FEASIBILITY STUDY

US 70/NC 11-NC 55 CORRIDOR FEASIBILITY STUDY
AND FUNCTIONAL DESIGN

CITY OF KINSTON, LENOIR COUNTY, NORTH CAROLINA

Prepared by
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for the
US 70 Corridor Commission
N. C. Department of Transportation Division 2
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Lenoir County and City of Kinston

US 70/NC 11-NC 55 Corridor Feasibility Study and Functional Design

I. General Description

Kimley-Horn and Associates, Inc. (KHA) has been retained by the US 70 Corridor Commission and the North Carolina Department of Transportation (NCDOT) to investigate a section of US 70 in the City of Kinston from the Neuse River Bridge to just east of NC 11-NC 55. The purpose of this study is to examine the feasibility of implementing interchange improvements for the current intersection of US 70 and NC 11-NC 55.

The proposed project is located in or bordering the City of Kinston in Lenoir County, in eastern North Carolina. The study area for the project generally encompasses an area bounded by Earl Tyndall Road in the north, the Neuse River to the west, Old Asphalt Road to the south, and extending if needed out to US 258 to the east. The study will consider impacts to the surrounding businesses, residences, and institutions in the affected area.

A map designating the study area is shown in Figure 1. Figure 2 displays a conceptual plan of the project.

Based on the US 70 Corridor Commission access management/freeway plans, the primary improvement being considered through this study would grade separate the existing US 70/NC 11-NC55 intersection, raising the NC 11-NC 55 roadway on a structure over US 70. This concept includes implementing a square loop interchange design to accommodate turning traffic and serve adjacent development. In addition, this study explores modifying access and turning movements on the section of US 70 between the Neuse River and the eastern edge of the proposed square loop interchange.

II. Need for the Project

The project aims to retrofit the existing US 70 and NC 11-NC 55 intersection using a grade-separated, access-managed facility with a series of square loops serving the corridors, the surrounding parcels, and the local street system. The facility is referred to as a square loop interchange. The objectives for the conversion from intersection to interchange are as follows:

- improve the safety of the existing intersection in terms of crash rates and crash severity;
- improve traffic operation, particularly for future years;
- encourage the economic redevelopment of properties in the study area;
- provide a more pedestrian-friendly environment; and
- provide an aesthetically pleasing entrance to the City of Kinston.
From June 2005 to May 2008, there were 35 total crashes at the intersection of US 70 and NC 11-NC 55, resulting in $181,125 in property damage. This crash frequency is the highest of all Lenoir County intersections along the US 70 corridor. Over half of the crash types during this period were rear-end crashes, with angle and sideswipe crashes each accounting for over 10% of crashes. The severity index of the crashes at this intersection during this time period was 8.25. This amount is significantly higher than the statewide average of 4.84 for US routes and 5.30 for NC routes.

Concerns to be addressed throughout the project include protecting the natural environment, maintaining access to businesses and private properties, and preserving the integrity of the corridors in the vicinity of the project.

The proposed square loop interchange is compatible with the local, regional, and statewide transportation and land use goals established for the City of Kinston, Lenoir County, and the US 70 Corridor Commission.

**III. Environmental Screening**

The following is a preliminary review of the environmental issues that may potentially impact the proposed project. The information and GIS mapping obtained for this environmental screening is readily available from agency databases. No survey work was conducted as part of this review. A field investigation was conducted by KHA biologists to verify and supplement key information regarding existing site conditions. The purpose of this environmental screening is to identify potential environmental issues early in the planning process.

**Historic Properties**

As part of the environmental screening process, a review of the North Carolina State Historic Preservation Office (SHPO) records was conducted to determine if any historic resources listed on or eligible for the National Register of Historic Places or state historic property lists exist within the proposed project corridor. No historical resources or properties were identified during field investigations (10/23/2008) or SHPO database reviews (11/4/2008). Formal consultation with SHPO was not conducted and no archaeological investigation was performed in this review.

