Appendix F

Interchange Comparison Matrices

I-895 INTERCHANGE COMPARISON MATRICES

Prepared: January 8, 2004

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

I-695 INTERCHANGE COMPARISON MATRICES

Prepared: January 8, 2004

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

MD 43 INTERCHANGE COMPARISON MATRICES

Prepared: January 8, 2004

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