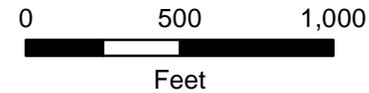


**Legend**

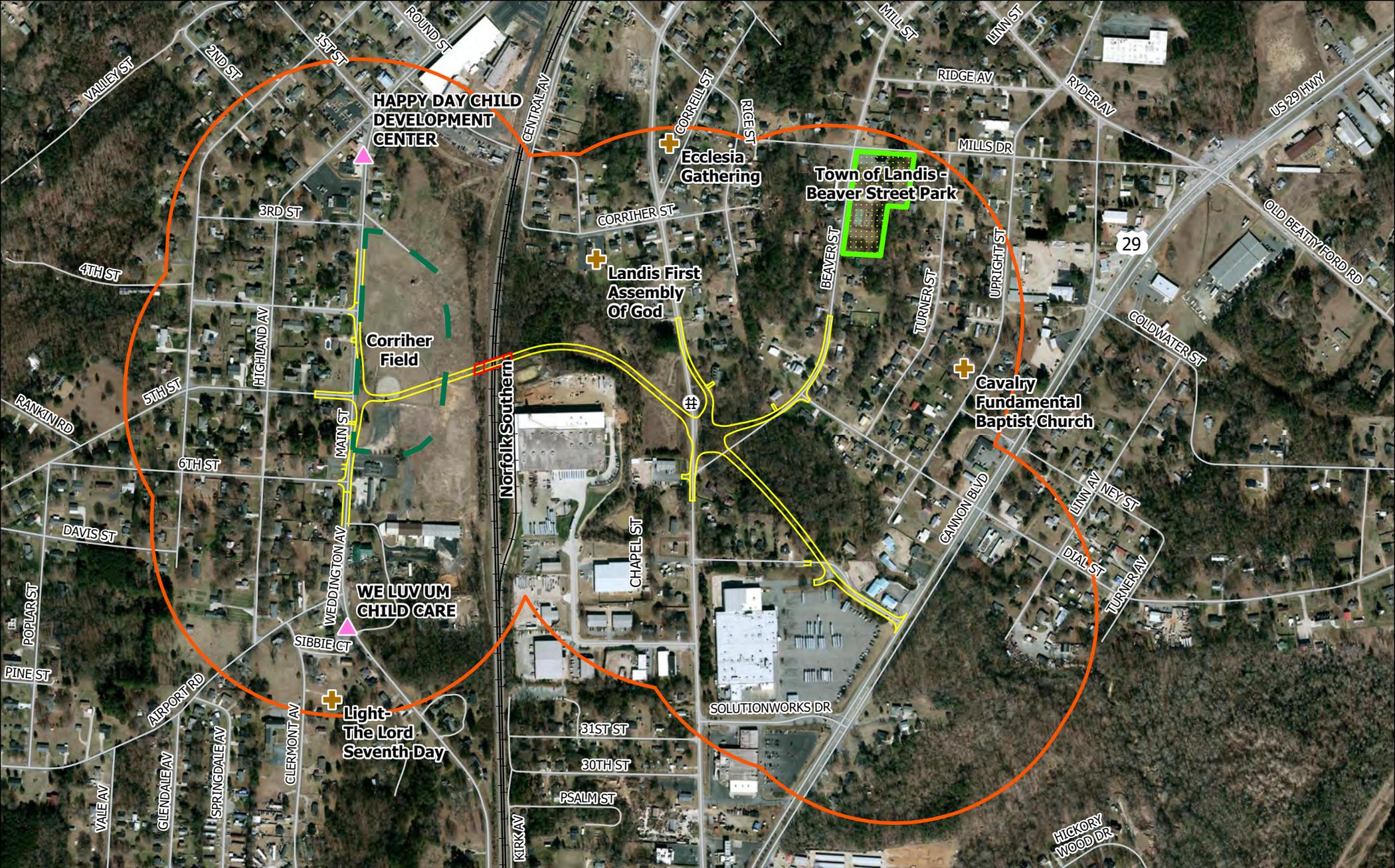
- Study Area
- Landis
- Alternative A
- Alternative C
- Kannapolis
- Railroad
- Road



**Study Area Map**

Project H-171399  
 S. Landis/N. Kannapolis  
 Railroad Grade Separation  
 Rowan County

Source: NCDOT, NC OneMap, ATLAS, HNTB (2023)

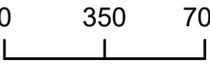


### Legend

|   |   |
|---|---|
|  Scoping Area                        |  Road                |
|  Proposed Edge of Travel             |  Railroad            |
|  Proposed Bridge                     |  Place of Worship    |
|  Corriher Field                      |  Child Care Facility |
|  Town of Landis - Beaver Street Park |  Existing Bridge     |