**Flood Hazards**

A review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Panel No. 3720450400J for Lenoir County, North Carolina (map effective date 07/02/2004; included in Appendix A) showed that the proposed project corridor is located in Zone AE, the flood insurance rate zone that corresponds to the 1% annual chance floodplains (100-year floodplain) that are determined in the Flood Insurance Study by detailed methods of analysis. Areas within the channel of the Neuse River and the adjacent land areas are also designated by FEMA as occurring within the regulatory floodway. Areas occurring within the floodway must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. As stated in 44 CFR Part 60.3 D, encroachments including fill, new construction, substantial
improvements, and other development within the adopted regulatory floodway is prohibited unless it has been demonstrated, through hydrologic and hydraulic analyses performed in accordance with standard engineering practices, that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

In addition to the restrictions mentioned above, specific properties located along the proposed project corridor are regulated by FEMA due to restrictive covenants placed on the property. These properties were purchased by FEMA as part of a disaster relief effort for the City of Kinston and Lenoir County following Hurricanes Floyd, Fran, and Bonnie. The properties were then granted back to the City of Kinston and Lenoir County under restrictive covenants as defined in the deeds. The restrictive covenants (included as Appendix B) require the dedication and maintenance of the properties for purposes compatible with open space, recreational purposes, and wetlands management. Allowable uses include outdoor recreational activities, recreational parks and greenways, nature reserves, unimproved permeable parking lots, and buffer zones. Through this process, it was determined that the proposed improvements to the US 70/NC 11-NC 55 intersection do not run through any of the affected properties.

**Streams and Water Quality**

The project corridor is located within the Neuse River Basin (sub-basin 03-04-05) in the U.S. Geological Survey (USGS) Hydrologic Unit 03020202. Streams and tributaries within the project corridor drain to the Neuse River. The reach of the Neuse River along the project corridor is included on the Final 2006 303(d) Impaired Waters List (NCDWQ; June 19, 2007). The impaired reach (NCDWQ assessment unit 27-(56)b) begins upstream of the project reach at the boundary of sub-basins 03-04-05 and 03-04-12 (near the Seymour Johnson Air Force Base) and extends downstream to the mouth of Contentnea Creek. This reach of the Neuse is classified as Class C and Nutrient Sensitive Water. Class C waters are protected for fishing, wildlife, fish consumption, aquatic life and propagation, survival and maintenance of biological integrity, and secondary recreation uses such as wading, boating, and uses that involve human body contact with water in an infrequent, incidental manner. Nutrient Sensitive Water (NSW) is a supplemental classification intended for waters needing additional nutrient management due to being subject to excessive growth of microscopic or macroscopic vegetation (NCDWQ, 2007). Sources of water pollution that preclude any of these uses on either a short/term or long/term basis shall be considered to be violating water quality standards. The reach described above is not included on the Draft 2008 303(d) Impaired Waters List (NCDWQ; January 7, 2008).

A review of NCDWQ databases, USGS topographic quadrangles, and the Lenoir County Soil Survey, as well as limited field reconnaissance identified channelized, perennial, unnamed tributaries in the project vicinity. Additionally, large open waters were identified on GIS mapping and were confirmed during field reconnaissance. These tributaries and open waters will likely be considered jurisdictional waters as they are hydrologically connected to the Neuse River. Through the field analysis conducted by KHA biologists and the review of existing data, no major impacts to these features have been identified at this level of design. Impacts will be reviewed in more detail when this project proceeds to final design.
Potential wetland areas located along the proposed project corridor were identified and reviewed using the National Wetland Inventory (NWI) mapping database and were confirmed and assessed during limited field reconnaissance. The extents of these wetland areas have been estimated based on aerial photography and have not been delineated or surveyed. Numerous wetland areas observed in the project corridor during field reconnaissance were not included in the NWI mapping database and a small wetland identified by NWI mapping (located immediately north of the Fuel Warehouse) was not observed during the field investigation. Wetland areas observed during field reconnaissance include both forested and herbaceous communities. The wetland systems observed west, north, and south of the US 70/NC 11-NC 55 intersection, are palustrine, forested, broad-leaved deciduous systems dominated by species such as sweetgum (Liquidambar styraciflua), red maple (Acer rubrum), water oak (Quercus nigra), giant cane (Arundinaria gigantea), and greenbriar (Smilax laurifolia). Herbaceous wetlands observed include a small depressional area behind the Deacon Jones car dealership located west of the intersection of US 70/NC 11-NC 55, and in a large maintained/mowed field southeast of the intersection. Dominant vegetation in the herbaceous wetlands includes common rush (Juncus effusus), bulrush (Scirpus spp.), and assorted grasses (Carex spp.). More detailed analysis of impacts to area wetlands will be conducted when this project proceeds to final design.

**Threatened and Endangered Species**

The U.S. Fish and Wildlife Service (USFWS) database for federally threatened and endangered species for Lenoir County, North Carolina (USFWS, Updated 01/31/2008) lists the red-cockaded woodpecker (Picoides borealis) as endangered, the sensitive joint-vetch (Aeschynomene virginica) as threatened, and the bald eagle (Haliaeetus leucocephalus) as receiving protection under the Bald and Golden Eagle Protection Act (BGPA). Federal species of concern (FSC) listed for Lenoir County include American eel (Anguilla rostrata), Carolina madtom (Noturus furiosus), Georgia lead-plant (Amorpha gerogiana var. georgiana), and Venus’ fly-trap (Dionaea muscipula). While FSC do not currently receive protection under Section 7 of the Endangered Species Act, their status may be upgraded at any time, and therefore, they are included here for consideration.

