



# Chapter 4: Implementation Plan



US 64 at  
Creekside Landing Drive  
(October 2009)



## CHAPTER 4. IMPLEMENTATION PLAN

This chapter of the study includes developing a plan for implementing the recommended short-term and long-term solutions for the corridor. The Implementation Plan includes several key elements to help guide the transition of the corridor from the existing conditions, through the short-term solution, to the long-term solution and includes the following information:

- segmenting the corridor into smaller pieces to allow for incremental development
- determining the priority and life-span of the short-term improvements
- determining the priority of the long-term improvements

This chapter also describes the process for implementing the solutions after this study is completed that would have to occur prior to construction of any project.

### 4.1 DEVELOPING CORRIDOR INTERSECTIONS AND SEGMENTS

For the purposes of determining how the recommended solutions will be implemented it was determined that a measured approach would be taken and the corridor would be evaluated on an intersection by intersection basis for the short-term solution. The recommended Short-term solution includes revisions to 14 intersections along the corridor. Because the recommended improvements are individual solutions at each of the intersection locations, they can be implemented either individually or as a part of a larger corridor project to upgrade multiple locations. Due to public concerns with the Short-term solutions it is recommended that initially the improvements be taken incrementally and only when needed. If following the implementation of several of the recommendations a consensus emerges that the improvements are beneficial, then the combination of multiple intersections into a single project may be beneficial from a cost standpoint. A listing of the intersections to be upgraded as a part of the Short-term solution is included in Figure 4.1 and summarized as follows:

- Intersection 1 – Firefox Trace
- Intersection 2– Mt. Gilead Church/North Pea Ridge Road
- Intersection 3 – Big Woods Road/Seaforth Road
- Intersection 4 – Farrington Road/Beaver Creek Road
- Intersection 5 – NC 751/New Hill Road
- Intersection 6 – Jenks Road
- Intersection 7 – Kellyridge Road
- Intersection 8 – Knollwood Road
- Intersection 9 – Shepherds Vineyard Drive
- Intersection 10 – Lake Pine Drive
- Intersection 11 – Autopark Boulevard
- Intersection 12 – Mackenan Drive/Chalon Drive
- Intersection 13 – Gregson Drive
- Intersection 14 – Edinburgh Drive

The partitioning of the corridor for the Long-term solution is a less straight forward endeavor than for the Short-term solution as several of the recommended improvements would require multiple portions of the corridor be upgraded as a part of a single project. This is because some segments of the corridor are tied together with a common improvement that would need to be constructed as a single project in order to be effective. In general, many of the intersections that are recommended as future interchanges can be implemented individually if necessary, or as a part of a larger project to upgrade a longer section of the corridor. Each segment could be developed as a stand alone project and provide benefits to the overall US 64 Corridor. The

segments were developed in a manner such that they would eliminate bottlenecks along the corridor and address any potential safety issues of converting the corridor to a higher level of access control while maintaining driver's expectations.

The evaluation of the corridor resulted in the development of 12 segments beginning at US 64 Business in Chatham County and extending east to the US 1 interchange in Cary. The segments are shown in Figure 4.2 and are summarized as follows:

- Segment A – West of Haw River
- Segment B – Mt. Gilead Church/North Pea Ridge Interchange
- Segment C – Big Woods Road/Seaforth Road Interchange
- Segment D – Jordan Lake Area
- Segment E – Farrington Road/Beaver Creek Road Interchange
- Segment F – NC 751/New Hill Road Interchange
- Segment G – Jenks Road Interchange
- Segment H – Kelly Road/NC 540/Green Level Church/NC 55 Area
- Segment I – Davis Drive Interchange Area
- Segment J – Laura Duncan Road/CSX Railroad Crossing Area
- Segment K – Lake Pine Drive Interchange
- Segment L – East of Lake Pine Drive to US 1 Interchange

### 4.2 DEVELOPING IMPLEMENTATION TIMEFRAME AND PRIORITY OF IMPROVEMENTS

For planning purposes it is important to anticipate when projects will likely be needed. Therefore, based on the current information known along the corridor, the projected timeframe and priorities will be developed to aid in the planning process. The first step in the development of the implementation plan is to determine when the existing intersections along US 64 are no longer functioning in an acceptable manner and need to be upgraded to the short-term improvements. The second step is to determine when each of the short-term solutions will no longer be functioning in an acceptable manner and require upgrading to the long-term improvements. The timeframes being considered for the implementation plan coincide with the timeframes used in the CAMPO Long Range Transportation Plan and include 2015, 2025 and 2035. 2015 projects are projects already underway that will occur between 2010 and 2015 with an expected completion date by 2015. The 2025 projects are programmed to occur between 2015 and 2025 while the 2035 projects are for programmed for the time period between 2025 and 2035 and include sections of roads forecasted to be beyond capacity by 2025 or 2035 and that can potentially be funded with existing revenue streams or reasonably foreseeable new revenue streams. A fourth timeframe (post 2035) will also be included for those improvements that will not be over capacity in 2035 but will eventually need to be upgraded to fulfill the Strategic Highway Corridor vision and accommodate traffic volumes beyond 2035.

The evaluation of both the existing conditions along the corridor and the proposed short-term improvements is directly tied to the operations of the signalized intersections. For a corridor, such as US 64, the element that has the greatest effect on the traffic operations is the signalized intersections. The determination of when a signalized intersection fails is not a direct quantitative evaluation where the point of failure can be identified definitively. The primary measure used in determining the operation of a signalized intersection is the Level of Service (LOS). The LOS for an intersection ranges from LOS A (nearly free flowing) to LOS F (failure of the intersection) and can be reported on an overall intersection basis or by each individual movement. Determining when an intersection will fail requires that a more qualitative analysis be undertaken. An intersection will typically fail in stages, with the first stage being a minor turning movement experiencing excessive delays which do not have a major effect on the overall intersection operation and is usually tolerated by most drivers. The second stage of failure is when a major movement begins to experience excessive delays, followed by the third stage which occurs when the entire intersection is over capacity and all

Figure 4.1: Short-term Solution Corridor Intersections



LEGEND

Short-term Solution Intersections



Corridor Intersection Number



Short-term Solution

Corridor Intersections

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Figure 4.2: Long-term Solution Corridor Segments



**LEGEND**

Long-term Solution Segments



Corridor Segment Number



Long-term Solution

Corridor Segments

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movements operate at an unacceptable level. Because the onset of the second stage of failure is where drivers are less tolerant of the delays it was determined that at this point the intersection would be considered to be failing.