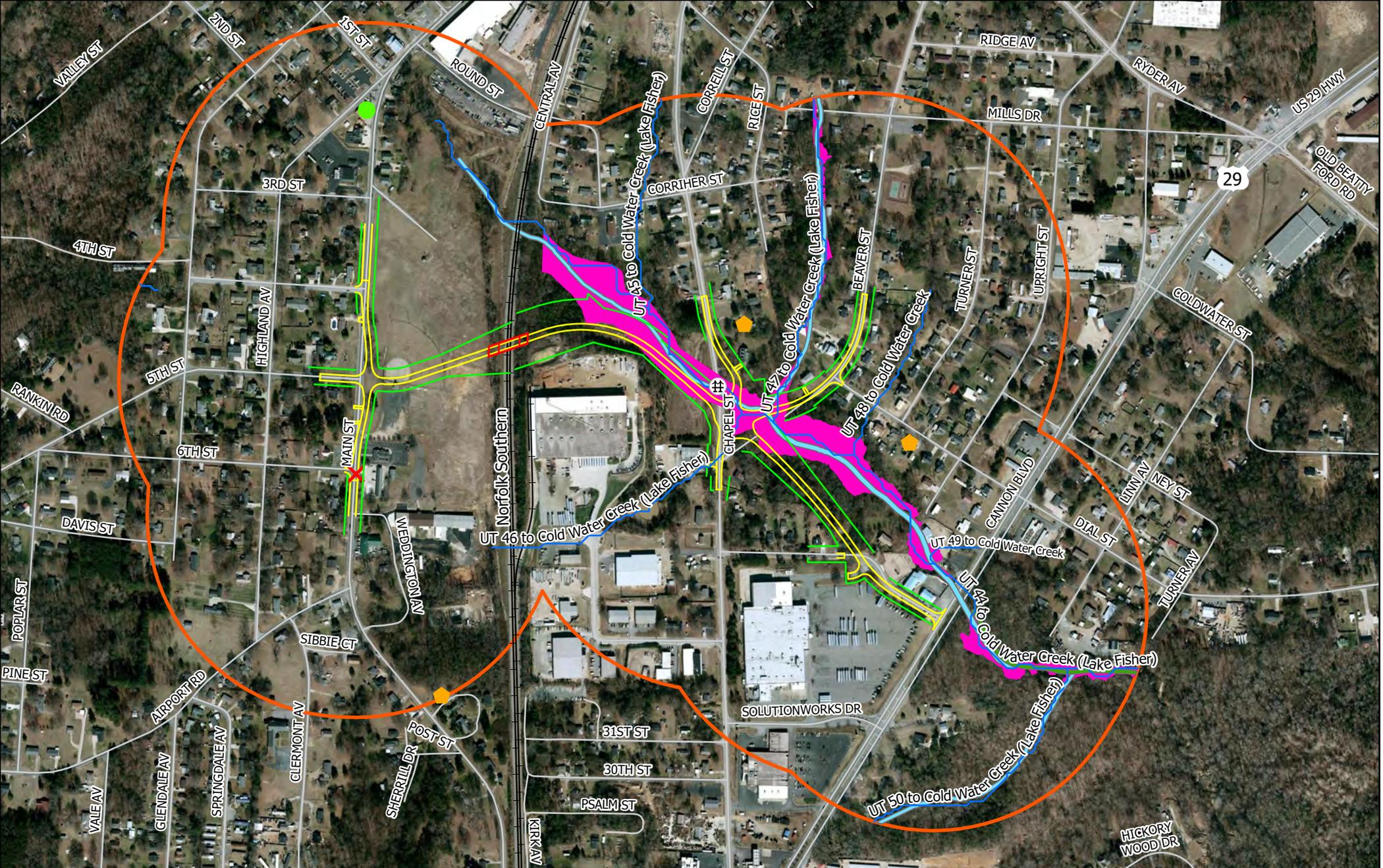
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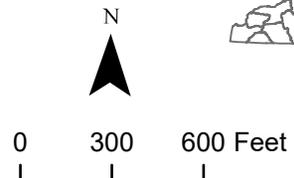
**Figure 2.**  
**SPOT Project H171399**  
**Design Concept A**  
**Community Resources Map**  
**Construct Railroad Grade Separating**  
**Connector from W 5th St. to US 29 in**  
**Landis/Kannapolis,**  
**Rowan County**

6/12/2023  
 Sources: NCDOT, NC OneMap. 2023.

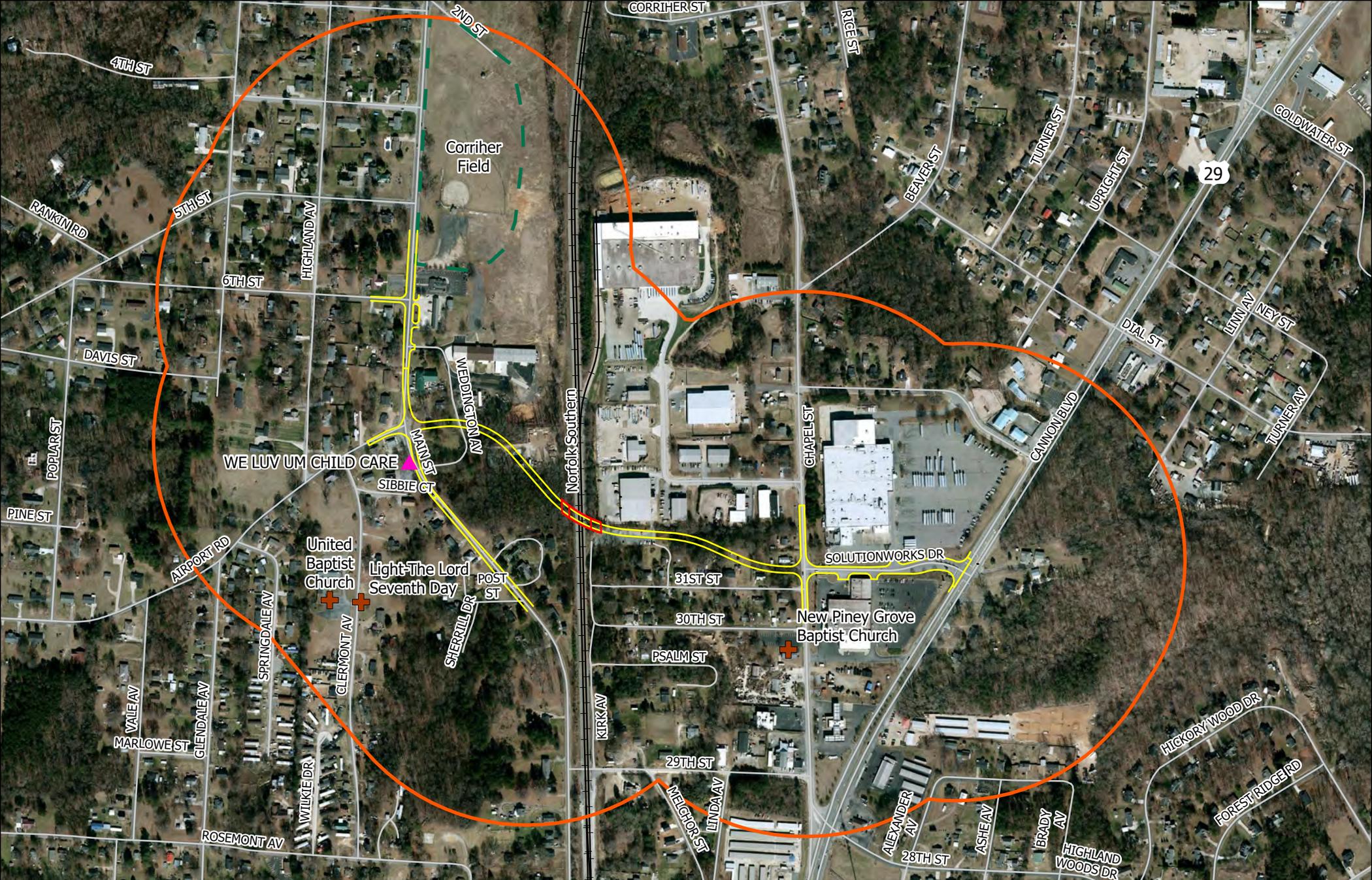


**Legend**

- Scoping Area
- Proposed Edge of Travel
- Proposed Bridge
- Road
- Railroad
- Stream
- 100-Year Floodplain
- National Wetland Riverine
- NWI Freshwater Forested/Shrub Wetland
- ⊕ Existing Bridge
- Underground Storage Tank (UST)
- Potential Historic Structure
- X Hazardous Waste Site