The North Carolina Natural Heritage Program (NCNHP) database was reviewed (review conducted on 09/30/08) to determine which, if any, federal or state protected species occurred within the vicinity of the proposed project corridor. Occurrences of the Carolina madtom and the state-listed American alligator (Alligator mississippiensis) are recorded on the NCNHP database within two miles of the proposed project corridor. Venus’ fly-trap and a state-listed species, Neuse River waterdog (Necturus lewisi), occur within three miles of the proposed project corridor. Additionally, the NCNHP database identifies the Brownwater Levee Hardwood Forest Landscape/Habitat Indicator Guild along the Neuse River. The Habitat Indicator Guild designation refers to a large block of a contiguous habitat type necessary for the preservations of ecosystems.

During field inspections (10/23/08), suitable habitat was observed for Carolina madtom, Neuse River waterdog, and Venus’ fly-trap. Surveys for these species may be recommended by the USFWS during
the progression of this project. If these species are identified within the project area, additional coordination with USFWS will be necessary.

**Permitting Requirements**

Section 401 General Water Quality Certification – A Section 401 General Water Quality Certification will be required for any activity that may result in a discharge into “Waters of the United States” or for which an issuance of a federal permit is required. The issuance of a required Section 401 certification is a prerequisite to the issuance of a Section 404 permit. If project impacts exceed the Nationwide Permit (NWP) impact thresholds, an Individual Section 401 Water Quality Certification will be required.

Section 404 (Impacts to “Waters of the United States”) – Impacts to “Waters of the United States” (including wetlands, streams, and ponds that are hydrologically connected to a navigable water) come under the jurisdiction of the U.S. Army Corps of Engineers (USACE). Discharges of dredge or fill material into jurisdictional wetlands, streams, or open waters associated with the construction of the roadway project will require a Section 404 permit from the USACE. The Nationwide Permit (NWP) 14 (Linear Transportation Projects) may cover the impacts to the jurisdictional streams within the project study area. Final determination of permit applicability lies with the USACE and N.C. Division of Water Quality (DWQ).

Neuse Riparian Buffer Rules – The Nutrient Sensitive Waters Management Strategy for the Protection and Maintenance of Riparian Buffers (15A NCAC 2B.0233) provides a designation for uses that cause impacts to riparian buffers within the Neuse River Basin. The rule applies to a 50-foot wide riparian buffer (measured perpendicular to the stream from the top of bank on either side of the stream) directly adjacent to surface waters in the Neuse River basin, excluding jurisdictional wetlands regulated under Section 404 of the Clean Water Act. Riparian buffers will be required adjacent to streams that appear on the USGS Topographic Quadrangles or USDA (Soil Conservation Service) Soil Survey of Lenoir County soil maps.

**Hazardous Materials**

A search of environmental database records within a 0.25 to 1.0-mile radius of the project study corridor was performed by Environmental Data Resources (EDR) and is included as **Appendix C.** KHA reviewed this information to obtain an understanding of any releases of regulated substances or petroleum products that may have occurred on or near the project study corridor.

The EDR report includes a search of state and federal databases, including the National Priority List (NPL), Proposed and Delisted NPL Sites, Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Plan (NFRAP), Resource Conservation and Recovery Act (RCRA) Treatment Storage and Disposal facility (RCRA TSD), RCRA Corrective Action List (RCRA COR), RCRA generator list (RCRA GEN), Brownfield Management System (BMS), Federal Engineering and Institutional Controls (IC/EC), Emergency Response Notification System (ERNS), Tribal Lands (DOI/BIA), State/Tribal Sites, State Spills 90, State/Tribal Solid Waste Facilities (SWF), State/Tribal Leaking Underground Storage Incident Reports (LUST), State/Tribal...
Registered Underground and/or Aboveground Storage Tanks (UST/AST), State/Tribal IC, State/Tribal Brownfields, Historic Landmarks, Radon, Other State facilities, and North Carolina Dry-Cleaning Solvent Cleanup Act Program (DSCA).

