3 ALTERNATIVES CONSIDERED

Substantive changes that have been made to this Final EIS since the publication of the Draft EIS are indicated with underlined text. This section is condensed from the Draft EIS. Refer to the Draft EIS or *Alternatives Retained for Detailed Study Concurrence Package* for more detailed information. Substantive changes that have been made in response to public or agency comments are indicated with double underlined text. Public comments and responses are in **Appendix G,** and agency comments and responses in **Appendix H**.

This chapter presents the 1) development of the alternative key elements and screening process, 2) Alternatives Retained for Detailed Study (ARDS) including the No-Build Alternative, 3) other components of the build alternatives, and 4) traffic analysis for the ARDS. Additional information related to alternatives development and screening to identify the ARDS is located in the *NOI APID* (November 2024).

3.1 Development of Alternative Key Elements and Screening Process

3.1.1 Study Limits

Any action evaluated under NEPA must have logical termini, which FHWA defines as 1) rational endpoints for a transportation improvement, and 2) rational end points for a review of the environmental impacts (FHWA, 1993). Per 23 CFR 771.111(f), 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.

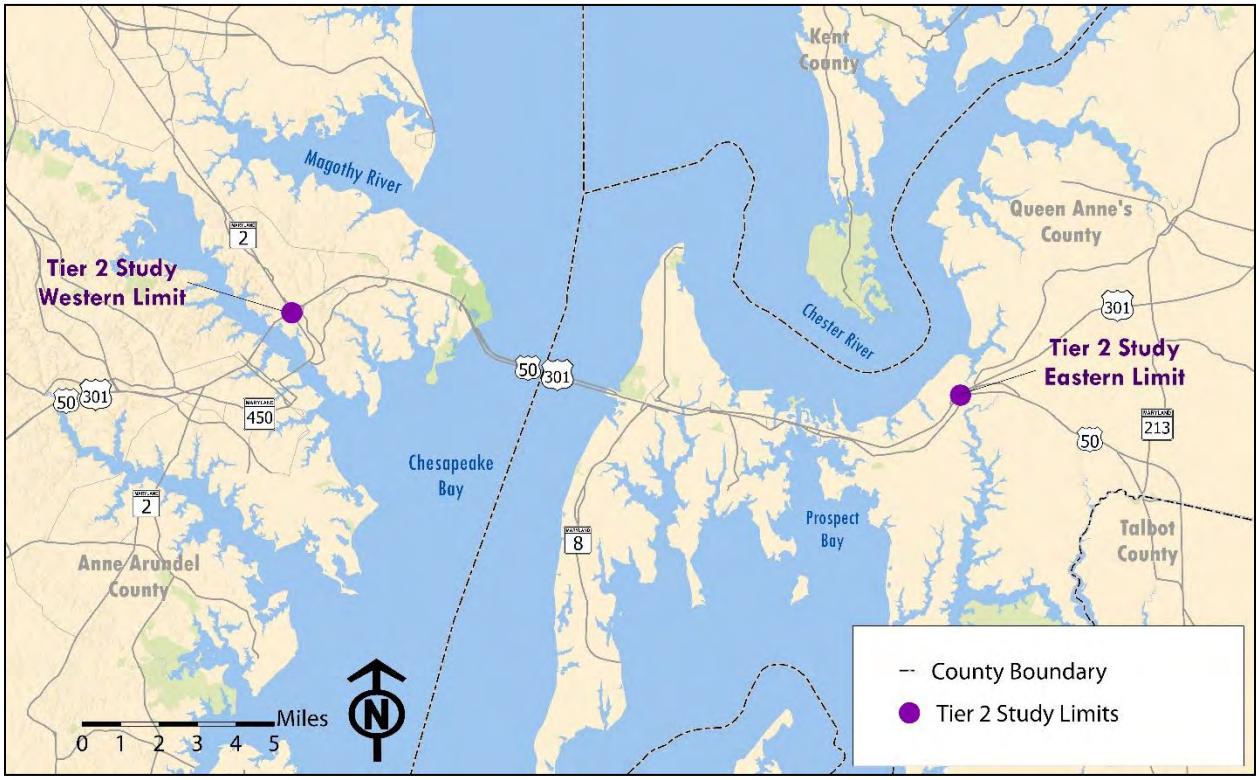
The Selected Corridor Alternative (Corridor 7) identified in the Tier 1 Study Final EIS/ROD was used as the basis to determine the Tier 2 Study limits along U.S. 50/301.

On the Western Shore, traffic data demonstrated 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. Approximately one-third of the traffic crossing the Bay Bridge traveling westbound exits from U.S. 50/301 onto the Broadneck Peninsula and approximately 55 to 71 percent of the traffic crossing the Severn River eastbound exits U.S. 50/301 onto the Broadneck Peninsula. Additionally, traffic volumes entering and exiting U.S. 50/301 at the MD 2/MD 450 interchange are more than twice the volume of any other interchange between the Bay Bridge and the Severn River Bridge. The MD 2/MD 450 interchange was therefore identified as the western limit of the Tier 2 Study. This interchange is also a rational end point for a comprehensive review of environmental impacts that would result from adding capacity across the Chesapeake Bay.

On the Eastern Shore, traffic data showed there is not a significant differential for eastbound or westbound traffic volume along the length of U.S. 50/301 between the Bay Bridge and the U.S. 50/301 split. 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. Thus, the eastern limit of the Tier 2 Study is the U.S. 50/301 split. **Figure 3-1** shows the Tier 2 Study Limits.

Figure 3-1: Study Limits



3.1.2 Key Elements

At the beginning of the alternatives development process, key elements were identified and studied individually. The key elements were critical components necessary to develop and evaluate reasonable alternatives and are graphically represented in **Figure 3-2** as puzzle pieces.

Figure 3-2: Key Elements of Alternatives



Each of the key elements had multiple options. For example, the existing bridge element had three options: remove both existing spans, maintain one existing span, and maintain both existing spans. After the options for each key element were identified, they were screened to determine which options would be reasonable to include in the ARDS. The project needs and objectives were used as screening criteria; options that did not address the needs and objectives were not included in the ARDS because they would not be able to address the project purpose and need. See **Chapter 2** for more details on the purpose and need.

This screening led to a reduced number of options considered for each key element. The reasonable

options from each key element were then combined to create the ARDS. A summary of the analysis completed for each key element was provided in Chapter 3 of the Draft EIS and additional detail on the screening of the options and the development of the ARDS is available in the *Notice of Intent* and *NOI APID* (November 2024).

3.1.2.1 Existing Bridge

The existing Bay Bridge consists of two spans: a two-lane span that carries eastbound traffic under normal conditions and a three-lane span that carries westbound traffic under normal conditions. The MDTA evaluated whether to remove both existing spans, keep one existing span, or keep both existing spans in the future should a build alternative be implemented. Keeping one or both existing spans was not considered reasonable and was not included in the ARDS.

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

3.1.2.2 Structure Type

Four options were considered for the proposed structure type to cross the Chesapeake Bay: full bridge (two spans); full tunnel; bridge-tunnel combination; and full bridge (double-decker). Additional detail is available in Appendix A[8] of the *Alternatives Retained for Detailed Study (ARDS) Concurrence Package.*[9] A full tunnel, bridge-tunnel combination, and full bridge (double-decker) were not considered reasonable and were not included in the ARDS.

A **full bridge (two spans)** was retained as a reasonable option because it would be designed to meet the Tier 2 Study's purpose and need. A full bridge with two spans would have a smaller environmental footprint compared to other options; would allow transport of hazardous materials across the Bay; and could include a shared-use path (SUP). Two spans would provide redundancy and more efficient maintenance of traffic during construction, incident management, and inspections; would have the ability to use the existing right-of-way with staged construction; would provide flexibility in spreading out funding needs; and would have a lower cost than the tunnel options.

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

Roadway alignments were evaluated for the U.S. 50/301 approaches to connect to a new crossing of the Chesapeake Bay, including the consideration of impacts to properties, environmental resources, and community resources on the Eastern and Western Shores and in the Chesapeake Bay. The analysis considered two options: maintaining the existing alignment along U.S. 50/301 or diverting to a new alignment either north or south of the existing roadway. An approach alignment that diverted to a new alignment was not considered reasonable and was not included in the ARDS.

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. The other

[8] https://www.baycrossingstudy.com/images/study_process/alternatives/Revised_AttachA-BCST2_Prop_ARDS_Screening_Summary_Doc-07.11.2025.pdf
[9] https://www.baycrossingstudy.com/images/study_process/alternatives/Revised_BCST2_ARDS_Post-Concurrence_Package_07.11.2025.pdf

purpose and need elements are not applicable to evaluating approach alignments because they pertain to the crossing itself. Maintaining the approach roadways on the existing alignment was considered reasonable because it would address the Tier 2 Study's purpose and need.

3.1.2.4 Number of Lanes

Several lane configuration options for the approach roads and the bridge were considered, including six lanes, eight lanes, ten lanes, and more than ten lanes. These lane totals were chosen based on the preliminary traffic analysis from the Tier 1 Study EIS and the need to provide additional roadway capacity.

The existing Bay Bridge has less traffic capacity than the approach roadways for several reasons that are described in **Section 3.5.2.3**. Consequently, some of the lane configurations include more lanes across the bridge than on the approach roads. The lane combinations evaluated included the following:

- **6-6-6:** 6 lanes on Western Shore, 6 lanes on crossing, and 6 lanes on Eastern Shore
- **6-8-6:** 6 lanes on Western Shore, 8 lanes on crossing, and 6 lanes on Eastern Shore
- **8-8-8:** 8 lanes on Western Shore, 8 lanes on crossing, and 8 lanes on Eastern Shore
- **8-10-8:** 8 lanes on Western Shore, 10 lanes on crossing, and 8 lanes on Eastern Shore
- **10-10-10:** 10 lanes on Western Shore, 10 lanes on crossing, and 10 lanes on Eastern Shore

The preliminary traffic analysis indicated that the 6-8-6, 8-8-8, and 8-10-8 lane combination options would perform well at the bridge with 2045 build traffic volumes; therefore, they were considered reasonable and included in the ARDS. More than ten lanes, the 6-6-6, and the 10-10-10 lane configurations were not considered reasonable and were not included in the ARDS.

3.1.2.5 Structure Location

Four main crossing location options were considered for a potential new Bay Crossing facility: north, south, fully in-between, and far south. The fully north, fully south, fully in-between, and far south bridge locations were not considered reasonable and were not included in the ARDS.

The two options included in the ARDS were the **north bridge location** consisting of one span to the north of the existing bridge and one span in between the existing spans, and the **south bridge location** consisting of one span to the south of the existing bridge and one span in between the existing spans.

Several other bridge locations were studied as part of the Section 4(f) avoidance and minimization analysis. A description of these alternatives and justification for why they were not included in the ARDS are located in in Sections 5 and 6 of the *Final Section 4(f) Evaluation* (**Appendix E**).

3.1.2.6 Transit

The MDTA considered multiple transit options, including ferry service, high-capacity transit (rail and bus rapid transit [BRT]), and enhanced bus service, in combination with the build alternatives. Currently, there are no existing ferries, high-capacity bus, or rail transit options across the Chesapeake Bay. Existing transit service is limited to bus service encompassing one deviated fixed route that crosses the bridge three times per day in each direction operated by QAC Ride and three commuter bus routes that cross the bridge during weekday peak periods only (one to/from Baltimore and two to/from Washington, D.C., operated by the MTA). While there are few existing transit options between the Eastern Shore and the rest of Maryland, the MTA *Maryland*

Statewide Transit Plan recognized that improved transit connections would help Eastern Shore residents and visitors travel to/from the State's major metropolitan areas.[10]

Enhancements to bus service were considered reasonable and could include expanded bus service and/or transit priority treatments. Potential bus service enhancements may include additions to the QAC Ride local bus service; MTA Commuter Bus service; or the establishment of new or expanded intercity service, resulting in additional operational and equipment costs and maintenance demands. Potential bus transit priority treatments may include dedicated transit lanes, bus-on-shoulder operations, and queue jump lanes. Enhanced bus service would be a more cost-effective way to address the study's reliable travel times and mobility needs with fewer environmental impacts than the other transit options; therefore, it would better meet the environmental responsibility and cost and financial responsibility objectives. The option would be reasonable and was included in the ARDS under the title "Transit-Related Improvements" and considered in connection with transportation systems management (TSM) and transportation demand management (TDM) options, as discussed in **Section 3.1.2.7**.

Ferry service and high-capacity transit (rail and BRT) were not considered reasonable and were not included in the ARDS.

3.1.2.7 Transportation Systems Management/Transportation Demand Management (TSM/TDM)

The Tier 2 Study evaluated TSM and TDM options, in combination with build alternatives, including congestion pricing, ramp metering, park-and-ride facilities, interchange consolidation, express-local lanes, priced managed lanes, and part-time shoulder use (PTSU) lanes. Ramp metering, interchange consolidation, express-local lanes, priced managed lanes, and a combination of transit, TSM, and TDM were not considered reasonable and were not included in the ARDS.

Congestion pricing would use variable tolls to shift some peak period traffic to the off-peak period to reduce congestion and provide a more reliable trip.[11] It has the ability to initially address the Tier 2 Study's purpose and need; therefore, the option was considered reasonable and was included in the ARDS.

Expanded **park-and-ride facilities** could be an option used to encourage carpooling and bus use across a new bridge. Currently, there are three existing park-and-ride locations within the study area. 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. Because park-and-ride facilities could help reduce the number of vehicles crossing the bridge and would encourage shared mobility with fewer environmental impacts and lower costs compared to other TSM/TDM options, expansion of park-and-ride facilities was considered reasonable and was included in the ARDS under the title "Transit-Related Improvements" in **Section 3.3.3**.

Part-Time Shoulder Use (PTSU) Lanes would use the shoulder of a roadway or bridge 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

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

be a cost-effective solution where geometric clearances, visibility, and pavement requirements can meet roadway standards. PTSU lanes have the potential to address the need for adequate capacity, reliable travel times, and mobility, and address the environmental responsibility and cost and financial viability objectives. Therefore, the option would be reasonable and was included in the ARDS.

3.1.2.8 Pedestrian and Bicycle Shared-Use Path (SUP)

The Tier 2 Study considered the safe inclusion of an SUP option in combination with other build alternatives. An SUP option across a new Bay Bridge would be a two-way pedestrian and bicycle facility that would be part of a new bridge structure and would be 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. The primary purpose of the facility would be for recreational activities, but an SUP that extends across the full length of the Bay could be used for commuting purposes as well. The inclusion of an SUP has received strong interest from the public, and it would address the study's mobility need; therefore, it was included in the ARDS as optional, if financial considerations allow.

3.1.2.9 Summary of Key Elements

The build alternatives include one of the options from each of the key elements listed in **Table 3-1**. The items that are shaded gray and in brackets were not considered reasonable because they did not meet the Tier 2 Study's purpose and need and were not included in the ARDS.

Table 3-1: Summary of Options for the Key Elements[1]

<table>
<tr><th>Existing Bridge</th><th>Structure Type</th><th>Approach Alignment Relative to Existing U.S. 50/301</th><th>Number of Lanes</th><th>Structure Location</th><th>Transit</th><th>TSM/TDM[2]</th><th>Shared-Use Path</th></tr>
<tr><td rowspan="2">[Maintain One Existing Span and Add New Spans]</td><td>Full Bridge</td><td rowspan="3">Existing Approach Alignment</td><td>[6-6-6]</td><td>North Bridge Location</td><td>[Ferry]</td><td>Congestion Pricing</td><td rowspan="6">Optional Shared-Use Pedestrian and Bicycle Path on Bridge</td></tr>
<tr><td rowspan="2">[Full Tunnel]</td><td>6-8-6</td><td rowspan="2">South Bridge Location</td><td rowspan="2">[High-Capacity Transit: Rail]</td><td>[Ramp Metering]</td></tr>
<tr><td rowspan="2">[Maintain Both Existing Spans and Add New Spans]</td><td>8-8-8</td><td>Park-and-Ride</td></tr>
<tr><td>[Bridge-Tunnel Combo]</td><td rowspan="3">[New Approach Alignment]</td><td>8-10-8</td><td rowspan="2">Fully In Between Bridge Location</td><td rowspan="2">[High-Capacity Transit: BRT]</td><td>[Interchange Consolidation]</td></tr>
<tr><td>Replace Both Existing Spans</td><td>[Double-Decker Bridge]</td><td>[10-10-10]</td><td>[Express-Local System]</td></tr>
<tr><td colspan="3"></td><td>[More Than 10 Lanes]</td><td>[Far South Bridge Location]</td><td>Bus Service Improve-ments</td><td>[Price Managed Lanes]</td></tr>
<tr><td colspan="7"></td><td>Part-Time Shoulder Use (PTSU)</td></tr>
</table>

[1] The bracketed text and gray shading are options that were not considered reasonable and were not included in the ARDS.

[2] The unshaded TSM/TDM boxes could all be included in the alternatives.

3.2 Alternatives Retained for Detailed Study (ARDS)

The MDTA identified seven alternatives, including the No-Build Alternative and six build alternatives. The alternatives were formed from the key elements that were considered reasonable and provided a reasonable range of alternatives. The six build alternatives are based on the number of lanes provided across the new bridge, the number of lanes on the approach roadways, and the bridge location. The ARDS were originally presented in the *NOI APID* and developed in coordination with cooperating and participating agencies, who reviewed and concurred with the ARDS on March 31, 2025. The ARDS were also presented in the Draft EIS.

For each of the build alternatives, the MDTA proposes to replace the existing two Bay Bridge spans with a new two-span bridge over the Chesapeake Bay; the existing spans would be removed. The build alternatives also include the following components: an optional pedestrian/bicycle SUP (if financial considerations allow), tolling, transit-related improvements, TSM/TDM, stormwater management (SWM), utilities, and a truck weigh and inspection stations (TWIS) as described in **Section 3.3**. Alternative A (No-Build Alternative) serves a baseline for comparison to the build alternatives. The six build alternatives are:

- 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

Several other alternatives were studied as part of the Section 4(f) avoidance and minimization analysis. A description of these alternatives and justification for why they were not included in the ARDS are located in in Sections 5 and 6 of the *Final Section 4(f) Evaluation* (**Appendix E**).

3.2.1 Design Considerations

Preliminary design was completed on the ARDS using AASHTO, MDTA, and SHA design standards. A design speed of 60 miles per hour (mph) was used on the U.S. 50/301 approaches and the Bay Bridge. For the approach roads on all build alternatives, the lane and shoulder widths would be 12 feet, and the median widths would vary. On the bridge, the lanes and median/inside shoulder width would be 12 feet, and the outside shoulder width would be 14 feet. If included, the optional SUP across the bridge would be 10 feet wide with 2-foot-wide offsets to the vertical barriers on both sides.

The maximum grade on the bridge would be 3.0 percent. The bridge would have a vertical navigational clearance of 230 feet over the 1,500-foot-wide main navigation channel, as established by the USCG in a PNCD issued November 28, 2025. The bridge would also maintain the vertical navigational clearance over the existing secondary channel located east of the main shipping channel. Several types of pier protection systems were considered for the new Bay Bridge including dolphins, pier islands, and fender systems; the pier protection system will be selected during final design.

The proposed new bridge spans would be longer than the existing bridge spans for all build alternatives. On the Western Shore, the bridge limits are further inland to accommodate vertical

clearance requirements over the main navigational channel and Mezick Pond. On the Eastern Shore, the bridge limits are further inland because more space is required to maintain traffic on the existing bridges during construction. For Alternatives B, D, and F, the bridge spans would extend approximately 700 feet west of the existing bridge abutment on the Western Shore and approximately 580 feet east of the existing bridge abutment on the Eastern Shore. For Alternatives C, E, and G, the bridge spans would extend approximately 50 feet west of the existing bridge abutment on the Western Shore and approximately 560 feet east of the existing bridge abutment on the Eastern Shore.

The MDTA will continue to evaluate the ability to provide shared bridge foundations for the two new spans as a method for minimizing the duration and extent of proposed impacts to the Bay. The design of the new structures will focus on durable, resilient bridge materials, a prescribed design life, and reduced lifecycle costs. This may include, but is not limited to, high performance concrete, corrosion-resistant steel, minimizing the number of joints on the bridge, preventing water intrusion, and regular monitoring and maintenance.

The roadside design would include a linear SWM swale to provide water quantity and quality treatment, where feasible. Where the swale would cause impacts to sensitive resources, a narrower roadside section would be used without the SWM swale. Where this roadside section would still cause impacts to sensitive resources, a retaining wall would be used to further reduce impacts of roadside grading. Typical sections and schematic lane configurations are shown in **Figures 3-3** through **3-8**.

3.2.2 Alternative A: 6-5-6 (No-Build)

The No-Build Alternative ("no-action alternative") 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. Alternative A would include regular maintenance of the Bay Bridge and U.S. 50/301, but no capital improvements other than currently planned and programmed projects. The MDTA continually seeks to optimize traffic operations on the Bay Bridge and its approach roadways and works with both state and local agencies to advance those efforts, including traffic enforcement and incident management. These efforts will continue into the future regardless of whether a new Bay Bridge is built or not; however, they will not address the congestion challenges on their own. Alternative A would not address the Tier 2 Study's purpose and need but has been retained as a baseline for comparison with the build alternatives.

3.2.3 Alternative B: 6-8-6 North

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 Chesapeake Bay (four per direction); and six lanes along U.S. 50/301 on the Eastern Shore (three per direction). **Figure 3-3** shows the typical sections and **Figure 3-6** provides the alignment location for the 8.3-mile-long alternative. Alternative B 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. Alternative B would have one bridge span north of the existing spans and one bridge span in between the existing bridge spans.

On the Western Shore, the transition from the existing six lanes to eight lanes near the bridge would occur west of Oceanic Drive in both directions. On the Eastern Shore, the transition from eight lanes to the existing six lanes would occur east of Cox Creek in both directions.