**Figure 3.**  
**SPOT Project H171399**  
**Design Concept A**  
**Environmental Features Map**  
**Construct Railroad Grade Separating**  
**Connector from W 5th St. to US 29 in**  
**Landis/Kannapolis,**  
**Rowan County**



**Legend**

- Scoping Area
- Road
- Railroad
- Proposed Edge of Travel
- Proposed Bridge
- Corriher Field
- Place of Worship
- Child Care Facility

N  
 0      350      700 Feet

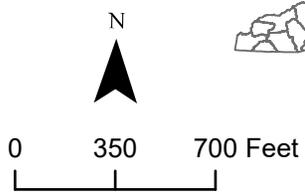
**Figure 4.**  
**SPOT Project H171399**  
**Design Concept C**  
**Community Resources Map**  
**Construct Railroad Grade Separating**  
**Connector from Airport Rd. to US 29 in**  
**Landis/Kannapolis,**  
**Rowan County**

Sources: NCDOT, NC OneMap. 2023. 6/12/2023



### Legend

- Scoping Area
- Proposed Edge of Travel
- Proposed Bridge
- Road
- Railroad
- Stream
- Corriher Field
- 100-Year Floodplain
- National Wetland Inventory (NWI) Riverine
- NWI Freshwater Forested/Shrub Wetland
- X Hazardous Waste Site
- Potential Historic Structure
- Underground Storage Tank (UST)



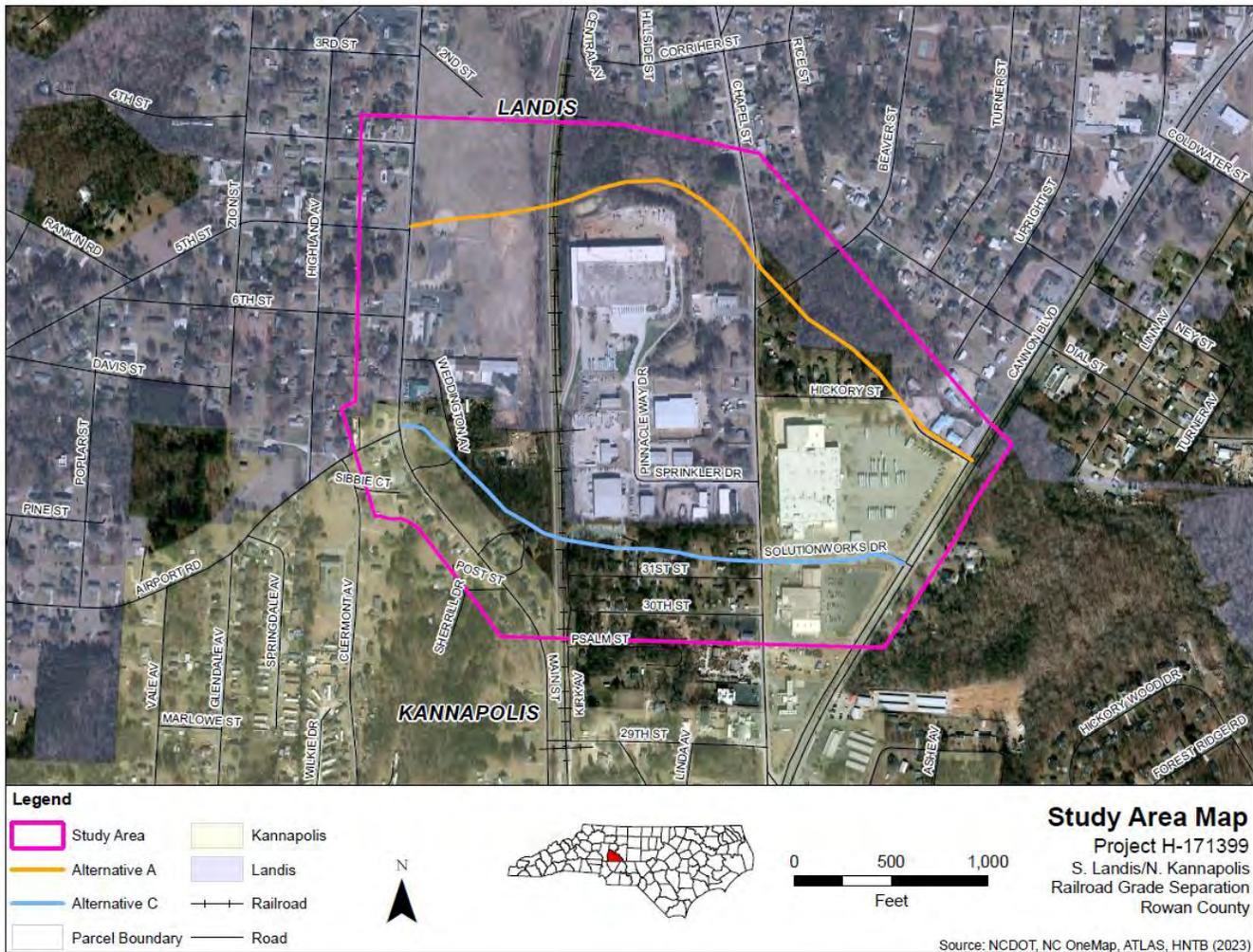
**Figure 5.**  
**SPOT Project H171399**  
**Design Concept C**  
**Environmental Features Map**  
**Construct Railroad Grade Separating**  
**Connector from Airport Rd. to US 29 in**  
**Landis/Kannapolis,**  
**Rowan County**