Sixteen sites were identified on the federal, state, and local database search and are described in Table 1. An additional forty “orphan” sites were identified on the databases but were not mapped due to inadequate address information. These sites are listed in the EDR report on page 6 of the Executive Summary.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Location</th>
<th>Database</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinston Coal Gas Plant</td>
<td>Not Listed</td>
<td>NC HSDS</td>
<td>Not reported</td>
</tr>
<tr>
<td>70 By-Pass Exxon</td>
<td>1100 W New Bern Rd</td>
<td>IMD, LUST, LUST TRUST, UST</td>
<td>Underground petroleum leak in 1993 resulted in groundwater /soil contamination, tank removed, Closed out on 06/12/96. Eight USTs permanently closed, removed.</td>
</tr>
<tr>
<td>Speedway Station #218</td>
<td>1105 Pink Hill Rd</td>
<td>LUST TRUST</td>
<td>Not reported</td>
</tr>
<tr>
<td>Mallard Food Shop 15</td>
<td>1020 E New Bern Rd</td>
<td>UST</td>
<td>Five USTs installed in 1977, one UST installed in 1985. All six USTs are currently in use.</td>
</tr>
<tr>
<td>Kinston Quick Stop</td>
<td>1005 S New Bern Rd</td>
<td>UST</td>
<td>Six USTs currently in use.</td>
</tr>
<tr>
<td>Rightway</td>
<td>1050 New Bern Rd</td>
<td>UST</td>
<td>Three USTs installed in 1999 and currently in use.</td>
</tr>
<tr>
<td>Fuel Warehouse</td>
<td>1101 W New Bern Rd</td>
<td>UST</td>
<td>Three USTs installed in 2002 and currently in use.</td>
</tr>
<tr>
<td>Kinston MGP</td>
<td>South and Heritage Street</td>
<td>Manufactured Gas Plants</td>
<td>Alternate names: Kinston Gas Co, Inc/Tide Water Power Co/Tide Water Gas Co</td>
</tr>
</tbody>
</table>
IV. Description of Alternatives

Several major alternatives were initially considered in this study and presented to the public in November 2008.

No-Build Alternative: The intersection of US 70 and NC 11-NC 55 would remain an at-grade, signalized connection. No median closures or openings would be considered within the study area. The existing laneage and connections can be seen in Figure 1.

Alternative 1 – NC 11-NC 55 Bridge over US 70 with Square Loop Ramps: The proposed interchange consists of four square loops connecting US 70 and NC 11-NC 55 in the four corners of the existing intersection. An overpass along NC 11-NC 55 moves traffic along the roadway above US 70. This design removes the signal on US 70 and instead incorporates two signals at the intersections of the square loops and NC 11-NC 55 north and south of US 70. All four square loops connect to US 70 with right-in-right-out configurations.

Between the square loop intersections, direct access to properties along US 70 and NC 11-NC 55 is restricted and shifted to the square loops. Here, motorists can enter properties at lower speeds, with safer movements, and at locations with less dense traffic. In addition, the slower traffic speeds will provide the roadway user additional time to make the decision to visit neighboring establishments. Stop signs provide unsignalized traffic control at access points along the square loops. In order to conform with interchange spacing requirements and to move toward the ultimate freeway concept for the US 70 corridor, additional right-in only or right-in/right-out access points along US 70 are not being considered at this time. This decision was made for safety reasons given that a high percentage of recent crashes in the area were rear-end collisions. Restricting access will minimize the number of locations where slow-moving vehicles interface with high-moving vehicles and will give sufficient distance for acceleration and deceleration between square loop roadway access points.

The northeast quadrant’s square loop is proposed to connect to the nearby Tabernacle Free Will Baptist Church with a square loop extension that improves mobility for motorists leaving the church and traveling east on US 70. The project also includes an access road that connects the northern leg of the northwest quadrant’s square loop to the middle of the quadrant in order to provide access to the multiple properties contained in that area.

The square loop interchange would provide full access between US 70 and NC 11-NC 55. In fact, motorists would have the opportunity to choose which square loop to use to continue toward their intended destinations. A square loop interchange design requires at least two square loops to provide full access, and this design includes four loops. Therefore, two options exist to complete each turning maneuver.
The NC 11-NC 55 bridge is planned to provide amenities such as sidewalks and street lamps to enhance safe passage for pedestrians across US 70. Since this corridor serves as a connection point between destinations such as the proposed Soccer Park, Rotary Dog Park, Veterans Park and Downtown Kinston, there may be significant demand for non-motorized travel in this area. The bridge is also planned to include an upgraded façade with lettering to welcome motorists to the Kinston area.