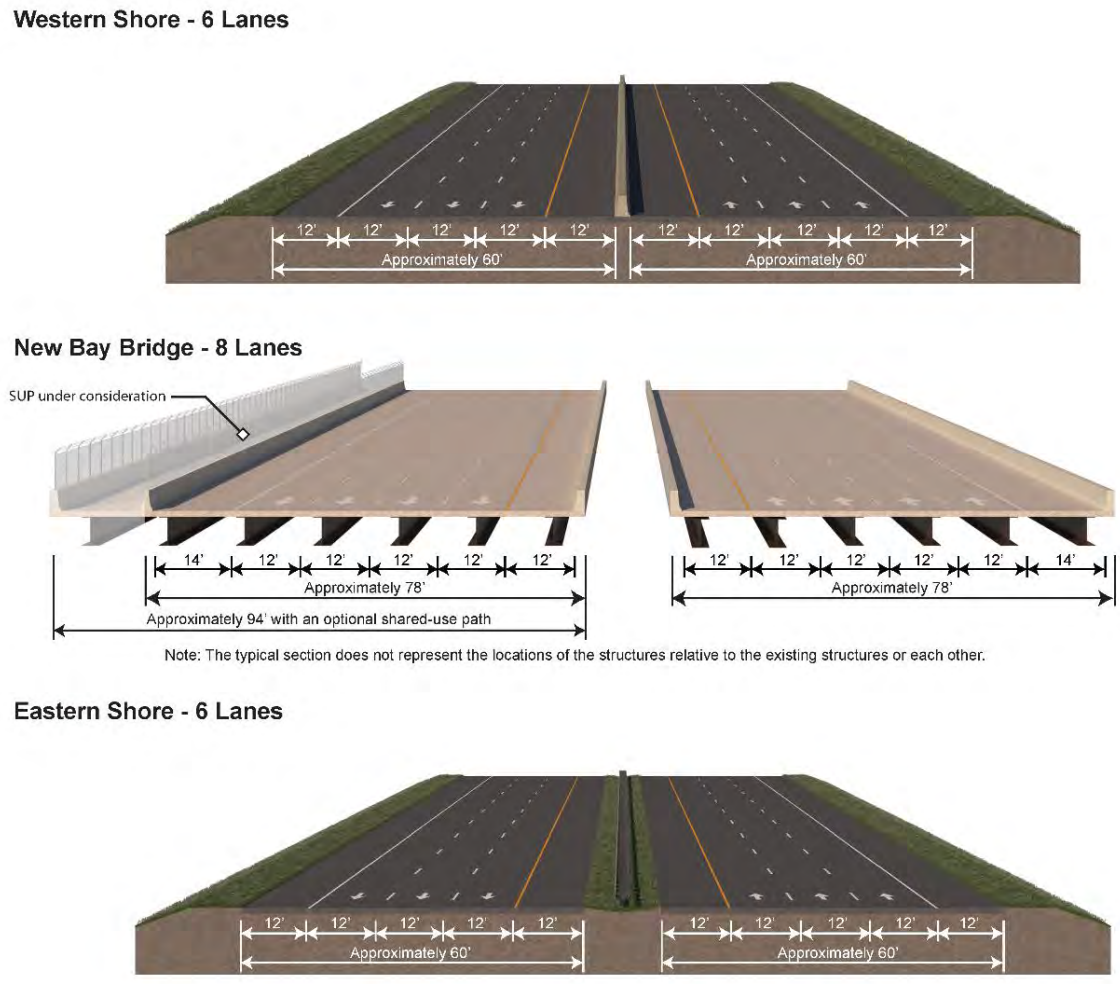
Alternative B would include modifications to several interchanges and bridges. The interchange ramps at Oceanic Drive, MD 8, and Thompson Creek Road/Duke Street would include minor adjustments to connect to the widened highway. The bridge over Cox Creek would require widening as part of Alternative B, but no crossroad bridges would require reconstruction.

3.2.4 Alternative C: 6-8-6 South

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 Chesapeake Bay (four per direction); and six lanes along U.S.50/301 on the Eastern Shore (three per direction), see **Figure 3-3** for typical sections. Alternative C 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. Alternative C would have one bridge span south of the existing spans and one bridge span in between the existing bridge spans.

On the Western Shore, the transition from the existing six lanes to eight lanes approaching the bridge would occur west of Oceanic Drive in both directions, as shown in **Figure 3-6**. On the Eastern Shore, the transition from eight lanes to the six existing lanes would occur east of Cox Creek in both directions. Alternative C would be 8.3 miles long.

Figure 3-3: Alternatives B and C (6-8-6) Typical Sections for U.S. 50/301



Alternative C would include modifications to several interchanges and bridges. The interchange ramps at Oceanic Drive, MD 8, and Thompson Creek Road/Duke Street would include minor modifications to connect to the widened highway. The bridge over Cox Creek would require widening as part of Alternative C, but no crossroad bridges would require reconstruction.

3.2.5 Alternative D: 8-8-8 North

Alternative D (8-8-8 North) would consist of eight lanes (four per direction) along the entire length of the study limits including U.S. 50/301 on the Western Shore, the Bay Bridge, and U.S. 50/301 on the Eastern Shore. Alternative D 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, see **Figure 3-4**. 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. The transition from the existing six lanes to eight lanes would occur at the MD 2/MD 450 interchange in both directions, as shown in **Figure 3-7**, providing a 20.4-mile-long alternative. On the Eastern Shore, widening would occur toward the inside in both directions, and then to the outside where there is not sufficient space in the median for the full typical section. The transition from eight lanes to the existing six lanes would occur through the U.S. 50/301 interchange in both directions.

Alternative D 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. Alternative D would have one bridge span north of the existing spans and one bridge span in between the existing bridge spans.

Alternative D would include modifications to several interchanges and bridges. The following interchange ramps would include minor modifications to connect to the widened highway: MD 2/MD 450, MD 648, Whitehall Road, Oceanic Drive, MD 8, Thompson Creek Road/Duke Street, Cox Neck Road/Castle Marina Road, Dominion Road/Chester Station Lane, S Piney Road/Piney Creek Road, Dundee Avenue, MD 18/Piney Narrows Road, Kent Narrows Road, MD 18/Jackson Creek Road, Station Lane/VFW Avenue, Evans Avenue/Winchester Creek Road, Hess Road/Hissey Road, Nesbit Road, and the U.S. 50/301 split. Several interchanges would require full reconstruction, including reconstruction of the crossroad bridge at Bay Dale Drive, MD 179, and Chester River Beach Road. As part of Alternative D, several U.S. 50/301 bridges would need to be reconstructed over the following major water crossings: Cox Creek, Piney Creek, and Kent Narrows.

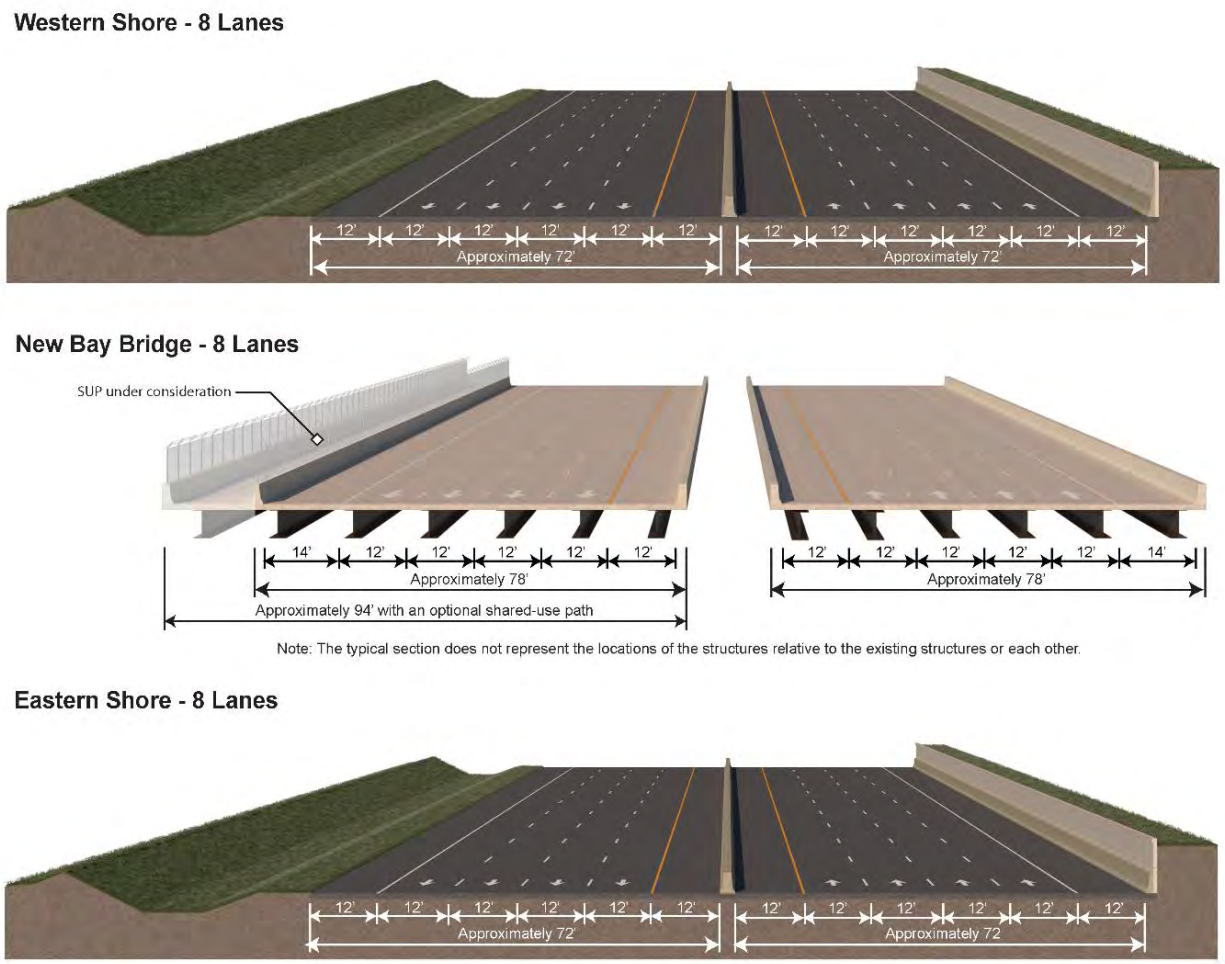
3.2.6 Alternative E: 8-8-8 South

Alternative E (8-8-8 South) would consist of eight lanes (four per direction) along the entire length of the study limits including U.S. 50/301 on the Western Shore, the Bay Bridge, and U.S. 50/301 on the Eastern Shore. Alternative E 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, see **Figure 3-4**. 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. The transition from the existing six lanes to eight lanes would occur at the MD 2/MD 450 interchange in both directions, as shown in **Figure 3-7**. 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. The transition from eight lanes to the existing six lanes would occur through the U.S. 50/301 interchange in both directions providing a 20.4-mile-long alternative.

Alternative E 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. Alternative E would have one bridge span south of the existing spans and one bridge span in-between the existing spans.

Alternative E would include the same modifications to interchanges and bridges as Alternative D, described in **Section 3.2.5**.

Figure 3-4: Alternatives D and E (8-8-8) Typical Sections for U.S. 50/301



3.2.7 Alternative F: 8-10-8 North

Alternative F (8-10-8 North) would consist of eight lanes (four per direction) along U.S. 50/301 on the Western Shore, ten lanes (five per direction) on the Bay Bridge, and eight lanes (four per direction) along U.S. 50/301 on the Eastern Shore. As shown in **Figure 3-5**, Alternative F 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. It 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. Alternative F would have one bridge span north of the existing spans and one bridge span in between the existing bridge spans.

On the Western Shore, widening would occur to the outside in both directions. The transition from the existing six lanes to eight lanes would occur at the MD 2/MD 450 interchange in both directions, as shown in **Figure 3-8**, resulting in a 20.4-mile-long alternative. The transition from eight lanes to ten lanes would occur west of Oceanic Drive 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. The transition from ten lanes to eight lanes would occur east of Cox Creek in both directions. The transition from eight lanes to the existing six lanes would occur through the U.S. 50/301 interchange in both directions.

Alternative F would include the same modifications to interchanges and bridges as Alternative D, described in **Section 3.2.5**, with the exception of the MD 8 interchange that would be reconstructed under Alternative F.

3.2.8 Alternative G: 8-10-8 South

Alternative G (8-10-8 South) would consist of eight lanes (four per direction) along U.S. 50/301 on the Western Shore, ten lanes (five per direction) on the Bay Bridge, and eight lanes (four per direction) along U.S. 50/301 on the Eastern Shore. As shown in **Figure 3-5**, Alternative G 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. It 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. Alternative G would have one bridge span south of the existing spans and one bridge span in-between the existing spans.

On the Western Shore, widening would occur to the outside in both directions. The transition from the existing six lanes to eight lanes would occur at the MD 2/MD 450 interchange in both directions, as shown in **Figure 3-8**, resulting in a 20.4-mile-long alternative. The transition from eight lanes to the ten lanes would occur west of Oceanic Drive 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. The transition from ten lanes to eight lanes would occur east of Cox Creek in both directions. The transition from eight lanes to the existing six lanes would occur through the U.S. 50/301 interchange in both directions.

Alternative G would include the same modifications to interchanges and bridges as Alternative D, described in **Section 3.2.5**, with the exception of the MD 8 interchange that would be reconstructed under Alternative G.