# MERGER PRE-SCREENING FORM



| PROJECT DATA   |  |  |   |
|--|--|--|---|
| <b>SPOT ID OR STIP #:</b> H171399  |  | <b>DIVISION:</b> 9   | Existing No. of Lanes: NA   |
| <b>NCDOT CONTACT:</b> Rupal Desai  |  | <b>WBS:</b>  | Proposed No. of Lanes: 2  |
| <b>PREPARED BY:</b> Clara Meier, HNTB  |  | <b>LEAD FEDERAL AGENCY:</b> USACE  |   |
| <b>DOCUMENT TYPE:</b><br><input type="checkbox"/> NEPA <input checked="" type="checkbox"/> CE/MCDC<br><input type="checkbox"/> SEPA <input type="checkbox"/> EA/FONSI<br><input type="checkbox"/> EIS  |  | <b>PROJECT TYPE:</b><br><input checked="" type="checkbox"/> DIVISION<br><input type="checkbox"/> CENTRAL | <b>Existing control of access:</b><br><input checked="" type="checkbox"/> No Control<br><input type="checkbox"/> Partial Control<br><input type="checkbox"/> Limited Control<br><input type="checkbox"/> Full Control |
| <b>Proposed control of access:</b><br><input checked="" type="checkbox"/> No Control<br><input type="checkbox"/> Partial Control<br><input type="checkbox"/> Limited Control<br><input type="checkbox"/> Full Control  |  |  |   |
| <b>IDENTIFIED NEED:</b><br><i>Include the identified need for the project as defined on the Identified Need form or Project Scoping Report or other available information. Note this is not necessarily the Project Purpose and Need that will be identified in Concurrence Point 1.</i><br><br>The purpose of the project is to improve safety for motorists and pedestrians and alleviate traffic conflicts with the railroad.<br><br>Improving traffic safety for motorists, rail passengers, and train crews is the primary reason that NCDOT is evaluating a grade separation connector between Main Street and Cannon Boulevard. |  |  |   |
| <b>PROJECT DESCRIPTION:</b><br><i>Identify and describe the proposed action, including its location. Include the termini (project beginning and end) and design features, such as laneage proposed.</i><br><br>North Carolina Department of Transportation (NCDOT) Division 9 proposes to construct a new connector road with grade separation of the North Carolina Railroad (NCRR) and the Norfolk Southern Railway (NSR) Railroad in South Landis/North Kannapolis connecting US 29 (Cannon Boulevard) and US 29A (Main Street) in Rowan County.  |  |  |   |

## VICINITY MAP & PROJECT SCOPING STUDY AREA:



## MERGER PRE-SCREENING CHECKLIST



# MERGER PRE-SCREENING FORM

|  |   |
|--|---|
| <b>1) IS THE PROJECT LIKELY TO REQUIRE SECTION 404 APPROVAL?</b>   | <input checked="" type="checkbox"/> <b>YES</b> , SECTION 404 APPROVAL IS LIKELY TO BE REQUIRED<br><input type="checkbox"/> <b>NO</b> , SECTION 404 APPROVAL IS NOT LIKELY TO BE REQUIRED<br>   |
| <b>2) IS THE PROJECT LIKELY TO REQUIRE A TYPE III CATEGORICAL EXCLUSION OR HIGHER LEVEL OF DOCUMENTATION?</b><br><input type="checkbox"/> CATEGORICAL EXCLUSION<br><input type="checkbox"/> TYPE I (C) <input type="checkbox"/> TYPE II (A/B) (EXCEPT #13)<br><input type="checkbox"/> TYPE I (A/B) <input type="checkbox"/> TYPE III (OR TYPE II #13)<br><input type="checkbox"/> EA/FONSI <input type="checkbox"/> EIS | <input checked="" type="checkbox"/> <b>YES</b> , THE PROJECT IS A TYPE II (A/B) #13 OR TYPE III CE OR HIGHER-LEVEL DOCUMENT<br><input type="checkbox"/> <b>NO</b> , THE PROJECT WOULD BE CLASSIFIED AS A TYPE I OR II CATEGORICAL EXCLUSION (EXCEPT TYPE II #13)<br> |

### 3) WHAT RESOURCES HAVE THE POTENTIAL TO BE IMPACTED BY THE PROJECT?

| NATURAL ENVIRONMENT   | HUMAN ENVIRONMENT  | PUBLIC / STAKEHOLDER   |
|---|--|--|
| <input checked="" type="checkbox"/> Stream(s)<br><input checked="" type="checkbox"/> Wetland(s)<br><input checked="" type="checkbox"/> Surface water(s)<br><input type="checkbox"/> Water supply critical area(s)<br><input type="checkbox"/> Wild & Scenic Rivers<br><input type="checkbox"/> CAMA Area(s) of Env Concern<br><input checked="" type="checkbox"/> T/E species or potential habitat<br><input checked="" type="checkbox"/> Protected land(s) | <input checked="" type="checkbox"/> Historic site(s)/District(s)<br><input type="checkbox"/> Archaeological resource(s)<br><input type="checkbox"/> EJ community(ies)<br><input type="checkbox"/> Park(s)/recreation area(s)<br><input type="checkbox"/> Federal land(s)<br><input type="checkbox"/> Major change(s) in access<br><input type="checkbox"/> Unusually large number of relocations<br><input type="checkbox"/> Other resource(s) of local importance | <input type="checkbox"/> Substantial negative comments<br><input type="checkbox"/> Organized opposition<br><input type="checkbox"/> Local government opposition<br><input type="checkbox"/> Other permit(s) required |

|   |  |
|---|--|
| <b>4) COULD ANY OF THE RESOURCE IMPACTS CONFLICT?</b> | <input type="checkbox"/> <b>YES</b> , THERE APPEAR TO BE CONFLICTING RESOURCES<br><br><input checked="" type="checkbox"/> <b>NO</b> , THE INVOLVED RESOURCE(S) ARE NOT IN CONFLICT<br> |
|---|--|

|  |   |
|--|---|
| <b>5) IF THERE ARE NOT CONFLICTING RESOURCES, COULD THERE BE SUBSTANTIAL IMPACTS TO ONE OR MORE RESOURCE(S)?</b> | <input type="checkbox"/> <b>YES</b> , THERE COULD BE SUBSTANTIAL IMPACTS TO RESOURCE(S)<br><br><input type="checkbox"/> <b>NO</b> , SUBSTANTIAL IMPACTS ARE NOT ANTICIPATED<br> |
|--|---|

## MERGER SCREENING DETERMINATION



# MERGER PRE-SCREENING FORM

6/12/2023  **YES, PROJECT WILL PROCEED THROUGH MERGER**  
MERGER

**NO, PROJECT WILL NOT USE**

**NCDOT ENVIRONMENTAL POLICY UNIT APPROVAL**

EPU SIGNATURE \_\_\_\_\_

DATE Click or tap to enter a date.

