II. ALTERNATES CONSIDERED

A. I-95 Master Plan Concepts

As previously discussed in Chapter I: *Purpose and Need*, the I-95 Master Plan (which was adopted by the Authority in April 2003 and concurred upon by the resource agencies) identified the need for four independent projects and their termini along the John F. Kennedy Memorial Highway (JFK). The I-95 Master Plan also considered six conceptual highway alternates for each of the four independent projects (including the Section 100 Project), and recommended which should be carried forward. The six concepts considered represented a broad range of potential highway improvements. The following provides a description of each of the six conceptual alternates.

1. Concept C-1: No-Build

The No-Build Concept would retain the existing I-95 highway and associated interchanges in their present configurations, and allow for routine maintenance and safety upgrades. Existing I-95 would remain four lanes per direction from the I-895(N) split to just north of MD 43. Although this concept would not meet the needs of the project, it was recommended for further evaluation as a baseline for comparing other alternates.

2. Concept C-2: All Lanes Tolled

The All Lanes Tolled Concept would require tolls on all existing and any additional travel lanes. This concept would assume six lanes per direction between the I-895(N) split and I-695 (i.e., the addition of two new lanes), and four lanes per direction from I-695 to just north of MD 43 (i.e., no lanes added). In addition, this concept would include the addition of auxiliary collector-distributor (C-D) lanes where needed to improve traffic operations and safety.

The tolling of all lanes would be expected to increase peak hour traffic volumes on parallel routes (primarily US 40, US 1, and MD 7) by 25 to 70 percent, causing operational failures along the entire highway network. Improvements to the parallel routes could increase environmental and community impacts related to transportation needs. Based on this assessment, the All Lanes Tolled Concept was not considered reasonable, and was therefore dismissed from further consideration.

3. Concept C-3: High Occupancy Vehicle (HOV) Lanes

This concept would include a total of six lanes per direction between the I-895(N) split and the I-695 Interchange, all of which would be general purpose lanes (i.e., the addition of two new general purpose lanes). Between I-695 and MD 43, this concept would propose to add one HOV lane per direction, resulting in a total of five lanes per direction, four of which would be general purpose lanes, and one of which would be an HOV lane.

HOV lanes would be expected to create an incentive for carpooling. Traffic analyses indicated that during the weekday, the peak hour/peak direction traffic in the general purpose lanes would operate at or above capacity (Level of Service (LOS) E and LOS F), while the HOV lane would operate between LOS B and LOS C. While the HOV lanes may encourage carpooling, their location adjacent to the median would require motorists to cross three or more general purpose lanes to access the HOV lane. In conclusion, traffic analysis indicated that LOS F is anticipated during the weekday on sections of the general purpose lanes and no dramatic relief would be provided by the single HOV lane. Based on this assessment, the HOV Lanes Concept was considered unable to meet the project need of improving congestion, and was therefore dismissed from further consideration.

4. Concept C-4: Reversible Lanes

This concept would include the addition of a two-lane separated and reversible roadway in the median through the entire study area. This concept would result in a total of ten lanes - four general purpose lanes in each direction, and two reversible lanes located between the northbound and southbound lanes, separated from the general purpose lanes by median barriers. The reversible roadways could be operated as managed lanes (HOV, tolled expressway, or other) in the peak direction during weekday and weekend peak periods.

During the weekday, the peak hour/peak direction traffic in the general purpose lanes would operate at or above capacity (between LOS E and LOS F), while the reversible lanes would operate between LOS A and LOS B. During the weekend, the study area roadway would operate at or above capacity (between LOS E and LOS F) in the direction in which the reversible roadway is not in operation.

It is anticipated that the Reversible Lanes Concept would work well during weekday peak periods (traffic flow is 65 percent in the peak direction); however, serious operational and maintenance concerns would arise when peak directions of flow were not established (50 percent north/50 percent south). Reversing traffic flow direction could take up to one hour for each four-mile section of roadway, and would reduce roadway capacity during flow reversal.

Since the peak traffic volumes during holidays and weekends are evenly distributed between directions, this concept would not offer the necessary flexibility for successful traffic management of regional traffic flows. In addition, extensive geometric modifications would be essential at connecting interchanges, and bridge replacement would be required, incurring substantial costs due to restricted placement opportunities for structural piers.

Based on this assessment, the Reversible Lanes Concept was found to be unable to meet the project need of reducing congestion, and was considered to be unreasonable due to extensive geometric modifications, costs, and time constraints required to both construct and operate the facility. This concept was therefore dismissed from further consideration.

5. Concept C-5: Managed Roadways

The Managed Roadways Concept would include the addition of two managed lanes per direction from I-895 to the I-695 Interchange, which would be separated from the general purpose lanes and one another by barriers. From I-695 to the MD 43 Interchange, a C-D roadway, consisting of two lanes, would be added. This would alter the roadway configuration to include two C-D lanes, three general purpose lanes, and two managed lanes per direction. Each type of roadway (i.e., general purpose, C-D, and managed) would be separated from one another by barriers, with an additional barrier serving as the median between the northbound and southbound roadways (i.e. a total of six additional lanes, four being managed lanes and two being C-D lanes).

The managed lanes could operate under a single management strategy 24-hours per day, or on a "time-share basis" with different restrictions at different times of day. Management strategies could include restrictions at access locations (ramps), by time of day (peak/off-peak), by vehicle type (trucks/buses), by type of use (commercial or occupancy-HOV), by price (tolling), or by direction (reversible). Managed lanes would be designed for flexibility so that management strategies could be modified over time to maximize person-moving capacity, optimize vehicle carrying capacity, and achieve transportation and community goals.

During the weekday, the peak hour/peak direction traffic in the general purpose lanes is projected to operate at or above capacity (between LOS E and LOS F), while capacity would be available in the managed lanes, which are projected to operate between LOS A and LOS B. During the weekend peak hour, the mainline general purpose lanes are projected to operate between LOS D and LOS E throughout the corridor. Modification of the management strategy to improve the traffic split between the general purpose and managed lanes is anticipated to provide a better LOS for all lanes. Based on this assessment, the Managed Roadways Concept was found to meet the project needs, and was considered reasonable. This concept was therefore recommended for further consideration and evaluation.

6. Concept C-6: General Purpose Lanes

This concept would include the addition of two new general purpose lanes in each direction (total of six lanes per direction) from the I-895(N) split to I-695, and the addition of one general purpose lane in each direction, plus two C-D lanes per direction (total of five general purpose lanes and two new C-D lanes per direction, separated by a barrier) from I-695 to just north of MD 43.