Figure 3-5: Alternatives F and G (8-10-8) Typical Sections for U.S. 50/301

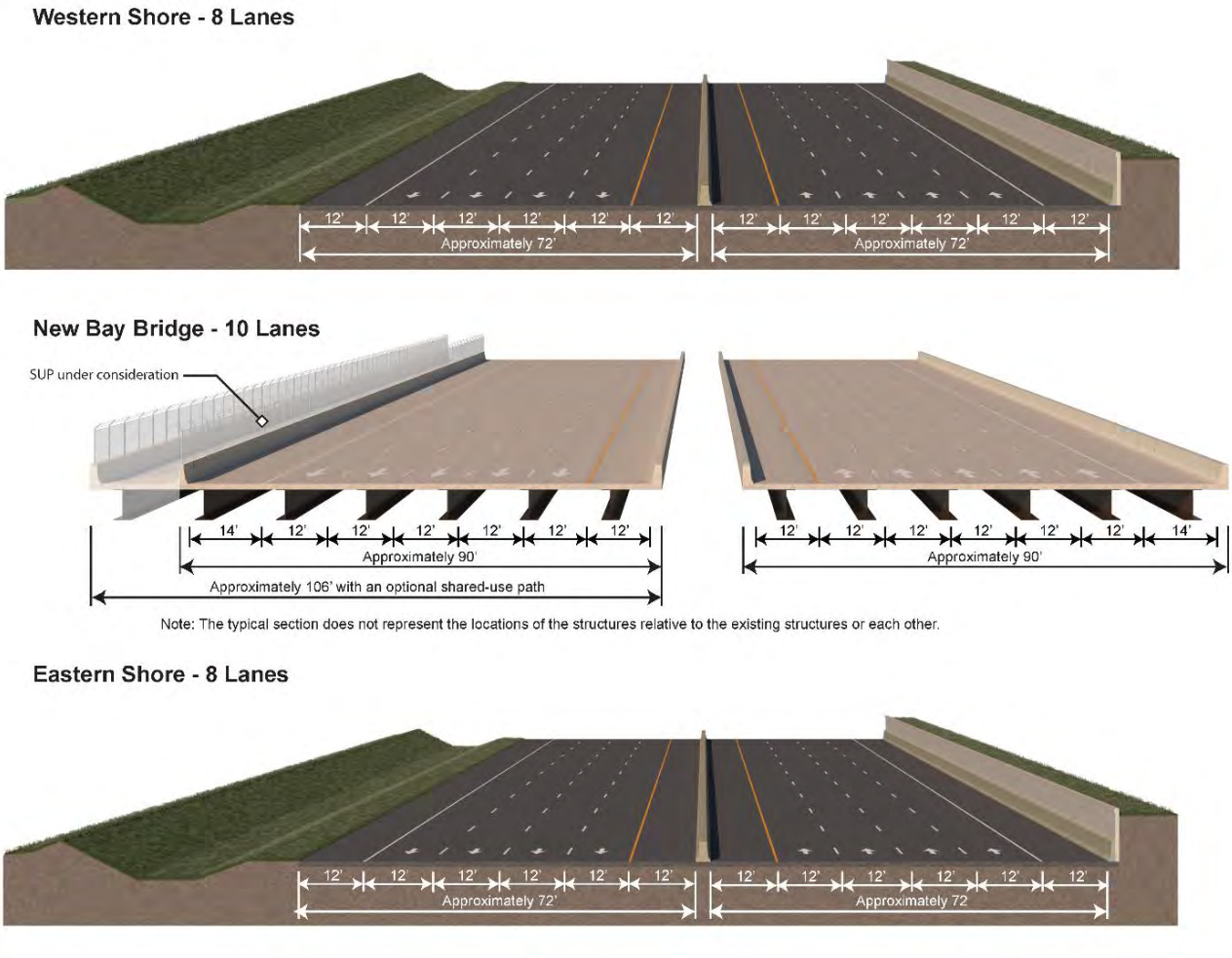


Figure 3-6: Alternatives B and C

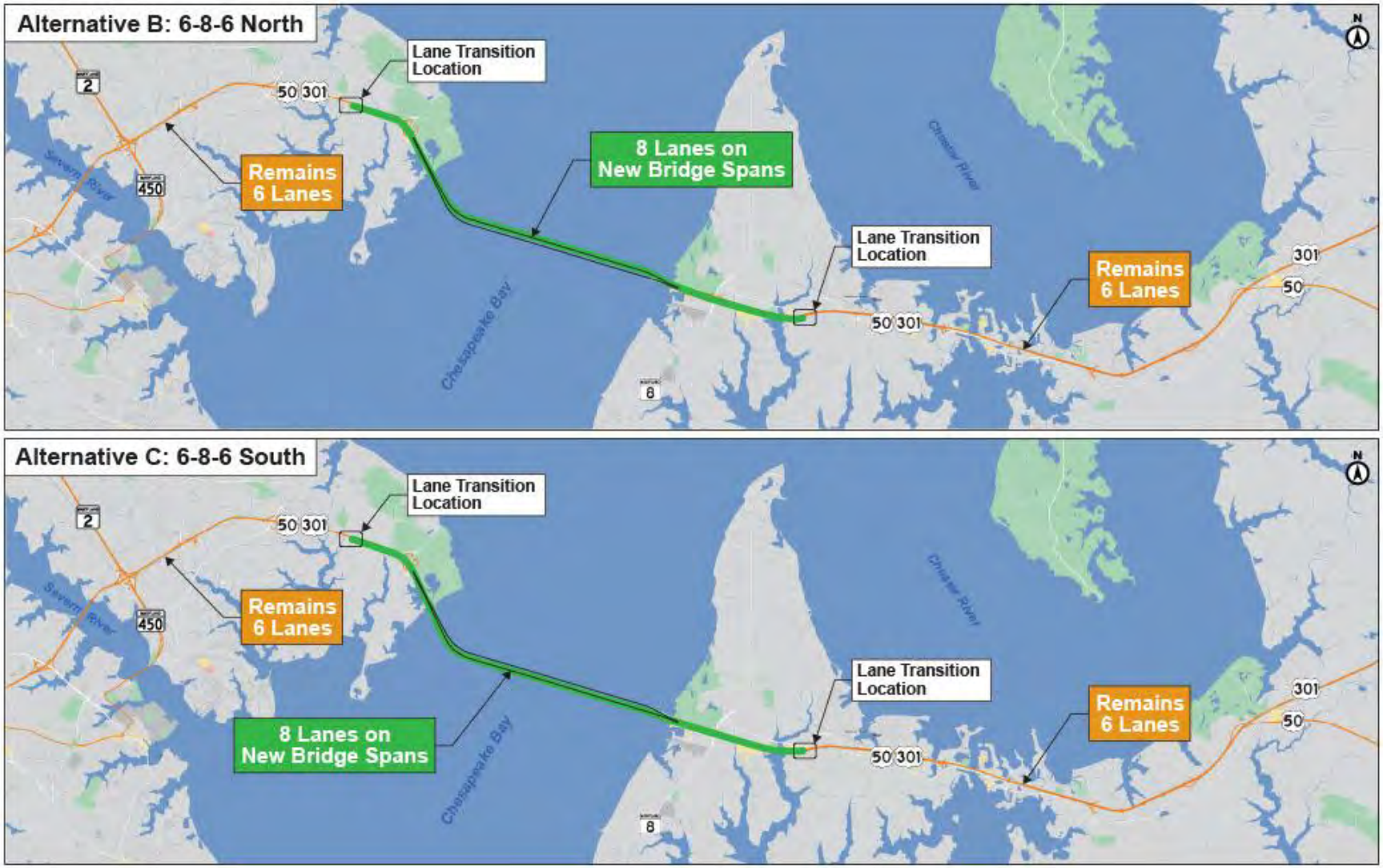


Figure 3-7: Alternatives D and E

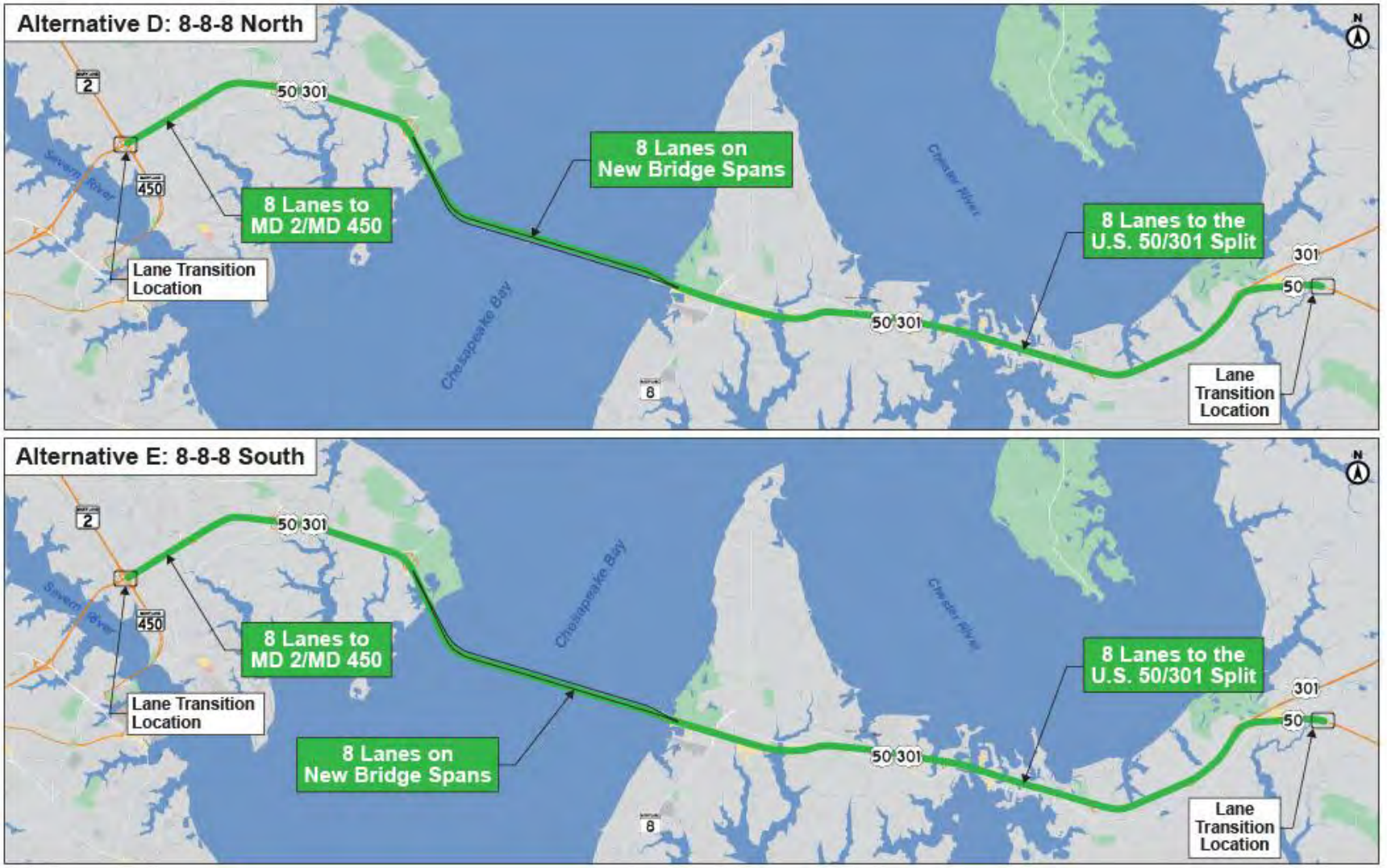


Figure 3-8: Alternatives F and G



3.3 Other Components of the Build Alternatives

In addition to the number of lanes and location of the build alternatives described in the prior section, there are other components that would be included in the build alternatives. These components would differ based on the needs of the build alternative (e.g., amount of SWM needed would depend on the amount of new impervious surface), but they would be included as part of each build alternative. The components include an optional pedestrian / bicycle SUP, tolling, transit-related improvements, TSM/TDM, SWM, utilities, and TWIS. Additionally, the items included in the limits of disturbance (LOD) are described at the end of this section.

3.3.1 Optional Pedestrian and Bicycle Shared-Use Path (SUP)

The safe inclusion of an SUP on a new Bay Bridge is being considered. An SUP would provide connectivity for pedestrians and bicyclists between the Eastern and Western Shores, allowing these types of users to cross the Chesapeake Bay. An SUP across a new Bay Bridge would be a two-way facility on a new bridge structure that would be separated from the adjacent travel lanes by a physical barrier. It would facilitate connections to adjacent trails, parks, or parking facilities on both shores. The MDTA has initiated coordination with MDNR, Anne Arundel County, and Queen Anne's County regarding these connections; refer to MDNR correspondence in **Appendix C** for their input on the SUP connections. The MDTA would provide the pedestrian and bicycle facilities adjacent to U.S. 50/301 from Oceanic Drive to MD 8. Trail connections beyond Oceanic Drive and MD 8 would be determined by the responsible county or state agency.

After approval of the Final EIS/ROD, the MDTA will perform financial analysis and determine whether the implementation of an SUP will be financially feasible. If the SUP is included, additional coordination would occur among local, state, and Federal agencies regarding connections, parking, maintenance, and other features, as well as consistency with local pedestrian and bicycle plans, the 2025 Maryland State Transportation Trails Strategic Plan, and MDOT's Complete Streets Policy.

On the Western Shore, there is not an existing trail near the west approach of the Bay Bridge. However, the Broadneck Peninsula Trail that is located northwest of the Bay Bridge is currently under construction to be extended to Oceanic Drive and South Beach Road leading into Sandy Point State Park. On the Eastern Shore, the Cross Island Trail begins at the parking lot of Terrapin Nature Park and extends east toward MD 8 and across Kent Island toward Grasonville. The oyster chaff walking trail within Terrapin Nature Park is located near the Bay Bridge's eastern approach.

Based on the evaluation of potential SUP connections to existing pedestrian and bicycle facilities (see Section 3.3.1 in the Draft EIS), the preferred SUP location would be along the westbound span on the north side of the Bay Bridge because it would place the path users closer to the existing trail connections on both shores. The optional SUP alignment is shown on the mapping in **Appendix A-1**.

An SUP location along the eastbound span on the south side of the Bay Bridge is not preferred because it would require pedestrians and bicyclists to travel along Old Ferry Slip Road, where large trucks would be traveling from the TWIS back to U.S. 50/301, or on the Eastern Shore, along Pier 1 Road, which would have large vehicles accessing the marina.

On the Western Shore, along the westbound span, the preferred connection would extend to Oceanic Drive. The MDTA coordinated with MDNR (see **Appendix C**), who stated that the

connection into Sandy Point State Park was not preferred because it would bring all path users through the heart of the park, near the beach, and would result in the placement of a short bridge with height limitations over Mezick Pond. On the Eastern Shore, the preferred connection would extend to MD 8. The connection into Terrapin Nature Park was not preferred because it would bring all path users into a tranquil nature park on a trail made of crushed oyster chaff. The preferred connections to Oceanic Drive and MD 8 would result in impacts to the edges of both Sandy Point State Park and Terrapin Nature Park; however, they would avoid permanent impacts to the Mezick Pond entrance.

The impacts that would be caused by the SUP were quantified based on an assumed location along the north side of the westbound bridge span and end points at Oceanic Drive and MD 8. Additionally, the environmental impacts of the alternatives were quantified with and without the SUP.

3.3.2 Tolling

The MDTA owns and operates the Bay Bridge and uses tolls from its eight facilities to maintain and operate all their facilities. The Bay Bridge will continue to be a tolled facility and the MDTA will continue to manage it and the toll rates to address current and future traffic and associated congestion. An operational management strategy that could be used is congestion pricing.

3.3.3 Transit-related Improvements

Transit-related improvements would be made through a financial commitment from the MDTA by providing a one-time investment for local transit agencies near the Bay Bridge. The same commitment would be made for all build alternatives and would not be used to differentiate between alternatives.

All transit-related opportunities would be determined in the future, closer to the time of construction. The MDTA would coordinate with MTA, local governments, and local transit agencies to help them determine the opportunities. However, these agencies would determine the transit-related improvements that would be most beneficial for them at that time, and they would be separate and distinct projects from the Bay Crossing.

The following are some examples of potential improvements that could be made with a financial commitment from the MDTA in the future:

- Marketing and branding services to encourage more use of transit options, particularly for connections between Anne Arundel County and Queen Anne's County.
- Vehicles for micro-transit services and/or paratransit services.
- Bus stop improvements and signage.
- Improvements to the Thompson Creek Road, Castle Marina Road, and Harry S. Truman (proposed Parole Transportation Center site) park-and-ride lots to facilitate multimodal connectivity, carpooling/vanpooling, safety, and efficient use of the lots, such as installation of defined pedestrian pathways within the lots; clear signage on the rules and regulations of the lot; wayfinding signage; trail connections; delineation of Kiss-and-Ride areas; electric vehicle (EV) charging stations and solar panels; enhanced covered bike facilities/bike pods; real-time parking space availability information; and pervious pavement systems.

- Construction of infrastructure, such as sidewalks, which support multimodal access to transit.
- Financial support for agencies to operate a transit service for a fixed value or period of time.

3.3.4 TSM/TDM Considerations

Two TSM/TDM improvements were considered with the retained build alternatives for potential implementation: congestion pricing and PTSU lanes.

The Bay Bridge will continue to be a tolled facility. Congestion pricing provides flexibility for toll management strategies, which the MDTA could use in the future to further reduce congestion and achieve transportation goals. Public input would be requested prior to the implementation of congestion pricing. See **Section 3.3.2** on Tolling.

The shoulders on the new bridge spans would be full width (12 and 14 feet wide) to accommodate future maintenance needs and incident management. Therefore, the shoulders would also be wide enough to accommodate a PTSU lane, which would be an operational management strategy that could be used for peak period vehicular operations or bus-on-shoulder operations. Additionally, PTSU could be used on the U.S. 50/301 approaches in the future if there is adequate width to accommodate a full-width paved shoulder. Although the build alternatives have been developed to accommodate PTSU, the operation of PTSU lanes is not being included as part of the build alternatives. Future implementation of PTSU is not precluded.

3.3.5 Stormwater Management (SWM)

A planning-level, conceptual SWM analysis was completed that identified the stormwater needs and potential treatment locations throughout the study area. The Maryland *Stormwater Management Act of 2007* established a comprehensive process for implementing Environmental Site Design (ESD)[12] to the Maximum Extent Practicable (MEP) during planning. It requires a proactive approach to SWM by focusing on multiple non-structural practices to reduce the need for traditional large-scale structural SWM infrastructure. Following the SWM Act of 2007 requirements, the treatment approach for this study emphasized integrating Best Management Practices (BMPs) into the roadway section to capture and treat runoff at the source.

The MDTA explored SWM treatment options to the MEP within the study area to provide water quality and quantity treatment as required under the SWM Act of 2007 and all subsequent updates to the Act. Additionally, the MDTA performed a preliminary hydrologic and hydraulic investigation of existing cross-highway culverts to identify locations where a culvert extension or increased capacity would be required. These culvert extensions are included in the LOD.

3.3.5.1 Methodology and Assumptions

The 2000 Maryland Stormwater Design Manual (Rev. May 2009) requires all projects to provide Water Quality Volume (WQv), Channel Protection Volume (Cpv), Recharge Volume (Rev), and Overbank Protection Volume or Quantity management (Qp); however, the Manual states that Cpv is not required for direct discharges to tidal waters. In addition, the study will need to meet the county requirements within their jurisdiction limits, including the latest updates at the time of

[12] The Act (codified at Title 4, Subtitle 2 of the Environment Article) defines ESD as "...using small-scale stormwater management practices, nonstructural techniques, and better site planning to mimic natural hydrologic runoff characteristics and minimize the impact of land development on water resources."

design. Anne Arundel County[13] will require a Qp based on the 100-year storm if it is determined historical flooding exists downstream of the study area. Queen Annes's County[14] may require measures beyond those specified in the 2000 Maryland Stormwater Design Manual (Rev. May 2009), quantity control measures if conditions warrant, or if flooding or stream channel erosion exists downstream from the study area. All new impervious area and 50 percent of the reconstructed impervious area within the build alternatives' LOD constitute the Impervious Area Requiring Treatment (IART). Reconstructed impervious area is defined as existing impervious area that is removed, exposing bare earth, before being repaved or repurposed.

Due to the proximity to the Chesapeake Bay, it was assumed most of the Points of Investigation (POIs) would fall within the Chesapeake Bay Critical Area. A conservative assumption was made when calculating the ESDv that Cpv treatment would not be waived by the Maryland Department of Natural Resources (MDNR) in the Critical Area. Within the study limits, 72 points were identified where concentrated runoff exits the state right-of-way, 39 locations within Anne Arundel County and 33 locations within Queen Anne's County. A detailed engineering evaluation of outfall conditions will be performed during final design and will comply with any and all updated SWM regulations.

3.3.5.2 Proposed Stormwater Management for the Build Alternatives

Six types of ESD BMP facilities were identified in the analysis: grass swales, wet swales, bio-swales, bioretention, submerged gravel wetlands, and alternative ESD treatment facilities such as underground vaults. The proposed preliminary SWM features are shown in **Appendix A-1**.

Preliminary SWM analysis indicated that providing adequate facilities to intercept and treat the IART would be the driving factor for the placement of proposed ESD BMPs.

SWM facilities were proposed to the MEP with an overall goal to avoid impacts to existing stream channels; wetlands and buffers; Section 4(f) and Section 106 resources; residences and businesses; and existing wetland mitigation sites. Linear SWM facilities were incorporated into the roadside design assuming grass/wet/bio-swales running parallel to the roadway, where feasible. Where the right-of-way width allowed, redundant facilities were proposed, e.g., a bioretention or submerged gravel wetland in the same POI as a swale to provide additional water quantity control storage volume. Where the LOD impacted an existing SWM facility, it was assumed the facility would be retrofit to provide water quality and quantity treatment. **Table 3-2** and **Table 3-3** summarize the required and provided ESDv and impervious area for the build alternatives.

[13] Anne Arundel County Stormwater Management Practices and Procedures Manual. Chapter 7.7 Extreme Flood Control (Q_f).

[14] Public Local Laws of Queen Anne's County. Chapter 14.1 Stormwater Management, Article III Stormwater Management Criteria, Section 14:4-14 Minimum Control Requirements.

Table 3-2: Required and Proposed Environmental Site Design (ESDv) per Build Alternative

Build Alternative	Required ESDv[1,2] (cubic feet [cf])	Proposed Surface Facilities – ESDv Credit (cf)	Proposed Alternative Facilities – ESDv Credit (cf)
Alternative B	1,042,000	252,000	790,000
Alternative C	1,061,000	252,000	809,000
Alternative D	2,012,000	1,168,000	844,000
Alternative E	1,967,000	1,174,000	793,000
Alternative F	2,156,000	1,163,000	993,000
Alternative G	2,138,000	1,173,000	965,000

[1] *ESDv calculated for the 1-year storm event.*
[2] *Additional water quantity treatment will be addressed per Anne Arundel County and Queen Anne's County requirements at each POI during final design.*

Table 3-3: Required and Proposed Impervious Areas Requiring Treatment (IART) per Build Alternative

Build Alternative	Impervious Area Requiring Quantity Treatment (ac)	Proposed Impervious Area Quantity Treatment Provided On-Site (ac)	Proposed Impervious Area Treatment Required Offsite (ac)
Alternative B	181	37	144
Alternative C	175	37	139
Alternative D	418	193	225
Alternative E	417	194	223
Alternative F	438	194	244
Alternative G	438	195	243

Due to the limited SWM treatment opportunities on-site, the MDTA will need to utilize alternative and off-site SWM mitigation treatment methods. Alternative SWM treatment methods could include underground facilities within the existing right-of-way, permeable pavement, and street cleaning operations. Off-site SWM treatment options could include the treatment of SHA-owned impervious area and County-owned impervious area, impervious area removal, stream channel stabilization, and shoreline stabilization. After approval of the Final EIS/ROD, the MDTA will perform additional SWM analysis for the Selected Alternative and complete a NEPA re-evaluation, as necessary, to assess changes to related environmental impacts.

3.3.6 Utilities

The study area along U.S. 50/301 contains public utilities including: potable water, sanitary sewer, natural gas, electric power/distribution, communications, and cable television. The build alternatives would impact some of these utilities that are in close proximity to U.S. 50/301 which would require a larger LOD and higher costs. These impacts were included to provide a more accurate LOD. The MDTA obtained record drawings, as-builts, and/or field verifications for existing and planned utilities from utility owners including, AT&T, BGE, Comcast, Crown Castle, Fiberlight, Lumen, Qwest, Verizon, Zayo, Breezeline, Choptank Electric, Delmarva Power, Talkie Communications, Anne Arundel County Department of Public Works, and Queen Anne's County Department of Public Works.

The utility facilities primarily run along service roads including a 48-inch trunk sewer north of U.S. 50/301 on the Western Shore that serves a large portion of Anne Arundel County. The

majority of the approximately 78 utility crossings are near major intersections/interchanges. There are also electric and telecommunication lines on the existing bridge spans that would need to be replaced. Additionally, several utilities may need to be encased or relocated, including natural gas, potable water, sanitary sewer, electric, communication/cable lines, and utility poles.

3.3.7 Truck Weigh and Inspection Stations (TWIS)

There are two existing TWIS along U.S. 50/301 between Oceanic Drive and the Bay Bridge, one in each direction. In the eastbound direction, the existing facility has a single scale and can store approximately 12 trucks waiting to enter the scale, off the highway. There is also space beyond the scale and along Old Ferry Slip Road for trucks to park that need additional inspections, repairs, or off-loading prior to re-entering U.S. 50/301. The existing facility would be reconfigured to accommodate the changing approach to the Bay Bridge. The eastbound TWIS would be upgraded to facilitate increased truck capacity; allow for a second scale or bypass lane; and improve overall access to U.S. 50/301 and interaction with the mainline traffic. Multiple conceptual TWIS configurations were developed to identify the right-of-way area required for the circulation and operation. The LOD for all build alternatives included the same modified eastbound TWIS in this area.

In the westbound direction, there is a single existing scale, west of the MDTA office facility on the Western Shore that can accommodate approximately three trucks. The existing lane striping would be adjusted to accommodate the changing departure from the Bay Bridge. The MDTA would prefer to have a TWIS on the Eastern Shore to inspect westbound trucks before they travel over the bridge; however, a potential site on the Eastern Shore has not yet been identified. The location for the westbound TWIS will be identified during final design. After approval of the Final EIS/ROD, the MDTA will perform additional analysis on the TWIS and complete a NEPA re-evaluation, as necessary, to assess changes to related environmental impacts.

3.3.8 Limits of Disturbance (LOD)

The LOD is the proposed boundary that would include all construction, erosion and sediment control (ESC), SWM, and right-of-way offsets. The LOD for the build alternatives were developed from the proposed horizontal and vertical geometry, typical sections, roadside design, and proposed interchange modifications. The LOD associated with each build alternative were used to calculate the environmental impacts presented in detail in **Chapter 5**, and included the following elements:

- Construction of two new Bay Bridge spans and demolition of existing Bay Bridge spans;
- Area assumed for reconstruction of U.S. 50/301 mainline bridges over water and other roadways, including the Kent Narrows Bridge;
- Area assumed for on-land construction activities such as roadway widening, roadside grading, retaining walls, clearing, landscaping, drainage, noise barrier replacement/ construction, maintenance of traffic, and utility relocations;
- Area assumed for profile adjustments and roadway shifts due to mainline widening and alignment shifts for the new Bay Bridge spans;
- Roads that cross over U.S. 50/301 including frontage roads and interchange ramps (relocation, reconfiguration, and tie-ins);
- Eastbound truck weigh station reconstruction;
- Utility impacts and relocations;

- On-site SWM, including swales, ponds, and large facilities along the roadside and within interchanges;
- Impact avoidance and minimization of adjacent land uses such as residences, businesses, parks, historic properties, streams, and wetlands; and
- Area required for dredging to accommodate a minimum depth of nine feet for barges and similar construction vessels. The dredged material is anticipated to be transported by barge to an approved and permitted dredged material containment facility (DMCF) or dredged material placement site, see **Section 5.5.5.2**.

The LOD includes some areas for construction staging and storage of materials along the corridor, primarily near the bridges and interchanges. Other off-site staging areas may be identified by the contractor prior to construction.

3.3.9 Construction

Construction assumptions are based on the current preliminary design considerations for the build alternatives and the best available information from similar bridge projects including the Francis Scott Key Bridge, Tappan Zee (Cuomo) Bridge, and Nice-Middleton Bridge. The MDTA developed a preliminary construction duration with two general activities: construction of two new spans and demolition of the two existing spans, as follows.

- Construct first bridge span plus approach roads: years 1 to 5;
- Demolish first bridge span: years 6 to 7;
- Construct second bridge span plus approach roads: years 7 to 13; and
- Demolish second bridge span: years 14 to 15.

The MDTA is currently considering a cable-stayed or suspension bridge for the main span over the navigation channel and a tied arch bridge for the secondary channel for the purpose of this EIS. Multiple span lengths and foundation types would be considered for the other structures approaching the main span. The piers near the navigation channels would have a collision protection system. Construction would include any dredging necessary to create access channels to support both demolition and construction activities. The dredging would extend to an assumed target depth of nine feet below the mean low water (MLW) level and to a width necessary to facilitate equipment mobility, loading and unloading material barges, and erecting structures. Temporary trestles would be used where water depths are less than 10 feet for construction access to facilitate pier placement for the new bridge within the dredged area, to load and unload materials and equipment, as well as demolition activities. Other temporary construction methods could include cofferdams and other dewatering devices for pile driving. Demolition of parts of the existing bridges' superstructures and piers is assumed to occur using blasting, as needed. Marine cranes affixed to barges would be used where water depths are greater than 10 feet to perform demolition activities.

3.4 Cost Analysis

The Bay Bridge is a critical link in the Maryland transportation network, being the only crossing of the Chesapeake Bay in the state. The cost of a new Bay Bridge would be an important investment for the future of Maryland and likely the most expensive transportation project in the state's history.

Therefore, in addition to addressing transportation needs and minimizing environmental impacts, the MDTA is committed to delivering a financially responsible solution to the challenges in the

study area. To evaluate financial responsibility, the MDTA has estimated the costs of the build alternatives and the long-term financial implications of Alternative A (No-Build).