The existing corridor also includes three major intersections that are currently unsignalized. The unsignalized intersections were evaluated and considered to be failing when the side street volumes exceeded the volumes that would warrant a signal being installed. It was also assumed that once an unsignalized intersection failed that the short-term improvement would be implemented instead of a standard signal.

The implementation plan for the US 64 corridor includes recommendations based on what is currently known along the corridor and what is expected to occur in the future. If a substantial safety or traffic operations problem develops along the corridor, NCDOT may implement solutions to improve safety and mobility along the corridor outside of what is included in this study.

One item that was clear from the public involvement efforts of the study was that the public wanted to see what effect the construction of NC 540 would have on the corridor, prior to implementing any of the improvements. The assumption is that once completed, NC 540 would allow some regional and statewide traffic to bypass the section of US 64 through Cary and Apex and allow the existing configuration to operate at an acceptable level. The Corridor Study Team considered this effect and agreed that the implementation of any of the Short-term solutions for the US 64 Corridor, from NC 540 to the US 1 interchange should be delayed until the time that NC 540 is open to traffic and the effects of the change in travel patterns can be evaluated.

#### 4.2.1 IMPLEMENTATION TIMEFRAME

The traffic operations analysis for the corridor was used to determine when each of the improvements would need to be implemented. Once it was determined when each of the improvements would be needed, the timeframe for implementation was developed. The selected timeframe for each of the improvements also includes other more qualitative considerations, such as the availability of funding and includes the consideration of the concerns from the public. For example, the highest priority along the corridor would be to upgrade Laura Duncan Road to an interchange; however due to the cost and the need to develop an environmental document for the improvement, it was moved to the 2015-2025 timeframe. Conversely, the intersection improvement at Jenks Road may not have the highest volumes along the corridor, but as an unsignalized intersection it became a higher priority because it will need to become a signalized intersection soon. Additionally, due to development in the area of Jenks Road, the recommended improvements may be included in the development plans and constructed by private entities.

The recommendations included in this section are based on the best available data and assumptions about the future growth in this area, are in no way to be seen as definitive measures for when the improvements should be implemented. Ongoing review of the safety and mobility along the corridor is essential to ultimately meeting the goals of the study. It is recommended that the Agreements signed as a part of this study include a working group that meets periodically to coordinate planning efforts along the corridor and monitor the changes along the corridor compared to the assumption made as a part of this study. It is likely that through ongoing coordination that the plans included in this study will be refined and improved as better data becomes available.

Prior to implementing any project along the corridor, the following two conditions need to be met: (1) a well defined need for the improvement based on empirical analysis including, traffic studies and/or crash analysis and safety studies; (2) an identified funding source.

The availability of funding may play a major role in the timeframe for implementation of the improvements along the corridor and is discussed in further detail in Section 4.2.3.

The results of the analysis for when improvements are anticipated to be implemented are shown in Table 4.1.

**Table 4.1: Implementation Timeframe**

Short-term Solution Intersections	Implementation Timeframe	Final Draft Short-term Solution
Intersection 1 – Firefox Trace	2015-2025	Superstreet with Direct Major Street Left Turn
Intersection 2– Mt. Gilead Church/North Pea Ridge Road	2015-2025	Superstreet with Direct Major Street Left Turn
Intersection 3 – Big Woods Road/Seaforth Road	2015-2025	Superstreet with Direct Major Street Left Turn
Intersection 4 – Farrington Road/Beaver Creek Road	2015-2025	Superstreet with Direct Major Street Left Turn
Intersection 5 – NC 751/New Hill Road	2015-2025	Superstreet with Direct Major Street Left Turn
Intersection 6 – Jenks Road	2010-2015	Superstreet with Direct Major Street Left Turn
Intersection 7 – Kellyridge Road	2015-2025	Left-in/Right-in/Right-out
Intersection 8 – Knollwood Road	2015-2025	Left-in/Right-in/Right-out
Intersection 9 – Shepherds Vineyard Drive	2015-2025	Included in Median U-turn Crossover at Lake Pine Drive
Intersection 10 – Lake Pine Drive	2015-2025	Median U-turn Crossover
Intersection 11 – Autopark Boulevard	2015-2025	Left-in/Right-in/Right-out
Intersection 12 – Mackenan Drive/Chalon Drive	2015-2025	Superstreet with Direct Major Street Left Turn with U-turn to eastbound US 64 at Autopark Boulevard
Intersection 13 – Gregson Drive	2015-2025	Superstreet with Direct Major Street Left Turn
Intersection 14 – Edinburgh Drive	2015-2025	Superstreet with Direct Major Street Left Turn
Long-term Solution Segments	Implementation Timeframe	Final Draft Long-term Solution
Segment A – West of Haw River	Post 2035	Access Closed and new roadway constructed to provide access to Hanks Chapel Road and US 64 Business
Segment B – Mt. Gilead Church/North Pea Ridge Interchange	Post 2035	Compact Diamond Interchange
Segment C – Big Woods Road/Seaforth Road Interchange	Post 2035	Partial Cloverleaf Interchange with ramps and loops on west side of Big Woods/Seaforth Road
Segment D – Jordan Lake Area	2025-2035	Convert to right-in/right-out access
Segment E – Farrington Road/Beaver Creek Road Interchange	Post 2035	Compact Diamond Interchange
Segment F – NC 751/New Hill Road Interchange	2025-2035	Tight Diamond Interchange with US 64 relocated to the north
Segment G – Jenks Road Interchange	2025-2035	Partial Cloverleaf Interchange with loop in southwest quadrant
Segment H – Kelly Road/NC 540/Green Level Church/NC 55 Area	2025-2035	Kellyridge Road -Right-in/Right-out connecting to eastbound collector-distributor road. US 64 with collector-distributor roads in both directions along US 64.
Segment I – Davis Drive Interchange Area	2025-2035	Improvements to Davis Drive and US 64 Ramps
Segment J – Laura Duncan Road/CSX Railroad Crossing Area	2015-2025	Tight Interchange with modern roundabout configuration preferred
Segment K – Lake Pine Drive Interchange	2025-2035	Tight Interchange with modern roundabout configuration preferred
Segment L – East of Lake Pine Drive to US 1 Interchange	2025-2035	Upgrade short-term solution to 6-lane roadway along US 64 and add additional ramp lane to US 1 SB to US 64 WB ramp