This concept would provide good overall traffic operations for both weekday and weekend peak periods. However, due to the number of accessible travel lanes provided, there is no readily available means to implement a travel demand management program and limited incentive for transit or carpooling. Based upon the traffic analysis, this concept was found to meet the needs of the project, and was therefore recommended for further consideration and evaluation.

In summary, the I-95 Master Plan process resulted in the recommendation of three concepts to be carried forward into preliminary engineering analysis – No-Build, General Purpose Lanes Concept, and Managed Roadways Concept. Federal and State agencies involved in the I-95 Master Plan process (including the United States Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE)) concurred in the decision to advance these concepts into preliminary engineering analysis, while eliminating the other concepts considered in the I-95 Master Plan process.

B. Development/Analysis of Preliminary Alternates

The I-95 Master Plan recommended three concepts for further study, including the No-Build, General Purpose Lanes, and Managed Roadways Concepts. The recommendation to carry these three concepts was concurred upon by the FHWA, EPA, USACE, NMF, MDE, and DNR during the development of the I-95 Master Plan. Additional agency concurrence was also provided at that time for the purpose and need for the I-95 improvements and the termini for all four independent projects.

Using the three concepts from the I-95 Master Plan that were recommended for further study, the project team developed preliminary engineering designs. The following is a description and analysis of the preliminary alternates. Additional details regarding these alternates can be found in the *Section 100: I-95, I-895(N) Split to North of MD 43 Alternatives Retained for Detailed Study (ARDS) Report* (Authority, 2004) prepared for this project.

1. Preliminary General Purpose Lanes Alternate (Including C-D Lanes)

This preliminary alternate was developed based on the General Purpose Lanes Concept from the I-95 Master Plan, and would include the provision of additional general purpose lanes to accommodate the projected traffic demand (***Figure II-1***). In addition, a barrier-separated C-D roadway would be provided from the I-695 Interchange to north of the MD 43 Interchange. In order to reach a peak hour/peak direction LOS E through the design year, this alternate would require a general roadway width of approximately 286 feet, and consist of the following:

- Four lanes in each direction of I-95 from approximately ¼ mile south of the I-895 Interchange to the point where I-95 merges with I-895,
- Six lanes in each direction between the I-895(N) split and I-695,
- Four general purpose lanes and three C-D lanes per direction (separated by barriers) between I-695 and MD 43, and
- North of MD 43, the roadway would transition from four general purpose and three C-D lanes per direction to the existing four general purpose lanes per direction.

2. Preliminary Managed Lanes Alternate (Including C-D Lanes)

This preliminary alternate was developed based on the Managed Roadways Concept from the I-95 Master Plan, and would include two managed lanes per direction between I-895 and north of MD 43 (with associated shoulders and barriers), plus additional general purpose lanes as needed (***Figure II-2***). In addition, a barrier-separated C-D roadway would be provided from I-695 to north of MD 43. In order to reach a peak hour/peak direction LOS E or better through the design year, this alternate would require the following number of lanes per direction, with a general roadway width of approximately 370 feet:

- Four general purpose lanes in each direction of I-95 from approximately ¼ mile south of the I-895 Interchange to the point where I-95 merges with I-895,
- Two managed lanes and four general purpose lanes in each direction between the I-895(N) split and I-695,
- A two-lane managed roadway, a three-lane general purpose roadway, and a three-lane C-D roadway in each direction between I-695 and MD 43, and
- North of MD 43, the roadway would transition from the eight-lane section (two-lane managed, three-lane general purpose, and three-lane C-D) in each direction into the existing four lanes in each direction.

3. Early Analysis of the Preliminary Alternates

Once the preliminary alternates were designed, the project team performed traffic and engineering analyses on each alternate. The original alternates included continuous barrier-separated C-D roadways from I-695 to north of MD 43 (as per the I-95 Master Plan Concepts). Analyses determined that the LOS criteria for the project could not be maintained through the MD 43/I-95 Interchange under this scenario, due to the high traffic volumes meant for the I-695 Interchange, which were being diverted through the MD 43 Interchange. In response, the project team examined the use of a local C-D roadway for only the MD 43 Interchange. However, the spacing between the I-695 and MD 43 Interchanges is insufficient to satisfactorily accommodate movements from the C-D lanes to the through lanes, and movements from the through lanes to the I-695 westbound deceleration lane. In addition, the incorporation of C-D lanes would require an expanded cross section, thereby requiring additional right-of-way, which would increase impacts to both the natural and man-made environment. Although the use of C-D lanes would reduce the number of conflict points, analyses indicate that they would not be necessary, and would not operate properly due to interchange spacing and/or traffic volumes.

Based upon this assessment, it was agreed that the C-D lanes should be removed from the General Purpose Lanes and Managed Lanes Alternate designs, as they would not improve the alternates' ability to meet the project needs, would not provide the originally intended function, and would increase impacts to the natural, cultural, and socio-economic environment. This agreement was reached with concurrence from the resource agencies, and in consultation with the Focus Group, as described in Chapter VI: *Coordination and Comments*.

C. Modifications to the Preliminary Alternates

The General Purpose Lanes Alternate and the Managed Lanes Alternate were modified based on the decision to eliminate C-D lanes from the preliminary designs.

1. General Purpose Lanes Alternate (Without C-D Lanes)

This alternate would include provisions of additional general purpose lanes to accommodate the projected traffic demand (***Figure II-1***). In order to reach a peak hour/peak direction LOS E through the design year, this alternate would consist of the following lane configurations, with a general roadway width of approximately 202 feet:

- Four lanes in each direction of I-95 from approximately ¼ mile south of the I-895 Interchange to the point where I-95 merges with I-895,
- Six lanes in each direction between the I-895(N) split and the MD 43 Interchange, and
- North of MD 43, the roadway would transition from six lanes in each direction to the existing four lanes in each direction.

2. Managed Lanes Alternate (Without C-D Lanes)

This alternate would include two managed lanes per direction between I-895 and north of MD 43 (with associated shoulders and barriers), plus additional general purpose lanes as needed (***Figure II-2***). In order to generally reach the peak hour/peak direction LOS E in the general purpose lanes and LOS D or better in the managed lanes through the design year, this alternate would require the following number of lanes per direction, with a general roadway width of approximately 262 feet:

- Four general purpose lanes in each direction of I-95 from approximately ¼ mile south of the I-895 Interchange to the point where I-95 merges with I-895,
- Two managed lanes and four general purpose lanes in each direction between the I-895(N) split and I-695,
- A two-lane managed roadway and a four-lane general purpose roadway in each direction between I-695 and MD 43, and
- North of MD 43, the roadway would transition from the six-lane section (two-lane managed and four-lane general purpose in each direction) into the existing four lanes in each direction.