## **APPENDIX A- PREVIOUS STUDIES**

- ❖ **LANDIS RAILROAD GRADE SEPARATION STUDY- NCDOT 2001**
- ❖ **KANNAPOLIS / LANDIS SAFETY RAIL PROJECT FEASIBILITY STUDY MEMO-  
HNTB 2017**
- ❖ **S. LANDIS/N. KANNAPOLIS RAILROAD GRADE SEPARATION STUDY MEMO-  
KITTELSON & ASSOCIATES 2021**

**FEASIBILITY STUDY**

**Landis**

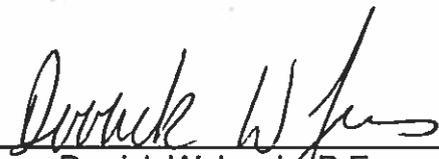
**Landis Railroad Grade Separation Study  
Rowan County**

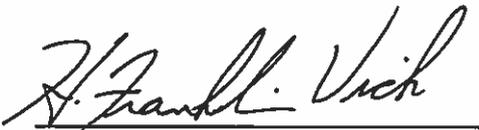
**Division 9**

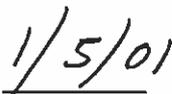
**FS-9909G**



Prepared by the  
Program Development Branch  
Division of Highways  
N. C. Department of Transportation

  
Derrick W. Lewis, P.E.  
Feasibility Studies Engineer

  
H. Franklin Vick, P.E.  
Feasibility Studies Unit Head

  
Date

Landis  
Landis Railroad Grade Separation Study

Rowan County

FS-9909G

**I. General Description**

This feasibility study describes the construction of a new railroad grade separation in Landis. The study area for this project is bound by Ryder Avenue (SR 1210) in Landis and 22<sup>nd</sup> Street (SR 1254 / SR 1171) in Kannapolis (See Figure 1). Based on discussions with the NCDOT Rail Division, five potential locations were identified as alternatives for this proposed railroad grade separation. These five locations are Ryder Avenue (SR 1210), Rice Street (NC 153), Corriher Street, Airport Road, and 22<sup>nd</sup> Street. These locations are described in detail below:

At the request of the City of Kannapolis, the scope of Alternative 5 has been expanded to include an interchange at the US 29A / 22<sup>nd</sup> Street intersection. It should also be noted that the right-of-way cost estimate for Alternative 4 (Airport Road) has been revised to include the new industrial park east of the railroad.

| <i>Alternative</i>  | <i>Total Cost</i>                  |
|---|------------------------------------|
| 1. Construct a railroad grade separation (overpass) at the existing Ryder Avenue (SR 1210) at-grade rail crossing. Includes a grade separation of Main Street (SR 2739-US 29A) and Central Avenue   | \$ 10,070,000<br>(Not Recommended) |
| 2. Construct a railroad grade separation (overpass) from West Rice Street (NC153) / Main Street intersection to East Rice Street. This alternative includes a grade separation of South Chapel Street and South Central Avenue.   | \$ 5,050,000<br>(Not Recommended)  |
| 3. Construct a railroad grade separation (underpass) from the Main Street / Third Street intersection to the Corriher Street / South Chapel Street intersection.  | \$ 4,620,000<br>(Feasible)         |
| 4. Construct a railroad grade separation (overpass) from the Main Street / Airport Road (SR 1182) intersection to the South Chapel Street (SR 1464) / Hickory Street (SR 2709) intersection. Includes \$1,420,000 for upgrading Hickory Street from South Chapel Street to US 29. | \$ 6,970,000<br>(Recommended)      |
| 5. Construct a railroad grade separation (overpass) at the existing 22 <sup>nd</sup> Street at-grade crossing. This alternative includes an interchange at the Main Street / 22 <sup>nd</sup> Street intersection.  | \$ 11,350,000<br>(Feasible)        |

Given the dynamic and complex nature of the area, a recommended alternative cannot be identified at this time. However, we currently consider Alternatives 3, 4, or 5 as feasible locations for a railroad grade separation.

- Alternative 3 (Corriher Street) is the nearest one of the three to the center of Landis. It is also the least expensive alternative and has significantly less right-of-way impacts.
- Alternative 4 (Airport Road) is near the southern city limit of Landis, serves the recent explosion of development in the area, and is a natural extension of a proposed thoroughfare on the approved Cabarrus-South Rowan Thoroughfare Plan (See Figure 2). However, this alternative does cross a newly developed industrial park, which may significantly increase the right-of-way cost as it develops.
- Alternative 5 (22<sup>nd</sup> Street) is the southern most alternative studied and is inside the City of Kannapolis approximately 1.8 miles (2.9 km) south of the downtown area of Landis. Current traffic projections indicate that this alternative would serve the greatest number of motorist when compared to the other three, but at a much greater cost in both right-of-way and construction. In addition, there is some concern that its location may not meet the requested scope for a railroad grade separation in Landis.

This study is the initial step in the planning and design process for this project and is not the product of exhaustive environmental or design investigations. The purpose of this study is to describe the proposed project including costs, and to identify potential problems that may require consideration in the planning and design phases.

## **II. Need for Project**

Improving traffic safety, for motorists, rail passengers and train crews, is the primary reason that NCDOT is evaluating a future railroad/highway grade separation between Ryder Avenue in Landis and 22<sup>nd</sup> Street in north Kannapolis. The Department agreed to conduct this feasibility study as part of the near-term (0-2 years) recommendations contained in the South End Traffic Separation Study. As part of a comprehensive evaluation of traffic patterns and road usage for an entire municipality or region, Traffic Separation Studies determine the need for improvements and/or elimination of public grade crossings to improve safety. Depending on its location, the construction of this grade separation would facilitate a crossing closure at Mills Street in Landis. This project is supported by the Town of Landis as well as the Rail Division of the North Carolina Department of Transportation.

Ryder Avenue is designated as a major thoroughfare in the Cabarrus-South Rowan Thoroughfare Plan and as a collector in the North Carolina Statewide Functional Classification System. Main Street (SR 2739) is

designated as a major thoroughfare in the Cabarrus-South Rowan Thoroughfare Plan and as a minor arterial in the North Carolina Statewide Functional Classification System. US 29 is designated as a major thoroughfare in the Cabarrus-South Rowan Thoroughfare Plan and as a principal arterial in the North Carolina Statewide Functional Classification System. NC 153 is designated as a minor thoroughfare in the Cabarrus-South Rowan Thoroughfare Plan and as a minor arterial in the North Carolina Statewide Functional Classification System. South Chapel Street is designated as a minor thoroughfare in the Cabarrus-South Rowan Thoroughfare Plan and as a collector in the North Carolina Statewide Functional Classification System. 22<sup>nd</sup> Street is designated as a minor thoroughfare in the Cabarrus-South Rowan Thoroughfare Plan and as a collector in the North Carolina Statewide Functional Classification System.

