

Engineering Report

Monroe Expressway

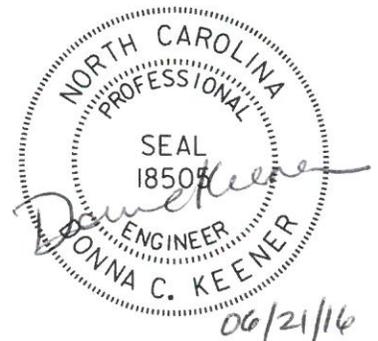
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June 21, 2016

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CHAPTER 1 | INTRODUCTION

This report documents and describes the location, engineering design features, project capital cost estimates, projected operation and maintenance expenses, renewal and replacement expenses, and the design-build procurement schedule for the proposed Monroe Expressway, the “Project”. This is a new location, all-electronic tolling (AET) project that will be funded, constructed, operated and maintained by the North Carolina Department of Transportation (NCDOT) and the North Carolina Turnpike Authority (NCTA).

The NCTA was created from a need to implement alternative financing to provide for key transportation projects during a time of rapid growth, dwindling resources and escalating construction costs. In October 2002, North Carolina Session Law 2002-133 created the NCTA. Since then, North Carolina has enacted legislation to further define the powers of NCTA, and to increase the number of projects that could be studied. The NCDOT is currently authorized to study, plan, develop, and undertake preliminary design work on an unlimited number of toll facilities in the state. At the conclusion of these activities, the NCDOT and NCTA are authorized to design, establish, finance, purchase, construct, operate, and maintain up to 11 toll facilities. The Monroe Expressway is the second of these projects to be financed and constructed.

NORTH CAROLINA TURNPIKE AUTHORITY ORGANIZATION

In October 2002, legislation was passed authorizing the creation of the NCTA with the purpose to study, design, plan, construct, promote, own, finance and operate a system of toll roads, bridges, and/or tunnels supplementing the traditional non-toll transportation system serving the citizens of North Carolina (NC General Statute [GS] §136-89.182). By action of the North Carolina General Assembly, effective July 27, 2009, the Authority became a part of the North Carolina Department of Transportation (NCDOT), a public agency of the State of North Carolina.

The NCTA is governed by a nine-member Authority Board. The General Assembly appoints four representatives: two based upon the recommendation of the President Pro Tempore of the Senate, and two based upon the recommendation of the Speaker of the House of Representatives. The remaining members consist of the Secretary of Transportation, and four members appointed by the Governor. The following powers have been delegated by the Secretary to the Authority Board:

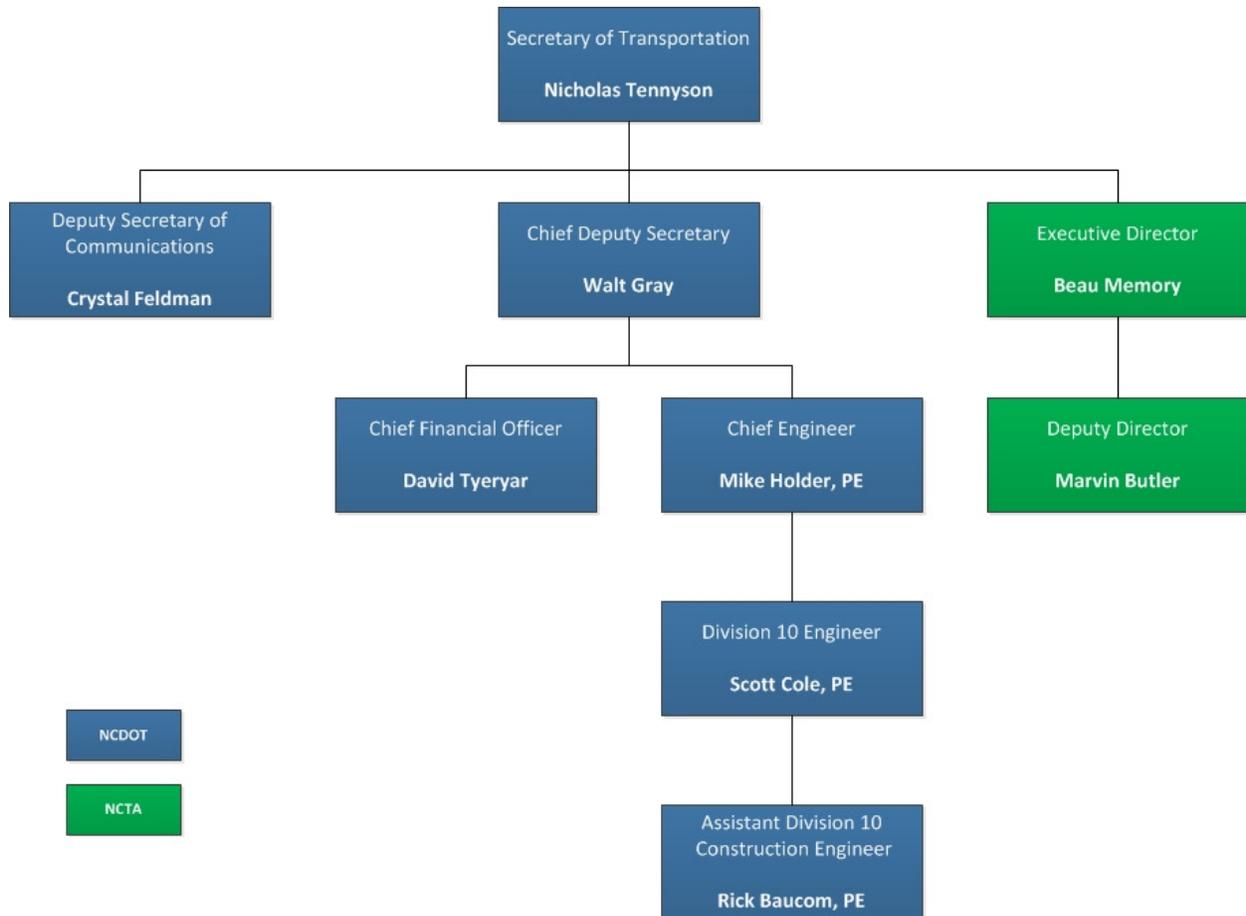
- Fix, revise, charge, and collect tolls and fees for Turnpike Projects pursuant to NCGS §136-89.183 (a)(5);
- Issue bonds or notes of the NCTA pursuant to NCGS §136-89.183(a)(6);
- Invest the proceeds of bonds or notes of the NCTA that are pending disbursement or other idle funds of the Authority in any investment authorized by NCGS §159-30 pursuant to NCGS §136-89.183 (6a); and,
- Exercise such additional powers as shall be necessary for the financing of Turnpike Projects through compliance with the associated bond documentation, including complying with any arbitrage, rebate or other federal tax filings and providing for secondary market disclosure; provided any such additional power may be subjected to conditions, including the involvement and participation of other portions of the North Carolina Department of Transportation, which are stated within the bond documentation and executed by the Secretary acting as the Secretary.

The following describes the reporting structure of the NCDOT and NCTA. (See also **Exhibit 1**):

- The NCDOT Secretary of Transportation is responsible for the oversight and management of departmental operations.

- The NCTA Executive Director is responsible for toll collection and traffic management on North Carolina’s toll roads; the Executive Director reports directly to the NCDOT Secretary of Transportation.
- The NCDOT Chief Engineer directs design, construction, and routine maintenance of the nearly 80,000 mile state highway system, including toll roads, in North Carolina, and also manages the 14 Division Offices. Monroe Expressway is located within Division 10.
- NCTA marketing efforts are a part of the NCDOT Communications Office.
- NCTA financial activities are under the control of the NCDOT Chief Financial Officer.

Exhibit 1: Organizational Chart



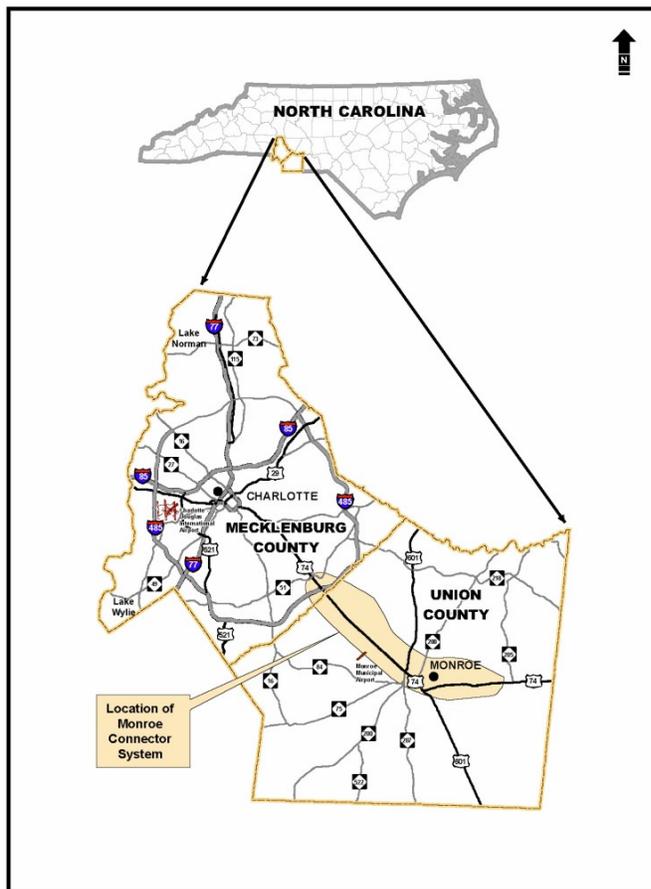
In order for a project to be considered for development as a toll facility, the legislation requires that the project be included in a locally adopted comprehensive transportation plan and be shown in the current NCDOT State Transportation Improvement Program (STIP) (GS§ 136-89.183[a][2]). Any toll road developed in the state must have a free alternate route (GS §136-89.197). All revenues from tolls are to be used to cover the cost of financing, operating and maintaining the road. Current legislation requires that when the toll revenue backed debt is retired, and financial obligations of the road are met, then tolls will be removed (GS §136-89.196).

CHAPTER 2 | PURPOSE OF PROJECT

The Monroe Expressway (formerly referred to as the Monroe Bypass/Connector, and later as the Monroe Bypass) is located southeast of Charlotte, a fast growing area of the state, and is expected to improve mobility and capacity within the project study area by providing a new parallel facility for the US 74 corridor, extending from US 74 near I-485 in Mecklenburg County to US 74 between the towns of Wingate and Marshville in Union County. This will allow for high-speed regional travel, while maintaining access to properties along existing US 74. See **Exhibit 2** for the Regional Project Map.

US 74 is the major east-west route connecting the Charlotte region, a major population center and freight distribution point, to the North Carolina coast and the port at Wilmington (North Carolina’s largest port). In addition, US 74 is a primary transportation connection between Union County, which was the fastest growing county in North Carolina between 2000 and 2010, and Mecklenburg County/City of Charlotte, the economic hub of the region. Even though Union County is one of the fastest growing counties in the state, it is the only county having a major border with Mecklenburg County that does not have a high-speed interstate-type facility which connects it to Mecklenburg County. US 74 also serves as an important commercial corridor for Union County residents and businesses, with many retail, commercial, and employment centers having direct access to/from US 74. In Union County, employment is most strongly concentrated in the City of Monroe and/or along existing US 74.

Exhibit 2: Regional Map



Currently, US 74 in the project area (from near I-485 in Mecklenburg County to between the towns of Wingate and Marshville in Union County) is a four- to six-lane arterial roadway with speed limits that range from 35 mph to 55 mph along the corridor. The weighted average posted speed limit is 49 mph. There is limited control of access along the facility; there are numerous driveway access points, turning points, and intersections, including 27 at-grade signalized intersections. Thus, traffic signals and the lack of access control cause slower speeds and congestion during typical weekday peak travel periods. An evaluation of real time travel information available from INRIX, Inc. and travel time field surveys (conducted as part of the NEPA documentation) demonstrated that average travel speeds during the morning and afternoon peak travel periods during the day, along existing US 74 did not reach 50 mph for the periods evaluated (2011, 2012 and 2013). There is a high level of existing and projected congestion along this route. As a vital intrastate corridor of regional, statewide, and national significance, the US 74 corridor is included in national, state and local transportation plans, and is a designated part of the National

Highway System Strategic Highway Network (STRAHNET). The STRAHNET includes roads that provide defense access, continuity, and emergency capabilities for movements of military personnel and equipment.

With Charlotte being the largest city in North Carolina, the Charlotte-Mecklenburg County region is a significant commercial center for the Carolinas. During the period between 2000 and 2010, both Union and Mecklenburg Counties experienced high population growth. North Carolina's population as a whole grew by 18.5 percent, while Union and Mecklenburg Counties grew at much faster rates (62.8 percent and 32.2 percent, respectively). As stated previously, Union County had the highest percentage of growth among all North Carolina Counties from 2000 to 2010. The largest percent increases in population from 2000 to 2010 generally occurred in and around the communities of Stallings and Indian Trail in western Union County and near Matthews within Mecklenburg County. These areas are in proximity to transportation infrastructure (including I-485) and the City of Charlotte. According to the 2012 Annual Mobility Report from Texas Transportation Institute, **the Charlotte urban area - the metropolitan area in NC and SC within and surrounding the city of Charlotte - ranked 25th in congestion per peak traveler in 2011, with the average peak traveler experiencing 40 hours of congestion per year.** An evaluation of congestion information since 1982 revealed a long-term increase in the yearly hours of delay per commuter of 32 hours.

Union County has a number of advantages relative to other parts of the region, including available land for development, high median income and good area schools. It has affordable housing relative to its median income level and one of the best school districts in the region, based on SAT scores and graduation rates. Despite having one of the highest average commute times over the last decade, Union County still has grown faster than any other county in the region. This finding suggests that factors other than accessibility to jobs are encouraging households to choose to locate in Union County. The factors driving these strong growth trends over the last decade are projected to continue to increase the population of Union County.

The county's proximity to employment centers in the Charlotte-Mecklenburg County urban area and relative affordability of housing has led to Union County's rapid development as a "bedroom community." A substantial percentage of Union County's residents commute to Mecklenburg County for work. According to the 2011 commuting patterns from the Employment Security Commission of North Carolina, approximately 57,875 (nearly 70 percent) of the 83,179 total workers residing in Union County commuted outside the county to work. Of those, approximately 65 percent (37,836) commuted to Mecklenburg County (Employment Security Commission of North Carolina Web site: <http://esesc23.esc.state.nc.us/WorkForceInDepth/>).

By providing a controlled-access expressway, the proposed Project is expected to reduce travel times in the design year 2035 by up to 50 minutes for travelers and commuters on the US 74 corridor in Union County. This travel time savings is assuming a roundtrip along the length of the Project compared to an equivalent roundtrip along existing US 74 from east of Marshville to the US 74/I-485 interchange.

This improved accessibility could result in a shift of some residential and commercial/industrial growth in eastern Union County instead of northwestern or central Union County. These areas of eastern Union County are currently predominately rural.

Charlotte is a hub in trucking transportation with 329 trucking firms located in the Charlotte metropolitan area, including many of the nation's largest trucking companies. Approximately half of the nation's top 100 trucking firms have operations in Charlotte, including nine of the top 10 firms. Approximately 28,000 people are employed by the trucking industry in Charlotte. US 74 is the primary route connecting Charlotte to the Port of Wilmington; as a result, the existing facility has a very high percentage of truck traffic (13 percent), with future projections ranging from 18 - 24 percent along the Project, and 7-10% of trucks continuing to use the existing US 74. With the



Trucks make up > 13 percent of US 74 traffic.

expansion of the Charlotte Intermodal Terminal, the nation's first inland port which opened in January 1984, and with container traffic on the east coast expected to continue to increase, the existing US 74 corridor would become overwhelmed by truck traffic.

Much of the US 74 corridor between Charlotte and Wilmington has been upgraded to a controlled-access expressway facility. Only the section of US 74 in Union County, and a portion in Anson County, remains unimproved. This section of US 74, with more than two dozen signalized intersections, continues to be the primary impediment to

efficient travel between Charlotte and eastern North Carolina. The Project will improve the deficiency of east-west transportation in Union County. The Project will decrease travel times through the corridor during peak periods by up to 50 minutes in 2035. Truck traffic will be encouraged to use this facility because of the reliable travel times instead of clogging up the local US 74 route.