Preliminary design and construction cost estimates were prepared for each build alternative at a planning level using the major quantities method of estimation in accordance with the MDTA cost estimating guidelines and the MDOT SHA 2022 *Highway Construction Cost Estimating Manual*. Where available, quantities for roadway work were obtained and appropriate contingencies were added. The cost estimates in **Table 3-4** include estimations for design, construction, and right-of-way. Quantities and costs for environmental mitigation were estimated based on large SHA projects from the past two decades and anticipated Tier 2 Study impacts that would require mitigation. The preliminary cost estimates are in 2025 dollars and include a 40 percent contingency.

Table 3-4: Alternative Cost Estimates

Alternatives	Total Cost (no SUP) ($B)	Total Cost (with Optional SUP) ($B)
Alternative A (No-Build)	$3.8*	N/A
Alternative B (6-8-6 North)	$15.1 - $16.6	$16.3 - $17.9
Alternative C (6-8-6 South)	$14.8 - $16.4	$16.1 - $17.6
Alternative D (8-8-8 North)	$17.5 - $19.0	$18.8 - $20.3
Alternative E (8-8-8 South)	$17.3 - $18.8	$18.5 - $20.1
Alternative F (8-10-8 North)	$19.5 - $21.1	$20.8 - $22.3
Alternative G (8-10-8 South)	$19.2 - $20.8	$20.5 - $22.1

** The cost for Alternative A (No-Build) includes the estimated cost to maintain the existing Bay Bridge through 2065.*

While Alternative A (No-Build) avoids the upfront capital costs associated with a new crossing, it may result in higher long-term maintenance and rehabilitation costs. Due to the age and condition of the existing Bay Bridge, there is a cost associated with Alternative A (No-Build) to keep the structures in satisfactory condition through 2065. Beyond 2025, major superstructure and substructure rehabilitation/replacement work will be required, such as painting, deck replacement, suspension cable rehabilitation, beam replacement, and electrical repairs.

The MDTA anticipates the cost of all maintenance projects from 2025 through 2065 would be approximately $3.8 billion. However, maintaining the existing Bay Bridge will not provide adequate capacity or reliable travel times, will hinder mobility in the region, will not address existing roadway deficiencies, will exhibit delays related to lane closures for extensive maintenance, and will not accommodate the USCG required navigational clearance. With Alternative A (No-Build), the MDTA would be spending billions of dollars over the next several decades that would not improve the lives of local residents, reduce congestion for roadway users, or enhance commerce in the region.

Alternatives B and C have the lowest costs because they would be the shortest alternatives. Alternatives F and G have the highest costs because they would have one more lane across the Bay Bridge in each direction than the other build alternatives. Although the build alternatives would have a higher initial cost than Alternative A (No-Build), they would require less maintenance and rehabilitation over the next several decades. The upfront cost would allow the MDTA to build new infrastructure that would provide an improvement to the challenges in the study area, by adding more travel lanes across the Bay, providing full shoulders, and raising the vertical

clearance to meet the USCG requirement. Additionally, this upfront cost would reduce maintenance needs that would require short- and long-term lane closures that would reduce capacity, create more congestion, and result in reduced reliability.

3.5 Traffic Analysis for the Alternatives

Traffic analyses were performed for existing conditions, No-Build, and the build alternatives. This section summarizes the analyses; a more detailed explanation is provided in the *Traffic Analysis Technical Report*.

Typically, during the NEPA process, the traffic analyses are performed for "normal" weekdays or days with typical commuting, school, and shopping activities. While the Bay Bridge does experience "normal" weekday traffic, it also experiences traffic volumes on weekends that often exceed weekday volumes, particularly during summer weekends. Thus, the Study included traffic analysis for typical non-summer weekdays (NSWD) and summer weekend days (SWED).

Although the build alternatives include two potential new bridge span locations (just south of and just north of the existing two spans), the physical location of the new spans across the Bay would not affect the traffic analysis because the spans would carry the same amount of traffic regardless of the location. Thus, the results of the traffic analysis would be identical. In addition, the traffic volume forecasts and analysis for the alternatives would be the same with or without the SUP, because the SUP would not remove traffic from the bridge spans. Therefore, the traffic analysis for the build alternatives was simplified to three sets of lane configurations for the six build alternatives:

- Alternatives B/C: 6-8-6 lane configuration
- Alternatives D/E: 8-8-8 lane configuration
- Alternatives F/G: 8-10-8 lane configuration

3.5.1 Existing Traffic Volumes and Development of Future Forecasts

The existing hourly traffic volume data for the Bay Bridge was obtained from the MDTA's count stations for the period starting on April 1, 2022, and ending on December 31, 2022. Additionally, between 2022 and 2023, traffic data was collected along U.S. 50/301 ramps on summer weekends from Memorial Day through Labor Day, and on non-summer weekdays between Labor Day and Memorial Day. The traffic data was summarized and presented to the agencies and the public in 2023 and is available in the *Traffic Analysis Technical Report*.

After examining the available regional travel demand models and consulting with the SHA Travel Forecasting and Analysis Division (TFAD), the MDTA chose the Maryland Statewide Transportation Model (MSTM) to develop the travel demand forecasts. The estimated traffic volumes for 2045 for Alternative A (No-Build) and the build alternatives at the Bay Bridge are summarized in **Table 3-5**. Forecasted volumes were also developed for the full length of the study area using the MSTM.

Table 3-5: Daily Trips Across the Bay Bridge (vehicles per day)

Volumes & Percent Change	Day Type	Existing (2022)	2045 Alternatives			
			Alt A No-Build	Alt B & C 6-8-6	Alt D & E 8-8-8	Alt F & G 8-10-8
Daily Volumes	Typical Non-Summer Weekday (NSWD)	69,588	91,150	92,600	93,450	93,850
	Typical Summer Weekend Day (SWED)	104,284	130,500	143,150	148,600	148,650
Percentage Change	Typical Non-Summer Weekday (NSWD)	n/a	31% from Existing	1.6% from No-Build	2.5% from No-Build	3.0% from No-Build
	Typical Summer Weekend Day (SWED)	n/a	25% from Existing	9.7% from No-Build	13.9% from No-Build	13.9% from No-Build

Between existing conditions (2022) and 2045, Alternative A (No-Build) volumes are forecast to increase by approximately 31 percent on typical NSWDs, and by about 25 percent on typical SWEDs. These results indicate that daily traffic volumes would be forecasted to grow approximately 1.2 percent annually for typical NSWDs, and approximately 1.0 percent annually for typical SWEDs through 2045. These forecasts are within the typical range of annual growth for this region. The growth between existing and 2045 Alternative A (No-Build) volumes represents a larger percentage growth than the growth between the No-Build and build volumes.

The NSWD volumes for the build alternatives show that daily volume growth would be relatively small, reaching a maximum of 3.0 percent for Alternatives F and G (8-10-8) compared to Alternative A (No-Build) volumes. The SWED volumes are expected to grow at a higher rate than NSWD volumes for each build alternative. Alternatives D and E (8-8-8) and Alternatives F and G (8-10-8) are expected to see a 13.9 percent increase over Alternative A (No-Build).

3.5.2 Traffic Analysis Methodologies

3.5.2.1 Highway Capacity Manual and Queuing Analyses

Two tools were used in the initial evaluation of the existing conditions, No-Build, and build alternatives: the HCM[15] and a Queuing Analysis Tool developed specifically for this project. The HCM analyses identified the LOS at a single specific location and did not consider external factors beyond that location that would affect traffic operations. Any hour with a queue would be operating at LOS D, E, or F. The Queuing Analysis Tool was used to supplement the HCM analyses in an attempt to address this limitation and provide additional depth for the initial evaluation.

LOS, as defined by the HCM, is a "performance measure or measures that represents quality of traffic 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."

In these initial evaluations, the preliminary traffic analyses treated the Bay Bridge as a free-standing element of the transportation system. Therefore, the analyses determined how the Bay Bridge would operate in the absence of any external factors, such as bottlenecks either upstream

[15] National Academies of Sciences, Engineering, and Medicine. 2022. *Highway Capacity Manual 7th Edition: A Guide for Multimodal Mobility Analysis*. Washington, DC: The National Academies Press. https://doi.org/10.17226/26432.

or downstream of the Bay Bridge. The analyses and results were beneficial as a comparison or base line to the detailed analysis that is required to take into consideration those external factors. ***If the bottlenecks at the study limits or within the study area were to be removed, the Bay Bridge itself would operate*** as shown in **Table 3-6** and described below.

- Under Alternative A (No-Build), queues of at least four miles would be expected in both directions during NSWD. On SWED, queues greater than 10 miles would be expected in both directions.
- Queuing would be eliminated in all the build alternatives during NSWDs, except for a short, 0.1 mile queue with Alternatives D and E.
- Under SWED conditions, Alternatives B and C (6-8-6) and Alternatives D and E (8-8-8) would have shorter queues than those expected under No-Build, but those queues would be at least seven miles long.
- Under SWED conditions, queues would be eliminated in Alternatives F/G (8-10-8).

Table 3-6: Initial Evaluation of Alternatives without Consideration of External Factors

Direction	Location	Metric	Existing Conditions (2022)	Alternative A (No-Build) In 2045	Alternative B/C (6-8-6) In 2045	Alternative D/E (8-8-8) In 2045	Alternative F/G (8-10-8) In 2045
Non-Summer Weekday (NSWD)	Eastbound on U.S. 50/301	Maximum Queue (miles)	0	4.1	0	0.1	0
		Duration of Queues > 1 mile (hours)	0	4	0	0	0
	Westbound on U.S. 50/301	Maximum Queue (miles)	0	4.9	0	0	0
		Duration of Queues > 1 mile (hours)	0	11	0	0	0
Summer Weekend Day (SWED)	Eastbound on U.S. 50/301	Maximum Queue (miles)	4.8	>10	7.3	7.5	0
		Duration of Queues > 1 mile (hours)	8	14	10	11	0
	Westbound on U.S. 50/301	Maximum Queue (miles)	3.5	>10	8.0	8.4	0
		Duration of Queues > 1 mile (hours)	8	14	10	11	0

3.5.2.2 VISSIM Traffic Simulation

The initial analyses described above provided a starting point for development of the ARDS. Subsequently, a traffic microsimulation computer model called VISSIM was used to perform more detailed analyses of the study area as a cohesive corridor. These detailed analyses did not

evaluate the Bay Bridge as a free-standing element of the transportation system; they took into consideration the external factors throughout the study area, including the bottlenecks both upstream and downstream of the Bay Bridge, which did have an impact on the traffic operations of the Bay Bridge. These detailed VISSIM analyses provide a corridor-wide assessment of traffic operations and therefore govern the results of the study and are described in the remainder of this section. Both sets of analyses (HCM and VISSIM) are discussed in the *Traffic Analysis Technical Report.*

3.5.2.3 Adjustments for the Bay Bridge

Traditional capacity analyses performed by the MDTA have consistently recognized that the Bay Bridge, even under ideal operating conditions, has a lower capacity than expected, considering the number of lanes and the operation of those lanes on the Bay Bridge. The following factors contribute to the Bay Bridge lanes having lower capacity than anticipated.

- The steep vertical grades (3.0 to 3.5 percent) across the bridge could cause trucks to travel at a slower speed than other vehicles. The horizontal curve on the bridge near the Western Shore could also cause vehicles to slow down as they view the long, curved bridge ahead.
- The lack of shoulders across the bridge, the height of the bridge above the Bay, and the movement of the bridge in windy conditions could create fear for some individuals, causing them to drive more slowly.
- The speed limit varies across the bridge between 40 and 50 mph and is lower than the approach roads (55 mph).
- The expansive views from the bridge under clear weather conditions and the lack of any roadside views during inclement weather conditions could create distractions for motorists.
- Vehicles exceeding five tons gross vehicle weight/gross vehicle weight rating (GWV/GWVR) have lane restrictions and are prohibited from traveling in the left lane.
- Maintenance activities and incident management often require lane closures due to lack of space on the roadway and shoulders.

It is likely that any new crossing of the Bay would address some of these physical factors; however, the ability of a new crossing to address one or more of the human factors is difficult to predict. An extensive analysis was performed on the hourly data for both directions on the Bay Bridge to estimate its actual capacity. This analysis showed that the existing capacity of a lane approaching the Bay Bridge is approximately 30 percent higher than a lane on the bridge itself. This result has been incorporated into the analyses described below for all alternatives to provide a baseline comparison and is described in more detail in the *Traffic Analysis Technical Report*.

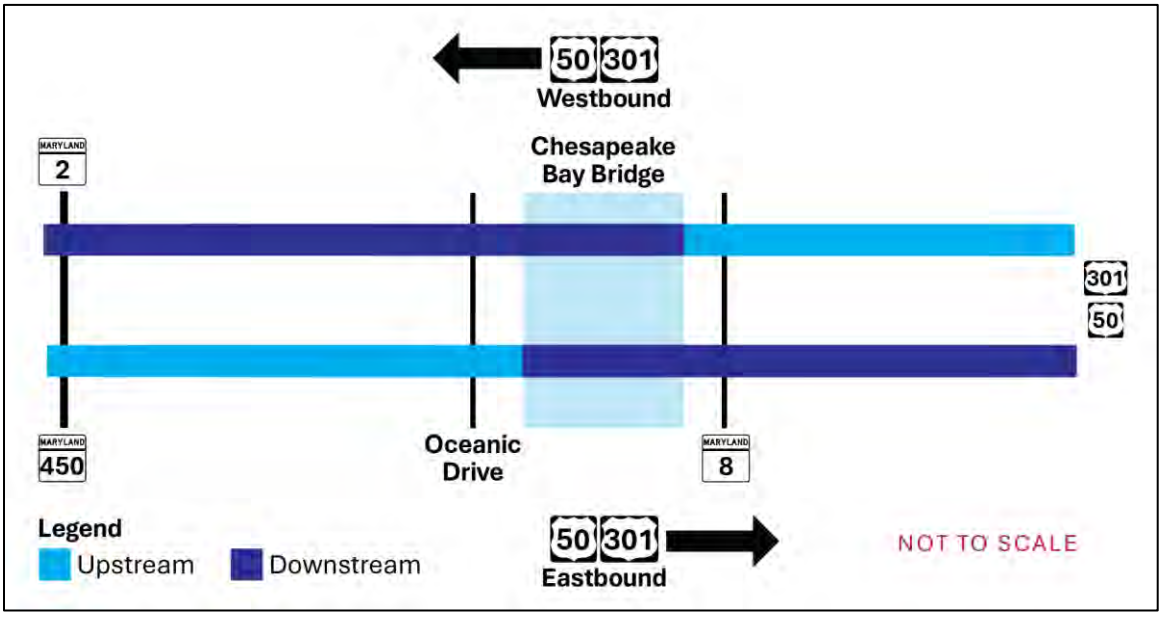
3.5.3 Traffic Analysis Results

The results of the VISSIM traffic analysis for existing conditions and the alternatives during NSWD and SWED are provided through the metrics listed below and in the remaining sections of this chapter. Further descriptions of the detailed analysis are available in the *Traffic Analysis Technical Report*.

- Queue lengths and queue durations in the study area and at the Bay Bridge including traffic flow bottleneck diagrams.

- Travel time and speed through the entire corridor. For these analyses, the study area was divided into two segments in each direction: (1) from the upstream study limits to the start of the Bay Bridge, and (2) from the start of the Bay Bridge to the downstream study limits. These limits are shown graphically in **Figure 3-9**. Since the starting point of queuing has historically been the start of the Bay Bridge, where the capacity per lane of U.S. 50/301 is reduced, this location was the most appropriate divider between the two segments.
- Throughput is the amount of traffic that can get across the Bay Bridge and is expressed in this Tier 2 Study as a percentage of the traffic that wants to cross the Bay Bridge.

Figure 3-9: Segments of U.S. 50/301 Used for Travel Time Analyses



3.5.3.1 Existing Conditions

The results of the VISSIM analysis for existing conditions[16] (year 2022 traffic) are provided in the *Traffic Analysis Technical Report*, for both NSWD and SWED, including tables with detailed results for the number of hours a queue is greater than one mile, maximum queue length approaching the Bay Bridge and in the study area, travel times, and throughput. **Table 3-7** presents a summary of the existing conditions traffic analysis results. Travel time and speeds are provided in **Table 3-8**. Bottleneck diagrams, visually summarizing the results of the analyses, are provided in **Figure 3-10** and **Figure 3-11**.

[16] Existing conditions are normal conditions for the corridor. This does not represent abnormal conditions due to incidents or other events that can cause backups and slowdowns.

Table 3-7: Summary of Traffic Results for Existing Conditions (2022)

	NSWD	SWED
Queuing	Eastbound (EB), with two-way operations, there is no queuing through the study area during the PM peak volume hour except approaching the Bay Bridge where there is an approx. 0.3 mi. queue. Westbound (WB), there is no queuing during the AM peak volume hour except approaching the Bay Bridge where there is an approx. 0.1 mi. queue. No queues extend longer than 1 mi.	EB, there is a bottleneck on the Western Shore on Fridays at the approach to the Bay Bridge that extends approx. 4.1 mi. WB, there is a bottleneck on the Eastern Shore on Sundays at the approach to the Bay Bridge that extends approx. 3.8 mi. In both directions, the Bay Bridge bottleneck reduces the amount of traffic able to cross the bridge resulting in less traffic on the bridge and downstream than there is approaching the bridge. Reduced volumes allow the downstream roadway to operate better and at higher speeds. Queuing starting at the approach to the Bay Bridge extends for > 1.0 mi. for up to 9 hours in both directions.
Travel time	The maximum total travel time through the corridor is 22 minutes EB (with two-way operations) and 24 minutes WB. These are relatively equal and represent an overall average speed between 50 and 55 mph.	The maximum total travel time is 48 min. EB and 43 min. WB. Although these are relatively equal, they are nearly double the NSWD travel time. The travel time approaching the Bay Bridge is a maximum of 32 min. EB from MD 2/MD 450 to the beginning of the Bay Bridge and 30 min. WB from the U.S. 50/301 split to the beginning of the Bay Bridge as a result of the bottleneck at the Bay Bridge. These travel times are more than 3 times longer than the NSWD. The speeds approaching the Bay Bridge EB are lower than downstream (9.4 vs. 55.9 mph). WB, the speeds are also lower approaching the Bay Bridge than downstream (17.2 vs. 49.1 mph)
Throughput	Throughput percentage was not assessed for existing conditions.	Throughput percentage was not assessed for existing conditions.

Table 3-8: Travel Time Results for Existing Conditions (2022) during NSWD and SWED

Existing Conditions		Eastbound U.S. 50/301		Westbound U.S. 50/301	
		MD 2/MD 450 to Start of Bay Bridge	Start of Bay Bridge to U.S. 50/301 Split	U.S. 50/301 Split to Start of Bay Bridge	Start of Bay Bridge to MD 2/MD 450
Non-Summer Weekday	Max Travel Time (min)	6	16	9	15
	Speed at Max Travel Time (mph)	50.0	55.9	57.3	44.5
Summer Weekend Day	Max Travel Time (min)	32	16	30	13
	Speed at Max Travel Time (mph)	9.4	55.9	17.2	49.1

Figure 3-10: Bottleneck Diagram for Existing Conditions (2022) during NSWD, Peak Hour of Queuing (Eastbound PM, Westbound AM)