## 4.2.2 PRIORITIZATION OF IMPROVEMENTS

The priority of the projects was developed for the 2010-2015, 2015-2025, 2025-2035 and post 2035 timeframes using a similar process to the one used to determine the implementation timeframe. The prioritization is based on both the projected traffic operations and more qualitative measures such as community input and projected growth trends. The project priority for each implementation timeframe are included in Table 4.2 and shown on Figure 4.3 through Figure 4.6.

**Table 4.2: Prioritization of Improvements Summary**

2010-2015 Implementation Timeframe		
Priority	Intersection/Segment	Recommended Solution
1	Intersection 6 – Jenks Road Intersection	Superstreet with Direct Major Street Left Turn
2015-2025 Implementation Timeframe		
Priority	Intersection/Segment	Recommended Solution
1	Segment J – Laura Duncan Road/CSX Railroad Crossing Area	Tight Interchange with modern roundabout configuration preferred
2	Intersection 10 – Lake Pine Drive Intersection 9 – Shepherds Vineyard Drive	Median U-turn Crossover
3	Intersection 5 – NC 751/New Hill Road	Superstreet with Direct Major Street Left Turn
4	Intersection 3 – Big Woods Road/Seaforth Road	Superstreet with Direct Major Street Left Turn
5	Intersection 14 – Edinburgh Drive	Superstreet with Direct Major Street Left Turn
6	Intersection 13 – Gregson Drive	Superstreet with Direct Major Street Left Turn
7	Intersection 11 – Autopark Boulevard Intersection 12 – Mackenan Drive/Chalon Drive	Superstreet with Direct Major Street Left Turn with U-turn to eastbound US 64 at Autopark Boulevard
8	Intersection 7 – Kellyridge Road	Left-in/Right-in/Right-out
9	Intersection 4 – Farrington Road/Beaver Creek Road	Superstreet with Direct Major Street Left Turn
10	Intersection 2 – Mt. Gilead Church/North Pea Ridge Road	Superstreet with Direct Major Street Left Turn
11	Intersection 8 – Knollwood Road	Left-in/Right-in/Right-out
12	Intersection 1 – Firefox Trace	Superstreet with Direct Major Street Left Turn
2025-2035 Implementation Timeframe		
Priority	Intersection/Segment	Recommended Solution
1	Segment K – Lake Pine Drive Interchange	Tight Interchange with modern roundabout configuration preferred
2	Segment H – Kelly Road/NC 540/Green Level Church/NC 55 Area	Kellyridge Road -Right-in/Right-out connecting to eastbound collector-distributor road. US 64 with collector-distributor roads in both directions along US 64.
3	Segment L – East of Lake Pine Drive to US 1 Interchange	Upgrade short-term solution to 6-lane roadway along US 64 and add additional ramp lane to US 1 SB to US 64 WB ramp
4	Segment I – Davis Drive Interchange Area	Improvements to Davis Drive and US 64 Ramps
5	Segment F – NC 751/New Hill Road Interchange	Tight Diamond Interchange with US 64 relocated to the north
6	Segment G – Jenks Road Interchange	Partial Cloverleaf Interchange with loop in southwest quadrant
7	Segment D – Jordan Lake Area	Convert to right-in/right-out access

Post 2035 Implementation Timeframe		
Priority	Intersection/Segment	Recommended Solution
1	Segment E – Farrington Road/Beaver Creek Road Interchange	Compact Diamond Interchange
2	Segment C – Big Woods Road/Seaforth Road Interchange	Partial Cloverleaf Interchange with ramps and loops on west side of Big Woods/Seaforth Road
3	Segment B – Mt. Gilead Church/North Pea Ridge Interchange	Compact Diamond Interchange
4	Segment A – West of Haw River	Access Closed and new roadway constructed to provide access to Hanks Chapel Road and US 64 Business

### 4.2.2.1 2010-2015 Projects

The only project recommended for completion prior to 2015 is at Jenks Road (Intersection 6). The existing intersection is unsignalized and the traffic volume is increasing rapidly. The need for a signal at this location is rapidly approaching and with NC 540 under construction, the growth in the area is likely to increase. Several development plans are being considered in the Jenks Road vicinity and it is possible that the recommended improvements could be constructed as a part of the approval process for a large development in the area.