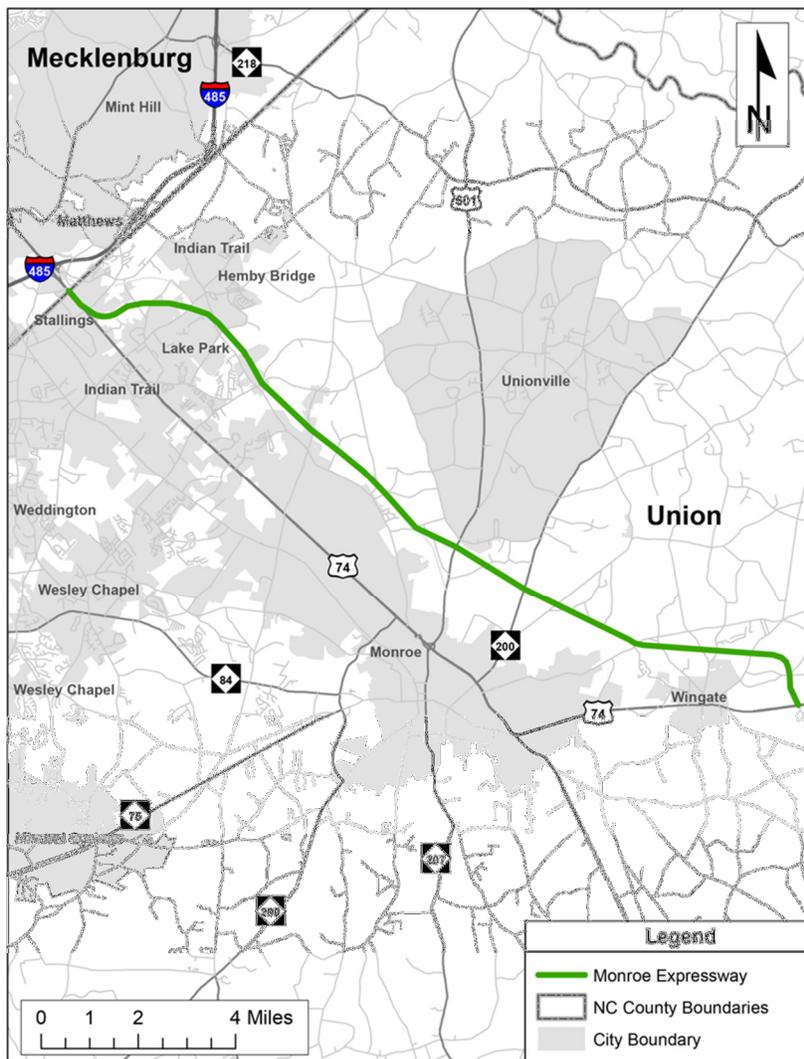
In addition, the **Project has been advocated by the North Carolina tourism industry.** The Project would support the state's tourism industry by connecting Charlotte and the southern Piedmont to beaches in South Carolina and southeastern North Carolina. With a less congested, quicker route, and significant travel time savings, residents of the Charlotte area may be encouraged to make more frequent trips to the beach.

Congestion reduces the efficiency of transportation infrastructure and increases travel time, air pollution, and fuel consumption. As noted before, the Charlotte urban area ranks 25th in congestion per peak traveler, with the average peak traveler experiencing 40 hours of congestion per year. This Project is seen as a major congestion reliever for this area of the Charlotte Metrolina Region.

CHAPTER 3 | PROJECT DESCRIPTION

The Monroe Expressway is a four-lane controlled access toll facility. Tolls will be collected by an all-electronic toll collection system. There will be no cash toll booths. Existing US 74 will be improved for approximately one mile from just east of I-485; the improvements consist of elevating US 74 and constructing an adjacent pair of frontage roads to maintain access to the local street network and businesses. At the east end of the elevated section, a partial interchange will be constructed to access US 74 Bypass, i.e., the “Monroe Expressway.” The Expressway then proceeds eastward on a new location alignment from east of Stallings Road to the project terminus at existing US 74 between the towns of Wingate and Marshville. The total length of the new location alignment of the Monroe Expressway Project is approximately 18.1 miles (see **Exhibit 3**). From west to east, full interchanges will be located at Indian Trail-Fairview Road, Unionville-Indian Trail Road, Rocky River Road, US 601, NC 200, and Austin Chaney Road. Partial interchanges will be located with US 74 on each end of the Project. The roadway is being constructed under one highway design-build contract.

Exhibit 3: Project Map



IMPROVEMENTS TO EXISTING US 74



The improvements to existing US 74 include an elevated six-lane controlled-access freeway, with two- or three-lane, one-way frontage roads on either side, for a total of 10 to 12 lanes. The length of the elevated section is approximately one mile. The number of lanes on the frontage roads varies depending on the proximity to U-turn locations, along with on and off-ramps. The six-lane non-tolled expressway portion of US 74 includes reconstructing US 74 on fill material with retaining walls, which allows the frontage roads to be built

immediately at the base of the retaining walls. The right-of-way width required for this section is approximately 260 feet.

NEW LOCATION TOLL FACILITY

The 18-mile, new location tolled expressway will have four 12-foot travel lanes, 12-foot outside paved shoulders, and 4-foot inside paved shoulders. The median is 46' in width, and will be capable of accommodating one additional lane in each direction, if deemed warranted at a later date. The right-of-way width being acquired is approximately 300 feet, with additional right-of-way required for interchanges, frontage roads, and improvements to intersecting roads.

Grade separations are being provided between the toll road and several local roads and streams, as well as an existing mainline CSX rail line. The construction of the Project is typical for the area with structures limited to normal grade separations and flyovers.

The Project will contain seven mainline toll collection zones, for a tolled distance of approximately 18 miles. (See **Exhibits 4-6**):

Exhibit 4: Toll Zone Locations

Toll Zone #	Toll Zone Locations	Distance (mi.)
1	Between US 74 & Indian Trail-Fairview Rd	1.87
2	Between Indian Trail-Fairview Rd & Unionville-Indian Trail Rd	2.24
3	Between Unionville-Indian Trail Rd & Rocky River Rd	1.38
4	Between Rocky River Rd & US 601	3.93
5	Between US 601 & NC 200	1.76
6	Between NC 200 & Austin Chaney Rd	3.97
7	Between Austin Chaney Rd & US 74 near Wingate	2.99
	Total Tolled Distance	18.14

Exhibit 5: Tolling Schematic – West End

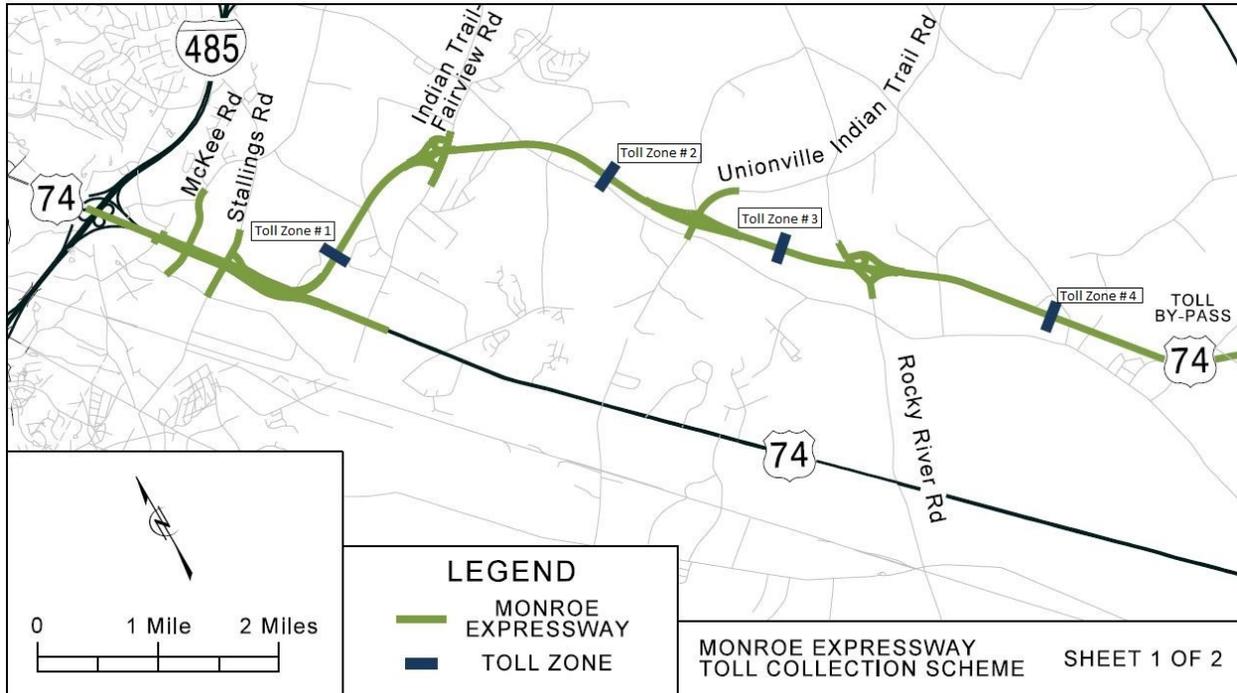
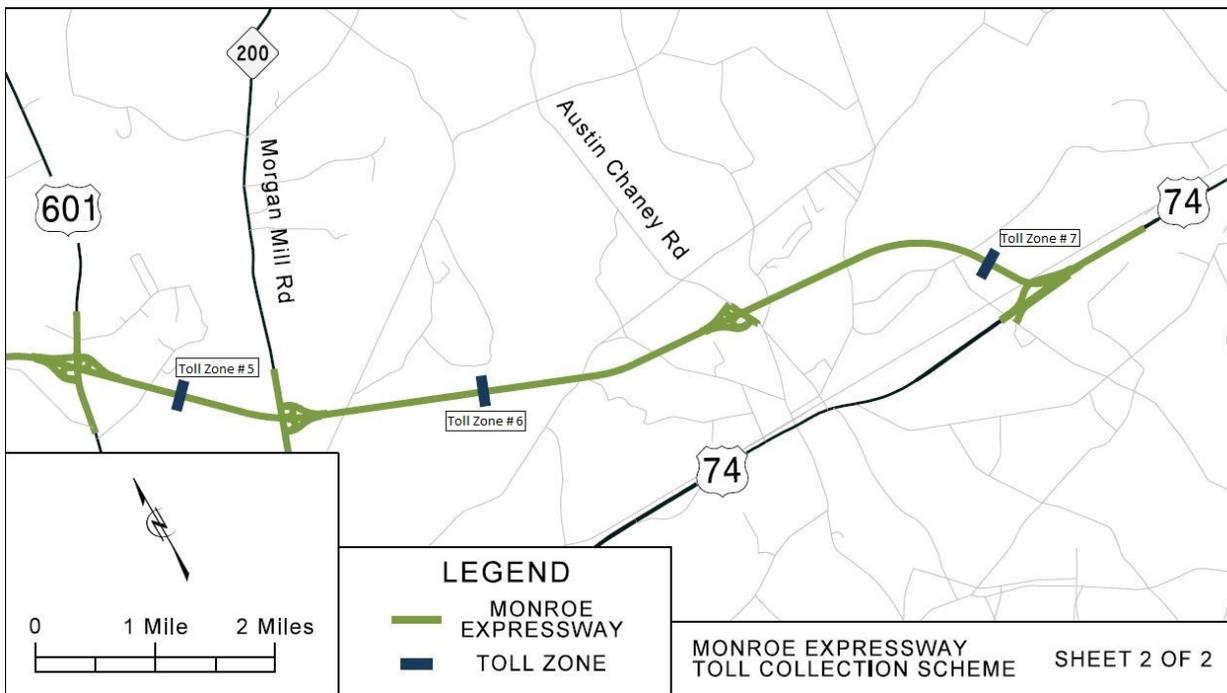


Exhibit 6: Tolling Schematic – East End



CHAPTER 5 | PROJECT BACKGROUND & HISTORY

PROJECT PLANNING

The preliminary planning and development of the corridor, including the required environmental reviews, was undertaken in accordance with the National Environmental Policy Act of 1969 (NEPA), FHWA regulations, NCDOT rules, and other applicable federal, state and local laws. Issues considered during the NEPA process included socioeconomic conditions in surrounding communities and environmental impacts, such as water resources (wetland, streams, and ponds), air quality, traffic noise, traffic, cultural resources, federally-protected species, community impacts and hazardous material sites. The planning for the Project was conducted by NCTA, NCDOT, and numerous consulting firms. The division FHWA office has been heavily involved in this Project since the project planning phase began for the Project. Representatives from the regional FHWA office attended all public meetings and hearings. Frequent discussions were also held with the FHWA to ensure project planning and environmental documents were in compliance with applicable federal statutes and regulations.

Preliminary designs for the Project were completed by external consultants contracted with the NCTA and NCDOT. Enhancements to the overall design, full definition of the ROW requirements, utility designs, and coordination with the design-build teams continued through award of the design-build contract. The NCTA is coordinating closely with NCDOT's Division 10 personnel and Raleigh-based design groups.

The Project will provide a number of benefits to the Metrolina region. While a project of this magnitude cannot be developed without some impacts to the environment, steps have been taken to avoid, minimize and mitigate those impacts to the greatest extent possible. Some of these steps are listed below.

STORMWATER

Stormwater drainage systems for the Project have been designed in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) program. The Project also utilizes NCDOT's Best Management Practices for the protection of surface waters during construction. Other design features such as vegetated berms and swales were considered and incorporated into the roadway design where appropriate to mitigate any potential transfer of toxins or other nutrients into surface waters. Grass-lined ditches will be used instead of concrete pipes, where possible, in order to maximize nutrient and particulate removal. Detention and retention facilities will be utilized, as required, to maintain appropriate water discharge rates into existing tributaries. These measures will assist in the preservation of the existing ecosystem.

WETLANDS AND STREAMS

A rigorous evaluation was undertaken to avoid and minimize the Project's impacts on wetlands and streams. Mitigation was required for all unavoidable impacts to jurisdictional wetlands and streams. Mitigation needs for the Project were provided through the North Carolina Division of Mitigation Services (formerly called the North Carolina Ecosystem Enhancement Program). Bridges will be utilized, where practical and feasible, to span wetlands and streams.

PROTECTED SPECIES

Informal Section 7 Consultation with the US Fish and Wildlife Service was completed to determine the effect of the Project on federally-protected species in the project area, in accordance with the Endangered Species Act of 1973. The Project was designed to avoid direct impacts to the Carolina heelsplitter by avoiding sensitive watersheds and to the Schweinitz's sunflower by protecting known plant occurrences. The US Fish and Wildlife Service issued a letter of concurrence with NCDOT/NCTA's Biological Assessment and associated biological conclusions on December 16, 2013 for the Carolina heelsplitter, its designated critical habitat in Goose and Duck Creeks, and the Schweinitz's sunflower.

Studies conducted for the Project concluded that the Project would not contribute notably to further effects to the Carolina heelsplitter, but NCDOT/NCTA voluntarily elected to fund conservation in the Flat Creek watershed in South Carolina to help offset any potential but unpredictable impacts to the species. In addition, NCDOT/NCTA funded the continued operation of the US Geological Survey's stream gauge on Goose Creek for five years.

In addition, because there are two occurrences of the Schweinitz's sunflower very close to the construction limits of the Project, NCDOT/NCTA has committed to protecting these two plant occurrences with measures and commitments that will protect them from impacts during construction of the Project as well as preserve these populations in perpetuity.

The Northern long-eared bat (NLEB) was proposed for listing in October 2013 and as of December 2014, the species was listed as having "potential" to occur in Mecklenburg and Union Counties. After officially becoming listed as federally-threatened in April 2015, the NLEB was removed from the list of protected species for Union County but remains on the list for Mecklenburg County. Based on the results of surveys conducted by NCDOT in 2014, proximity to known occurrences of NLEB, lack of potential foraging and roosting habitat within the study area, and using currently available guidance from US Fish and Wildlife Service, the proposed project has a biological conclusion of No Effect for NLEB.

AIR

The project study area is located within the Charlotte-Gastonia-Rock Hill air quality region (which includes Mecklenburg County and Union County), which is a moderate non-attainment region for ozone. Mecklenburg County is a maintenance area for carbon monoxide. Compliance of an individual project with the ozone and carbon monoxide National Ambient Air Quality Standards (NAAQS) is demonstrated if the project is included in a conforming transportation plan, which considers the urban area as a whole. The Monroe Expressway is included in the MUMPO 2035 LRTP, which is a conforming transportation plan.

NOISE

Traffic noise studies have been conducted as part of the environmental study process to identify impacted receptors and how best to mitigate potential traffic noise from the Project. Based on the Design Noise Report completed in February 2016, four noise walls are considered to be "likely" in the following general locations: White Oak Lane, Oakland Avenue, Clear Creek Drive and Dusty Hollow Road/Wallace Road. The final decision on the installation of the noise walls will be made upon completion of the project design, the public involvement process, concurrence with NCDOT Policy and FHWA approval. The current aesthetic design plans incorporate aesthetic treatment into the noise walls.

HAZARDOUS MATERIALS

The NCDOT is ensuring that all state and federal laws will be strictly adhered to in the abatement of hazardous materials located on the Project's right of way, if encountered. The identification and remediation of these sites that would otherwise remain unidentified is of incalculable benefit to the environment.

NEPA DOCUMENTATION, INITIAL PROJECT FINANCING, & LITIGATION DELAYS

The Final Environmental Impact Statement (EIS) was approved in May 2010 and a Record of Decision was received in August 2010.

In October 2010, the NCTA issued \$233,920,000 in State Appropriation Revenue Build America Bonds (BAB's). On October 28, 2010, the NCTA opened design-build price proposals for the highway design-build contract. The successful proposer was Monroe Bypass Constructors (a joint venture of United Infrastructure, Anderson Columbia, and Boggs Paving) with a bid of \$367,700,000, which included the costs for final design and construction engineering and inspection (CEI). The selected team's bid was 21% below the engineer's estimate of \$465.2 million, and 9% and 13% below the unsuccessful bids of \$402.1 million and \$424.4 million, respectively. In their Technical Proposal, the design-build team proposed a project opening date of December 31, 2014.