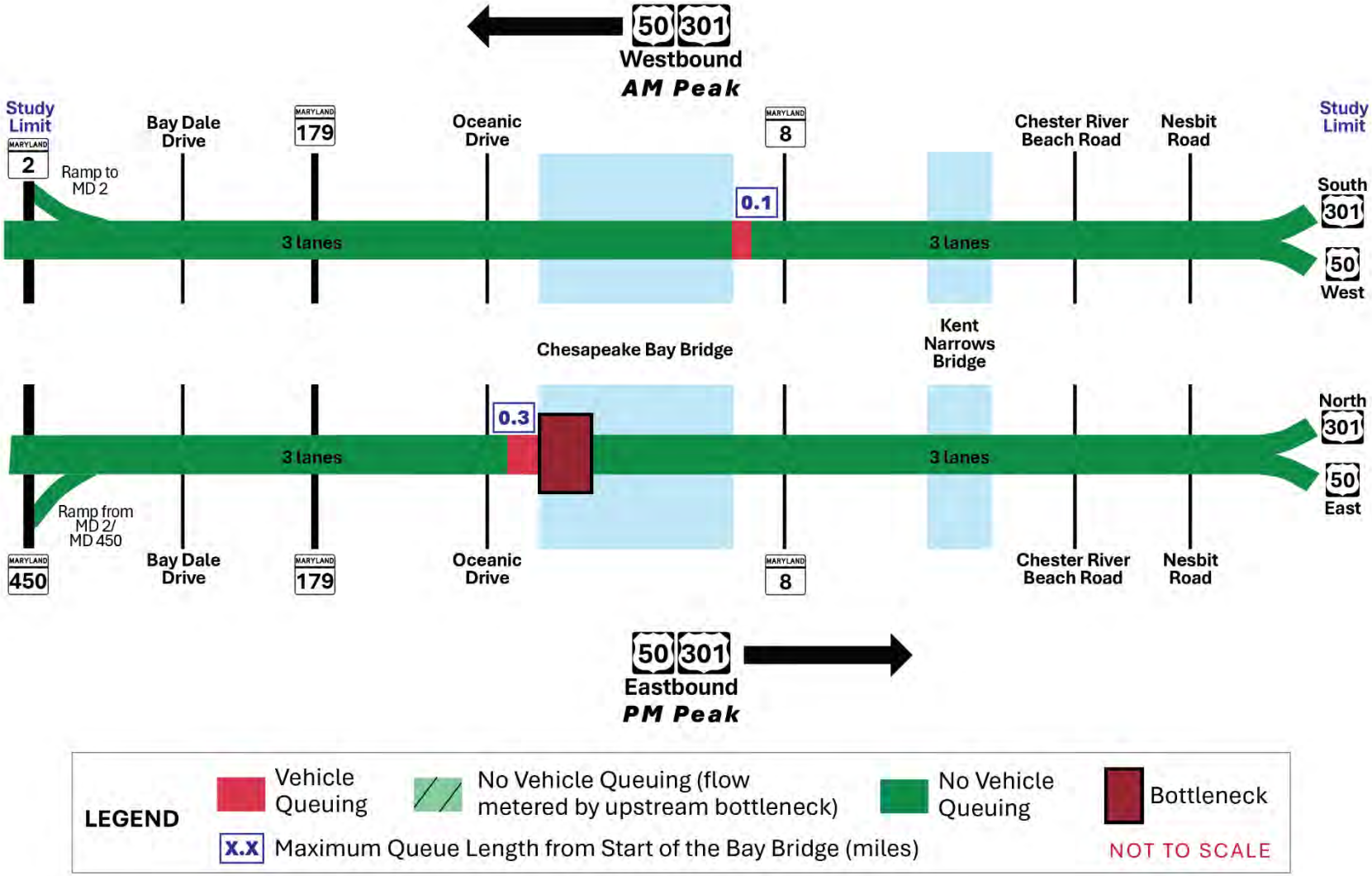
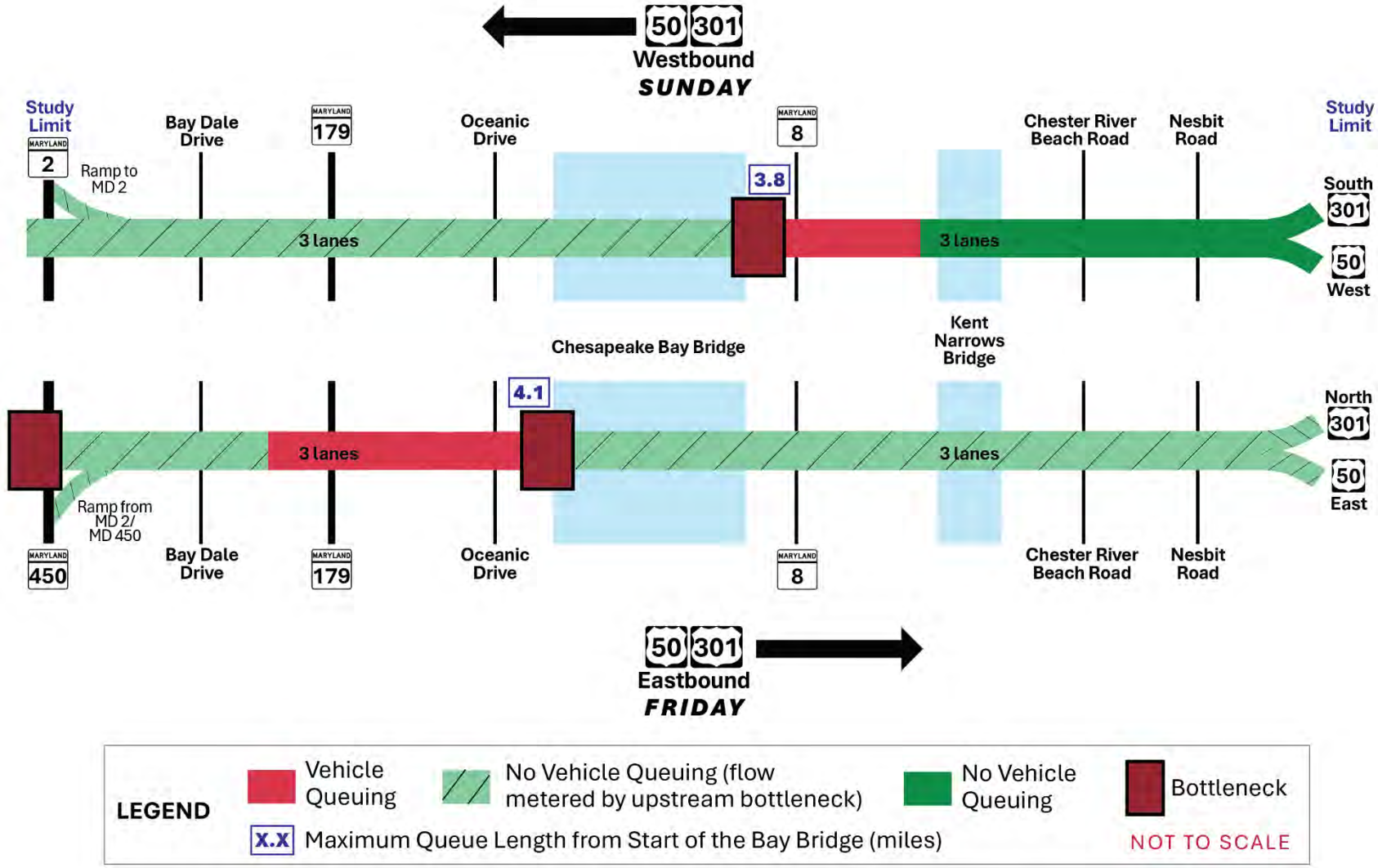


Figure 3-11: Bottleneck Diagram for Existing Conditions (2022) During SWED, Peak Hour of Queueing (Eastbound Friday, Westbound Sunday)



3.5.3.2 Alternative A: No-Build (6-5-6)

The results of the VISSIM analyses for Alternative A (No-Build) in 2045 are provided in Chapter 6 of the *Traffic Analysis Technical Report*, for both NSWD and SWED conditions, including tables with detailed results for the number of hours a queue is greater than one mile, maximum queue length approaching the Bay Bridge and in the study area, travel times, and throughput. **Table 3-9** presents a summary of the traffic analysis results. Travel time is provided in **Table 3-10**. Bottleneck diagrams, visually summarizing the results of the analyses, are provided in **Figure 3-12** and **Figure 3-13**.

Table 3-9: Summary of Traffic Results for Alternative A (No-Build) in 2045

	NSWD	SWED
Queuing	EB, during the PM peak volume hour, a queue would extend back from the Bay Bridge for approx. 1.7 mi. but there would not be queues at other locations. The queue would be >1.0 mi. for approx. 5 hours. Traffic would be metered by the bottleneck upstream of the study area that would result in less traffic reaching the Bay Bridge. WB, during the AM peak volume hour, two queues would occur, one starting from the Bay Dale Dr. interchange and the second starting from the approach to the Bay Bridge. Traffic would be metered by the bottleneck at the Bay Bridge extending a max. of 2.4 mi. resulting in less traffic reaching the Western Shore. However, there would still be a bottleneck at Bay Dale Drive due to the amount of traffic entering U.S. 50/301 on the Broadneck Peninsula, with a max. length of 3.9 mi. This queue would be >1.0 mi. for approx. 7 hours.	A bottleneck would occur EB on the Western Shore on Fridays resulting in queues of approx. 7.1 mi., the full length to the western study limits. A bottleneck would occur WB on the Eastern Shore on Sundays resulting in queues of >11.0 mi., the full length to the eastern study limits. Queues in both directions would be >1.0 mi. for 13 hours on the peak day in each direction. In both directions, the Bay Bridge bottleneck reduces the amount of traffic able to cross the Bay Bridge resulting in less traffic on the Bay Bridge and downstream than there is approaching the Bay Bridge. Reduced volumes allow the roadway to operate at higher speeds in these areas.
Travel time	The maximum total travel time would be 33 min. EB and 53 min. WB. The travel time approaching the Bay Bridge in both directions would be more than double existing conditions (17 min. compared to 6 min. EB and 20 min. compared to 9 min. WB). Travel time departing the Bay Bridge EB would be approx. the same as existing conditions, but WB would be more than double the existing conditions. The speeds approaching the Bay Bridge EB would be lower than downstream (17.6 vs. 55.9 mph). WB, the speeds would be about equal approaching the Bay Bridge compared to the downstream side (25.8 vs. 29.5 mph).	The maximum total travel time would be 70 min. EB and 92 min. WB. The travel time approaching the Bay Bridge in both directions would be approximately double existing conditions (54 min. EB and 79 min. WB). Travel time departing the Bay Bridge (in both directions) would be approx. the same as existing conditions. The speeds approaching the Bay Bridge EB would be lower than downstream (5.6 vs. 55.9 mph). WB, the speeds would also be lower approaching the Bay Bridge than on the downstream side (6.5 vs. 49.1 mph)
Throughput	EB and WB throughput would range from 80% to 90% where 10% to 20% of traffic in the peak volume hour would not be able to cross the Bay Bridge.	EB throughput would range from 60% to 70% and WB throughput would range from 70% to 80%. Throughput would be lower than any of the build alternatives.

Table 3-10: Travel Time Results for Alternative A (No-Build) during 2045 NSWD and SWED

Alternative A: No-Build		Eastbound U.S. 50/301		Westbound U.S. 50/301	
		MD 2/MD 450 to Start of Bay Bridge	Start of Bay Bridge to U.S. 50/301 Split	U.S. 50/301 Split to Start of Bay Bridge	Start of Bay Bridge to MD 2/MD 450
Non-Summer Weekday	Max Travel Time (min)	17	16	20	33
	Speed at Max Travel Time (mph)	17.6	55.9	25.8	29.5
Summer Weekend Day	Max Travel Time (min)	54	16	79	13
	Speed at Max Travel Time (mph)	5.6	55.9	6.5	49.1

Figure 3-12: Bottleneck Diagram for Alternative A: No-Build during 2045 NSWD, Peak Hour of Queuing (Eastbound PM, Westbound AM)

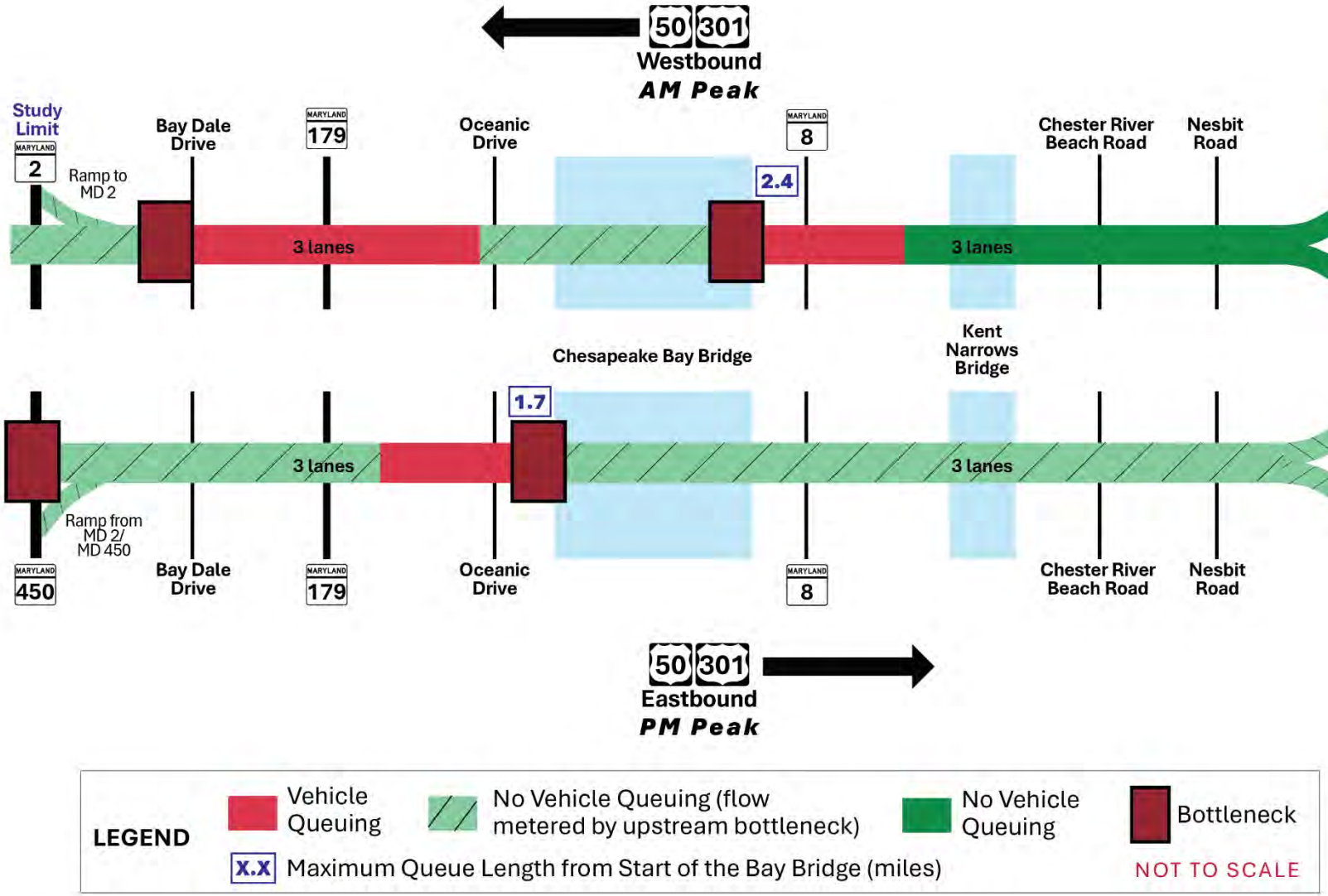
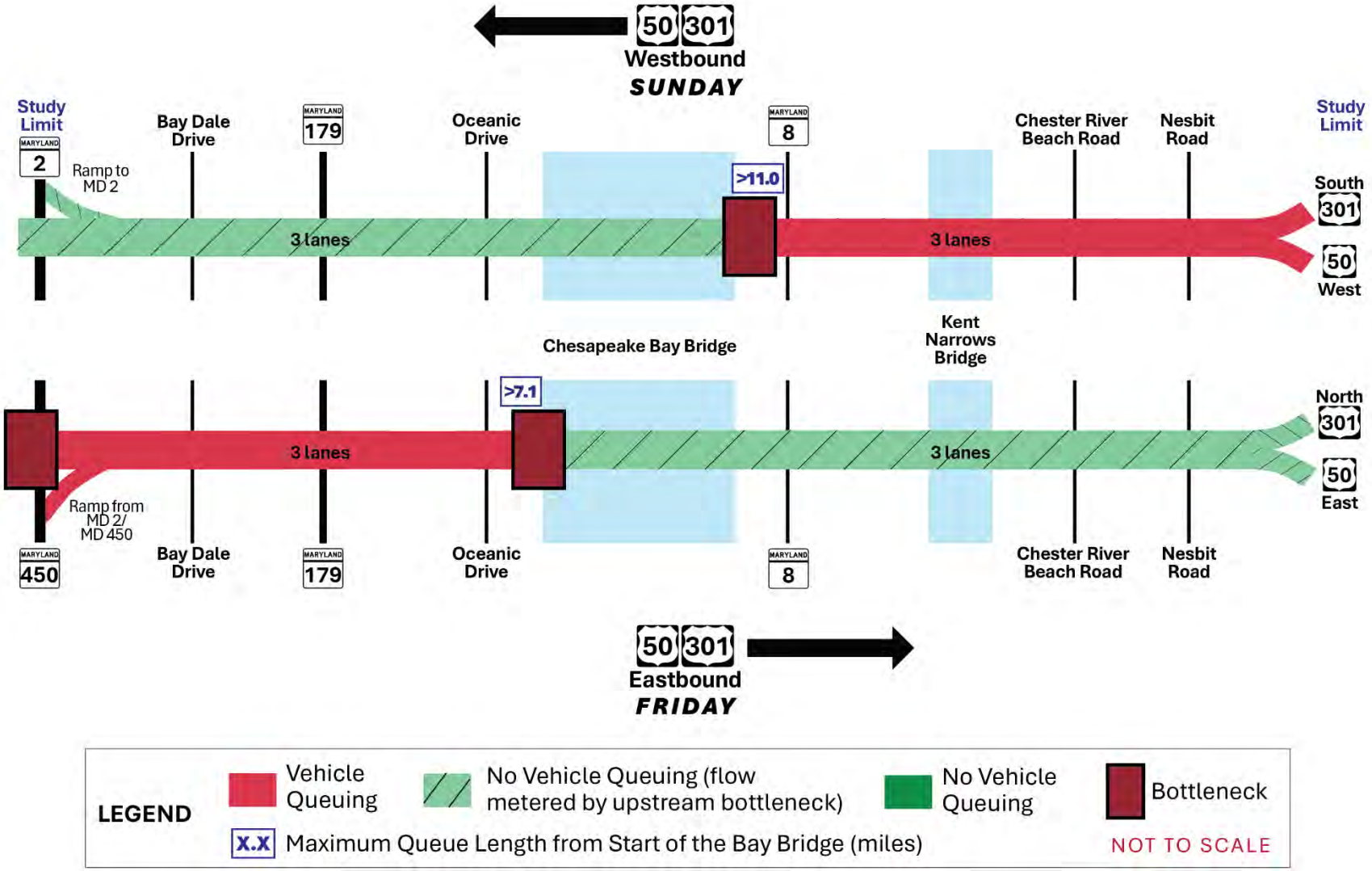


Figure 3-13: Bottleneck Diagram for Alternative A: No-Build during 2045 SWED, Peak Hour of Queuing (Eastbound Friday, Westbound Sunday)



3.5.3.3 Alternatives B/C: (6-8-6 North and 6-8-6 South)

It should be noted that each build alternative being considered for a new Bay Bridge includes a lower profile grade (3.0 percent) than the existing Bay Bridge (3.0 and 3.5 percent) and full shoulders on both sides of the travel lanes. These changes are likely to increase the capacity per lane on the Bay Bridge; however, the extent of that increase is uncertain. The ability of a new crossing to address the human factors that currently reduce capacity is difficult to predict. Therefore, the capacity analyses for future conditions assumed that a new crossing would have the same capacity per lane as the existing conditions. Specifically, a lane on the new bridge crossing was analyzed with a capacity of approximately 30 percent less than the capacity of a lane approaching the new bridge. A sensitivity analysis addressing this topic was performed, and is discussed in the *Traffic Analysis Technical Report*, Section 7.1.

The results of the VISSIM analyses for Alternatives B and C are provided in Chapter 6 of *Traffic Analysis Technical Report* for both NSWD and SWED, conditions including tables with detailed results for the number of hours a queue is greater than one mile, maximum queue length approaching the bridge and in the study area, travel times, and throughput. **Table 3-11** presents a summary of the traffic analysis results. Travel time is provided in **Table 3-12**. Bottleneck diagrams, visually summarizing the results of the analyses, are shown in **Figure 3-14** and **Figure 3-15**.

Table 3-11: Summary of 2045 Traffic Results for Alternative B/C (6-8-6)

	NSWD	SWED
Queuing	EB, queuing would not develop at the western end of the Bay Bridge during the PM peak and operational deficiencies would not be expected. Traffic would be metered by the bottleneck west of the study area, resulting in less traffic reaching the Bay Bridge. WB, a max queue of approx. 2.8 mi. would occur during the AM peak starting from the Bay Dale Drive interchange due to the amount of traffic entering U.S. 50/301 on the Broadneck Peninsula. This queue would be >1.0 mi. for approx. 7 hours. There would be a minimal queue approaching the Bay Bridge.	EB, queuing would not develop at the western approach to the Bay Bridge during a summer Friday. However, there would be a bottleneck at the MD 2/MD 450 interchange where the entrance ramp joins U.S. 50/301. This bottleneck would meter traffic into the study area and toward the Bay Bridge, resulting in less traffic at the Bay Bridge. EB at the U.S. 50/301 split near the eastern limit of the study area, a queue would form from the U.S. 50 merge, backing up a maximum of 4.4 mi. into the study area. This would be similar to the queues exhibited in Alternatives D/E (8-8-8) and F/G (8-10-8) that would extend from the U.S. 50 merge. Queues would be > 1 mi. for 8 hours. WB during summer Sundays, a bottleneck would form at the Bay Dale Drive interchange that would cause slow speeds and result in queuing. This queuing would continue to grow throughout the day and would extend across the Bay Bridge and onto the Eastern Shore, a max. length > 19.7 mi within the study area. A queue longer than 1.0 mile would last 13 hours. Additionally, WB, there would be a bottleneck east of the study area that would meter traffic approaching the Bay Bridge, resulting in less traffic reaching the Bay Bridge and the Western Shore.

	NSWD	SWED
Travel time	The maximum total travel time would be 25 min. EB and 36 min. WB. Travel time would be less than Alternative A (No-Build) by approximately 8 min. EB and 17 min. WB. The travel times approaching the Bay Bridge would be less than half of Alternative A (8 min. compared to 17 min. EB, and 9 min. compared to 20 min. WB). The speeds approaching the Bay Bridge EB would be lower than downstream (37.5 vs. 52.1 mph). WB, the speeds would be higher approaching the Bay Bridge than on the downstream side (57.3 vs. 34.8 mph)	The maximum total travel time would be 40 min. EB and 126 min. WB. EB, this travel time would be a little more than half of Alternative A (No-Build). The travel time approaching the Bay Bridge on both shores would be less or about equal to Alternative A (No-Build). The EB speeds would average approx. 33 mph through the study area. However, WB, the travel time would be approximately 34 min. longer than Alternative A (No-Build) due to the queuing at Bay Dale Drive. The speeds would average approx. 10 mph traveling WB.
Throughput	The throughput for both EB and WB would range from 90% to 100%.	The throughput for both EB and WB would range from 80% to 90%. This means that 10% to 20% of the traffic that wants to cross the Bay Bridge in the peak volume hour would not be able to cross it.