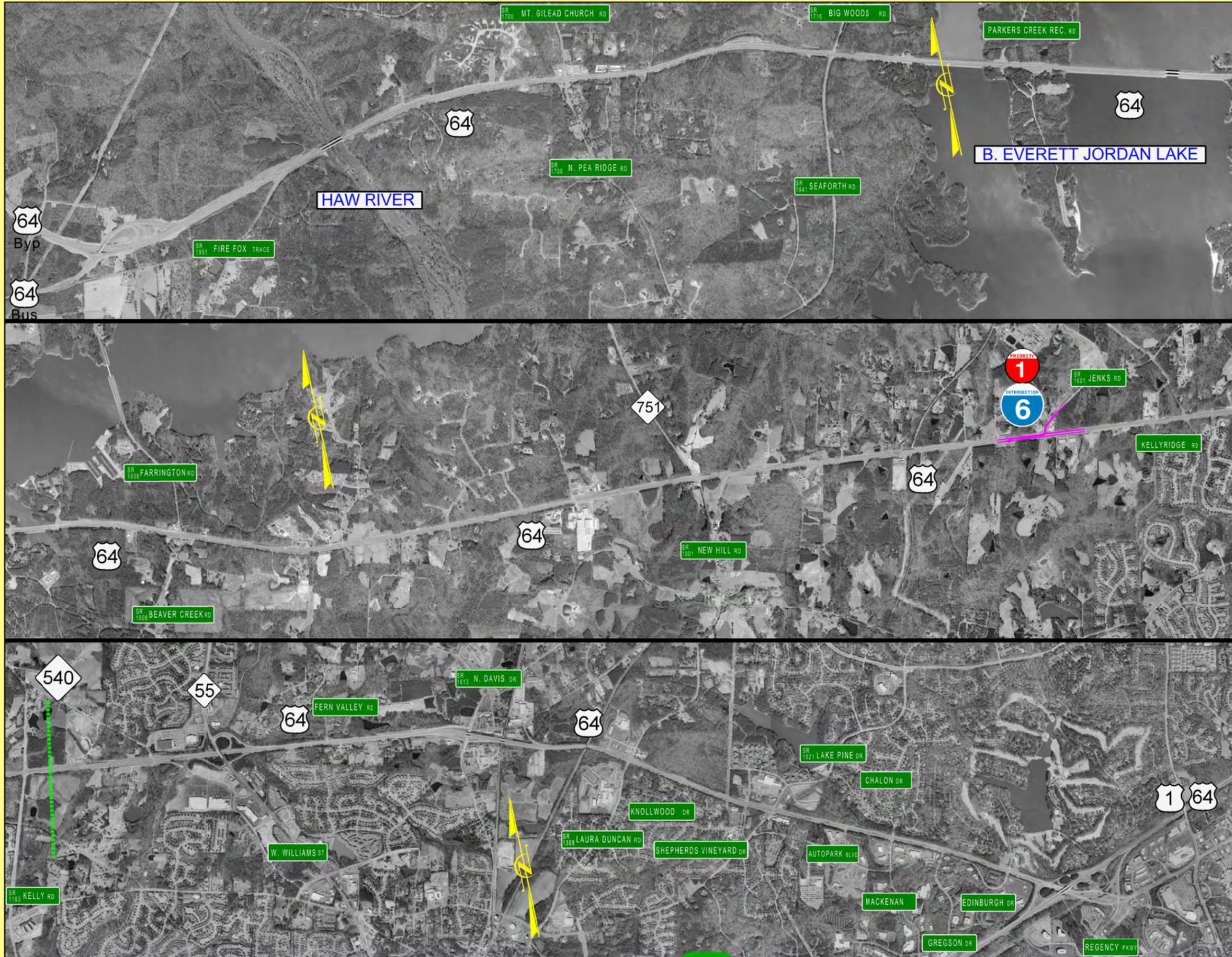
### 4.2.2.2 2015-2025 Projects

The projects that are recommended for implementation between 2015 and 2025 are generally the short-term solutions for the corridor, with one notable exception. The highest priority project will be to construct the interchange at Laura Duncan Road (Segment J) due to the high traffic volumes and the pedestrian traffic associated with Apex High School. This project was supported by the public and it was clear from the public outreach effort that improvements were needed to this area to address safety concerns. The second highest priority along the corridor will be to implement the short-term improvements at Lake Pine Drive (Intersection 10), which also includes the changes to Shepherds Vineyard Drive (Intersection 9) due to its proximity to Lake Pine. The Lake Pine intersection is the highest volume intersection along the corridor and is the location that is currently causing the most congestion in the area. The third priority will be to implement the short-term solutions at NC 751/New Hill Road (Intersection 5) which is ranked at this level due to the high left turn volumes. The next priority will be to implement the short-term solution at Big Woods Road/Seaforth Road (Intersection 3) due to the likely need that a signal will be needed at this location. Priorities 5 through 7 include implementing the short-term solution at Edinburgh Drive (Intersection 14), Gregson Drive (Intersection 13), Mackenan Drive/Chalon Drive (Intersection 12), and Autopark Boulevard (Intersection 11). Based on similar experiences, the traffic volumes in this area may temporarily drop when NC 540 is completed and eventually build to a level that will require the recommended improvements. It is assumed that the travel patterns associated with NC 540 will be well established and 3 or 4 other similar improvements will be in place along the corridor prior to implementing this series of improvements. The improvements for Intersections 11 through 14 can be implemented individually or as a part of a single project, and are dependent on the results of public involvement during the future study. It is likely that the improvements for Mackenan Drive/Chalon Drive and Autopark Boulevard will be completed as a single project due to their proximity and shared features. Priorities 8, 9, 10 and 12 include implementing the short-term solutions beginning at NC 540 and working to the west. Priority 11, Knollwood Road (Intersection 8) is a relatively minor change and will likely be based on traffic operations and safety associated with the interchange at Laura Duncan Road.

### 4.2.2.3 2025-2035 Projects

The projects that are recommended for implementation between 2025 and 2035 are generally implementing the long-term solution from just west of the Wake County line to US 1. Similar to with the short-term solution, the highest priority long-term solution (with the exception of the Laura Duncan interchange constructed prior to 2025) will be at Lake Pine Drive (Segment K) due to the heavy traffic volumes and pedestrian and bicycle access. The second priority will be to upgrade the area from Kelly Road to east of NC 55 by installing the

Figure 4.3: Implementation Plan - 2010-2015 Projects



**LEGEND**

- Intersection/Segment Implemented by 2015
- Corridor Intersection Number
- Corridor Segment Number
- 2010-2015 Priority



Implementation Plan  
2010-2015 Projects

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Figure 4.4: Implementation Plan - 2015-2025 Projects



**LEGEND**

- Intersection/Segment Implemented by 2025
- Corridor Intersection Number
- Corridor Segment Number
- 2015-2025 Priority
- Intersection/Segment Implemented Prior to 2015
- Corridor Intersection Implemented Prior to 2015
- Corridor Segment Implemented Prior to 2015

**Implementation Plan**  
2015-2025 Projects

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Figure 4.5: Implementation Plan - 2025-2035 Projects



**LEGEND**

- Intersection/Segment Implemented by 2035
- Intersection/Segment Implemented Prior to 2025
- Corridor Intersection Number
- Corridor Segment Number
- 2025-2035 Priority

**Implementation Plan  
2025-2035 Projects**

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Figure 4.6: Implementation Plan - Post 2035 Projects