However, the project financing did not move forward due to a lawsuit filed by the Southern Environmental Law Center (SELC) on behalf of three conservation groups challenging the Project's NEPA document. The design-build contract was not awarded because of the financing delays. The design-build team agreed to hold their price for up to one year. NCDOT prevailed in the initial lawsuit filed by the SELC in the United States District Court in the opinion published on October 24, 2011. Following the favorable court opinion, the following activities took place:

- November 9, 2011 - \$10 million Senior Toll Revenue Bonds sold
- November 16, 2011 - \$214.505 million State Appropriation Revenue Bonds sold
- November 23, 2011 – Design-Build highway construction contract awarded and a Limited Notice to Proceed was granted for design and permitting activities
 - Revised Substantial Completion Date (project opening) to December 31, 2015
 - Revised Final Completion Date to July 1, 2016
- December 15, 2011 - \$145.535 million GARVEE bonds sold

Following the October 2011 ruling, the SELC filed an appeal to the United States 4th Circuit Court of Appeals, and a three-judge panel overturned the lower court decision on May 3, 2012. Out of an abundance of caution, the NCTA undertook a review of the issues detailed in the panel's opinion to determine what, if any, additional environmental study may be necessary. During this data review process, NCTA engaged a variety of experts to assist in the data analysis and explanation. The design, construction, and right-of-way acquisition of the Project were halted in May 2012 and the August 2010 Record of Decision was rescinded by the FHWA. NCDOT agreed to compensate the Design-Build Team monthly for idle labor and equipment due to the delay in accordance with the executed contract. The cost of this delay was approximately \$2.8 million. The acquisition of right of way due to hardship situations (medical and financial) was permitted to continue during the work stoppage.

On May 15, 2014, a Final Supplemental Final Environmental Impact Statement (FSFEIS) was approved and a new Record of Decision was issued by the FHWA. The Design Build Team remobilized and reinitiated the preparation of design plans. On June 23, 2014, the SELC again filed suit in United States District Court, challenging the NCDOT and FHWA's NEPA documentation prepared for the Project. The NC Department of Environment and Natural Resources

– Division of Water Resources issued the 401 Water Quality Certification on March 6, 2015. The US Army Corps of Engineers issued the Section 404 Individual Permit on May 8, 2015. On this same day, NCDOT issued an Unlimited Notice to Proceed with construction activities.

In April 2015, NCDOT also removed the CEI scope of work from the design-build contract; subsequently, NCDOT executed a contract directly with Summit Design and Engineering Services to perform CEI services directly for the Department. The value of this cost-plus, not-to-exceed contract is \$18,187,091.20. Within this same design-build change order, NCDOT supplemented the design-build team to provide additional contract time and compensation related to project delay. The net amount of the change order executed on April 2, 2015 was \$76,061,160.21. The revised Substantial Completion Date was updated to November 27, 2018. The Project is scheduled for Final Completion on May 28, 2019.

On May 14, 2015, the SELC filed a motion for a temporary restraining order and preliminary injunction in the United States District Court, asking the court to enjoin NCDOT and FHWA from all construction activities to preserve the status quo while the merits of the June 2014 case are considered. On September 10, 2015, the US District Court denied the SELC's motions for summary judgment, temporary restraining order, preliminary injunction, and motion for a hearing. SELC filed a notice of appeal to the US 4th Circuit Court of Appeals on September 15, 2015. The parties submitted legal briefs and oral arguments were held on May 12, 2016. On June 9, 2016 the U.S. Court of Appeals for the 4th Circuit ruled in favor of NCDOT/FHWA by holding that the agencies' environmental study was valid and did not violate any laws. If the Plaintiffs choose to seek additional appeals, they have 90 days to seek an appeal with the U.S. Supreme Court. It is entirely within the discretion of the U.S. Supreme Court whether it would consider any appeal. There is no other pending or threatened litigation.

Federal, state, and local permits and other approvals already obtained for the Monroe Expressway include:

- MPO Approval, Air Quality Conformity (May 3, 2010)
- NC Ecosystem Enhancement Program Acceptance of Mitigation (June 24, 2010)
- NC Department of Environment and Natural Resources 401 Water Quality Certification (December 22, 2010, withdrawn May 17, 2012, reissued March 6, 2015)
- US Army Corps of Engineers 404 Permit (April 15, 2011, suspended May 17, 2012, reissued May 8, 2015)

CHAPTER 6 | PROJECT DETAILS

HIGHWAY DESIGN-BUILD CONSTRUCTION

The design criteria are consistent with the current practices and standards of NCDOT and the American Association of State Highway and Transportation Officials (AASHTO). Design criteria and typical sections were based on existing (2008) and projected (2035) traffic forecasts and the long-range vision for the US 74 corridor, as defined by the NC Strategic Highway Corridor program and the NC Intrastate Corridor System. Future traffic projections for the facility were based on a design year of 2035 and assume the facility is tolled. Design guidelines were based on desirable roadway standards from AASHTO's *A Policy on Geometric Design of Highways and Streets* (2004), the *NCDOT Roadway Design Manual*, and the *NCDOT Roadway Standard Drawings*.

Two typical sections were developed for the Project – one for the western segment which includes upgrading a short portion of existing US 74 and one for the majority of the roadway on new location. These typical sections are depicted in **Appendix A**.

The posted speed limit for the tolled highway on the new location roadway will be 65 mph, although it is likely to be reposted at 70 mph after opening in order to be in accordance with the latest speed limit policies for similar facilities in North Carolina. Along the western end of the Project within the elevated section, the posted speed limit will be 55 mph. The posted speed limit of the frontage roads adjacent to the elevated section will be 35 mph.

The design and construction of all local cross streets (-Y- Lines), ramps, service roads and cul-de-sacs, widening and improvements are of sufficient length to tie to existing facilities based upon the current guidelines and standards. The -Y- Lines were designed for the appropriate speeds based upon the functional classification and for a speed consistent with the currently posted speed limits.

The US Army Corps of Engineers 404 Permit was obtained for the Project. Any required coordination with the environmental agencies, approvals from the environmental agencies, public involvement and/or permit modifications resulting from a variation in the proposed design and/or construction method, or utility relocation/construction is the sole responsibility of the design-build team and will be coordinated with NCDOT. NCDOT will not allow any contract time extensions associated with obtaining a permit modification, public involvement or additional agency coordination/approvals.

PAVEMENT

Because the projected traffic volumes are predicted to be heaviest on the western end and become lighter on the eastern end, the NCTA divided the Project into three segments for pavement design purposes. The western section is about one mile long, and includes the upgrade of existing US 74. The middle section is about eleven miles long and the eastern section is the remaining seven miles. For each of these three sections, the NCDOT Pavement Management Unit prepared six 30-year design options to allow maximum flexibility in pavement type selection for the design-build teams. In addition, the design-build teams were allowed to economize these designs as long as certain criteria were met. In general, the pavement designs are thicker on the western end and progress to thinner designs on the eastern end. Monroe Bypass Constructors economized on an asphalt pavement option with cement-treated aggregate base course and asphalt shoulders.

BRIDGE AND WALL STRUCTURES

Bridge design and construction criteria for the Project's 37 bridges conform to the most current versions of the AASHTO *"Load and Resistance Factor Design (LRFD) Bridge Design Specification"*, NCDOT *"Structure Design Manual"* (including policy memos) and *"NCDOT Bridge Policy Manual"*. Design Live Load for structures and ramp structures is HS25 loading. Construction and materials shall be in accordance with *NCDOT Standard Specifications for Roads and Structures* (2012), NCDOT Structure Design Unit Project Special Provisions, NCDOT Structure Design Unit Standard Drawings and any special provisions included in the project requirements. Bridge materials include non-prestressed cast-in-place concrete, prestressed precast concrete and steel.

HYDRAULICS

Stormwater conveyance was designed in accordance with criteria provided in the North Carolina Division of Highways *"Guidelines for Drainage Studies and Hydraulics Design-1999"*, the addendum *"Handbook of Design for Highway Drainage Studies-1973"*, NCDOT *"Stormwater Best Management Practices Toolbox-2008"* and North Carolina Division of Highways Hydraulics Unit website, <http://www.ncdot.org/doh/preconstruct/highway/hydro/>.

The design-build team has completed the hydraulics design scope of work for the Project. The following milestones have been achieved:

- Submitted permit drawings and permit application package to NCDOT for submittal to environmental agencies
- Designed all storm drainage systems within the project limits
- Prepared Culvert and Bridge Survey Reports for structures
- Designed erosion and sedimentation control plans
- Analyzed existing culverts and cross pipes adjacent to the Project and within existing ROW. Recommended replacement of any deficient (structurally and/or hydraulically) pipes and/or culverts
- Prepared CLOMR or MOA packages for FEMA regulated streams impacted by the design

LIGHTING

The design of all illumination systems will conform to the latest edition of the AASHTO *"Roadway Lighting Design Guide"*, and in accordance with the NCTA's specific requirements. The design will be performed as part of the design-build contract. All lighting will be reviewed by NCTA and other units of NCDOT for conformance with the project requirements.

Roadway lighting is required, including service roads and underpasses, from the western end of the Project through the interchange of US 74 Bypass and existing US 74 near Stallings. Continuous roadway lighting is not required through the remainder of the Project. Complete interchange lighting will be installed at the westernmost interchange of US 74 Bypass and existing US 74. To keep traffic flowing smoothly, the all-electronic tolling (AET) zones will not be lighted beyond what is necessary for video tolling; this approach will de-emphasize the tolling equipment where no driver decisions are required.

Standard design documents developed by NCTA will be utilized for the Project. Lighting systems will be comprised of two main types of equipment – high mast lighting standards (poles of up to 100' tall with a ring of 4 to 12

luminaries), and pole-top lighting standards (poles of up to 45' tall with one or two full-cutoff luminaries without arm and at zero tilt). Conventional lighting standards with a cobra head luminary and arm will not be used, as the pole top luminaries can be more easily maintained without lane closures. The design-build contractor will design the systems for economy of installation and maintenance. High mast lighting will be used wherever possible. At a minimum, pole lighting will be utilized where ROW does not allow for standard installation of high mast lighting, and where high mast lighting standards are not found to be the most economical equipment.

SIGNING

Distinctive and adequate signing is a necessity for major highway facilities. Signs will provide a means by which the user can readily be guided throughout the Monroe Expressway corridor. Large, legible, directional signage, as well as regulatory and warning signs, will be provided. Signs along existing intersecting highways and thoroughfares will be modified as necessary to provide clear directions to the Monroe Expressway. Special signing in advance of the toll zones will be used to inform drivers of the various payment options.

The development of Signing Plans is underway by the design-build team in accordance with the latest editions of the *Manual on Uniform Traffic Control Devices (MUTCD)*, the *NC Supplement to the MUTCD*, *NCDOT Standard Specifications for Roads and Structures*, the *NCDOT Roadway Standard Drawings*, *AASHTO's Standard Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals*, "Guidelines for Preparation of Signing Plans for Design-Build Projects", and the "Design-Build Submittal Guidelines". NCTA toll collection signing standards have been developed and are being utilized by the design-build team for these specific signs. All electrical installations and coordination are the responsibility of the design-build team and must meet NEC, state, and local codes. All electrical/electronic equipment and devices must be UL (Underwriters Laboratory) approved and listed. NCTA has provided the design-build team with a Signing Schematic of the toll road corridor for use in developing the signing plans.

In addition to the required signage, NCTA will provide mile markers every one-half mile on the mainline. Each mile marker location shall have two mile markers mounted back to back on one u-post to permit easy visual identification and promote safety.

All overhead sign assemblies shall be designed, fabricated, and installed by the design-build team and shall meet all NCDOT and NCTA requirements. The wind speed for overhead sign assembly design is 90 miles per hour.

The design-build team shall use Type IX reflective sheeting for the legends (text) and background on all overhead signs. No overhead sign lighting is required for advance guide, toll related signs or exit directional overhead signs.

NCTA sign standards include posting signs before entry to the Expressway, prior to system or service interchange ramps, which identify the Expressway as a tolled road and present the two options for customer payment (NC Quick Pass and Bill by Mail). As required by general statute, blue guide signs will be installed on the toll facility at an exit to be determined that will direct customers to the NC Quick Pass storefront (where customers can purchase a transponder and receive customer service). Additional guide signs will be installed on the ramps and along the route to provide turn by turn direction to the storefront.

SIGNALS

The design-build team is designing and preparing plans for the traffic signal installations. This work includes, but is not limited to, the preparation of Traffic Signal Plans, Electrical and Programming Details, Utility Make-Ready Plans,

Communications Cable & Conduit Routing Plans and Project Special Provisions. These plans are being prepared in accordance with the *“Design-Build Submittal Guidelines”* and the *“Guidelines for Preparation of Traffic Signal & Intelligent Transportation System Plans on Design-Build Projects,”* which are available on the NCDOT Design-Build website.

The design-build team is responsible for providing the safest and most economical design for the public. The design-build team is responsible for ensuring that all plans and designs conform to the current design standards of the NCDOT Intelligent Transportation Systems & Signals Unit. All plans and associated design material and specifications are being reviewed and approved by NCDOT before installation.

The original scope of work included six new traffic signals at interchange ramp terminals and seven upgraded signals in the project vicinity. However, the selected team elected to design and construct roundabouts in lieu of traffic signals at several locations. In addition, the design-build team will install and/or maintain a spread-spectrum wireless communication system which will serve as the communications medium between existing traffic signals and/or new traffic signals as required to form closed-loop traffic signal systems.

INTELLIGENT TRANSPORTATION SYSTEMS

The Monroe Expressway will include Intelligent Transportation Systems (ITS) infrastructure and operational systems to support overall management of traffic flow to assist with timely response to incidents. ITS deployment will complement similar NCDOT activities on interstate highways in the region, and will meet or exceed the State’s ITS performance requirements. ITS will be constructed by the highway design-build contractor. The project elements comprising the ITS include:

- A fiber-optic (backbone) network (FON), in combination with leased commercial circuits, to provide a redundant communication network for the toll systems and the ITS. The communication network will be configured to connect toll locations, ITS devices and NCTA and NCDOT transportation management centers (TMCs).
- Approximately 47 traffic detector locations (two per mainline segment between interchanges and one on each interchange ramp).
- Approximately 25 closed-circuit television (CCTV) camera locations with approximately 1-mile spacing sufficient to provide full viewing of the Expressway and of the crossing roads at interchanges.
- Ten Dynamic Message Sign (DMS) locations in advance of key decision points relative to major cross routes or alternative routes. Seven full-color DMS’s will be located on toll gantries, while one amber DMS will be located on a shared sign structure, and two amber DMS’s will be on a shared standalone pedestal.
- One Environmental Sensing Station (ESS) will be provided for atmospheric and pavement monitoring at a key location on the west end of the corridor.

The design of the ITS elements is well underway by the highway design-build team. These designs are being reviewed by NCTA, the toll integrators (once they are selected), NCDOT ITS Design, and local NCDOT ITS Operations staff to ensure that the design approach fits into both the overall tolls operational scheme and the ITS operational plan for the metro area.

It is crucial that ITS video feeds and data are transmitted seamlessly to the TMC (traffic management center) in Charlotte and to the NCTA in the State Transportation Operations Center (STOC) located in the Joint Facilities

Headquarters in Raleigh. It is also crucial to establish a reliable and secure connection to transmit tolls data to the NCTA Customer Service Center (CSC) in Raleigh.

TOLL INFRASTRUCTURE

The design and construction of the toll infrastructure is included in the design-build lump sum price of the highway construction contract.

Toll infrastructure consists of 14 mainline toll zones with dual-gantry design (similar to Triangle Expressway) with 50-foot separation between the gantries. There are no proposed ramp gantries. The design-build team will also design and construct maintenance pull-off areas at the toll zone sites, toll equipment vaults/shelters, backup power generator equipment and propane tank, and aesthetic screen walls. The toll gantries are being designed for a 4-lane mainline cross-section, which can be easily modified to accommodate an additional lane in the median in both directions.

CONSTRUCTION OVERSIGHT

NCDOT Division 10 is responsible for construction management and construction oversight for the Project. In addition, NCDOT has engaged a private engineering firm, Summit Engineering and Design, to provide construction engineering and inspection services. Activities include monitoring and reviewing project documentation to ensure that plans, specifications, standards, reporting, procurement and construction are in compliance with applicable federal/state laws and regulations. The NCDOT Division Engineer is responsible for overseeing these activities. Summit is providing independent monitoring of construction to verify construction progress, contractor invoicing and quality of work.

The NCDOT required the selected design-build team to procure an independent consultant to provide impartial environmental and permit monitoring services in conjunction with the Project. Three Oaks Engineering is currently monitoring items during each phase of the construction, including construction runoff water quality device inspections, hazardous material spill reporting and response, compliance with US Army Corps of Engineers Section 404 permit requirements and NCDENR-DWQ 401 permit requirements, and notifications of archaeological discoveries. The NCDOT has designated an internal environmental coordinator to review and supervise this monitoring program. NCDOT is assisting with erosion and sedimentation compliance during design reviews and during construction.

AESTHETICS AND LANDSCAPING

Pursuant to NCTA desires and commitments, landscaping and special aesthetic treatments will be provided along the Monroe Expressway corridor with a budget of approximately 3% of the total construction cost. The historical and natural features of the area (including building patterns, style, colors, native stone, and native plants) were selected to support a design image that reflects the surrounding natural environment.

