5. Recommendations

The I-95 Corridor Study has analyzed current and future year travel demand, given the existing roadway conditions, and developed a set of Preferred Concepts for improving safety and capacity at three existing interchanges and along the I-95 mainline. These concepts have been coordinated closely with VDOT and the study's Technical Advisory Committee, resulting in a consensus-based set of solutions.

The overall recommendation of this study is for the stakeholders of the I-95 corridor in the study area to consider the Preferred Concepts described in this report in their ongoing planning processes, and in preserving right-of-way for future capacity improvements. Specific recommendations are described below, including possible implementation strategies for a master plan of Preferred Concepts.

5.1 Possible Master Plan

During this study, the Preferred Concepts were further analyzed to determine how a "Master Plan" of projects could be developed and programmed. Through the analysis process, these "ultimate" concepts were found to adequately handle the traffic volumes projected for the year 2025. This analysis led to suggestions on interim solutions as project phases, as well as how much the improvements may cost.

Given a set of planned project phases within a master plan, interim solutions can be implemented as land development increases along the corridor and traffic volumes grow. Stakeholders may wish to determine thresholds of development activity that would initiate the design and construction of the interim phases of the ultimate solutions. Of course, the full solution could be planned and programmed at any time, given available budget and the desires of Hanover County, the Town of Ashland, VDOT, and the Commonwealth Transportation Board.

Thus, two approaches to constructing each of the interchange Preferred Concepts include: (1) proceeding through a sequence of several projects, individually programmed; or (2) proceeding through a single project with multiple phases. The same approach could be taken with widening the mainline as part of the interchange projects and as a set of stand-alone projects, especially between the Route 54 and Route 30 interchanges.

Multiple projects programmed individually can lengthen the duration of the interchange project and increase overall costs. However, gradual development may warrant such programming. Duration of the construction of the ultimate improvements would be increased as a result of stopping and starting the different projects. The duration could also increase if the projects are not properly sequenced in the VDOT Six-Year Improvement Program. Costs of the projects would increase due to additional temporary improvements, as well as the ancillary modifications made to the roadways to maintain traffic.

Programming a single project with multiple phases allows more control over cost and schedule, given a consistent funding stream. This phased approach also results in a smoother transition of construction from phase to phase, and limits adverse impacts on the traveling public.

Whether a series of individual projects or phases of single projects, it is recommended that the Preferred Concepts of improvements to the I-95 interchanges, as shown in Figures 4-1 through 4-4, be executed as part of a Master Plan as described below. These improvements could be implemented through the VDOT Six-Year Improvement Program.

5.2 Possible Interim Projects

Each of the interchange concepts described in this study could be implemented in phases as a series of interim projects. In addition, more immediate projects or short-term solutions could be implemented to enhance the capacity of the existing interchanges and the I-95 mainline. Recommended interim projects and short-term solutions are described below.

5.2.1 I-95 / Route 802 Interchange (Lewistown Road)

Given that the ultimate solution for Year 2025 conditions is a full cloverleaf, the following short-term and longer-term interim solutions could be implemented:

- Install traffic signals at the intersections of the ramps with Route 802 and coordinate signals with those at the Air Park Road and Lake Ridge Parkway intersections.
- Widen and lengthen interchange ramps to accommodate additional traffic and to provide greater deceleration distance and additional distance for merging.
- Widen Route 802 to provide short exclusive left turn lanes to access I-95 ramps.
- Implement ITS applications such as ramp metering.
- Replace bridge to fix clearance deficiencies, ideally constructing the bridge needed for the ultimate interchange configuration.
- Construct partial cloverleaf interchange of one, two, and/or three loops (SE, NE, and NW loops) as part of the ultimate configuration. Such a solution requires a new bridge. Build SW loop in long term.
- Construct CD roads on east side of I-95 (if building SE and NE loops).

5.2.2 I-95 / Route 54 Interchange (Ashland)

The ultimate solution for Year 2025 conditions is a partial cloverleaf, a flyover ramp, and a second off-ramp to meet the needs of anticipate traffic movements. The following short-term and longer-term interim solutions could be implemented:

- Install traffic signals at the intersections of the I-95 ramps with Route 54 and coordinate signals along England Street in Ashland.
- Add/upgrade wayfinding signage to inform drivers of destinations (Exit 92A vs. 92B).
- Widen and lengthen interchange ramps to accommodate additional traffic and to provide greater deceleration distance and additional distance for merging.
- Provide short, exclusive left turn lane for westbound Route 54 turning to southbound I-95. The existing median could be modified to accommodate 2-3 vehicles.
- Implement ITS applications such as ramp metering.