LEGEND

- Intersection/Segment Implemented after 2035
- Corridor Intersection Number
- Corridor Segment Number
- Post 2035 Priority
- Intersection/Segment Implemented Prior to 2035
- Corridor Intersection Implemented Prior to 2035
- Corridor Segment Implemented Prior to 2035

Implementation Plan  
Post 2035 Projects

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collector–distributor roadways as recommended for Segment H. The heavy traffic volumes to and from NC 540 and the close proximity of the quadrant interchange at Kelly Road will eventually degrade to a point where this section needs to be upgraded. The third priority will be to add the additional through lane in each direction from east of Lake Pine Drive to the US 1 interchange (Segment L) as it is likely that the heavy traffic volumes in this location will require the additional capacity within this timeframe. The fourth priority will be to upgrade the interchange at Davis Drive (Segment I) due to the high traffic volumes requiring additional capacity to Davis Drive and the US 64 ramps. The fifth and sixth priorities, similar to with the short-term, begin upgrading the area west of NC 540 to interchanges based on the increase in projected traffic volumes, with NC 751 (Segment F) being constructed prior to the interchange at Jenks Road (Segment G) due the higher projected traffic volumes on NC 751. The final improvement recommended for the 2035 timeframe will be to modify the area along Jordan Lake (Segment D) due to the increased traffic volumes not allowing adequate gaps to make left turns along US 64.

#### 4.2.2.4 Post 2035 Projects

The improvements recommended for the period beyond 2035 are those that are projected to see increased traffic volumes soon after the 2035 planning horizon for this study that will require improvements. In general the post 2035 improvements will be upgrading the corridor from west of NC 751/New Hill Road to the US 64 Bypass interchange, working from east to west.

#### 4.2.3 FUNDING

The ability to fund any of the improvements along the corridor is subject to the availability of funds. Currently, transportation funding is not able to keep pace with the growing need for improvements and the rapid inflation in construction costs. North Carolina’s Long-Range Statewide Multimodal Transportation Plan, completed in 2004 identified the need for over \$84 billion over the next 25 years with a projected \$55 billion in revenues, generating a \$29 billion shortfall. A 2006 update to this report showed that the gap had expanded to \$65 billion over the next 25 years. Locally, the CAMPO Long Range Transportation Plan identifies \$13.6 billion in needs over the next 25 years with only \$8.2 billion in expected revenue, generating a \$5.4 billion shortfall.

As shown above, the competition for the limited amount of project funding is very high and it is likely that the timeframes shown in this plan may be optimistic with the actual implementation lagging behind due to a growing number of unmet needs. The current CAMPO Long Range Transportation Plan allocates approximately \$11 million of the nearly \$430 Million estimated to upgrade the entire corridor included in this plan to the long-term solution in the next 25 years. The priorities in the Long Range Transportation Plan are updated every four years, but it is unlikely that, due to the competitive nature of funding situation, any major improvements needed to improve mobility along US 64 will be undertaken without strong community support. It should be noted that any safety needs that arise along the corridor will be undertaken by NCDOT in order to provide a safe roadway for the traveling public.

#### 4.2.4 STUDY RECOMMENDATIONS

In addition to the detailed recommendations on the design of the short-term and long-term solutions, several additional recommendations are being made for the corridor by the Corridor Study Team, including the following:

- Conduct a speed study for the purpose of setting an appropriate speed limit along US 64 from Kellyridge Road to US 1 before NC 540 opens and after NC 540 opens.
- Place landscaping in the median and fencing along US 64 to encourage students to use the crosswalk at the Laura Duncan Road intersection.
- Make any improvements as aesthetically pleasing as possible (keep the green/boulevard feel along the corridor).

- Consider lowering the speed limit between Laura Duncan Road and US 1 when short-term solutions are implemented.
- Recommend the towns of Cary and Apex consider developing a no compression braking ordinance to reduce noise concerns.
- The Corridor Study Team recommends that NCDOT pursue the signing of US 64 along NC 540.
  - This recommendation would request that NCDOT consider a formal recommendation to designate the NC 540/US 1 roadways as US 64 Bypass and re-designate existing US 64 as US 64 Business by submitting an application to the American Association of State Highway and Transportation Officials (AASHTO) for approval. If approved by both NCDOT and AASHTO there may also be some legislative issues that would need to occur to allow the signing of a US route along a toll road.
- Recommend Town of Cary study extending Mackenan Drive to Regency Parkway over US 1 via a new bridge as part of next Comprehensive Transportation Plan.
- Recommend that the Long-term Solution be coordinated with the CAMPO Triangle Regional Intelligent Transportation System (ITS) Strategic Deployment Plan. The plan includes recommendations for the use of network surveillance through detectors and cameras and Dynamic Message Signs along US 64. The plan also recommends Emergency Management including a roadway service patrol vehicle for the portion of the corridor between NC 540 and US 1.
- Recommend that Chatham County review their land use policies and develop land use controls that would not allow the portion of the corridor within Chatham County to develop with strip mall type developments. Additionally, Chatham County and the Town of Pittsboro should consider the recommendations in this report as they evaluate emergency response times and provide additional fire stations as needed to accommodate the population growth.
- Recommend that the study partners take an active role in the development of local and regional transit efforts and take a proactive role in identifying park and ride facilities to enhance transit operations.

#### 4.3 COST ESTIMATES

The primary goal of the implementation plan is to give stakeholders along the corridor a guide to not only what improvements will be needed along the corridor, but how much they are likely to cost and when they will be needed. The funding for the improvements included in this plan is uncertain and depends on many variables that are difficult to predict. The recommendations included in this plan are intended to be used by NCDOT, the Capital Area Metropolitan Planning Organization, Chatham and Wake Counties and the Towns of Pittsboro, Apex and Cary in the decision making process of planning and programming improvements throughout their individual organizations.

The preliminary construction costs of each of the recommended short-term and long-term improvements are included in Table 4.3. The right-of-way cost estimates are currently being developed and will be included in the Final report.