AESTHETICS

The Monroe Expressway will have a distinctive aesthetic character, making it a distinguishable road within North Carolina. The NCTA's purposes in setting a high aesthetic standard for the facility are to:

- Encourage the attraction of initial users, by giving the road a distinguishable “brand”;
- Provide an enhanced travel experience to users who will be paying to use the road; and
- Create a community amenity with the potential to attract public support and possibly some financial contribution for landscape, amenities, maintenance and public art.

The *Aesthetic Design Guidelines*, including architectural guidelines for the toll zones, bridges and retaining walls, sound walls, and sign structures, were developed by Atkins, in close coordination with NCTA staff. An architectural review committee of community representatives was consulted to assure that the design is appropriate for the context in which the Monroe Expressway will be located. The style and detailing of the aesthetic themes was inspired by regional architectural themes. The selected theme uses primarily brick with a mix of stone, and incorporates retaining walls, decorative pilasters, and emblems.

The aesthetic design is concentrated around the major interchanges and cross-street bridges. The NCTA has prioritized the aesthetics treatments in the following order, from highest to lowest:

1. Elevated section adjacent to existing US 74
2. Bridges visible to motorists
3. Toll gantries, retaining walls, and sound walls
4. Overhead and DMS signs

LANDSCAPING

Landscaping design plans are being prepared by the NCDOT Roadside Environmental Unit. The guiding principles are to utilize the most highly visible areas within the corridor to provide the most visual impact, while also using plant materials that require low maintenance. The NCDOT intends to award one or more separate landscape installation contracts.

UTILITY ADJUSTMENTS

To facilitate early utility coordination for the Project, NCTA employed URS Corporation (URS) and their subconsultant, MA Engineering Consultants (MA). Prior to award of the design-build contract, the URS/MA team was responsible for coordinating project development with all public and private utilities that may be affected by the Project. They confirmed the location and type of the utilities, as well as identified the utility owners in order to coordinate the relocation of all utilities in conflict with the Project. Following project award in November 2011, the design-build team has been responsible for utility coordination work.

The URS/MA team as well as the selected design-build team followed the guidelines as listed below:

- *NCDOT Utility Manual - Policies & Procedures for Accommodating Utilities on Highway Rights of Way*
- *Federal Aid Policy Guide- Subchapter G, Part 645, Subparts A & B*
- *Federal Highway Administration’s Program Guide, Utility Adjustments & Accommodations on Federal Aid Highway Projects*
- *NCDOT Construction Manual Section 105-8*
- *NCDOT Right of Way Manual - Chapter 16 Utility Relocations*
- *NCDENR Public Water Supply - Rules governing public water supply*

- *NCDENR Division of Water Quality - Title 15A - Environment and Natural Resources*

In addition to municipal water and sanitary sewer (“wet” utilities) within the various municipalities, the impacted “dry” utilities include Duke Energy, Piedmont Natural Gas, Time Warner Cable, Sprint (fiber-optic cable), Union Power, Verizon, and Windstream. As with most projects, timely utility relocations are a challenge. To date, the design-build team has been able to mitigate most delays by rescheduling operations.

The design-build team’s lump sum price includes the cost to relocate water and sanitary sewer lines. The cost for the relocation of “dry” utility relocations will be paid by NCDOT if the utility demonstrates compensable interest. In those cases where the utility owner wishes to provide additional capacity or correct existing deficiencies, the utility owner will reimburse NCDOT for these betterment costs.

CHAPTER 7 | PROJECT IMPLEMENTATION

The implementation of the Monroe Expressway is well underway. The project planning phase is complete, and the highway construction has begun.

HIGHWAY CONSTRUCTION

HIGHWAY DESIGN-BUILD CONSTRUCTION

The construction of Monroe Expressway is being completed using a design-build method of contracting. A Request for Qualifications for the highway contract was distributed in April 2010, the short-list of teams was selected in June 2010, the contract price proposals were opened on October 28, 2010 and technical scores were announced. From the group of three short-listed teams, Monroe Bypass Constructors, LLC (MBC) was selected through the design-build best-value procurement process. MBC is a joint venture of United Infrastructure Group, Boggs Paving and Anderson Columbia Company with Rummel, Klepper & Kahl (RK&K) as the lead design firm. Headquartered in South Carolina, United Infrastructure was founded in 1926 and specializes in bridge and highway construction projects in the southeastern United States. Anderson Columbia was founded in 1958 as a local contractor in Florida, and has expanded their highway and bridge construction to several states in the Southeast. Boggs Paving was founded in 1994 in Monroe, NC with an emphasis on asphalt paving. At the time of project award, the joint venture collectively had 151 years of highway and bridge construction experience. This team offered a lump sum price of \$367.7 million. This original price proposal included construction engineering and inspection (CEI) services; CEI services were removed from the contract in 2015 as part of a larger change order.

PAYMENT AND PERFORMANCE BONDS

At the time of project award in 2011, the NCDOT required that the design-build team execute payment and performance bonds in the amount of the bid (\$367.7M). Additionally, the design-build team has executed payment and performance bonds for each subsequent supplemental agreement and change order. Liberty Mutual Insurance Company is serving as the surety for these bonds.

The performance bond secures the design-build team's promise to perform the project in accordance with its terms and conditions, within the time allowed. The payment bond protects certain laborers, material suppliers, and subcontractors against nonpayment.

WARRANTY

As a requirement of the contract, the design-build team will furnish a warranty bond in the amount of 5% of the total cost of the contract as a prerequisite for determination of substantial completion. Initial acceptance will occur as soon as the NCDOT confirms in writing that contract provisions have been met and the design-build team has reached Substantial Completion. The date on which Substantial Completion occurs will coincide with the Warranty Initiation Date. Prior to expiration of the three-year warranty term, the NCDOT will produce a punch list of those items which require corrective work prior to fulfillment of the warranty obligation.

INCENTIVE BONUSES AND LIQUIDATED DAMAGES

The highway design-build contract includes provisions for both incentives and liquidated damages for various elements. . **Exhibit 7** contains the various bonuses available to the team, as well as the damages for not meeting certain requirements.

Exhibit 7: Incentive Bonuses and Liquidated Damages

Item	Incentive if Met	Liquidated Damages if Not Met
Substantial Completion Date, including Toll Integration	\$3.0 million bonus to Design-Build Team	\$25,000/day
Substantial Complete Date, without Toll Integration	\$2.0 million bonus to Design-Build Team	\$25,000/day
Roadside Toll Collection System by Substantial Completion Date	\$100,000 to RTCS vendor	\$5,000/day
Final Completion Date	N/A	\$10,000/day
Completion of ORT infrastructure and ITS devices by July 31, 2018	N/A	\$15,000/day
Road and lane closures in excess of those permitted in RFP	N/A	Varies by roadway from \$1,000/hour to \$10,000/hour
Environmental Excellence: No Immediate Corrective Actions (ICA) No Continuances of Immediate Corrective Actions (CICA) No Notices of Violation (NOV) No Cease and Desist Orders (C&D)	\$150,000	\$50,000 forfeiture per ICA or CICA \$150,000 forfeiture per NOV or C&D \$12,000 liquidated damages per each follow-up violation

SCHEDULE

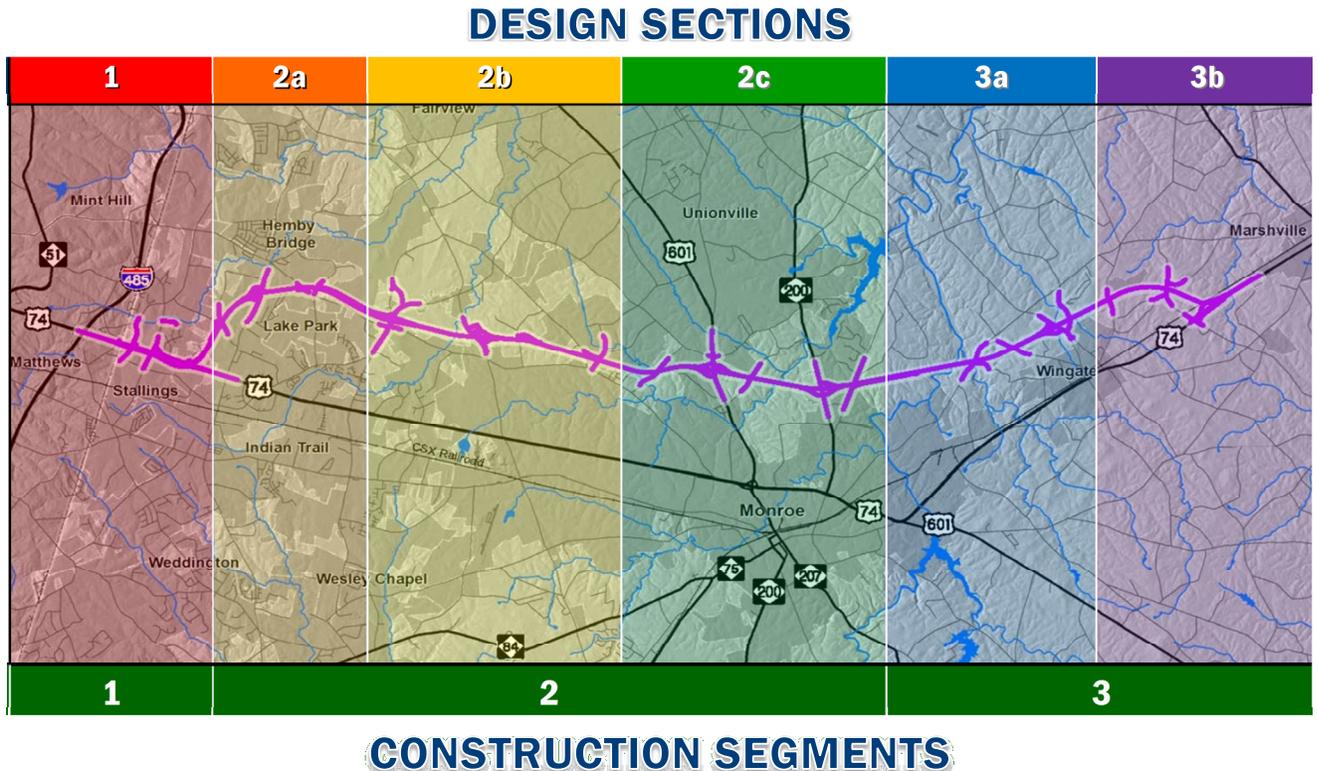
As part of their Technical Proposal, MBC proposed a project opening date of December 31, 2014. However, due to delays caused by litigation, the current schedule assumes the Project will open to traffic on November 27, 2018, with final completion occurring in May 2019.

As of March 31, 2016, MBC was approximately 29% complete with the design and construction of the highway.

PROJECT SEGMENTS

The Monroe Expressway design-build team has divided the Project into six sections for design and right-of-way acquisition, which are sub-segments of three construction segments, as depicted below in **Exhibit 8**. The construction segments are designated 1, 2 and 3, while the design sections are designated 1, 2a, 2b, 2c, 3a and 3b.

Exhibit 8: Design Section and Construction Segment Map



LANDSCAPING INSTALLATION CONTRACT

One or more landscape installation contracts will be awarded for the length of the corridor. The landscape design will be performed by NCDOT's Roadside Environmental Unit; the contract(s) will be awarded to the lowest qualified bidder(s).

RIGHT OF WAY ACQUISITION

NCDOT purchased right of way for portions of the Monroe Bypass (R-2559) in 2001-2002 under a previously approved NEPA document (Project R-2559 Finding of No Significant Impact (FONSI) dated June 1997). As part of the right of way purchase, it is estimated that 39 residences (which included nine mobile homes) and three businesses were relocated.

For a project of this magnitude, the NCDOT is working with four professional services firms to manage and perform the right of way acquisition process on their behalf. All of the selected firms have extensive experience in the field

of right of way acquisition, relocations, and related services and will adhere to the provisions of the Uniform Relocation and Real Property Acquisition Act of 1970, as well as all appropriate state and federal guidelines.

As of June 4, 2016, right-of-way and easement acquisition is virtually complete for the 472 parcels. 352 parcels (74.6%) have been settled, 117 parcels (24.8%) have been filed for condemnation, which leaves three parcels (0.6%) remaining.

TOLL INTEGRATION

In order to enable tolling of the Monroe Expressway, new procurements are underway for the Roadside Toll Collection System (RTCS) and Electronic Toll Collection System (ETCS) vendors. NCTA will exercise its option for contract amendments to the Triangle Expressway for the Back Office System (BOS) and Operations Center for Customer Service (OPS) contracts that were procured as part of North Carolina's first toll road, the Triangle Expressway.

ROADSIDE TOLL COLLECTION SYSTEM (RTCS)

A procurement is underway that will enable NCTA to select a single vendor to design, install, operate, and maintain the RTCS for Monroe Expressway, with the possibility of expansion to other NCTA projects. This multi-year contract will include all aspects of NC Quick Pass (transponder-based) and Bill by Mail (video-based) transaction creation from the roadside environment to the existing NCTA BOS, including transaction formation, image processing and verification, digital video system, toll host.

An Industry Forum was held on February 16, 2016 to provide an opportunity for NCTA to provide a project overview and information regarding the scope of work and agency requirements to interested vendors. The RTCS Request for Proposals (RFP) for Monroe Expressway was advertised on April 14, 2016 and proposals are due on July 8, 2016. Negotiations to obtain a fixed-price contract with the selected vendor are scheduled for the summer of 2016; the Notice to Proceed (NTP) is anticipated in November 2016.

To encourage coordination and cooperation with Monroe Bypass Constructors, an incentive payment of \$100,000 will be paid to the Roadside Toll Collection vendor if the open to toll traffic go-live date of November 26, 2018 is met.

The contract includes the initial design and construction, plus operations and maintenance for a period of five years from NTP. The contract will also allow for up to two 3-year extensions.

ELECTRONIC TOLL COLLECTION SYSTEM (ETCS)

The procurement process for an ETCS vendor began in mid-2016. The selected vendor will provide the ETCS subsystem and transponders for the Monroe Expressway. The ETCS currently contemplated for the Monroe Expressway is a multiprotocol solution that will allow NCTA to read transponders issued by NC Quick Pass, E-ZPass®, Sun Pass®, and Peach Pass®. This contract will include the ETCS design, coordination with the RTCS vendor for installation and testing of the antennas and readers, as well as the initial purchase of transponders.

The Monroe Expressway ETCS will be fully implemented and tested prior to going live on November 26, 2018.

BACK OFFICE SYSTEM (BOS)

The existing BOS contract for Triangle Expressway was awarded to Xerox in 2009 and includes customer account management, RTCS transaction processing, system reporting, invoicing, webpage, etc. The original contract was established with the understanding that as additional projects come on-line, the BOS would be modified as necessary to accommodate them. Expanding the BOS in this manner allows for economies of scale, compliance with state legislation and DMV agreements, and streamlined customer service. The existing BOS currently supports two types of payments for trips on the Triangle Expressway: pre-paid tolls through ETC accounts (NC Quick Pass) and post-paid tolls through video tolling (Bill-by-Mail). In addition to accepting North Carolina's transponder, the NC Quick Pass, NCTA has toll interoperability agreements with E-ZPass®, Florida's SunPass®, and Georgia's Peach Pass. The Monroe Expressway will accept transponders from all of these toll programs.

In addition to processing ETC and video tolling transactions for the Monroe Expressway and other NCTA facilities, the BOS must be able to accurately manage system requirements that are unique to that facility. With the addition of new facilities, the BOS will be required to have a reporting system that accounts for transactions and reconciles the revenues for each facility. Information will also be added to the NC Quick Pass website (maps, toll rates) to provide customers and potential customers with enough information to make informed travel and transponder decisions.

It is currently assumed that NCTA will scope and negotiate an Extra Work Order with Xerox for the BOS that will be executed in November 2016. In order to accommodate Monroe Expressway transactions, the BOS will be fully implemented and tested prior to going live in August 2018.

CUSTOMER SERVICE CENTER (CSC)

Staffing and management of the NC Quick Pass Customer Service Center is being performed by AECOM. The scope of work includes establishing and maintaining accounts, as well as overall customer service operations. NCTA has projected that additional customer service representatives will be needed once the Monroe Expressway begins selling transponders and collecting tolls. An additional storefront where customers can buy transponders, pay their bills, and set up accounts will be established in the vicinity of the Monroe Expressway. NCTA is currently in the process of evaluating the vicinity near Monroe, I-485, and US 74 to determine if a location is available that would meet the dual needs of a storefront and a back-up or 2nd call center. This investigation is in the preliminary phases and no final determination as to whether NCTA can accommodate, and/or if it is financially prudent to have, a back-up or 2nd call center in this region, has been made. That being said, the 'biggest case' scenario would entail NCTA accommodating approximately 20 call center stations, four or five storefront windows, tag storage and deposit rooms, plus related supervisory, managerial and NCTA support (offices, conference rooms, file storage, etc.). If the facility is large enough, it is possible that NCTA would accommodate additional storage for other parts of the Project (roadside, etc.). The 'smallest case' scenario would have NCTA accommodating four or five storefront windows, tag storage and deposit rooms, plus related supervisory and NCTA support.