Table 3-12: Travel Time Results for Alternatives B and C: 6-8-6 during NSWD and SWED

Alternatives B/C: 6-8-6 Conditions		Eastbound U.S. 50/301		Westbound U.S. 50/301	
		MD 2/MD 450 to Start of Bay Bridge	Start of Bay Bridge to U.S. 50/301 Split	U.S. 50/301 Split to Start of Bay Bridge	Start of Bay Bridge to MD 2/MD 450
Non-Summer Weekday	Max Travel Time (min)	8	17	9	27
	Speed at Max Travel Time (mph)	37.5	52.1	57.3	34.8
Summer Weekend Day	Max Travel Time (min)	9	31	75	51
	Speed at Max Travel Time (mph)	33.3	32.1	6.9	13.5

Figure 3-14: Bottleneck Diagram for Alternatives B/C (6-8-6) during 2045 NSWD, Peak Hour of Queuing (Eastbound PM, Westbound AM):

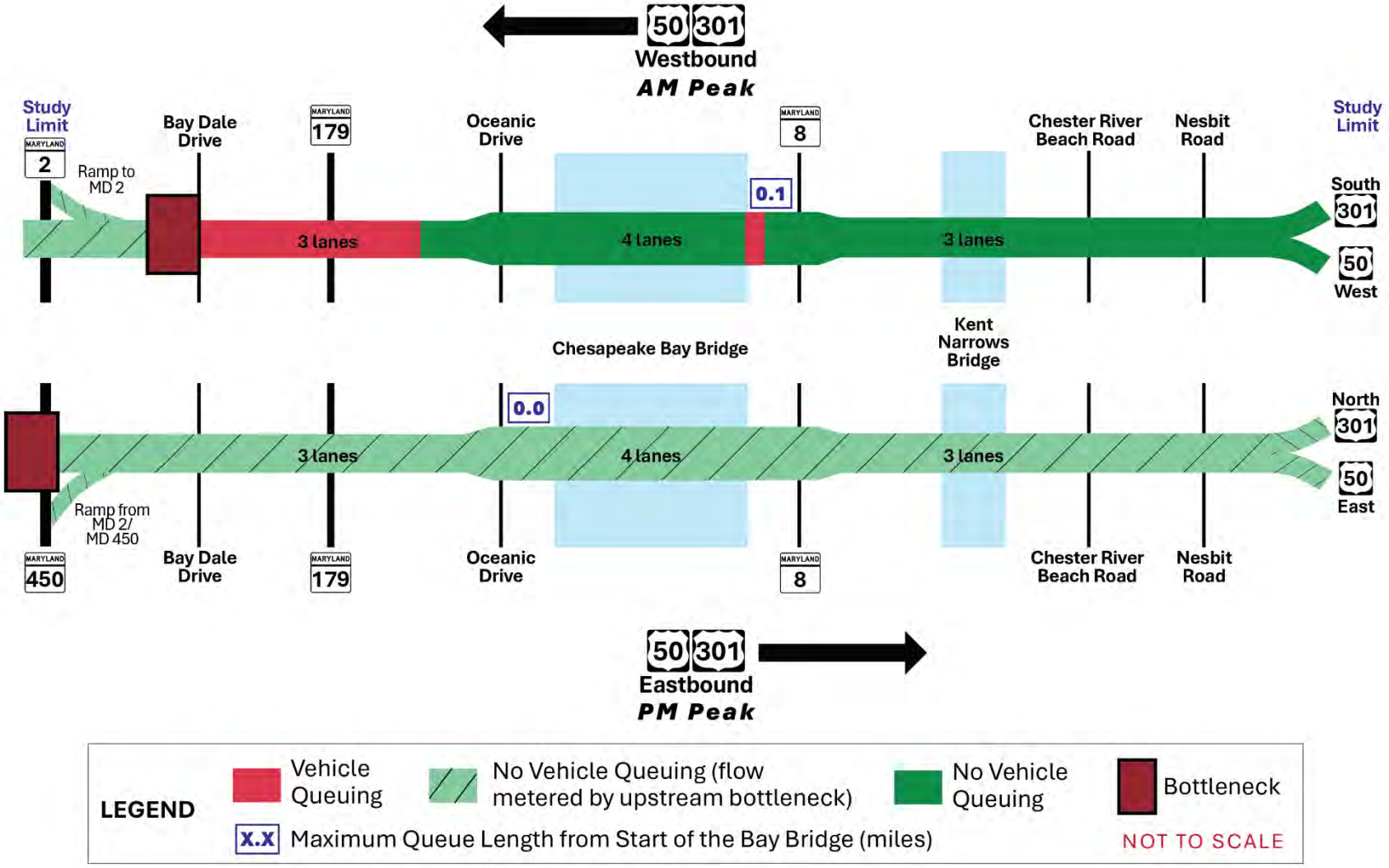
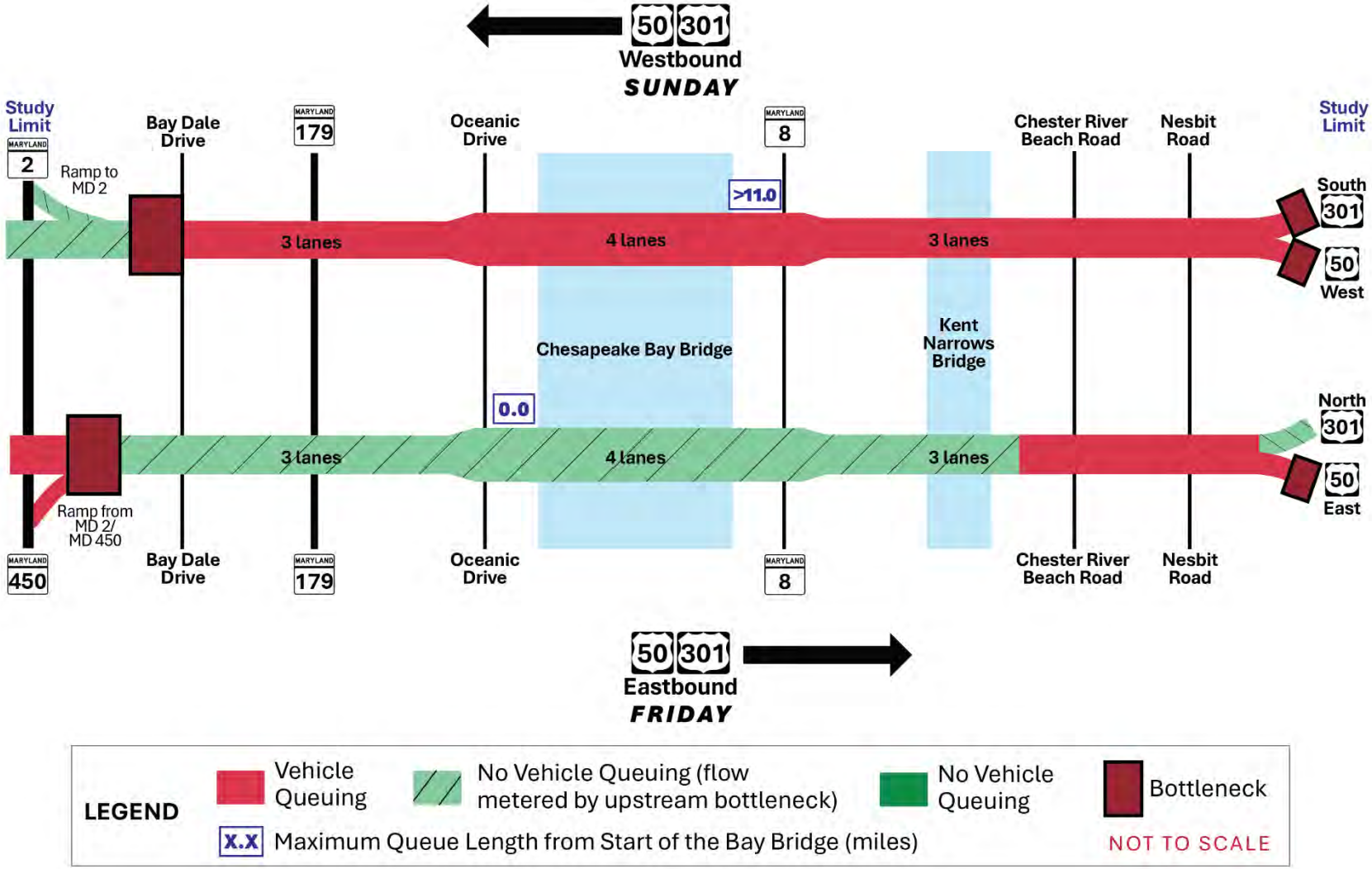


Figure 3-15: Bottleneck Diagram for Alternatives B/C (6-8-6) during 2045 SWED (Eastbound Friday, Westbound Sunday)



3.5.3.4 Alternatives D/E (8-8-8 North and 8-8-8 South)

The results of the VISSIM analyses for Alternatives D and E are provided in Chapter 6 of the *Traffic Analysis Technical Report*, for both SWED and NSWD conditions, including tables with detailed results for the number of hours a queue is greater than one mile, maximum queue length approaching the bridge and in the study area, travel times, and throughput. **Table 3-13** presents a summary of the traffic analysis results. Travel time is provided in **Table 3-14**. Bottleneck diagrams, visually summarizing the results of the analyses, are provided in **Figure 3-16** and **Figure 3-17** and summarized below.

Table 3-13: Summary of 2045 Traffic Results for Alternative D/E (8-8-8)

	NSWD	SWED
Queuing	EB, queueing would not be observed at the western end of the Bay Bridge and operational deficiencies would not be expected. Traffic would continue to be metered by a bottleneck west of the study area, but the addition of a fourth EB lane at the MD 2/450 interchange would improve operations approaching the Bay Bridge. WB, a max queue of approx. 0.9 mi. would occur during the AM peak starting from the MD 2 interchange due to the amount of traffic entering U.S. 50/301 on the Broadneck Peninsula. There would be minimal queuing approaching the Bay Bridge.	EB, there would be a bottleneck west of the study area that would constrain traffic entering the study area. With the addition of a fourth EB lane at the MD 2/450 interchange at the western end of the study limits, additional traffic would enter the study area and reach the Bay Bridge compared to Alternatives B/C, resulting in maximum queues of 1.9 mi. extending from the start of the Bay Bridge during a summer Friday, where Alternatives B/C do not form a queue in this location. EB, at the U.S. 50/301 split near the eastern limit of the study area, queues would form due to the lane drop from 3 lanes on U.S. 50 past the split to the 2 existing EB lanes. These queues would extend back from the split approx. 11.1 miles onto the Bay Bridge. Queues in the entire study limit would be > 1.0 mi. for 10 hours. WB, near the western limit of the study area, queues would form due to the lane drop from 4 lanes to the 3 existing lanes near the MD 2 interchange during summer Sundays. This queuing would continue to grow throughout the day and would extend across the Bay Bridge and onto the Eastern Shore, a max. length of 20.3 mi within the study area and extending beyond the study area. Queues would be > 1.0 mi. for 12 hours. Additionally, WB, there would continue to be a bottleneck east of the study area, which would meter traffic approaching the Bay Bridge, resulting in less traffic at the Bay Bridge.
Travel time	The maximum total travel time would be 23 min. EB with average speeds ranging from approximately 50 to 55 mph and 26 min. WB with average speeds ranging from approximately 40 to 50 mph. These travel times would be shorter than Alternative A (No-Build) by 10 min. EB and 27 min. WB.	The maximum total travel time would be 77 min. EB with average speeds ranging from about 20 to 30 mph. The travel time approaching the Bay Bridge would be similar to the other build alternatives and shorter than Alternative A (No-Build); however, the travel time on the Eastern Shore would be longer due to the lane drop from three to two lanes and the bottleneck at MD 2/MD 450. The maximum travel time WB would be 154 min., approximately 22% longer than Alternative B/C (6-8-6) with average speeds ranging from approx. 5 to 10 mph.

	NSWD	SWED
Throughput	The throughput for both EB and WB would range from 90% to 100%.	The throughput for EB would range from 90% to 100% and for WB, it would range from 80% to 90%.

Table 3-14: Travel Time Results for Alternatives D and E: 8-8-8 during NSWD and SWED

Alternatives D/E: 8-8-8 Conditions		Eastbound U.S. 50/301		Westbound U.S. 50/301	
		MD 2/MD 450 to Start of Bay Bridge	Start of Bay Bridge to U.S. 50/301 Split	U.S. 50/301 Split to Start of Bay Bridge	Start of Bay Bridge to MD 2/MD 450
Non-Summer Weekday	Max Travel Time (min)	6	17	10	16
	Speed at Max Travel Time (mph)	50.0	52.1	51.6	42.8
Summer Weekend Day	Max Travel Time (min)	10	67	92	62
	Speed at Max Travel Time (mph)	30.0	21.4	5.6	11.9

Figure 3-16: Bottleneck Diagram for Alternatives D/E (8-8-8) during 2045 NSWD (Eastbound PM, Westbound AM)

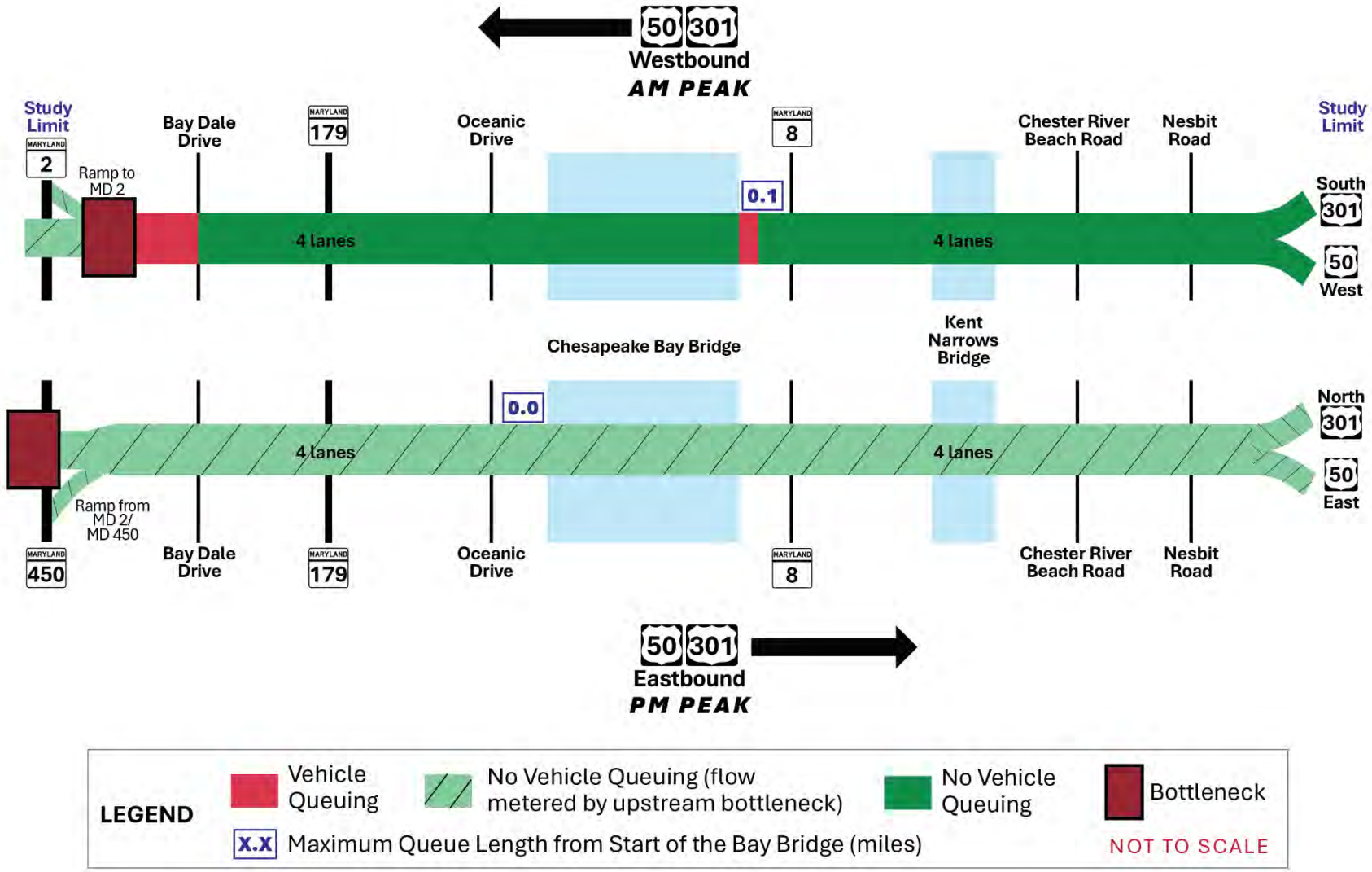
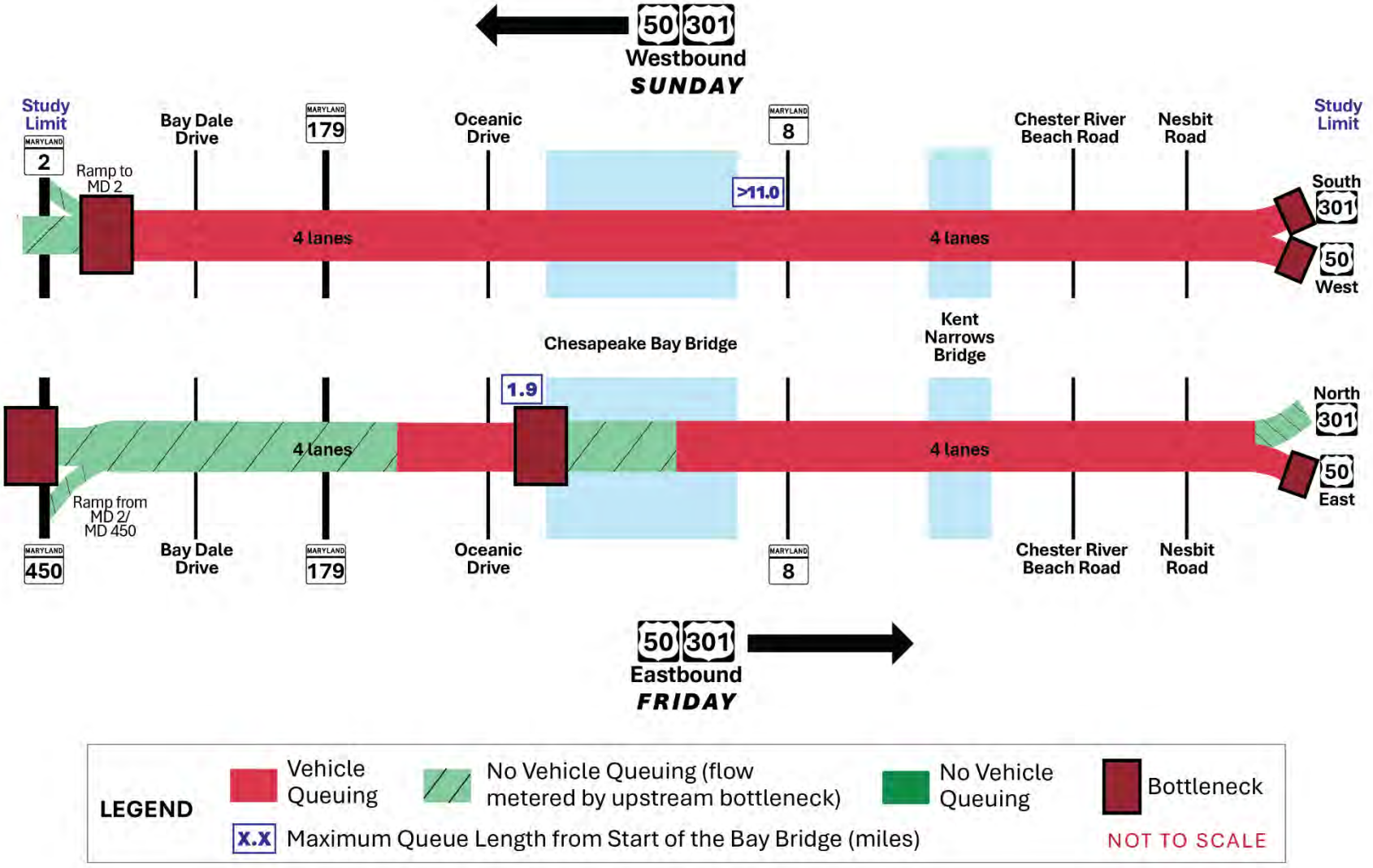


Figure 3-17: Bottleneck Diagram for Alternatives D/E (8-8-8) during 2045 SWED (Eastbound Friday, Westbound Sunday)



Note: Eastbound, at the eastern limit of the study area, the bottleneck will occur on U.S. 50 east of the Queenstown Premium Outlets, where the three lanes on eastbound U.S. 50 will be reduced to the existing two lanes. For consistency with the other bottleneck diagrams, the bottleneck is shown at the U.S. 50/301 Split.

3.5.3.5 Alternative F/G (8-10-8 North and 8-10-8 South)

The results of the VISSIM analyses for Alternatives F and G are provided in Chapter 6 of the *Traffic Analysis Technical Report*, for both SWED and NSWD conditions, including tables with detailed results for the number of hours a queue is greater than one mile, maximum queue length approaching the bridge and in the study area, travel times, and throughput. **Table 3-15** presents a summary of the traffic analysis results. Travel time is provided in **Table 3-16**. Bottleneck diagrams, visually summarizing the results of the analyses, are provided in **Figure 3-18** for NSWD conditions and **Figure 3-19** for SWED conditions.