**Table 4.3 : Cost Estimates**

Short-term Solution Intersections	Construction Cost	Right-of-way Cost	Total Cost
Intersection 1 – Firefox Trace	\$1,700,000	\$0	\$1,700,000
Intersection 2– Mt. Gilead Church/North Pea Ridge Road	\$2,200,000	\$927,000	\$3,127,000
Intersection 3 – Big Woods Road/Seaforth Road	\$2,100,000	\$613,500	\$2,713,500
Intersection 4 – Farrington Road/Beaver Creek Road	\$2,900,000	\$1,940,500	\$4,840,500
Intersection 5 – NC 751/New Hill Road	\$3,400,000	\$913,500	\$4,313,500
Intersection 6 – Jenks Road Interchange	\$2,300,000	\$786,000	\$3,086,000
Intersection 7 – Kellyridge Road	\$1,000,000	\$309,000	\$1,309,000
Intersection 8 – Knollwood Road	\$625,000	\$0	\$625,000
Intersection 9 – Shepherds Vineyard Drive	\$75,000	\$313,500	\$388,500
Intersection 10 – Lake Pine Drive	\$3,600,000	\$318,000	\$3,918,000
Intersection 11 – Autopark Boulevard	\$500,000	\$313,500	\$813,500
Intersection 12 – Mackenan Drive/Chalon Drive	\$2,200,000	\$313,500	\$2,513,500
Intersection 13 – Gregson Drive	\$1,550,000	\$313,500	\$1,863,500
Intersection 14 – Edinburgh Drive	\$2,450,000	\$313,500	\$2,763,500
<b>TOTAL</b>	<b>26,600,000</b>	<b>\$7,375,000</b>	<b>\$33,975,000</b>
Long-term Solution Segments	Construction Cost	Right-of-way Cost	Total Cost
Segment A – West of Haw River	\$3,300,000	\$1,115,000	\$4,415,000
Segment B – Mt. Gilead Church/North Pea Ridge Interchange	\$27,600,000	\$11,030,000	\$38,630,000
Segment C – Big Woods Road/Seaforth Road Interchange	\$14,800,000	\$5,055,000	\$19,855,000
Segment D – Jordan Lake Area	\$15,000,000	\$155,000	\$15,155,000
Segment E – Farrington Road/Beaver Creek Road Interchange	\$19,800,000	\$9,250,000	\$29,050,000
Segment F – NC 751/New Hill Road Interchange	\$72,000,000	\$9,760,000	\$81,760,000
Segment G – Jenks Road Interchange	\$25,900,000	\$12,350,000	\$38,250,000
Segment H – Kelly Road/NC 540/Green Level Church/NC 55 Area	\$41,500,000	\$6,555,000	\$48,055,000
Segment I – Davis Drive Interchange Area	\$23,800,000	\$6,970,000	\$30,770,000
Segment J – Laura Duncan Road/CSX Railroad Crossing Area	\$33,300,000	\$4,335,000	\$37,635,000
Segment K – Lake Pine Drive Interchange	\$33,900,000	\$4,745,000	\$38,645,000
Segment L – East of Lake Pine Drive to US 1 Interchange	\$11,800,000	\$795,000	\$12,595,000
<b>TOTAL</b>	<b>\$322,700,000</b>	<b>\$72,115,000</b>	<b>\$394,815,000</b>

Combining the prioritization of the short-term and long-term improvements with the costs included above, the funding needed for each implementation timeframe is summarized in Table 4.4.

**Table 4.4: Implementation Funding Needs**

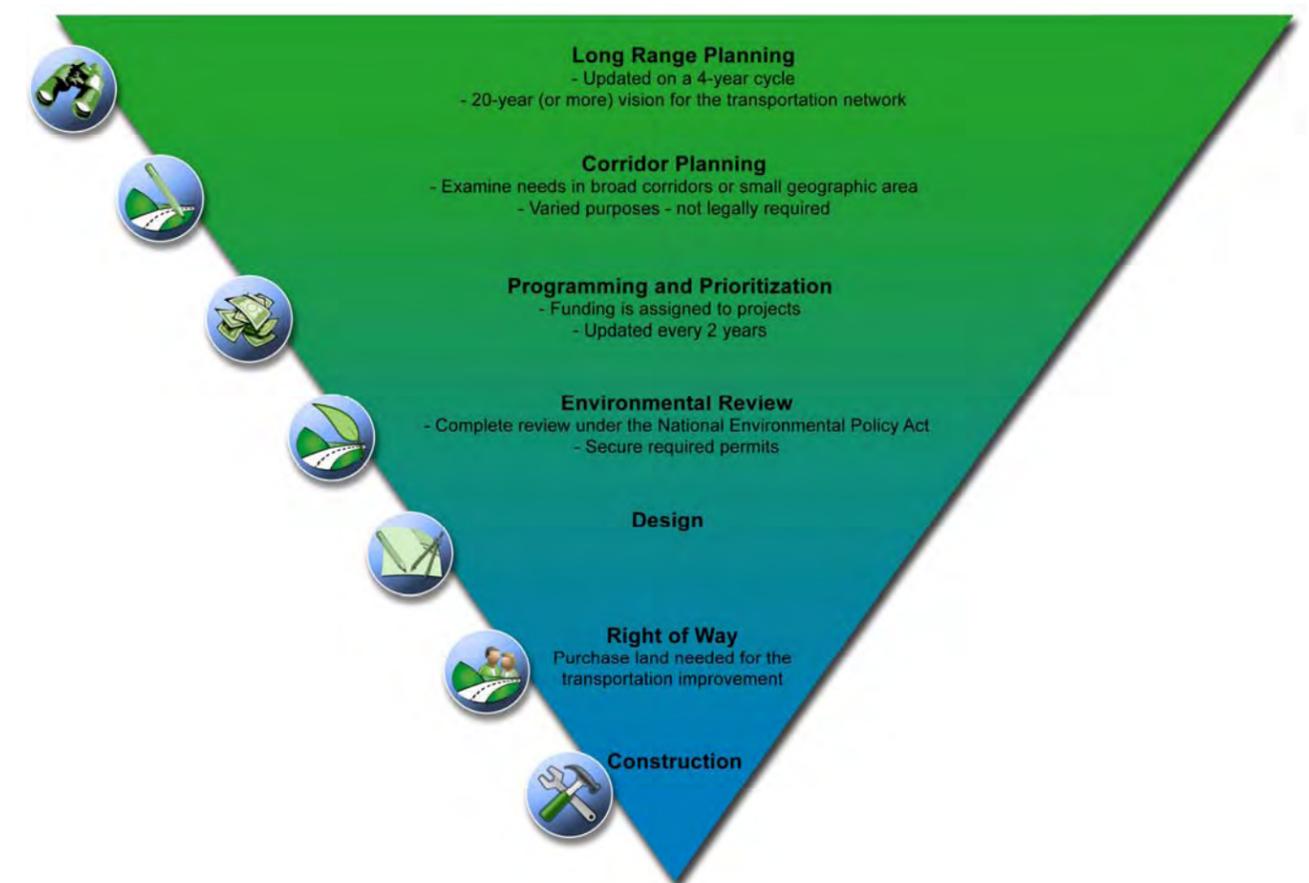
Implementation Timeframe	Funding Needs
2010-2015	\$3,086,000
2015-2025	\$68,524,000
2025-2035	\$265,230,000
Post 2035	\$91,950,000
<b>Total</b>	<b>\$428,790,000</b>