The existing operations contract with AECOM will be amended to accommodate the additional personnel requirements. The go-live date for the revisions to the Operations Center and the Charlotte area storefront is August 2018.

PUBLIC INVOLVEMENT

Public involvement and input has been encouraged throughout the development of the Project. Local government officials, civic organizations, neighborhood groups, and interested citizens were informed of the progress of the Project through a series of public workshops and a substantial number of small group meetings. Other outreach efforts and opportunities for the public to review project information and provide input included project mailings, a project website, and a toll-free project telephone number (i.e., project hotline).

In addition, the NCTA has set aside a budget for marketing, advertising and public information services and advice regarding a public information campaign for marketing of toll roads. The focus of this public information and education campaign will be the development and implementation of a marketing plan for the sale and distribution of electronic toll tags to be used in conjunction with NCTA toll roads. The efforts will include research and market surveys to provide the NCTA input and alternatives for its public information and education campaign. A comprehensive public education and outreach campaign will serve to increase knowledge, perception and understanding of the need for and benefits of the NCTA toll roads, including developing a strategy and content for print, television, radio and direct mail components of a public outreach campaign.

During the design and construction phases of the Monroe Expressway, the public information and involvement program has maintained a high level of communication by informing and educating local government agencies, special interest groups, businesses, and the general public about the project status of the Monroe Expressway. The NCDOT Communications Office, with input from the design-build team, will develop a Public Information Plan for the Project that will provide the public with an opportunity for input, notify the public in advance of construction and potential impacts, and demonstrate to the public that the Monroe Expressway will be developed pursuant to a well-executed Public Information Plan.

MARKETING

Prior to Project opening, NCDOT will develop a marketing plan to educate the public about the travel time savings associated with the Monroe Expressway. The use of an NC Quick Pass transponder to obtain a discounted toll rate will also be encouraged. The marketing initiatives will be tailored to fit the market conditions and needs of the commuters in the Charlotte and Monroe areas and their surrounding counties. These initiatives consist of outreach programs to local businesses, creative services, advertising, branding, interactive marketing, social media, as well as sales and other promotional activities.

CHAPTER 8 | TOLL COLLECTION OPERATIONS

Toll collection operations include the collection of the correct toll amounts from patrons, in accordance with the established toll rate schedule, accounting of the toll revenue, transfer of the funds into banks and among interoperable agencies, and documentation of the toll collection activities.

Similar to NCTA's Triangle Expressway, the Monroe Expressway will be exclusively operated as an all-electronic toll (AET) system. AET is the collection of toll revenue through the use of electronic toll collection (ETC) devices, otherwise referred to as transponders, and/or through the capture of license plate images. The proposed AET system will collect tolls as vehicles pass through tolling zones at highway speeds. A toll zone is defined as the area of the roadway, under or on the gantry, where the toll collection system equipment is located, performing the development of a toll transaction. There will be seven mainline tolling points and 28 tolled lanes. The shoulders will not contain a complete suite of toll equipment, but will contain triggers and cameras to record the license plates of vehicles trying to evade tolls by leaving the travel lanes.

The basic components for any AET toll collection program are the roadside toll collection system (RTCS) and back office systems (BOS), the Customer Service Center, and overall operations and maintenance.

Toll collection will utilize pre-paid and post-paid payment methods. For the former, patrons have the option of establishing pre-paid toll accounts and purchasing transponders, which are mounted within the vehicle. Tolls are deducted from the customer's account as they pass through a toll zone. For customers who do not pre-pay, video tolling camera equipment will process license plate captures and they will be subsequently billed on a monthly basis for the tolls in accordance with established NCTA policies pertaining to video toll invoicing or post-paid tolls.

Session Law 2008-225 was ratified by the North Carolina General Assembly on July 18, 2008 and requires payment of outstanding turnpike tolls and applicable fees or fines prior to vehicle registration renewal. This bill was revised in July 2010 as Session Law 2010-133 as it pertains to the video toll collection process.

ROADSIDE TOLL COLLECTION SYSTEM (RTCS)

The function of the RTCS is to detect vehicles at the toll zones, build the proper transaction, and transmit that transaction and supporting data to the BOS. The RTCS being developed for the Monroe Expressway is a state-of-the-art fully automated toll zone, plaza, toll facility host and database.

The RTCS includes all toll-related hardware and software located on the roadway, automated license plate recognition and processing software. Additionally, the RTCS includes CCTV cameras for roadway overview, traffic and system audit, and site security.

The RTCS will build a completed transaction by detecting and classifying the vehicle, by identifying vehicles through reading a transponder, if present, or by capturing front and rear images of the vehicle's license plate number to begin image processing. If an ETC transponder is detected, the transaction information is sent to the BOS for validation of account status and debiting of the account for the correct toll amount. If an ETC transponder is not detected, an image of the vehicle's license plate will be captured and identified post transaction through image processing. License plate numbers not associated with any prepaid accounts will be sent to the appropriate state DMV to obtain their demographic information through the BOS. All transactions for a given billing period will be billed to the registered owner of the vehicle through an invoicing process.

ELECTRONIC TOLL COLLECTION SYSTEM

The ETCS for the Monroe Expressway will include a system that automatically recognizes a vehicle using a valid encoded transponder, records the vehicle passing through the toll system, and provides necessary information to the RTCS needed to build a transaction that will collect a toll from a previously established pre-paid account. This subsystem includes the lane antennas and readers to capture the transactions and the transponders that will be issued to the customers.

BACK OFFICE SYSTEM (BOS)

The BOS is a state-of-the-art toll system management and toll account management system made up of the system host, databases, customer service center (CSC) module and necessary interfaces to payment systems and commercial establishments. The BOS is located within NCTA's toll operation center in Morrisville, NC. The system's overriding functions include acceptance of transactions and roadway data, managing prepaid toll accounts, collecting revenue through these accounts, reporting revenue collection activities, and interfacing with external contacts (retail, interoperable agencies, financial institutions, and DMVs).

The BOS includes the main toll collection system computer server and database, and the hardware and software necessary to support the customer service center and interoperability with out-of-state toll agencies.

CUSTOMER SERVICE CENTER (CSC)

NCTA's Customer Service Center (CSC) will house the BOS and CSC for statewide operations. The Customer Service Center is located in an offsite facility at 200 Sorrell Grove Church Road in Morrisville, NC. In addition, to provide local customer service for the Monroe Expressway, a storefront service center will be located in the vicinity of the Project.

Prior to the opening of Phase I of the Triangle Expressway in 2012, NCTA selected URS (now merged with AECOM) to provide staffing for the CSC, and to manage all functions for the statewide ETC and video billing programs. These functions include customer service at walk-in centers, call center, mail and email responses, ETC account opening, transponder sales and inventory management, account management, image reviews, video billing, interoperability/reciprocity with out-of-state toll facilities, and collection efforts. NCTA will negotiate a supplemental agreement to extend AECOM's service to the Monroe Expressway storefront locations.

NCTA operations personnel will continue to be co-located with AECOM staff within the Operations Center and will oversee the contract, monitor performance requirements, and provide audit and accounting for these operations.

CHAPTER 9 | PROJECT COSTS

INITIAL PROJECT COST ESTIMATE

HNTB developed the initial project cost estimate, which was based on the results of a Monte Carlo simulation. The cost estimating team used a statistical software tool called Crystal Ball[®] in order to perform the simulation. Each of the input variables was assigned a reasonable range of values, with the end result being a final forecast probability curve that reflects the uncertainty of the input variables. In addition, the estimates for each category were inflated into year-of-expenditure dollars using a range of reasonable inflation rates. For instance, right of way cost estimates were modeled using annual inflation rates ranging from 0% to 3%, with 2% being most likely. Contrastingly, administrative expenses were modeled using annual inflation rates ranging from 2.0% to 4.5%, with 3.5% being most likely. Based on guidance from FHWA, the project team used the cost that represents a 70% probability that the cost will be less than or equal to this value. In addition, a Cost Estimate Review workshop was conducted by FHWA in April 2010 that served to validate the estimating processes used and the final results. The project cost estimate used to finalize project financing in the fall of 2011 was \$671.5 million.

REVISED PROJECT COST ESTIMATE

The most recent cost estimate to complete the Project is \$731 million. Schedule and scope changes, as well as recent right-of-way acquisition trends, caused the following cost estimates to be revised:

- Highway Design-Build Contract
- Damages for Project Delays
- Inflationary Adjustments for Design and Construction
- Construction Engineering and Inspection (CEI)
- Diesel Fuel and Asphalt Cement Adjustments
- Right of Way Acquisition
- NCDOT Labor and Administration

The adjustments to these estimates are discussed below. **Exhibit 9** illustrates how the cost estimate has evolved since 2011. Descriptions of all of the current cost estimates are provided in this section.

Exhibit 9: Initial and Current Project Cost Estimate

Description	Initial Estimate (\$M)	Current Estimate (\$M)
Highway Design-Build Base Contract	\$ 367.70	\$ 349.81
Construction Change Orders	\$ 26.57	\$ 26.22
Delay Claim/Inflationary Adjustments	\$ -	\$ 99.61
Construction Administration - outsourced	\$ 11.95	\$ -
CEI - outsourced	\$ -	\$ 18.19
Landscaping	\$ 5.91	\$ 5.91
Diesel Fuel and AC Adjustments	\$ 13.89	\$ 13.89
Stipends and Incentives	\$ 3.65	\$ 3.60
Right of Way Acquisition	\$ 187.27	\$ 147.27
Utility Relocation	\$ 4.76	\$ 4.76
Toll Integration	\$ 23.45	\$ 23.45
NCDOT Labor and Administration	\$ 22.89	\$ 34.84
Marketing and Outreach	\$ 3.43	\$ 3.43
Estimated Project Cost	\$ 671.47	\$ 730.98

HIGHWAY DESIGN-BUILD CONTRACT

The price proposals for the highway construction contract were opened on October 28, 2010 and the technical scores for each team’s technical proposal were announced. Monroe Bypass Constructors was selected based on the best value procurement process. The team’s lump sum price of \$367.7 million included the costs for final design and Construction Engineering and Inspection (CEI). However, due to delays caused by litigation, the Project was suspended from May 2012 until May 2014. To compensate the design-build team for damages and inflation, NCDOT has supplemented the design-build team with an additional \$99.61M, which includes an additional \$2.53M in design fees as a result of the delay. Also included within this sum are damages paid to date of \$2.84M for idle equipment, demobilization, remobilization, and calculating new costs to complete the Project. Details of these cost increase are discussed in the following sections.

DAMAGES FOR PROJECT DELAYS

On May 22, 2012, due to an adverse court ruling, NCDOT gave notice of suspension to Monroe Bypass Constructors to stop all further work on the Project. The suspension was caused by conditions beyond the control of and not the fault of the Contractor. NCDOT determined that if and when the construction restarted, an adjustment to the contract costs would be warranted. This suspension was rescinded by NCDOT on May 18, 2014. Due to this suspension, change orders for the Project have consisted of adjustments and revisions to the original contract, as well as compensation for labor and equipment associated with the delay.

The design-build team’s request for compensation for labor and associated equipment is comprised of two parts, compensation for affected labor made idle as a result of the work suspension and compensation for extra work

necessitated by the work suspension. At the time of the work suspension, the design-build team had 112 positions staffed to the Project in management/construction, design/consulting and CEI. Due to the projected length of the suspension, the design-build team worked to reassign project personnel as quickly as possible to other current projects where needed, as well as bidding on new projects in the interim. The design-build team requested compensation for the personnel that were not fully utilized or billable on other projects. The NCDOT agreed to provide this compensation for essential project personnel retained to work on this Project if and when it recommenced. In addition, the design-build team performed some extra work during the suspension, such as contract reviews with all subcontractors and material suppliers, and the subsequent recalculation of escalation and/or continuation costs. The design-build team submitted monthly damage claims for both of these types of labor compensation. Equipment costs requested are for reimbursement of vehicles for affected personnel and the construction field office already established for project use. The total cost of these delay-related damages is \$2.84 million.

Costs related to delay claims were not included in the original budget. NCDOT does not anticipate the payment of additional damages for project delays; as of Fiscal Year 2015, all of these damages have been paid to the design-build team.

DESIGN COST INCREASE

NCDOT also agreed to compensate the design-build team for inflationary delays associated with the engineering and design work. During this time, labor rates at the prime design firm were adjusted annually between 2011 and 2014. The overall increase was 14.2%. The overhead rate for the firm was also adjusted from 149% in October 2010 to 162.98% in May 2014. The design sub-consultants experienced similar adjustments to their labor and overhead rates. Overall, NCDOT agreed to increase the design fees by 16.4%. This increase only applied to the work remaining at the time of the work stoppage. Payment of the change order will be prorated over the remaining contract period; as of February 29, 2016, \$2.06 million of the \$2.53 million change order has been paid to the design-build team. NCDOT does not anticipate an additional change order for design cost increases, unless the Court grants an injunction pending appeal.

Costs related to delay claims and change orders for inflation were not included in the original budget. The current budget accounts for these costs.

CONSTRUCTION COST INCREASE

The design-build team also requested additional compensation for the delay-related construction cost increase. The design-build team supplied updated escrow bid documents as the basis for the change order. NCDOT and the design-build team agreed to a construction cost increase of approximately \$94.25 million. As part of this change order, NCDOT also removed Construction Engineering and Inspection (CEI) services from the scope of work. As a result, the ensuing change order amount for adding the construction cost increases and deducting the CEI scope was \$76.06 million. Payment of the change order will be prorated over the remaining contract period. As of February 29, 2016, more than \$17.8 million has been paid toward this change order. NCDOT does not anticipate an additional change order for construction cost increases, unless the Court grants an injunction pending appeal.

CHANGE ORDERS

Costs related to change orders for inflationary delays were not included in the original budget; however, the budget does include a contingency of \$26.6 million for “traditional” change orders such as owner-directed changes and unknown conditions.

At the request of NCDOT and NCTA, the design-build team has been issued 18 engineering and permit related change orders totaling \$350,573. These change orders cover the additional engineering costs for such tasks as revising the tolling scheme to an all-mainline tolling scenario, revising certain service roads and access points to reduce right-of-way costs, and updating field surveys of environmental resources in order to obtain the required permits.

The current budget includes an allowance of almost \$26.6 million for change orders, including the \$350,573 for change orders described above. NCDOT anticipates additional change orders for noise walls, LED lighting, additional turn lanes, changes to design standards, and other owner-directed changes that are expected to arise during construction. Although the NCDOT believes that the current allowance of \$26.6 million is adequate and is highly unlikely to be utilized, the estimate is unchanged at this time.

CONSTRUCTION ENGINEERING AND INSPECTION SERVICES

As discussed above and in Chapter 3, the NCDOT also removed the CEI scope of work from the design-build contract; subsequently, NCDOT entered into a contract directly with Summit Design and Engineering Services to perform CEI services directly for the Department. The value of this cost-plus, not-to-exceed contract is \$18,187,091.

These costs were included in the original budget as part of the design-build scope of work. Because these services are now being performed under the direct supervision of NCDOT, the extra costs of quality assurance testing will not be required. Although NCDOT estimates that this budget has the potential to underrun by approximately \$5.0 million, the estimate for CEI is unchanged at this time.

DIESEL FUEL AND ASPHALT CEMENT PRICE ADJUSTMENT RESERVE ACCOUNTS

The Department is bearing the risk of rising diesel fuel and asphalt cement prices during the construction period. The converse is also true; if the prices drop, then NCDOT will reduce payments to the design-build team to reflect the lower price.

The base prices of diesel fuel and asphalt cement had dropped to relatively low levels when contract bids were opened in 2010, at \$2.24/gallon and \$460.00/ton, respectively. A contract provision and quantity-based formula enables the design-build contractors' monthly invoices to be adjusted up or down as the prices of these commodities change from the base prices.