Table 3-15: Summary of 2045 Traffic Results for Alternative F/G (8-10-8)

	NSWD	SWED
Queuing	EB, queuing would not be observed through the study area nor at the western end of the Bay Bridge. Traffic would be metered by the bottleneck west of the study area but the addition of a fourth lane at the MD 2/450 interchange would eliminate the effects of that bottleneck. WB, there would be no queuing through the study area during the AM peak volume hour except a small queue at the western limit where an approx. 0.2 mi. queue would occur starting from the MD 2 interchange due to the amount of traffic entering U.S. 50/301 on the Broadneck Peninsula. There would be no queuing approaching the Bay Bridge.	EB, queuing would not be observed at the western approach to the Bay Bridge during a summer Friday. However, there would be a bottleneck west of the Tier 2 study area that would meter traffic into the study area and toward the Bay Bridge, resulting in less traffic at the Bay Bridge. EB, at the U.S. 50/301 split near the eastern limit of the study area, queues would form due to the lane drop from 3 EB lanes on U.S. 50 past the split to the 2 existing EB lanes. This would be similar to the queues exhibited in Alternatives D/E (8-8-8), that would extend back from the split approx. 10.3 mi. extending onto the bridge. Queues would be >1.0 mi. for 11 hours. WB, near the western limit of the study area, queues would form due to the lane drop from 4 lanes to the 3 existing lanes near the MD 2 interchange. These queues would begin to extend toward and across the Bay Bridge. This queuing would continue to grow throughout the day and would extend across the Bay Bridge and onto the Eastern Shore, a max. length 16.2 mi within the study area. These WB queues would be caused, for the most part, by the lane drop. Queues would be >1.0 mi. for 12 hours. There would continue to be a bottleneck east of the study area, which would meter traffic coming into the study area and toward the Bay Bridge, resulting in less traffic at the Bay Bridge.
Travel time	The maximum total travel time would be 23 min. EB with average speeds ranging from about 50 to 55 mph and 25 min. WB with average speeds ranging from about 40 to 60 mph. These travel times are shorter than Alternative A (No-Build) by 10 min. EB and 28 min. WB.	The maximum total travel time would be 85 min. EB. The travel time approaching the Bay Bridge (6 min.) would be similar to the other build alternatives and substantially less than Alternative A (No-Build) (54 min.); however, the travel time on the Eastern Shore would be longer due to the lane drop from 3 to 2 lanes. The speeds approaching the Bay Bridge EB would be higher than downstream (50.0 vs. 17.5 mph). The maximum travel time WB would be 136 min.; it would be longer than Alternatives B/C (6-8-6), with an average speed under 10 mph. The travel time approaching the Bay Bridge would be 58 min, which would be shorter than Alternative A (No-Build) and the other build alternatives; however, the travel time on the Western Shore would be longer due to the lane drop from 4 to 3 lanes.

	NSWD	SWED
Throughput	The throughput for both EB and WB would range from 90% to 100%.	The throughput for EB would range from 90% to 100% and for WB, it would range from 80% to 90%.

Table 3-16: 2045 Travel Time Results for Alternatives F and G: 8-10-8 during NSWD and SWED

Alternatives F/G: 8-10-8 Conditions		Eastbound U.S. 50/301		Westbound U.S. 50/301	
		MD 2/MD 450 to Start of Bay Bridge	Start of Bay Bridge to U.S. 50/301 Split	U.S. 50/301 Split to Start of Bay Bridge	Start of Bay Bridge to MD 2/MD 450
Non-Summer Weekday	Max Travel Time (min)	6	17	9	16
	Speed at Max Travel Time (mph)	50.0	52.1	57.3	42.8
Summer Weekend Day	Max Travel Time (min)	6	79	58	78
	Speed at Max Travel Time (mph)	50.0	17.5	8.9	8.6

Figure 3-18: Bottleneck Diagram for Alternatives F/G (8-10-8) during 2045 NSWD (Eastbound PM, Westbound AM)

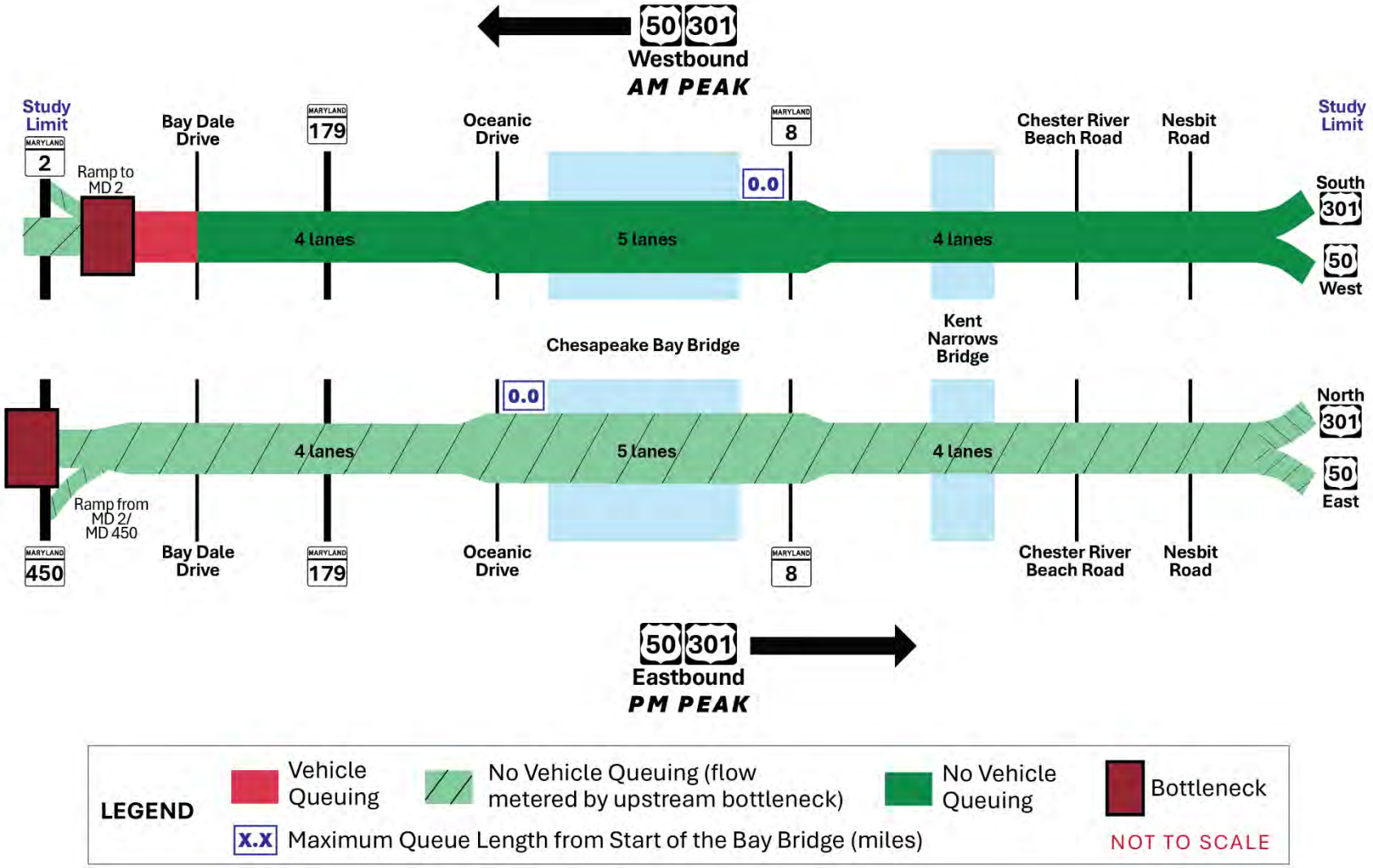
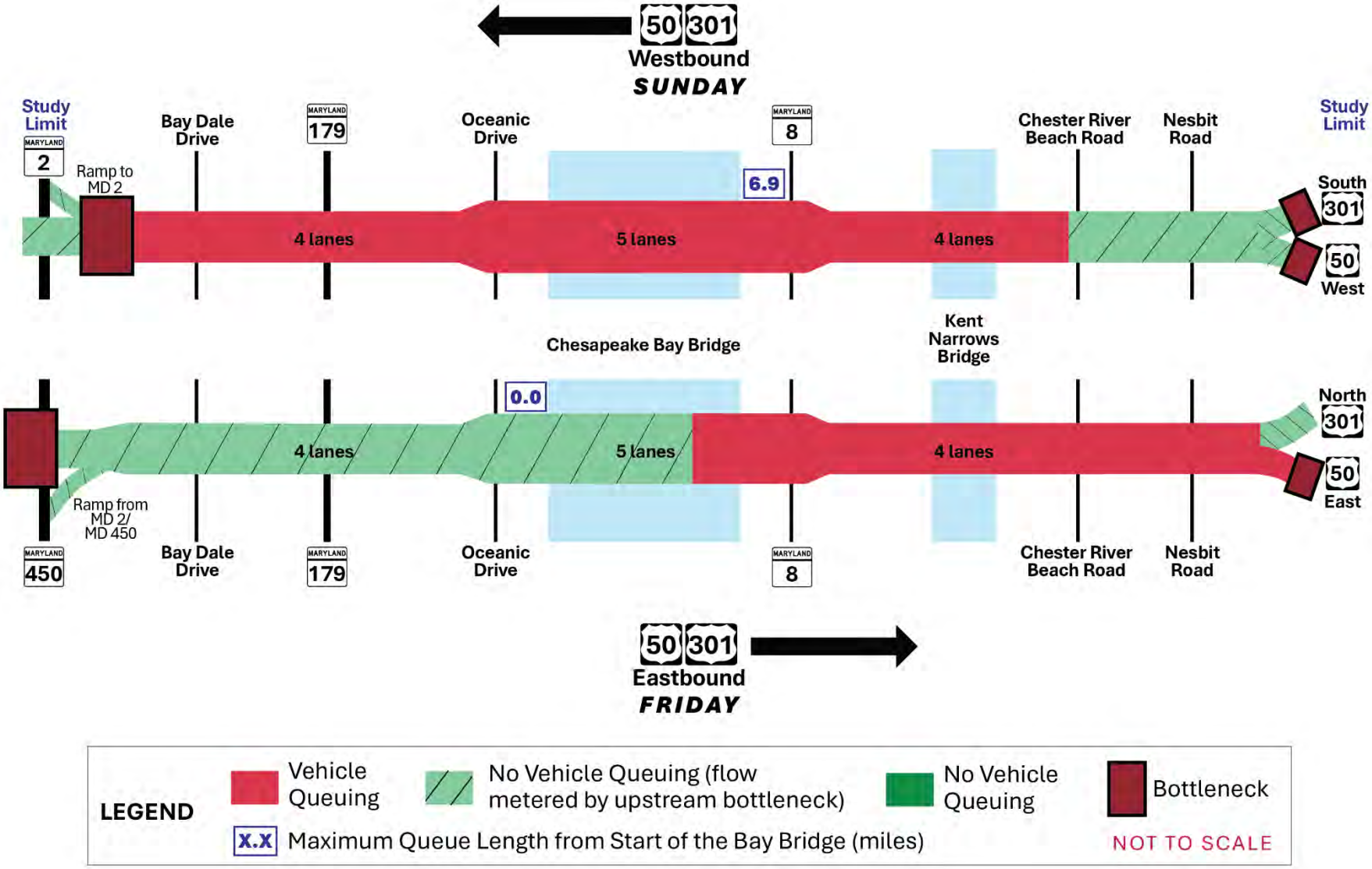


Figure 3-19: Bottleneck Diagram: Alternative F/G (8-10-8) during 2045 SWED (Eastbound Friday, Westbound Sunday)



3.5.3.6 Reliable Travel Times

Reliable travel time is a need of the Tier 2 Study because it is highly desirable for a traveler to know how long their trip will take with some degree of certainty. The unreliable travel times are generally caused by two factors: contraflow (two-way) operations and a lack of full shoulders.

All five lanes on the existing two bridge spans are capable of being reversed or operated in the opposite direction (contraflow) to accommodate a broad range of operating conditions. Examples of these different conditions include operating three eastbound lanes during the weekday PM peak period; operating three lanes eastbound on Fridays and Saturdays during the summer peak; and lane closures in either direction due to incidents or maintenance operations. The most frequent departure from normal lane configuration operation is where the southernmost lane on the three-lane westbound span operates eastbound providing a third eastbound lane to accommodate heavy traffic volumes. This condition is called "contraflow" or locally known as "two-way traffic."

Under existing conditions and Alternative A (No-Build), contraflow provides flexibility for the MDTA to respond quickly to rapidly changing traffic conditions, but it also limits the traveling public's ability to reasonably estimate their travel times through the corridor. A traveler may not know whether one, two, or three lanes will be open in their direction of travel because of the following reasons:

- **Traffic Volumes:** The MDTA strives to balance the length of the queue on both approaches without overly impeding emergency service access. This can lead to implementation of the contraflow lane at different times of the day. For example, the contraflow lane on the westbound bridge span typically operates eastbound during weekday PM peak periods, but it could end early if westbound queues build unexpectedly causing backups across Kent Island. Another example is on summer Saturdays where volumes are high in both directions and the MDTA has to be flexible when they start and stop the eastbound contraflow lane, based on the volume of westbound traffic.
- **Inclement Weather:** The MDTA does not operate contraflow during inclement weather, such as high winds, heavy rain/snow, fog, or other adverse weather conditions.

Additionally, both bridge spans have less than one-foot shoulders between the travel lanes and the bridge barrier on both sides of the spans. The lack of adequate width shoulders diminishes travel time reliability for the following reasons:

- **Maintenance:** With narrow shoulders on the existing bridge spans, nearly all maintenance activity on the bridge deck requires the closure of at least one lane. This maintenance could include larger planned rehabilitation, minor emergency repairs, or debris removal.
- **Minor incidents:** A stalled vehicle, flat tire, or minor crash/fender bender requires a lane closure, because there are no shoulders for those vehicles to use.

These factors would be addressed with the build alternatives because they would limit the use of two-way operations. On a regular day, the number of lanes would remain consistent with all build alternatives and inclement weather would not affect the number of lanes operating on each bridge. The full-width shoulders would accommodate a stalled vehicle, minor incident, and minor maintenance.

3.5.3.7 Local Mobility – Diversions

Mobility is a Tier 2 Study need because congestion can limit mobility and connectivity within local communities inhibiting access to important resources. During peak travel periods, traffic congestion on U.S. 50/301 results in traffic spilling over onto local roadways of adjacent communities in the study area. This practice inadvertently causes local traffic backups. These diversions occur on roads such as Whitehall Road on the Western Shore and MD 18 on the Eastern Shore. If there are no queues on U.S. 50/301, traffic does not divert to local roads. However, when there is a queue on U.S. 50/301, there is likely to be diversion if a driver anticipates they will have a shorter travel time on the local roadway than on U.S. 50/301.

These diversions to local roads were addressed at a qualitative level. The extent of the diversion and the location where diversions from U.S. 50/301 start vary based on the length of the queue on U.S. 50/301; they also vary hour-to-hour and day-to-day. Starting in summer 2023, SHA, Anne Arundel County, and Queen Anne's County tried to discourage vehicles from diverting onto local roads by temporarily closing key entrance ramps approaching the Bay Bridge and close to the Bay Bridge during summer peak periods. Traffic that attempted to divert to local roads could not get back onto U.S. 50/301 close to the bridge, thus discouraging them from diverting in the first place. In 2025, SHA continued with this pilot project by temporarily closing some entrance ramps approaching the Bay Bridge to determine if the closures reduce diversions that impact local traffic conditions. These operational changes are likely to continue in the future and perhaps be modified to address growth in traffic volumes in the study area. However, to provide a consistent basis of analysis across all the alternatives, these operational changes were not factored into the qualitative analyses.

On NSWDs, approaching the Bay Bridge, queues are expected to occur in both directions under Alternative A (No-Build), but they are not expected under any of the build alternatives. Downstream of the Bay Bridge, queues are not expected on the Eastern Shore; however, queues originating at either the Bay Dale Drive or MD 2/MD 450 interchanges are expected on the Western Shore in all the alternatives. Qualitatively, these queues could lead to some traffic diverting to MD 2 northbound. Diversions of traffic destined for the Severn River Bridge would be unlikely, due to the indirectness of the diversion routes.

During SWEDs, approaching the Bay Bridge from the Western Shore, only Alternatives A (No-Build) and D and E (8-8-8) would be expected to experience queuing, and it would be less than two miles. Approaching the Bay Bridge from the Eastern Shore, all alternatives would be expected to have queues extending back to the U.S. 50/301 split. Therefore, similar levels of traffic diversions would be likely under all alternatives.

During SWEDs, downstream of the Bay Bridge on both the Eastern and Western shores, queuing would be anticipated with all the build alternatives. This congestion would be expected to lead to traffic diversion on both shores.

3.5.4 Summary of Traffic Results

3.5.4.1 Queuing

NSWD Conditions

As shown in **Figure 3-20**, for NSWD conditions eastbound, queuing would not occur at the Bay Bridge for any of the build alternatives (Alternatives B through G) but there would be a 1.7-mile queue for Alternative A (No-Build). In addition, queuing would not occur on the Eastern Shore,

downstream of the Bay Bridge for any of the alternatives. Queuing would not occur at the Bay Bridge for any of the build alternatives because traffic headed towards the bridge is metered at MD 2/MD 450, which reduces the amount of traffic that can get to the bridge. Additionally, the build alternatives would provide more capacity over the Bay Bridge compared to Alternative A (No-Build).

As shown in **Figure 3-21**, for NSWD conditions westbound, there would be a 2.4-mile queue for Alternative A (No-Build). Queuing would not occur at the Bay Bridge for any of the build alternatives (Alternatives B through G) because the build alternatives would provide additional capacity over the Bay Bridge compared to Alternative A (No-Build). However, queuing would occur on the Western Shore, downstream of the Bay Bridge in all alternatives due to the increase in volume from traffic entering U.S. 50/301 on the Broadneck Peninsula between the Bay Bridge and the western study limit. The queue downstream of the Bay Bridge would be 3.9 miles starting at Bay Dale Drive for Alternative A (No-Build), 2.8 miles starting at Bay Dale Drive for Alternatives B and C, 0.9 mile starting at MD 2/MD 450 for Alternatives D and E, and 0.2 mile starting at MD 2/MD 450 for Alternatives F and G.

SWED Conditions

As shown in **Figure 3-22**, for SWED conditions eastbound, queuing at the Bay Bridge would vary by alternative. Alternatives B and C (6-8-6) and F and G (8-10-8) would not have queues at the Bay Bridge because they would provide additional travel lanes over the Bay Bridge compared to both Alternative A (No-Build) and the approaches. Since the Bay Bridge has a lower capacity than the approach roadways, the additional travel lanes across the bridge in Alternatives B, C, F, and G would counteract the drop in capacity across the bridge. Starting at the approach to the Bay Bridge, Alternative A (No-Build) would have a queue that extends beyond the study limits (greater than 7.1 miles), and Alternatives D and E (8-8-8) would have a 1.9-mile queue.

For SWED conditions eastbound, queuing at the U.S. 50/301 split, caused by the existing bottleneck on U.S. 50 east of the split, would vary by alternative. Alternative A (No-Build) would not have queues extending back from the U.S. 50/301 split because the Bay Bridge would meter the traffic, thereby reducing the volumes that could get to the east end of the study limits. However, all the build alternatives (Alternatives B through G) would have queues at this location because of the additional lanes on the Bay Bridge allowing more volume to reach the Eastern Shore. The queue within the study limits from the U.S. 50/301 split for Alternatives B and C (4.4 miles) would be shorter than the queues for Alternatives D and E (11.1 miles) and F and G (10.3 miles), which would extend back onto the Bay Bridge.

As shown in **Figure 3-23**, for SWED conditions westbound, queuing at the Bay Bridge would occur with all alternatives, including Alternative A (No-Build). The queues within the study limits on the approach to the Bay Bridge would be 11.1 miles for Alternatives A (No-Build), B and C, and D and E, and 6.9 miles for Alternatives F and G. For all alternatives except for Alternatives F and G (8-10-8), the queues would be expected to extend beyond the U.S. 50/301 split. The queues would not predominantly be caused by the Bay Bridge itself, but more so by the lane drop at the west end of the study limits and the queues formed at the Bay Dale Drive and MD 2/MD 450 interchanges spilling back across the Bay Bridge.

For SWED conditions westbound, queuing on the Western Shore would vary by alternative. Alternative A (No-Build) would not have queues on the Western Shore because the Bay Bridge would meter the traffic thereby reducing the volumes that could get to the west end of the study

limits. The build alternatives would all have queues on the Western Shore due to an increase in volume of traffic entering the highway from the Broadneck Peninsula and the higher volume resulting from the additional lanes on the Bay Bridge. The total queue within the study limits for Alternatives B and C would be 19.7 miles, starting at the Bay Dale Drive interchange, extend across the Bay Bridge and beyond the U.S. 50/301 split. The total queue within the study limits for Alternatives D and E (20.3 miles) would start at the MD 2/MD 450 interchange, extend across the Bay Bridge and beyond the U.S. 50/301 split. The total queue within the study limits for Alternatives F and G (16.2 miles) would be shorter than the other build alternatives and it would not extend to the U.S. 50/301 split. The queue for Alternatives F and G would start at MD 2/MD 450, so the length on the Western Shore would be the same as Alternatives D and E and longer than Alternatives B and C. Alternatives D, E, F, and G would include a lane drop from 8 lanes to the existing 6 lanes further contributing to the congestion.

3.5.4.2 Travel Time

The travel times and average speeds are shown in **Table 3-17** for NSWD conditions and in **Table 3-18** for SWED conditions.

NSWD Conditions

For NSWD conditions eastbound approaching the Bay Bridge, all build alternatives would have similar travel times (6 to 8 minutes) and would be shorter than the travel time for Alternative A (No-Build) (17 minutes). The travel times for the build alternatives would be 53 to 65 percent shorter compared to Alternative A (No-Build). The travel time across the Bay Bridge and to the eastern study limit would be similar for all alternatives (16 to 17 minutes).

For NSWD conditions westbound approaching the Bay Bridge, all build alternatives would have similar travel times (9 to 10 minutes) and would be shorter than the travel time for Alternative A (No-Build) (20 minutes). The travel times for the build alternatives would be 50 to 55 percent shorter compared to Alternative A (No-Build). The travel time across the Bay Bridge and to the western study limit would vary for each build alternative (27 minutes for Alternative B and C, 16 minutes for Alternatives D and E and F and G) but would still be shorter than Alternative A (No-Build) (33 minutes). Alternative B and C would be 18 percent shorter, and Alternatives D and E and F and G would be 51 percent shorter compared to Alternative A (No-Build).

SWED Conditions

For SWED conditions eastbound approaching the Bay Bridge, all build alternatives would have similar travel times (6 to 10 minutes) and would be substantially shorter than Alternative A (No-Build) (54 minutes). The travel times for the build alternatives would be 81 to 89 percent shorter than Alternative A (No-Build). The travel times across the Bay Bridge and to the eastern study limit would be longer for all build alternatives (31 minutes for Alternatives B and C, 67 minutes for Alternatives D and E, and 79 minutes for Alternatives F and G) than Alternative A (No-Build) (16 minutes). These longer travel times would be due to the additional lanes on the Bay Bridge allowing more traffic to cross the Bay. Alternatives B and C are the build alternatives that would have the shortest travel time across the Bay Bridge and to the eastern study limit.