#### 4.4 HOW ROADS ARE BUILT IN NORTH CAROLINA

Generalized, the process for building roads in North Carolina includes seven to eight phases (not all roads go through corridor planning):

- Long Range Planning
- Corridor Planning
- Prioritization and Programming
- Environmental Analysis
- Permitting
- Design
- Right-of-Way
- Construction

A brief description of these eight phases and an explanation of where the improvements to US 64 are in the decision-making process are provided in this section. The phases are not all conducted consecutively; environmental analysis, right-of-way, permitting and design all overlap to some extent. The graphic in Figure 4.7 depicts the general order of the major phases. The NCDOT also provides a good overview of the transportation decision making process in North Carolina on their website at: <http://www.ncdot.gov/projects/roadbuilt/default.html>.

**Figure 4.7: Major Phases in Transportation Decision Making in North Carolina**


#### 4.4.1 LONG RANGE PLANNING

States and urbanized areas with populations over 50,000 are required by federal law to develop long range transportation plans. These plans describe the goals for an area's transportation system (including the road network, transit, bicycle and pedestrian facilities, etc.) 20 or more years in the future and are updated every four years (on average). Long range transportation plans are developed with input from the public and balance the planning area's goals and transportation needs. They are fiscally constrained and must address certain air quality requirements. The section of US 64 between Apex and Pittsboro is included in two long range transportation plans:

- North Carolina's statewide plan: *Charting a New Direction for NCDOT: North Carolina's Long-Range Statewide Multimodal Transportation Plan*, lists this section of US 64 as a Strategic Highway Corridor, as described in Section 1.1 of this report.
- The Capital Area Metropolitan Planning Organization's (CAMPO's ) *2035 Long Range Transportation Plan* also addresses this section.

#### 4.4.2 CORRIDOR PLANNING

Since there is no legislation that requires or guides corridor planning; corridor plans vary in their method and purpose. In general, corridor plans take a more detailed look at transportation issues at a smaller geographic scale than long range plans, but do not reach the level of detail of environmental analysis. The subject section of the US 64 corridor between Apex and Pittsboro has been studied in two corridor plans:

- The *US 64-NC49 Corridor Study* (also known as the Phase I Study)
- The current study documented in this report, *US 64 Corridor Study Phase IIA*

The Phase I study established the vision for the US 64 and NC 49 corridor from Charlotte and Statesville to Raleigh. An explanation of how it is related to the current study is provided in Section 1.5. The approach used in the Phase IIA study was described in detail in Section 1.4.

#### 4.4.3 PRIORITIZATION AND PROGRAMMING

Programming refers to the process of assigning funds to projects in the long range transportation plan. The result of programming is a Statewide Transportation Improvement Program (STIP) listing the funded projects along with a brief description, location, estimated costs, funding source(s) and unfunded portion. While long range transportation plans are generally updated on a four-year cycle, the STIP is updated every two years, therefore, the long range transportation plan includes both funded and unfunded projects. Improvements to US 64 between Apex and Pittsboro are unfunded in the long range transportation plan – they have not yet gone through programming and are not included in the STIP. Likewise, the planned improvements to US 64 have not gone through any of the subsequent phases described in the remainder of this section.

Transportation projects can be paid for using federal, State, municipal, or private funds. The transportation decision making process varies depending on the source(s) of funds. The following sections briefly describe the processes of environmental analysis, design, right-of-way and construction for each funding source.

To improve project programming, NCDOT has established a new strategic planning process, which is built on professional, transparent and strategic decision making. This new process will use facts about pavement condition, traffic congestion and road safety, as well as input from local governments and NCDOT staff to determine the department's priorities. This data-driven approach will put projects for all modes of transportation in priority order, based on the department's goals (Safety, Mobility, Infrastructure Health), and serve as the primary input source for the STIP.

#### 4.4.4 FEDERALLY FUNDED PROJECTS

##### 4.4.4.1 Environmental Analysis (NEPA) and Permitting

Transportation projects that are built using federal funds are required to comply with the National Environmental Policy Act (NEPA). The NEPA requires agencies to assess the effects of their plans before making decisions and taking action. Public involvement is a required component of the NEPA process. The Council on Environmental Quality, which oversees NEPA at a national level, developed a guide to help citizens understand NEPA and is a good source of information for those who want to become involved in the decision making process.<sup>1</sup> According to NCDOT:

The process [of environmental analysis] includes specialized environmental studies and coordination with the environmental regulatory agencies to ensure appropriate consideration is given to environmental matters. Specialists in such fields as noise and air quality, archaeology, architectural history, biology, land-use planning and sociology provide evaluations regarding the environmental impacts of proposed highway projects. The process also involves design and traffic engineering studies, which provide an analysis of highway alternatives to safely, efficiently and economically meet future travel demands.

Citizens are encouraged to participate in this process by attending informational workshops and hearings held to obtain public comment and input on proposed highway projects. Public input is evaluated and addressed during the development of highway improvements.