DIESEL FUEL RESERVE ACCOUNT AND COST TRENDS

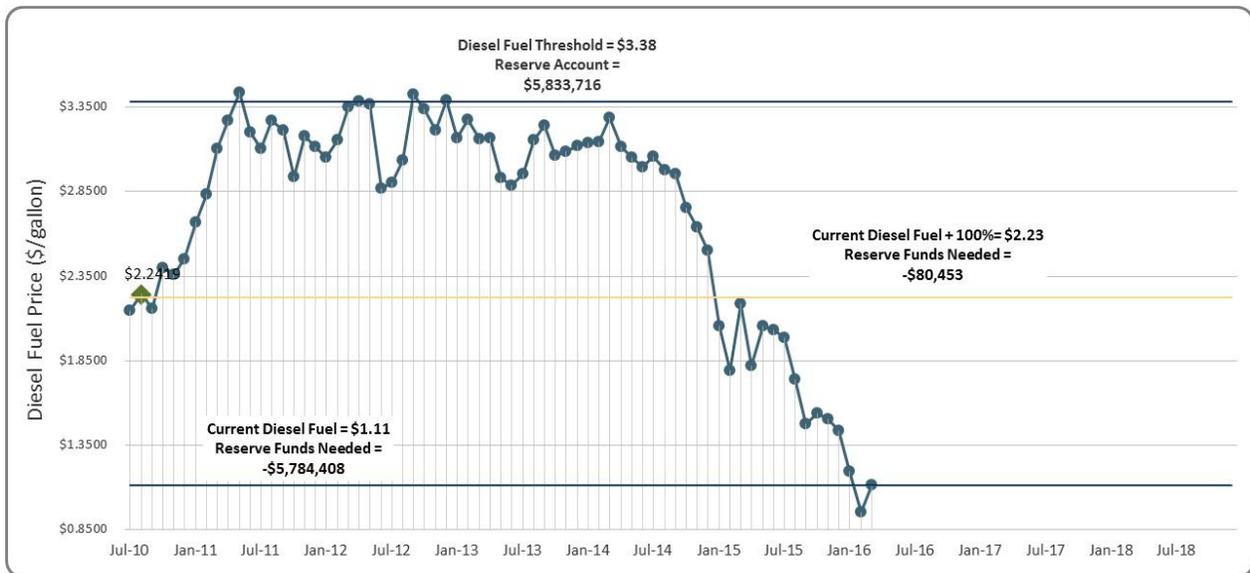
For the Initial Financial Plan, the Department assumed that the terminal price of diesel fuel would average \$3.38/gallon during the construction period, a 50% increase from the 2010 contractual base price. From August 2010 through March 2016, the base price of diesel fuel ranged between \$0.95/gallon and \$3.44/gallon, but generally remained around or below the threshold. If the price continues to remain historically low or even increases by 50% over current levels, the Department will not expend the budgeted reserve account of \$5.8 million. Rather than take the risk for rising fuel prices, NCDOT opted to purchase a fuel hedge that will allow the agency to release the contingency at a future date as needed. On April 26, 2016, NCDOT executed a hedge agreement with Barclays Bank with the following terms:

- Total Notional Quantity: 4,673,026 gallons
- May 1, 2016 through November 30, 2018

- Strike Price: \$2.00/gallon
- Total Premium: \$322,438.79
- Available Contingency: \$4.4M to \$5.2M

Exhibit 10 illustrates the five-year history of diesel fuel prices, including the base price, threshold for the reserve account, and potential for cost savings. As of March 31, 2016, the NCDOT has realized \$223,600 in fuel adjustment credits from the design-build team. Regardless of the fuel hedge, these credits will continue during construction as long as the price of diesel fuel stays below the base price of \$2.2419.

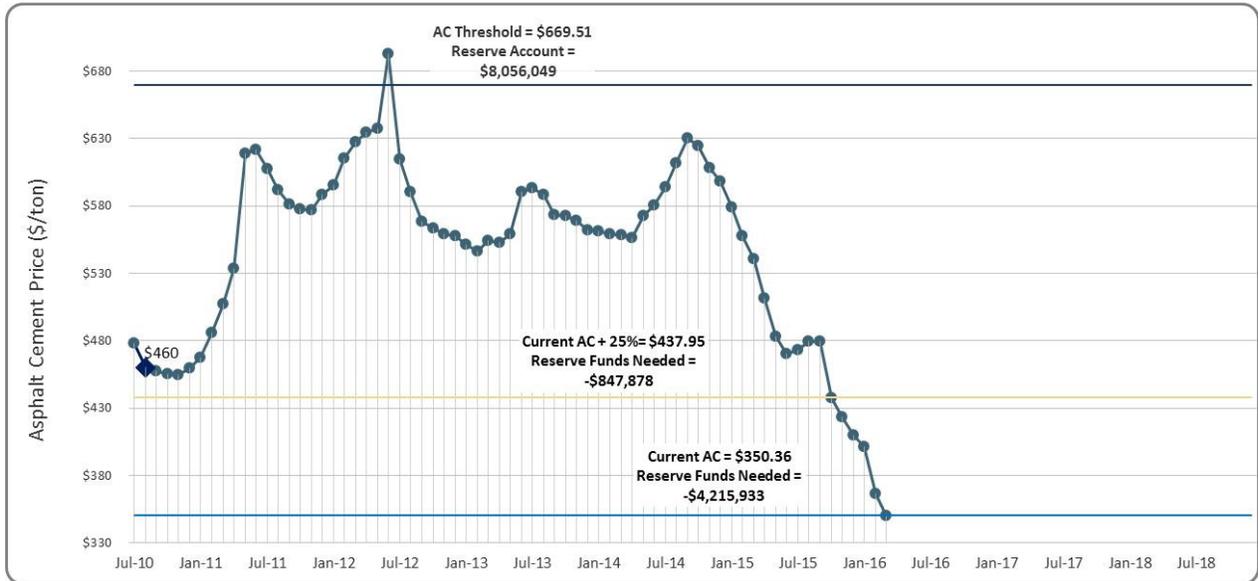
Exhibit 10: Diesel Fuel Price Trend



ASPHALT CEMENT RESERVE ACCOUNT AND COST TRENDS

For the Initial Financial Plan, the Department assumed that the terminal price of asphalt cement would average \$661.00/ton during the construction period, a 44% increase from 2010 prices. With a more volatile price history than diesel fuel, the price of asphalt cement ranged between \$366/ton and \$693/ton between August 2010 and February 2016, with an average price during that time of \$548.95/ton. Similar to the scenario with fuel prices, if the asphalt cement price continues to remain low or even increases by 25%, the Department will not expend the budgeted reserve account of \$8.1 million. Although an underrun looks likely at this time, the prices over time are very unstable; therefore, the Department is not currently budgeting for an underrun. **Exhibit 11** illustrates the five-year history of asphalt cement prices, including the base price, threshold for the reserve account, and potential for cost savings. As of March 31, 2016, the NCDOT has realized \$5,400 in asphalt cement adjustment credits from the design-build team.

Exhibit 11: Asphalt Cement Price Trend



RIGHT OF WAY ACQUISITION

In 2010, right-of-way cost estimates for the approximately 670 remaining parcels were developed using the right of way limits shown on the functional roadway design plans for the Monroe Expressway. The appraisers researched tax records and recent sales data to develop preliminary values. The estimate of \$187 million included conservative contingencies for unwilling sellers and condemnations.

Since the original right-of-way cost estimate of \$187 million was completed for the Initial Financial Plan, the following details have impacted either the amount of right of way needed or its associated cost:

- Real estate market has flattened or experienced deflation in certain areas.
- During the latter phase of project planning, the median width was reduced from 70 feet to 46 feet. This action reduced the parcel count by 30%, from 670 parcels to 474 parcels. The overall footprint and right of way needed for the Project was likewise reduced.
- During design of the final right-of-way plans, the design-build team further reduced the project footprint.
- Service roads have been proposed to eliminate total takes or otherwise limit damages to property owners.
- The acquisition of right of way was delayed from the 2012-2013 timeframe to the 2015-2016 timeframe.

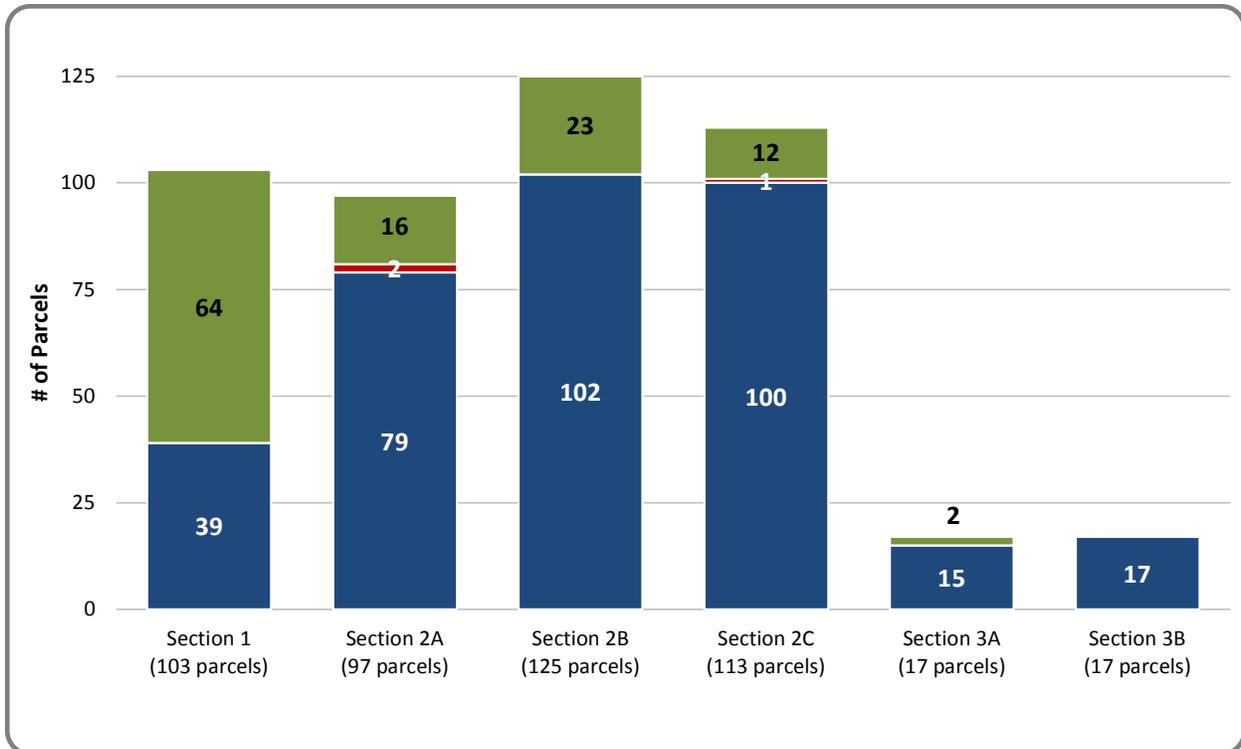
As an added incentive to minimize right of way on the western end of the Project (where the proposed expressway is located between the frontage roads), the design-build team will be responsible for the cost of any additional right of way required for their proposed design.

As of June 4, 2016, with the exception of three parcels, all 472 parcels required for this project have either been settled (352 parcels) or filed for condemnation (117 parcels). A court date in November 2016 has been set for three condemned parcel; a court date in March 2017 has been set for one parcel. The Attorney General’s Office strongly feels that the majority of the remaining condemned parcels will settle without going to court. All condemnation cases are anticipated to be settled by late 2019, but the exact schedule is unknown at this time. As a conservation measure, all condemned cases are assumed to settle for two times the appraised value. For

comparison, the seven condemned parcels that have settled to date were paid between 121% and 191% of appraised value, with an average settlement of 161% of appraised value. NCDOT and its right-of-way program management consultant have done an analysis on the parcels remaining to be purchased and settled through condemnation. As a result, NCDOT is projecting an underrun of the original budget of more than \$40 million. In light of this, the current budget has reduced the anticipated right of way budget by \$40 million to \$147.3 million.

Exhibit 12 shows the status of right-of-way acquisition by section as of June 4, 2016.

Exhibit 12: Parcel Acquisition Status as of June 4, 2016



NCDOT LABOR AND ADMINISTRATION

The estimates for administrative expenses and contingency funds were prepared in close coordination with NCTA staff. The budgeted administrative expenses include construction administration, engineering coordination, design reviews by in-house staff and consultants, mediation costs during construction, surcharges from the NCDOT accounting system, railroad force account charges, as well as a contingency for unexpected costs.

When originally contracted, NCTA planned to utilize an independent construction management consultant to manage the day-to-day construction operations. Since that time, NCDOT Division 10 forces have assumed this responsibility. There has been no net change in the overall budget for construction administration; however, the \$12 million originally budgeted to be outsourced has been added to the NCDOT Labor and Administration line item.

TOLL INTEGRATION

Estimates for toll integration were based on the unit prices shown in the Triangle Expressway contracts; these contracts were awarded in 2010. Quantity estimates for the Monroe Expressway were developed assuming a similar concept of operations as Triangle Expressway. Variability in unit costs, quantities, and inflation was built into the Monte Carlo cost estimate simulation. In general, unit costs were assumed to vary between 90% and 120% of the base costs. At the time of the Initial Financial Plan, the Project was scheduled to be open to toll traffic in 2016. Annual inflation was assumed to vary between 2.5% and 4%; toll integration costs were escalated from current values to the anticipated years of expenditure in 2014 and 2015. Because the plans were conceptual in nature, a contingency was also added to the toll integration elements. The Project is currently scheduled to open in November 2018. Budgetary adjustments to account for additional inflation beyond 2015 have not been made.

ROADSIDE TOLL COLLECTION SYSTEM

When the original estimate was developed in 2010, a combination of mainline and ramp tolling zones was assumed. The base estimate included 32 tolled travel lanes and 11 tolled outside shoulders (43 total instrumented lanes). Under the revised all-mainline tolling scheme, in which the elevated section will not be tolled and the shoulders will no longer be tolled as travel lanes, the system will include 28 tolled travel lanes. Although there has been a reduction in both the number of tolled travel lanes and shoulder instrumentation, the original estimate of \$12.63 million is unchanged from the Initial Financial Plan. Items included in roadside toll collection system cost estimate include cameras, vehicle profilers, pavement loops, uninterrupted power supplies, CCTV surveillance cameras, and software.

ELECTRONIC TOLL COLLECTION SYSTEM

The Monroe Expressway will use a similar Electronic Toll Collection System as the Triangle Expressway. The quantities of readers and antennas were estimated based on the number of tolled lanes and toll zones. As with the roadside toll collection system, the Monte Carlo simulation model accounted for possible variability in these quantities. The original budget also included a line item for transponder purchases of approximately \$1.5 million. Presently, the original estimate of \$3.97 million is unchanged from the Initial Financial Plan.

BACK OFFICE SYSTEM

The Back Office System developed for Triangle Expressway was sized to handle future projects such as the Monroe Expressway. Other items in the budget include application software, installation, and testing. NCTA will begin scoping and negotiating the extra work order with Xerox in 2016. Presently, the original estimate of \$2.14 million is unchanged from the Initial Financial Plan.

CUSTOMER SERVICE CENTER

Staffing and operations of the NC Quick Pass Customer Service Center near the Triangle Expressway is being performed by AECOM. The existing operations contract with AECOM will be amended to accommodate the additional personnel requirements. The initial budget of \$1.41 million is unchanged for the current plan of finance.

CONSULTANT SERVICES

NCTA has budgeted \$3.31 million for consultant services during the toll integration phase. These consultants will advise and assist NCTA with procurement, contracting, design, installation, and testing of the roadside toll collection system, the back office system, and the electronic toll collection system. This budget is unchanged from the initial plan of finance.

LANDSCAPING

The landscaping work will be accomplished through one or more separate contracts, which will be advertised after construction is underway. The budgeted amount for landscape implementation is \$5,908,855, which is approximately 1.5 percent of the construction cost. This amount has been included in the project budget as a separate item.

UTILITY RELOCATION

The utility relocation cost estimates were prepared by MA Engineering Associates. They coordinated extensively with the existing utility owners within the Project limits, such as Duke Energy, Verizon, Alltel, Time Warner Cable, Piedmont Natural Gas, etc. The initial utility relocation estimate of \$4.76 million is unchanged.

STIPENDS AND INCENTIVES

A stipend amount of \$250,000 was paid to both of the unsuccessful design-build teams.

Incentives and disincentives to the design-build contractor to meet certain schedule milestones are included in the construction contract. In the event that substantial completion is achieved by the negotiated completion date (assuming a date no later than November 27, 2018), and toll collection and enforcement technology is fully implemented, a bonus of \$3 million will be paid to the team. If the substantial completion date is met, but the toll integrator has not yet completed installation of the toll system, then the design-build team will receive a completion bonus of \$2 million. The purpose of this tiered completion bonus is to encourage cooperation between the design-build team and the toll integrator. In the event that the substantial completion date is not met, then the design-build team will be liable for liquidated damages in the amount of \$25,000 per calendar day for each day of delay in reaching this milestone. In addition, for each day of delay that the team does not meet their proposed final completion date, the team will be liable for liquidated damages in the amount of \$10,000 per calendar day of delay.

Additional incentives are in the design-build contract to encourage environmental excellence during construction. The design-build team will be eligible for an incentive in the amount of \$150,000 if construction operations have been performed in accordance with all environmental regulations and specifications, and the design-build team does not receive any Immediate Corrective Actions (ICA), Continuances of Immediate Correction Action (CICA), Notices of Violation (NOV), and/or Cease and Desist (C&D) orders at any time during the Project. The design-build team's first NOV or C&D violation will result in forfeiture of the entire incentive payment. For each ICA or CICA, the team will forfeit \$50,000 until the entire amount is forfeited. At the point in time that the entire amount is forfeited, the design-build team will be assessed liquidated damages of \$12,500 for any type of violation. On August 13, 2015, the NCDOT Roadside Environmental Unit issued an ICA due to sediment loss on the eastern end of

the Project; therefore, forfeiting \$50,000 of the possible \$150,000 incentive bonus. Assuming no other violations are received, the design-build team would receive the remaining \$100,000 upon final completion in May 2019.

PUBLIC EDUCATION AND OUTREACH

Prior to Project opening, NCDOT will develop a marketing plan to educate the public about the travel time savings associated with the Monroe Expressway. The use of an NC Quick Pass transponder to obtain a discounted toll rate will also be encouraged. The marketing initiatives will be tailored to fit the market conditions and needs of the commuters in the Charlotte and Monroe areas and their surrounding counties. These initiatives consist of outreach programs to local businesses, creative services, advertising, branding, interactive marketing, social media, as well as sales and other promotional activities.