To the west of the US 70/NC 11-NC 55 square loop interchange, some modifications are proposed to the existing access and connections to US 70. Throughout this section, driveway consolidation is recommended, identifying and improving driveways that can serve several adjacent sites. For certain properties, direct driveways to US 70 are proposed for removal, with a service road proposed for construction to serve the rear of these properties. In addition, modifications are proposed to the turning movements allowed at the intersection of US 70 and Tyndall Park Boulevard. A traditional left-over would be installed at the easternmost intersection of these roads, with a reverse left-over installed at the western intersection of these roads. These movements would reduce conflict points and enhance safety while still allowing full movement capabilities between the two roadways.

**Alternative 2 – US 70 Bridge over NC 11-NC 55 with Square Loop Ramps:** This alternative is similar to Alternative 1 in every regard except the overpass itself. In this alternative, dual bridges would be constructed for US 70, forming an overpass over the NC 11-NC 55 corridor, with a set of four square loops serving turning movements and development in the area. This design would still remove the signal at this intersection, instead incorporating two signals at the square loop intersections with NC 11-NC 55. All four of the square loops would connect to US 70 via right-in/right-out access points.

Since US 70 is not regarded as a desirable travel option for pedestrians in this area, sidewalks would not be recommended for construction in this alternative.

**Alternative Selection**

Conceptual depictions of both Alternatives 1 and 2 can be found in **Figure 3**. Following a review of public meeting input and project considerations, the project team, NCDOT, and client selected Alternative 1 as the preferred alternative. Key factors considered in this decision include the following:

- The bridging of NC 11-NC 55 would allow for enhanced bicycle and pedestrian connectivity to destination points to the south and the north of this area. Recommended pedestrian facilities in this improvement would connect to the Rotary Dog Park and could be extended through future projects to extend to the proposed Soccer Park south of the interchange and to Veterans Park north of the interchange.

- With dual bridges on US 70 (Alternative 2), vehicles entering the highway from the square loop access points before the bridge would have difficulty accelerating and joining traffic while climbing the bridges. Vehicles exiting the highway at square loop intersections after the bridge would have difficulty decelerating before turning while descending the bridges. Although these general principles also relate to the bridge on NC 11-NC 55 (Alternative 1), the two traffic signals and lower speeds on the roadway make acceleration and deceleration concerns less problematic. Therefore, a bridge on NC 11-NC 55 would likely be safer in terms of acceleration and deceleration and more effective in terms of traffic flow.
• In both build alternatives, the overpass has been envisioned to function as a gateway into the Kinston area. Since a large percentage of the traffic entering into the Kinston area travels via the US 70 corridor, a bridge over that corridor will better serve to introduce the traveling public to the Kinston area.

• Project right-of-way needs were studied for both alternatives. In both build alternatives, the bridge(s) are designed with MSE retaining walls, which will minimize the footprint. Therefore, right-of-way was not a primary basis for the selection of the preferred alternative.

• The estimated cost for Alternative 1 is projected to be less than the cost for Alternative 2. This cost difference is largely in part to the reduced cost of constructing one bridge (for the NC 11-NC 55 overpass) instead of two (for the dual bridges of the US 70 overpass).

• The potential construction phasing of the proposed build alternatives was discussed. During the construction of either alternative, portions of the square loop system will likely have to be constructed first, with traffic from the route to be converted to an overpass diverted to these loop sections during construction. Due to the traffic levels currently present on these roadways, the partial closure of NC 11-NC 55 will have less of an impact on the congestion of the system than would a partial closure of US 70.

This report details the findings of Alternative 1 analysis. The No-Build Alternative serves as a point of comparison for future traffic operation in the area.

V. Traffic Analysis

Recommendations for the square loop roadway network were developed based on the capacity analyses described in this section.

Background Data Collection

Traffic Survey Services inventoried existing intersection geometry and performed traffic counts on August 29, September 1, and September 2 of 2008. Figure 4 shows the existing roadway laneage.

Existing Traffic

AM peak hour (7:00 AM to 9:00 AM) and PM peak hour (4:00 PM to 6:00 PM) turning movement counts were performed by Traffic Survey Services, Inc. at the intersection of US 70 at NC 11-NC 55 on September 2, 2008 and August 29, 2008, respectively. The turning movement counts are included in the Appendix. The existing AM and PM peak hour traffic volumes are shown in Figure 5.
**Traffic Forecast Projections**

For the 2030 no-build scenario, volumes were generated based on historic growth traffic. Historic growth traffic is the increase in traffic due to usage increases and non-specific growth throughout the area. Based on a review of NCDOT average daily traffic counts from 1999 to 2007, very little growth has occurred in the study area over the past several years. To be conservative, the existing (2008) peak hour traffic volumes were grown by an annual rate of 2% for twenty-two years to account for background growth in 2030. The projected 2030 no-build AM and PM peak hour volumes are shown in Figure 6.