- Replace bridge to fix clearance deficiencies, ideally constructing the bridge or bridges needed for the ultimate interchange configuration.
- Construct SE loop to eliminate left turns at the intersection east of I-95.
- Construct CD roads on the east side of I-95 (if building SE loop).

5.2.3 I-95 / Route 30 Interchange (Kings Dominion)

Given that the ultimate solution for this interchange in Year 2025 conditions is a modified cloverleaf, with new and upgraded ramps and a new flyover ramp into the Kings Dominion (KD) theme park, the following short-term and longer-term interim solutions could be implemented:

- Install a traffic signal at the intersection of the southbound I-95 ramp with Route 30 to address safety concerns.
- Coordinate signals along Route 30 to accommodate traffic entering Kings Dominion from the south.
- Add/upgrade wayfinding signage along interstate and on the ramps, especially on the I-95 NB ramp leading to both Route 30 and to the KD entrance. Inform drivers to use right 2 lanes (or more if Route 30 is widened) for entering KD.
- Reconfigure Kings Dominion parking gates to minimize backups on I-95. Move gates to the east to provide more storage for arriving cars. Consider upgraded, efficient “mega-gate” to handle all incoming vehicles, eliminating gate just each of the flyover bridge.
- Widen and lengthen interchange ramps to accommodate additional traffic and to provide greater deceleration distance and additional distance for merging.
- Implement ITS applications such as ramp metering, highway advisory radio (HAR), variable message signs (portable or permanent), and CCTV cameras.
- Replace bridges to address increases in traffic, ideally constructing the bridges needed for the ultimate interchange configuration.
- Construct SE and NE loops as interim solutions
- Construct CD roads on east side of I-95 (if building SE and NE loops).

5.2.4 I-95 Mainline

The ultimate solution for the mainline, as analyzed by the study team and described in this report, is a 10-lane section, varying from a narrow, 250-foot section with a median barrier to a wider section, greater than 350 feet, with a median of grass, trees, or forest. Widening 13.5 miles of interstate highway from 6 to 10 lanes is a significant undertaking. Not only will costs be substantial, but construction will also impact an already heavy stream of traffic.

As the Commonwealth progresses toward the ultimate solution for the mainline to meet the needs of 2025 traffic conditions, the following short-term and interim solutions are possible:

- Implement ITS applications such as HAR, variable message signs (portable or permanent), and CCTV cameras.

- Lift commercial restrictions (i.e., trucks required to use right 2 lanes only) during incidents. Inform drivers through HAR, variable message signs, and local radio stations.
- Establish procedures for formal use of diversion routes (U.S. 1 and U.S. 301) during incidents through informing drivers at strategic locations using HAR, variable message signs, and local radio stations.
- Install communication system as part of any interchange or mainline improvement project.
- Add/upgrade wayfinding signage along interstate for destinations such as Kings Dominion, Virginia Beach, and other tourist spots.
- Replace bridges to fix clearance issues, ideally constructing the bridges needed for the ultimate interchange configuration.

5.3 Rough-Order-of-Magnitude Costs

To provide decision-makers with a range of probable costs for the improvements to the existing interchanges and the widening of the I-95 mainline, the study team prepared a rough-order-of-magnitude (ROM) cost estimate for use in implementing the possible master plan of Preferred Concepts. Costs were projected on a per mile basis of roadway, square footage of bridges, and a per acre basis of right-of-way. Planning costs per mile and per bridge square foot, as well as right-of-way costs, are based on *VDOT TPD Planning Cost Estimates*, dated January 2002, and escalated to 2003 dollars.

The total cost of implementing the Preferred Concepts is likely to range between $233 million and $292 million, as shown in **Table 5-1**. The table identifies the segments that were analyzed for cost estimating purposes, and it breaks down the cost per type of improvements, i.e., mainline, arterial roadways, bridges, right-of-way, and other items such as sound walls and environmental remediation. **Appendix G** includes a breakdown of the ROM cost estimate for each segment and lists assumptions and notes.

The list of segments shown in **Table 5-1** is not a prioritized list, but it does imply the likely pattern of land development and growth in traffic (from south to north). The ultimate cost of improvements depends on the final configuration of the interchanges and the mainline, as well as the cost of special structures such as retaining walls and the price of land. The cost of implementation will also depend on construction phasing.