Ryder Avenue (SR 1210) is currently a two-lane curb-and-gutter roadway, 33 feet (10.0 m) wide face-to-face of curbs. Under Alternatives 1, 2, and 3, Main Street (SR 2739) is a two-lane curb-and-gutter roadway with 36 feet (10.97 m) wide, face-to-face of curbs. For Alternatives 4 and 5, Main Street is a two-lane shoulder section with 22 feet (6.71 m) of pavement. For Alternatives 1, 2 and 3, South Chapel Street is a two-lane curb-and-gutter section with 36 feet (10.97 m) wide, face-to-face of curbs. For Alternative 4, South Chapel Street (SR 1464) is a two-lane shoulder section with 24 feet (7.31 m) of pavement. West Rice Street (NC 153) is a two-lane shoulder section with a pavement width of 30 feet (9.14 m). East Rice Street is a two-lane curb-and-gutter facility, 30 feet (9.14 m) wide, face-to-face of curbs. Corriher Street is a two-lane curb-and-gutter section, 30 feet (9.14 m) wide, face-to-face of curbs. 22<sup>nd</sup> Street is a two-lane shoulder section with 20 feet (6.1 m) of pavement west of Main Street and 24 feet (7.31 m) of pavement east of Main Street. Hickory Street (SR 2709) is a two-lane shoulder section with 20 feet (6.1 m) of pavement.

The major rail line through the project study area is the North Carolina Railroad, owned by the State of North Carolina. Norfolk Southern provides freight service over this line with 49 daily trains. Amtrak operates an additional six daily passenger trains that include the Crescent and the state-sponsored Piedmont and Carolinian.

There are existing traffic signals at the following intersections: Ryder Avenue (SR 1210) / Main Street (SR 2739), Ryder Avenue / Central Avenue, and Main Street / West Rice Street (NC 153).

### **III. Discussion of Alternatives**

This feasibility study describes construction of a railroad grade separation in an area between Ryder Avenue (SR 1210) in Landis and 22<sup>nd</sup> Street (SR 1254 / SR 1171) in Kannapolis. Based on discussions with the NCDOT Rail Division, five potential locations were identified as Alternatives for this proposed railroad grade separation.

**Ryder Avenue**  
 (Alternative 1)  
 (Not Recommended)

Alternative 1 proposes to construct a railroad grade separation at the existing Ryder Avenue (SR 1210) at-grade rail crossing. Because both Main Street (SR 2739) and Central Avenue are adjacent to the railroad in this area, the grade separation would also span these roadways. Therefore, all access between these facilities would be via the existing street network. It should also be noted that this area of Landis appears to be eligible for the National Register of Historic Places and Section 4(f) of the Department of Transportation Act will apply if federal aid funds are utilized. In addition, this alternative would have significant impact on the central business district near the existing railroad crossing and require a vertical grade modification to Chapel Street in order to maintain access to the proposed grade separation. Therefore, we do not recommend the implementation of this alternative.

However, if a grade separation were provided at this location, a new structure, approximately 250 feet (76.2 m) long and 42 feet (12.8 m) wide, with sidewalks on both sides. The recommended cross-section is a two-lane curb-and-gutter section, 32 feet (9.75 m) wide from face-to-face of curbs, with 10-foot (3.0-m) berms. In order to minimize the right-of-way impacts in this area, reinforced earth walls are recommended on the fill sections. It is anticipated that 14 residences and 6 businesses will be relocated due to this alternative. The total cost of the project, including construction and right-of-way, is estimated to be \$10,070,000.

|                   |                      |
|-------------------|----------------------|
| Construction..... | \$ 7,100,000         |
| Right-of-way..... | \$ 2,970,000         |
| Total Cost .....  | <u>\$ 10,070,000</u> |

**Rice Street**  
 (Alternative 2)  
 (Not Recommended)

Alternative 2 proposes to construct a railroad grade separation from West Rice Street (NC 153) to East Rice Street. Given the existing grade difference between the West Rice Street (NC 153) / South Main Street (SR 2739) intersection and the railroad, it is recommended that the proposed grade separation begin at this intersection. It is anticipated that this grade separation would span South Central Avenue and South Chapel Street before connecting with East Rice Street. This alternative would connect to East Rice Street within an existing residential area of Landis and utilize the existing street network to access a local thoroughfare. Therefore, implementation of this alternative is not recommended.

However, a grade separation at this location would include a new structure, approximately 650 feet (198.1 m) long and 42 feet (12.8 m) wide with sidewalks on both sides. The recommended cross-section is a two-lane curb-and-gutter section, 32 feet (9.75 m) wide, face-to-face of curbs, with 10-foot (3.0-m) berms. It is anticipated that 8 residences and 1 business will be relocated due to this alternative. The total cost of the project, including construction and right-of-way, is estimated to be \$5,050,000.

|                   |              |
|-------------------|--------------|
| Construction..... | \$ 4,000,000 |
| Right-of-way..... | \$ 1,050,000 |
| Total Cost .....  | \$ 5,050,000 |

Corriher Street  
(Alternative 3)  
(Feasible)

Alternative 3 proposes to construct a railroad grade separation from the Main Street / Third Street intersection to Corriher Street east of the railroad. Given the existing terrain in this area, this proposed roadway would cross beneath the railroad. Therefore, a temporary detour of the railroad would be required to construct the proposed railroad overpass.

This alternative is considered feasible, but will include coordination with the railroad because of the railroad detour. Of the alternatives evaluated, this one is the most economical and has the least amount of impact on the community. In addition, it is close enough to downtown Landis to meet the purpose of providing a railroad grade separation in Landis as indicated in the South End Traffic Separation Study.

If this alternative were utilized, the proposed railroad structure would be approximately 52 feet (15.85 m) long and 35 feet (10.7 m) wide. The recommended cross-section is a two-lane curb-and-gutter section, 32 feet (9.75 m) wide from face-to-face of curbs, with 10-foot (3.0-m) berms. It is anticipated that 3 residences and no businesses will be relocated due to this alternative. The total cost of the project, including construction and right-of-way, is estimated to be \$4,620,000.

|                   |              |
|-------------------|--------------|
| Construction..... | \$ 3,700,000 |
| Right-of-way..... | \$ 920,000   |
| Total Cost .....  | \$ 4,620,000 |

Airport Road  
(Alternative 4)  
(Recommended)

Alternative 4 proposes to construct a railroad grade separation from the South Main Street (SR 2739) / Airport Road (SR 1182) intersection to the South Chapel Street (SR 1464) / Hickory Street (SR 2709) intersection. A proposed grade separation at this location would include a new structure 250 feet (76.2 m) long and 42 feet (12.8 m) wide with sidewalks on both sides. The recommended cross-section is a two-lane curb-and-gutter section, 32 feet (9.75 m) wide from face-to-face of curbs, with 10-foot (3.0-m) berms.

The proposed grade separation in Alternative 4 (Airport Road) provides direct access between Main Street (SR 2739) and South Chapel Street with significantly less right-of-way impacts when compared to Alternative 5 (22<sup>nd</sup> Street). Direct access to US 29 is provided via South Chapel Street and Hickory Street. It should also be noted that the approved Cabarrus-South Rowan Thoroughfare Plan proposes a new thoroughfare that connects NC 153 west of Landis to the Main Street / Airport Road intersection south of Landis (See Figure 2). Alternative 4 is considered a logical extension of this proposed thoroughfare. It will also serve the recent explosion of development within this area.