For the 2030 build scenario, the volume projections were based on historic growth traffic plus traffic from existing and potential future developments in the area. The traffic generation of these developments was determined using the traffic generation rates published in *Trip Generation* (Institute of Transportation Engineers, Seventh Edition, 2003). For currently undeveloped parcels, the potential future trip generation was based on a retail land use (land use code 820) assuming that the parcel would be developed at a density of 10,000 square feet of retail development per acre.

The trip generation potential of each quadrant of the interchange was calculated separately (trip generation worksheets can be found in Appendix D). Where appropriate, internal capture and pass-by capture rates were applied to the raw traffic generation potential of each quadrant. Internally captured trips are trips that begin and end within the quadrant and do not access the external roadway network. Pass-by trips are trips already on the roadway network that will make a trip to the site as they pass by on the adjacent street. Internal Capture and Pass-By Capture were taken into account using rates published in the Institute of Transportation Engineers (ITE) *Trip Generation Handbook* (Second Edition, 2004). Pass-by trips were assigned to the roadway network based on anticipated traffic patterns on US 70 and on NC 11-NR 55.

The traffic from each quadrant was assigned to the surrounding roadway network based on land uses and population densities in the area. Traffic is expected to access the developments based on the following distribution:

- 35% to/from the west on US 70
- 35% to/from the east on US 70
- 25% to/from the north on NC 11-NR 55
- 5% to/from the south on NC 11-NR 55

Since each turning movement has two available options at a square loop interchange with four loops, some assumptions were made regarding the percentage of vehicles that were likely to select each option. The signage for vehicles on NC 11-NR 55 that would like to turn left onto US 70 will direct them to turn right at the appropriate traffic signal to loop back onto US 70. It was assumed that 80% of this traffic would follow the signage to turn right and the remaining 20% would turn left at the signal to access US 70. Similarly traffic on US 70 that would like to turn left onto NC 11-NR 55 will be directed via signage to turn right at the right-in/right-out access points. It was assumed that 50% of the traffic would turn at the first right-in/right-out access point and then turn left at the traffic signal and 50% would use
the second right-in/right-out access point to loop back onto NC 11-NC 55. All traffic wishing to turn right from US 70 onto NC 11-NC 55 or from NC 11-NC 55 onto US 70 was assumed to turn right at the first available access point.

Since the 2030 build scenarios include the projected development traffic, the overall network volumes are higher than those in the 2030 no-build scenarios. For a fair comparison, additional no-build scenarios were also analyzed that include the projected development traffic. The projected 2030 no-build AM and PM peak hour volumes including projected development traffic are shown in Figure 7. The projected 2030 build AM and PM peak hour volumes are shown in Figure 8.

**Description of Analysis**

The traffic analysis for this interchange includes intersection analyses for all intersections involved in the square loop roadway. The intersections include the two signalized intersections along NC 11-NC 55, the five right-in-right-out intersections along US 70, and the access point intersections along the square loops. Figures 4 and 9 show the existing and proposed lane geometry in the study area, respectively.

Capacity analyses (see Appendix E) were performed for the AM and PM peak hours for the existing (2008) traffic condition, the projected (2030) no-build traffic condition, the projected (2030) no-build traffic condition with development traffic, and the projected (2030) build traffic condition using Synchro (Version 7) software to determine the operating characteristics of the adjacent roadway network.

Capacity is defined as the maximum number of vehicles that can pass over a particular road segment or through a particular intersection within a set time duration. Capacity is combined with Level-of-Service (LOS) to describe the operating characteristics of a road segment or intersection. LOS is a qualitative measure that describes operational conditions and motorist perceptions within a traffic stream. Synchro Version 7 defines six levels of service, LOS A through LOS F, with A representing the shortest average delays and F representing the longest average delays.

For signalized intersections, LOS is defined for the overall intersection operation. LOS D is the typically accepted standard for signalized intersections in urbanized areas.

For unsignalized intersections, only the movements that must yield right-of-way experience control delay. Therefore, LOS criteria for the overall intersection is not reported by Synchro Version 7 or computable using methodology published in the *Highway Capacity Manual*. Accordingly, minor street approach delays are reported herein for unsignalized conditions. For descriptive purposes, results between LOS A and LOS C for the side street approach are assumed to represent short delays. Results between LOS D and LOS E for the side street approach are assumed to represent moderate delays, and LOS F for the side street approach is assumed to represent long delays. It is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, while the majority of the traffic moving through the intersection on the major street experiences little or no delay. Table 2 lists the LOS control delay thresholds published in the *Highway Capacity Manual* for signalized and unsignalized intersections, as well as the unsignalized operational descriptions assumed herein. Table 3 shows the build and no-build LOS and delay levels for the existing and proposed signalized intersections.
LEGEND
XX AM PEAK HOUR
(XX) PM PEAK HOUR