These ROM costs are planning-level estimates only and are intended for use by VDOT, project stakeholders, and local officials to pursue funding allocations from the Commonwealth of Virginia and other sources for follow-on planning for improvement projects within the I-95 corridor study area.

5.4 Summary and Conclusions

The I-95 Corridor Study has been a 12-month planning effort under the direction of VDOT TMPD and in coordination with a Technical Advisory Committee representing the stakeholders of this study. The study area has included 13.5 miles of I-95 in Hanover County and Ashland, Virginia, including interchanges with Route 802, Route 54, and Route 30.

Table 5-1
Rough-Order-of-Magnitude (ROM) Costs
Master Plan of Preferred Concepts

SEGMENT DESCRIPTION	LENGTH (miles)	ROM COST LOW	ROM COST HIGH
I-95 / ROUTE 802 INTERCHANGE (Reference Figures 4-1 and 4-4)	2.8	$ 55,600,000	$ 69,500,000
I-95 / ROUTE 54 INTERCHANGE (Reference Figures 4-2 and 4-4)	2.7	$ 51,300,000	$ 64,200,000
MAINLINE BETWEEN INTERCHANGES (Reference Figure 4-4)	3.5	$ 46,100,000	$ 57,600,000
I-95 / ROUTE 30 INTERCHANGE (Reference Figures 4-3 and 4-4)	2.4	$ 52,500,000	$ 65,600,000
MAINLINE NORTH TO CAROLINE CO. LINE (Reference Figure 4-4)	2.1	$ 27,900,000	$ 34,800,000
TOTALS	**13.5**	**$ 233,400,000**	**$ 291,700,000**
TYPE OF IMPROVEMENT			
MAINLINE WIDENING		$ 125,700,000	$ 157,100,000
INTERCHANGE ROADWAYS		$ 18,300,000	$ 22,900,000
BRIDGES		$ 59,600,000	$ 74,500,000
RIGHT-OF-WAY		$ 23,500,000	$ 29,400,000
OTHER		$ 6,300,000	$ 7,800,000
TOTALS		**$ 233,400,000**	**$ 291,700,000**

Notes:
1. All costs are in Year 2003 dollars.
2. Costs include 25% for engineering and contingencies.

The study process has included data collection and alternatives analysis and the development of recommended solutions designed to address traffic operations and safety concerns as well as roadway capacity needs in 2025. The study has also included presentations of findings and recommendations to the Hanover County Board of Supervisors and to the Ashland Town Council. (A copy of this presentation is included in **Appendix H**.) Members of the County Board and the Town Council confirmed the need for improvements to this corridor and provided very useful comments for this interchange study.

5.4.1 Planning Tool

This Final Report is envisioned to be a planning tool to identify anticipated right-of-way requirements within the study area, to address access issues near the interchanges, and to develop specific projects that can be executed through the traditional planning processes of the stakeholders, including the Comprehensive Plans of Hanover County and the Town of Ashland, the Richmond Area 2026 Long-Range Transportation Plan (LRTP), and the VDOT Six-Year Improvement Program.

Through the analysis of the I-95 corridor, it has been determined that significant deficiencies will exist by 2025. Traffic volumes and truck percentages will exceed capacity. Safety and operational concerns will intensify. Feasible, cost-effective solutions for the mid-term (5-10 years) and the long-term (15-20 years) are needed to meet the future travel demand requirements, address anticipated deficiencies, and improve traffic operations.

In close coordination with the stakeholders, recommended Preferred Concepts have been developed that provide a corridor master plan to address future year conditions. The anticipated cost of the master plan in today's dollars ranges from $233 million to $292 million. However, the Preferred Concepts can be built in phases or interim solutions over the next 20 years that correspond to thresholds of land development and traffic growth.

5.4.2 Next Steps

The next steps in the planning process for improving the I-95 corridor and its existing interchanges involves community and local government leaders advocating for the improvements through the transportation planning processes of VDOT, Hanover County, the Town of Ashland, and the Richmond Regional MPO. No specific projects related to the mainline or the interchanges are identified in the current VDOT Six-Year Improvement Program.

Through the combined efforts of local governments and citizens groups in the corridor area, working with VDOT and the Commonwealth Transportation Board, individual projects could be programmed, given available funding. If funding is available in the future and projects within the master plan are programmed, the next logical step will be to conduct preliminary engineering and to study environmental impacts of the improvements in a more detailed location study. Thus, it is recommended that the I-95 Corridor Study be used as a planning tool to achieve the next steps of planning, programming, designing, and constructing the needed safety and operational improvements to the mainline and the interchanges.