The managed lanes could operate under a single management strategy 24-hours per day, or on a "time-share basis" with different restrictions at different times of day. Management strategies could include restrictions at access locations (ramps), by time of day (peak/off-peak), by vehicle-type (trucks/buses), by type of use (commercial/HOV), or by price (variable or fixed). Managed lanes would be designed for flexibility so that management strategies could be modified over time to maximize person-moving capacity, optimize vehicle carrying capacity, and achieve transportation and community goals.

D. Development/Analysis of Interchange Options

Originally, two interchange options were developed for each Build Alternate at each of the three interchange locations. These interchange options were based on the preliminary designs, which included C-D lanes. Details regarding these interchange designs can be found in the *Section 100: I-95, I-895(N) Split to North of MD 43 ARDS Report* prepared for this project. However, since C-D lanes were dismissed due to their inability to improve roadway capacity and safety conditions, and their increased man-made and environmental impacts, the interchange options were revised to accommodate the modified designs (without C-D lanes).

Using the modified alternate designs (without C-D lanes), two interchange options were developed for the General Purpose Lanes Alternate at each of the three existing interchange locations on I-95. For the Managed Lanes Alternate, two interchange options were developed for both the I-895 and MD 43 Interchanges, while three options were developed for the I-695 Interchange. The following is a summary of these interchange options. Details regarding these interchange designs can be found in the *Section 100: I-95, I-895(N) Split to North of MD 43 ARDS Report* prepared for this project.

1. General Purpose Lanes Alternate

a. I-95/I-895(N) Interchange

Option 2A: This interchange option would widen I-895 and I-95 on existing alignment, retaining I-895 as the through movement (***Figure II-3***).

Option 2B: This interchange option would adjust the configuration of the existing interchange by relocating the southbound roadway of I-95 and the northbound roadway of I-895 to make I-95 the through movement (***Figure II-4***).

b. I-95/I-695 Interchange

Option 2A: This interchange option would be a fully directional interchange, which would remove the braided mainline roadways on both I-95 and I-695, replacing them with mainline roadway alignments that would remain parallel. This would improve the interchange geometry and driver expectancy by replacing all left-hand entrances and exits with more conventional right-hand entrances and exits (***Figure II-5***). Driver expectancy describes situations that a driver would normally anticipate, such as exit ramps generally being located on the right side of the roadway.

Option 2B: This interchange option would maintain the braided mainline roadways on both I-95 and I-695. All left-hand exits and entrances would be retained. The movement from westbound I-695 to southbound I-95 would be replaced with a loop ramp (***Figure II-6***).

c. I-95/MD 43 Interchange

Option 2A: This interchange option would provide a single exit point on each approach with direct connections provided for all interchange movements. All weaving within the interchange would be eliminated (***Figure II-7***).

Option 2B: This option would provide a partial cloverleaf configuration, with two half-signals on MD 43 at the spur ramps. Weaving within the interchange would be minimized (***Figure II-8***).

2. Managed Lanes Alternate

a. I-95/I-895(N) Interchange

Option 3A: This option would adjust the configuration of the existing interchange by relocating the southbound roadway of I-95 and the northbound roadway of I-895 to make I-95 the through movement in the interchange (***Figure II-9***). In this option, the I-95 managed lane access points would be within the median, while the I-895 managed lane access points would exit the general purpose lanes and span over the I-95 general purpose lanes to merge into the I-95 managed lanes.

Option 3B: Like the I-95/I-895(N) Interchange Option 3A, this option would adjust the configuration of the existing interchange to make I-95 the through movement in the interchange (***Figure II-10***). However, this option differs from 3A in that the managed lanes for I-895 would stay within the median, thereby not requiring the spanning of the I-95 general purpose lanes.

b. I-95/I-695 Interchange

Option 3A: This interchange option would improve the geometry and driver expectancy on I-95 by removing the braided mainline of I-95 and replacing all left-hand entrances and exits with more conventional right-hand entrances and exits (***Figure II-11***). However, the braided alignment would be retained on I-695 to make efficient connections between the I-95 and I-695 roadways. I-695 general purpose lanes would be reconfigured to make right-hand single point connections, despite the maintenance of the braided alignment on I-695.

Option 3A Modified: This option would take option 3A to the next step by removing the existing braid on I-695 as well as removing the braiding on existing I-95. Driver expectancy would be further improved by eliminating all left-hand entrance and exit ramps from the higher volume general purpose lanes. A few left-hand access points would still remain, but would only be located on the low volume managed lane ramps. This option would also best facilitate maintenance of traffic during construction by spanning the existing braids of I-95 with northbound and southbound I-95 managed lanes (***Figure II-12***).

Option 3B: Like the General Purpose Interchange Option 2B, this option would maintain the braided mainline roadways on both I-95 and I-695, and retain all left-hand exits and entrances, but would add managed lane movements as well as general purpose movements. The movement from westbound I-695 to southbound I-95 would be replaced with a loop ramp. This option would be compatible with potential future managed lanes along I-695 west of I-95 (***Figure II-13***).

c. I-95/MD 43 Interchange

Option 3A: This option would include a single exit point on each approach with direct connections provided for all interchange movements. All weaving within the interchange would be eliminated under this option. Single-lane ramps would provide for all movements to and from the managed lanes, with the lanes connecting directly to MD 43 at a signalized intersection on the structure over I-95 (***Figure II-14***).

Option 3B: The features of this option would be similar to the 3A Interchange Option, in that single-lane ramps would be provided for all movements to and from the managed lanes. In an effort to minimize impacts to the traffic flows on MD 43, however, the MD 43 lanes would be realigned to avoid the managed lane intersection. This option would require two more bridge structures over I-95 than Option 3A (***Figure II-15***).

3. Analysis of Interchange Options

Interchange options were compared based on the analysis of: 1) operations/LOS; 2) design standards/exceptions; 3) environmental impacts; 4) displacements; 5) major utility involvement; 6) maintenance of traffic; 7) construction costs; and 8) maintenance considerations. These criteria were used to select one option per interchange for detailed study. The following summarizes the selected interchange options, and the reasoning behind their selection. The complete analysis summary for the I-895, I-695, and MD 43 Interchanges are provided in ***Table II-1, Table II-2, and Table II-3*** respectively.

a. General Purpose Lanes Alternate Interchange Options

I-95/I-895(N) Interchange: General Purpose Lanes Interchange Option 2B would provide route continuity with minimal cost difference to Option 2A. In comparison, Option 2A would be unable to provide route continuity and therefore would not best meet the capacity and safety needs of the project. Option 2A was therefore dismissed from further consideration, and Option 2B was retained for detailed study.