US 70 PILOT PROJECT
KINSTON US 70 AT NC 11-NC 55 INTERCHANGE
PROJECTED (2030) NO BUILD WITH DEVELOPMENT PEAK HOUR TRAFFIC VOLUMES

FIGURE 7
US 70 at NC 11-NC 55 – Signalized

The existing signalized intersection of US 70 at NC 11-NC 55 currently operates at LOS C (33.0 seconds of delay per vehicle) in the AM weekday peak hour and LOS D (47.5 seconds of delay per vehicle) in the PM peak hour. In the design year (2030), the intersection is projected to operate at LOS D in the AM peak hour and LOS F in the PM peak hour under No Build traffic conditions. When not considering the projected development traffic, the AM and PM peak hour intersection delays per vehicle are 41.0 seconds and 144.9 seconds, respectively. If the additional traffic due to future development is considered, the AM and PM peak hour intersection delays per vehicle increase to 52.8 seconds and 201.4 seconds, respectively.

<table>
<thead>
<tr>
<th>Level-of-Service</th>
<th>Signalized Intersections – Control Delay Per Vehicle [sec/veh]</th>
<th>Unsignalized Intersections – Average Control Delay [sec/veh] &amp; Qualitative Operational Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤ 10</td>
<td>≤ 10 Earth Delays</td>
</tr>
<tr>
<td>B</td>
<td>&gt; 10 – 20</td>
<td>&gt; 10 – 15 Short Delays</td>
</tr>
<tr>
<td>C</td>
<td>&gt; 20 – 35</td>
<td>&gt; 15 – 25 Short Delays</td>
</tr>
<tr>
<td>D</td>
<td>&gt; 35 – 55</td>
<td>&gt; 25 – 35 Medium Delays</td>
</tr>
<tr>
<td>E</td>
<td>&gt; 55 – 80</td>
<td>&gt; 35 – 50 Medium Delays</td>
</tr>
<tr>
<td>F</td>
<td>&gt; 80</td>
<td>&gt; 50 Long Delays</td>
</tr>
</tbody>
</table>

NC 11-NC 55 at NW Quadrant and NE Quadrant – Signalized

In the design year (2030) under Build conditions, this intersection is projected to operate at LOS B (12.1 seconds of delay per vehicle) in the AM peak hour and LOS C (23.5 seconds of delay per vehicle) in the PM peak hour.

NC 11-NC 55 at SW Quadrant and SE Quadrant – Signalized

In the design year (2030) under Build conditions, this intersection is projected to operate at LOS D (37.4 seconds of delay per vehicle) in the AM peak hour and LOS C (29.0 seconds of delay per vehicle) in the PM peak hour.
Table 3. Scenario Levels of Service and Delay Times*

<table>
<thead>
<tr>
<th>SCENARIO</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXISTING (2008)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>US 70 &amp; NC 11-NV 55</td>
<td>US 70 &amp; NC 11-NV 55</td>
</tr>
<tr>
<td></td>
<td>C (33.0 s)</td>
<td>D (47.5 s)</td>
</tr>
<tr>
<td>FUTURE (2030) NO BUILD</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>US 70 &amp; NC 11-NV 55</td>
<td>US 70 &amp; NC 11-NV 55</td>
</tr>
<tr>
<td></td>
<td>D (52.8 s)</td>
<td>F (201.4 s)</td>
</tr>
<tr>
<td>FUTURE (2030) NC 11-NV 55 BRIDGE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC 11-NV 55 &amp; north ramps</td>
<td>B (12.1 s)</td>
<td></td>
</tr>
<tr>
<td>NC 11-NV 55 &amp; south ramps</td>
<td>D (37.4 s)</td>
<td></td>
</tr>
<tr>
<td>NC 11-NV 55 &amp; north ramps</td>
<td></td>
<td>C (23.5 s)</td>
</tr>
<tr>
<td>NC 11-NV 55 &amp; south ramps</td>
<td></td>
<td>C (29.0 s)</td>
</tr>
</tbody>
</table>

* - Future traffic and delay levels consider projected development traffic in the project area.

Unsignalized Intersections

In the design year (2030) under Build conditions, all unsignalized intersections are projected to operate with short delays in the AM peak hour. In the PM peak hour, the side street movements at the intersections of the NE Quadrant roadway at the NE Retail driveway and the SW Quadrant roadway at the SW Retail driveway are projected to operate with long delays. All other unsignalized intersections are projected to operate with short delays in the PM peak hour.