It is anticipated that 4 residences and 1 business will be relocated due to this alternative. The total cost of the improvement, including construction and right-of-way, is estimated to be \$5,550,000.

|                   |              |
|-------------------|--------------|
| Construction..... | \$ 3,500,000 |
| Right-of-way..... | \$ 2,050,000 |
| Total Cost .....  | \$ 5,550,000 |

As a supplement to Alternative 4, improvements to Hickory Street (SR 2709) between South Chapel Street and US 29 were also considered. The recommended cross-section is a two-lane curb-and-gutter section, 32 feet (9.75 m) wide, face-to-face of curbs, with 10-foot (3.0-m) berms. It is anticipated that 5 residences and no businesses will be relocated due to this supplemental improvement. If this supplemental improvement were to be included, the total cost, including construction and right-of-way, is estimated to be \$1,420,000.

|                   |              |
|-------------------|--------------|
| Construction..... | \$ 800,000   |
| Right-of-way..... | \$ 620,000   |
| Total Cost .....  | \$ 1,420,000 |

The total cost of this alternative including the Hickory Street improvements is \$6,970,000. However, if the recently developed industrial park between the railroad and South Chapel Street continues to materialize, the right-of-way cost of this alternative could increase.

**22<sup>nd</sup> Street**  
**(Alternative 5)**  
**(Feasible)**

Alternative 5 proposes to construct a railroad grade separation at the existing 22<sup>nd</sup> Street at-grade rail crossing in Kannapolis. Since Main Street is parallel to the railroad in this area, the grade separation would also span this facility. In addition, the two 22<sup>nd</sup> Street approaches to Main Street form an offset intersection and the western 22<sup>nd</sup> Street approach should be relocated opposite the eastern approach. At the request of the City of Kannapolis, this alternate includes a partial cloverleaf interchange between Main Street and 22<sup>nd</sup> Street with the ramps and loops to the west of Main Street. With this interchange, the projected traffic volumes are expected to be significant. Therefore, we recommend that a five-lane curb and gutter section, 64 feet (19.5 m) wide be provided from the proposed interchange with Main Street to the US 29 / 22<sup>nd</sup> Street intersection. West of the proposed interchange, a two-lane curb and gutter section, 32 feet (9.75 m) wide face to face of curbs, would be utilized to transition back to the existing cross section.

The proposed grade separation at this location would include a new structure, approximately 310 feet (94.5 m) long and 74 feet (22.6 m), wide with sidewalks on both sides. It is anticipated that 39 residences and 6 business will be relocated due to this alternative. The total cost of this alternative, including construction and right-of-way, is estimated to be \$11,350,000.

|                   |                      |
|-------------------|----------------------|
| Construction..... | \$ 6,500,000         |
| Right-of-way..... | \$ 4,850,000         |
| Total Cost .....  | <u>\$ 11,350,000</u> |

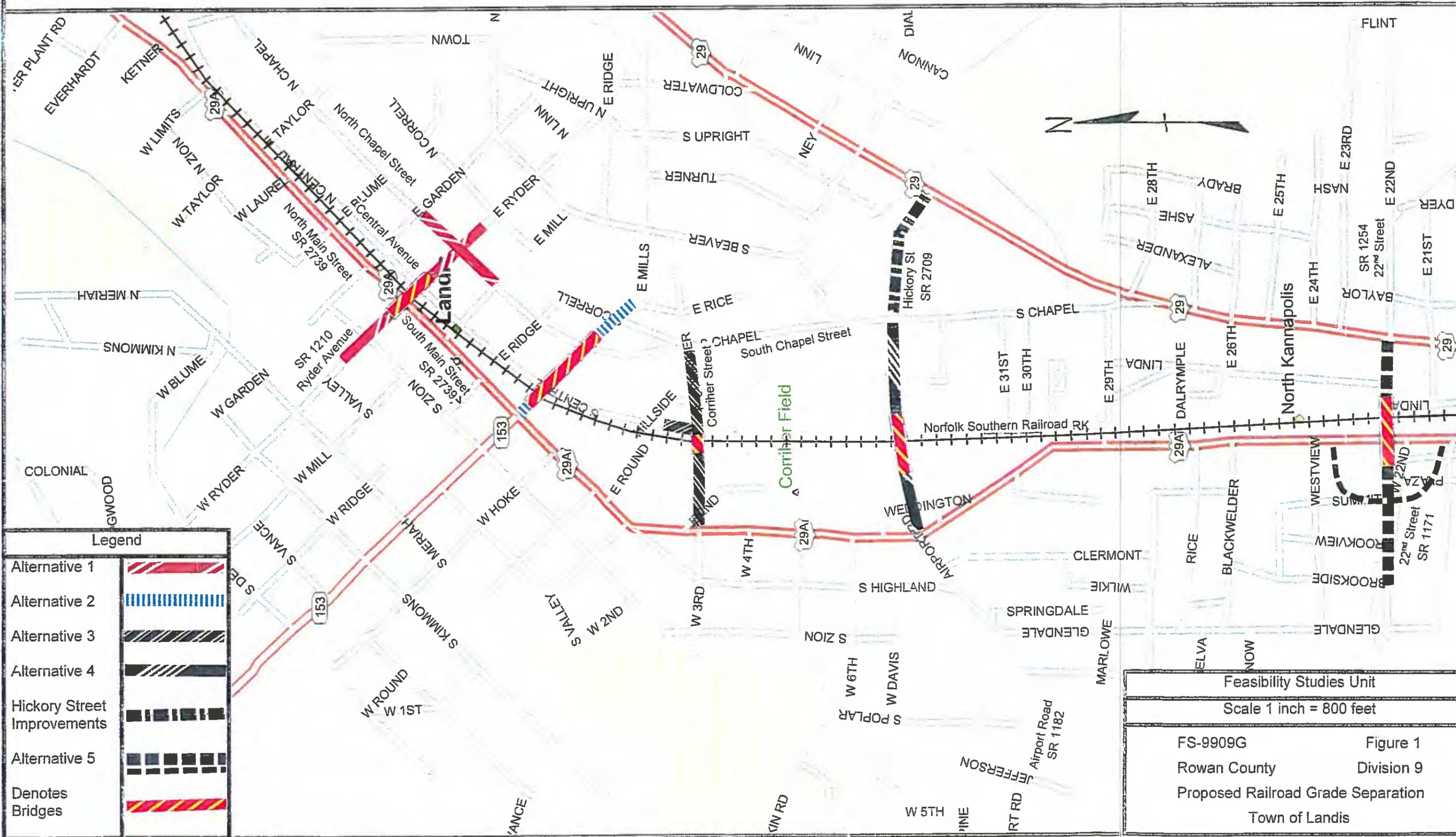
**V. Additional Comments**

An environmental screening was not conducted for this study.