***I-95/I-695 Interchange*:** General Purpose Lanes Interchange Option 2A would best meet the safety needs of the project by providing substantial improvements regarding positive guidance such as signing and roadway markings, as well as driver expectancy. This would be accomplished by removing braided roadways and left-hand entries and exits. In addition, Option 2A would result in less environmental impacts than Option 2B. Based on this assessment, Option 2A was selected for detailed study, and Option 2B was dismissed from further consideration.

***I-95/MD 43 Interchange*:** General Purpose Lanes Interchange Option 2B would reduce impacts to the rubble landfill, require fewer structures over I-95, reduce impacts to adjacent development, and have no maintenance concerns, while providing the same LOS as Option 2A. Based on this assessment, Option 2B was found to best meet the project needs while minimizing impacts to the natural, cultural, and socio-economic environment, and was therefore selected for detailed study. Option 2A was dismissed from further consideration.

b. Managed Lanes Alternate Interchange Options

***I-95/I-895(N) Interchange*:** Managed Lanes Interchange Options 3A and 3B were very similar. However, studies showed that Option 3B would be easier to construct, require less right-of-way, and have no substantial difference in costs and environmental impacts as compared to Option 3A. Option 3B was therefore considered to best meet the needs of the project while minimizing impacts to the natural, cultural, and socio-economic environment, and was selected for detailed study. Option 3A was dismissed from further consideration.

***I-95/I-695 Interchange*:** Managed Lanes Interchange Option 3A Modified would best facilitate maintenance of traffic when compared to all other Managed Lanes Interchange Options. In addition, Option 3A Modified would have no substantial difference in environmental impacts compared to Option 3A, and would provide a higher design speed on the ramp from westbound I-695 to southbound I-95 compared to Option 3B. Based on this assessment, Option 3A Modified was found to best meet the project needs while minimizing impacts to the natural, cultural, and socio-economic environment, and was therefore selected for detailed study. Options 3A and 3B were dismissed from further consideration.

***I-95/MD 43 Interchange*:** Managed Lanes Interchange Option 3A would reduce impacts to the rubble landfill and minimize impacts to the existing power lines/substation. In addition, this option would eliminate the weaving sections, thereby best meeting the safety needs for the project. Based on this assessment, Option 3A was found to best meet the needs of the project while minimizing impacts to the natural, cultural, and socio-economic environment. Option 3A was therefore retained for detailed study, while Option 3B was dismissed from further consideration.

E. Alternates Retained for Detailed Study

Based upon the analyses described above, along with input gathered from the Focus Group and the November 18, 2003 Public Workshop (Chapter VI: *Coordination and Comments*), three alternates were recommended for further evaluation in detailed design. The following summarizes each of the ARDS.

Table II-1. I-895 Interchange Comparison Matrices

Evaluation Criteria	General Purpose Lane Alternative		Managed Lane Alternative	
	Option 2A	**Option 2B*** **	**Option 3A**	**Option 3B*** **
Operations / Level of Service	• The LOS design criteria for all interchanges of the General Purpose Lanes Alternate was LOS E or better. In comparing the No-Build to the General Purpose Lanes Alternate, this criteria provides significant improvements to the LOS for traffic in the peak direction during each peak hour.	• The LOS design criteria for all interchanges of the General Purpose Lanes Alternate was LOS E or better. In comparing the No-Build to the General Purpose Lanes Alternate, this criteria provides significant improvements to the LOS for traffic in the peak direction during each peak hour.	• *Pending. Goal is to provide LOS C for Managed Lanes* • Direct access is provided between the managed lanes to Moravia Road, but traffic exiting from the general purpose roadway to Moravia Road must weave with managed lanes traffic that proceeds southbound on I-895 through the Moravia Road interchange.	• *Pending. Goal is to provide LOS C for Managed Lanes.* • *Direct access, if warranted by traffic volumes, must be provided between the managed lanes to Moravia Road by direct connection to the Moravia Road overpass structure due to the short weaving distance across the I-895 general purpose lanes in each direction.*
Design Standards / Exceptions	• Widening without Geometric Improvement • Includes Left-hand Merge (NB I-895 to NB I-95 into dedicated lane) • Does not Provide Route Continuity • The I-895 interchange would continue to be deficient in regard to AASHTO criteria on route continuity • Left-hand merge (NB I-895 to NB I-95 into dedicated lane)	• Adjusts interchange geometry to provide route continuity along I-95 • Eliminates Left-hand Merge (NB I-895 to NB I-95 into dedicated lane)	• Southbound managed ramp flys over southbound I-95 general purpose lanes to access I-895 and Moravia Road. Northbound managed lane splits from northbound I-895 ramp and flys over northbound I-95 general purpose lanes to provide access to northbound I-95 managed lanes • Quicker tie-in to SB I-895 Road • Favors SB Managed Movement to Moravia Road. Lane Drop occurs on SB I-895 • Higher Profile of NB Managed with Respect to 62nd Ave • Higher Profile Of SB Managed with Respect to Schering Road • More Extensive Retaining Walls than 3B and General Purpose Options • Weave from SB Managed to Stay on SB I-895 • This option adjusts the existing interchange configuration to meet AASHTO requirements for route continuity. This option has flatter grades for I-895 relocated than Option 3B	• Median to Median Connections for Managed Lanes • Favors SB Managed Movement to SB I-895 • Lane Drop onto Moravia Road Off-ramp • Longer tie-in to SB I-895 • Off-ramp to Moravia Road overpass structure is required to provide direct access to Moravia Road from Managed Lanes of I-95 • This option improves positive guidance on the general purpose roadway by adjusting the interchange to meet AASHTO requirements for route continuity. Route continuity on the managed roadway can be addressed by adjustment of managed ramp locations • This option has steeper I-895 grades than option 3A.
Environmental Impacts	• Ties in Sooner on south leg of I-95 (lane drop with respect to tangent) • Least Impacts to Moores Run • No significant impact to existing noise walls anticipated	• Extended LOD for south leg of I-95 (lane drop with respect to tangent) • More Impacts to Moores Run than Option 2A. • No significant impact to existing noise walls anticipated	• This option provides the least impacts for the managed options as the managed and general purpose I-895 roadways split north of the Moores Run. • Noise Walls south of Chesaco Avenue are Impacted.	• This option can minimize impacts to wetlands and floodplain by bridging them, limiting impacts to the shading of wetlands under the managed and general purpose crossings over Moores Run • Noise Walls south of Chesaco Avenue are Impacted.
Displacements	• Least impact on existing development • 0 Displacements	• More impact to adjacent development than Option 2A • 0 Displacements	• This option results in greater right-of-way taking than option 3B to allow room for splitting the managed and general purpose roadways on the north side of the interchange. • There are no significant differences from the general purpose alternates with respect to displacements (none) or anticipated impacts to recreational facilities or historic or archeological sites. • 0 Displacements	• This option results in less right-of-way taking than option 3A as the managed and general purpose roadways split south of the interchange in an undeveloped area. There are no significant differences from the general purpose alternates with respect to displacements (none) or anticipated impacts to recreational facilities or historic or archeological sites. • 0 Displacements
Maintenance of Traffic	• Simple MOT	• More extensive MOT than 2A due to relocation of I-95 roadway.	• More difficult to construct	• Easier to construct than 3A.
Construction Costs	**$40 million -** Includes cost of rehabilitating and widening existing overpass structure for SB I-95	**$43 Million**	**$75 million.** Highest cost due to larger scope for structures.	**$73 million.** Does not include cost for direct connection to Moravia Road.
Maintenance Considerations	• Emergency crossovers are feasible between interchanges.	• Emergency crossovers are feasible between interchanges.	• Emergency crossovers may be feasible for managed lanes, but access between general purpose roadway must be provided via interchanges.	• Emergency crossovers may be feasible for managed lanes, but access between general purpose roadway must be provided via interchanges.
RECOMMENDED FOR DETAILED STUDY?	**No** - Does not provide route continuity.	**Yes** - Provides route continuity with minimal cost difference over Option 2A. Environmental impacts can further be minimized through spanning Moores Run.	**No**	**Yes** - Easier to Construct. No significant difference in cost and environmental impacts.