In addition to going through the NEPA analysis, transportation projects must be approved by agencies with authority over sensitive resources in the vicinity and issued a permit. In North Carolina, one of the permits typically needed for transportation projects is a Section 404 permit, which is issued by the US Army Corps of Engineers and relates to impacts to waters of the United States (including wetlands). North Carolina uses a "Section 404/Merger 01 Process" (Merger Process) to concurrently address the requirements of NEPA and Section 404 of the Clean Water Act.<sup>2</sup> The Merger Process incorporates steps in the design and right-of-way phases and depending on the type of projects includes at least two opportunities for public involvement and often times more. During the process there are multiple points of coordination with resource agencies and with public stakeholders. Typical outreach methods include newsletters, small group meetings, open houses, telephone hotlines and web-based materials.

##### 4.4.4.2 Design

Typical section options (number of lanes, curb and gutter, shoulder, median section, etc.), hydraulic structure requirements (bridge or culvert and length of bridge), and preliminary designs (horizontal and vertical alignments, edge of pavements, slope stakes, turn lanes, superelevation and right of way limits) are developed in the course of environmental analysis (see steps 12 through 15). Once a preferred alternative is selected (Step 22), further refinement of the preliminary design takes place to avoid and minimize impacts to sensitive resources (Step 23). All of this information is included in the environmental document issued as part of environmental analysis.

After the final environmental document is issued, final surveys are requested in order to develop right of way plans, finalize horizontal and vertical alignment, begin drainage design, identify utility locations and conduct geotechnical investigations. A meeting is held among all agencies involved in the Merger 01 Process when the

<sup>1</sup> Council on Environmental Quality Executive Office of the President. "A Citizen's Guide to the NEPA: Having your Voice Heard." December 2007. Available: [http://ceq.hss.doe.gov/nepa/Citizens\\_Guide\\_Dec07.pdf](http://ceq.hss.doe.gov/nepa/Citizens_Guide_Dec07.pdf)

<sup>2</sup> North Carolina Department of Transportation. "The Merger Process." Available: <http://www.ncdot.gov/doh/preconstruct/pe/MERGER01/PIDProcessII.html#SBS19>.

drainage design is 30% complete (Step 29). Several more steps are required until final designs are completed, including the rendering of a permit decision and development of right-of-way plans. According to NCDOT:

During the course of the right of way acquisition, the Design Engineers will begin to develop the final plans for the project. The final design is a very detailed design that also includes computing and summarizing the contract quantities required for the project, incorporating right of way revisions, compiling plans from various units (Mobility and Safety Division, Roadside Environmental Unit, Utilities Section, etc) and incorporating them in the project. NCDOT will make sure that all environmental commitments and permit conditions are incorporated. NCDOT will ensure that construction drawings match the permit plan drawings and permit conditions, including any permit modifications.

#### 4.4.4.3 Right-of-Way

On their website, NCDOT provides a good summary of the right-of-way process:

Right-of-way is the process NCDOT goes through to obtain the land needed to complete highway projects. This is the last major activity to occur between the completion of design and the release of the project to bidders for construction.

In many cases, it is inevitable that a certain amount of private property must be acquired. The displacement of homes and businesses is minimized to the extent practicable. In the acquisition of right-of-way, the NCDOT must treat all property owners with impartiality, fully explain all legal rights, pay just compensation in exchange for property rights, furnish relocation assistance and initiate legal action should a settlement not be reached.

#### 4.4.4.4 Construction

A brief description summarizing construction is also provided:

Once the road design is complete, bids are received for construction on the identified date and are publicly disclosed. The Board of Transportation awards the contract to the lowest responsible bidder. The bidder (private contractor) is then obligated to construct the project in accordance with plan requirements and specifications upon which the bid was received.

NCDOT staff in the Division of Highways administer the contract and provide inspection and testing functions to assure the project is properly constructed. An NCDOT resident engineer and his/her staff interpret plan details and contract requirements, test for quality, check for conformity with contractual requirements and document the quantity of work performed so the contractor can be paid on a monthly basis. The resident engineer and staff also make certain the environment is protected, manage traffic flow along the project, work with adjacent property owners, observe work zone safety and oversee coordination with state and federal agencies.

Once the project is complete, a final inspection is made by an engineer not involved in the project's construction to verify it has been completed properly. The highway is then opened to traffic.

#### 4.4.5 STATE-FUNDED PROJECTS

The legislation guiding the environmental analysis of state-funded projects is called the North Carolina State Environmental Policy Act (SEPA). The SEPA was modeled after NEPA and has very similar requirements and procedures. Any action that has gone through the federal NEPA process automatically meets the requirements of SEPA, so that projects that receive both federal and state funding only need to go through

NEPA. There are slight variations between NEPA and SEPA, for example SEPA does not require a public hearing; however, public hearings are considered a priority for controversial projects that go through SEPA.

#### 4.4.6 LOCALLY-FUNDED PROJECTS

Locally funded projects along US 64 would be those taken on by the towns of Pittsboro, Apex and Cary. Coordination with town staff indicates that because US 64 is owned and maintained by NCDOT that the local governments were not likely to include improvements on US 64 as a part of the Capital Improvements Program (CIP). It is recommended that in the event that a locally-funded improvement project be developed along the corridor, that the local municipality work with the US 64 Corridor working group that is recommended to be formed at the completion of this study, to ensure that adequate public involvement occurs during the planning phase of the project.

#### 4.4.7 PRIVATELY-FUNDED PROJECTS

Each of the local governments along the corridor have development standards that require private developers who are making a substantial increase in traffic volumes generate a traffic study. If the standards for traffic operations are not met then the developer would be required to make improvements to the transportation system in order to mitigate the negative effects associated with the proposed development. Privately funded projects along US 64 are not uncommon and it is likely that as development increases that additional improvements along US 64 will be required by private developers. There is no set procedure for public involvement regarding privately funded projects; however they typically involve approval by the Town Council. Driveway Permits would be required from NCDOT and may require improvements be made to mitigate impacts to traffic operations and safety. Due to the controversy surrounding this study, it is recommended that the local municipalities work with the US 64 Corridor working group that is recommended to be formed at the completion of this study, to ensure that adequate public involvement occurs during the development phase for any improvements along US 64.



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