The NCTA has set aside a budget of \$3.43 million for marketing, advertising and public information services and advice regarding a public information campaign for marketing of toll roads. The focus of this public information and education campaign will be the development and implementation of a marketing plan for the sale and distribution of electronic toll tags to be used in conjunction with NCTA toll roads. The efforts will include research and market surveys to provide the NCTA advice and alternatives for its public information and education campaign; creation and implementation of a comprehensive public education and outreach campaign to increase knowledge, perception and understanding of the need for and benefits of the NCTA toll roads, including developing a strategy and content for print, television, radio and direct mail components of a public outreach campaign.

CHAPTER 10 | CASH FLOW PROJECTIONS

Quarterly projections of cash flow required to construct the Monroe Expressway are shown in **Exhibit 13**. Quarterly cash flows are based upon the actual expenditures through June 30, 2015 (Q4 FY15) and then the anticipated schedule of design-build construction, right of way acquisition, and other activities. The highway design-build contract is utilizing a monthly payment based upon verified progress of work. If construction progress is slower than scheduled, payment will be made only for the amount of work actually accomplished in a given month.

Tolling is expected to be initiated with the completion of the Project on or before November 27, 2018, which takes into account the delays due to litigation. The final completion of the Project is currently scheduled to be no later than May 28, 2019.

Exhibit 13: Cash Flow Summary

DESCRIPTION/QUARTER	Budget	FY 12 thru	Jul-Sept 15	Oct-Dec 15	Jan-Mar 16	Apr-Jun 16	Jul-Sept 16	Oct-Dec 16	Jan-Mar 17	Apr-Jun 17
		FY 15	Q1 FY16	Q2 FY16	Q3 FY16	Q4 FY16	Q1 FY17	Q2 FY17	Q3 FY17	Q4 FY17
HIGHWAY DESIGN-BUILD CONTRACT										
DESIGN-BUILD CONTRACT LESS CEI	\$ 449,424,194	\$ 59,419,029	\$ 23,468,324	\$ 18,514,586	\$ 30,068,219	\$ 43,972,650	\$ 40,494,400	\$ 34,145,364	\$ 34,433,105	\$ 35,162,659
LANDSCAPING	\$ 5,909,095	\$ -	\$ -	\$ -	\$ 4,967	\$ -	\$ -	\$ -	\$ 221,582	\$ 221,582
DIESEL FUEL ADJ RESERVE ACCT	\$ 5,833,787	\$ -	\$ (21,207)	\$ (70,261)	\$ (136,092)	\$ (258,348)	\$ 153,270	\$ 23,880	\$ 87,581	\$ 246,325
AC ADJ RESERVE ACCT	\$ 8,050,603	\$ -	\$ -	\$ -	\$ (5,447)	\$ (20,000)	\$ 10,010	\$ -	\$ 200,000	\$ 1,402,500
INCENTIVES	\$ 3,100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CEI BY SUMMIT	\$ 18,184,132	\$ 20,412	\$ 336,542	\$ 432,239	\$ 1,153,867	\$ 1,273,096	\$ 1,273,096	\$ 1,182,161	\$ 1,182,161	\$ 1,182,161
STIPENDS	\$ 500,000	\$ 500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
ROW & UTILITIES										
RIGHT OF WAY	\$ 136,057,012	\$ 33,846,642	\$ 14,555,643	\$ 16,468,919	\$ 13,792,574	\$ 14,966,351	\$ 12,381,254	\$ 4,136,155	\$ 4,140,237	\$ 4,081,732
RIGHT OF WAY CONSULTANTS	\$ 11,211,071	\$ 5,933,528	\$ 1,010,818	\$ 946,857	\$ 1,049,122	\$ 897,085	\$ 672,814	\$ 241,092	\$ 112,136	\$ 112,136
UTILITIES	\$ 4,759,188	\$ -	\$ 21,559	\$ -	\$ 90,543	\$ 713,911	\$ 951,882	\$ 951,882	\$ 542,097	\$ 416,448
TOLL INTEGRATION										
BACK OFFICE SYSTEM	\$ 2,138,200	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 106,910	\$ 106,910	\$ 106,910
TOLL OPS	\$ 1,407,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 70,350	\$ 70,350	\$ 70,350
ROADSIDE TOLL COLLECTION SYSTEM	\$ 12,630,600	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 631,530	\$ 631,530	\$ 631,530	\$ 631,530
ETC CONTRACTOR	\$ 3,967,750	\$ 13,540	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 184,895	\$ 198,385	\$ 198,385
TOLLING CONSULTANTS	\$ 3,309,426	\$ -	\$ -	\$ 21,112	\$ 147,139	\$ 330,650	\$ 165,325	\$ 165,325	\$ 165,325	\$ 165,325
NCDOT/NCTA IN-HOUSE COSTS & RESERVES										
NCTA CONSULTANTS	\$ 628,401	\$ 24,031	\$ -	\$ 32,494	\$ 182,018	\$ 31,440	\$ 25,152	\$ 25,152	\$ 12,576	\$ 25,152
DOT ADMIN/TRANSFER SURCHARGE	\$ 2,362,640	\$ 493,482	\$ -	\$ 1,314,493	\$ 47,205	\$ 47,205	\$ 35,404	\$ 47,205	\$ 47,205	\$ 47,205
NCDOT LABOR & CONSTR. MGMT.	\$ 16,007,911	\$ 545,648	\$ 92,330	\$ 137,951	\$ 141,482	\$ 640,446	\$ 1,160,808	\$ 1,280,891	\$ 1,280,891	\$ 1,120,780
MARKETING & OUTREACH	\$ 3,433,693	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
RAILROAD FORCE ACCOUNT	\$ 27,678	\$ 22,935	\$ 1,105	\$ 3,638	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CHANGE ORDER CONTINGENCY	\$ 26,215,153	\$ -	\$ -	\$ -	\$ 262,152	\$ 1,048,606	\$ 1,310,758	\$ 1,310,758	\$ 2,621,515	\$ 2,621,515
MISCELLANEOUS PROJECT COSTS	\$ 15,812,967	\$ -	\$ -	\$ -	\$ 158,130	\$ 632,519	\$ 790,648	\$ 790,648	\$ 1,581,297	\$ 1,581,297
TOTAL	\$ 730,970,501	\$ 100,819,247	\$ 39,465,113	\$ 37,802,029	\$ 46,955,877	\$ 64,275,612	\$ 60,056,350	\$ 45,294,198	\$ 47,634,883	\$ 49,393,992

DESCRIPTION/QUARTER	Budget	Jul-Sept 17	Oct-Dec 17	Jan-Mar 18	Apr-Jun 18	Jul-Sept 18	Oct-Dec 18	Jan-Mar 19	Apr-Jun 19	Jul-Sept 19	Oct-Dec 19
		Q1 FY18	Q2 FY18	Q3 FY18	Q4 FY18	Q1 FY19	Q2 FY19	Q3 FY19	Q4 FY19	Q1 FY20	Q2 FY20
HIGHWAY DESIGN-BUILD CONTRACT											
DESIGN-BUILD CONTRACT LESS CEI	\$ 449,424,194	\$ 29,578,754	\$ 18,947,698	\$ 18,468,450	\$ 30,519,593	\$ 24,519,122	\$ 5,236,038	\$ 1,673,628	\$ 802,575		
LANDSCAPING	\$ 5,909,095	\$ 221,582	\$ 221,582	\$ 886,328	\$ 886,328	\$ 886,328	\$ 886,328	\$ 369,303	\$ 369,303	\$ 369,303	\$ 364,576
DIESEL FUEL ADJ RESERVE ACCT	\$ 5,833,787	\$ 714,943	\$ 256,357	\$ 533,718	\$ 2,844,133	\$ 1,140,708	\$ 318,781				
AC ADJ RESERVE ACCT	\$ 8,050,603	\$ 1,390,000	\$ 230,890	\$ 230,000	\$ 1,725,000	\$ 2,070,000	\$ 817,650				
INCENTIVES	\$ 3,100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,100,000	\$ -	\$ -	\$ -	\$ -
CEI BY SUMMIT	\$ 18,184,132	\$ 1,273,096	\$ 1,273,096	\$ 1,227,629	\$ 1,227,629	\$ 1,227,629	\$ 1,273,096	\$ 809,326	\$ 745,671	\$ 691,109	\$ 400,116
STIPENDS	\$ 500,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
ROW & UTILITIES											
RIGHT OF WAY	\$ 136,057,012	\$ 4,081,732	\$ 2,721,155	\$ 2,721,155	\$ 2,721,155	\$ 1,360,577	\$ 1,360,577	\$ 1,360,577	\$ 680,289	\$ 680,289	\$ -
RIGHT OF WAY CONSULTANTS	\$ 11,211,071	\$ 112,136	\$ 44,854	\$ 11,214	\$ 11,214	\$ 11,214	\$ 11,214	\$ 11,214	\$ 11,214	\$ 11,214	\$ -
UTILITIES	\$ 4,759,188	\$ 416,448	\$ 416,448	\$ 59,493	\$ 59,493	\$ 59,493	\$ 59,493	\$ -	\$ -	\$ -	\$ -
TOLL INTEGRATION											
BACK OFFICE SYSTEM	\$ 2,138,200	\$ 106,910	\$ 106,910	\$ 106,910	\$ 213,820	\$ 213,820	\$ 213,820	\$ 213,820	\$ 213,820	\$ 213,820	\$ 213,820
TOLL OPS	\$ 1,407,000	\$ 70,350	\$ 70,350	\$ 70,350	\$ 140,700	\$ 140,700	\$ 140,700	\$ 140,700	\$ 140,700	\$ 140,700	\$ 140,700
ROADSIDE TOLL COLLECTION SYSTEM	\$ 12,630,600	\$ 631,530	\$ 1,263,060	\$ 1,263,060	\$ 1,263,060	\$ 1,263,060	\$ 1,263,060	\$ 1,263,060	\$ 631,530	\$ 631,530	\$ 631,530
ETC CONTRACTOR	\$ 3,967,750	\$ 198,385	\$ 595,155	\$ 595,155	\$ 396,770	\$ 396,770	\$ 396,770	\$ 396,770	\$ 198,385	\$ 198,385	\$ -
TOLLING CONSULTANTS	\$ 3,309,426	\$ 165,325	\$ 165,325	\$ 165,325	\$ 330,650	\$ 330,650	\$ 330,650	\$ 330,650	\$ 165,325	\$ 165,325	\$ -
NCDOT/NCTA IN-HOUSE COSTS & RESERVES											
NCTA CONSULTANTS	\$ 628,401	\$ 25,152	\$ 12,576	\$ 25,152	\$ 25,152	\$ 25,152	\$ 37,728	\$ 31,440	\$ 31,440	\$ 31,440	\$ 25,152
DOT ADMIN/TRANSFER SURCHARGE	\$ 2,362,640	\$ 47,205	\$ 47,205	\$ 47,205	\$ 47,205	\$ 23,603	\$ 23,603	\$ 23,603	\$ 23,603	\$ -	\$ -
NCDOT LABOR & CONSTR. MGMT.	\$ 16,007,911	\$ 1,120,780	\$ 1,120,780	\$ 960,668	\$ 960,668	\$ 960,668	\$ 960,668	\$ 960,668	\$ 960,668	\$ 960,668	\$ 640,446
MARKETING & OUTREACH	\$ 3,433,693	\$ -	\$ -	\$ -	\$ -	\$ 858,423	\$ 858,423	\$ 858,423	\$ 858,423	\$ -	\$ -
RAILROAD FORCE ACCOUNT	\$ 27,678	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
CHANGE ORDER CONTINGENCY	\$ 26,215,153	\$ 2,621,515	\$ 2,621,515	\$ 2,621,515	\$ 1,310,758	\$ 1,310,758	\$ 1,310,758	\$ 1,310,758	\$ 1,310,758	\$ 1,310,758	\$ 1,310,758
MISCELLANEOUS PROJECT COSTS	\$ 15,812,967	\$ 1,581,297	\$ 1,581,297	\$ 1,581,297	\$ 790,648	\$ 790,648	\$ 790,648	\$ 790,648	\$ 790,648	\$ 790,648	\$ 790,648
TOTAL	\$ 730,970,501	\$ 44,357,141	\$ 31,696,254	\$ 31,574,624	\$ 45,473,976	\$ 37,589,323	\$ 19,390,006	\$ 10,544,589	\$ 7,934,352	\$ 6,195,190	\$ 4,517,746

CHAPTER 11 | IMPLEMENTATION SCHEDULE

The implementation schedule for the Monroe Expressway is shown in *Exhibit 14*.

Exhibit 14: Project Implementation and Financing Schedule

Activity	Anticipated Start	Anticipated Completion
Design-Build Highway Construction	November 2011 (awarded contract) May 3, 2012 (put on hold) May 2014 (re-start design) May 2015 (groundbreaking)	July 1, 2016 (original completion date) November 2018 (revised opening date) May 2019 (final completion)
Comprehensive Traffic & Revenue Study	July 2015	April 2016 (Draft) May 2016 (Final)
FY 15 Finance Plan Update	July 2015	September 30, 2015
Roadside Toll Collection System	April 2016 (Issue RFP) August 2016 (NTP)	August 2016 (NTP) November 2018
TIFIA/Bond Financing Application	July 2016	November 2016
FY 16 Finance Plan Update	July 2016	September 2016
Electronic Toll Collection	November 2016	November 2018
BOS Contract Modification	November 2016	August 2018
Toll Operations Contract Modification	November 2016	August 2018
CSC Storefront	April 2017	August 2018
Landscaping Installation	July 2017 (NTP)	Fall 2019

CHAPTER 12 | OPERATIONS, MAINTENANCE, RENEWAL AND REPLACEMENT

TOLL COLLECTION SYSTEM OPERATION AND MAINTENANCE

Operation and maintenance of the Monroe Expressway Toll Collection System will be provided by an RTCS and BOS integrator with oversight by NCTA personnel. The operations and maintenance of the system includes all preventive, predictive and corrective maintenance, and will ensure the highest level of accuracy and availability as required through established performance measures. The up-front and ongoing costs for marketing and sales of transponders are also included in the O&M estimate.

In addition to normal maintenance, the requirements also include 24-hour, seven days a week of on-call maintenance services. Minimum response times, depending on time of day and on priority of the malfunction, will be specified. The toll collection system will be required to generate its own system malfunction and maintenance messages, which will be used in conjunction with toll collection staff reports, to alert maintenance staff of problems. The mandate of this program is to maintain the capability of the system to collect tolls 24 hours per day, 365 days per year.

TRAFFIC OPERATIONS

From the Metrolina Regional Transportation Management Center, NCTA will monitor video and data feeds from the Monroe Expressway for traffic management, maintenance, and security concerns. Staff will work closely with local NCDOT personnel, the maintenance contractors, and the toll integrators to proactively address any needs detected. Incident Management Assistance Patrols (IMAP) will also be included as part of the ITS and Operations program. Dedicated IMAP vehicles will be assigned to the Monroe Connector Bypass to aid stranded motorists, provide temporary traffic control, and assist in incident clearance of disabled vehicles and debris. IMAP operations will be closely coordinated with local IMAP patrol routes and procedures. IMAP drivers will also be involved in spotting and reporting maintenance and security concerns. Dedicated North Carolina State Highway Patrol (NCSHP) officers will also be assigned to patrol the corridor. IMAP and NCSHP communications hardware and procedures will be consistent with current NCDOT/NCSHP practices.

ROUTINE ROADWAY MAINTENANCE

Routine maintenance costs include recurring and routine maintenance activities associated with the highway, such as mowing, snow and litter removal, guardrail and signing maintenance, and regular repairs to the pavement structure. Similar to the model used for Triangle Expressway, it is assumed that NCDOT Division 10 will have overall responsibility for the routine maintenance of the Monroe Expressway, and will ensure its safe and efficient operation. The maintenance activities will be performed through a combination of in-house and subcontracted vendors and suppliers.

The NCTA has developed an in-house model for estimating operations and maintenance costs by utilizing the following: actual contract values procured for the Triangle Expressway where possible, available cost data for certain administrative costs, as well as data available to NCTA for contracted maintenance services for similar roadway facilities. In addition, the cost projections are based on NCTA's Business Policies and Procedures Manual and have been adjusted to reflect anticipated organizational changes. These available costs have been adjusted to fit the Monroe Expressway, with modifications made for the tolling configuration and anticipated volumes. HNTB

assisted in the development and review of the operations and maintenance model. Sound management practices and an effective program of inspection and maintenance will be essential in maintaining the facilities in good repair and working condition. These baseline costs have been projected to the year 2058 and are presented in **Exhibit 14**.

The plan of finance assumes that operations and maintenance costs of the tolled freeway will be funded by toll revenues. The non-tolled, elevated section leading up to the toll facility will be maintained by NCDOT Division 10 using typical NCDOT maintenance funding sources (not toll revenues). If, at any time the toll revenues fail to cover operations and maintenance expenses, NCDOT commits to replenish the Operating Reserve Fund and Renewal & Replacement Fund, both pursuant to the trust indenture, which allows Senior and Subordinate debt service to be paid before O&M Expenses and R&R Costs.