For SWED conditions westbound approaching the Bay Bridge, travel times would vary for all alternatives. Alternatives B and C would have a similar travel time (75 minutes) and Alternatives F and G would have a shorter travel time (58 minutes) compared to Alternative A (No-Build) (79 minutes), but Alternatives D and E would have a longer travel time (92 minutes) compared to

Alternative A (No-Build). Despite the fluctuation in travel times, all alternatives would have travel speeds below 10 mph. The travel time across the Bay Bridge and to the western study limit would be longer for all build alternatives (51 minutes for Alternatives B and C, 62 minutes for Alternatives D and E, and 78 minutes for Alternatives F and G) than Alternative A (No-Build) (13 minutes). The longer travel times associated with the build alternatives are due to the additional lanes across the bridge allowing more traffic to cross the Bay. Alternatives B and C are the build alternatives that would have the shortest travel time across the Bay Bridge and to the western study limit.

3.5.4.3 Throughput

For NSWD conditions in both directions, Alternative A (No-Build) would have 80 to 90 percent throughput and all build alternatives would have 90 to 100 percent throughput.

For SWED conditions eastbound, Alternative A (No-Build) would have 60 to 70 percent throughput, Alternatives B and C (6-8-6) would have 80 to 90 percent throughput, and Alternatives D and E (8-8-8) and F and G (8-10-8) would have 90 to 100 percent throughput.

For SWED conditions westbound, Alternative A (No-Build) would have 70 to 80 percent throughput and all build alternatives would have 80 to 90 percent throughput.

On NSWDs and SWEDs in both directions, all build alternatives show an improvement in throughput at the Bay Bridge over Alternative A (No-Build) because of the additional lanes on the Bay Bridge. The difference in throughput between the build alternatives contributes to how they would each perform in terms of queuing and travel times within the corridor, as discussed above.

3.5.4.4 Overview

For eastbound traffic approaching the Bay Bridge, all build alternatives would provide an improvement over Alternative A (No-Build) for both NSWD and SWED conditions. There would be no queues with the build alternatives for NSWD conditions, and the only queue for SWED conditions would be for Alternatives D and E, which would still be shorter than Alternative A (No-Build).

For eastbound traffic departing the Bay Bridge, all alternatives would provide essentially the same conditions, with no queuing downstream of the Bay Bridge. For SWED conditions, congestion would be expected with all build alternatives, due partially to more lanes on the bridge allowing more traffic to cross the Bay. The queue would be the shortest for Alternatives B and C (6-8-6).

For westbound traffic approaching the Bay Bridge, all build alternatives would provide an improvement over Alternative A (No-Build) for NSWD conditions. For SWED conditions approaching the Bay Bridge, Alternatives B, C, D, and E would not be worse than Alternative A (No-Build) for SWED conditions.

For westbound traffic departing from the Bay Bridge, all build alternatives would provide an improvement over Alternative A (No-Build) for NSWD conditions. The build alternatives would still have queues downstream of the Bay Bridge, but they would be shorter than Alternative A (No-Build). For SWED conditions, congestion would be expected with all build alternatives, due partially to more lanes on the bridge allowing more traffic to cross the Bay. The queue in the study area would be the shortest for Alternatives B and C (6-8-6), because the backup would start further to the east at the Bay Dale Drive interchange compared to Alternatives D and E and F and G that starts at the MD 2/MD 450 interchange.

For NSWD conditions, the travel time through the study area in both directions for the build alternatives would be shorter than or approximately the same as Alternative A (No-Build). For SWED conditions, the travel time in both directions approaching the Bay Bridge would be shorter than or approximately the same as Alternative A (No-Build), with the exception of Alternative D and E westbound that would be longer. The travel time across the Bay Bridge in both directions and to the study limits would be longer for the build alternatives than Alternative A (No-Build) because the additional lanes across the bridge would allow more traffic to cross the Bay.

For NSWD and SWED conditions in both directions, throughput for all build alternatives would be higher than for Alternative A (No-Build).

Diversion to local roads would be expected in locations where there is queueing. Diversion would be expected to be largest for the alternatives with the longest queues.

Figure 3-20: Summary of Bottleneck Diagrams for Eastbound NSWD Conditions

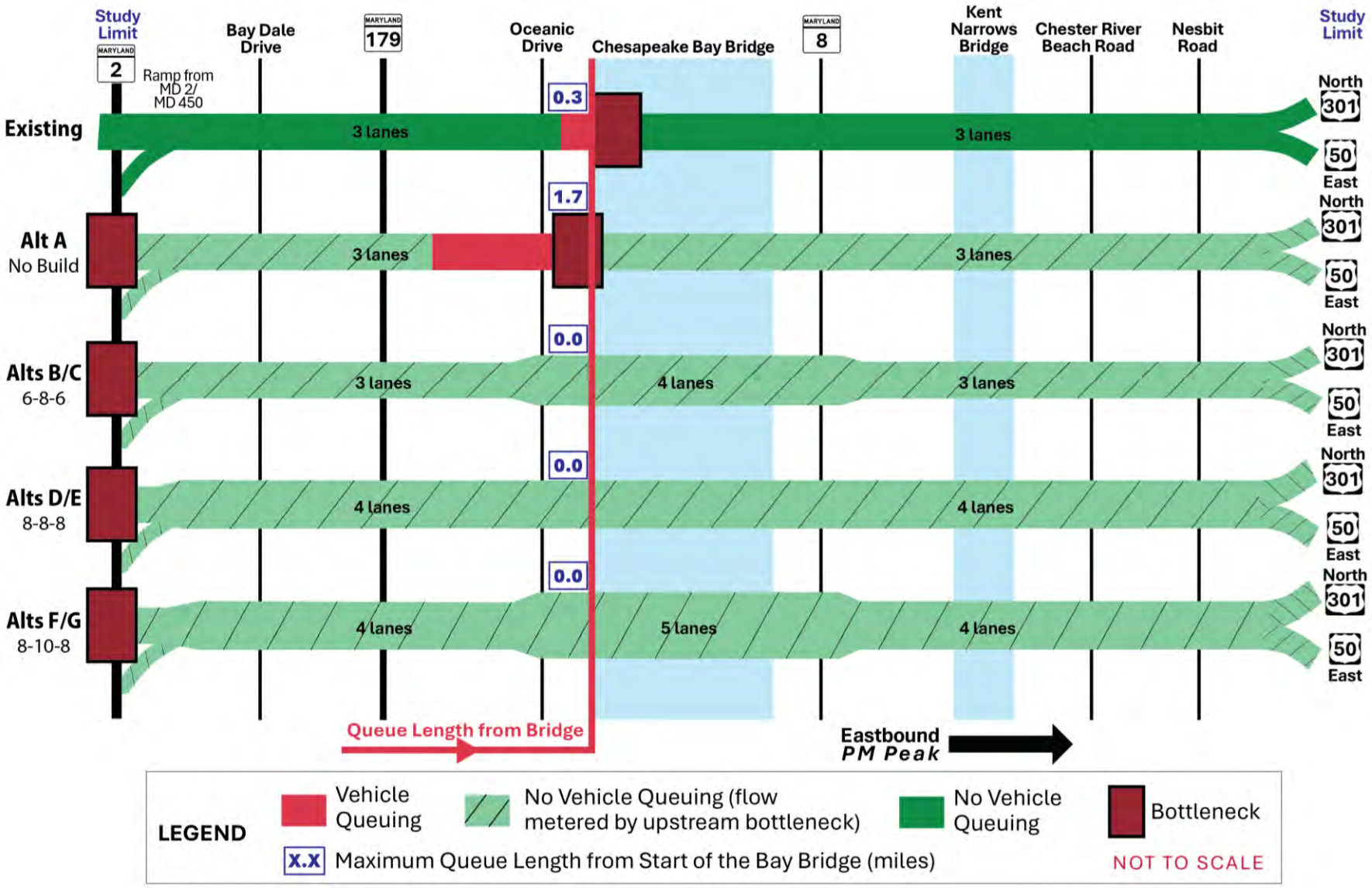


Figure 3-21: Summary of Bottleneck Diagrams for Westbound NSWD Condition

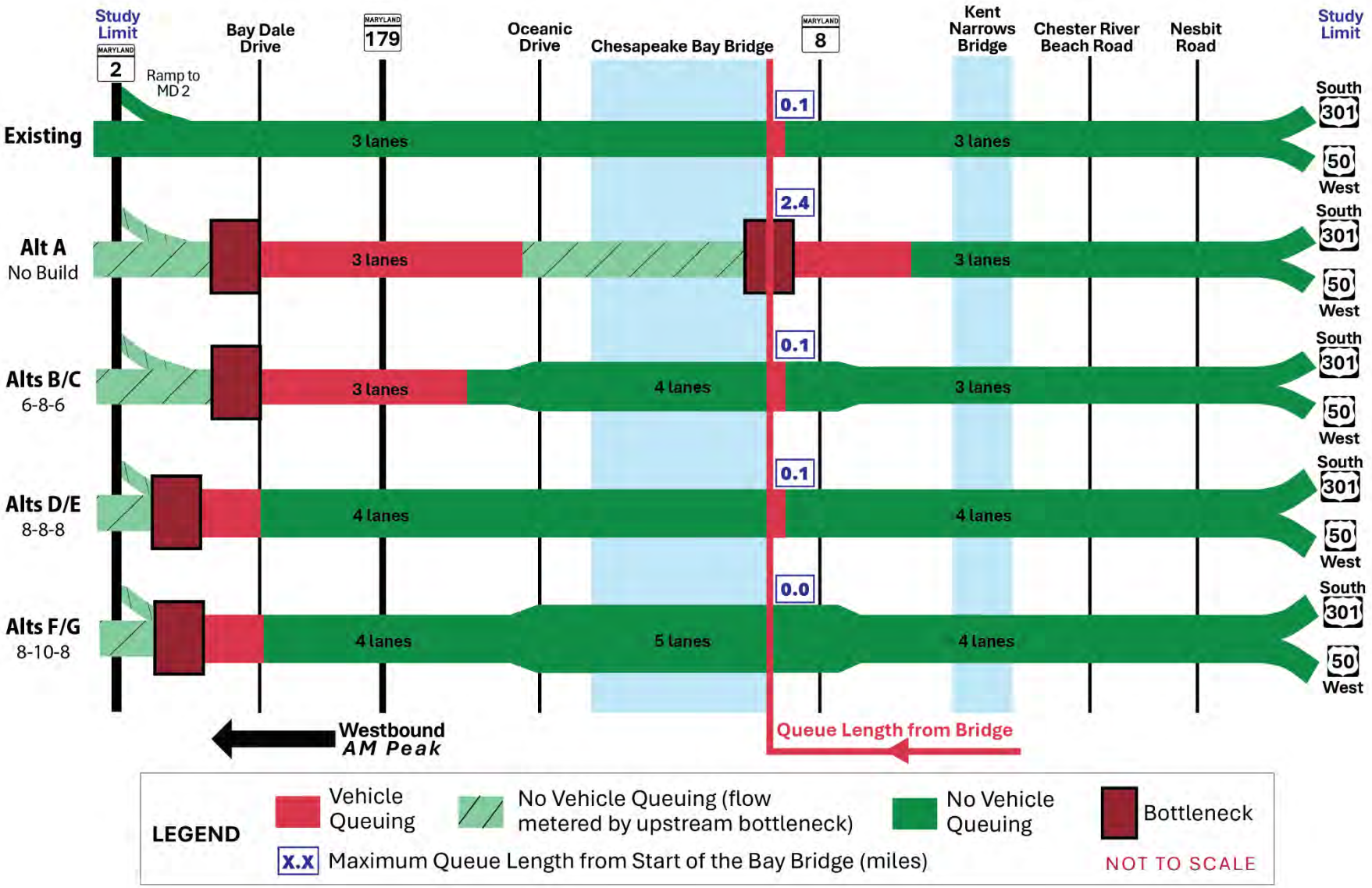


Figure 3-22: Summary of Bottleneck Diagrams for Eastbound SWED Conditions

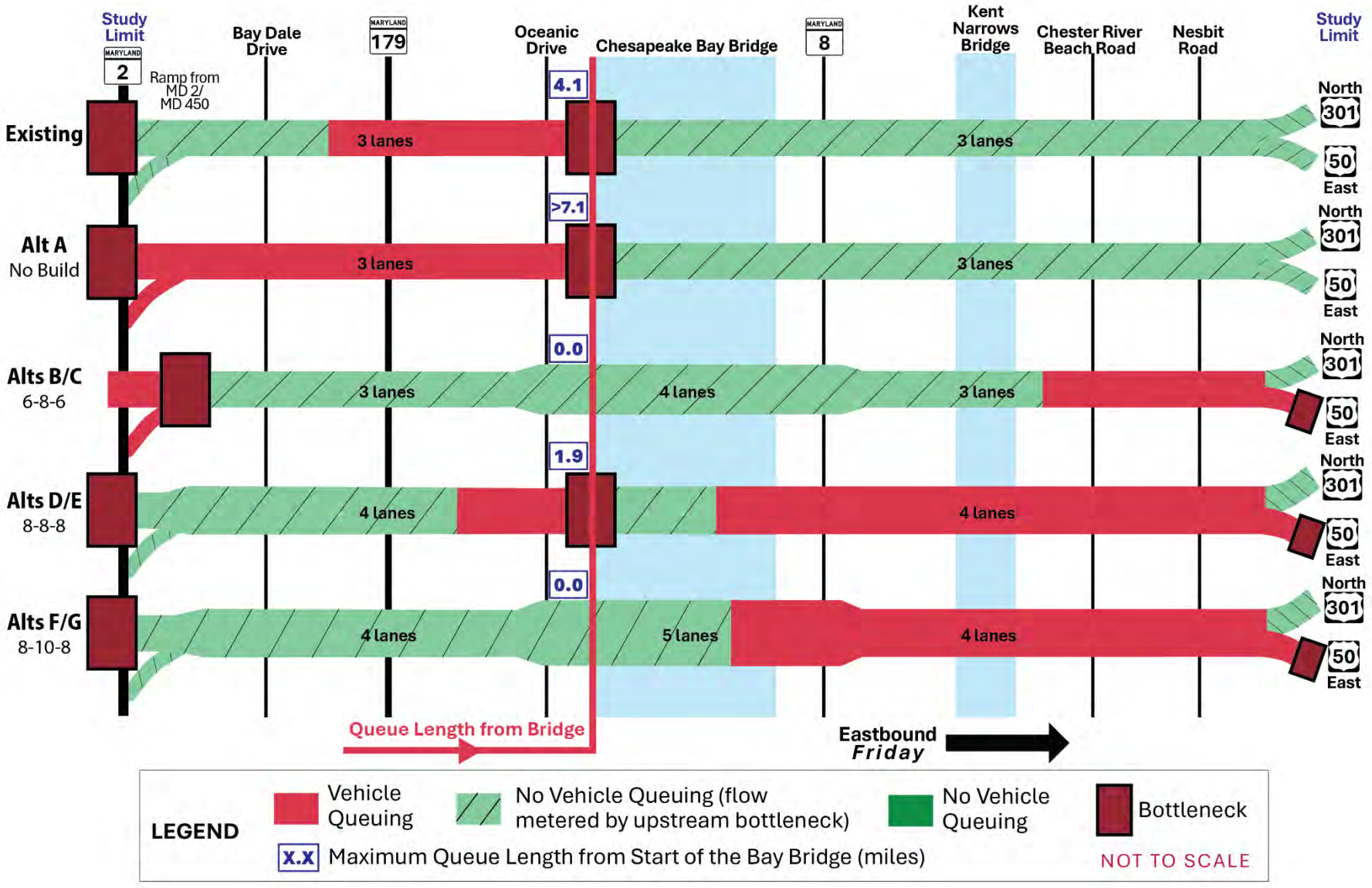


Figure 3-23: Summary of Bottleneck Diagrams for Westbound SWED Conditions

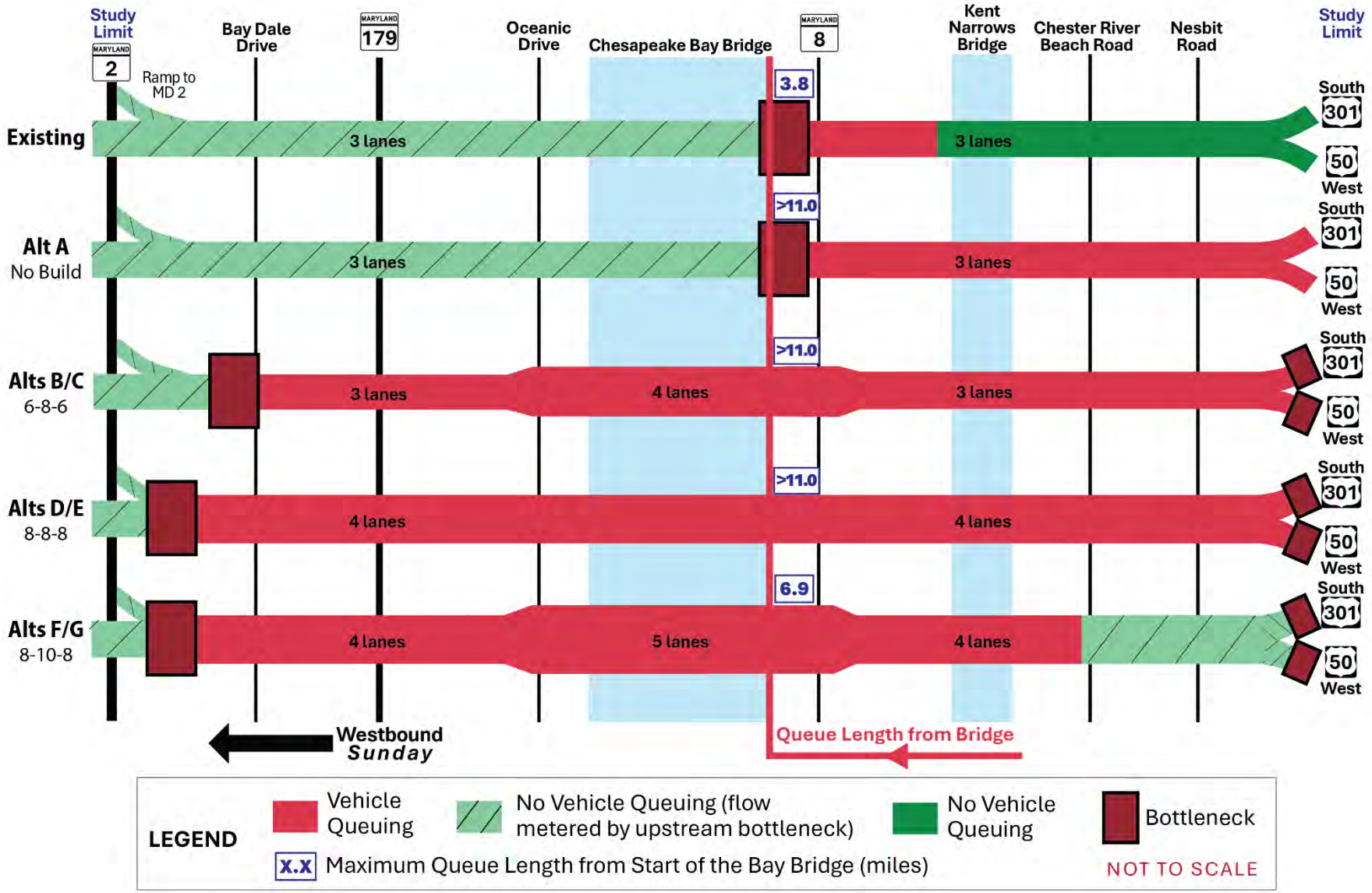


Table 3-17: Summary of NSWD Travel Times per Alternative

Location		Metric	Existing Conditions	Alternative A (No-Build)	Alternative B/C (6-8-6)	Alternative D/E (8-8-8)	Alternative F/G (8-10-8)
Eastbound on U.S. 50/301	MD 2/ MD 450 to start of Bay Bridge	Max Travel Time (min)	6	17	8	6	6
		Speed at Max Travel Time (mph)	50.0	17.6	37.5	50.0	50.0
	Start of Bay Bridge to U.S. 50/301 split	Max Travel Time (min)	16	16	17	17	17
		Speed at Max Travel Time (mph)	55.9	55.9	52.1	52.1	52.1
Westbound on U.S. 50/301	U.S. 50/301 split to start of Bay Bridge	Max Travel Time (min)	9	20	9	10	9
		Speed at Max Travel Time (mph)	57.3	25.8	57.3	51.6	57.3
	Start of Bay Bridge to MD 2/ MD 450	Max Travel Time (min)	15	33	27	16	16
		Speed at Max Travel Time (mph)	44.5	29.5	34.8	42.8	42.8

Table 3-18: Summary of SWED Travel Times per Alternative

Location		Metric	Existing Conditions	Alternative A (No-Build)	Alternative B/C (6-8-6)	Alternative D/E (8-8-8)	Alternative F/G (8-10-8)
Eastbound on U.S. 50/301	MD 2/ MD 450 to start of Bay Bridge	Max Travel Time (min)	32	54	9	10	6
		Speed at Max Travel Time (mph)	9.4	5.6	33.3	30.0	50.0
	Start of Bay Bridge to U.S. 50/301 split	Max Travel Time (min)	16	16	31	67	79
		Speed at Max Travel Time (mph)	55.9	55.9	32.1	21.4	17.5
Westbound on U.S. 50/301	U.S. 50/301 split to start of Bay Bridge	Max Travel Time (min)	30	79	75	92	58
		Speed at Max Travel Time (mph)	17.2	6.5	6.9	5.6	8.9
	Start of Bay Bridge to MD 2/ MD 450	Max Travel Time (min)	13	13	51	62	78
		Speed at Max Travel Time (mph)	49.1	49.1	13.5	11.9	8.6