*** Options recommended for detailed study

Table II-2. I-695 Interchange Comparison Matrices

Evaluation Criteria	General Purpose Lane Alternative		Managed Lane Alternative		
	Option 2A* **	**Option 2B**	**Option 3A**	**Option 3A Modified*** **	**Option 3B**
Operations / Level of Service	• The LOS design criteria for all interchanges of the General Purpose Lanes Alternate was LOS E or better. In comparing the No-Build to the General Purpose Lanes Alternate, this criteria provides significant improvements to the LOS for traffic in the peak direction during each peak hour.	• The LOS design criteria for all interchanges of the General Purpose Lanes Alternate was LOS E or better. In comparing the No-Build to the General Purpose Lanes Alternate, this criteria provides significant improvements to the LOS for traffic in the peak direction during each peak hour.	• Pending. Goal is to provide LOS C for Managed Lanes	• Pending. Goal is to provide LOS C for Managed Lanes	• Pending. Goal is to provide LOS C for Managed Lanes.
Design Standards / Exceptions	• Modifies Existing Geometry to Replace All Left-Hand Merges/Diverges with Right-Hand. Requires removal of braided mainlines on both I-95 and I-695 • All Right-hand Entries and Exits • Removal of Braided Alignments Better Facilitates Future Capacity Improvements on Mainlines • Directional Ramp from WB to SB provides Higher Design Speed (50 mph) than Loop Ramp • Improves Tangent Lengths between Reverse Curves on Existing Interchange. • Directional Ramps and Mainline Connections to Reverse Traffic Flow in Braided Areas Must Be Constructed Before Removal of Braided Alignment, Resulting in Greatest MOT Complexity and Longest Project Duration of General Purpose Options. • Highest Interchange Profile of General Purpose Options.	• Retains Existing Geometry Except for Construction of Directional Connections to CD Roadway and Loop Ramp • Left-Hand Merges/Diverges Accommodate Higher Design Speeds for Ramps • Structures and Ramp Locations for Braided Roadways Limit Future Capacity Improvements for Both I-95 and I-695. • Design Speed Limited to 30 mph on Loop Ramp for movement from WB I-695 to SB-I-95. • Retains Deficient Tangent Lengths between Reverse Curves on Braided Roadways. • Directional Ramps and Mainline Connections to Reverse Traffic Flow in Braided Areas Must Be Constructed Before Removal of Braided Alignment, Resulting in Greatest MOT Complexity and Longest Project Duration of All Options. • Lowest Interchange Profile.	• Removes Braided Mainline on I-95 to Reduce Number of Left-Hand Merge/Diverge Movements and Improve I-95 Geometrics • No Left Merges/Diverges for Managed Roadways on I-95 • Removal of Braided Alignment Better Facilitates Future Capacity Improvements for I-95. • Directional Ramp from WB to SB General Purpose provides Higher Design Speed (50 mph) than Loop Ramp • Addresses Deficient Tangent Lengths between Reverse Curves on Existing Interchange Modest footprint • Higher interchange profile than Options 2A, 2B and 3B.	• Removes Braided Mainline on I-95 and I-695 to Reduce Number of Left-Hand Merge/Diverge Movements and Improve Geometrics on both Roadways • No Left Merges/Diverges for Managed Roadways on I-95. • Removal of Braided Alignment Better Facilitates Future Capacity Improvements for both I-95 and I-695. • Directional Ramp from WB to SB General Purpose provides Higher Design Speed (50 mph) than Loop Ramp • Addresses Deficient Tangent Lengths between Reverse Curves on Existing Interchange Modest footprint • Highest interchange profile.	• Retains Existing Geometry Except for Construction of Directional Connections to CD Roadway and Managed Roadways. • Requires Left-hand Merges (constrained by Lane Drops) for Managed Roadways on I-95 • Structures and Ramp Locations for Braided Alignment Limit Future Capacity Improvements for Both I-95 and I-695. • Low Design Speed (30 mph) for Loop Ramp • Retains Deficient Tangent Lengths between Reverse Curves on Braided Roadways. • Higher interchange profile than General Purpose Alternatives, but Lower than Other Managed Options. • Currently Includes Broken-back Alignments.
Environmental Impacts	• See Table 3	• See Table 3	• See Table 4	• See Table 4	• See Table 4
Displacements	• 4 Displacements • Wider footprint in SW Quadrant and Narrower Footprint in NE Quadrant than Option 2B.	• 4 Displacements • Narrower footprint in SW Quadrant and Wider Footprint in NE Quadrant than Option 2A. Footprint in NE Quadrant could be minimized by introducing compound curvature for Ramp GH.	• 9 Displacements • Wider Footprint in SE Quadrant	• 9 Displacements • Widest Footprint of All Options.	• 8 Displacements • Lessened Footprint in SE Quadrant
Major Utilities	• Impacts 4 electric transmission towers	• Does not impact electric transmission lines	• Impacts 10 electric transmission towers	• Impacts 10 electric transmission towers	• Impacts 10 electric transmission towers
Maintenance of Traffic	• Directional Ramps and Mainline Connections to Reverse Traffic Flow in Braided Areas Must Be Constructed Before Removal of Braided Roadways, Resulting in Greatest MOT Complexity and Longest Project Duration of the General Purpose Options.	• MOT on I-95 primarily accomplished through widening and traffic shifts, resulting in greater MOT complexity and project duration than Option 3A-Mod.	• Directional Ramps and Mainline Connections to Remove Braided Roadways will Complicate MOT and Lengthen Project Duration over all other identified Options.	• Facilitates MOT and lessens Construction Duration on I-95 Mainline by relocating I-95 traffic to Managed Roadway while General Purpose Roadways are Constructed. MOT on I-695 is facilitated by connecting general purpose ramps outside braided roadways. Less temporary roadways required than other managed options.	• MOT on I-95 primarily accomplished through widening and traffic shifts, resulting in greater MOT complexity and project duration than Option 3A-Modified.
Construction Costs	**$236 million**	**$208 million**	**$363 million**	**$406 million** - Note that significant MOT Savings are anticipated but cannot be quantified without preparation of MOT plans for comparison.	**$344 million**
Maintenance Considerations	• Emergency crossovers are feasible between interchanges. • Greater Height and Longer Lengths of Bridges than Option 2B.	• Emergency crossovers may be feasible for managed lanes, but access between general purpose roadway must be provided via interchanges. • Lowest Heights and Shortest Lengths of Bridges of any Option.	• Emergency crossovers may be feasible for managed lanes, but access between general purpose roadway must be provided via interchanges. • Median (in numeric sense) Height and Median Length Bridges for Managed Options.	• Emergency crossovers may be feasible for managed lanes, but access between general purpose roadway must be provided via interchanges. • Highest and Longest Bridges of Any Option.	• Emergency crossovers may be feasible for managed lanes, but access between general purpose roadway must be provided via interchanges. • Lowest and Shortest Bridges of Any Managed Option.
RECOMMENDED FOR DETAILED STUDY?	**Yes** - Significant Improvements in Regard to Positive Guidance and Driver Expectancy by Removing Braided Roadways and left-hand entries and exits. Less Environmental Impacts than Option 2B.	**No**	**No**	**Yes** - Best facilitates MOT among all Managed Options. No significant difference in impacts from Option 3A. Higher design speed on ramp from WB I-695 to SB-I-95 than reflected in Option 3B. Significant improvements in regard to positive guidance and driver expectancy on both I-95 and I-695 by removing braided	**No**