Conclusions and Recommendations

The traffic capacity analyses shows that the square loop interchange proposed for US 70 at NC 11-NV 55 is projected to operate at acceptable levels-of-service in the design year.

Figure 9 outlines the recommended laneage and traffic control based on the capacity analyses.

VI. Public Involvement

The proposed improvements to the intersection of US 70 and NC 11-NV 55 will significantly change the access patterns and mobility characteristics of this area. As a result, it was imperative to educate and inform the public during the development of the project feasibility study. Public outreach was conducted in several different forums.

Technical Steering Committee

The improvement of the US 70/NC 11-NV 55 intersection will involve the cooperation of several different agencies. Representatives from NCDOT, the City of Kinston, and Lenoir County comprised a Technical Steering Committee that met throughout the life of this project. The purpose of this
Committee was to evaluate improvement alternatives, discuss environmental and physical constraints, and provide committee members with the resources to educate their constituents. The Technical Steering Committee met for an initial kickoff meeting in September 2008. This meeting highlighted the background and need for the project, identified issues facing the project, and discussed a plan for public outreach. Following the first public outreach session in November 2008, the Technical Steering Committee met to review the results of the public workshop, discuss the proposed alternatives, and to select an alternative to move forward with into preliminary design. As the project progressed, the Technical Steering Committee met a third time in September 2009. This meeting was used to review the preliminary design plans and design criteria, and to discuss outreach methods for the final public workshop.

Public Workshop #1

In November 2008, an initial public workshop was conducted with interested property owners and residents of the Kinston/Lenoir County area. During this workshop, an initial presentation highlighted the safety and congestion issues currently facing the study area. The two preliminary alternatives being considered were described and illustrated to the public using 3-D animated visualizations (i.e., Sketch-Up). Following this presentation and a general question and answer period, project facilitators sat down with members of the public to hear their concerns and issues and discuss proposed improvements. The feedback received during this process was used in determining the preferred alternative and in shaping future public outreach efforts. A group of almost 20 people attended the workshop, consisting of neighboring property owners, city, county, and state representatives, and members of the media.

Public Workshop #2

The second Public Workshop was conducted in December 2009. Local representatives from the Technical Steering Committee helped to advertise this workshop by distributing flyers and meeting information to local property owners. A presentation at this workshop reviewed the need for the project from a safety and congestion standpoint. Traffic analysis results and a traffic simulation were shown to illustrate the changes in congestion levels through the proposed improvement. 3-D animated simulation was also performed to illustrate the visual effect the proposed project would have on the study area. Finally, a review of the work conducted on the project to date was summarized, outlining the preliminary roadway designs that had been developed as well as the projected project costs and impacts. A question and answer session was held following this presentation to further address concerns and questions from the public. Finally, members of the public were encouraged to gather around maps showing the proposed designs and give feedback with their concerns or comments. Following this workshop, comments received were considered and integrated as appropriate into the preliminary design. More than 20 members of the general public attended this workshop.
VII. Conceptual Design

The final result of this feasibility study is a preliminary design of the US 70/NC 11-NC 55 interchange and surrounding study area. Horizontal and vertical design elements were produced and reviewed by members of the Technical Steering Committee and the public. Preliminary right-of-way, height requirements, and interchange spacing were all evaluated during this effort. The environmental conditions identified as a part of this study were also considered during the preliminary design phase. Where possible, identified environmental constraints were avoided or mitigated. The square loop does traverse partially through a body of water in the southeast quadrant of the interchange. However, this water body was not identified as an environmentally sensitive or protected body, since it is the result of a borrow pit.

As a part of this effort, design criteria were produced and reviewed by the Technical Steering Committee. These design criteria were used to guide the development of the preliminary roadway design. A copy of these design criteria can be found in Appendix F. In addition, quantities and rough cost estimates were determined for the project. After computing probable costs for construction, engineering and construction observation, utility relocation, right-of-way and easement acquisition, and environmental mitigation, the estimated cost for this project is $32.6 million. A breakdown of the quantities and cost estimates for this project can be found in Appendix G.

VIII. Conclusion and Next Steps

The intent of this feasibility study is to provide a tool for the City of Kinston, Lenoir County, NCDOT, and the US 70 Corridor Commission. The information contained in this document can be used to help position this project for future funding. This request for funding may involve the traditional TIP process. Since these improvements would also mitigate safety concerns at this intersection, the use of Hazard Elimination funding could also be considered. The US 70 Corridor Commission could serve as a sponsoring agency to help secure funding through NCDOT. When funding has been secured for this project, further discussions on right-of-way acquisition and final design will commence.