The NCTA is mandated by State law and the terms of the Trust Agreement to maintain a safe highway facility in sound condition. An effective maintenance policy will contribute significantly to ensuring a safe highway for system users, as well as preserving the investment. Routine maintenance for the new facilities is anticipated to include, but not be limited to, maintenance of the following items:

- Concrete and asphalt pavement surfaces
- Bridge deck, superstructure, substructure
- Pavement markings and signage
- Mowing and landscaping
- Snow and ice removal
- Drainage, stormwater systems and slopes
- Roadside protection (guardrail, barrier, attenuation)
- Lighting
- Tolling and ITS equipment
- Litter and obstruction removal
- Building infrastructure
- Traffic control devices
- Emergency maintenance services

Regular maintenance will be performed by Division 10 forces or specialty contractors. Specialty contracts may be developed for mowing, snow and ice removal, litter pick-up, etc. The NCTA will be responsible for preparing an annual operations and maintenance plan and budget along with routine maintenance assessments. The maintenance contractors will be required to perform maintenance activities in a safe and efficient manner with a minimum effect on traffic operations.

REPAIR AND REHABILITATION

During the initial years of operation, the new facility should require relatively minor upkeep. However, as the many elements of the facility are subjected to aging and wear, increasing amounts of maintenance and rehabilitation will be required. In addition to being responsible for building the Monroe Expressway, operating and maintaining the facility, paying off its bond indebtedness, and operating with a positive cash flow, the NCDOT and NCTA are also required to protect, preserve and maintain the properties it will construct. In order to protect the investments in its properties, revenues are to be allocated annually to a Renewal and Replacement Account established in

connection with the issuance of bonds to finance the Monroe Expressway. Amounts in the Renewal and Replacement Account can be disbursed only for the purpose of paying for the cost of:

- Unusual or extraordinary maintenance or repairs, maintenance or repairs not recurring annually, and renewals and replacements, which includes major items of equipment. Examples include asphalt overlays, pavement markings, and toll equipment upgrades.
- Repairs or replacements resulting from an emergency caused by some extraordinary occurrence, as characterized by a certificate signed by an Authorized Representative of the NCTA and filed with the Trustee stating that the moneys in the Revenue Fund and insurance proceeds, if any, available therefore are insufficient to meet such emergency.
- Paying all or any part of the cost of any capital improvement to the facility.

The assumed inflation rates for operation and maintenance expenses (O&M) and renewal and replacement (R&R) costs reflect those used by CDM Smith in the *Traffic and Revenue Study*. It is our opinion that the costs projected for the operation and maintenance of the Monroe Expressway are reasonable estimations of future costs assuming that the Project facility is operated and maintained under procedures and practices typical for the toll road industry. Sound management practices and an effective program of inspection and maintenance will be essential in maintaining the facilities in good repair and working condition.

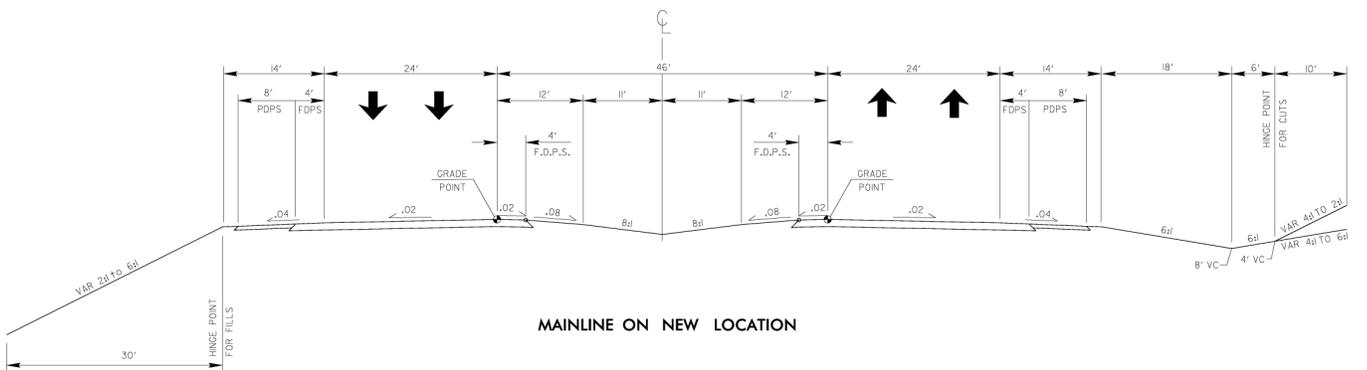
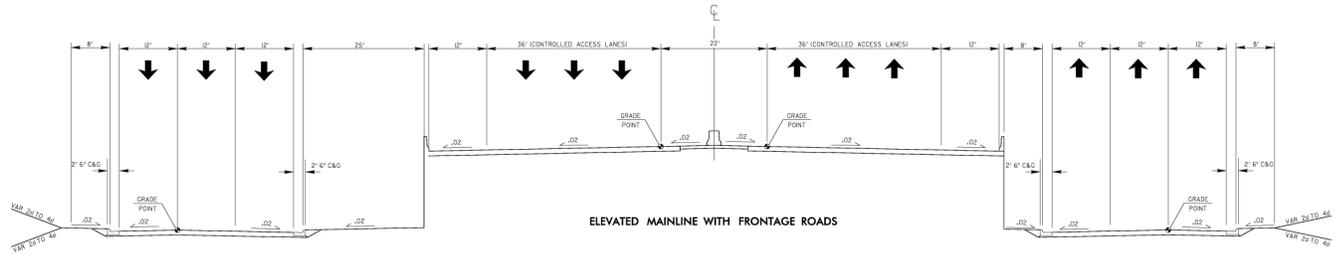
In light of the fact that the Monroe Expressway will be an entirely new facility, covered in part by warranties for the initial operations under terms of the design-build contract, deposit amounts shall be appropriate to meet the projected needs listed in **Exhibit 15**. The amounts in **Exhibit 15** reflect an asphalt pavement design, as selected by the design-build team. The projected amounts shall be reviewed on an annual basis by the NCTA in conjunction with the annual inspections and updated as appropriate to meet the needs of the preservation of the facility. In addition, the NCDOT is also approved through a resolution to provide contingent funding support for construction, operations and maintenance, and renewal and replacement expenses. Such guarantees of support are contained in the Trust Agreement.

Exhibit 15: Projected O&M and R&R Expenses (FY 2019 – FY 2058)

FY	Operations	Maintenance	R&R	Total
2019	\$ 3,549,000	\$ 1,702,000	\$ 300,000	\$ 5,551,000
2020	\$ 8,404,000	\$ 1,741,000	\$ 307,000	\$ 10,452,000
2021	\$ 10,779,000	\$ 1,781,000	\$ 314,000	\$ 12,874,000
2022	\$ 12,325,000	\$ 1,822,000	\$ 321,000	\$ 14,468,000
2023	\$ 12,982,000	\$ 1,864,000	\$ 329,000	\$ 15,175,000
2024	\$ 13,339,000	\$ 1,906,000	\$ 336,000	\$ 15,581,000
2025	\$ 13,610,000	\$ 1,950,000	\$ 996,000	\$ 16,556,000
2026	\$ 13,562,000	\$ 1,991,000	\$ 347,000	\$ 15,900,000
2027	\$ 13,635,000	\$ 2,033,000	\$ 354,000	\$ 16,022,000
2028	\$ 13,711,000	\$ 2,076,000	\$ 362,000	\$ 16,149,000
2029	\$ 13,787,000	\$ 2,119,000	\$ 4,652,000	\$ 20,558,000
2030	\$ 13,860,000	\$ 2,164,000	\$ 377,000	\$ 16,401,000
2031	\$ 13,913,000	\$ 2,209,000	\$ 30,096,000	\$ 46,218,000
2032	\$ 13,955,000	\$ 2,256,000	\$ 393,000	\$ 16,604,000
2033	\$ 13,998,000	\$ 2,303,000	\$ 401,000	\$ 16,702,000
2034	\$ 14,043,000	\$ 2,352,000	\$ 410,000	\$ 16,805,000
2035	\$ 14,090,000	\$ 2,401,000	\$ 418,000	\$ 16,909,000
2036	\$ 14,141,000	\$ 2,451,000	\$ 427,000	\$ 17,019,000
2037	\$ 14,193,000	\$ 2,503,000	\$ 1,263,000	\$ 17,959,000
2038	\$ 14,248,000	\$ 2,555,000	\$ 445,000	\$ 17,248,000
2039	\$ 14,305,000	\$ 2,609,000	\$ 6,368,000	\$ 23,282,000
2040	\$ 14,365,000	\$ 2,664,000	\$ 464,000	\$ 17,493,000
2041	\$ 14,458,000	\$ 2,720,000	\$ 474,000	\$ 17,652,000
2042	\$ 14,585,000	\$ 2,777,000	\$ 484,000	\$ 17,846,000
2043	\$ 14,713,000	\$ 2,835,000	\$ 44,091,000	\$ 61,639,000
2044	\$ 14,841,000	\$ 2,895,000	\$ 504,000	\$ 18,240,000
2045	\$ 14,971,000	\$ 2,955,000	\$ 515,000	\$ 18,441,000
2046	\$ 15,081,000	\$ 3,017,000	\$ 526,000	\$ 18,624,000
2047	\$ 15,168,000	\$ 3,081,000	\$ 537,000	\$ 18,786,000
2048	\$ 15,256,000	\$ 3,145,000	\$ 548,000	\$ 18,949,000
2049	\$ 15,344,000	\$ 3,211,000	\$ 13,347,000	\$ 31,902,000
2050	\$ 15,433,000	\$ 3,279,000	\$ 571,000	\$ 19,283,000
2051	\$ 15,523,000	\$ 3,348,000	\$ 583,000	\$ 19,454,000
2052	\$ 15,613,000	\$ 3,418,000	\$ 596,000	\$ 19,627,000
2053	\$ 15,704,000	\$ 3,490,000	\$ 608,000	\$ 19,802,000
2054	\$ 15,796,000	\$ 3,563,000	\$ 621,000	\$ 19,980,000
2055	\$ 15,889,000	\$ 3,638,000	\$ 49,559,000	\$ 69,086,000
2056	\$ 15,981,000	\$ 3,714,000	\$ 647,000	\$ 20,342,000
2057	\$ 16,075,000	\$ 3,792,000	\$ 661,000	\$ 20,528,000
2058	\$ 16,169,000	\$ 3,872,000	\$ 675,000	\$ 20,716,000

APPENDIX A: TYPICAL SECTIONS

Typical Sections



**RESOLUTION OF BOARD OF NORTH CAROLINA TURNPIKE AUTHORITY
CONCERNING APPLICATION TO LOCAL GOVERNMENT COMMISSION FOR
APPROVAL OF 2016 TOLL REVENUE BONDS AND THE WORKING GROUP
PARTICIPANTS FOR THE ISSUANCE THEREOF**

WHEREAS, the North Carolina Turnpike Authority (the "*Authority*") is duly organized and existing under the laws of the State of North Carolina (the "*State*") within the State Department of Transportation, and is authorized under Article 6H (Turnpike Authority and Toll Projects) of Chapter 136, as amended (the "*Act*"), of the North Carolina General Statutes (the "*NCGS*") and The State and Local Government Revenue Bond Act, Article 5 of Chapters 159, as amended, of the NCGS (the "*Revenue Bond Act*"), to issue revenue bonds for the purpose of financing and refinancing the cost of acquiring, constructing and equipping "turnpike projects," as defined in the Act;

WHEREAS, the Secretary of Transportation of the State, pursuant to Section 143B-10 and 143B-349 of the NCGS, has delegated to the Board of the Authority certain powers including the power to fix, revise, charge, and collect tolls and fees for the use of turnpike projects and the power to issue bonds or notes of the Authority to finance such projects;

WHEREAS, the Authority has previously issued revenue bonds pursuant to the Act and the Revenue Bond Act to finance a portion of the costs of the land, easements, rights of way, capital improvements and equipment constituting a turnpike project of the Authority now known as the "Monroe Expressway" and generally consisting of an approximately 19.7 mile roadway extending from US Highway 74 at Interstate 485 in eastern Mecklenburg County, North Carolina, near the Town of Matthews to US Highway 74 near the Town of Marshville in Union County, North Carolina (the "*Project*");

WHEREAS, due to unforeseen delays in construction, the cost of the Project has increased and the Authority has determined to finance such increase by the issuance of additional revenue bonds to be repaid from toll and other revenues of the Project, as well as a borrowing from the U. S. Department of Transportation under the Transportation Infrastructure Finance and Innovation Act of 1998 ("*TIFIA*"); with proceeds used, among other things, to pay such costs, fund reserves for the bonds and refund certain prior revenue bonds; and

WHEREAS, the Revenue Bond Act requires that revenue bonds thereunder be approved by the North Carolina Local Government Commission (the "*LGC*"), and that the LGC make certain findings with respect to such bonds, based, in part, on findings made by the issuer thereof;

NOW, THEREFORE, THE BOARD OF THE NORTH CAROLINA TURNPIKE AUTHORITY HEREBY RESOLVES:

1. An application to the LGC for approval of the issuance of non-recourse toll revenue bonds in one or more series under the Revenue Bond Act for the purpose of financing remaining costs of the Project, with appropriate reserves and issuance costs, and secured by and payable from the toll or other revenues of the Monroe Expressway (the "*2016 Bonds*"), is hereby authorized, approved and confirmed.

2. In connection with the application to the LGC, the Board of the Authority hereby makes the following findings:

a. The Project, based in part on the General Assembly's actions in designating it as a "turnpike project" under the Act and taking action for certain committed state appropriations, is both necessary and expedient. Further, the issuance of the 2016 Bonds for the purpose of financing the Project is both necessary and expedient.

b. The Project is feasible.

c. The amount of debt to be incurred in connection with the Project and the fees to be paid in connection therewith are sufficient but not excessive for the purpose of finishing acquiring, constructing and installing the Project by paying debt service on the 2016 Bonds from toll and other revenues.

d. The Authority has not defaulted on any debt obligation.

e. The Authority follows the debt management guidelines of the North Carolina Local Government Commission.

f. The anticipated toll revenues, based on a professional traffic and revenue study for the Project, will be sufficient to service the proposed 2016 Bonds payable therefrom.

g. The proposed 2016 Bonds may be issued at reasonable rates of interest.

3. The Authority hereby designates, and requests the LGC approve, to the extent necessary, the following parties working in the following capacities in connection with the 2016 Bonds.

Underwriters:

Senior Manager _____

Co-Managers _____

Financial Advisor Public Financial Management, Inc.

Professional Engineers HNTB

Traffic and Revenue Consultants CDM Smith

Trustee Wells Fargo Bank, N.A.

Underwriters' Counsel _____

Bond Counsel Hunton & Williams LLP

Authority Counsel Ebony Pittman, Esq, of Attorney General's Office

4. This resolution shall take effect immediately.

RESOLUTION ON TOLL RATES FOR OLD HOLLY SPRINGS – APEX ROAD INTERCHANGE ON TRIANGLE EXPRESSWAY

WHEREAS, the North Carolina Turnpike Authority (the “*Authority*”) is duly organized and existing under the laws of the State of North Carolina (the “*State*”) within the State Department of Transportation, and is authorized under Article 6H (Turnpike Authority and Toll Projects) of Chapter 136, as amended (the “*Act*”), of the North Carolina General Statutes (the “*NCGS*”), to acquire, construct and operate “turnpike projects,” as defined in the Act;

WHEREAS, the Authority has financed the construction of its Triangle Expressway System as a turnpike project under the Act through the issuance of its revenue bonds and entry into a loan agreement with the U. S. Department of Transportation, among other agreements and contracts;

WHEREAS, the Secretary of Transportation, pursuant to Section 143B-10 and 143B-349 of the NCGS, has delegated to the Board of the Authority certain powers including the power to fix, revise, charge, and collect tolls and fees for the use of turnpike projects;

WHEREAS, the Authority on September 17, 2008, adopted a policy for adopting toll schedules and any adjustments to toll schedules (the “*Toll Rate Policy*”) and the Toll Rate Policy provides that under the direction of the Authority a Traffic Consultant shall prepare a Traffic and Revenue Study forecasting projected traffic for each turnpike project and the toll revenues to be generated and after receipt of such Traffic and Revenue Study the Authority will adopt a toll rate schedule for the use of the turnpike project based upon factors it determines appropriate, including but not limited to, the location of the turnpike project for which the toll is collected, the type of vehicles anticipated to use the turnpike project, the method of collection of the toll (electronic, video, cash or other method) and other factors; and

WHEREAS, the Traffic and Revenue Study for the Triangle Expressway System, prepared by CDM Smith, is dated April 2009, and has been supplemented, including by a CDM Smith report dated _____, 2016, containing a proposed toll rate schedule for the new Old Holly Springs – Apex Road interchange to be opened on the Triangle Expressway;

NOW THEREFORE, THE BOARD OF THE NORTH CAROLINA TURNPIKE AUTHORITY HEREBY RESOLVES:

1. The Board hereby approves and authorizes the proposed toll rate schedule for the new Old Holly Springs – Apex Road interchange as presented.
2. The Chairman, the Executive Director, the Finance Office and other members, staff and employees of the Authority are authorized and directed to take such action and to execute and deliver any documents, certificates, undertakings, agreements or other instruments as they, with the advice of counsel, may deem necessary and appropriate to effect the purposes of this resolution.
3. This resolution shall take effect immediately upon its passage.

Adopted _____, 2016