*** Options recommended for detailed study

Table II-3. MD 43 Interchange Matrices

Evaluation Criteria	General Purpose Lane Alternative		Managed Lane Alternative	
	Option 2A	**Option 2B*** **	**Option 3A*** **	**Option 3B**
Operations / Level of Service	• LOS E or better for weekday operations	• LOS E or better for weekday operations	• LOS E or better for weekday operations**	• LOS E or better for weekday operations***
Design Standards / Exceptions	• Fully direction interchange eliminates weaving sections along I-95 • Two high volume (>1,000 vph), low speed (<35 mph) loop ramps • No signalized intersections • All right-hand entries and exits • Ramp from SB I-95 to WB MD 43 relocated further east of Honeygo Blvd intersection • Improves tangent lengths between curves	• Partial cloverleaf configuration eliminates weaving sections along I-95 • Two high volume (>1,000 vph), low speed (<35 mph) loop ramps • Two partial traffic signals required on MD 43 • Ramp from SB I-95 to WB MD 43 relocated further east of Honeygo Blvd intersection • Improves tangent lengths between curves	• Fully direction interchange eliminates weaving sections along I-95 • Two high volume (>1,000 vph), low speed (<35 mph) loop ramps • Signal control of MD 43 through traffic • Managed lane intersects directly with MD 43 at a traffic signal	• MD 43 through lanes split around separate managed lane interchange • One high volume (>1,000 vph), low speed (<35 mph) loop ramp • Two left-side exits (EB MD 43 to NB I-95, WB MD 43 to SB I-95) and one left side entrance (SB I-95 to EB MD 43) • Weaving section created on EB MD 43 • All managed lane traffic enters/exits MD 43 on the left • Vertical constraints limit design speed on MD 43
Environmental Impacts	• Within existing footprint, except the NE quadrant (rubble landfill)	• Less impacts to rubble landfill	• Minor impacts to rubble landfill	• Major impacts to rubble landfill
Displacements	• More impacts to adjacent development • 3 Displacements	• Less impacts to adjacent development • 2 Displacements	• Minor impacts to adjacent development • 2 Displacements	• None • 5 Displacements
Major Utilities	• No impacts to existing power lines/substation • No impact to 108” water main	• No impacts to existing power lines/substation • No impact to 108” water main	• No impacts to existing power lines/substation • No impact to 108” water main	• Potential relocation of overhead electric transmission towers/lines • No impact to 108” water main
Maintenance of Traffic	• Construction of four separate structures over I-95	• Construction of two separate structures over I-95 (two less than Option 2A)	• Requires reconstruction of interchange then construction of managed lanes • Construction of two separate structures over I-95	• Construction of three separate structures over I-95
Construction Costs	• **$98 million**	• **$91 million**	• **$166 million**	• **$188 million**
Maintenance Considerations	• Re-decking of two single lane bridges	• None	• Access to managed lanes at interchanges only • Re-decking of two single lane bridges	• Access to managed lanes at interchanges only
RECOMMENDED FOR DETAILED STUDY?	**NO**	**YES –** This option provides an acceptable LOS in the Design Year with a cost significantly lower than the remaining options.	**YES –** This option provides acceptable LOS for a significant reduction in cost over 3B and 3B Modified.	**NO**

** Levels of service are based on the latest available managed lane traffic volume projections. The managed lane strategy to be implemented is still under investigation, and thus the LOS results are subject to change. It is anticipated that the options could be modified slightly as necessary to accommodate any changes in projected managed lane traffic volumes.

*** Options recommended for detailed study

1. Alternate 1 - No-Build

The No-Build Alternate would be restricted to normal maintenance and safety improvements. There would be no increase in roadway capacity, and I-95 would remain four lanes in each direction from the I-895(N) split to approximately the New Forge Road overpass. As a result, LOS would continue to degrade, and there would be no reduction in the accident rate. This alternate was carried as a baseline for comparison.

2. Alternate 2 - General Purpose Lanes

The General Purpose Lanes Alternate (***Appendix A, Plates 1-26***) would operate at peak hour/peak direction LOS E, and would consist of:

- Four lanes in each direction on I-95 from approximately ¼ mile south of the I-895 Interchange to the point where I-95 merges with I-895,
- Six lanes in each direction between the I-895(N) split and MD 43,
- North of MD 43, the roadway would transition from six lanes in each direction to the existing four lanes in each direction,
- Incorporation of the I-95/I-895(N) Interchange Option 2B (as described in Section II-D1a and ***Figure II-4***),
- Incorporation of the I-95/I-695 Interchange Option 2A (as described in Section II-D1b and ***Figure II-5***), and
- Incorporation of the I-95/MD 43 Interchange Option 2B (as described in Section II-D1fc and ***Figure II-8***).

Additional details regarding Alternate 2 and the proposed interchange options can be found in the *Section 100: I-95, I-895(N) Split to North of MD 43, ARDS Report* prepared for this project. A typical section is provided in ***Figure II-1*** (without C-D Roadways).

3. Alternate 3 - Managed Lanes

The Managed Lanes Alternate would include two managed lanes in each direction from I-895 to north of MD 43, plus additional general purpose lanes. This alternate would generally operate in the peak hour/peak direction at LOS E in the general purpose lanes and at LOS D or better in the managed lanes, and would require the following (***Appendix B, Plates 27-52***):

- Four general purpose lanes in each direction of I-95 from approximately ¼ mile south of the I-895 Interchange to the point where I-95 merges with I-895,
- Two managed lanes and four general purpose lanes in each direction between the I-895(N) split and I-695,
- Two managed lanes and four general purpose lanes in each direction between I-695 and MD 43,
- North of MD 43, the roadway would transition from the six-lane section (two-lane managed and four-lane general purpose) in each direction into the existing four lanes in each direction),

- Incorporation of the I-95/I-895(N) Interchange Option 3B (as described in Section II-D2a and ***Figure II-10***),
- Incorporation of the I-95/I-695 Interchange Option 3A Modified (as described in Section II-D2b and ***Figure II-12***), and
- Incorporation of the I-95/MD 43 Interchange Option 3A (as described in Section II-D2c and ***Figure II-14***).

The managed lanes could operate under a single management strategy 24-hours per day, or on a "time-share basis" with different restrictions at different times of day. Management strategies could include restrictions at access locations (ramps), by time of day (peak/off-peak), by vehicle-type (trucks/buses), by type of use (commercial/HOV), or by price (variable or fixed). Managed lanes would be designed for flexibility so that management strategies could be modified over time to maximize person-moving capacity, optimize vehicle carrying capacity, and achieve transportation and community goals.

Additional details regarding Alternate 3 and the proposed interchange options can be found in the *Section 100: I-95, I-895(N) Split to North of MD 43, ARDS Report* prepared for this project. A typical section is provided in ***Figure II-2***.

F. Comparison of Alternates

The following discussion is a comparison of the General Purpose Lanes and Managed Lanes Alternates, based on five categories of evaluation criteria including ability to meet purpose and need, environmental impacts, operational efficiency, fiscal responsibility, and regulatory compliance.

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

1. Ability to Meet Purpose and Need

a. *Congestion*

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

Table II-4 provides a summary of the future LOS for the alternates considered. Overall, the Managed Lanes Alternate would better accommodate traffic and minimize congestion. Managed lane strategies preserve a portion of the highway capacity for priority needs by providing opportunities for eligible vehicles to maintain generally free flow speeds on the designated lanes. Managed lanes could establish stable travel speeds and vehicle spacing, thus maximizing vehicle throughput on the highway.

On I-95 Section 100, the Managed Lanes Alternate would be better at providing superior service for motorists that utilize the managed lanes (separated from the general purpose lanes) which are anticipated to be operated at or above LOS D during weekday peak periods. The LOS for the managed lanes would vary depending upon the strategy that was utilized. The operation of the managed lanes would affect the LOS for the general purpose lanes depending on the number of trips that are not taken, are made during a non-peak period of travel and/or change travel modes. The managed lane strategies could range from forms of pricing to vehicle type or use to access control to time of day. Each strategy would present unique characteristics causing trade-offs between the associated LOS. These management strategies may be combined and modified to achieve changing regional transportation goals. Maximum flexibility of a managed lane system will best meet changing needs for the safe and efficient movement of people and goods across all transportation modes. One of the keys to the success of the managed lanes concept is the ability to alter the operation of the lanes in ways that keep traffic flowing and provides flexibility for the lanes to be open to more or different user groups, during day-to-day operations of the lanes or in situations where isolated incidents such as major accidents or other events block the movement of traffic.

One of the potential benefits of managed lanes is the ability to manage peak demand and satisfy mobility needs by encouraging shifts in travel time from the peak demand period to periods of lower demand. Highways could be priced to encourage travel during off-peak periods of demand while offering travel choices during peak periods of demand.

The Managed Lane Alternate is designed to maintain management strategy options. This flexibility will allow for adjustments over time to provide for predictable and dependable travel times and speeds. Predictable travel times promote transit by providing reliable service due to a known consistent level of service along the roadway.

Table II-4. Project Weekday 2025 LOS Summary

Alternate	Roadway Section		AM Peak Period		PM Peak Period	
			NB	SB	NB	SB
No-Build	I-895 to I-695		D	F	F	D
	I-695 to MD 43		D	F	F	E
General Purpose Lanes	I-895 to I-695		B	E	E	C
	I-695 to MD 43		C	E	E	C
Managed Lanes(1)	I-895 to I-695	ML	A	A-D	A-D	A
	I-895 to I-695	GP	C	E-F	E-F	C
	I-695 to MD 43	ML	A	A-C	A-D	A
	I-695 to MD 43	GP	C	E-F	E-F	D
(1) Varying management strategies for the Managed Lanes Alternate will influence the anticipated level of service.						

b. Safety

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

Roadway safety is often influenced by the number of lanes in each direction. For example, if there are too few lanes, it may be difficult for vehicles behind a slower moving vehicle to transfer out of that lane, as the other lanes may already be operating at high capacity. On the other hand, the operator of a disabled vehicle can find it difficult to maneuver onto the shoulder if there are too many lanes to cross.

The General Purpose Lanes Alternate would consist of six contiguous lanes in each direction; this could generate difficulty for disabled vehicles trying to access the shoulder, and would increase the number of lanes that a driver must traverse to exit the highway.

The Managed Lanes Alternate would consist of two contiguous managed lanes and four contiguous general purpose lanes in each direction, with a concrete traffic barrier separating the two roadway types. The managed lanes are expected to be operated at LOS D or better, thereby allowing for gaps in traffic where vehicles can switch lanes to pass other drivers. By separating the general purpose and managed lanes and providing a maximum of four contiguous lanes, safety would be enhanced through a reduction of lanes to be traversed when entering or exiting, and allowing disabled vehicles to more easily access the shoulder.

The provision of managed lanes could reduce congestion, improve emergency response times, separate vehicles by size, and/or reduce the number of conflict points between vehicles, thereby providing opportunities for improved public safety. In addition, the

managed lanes alternate could improve work zone safety by allowing for off-peak closures of the managed or general purpose system thus reducing conflict points between motorists and maintenance or construction activities.

c. Intermodal Access

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

Section 100 provides access to the Port of Baltimore, Baltimore Washington International (BWI), and Martin State Airports, Amtrak rail service, and the local transit system. In order to provide dependable intermodal connectivity, it is important that highway travel times remain fairly consistent, and that those times be perceived as reasonable by users.

The General Purpose Lanes Alternate would involve the addition of lanes as necessary to accommodate the projected traffic volumes. This alternate would have a moderate effect on bus transit in the Section 100 corridor. Although the capacity of I-95 would increase in Section 100, all travelers including transit services would experience decreasing benefits as traffic volumes grow over time.

The Managed Lanes Alternate would involve the addition of two managed lanes per direction between I-895 and north of MD 43. This alternate would also include four general purpose lanes to accommodate projected traffic volumes. Bus transit could benefit from the implementation of managed lanes. Managed lane strategies preserve a portion of the highway capacity for priority needs by providing opportunities for eligible vehicles, such as buses, to maintain generally free-flow travel speeds on designated lanes. By utilizing the managed lanes buses could benefit from the higher level of service that could be provided in these managed lanes. Managed lanes could improve the attractiveness of transit services by providing reliable and predictable transit service times. Therefore by implementing managed lanes, bus ridership would likely increase. Access to and from the managed lanes at interchanges where transit services are planned would be considered in the design of the Managed Lanes Alternate.

The success of a managed lane system hinges on a user's ability to consistently experience a predictable travel time and a facility operator's ability to consistently manage traffic volumes to provide the expected travel speed and travel time with a high degree of certainty. Predictable travel times create advantages for transport fleets with schedules to meet such as those engaged in transit services or commercial "just in time" freight delivery services.

Based on this assessment, the Managed Lanes Alternate would best provide for intermodal access, because it is anticipated that the managed lanes would operate at LOS D or better, thereby providing faster, more consistent travel conditions as compared to the General Purpose Lanes Alternate, which would operate at LOS E during weekday peak periods.

2. Environmental Impacts

a. Natural and Human Environment

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

Managed lanes could provide long term environmental benefits by reducing the need for future highway widening and the associated environmental impacts. Managed lanes could also provide short-term environmental benefits such as reduced vehicle emissions by establishing a stable travel speed.

A detailed comparison of the natural and human environmental impacts are included in Chapter IV: *Environmental Consequences.*

b. Land Use Impacts

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

A detailed comparison of the land use impacts is included in Chapter IV: *Environmental Consequences.*

3. Operational Efficiency

a. Incident Management

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

It is essential that police, fire, rescue, and maintenance personnel be able to respond quickly to an incident by accessing the site, assessing the nature of the incident, and taking appropriate measures. To that end, both of the Build Alternates have been designed with 14-foot shoulders. This would not only provide additional clearance for emergency vehicles using the shoulders, but would also give the emergency responders additional room to establish their work perimeter and the necessary traffic control measures.

Of the two Build Alternates, the Managed Lanes Alternate would offer the most benefit for incident management. First, physical separation of the general purpose and managed lanes would provide adjacent detour routing and/or access for emergency services during traffic related and other incidents. In addition, the managed lanes would provide emergency responders with unimpeded access throughout Section 100, since the managed lanes would operate at LOS D or better. Furthermore, by having a maximum of four contiguous lanes (general purpose) and additional shoulders associated with the managed lanes, additional areas would be available for crews to work and safely access the site.

b. Facility Maintenance

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

Heavily traveled Interstate facilities require substantial levels of routine maintenance such as the replacement of pavement markings and overhead lights, cleaning of drainage systems, replacement/repair of guardrail and energy absorption systems, repaving/resurfacing, and upkeep of stormwater management (SWM) facilities. High traffic volumes make almost any maintenance activity a major undertaking. As a result, most maintenance is performed off-peak, quite often at night.

Of the two Build Alternates, the Managed Lanes Alternate would offer the least obstacles to facility maintenance. Most work could be done off-peak by diverting traffic to either the managed lane roadway or to the general purpose roadway. There would be minimal effort and materials required to redirect the traffic, and worker safety would be enhanced by the concrete barrier that would separate them from the traffic.

c. Enforcement

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

4. Fiscal Responsibility

a. Operational Cost

The term No-Build is often misleading. It does not mean that there would be no cost associated with this alternate. Rather, it means that no funds would be expended to increase the capacity of the roadway. There would still remain significant costs associated with maintaining the facility. This would include activities such as roadway resurfacing, bridge replacement, signing, lighting, pavement markings, etc. However, these costs were not calculated for the purposes of this comparison.

The General Purpose Lanes Alternate preliminary cost estimate is approximately $452,026,668, while the Managed Lanes Alternate preliminary cost estimate is approximately $821,635,146. These preliminary costs do not include right-of-way, mitigation and aesthetic enhancement costs. *[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]*

5. Regulatory Compliance

[This section reflects a preliminary comparison of the Build Alternates. It is expected that this section will be modified and expanded before the EA is circulated for public review and comment.]

The Section 100 Alternates have been developed in compliance with the National Environmental Policy Act (NEPA) as well as several other applicable state and federal regulations including, but not limited to, the Endangered Species Act (ESA) Section 7, Section 4(f), Section 404, Executive Order 12898 Environmental Justice, Conformity/Planning, and Section 106.