The NCDOT Division of Bicycle and Pedestrian Transportation has not requested that bicycle accommodations be provided under this project. However, the cost estimates for this project include pedestrian and bicycle accommodations in case future conditions indicate the need.

A transportation benefit analysis was not completed for this project because the proposed improvements are beyond the capabilities of the benefit analysis package developed by the Statewide Planning Branch. However, the addition of a grade-separated railroad crossing within this area will improve the traffic safety and operations of the area.

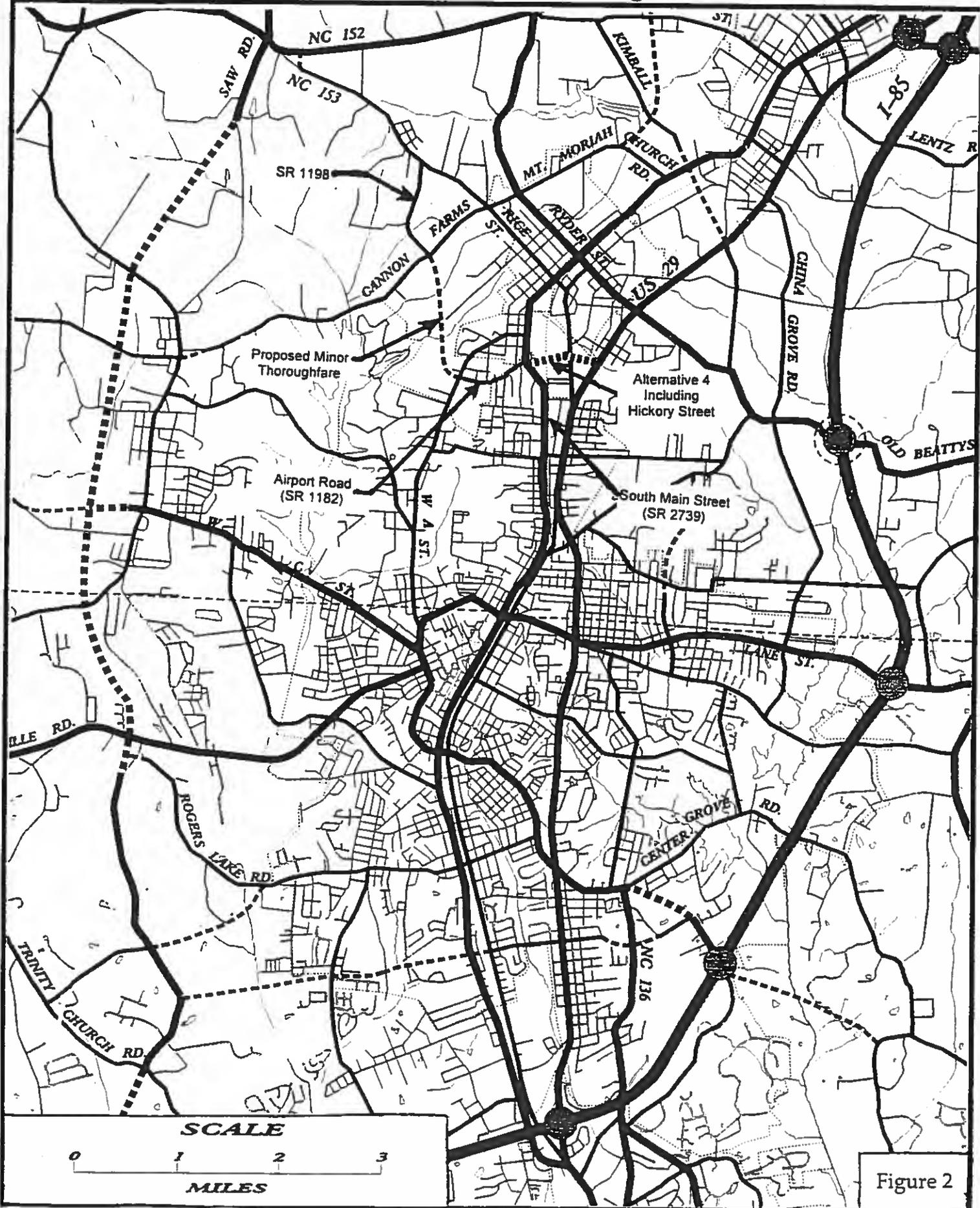
# FS-9909G Landis Railroad Separation Study



| Legend                      |  |
|-----------------------------|--|
| Alternative 1               |  |
| Alternative 2               |  |
| Alternative 3               |  |
| Alternative 4               |  |
| Hickory Street Improvements |  |
| Alternative 5               |  |
| Denotes Bridges             |  |

|                                    |            |
|------------------------------------|------------|
| Feasibility Studies Unit           |            |
| Scale 1 inch = 800 feet            |            |
| FS-9909G                           | Figure 1   |
| Rowan County                       | Division 9 |
| Proposed Railroad Grade Separation |            |
| Town of Landis                     |            |

An Excerpt From The  
Cabarrus - South Rowan Thoroughfare Plan



**NCDOT STIP P-3309P  
KANNAPOLIS / LANDIS SAFETY RAIL PROJECT  
ROWAN COUNTY**

**FEASIBILITY STUDY MEMORANDUM**



Prepared for:

*North Carolina Department of Transportation  
Rail Division*



**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

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February 2017

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## **I. GENERAL DESCRIPTION**

The Kannapolis / Landis Safety Rail Project is a combination of a feasibility study and the development of functional designs to be used for determining the potential location for a new grade separation of the North Carolina Railroad (NCRR) and the Norfolk Southern Railway (NSR) Railroad. The grade separation promotes a safer connection for motorists and pedestrians, and alleviates traffic conflict with the railroad. The study area extends from 5th Street in Landis to 22nd Street in Kannapolis. Each alternative provides access across Kannapolis and Landis from I-85 to West A Street on the west side of Kannapolis. The new grade separation will be classified as a minor thoroughfare. To fit with the Long Range Transportation Plan (LRTP) for the area, NCDOT Transportation Planning Branch recommends that the cross-section of the proposed roadway be a two-lane undivided roadway with curb and gutter with 14-foot shared bike lanes, and sidewalks. The proposed roadway will be posted 35 mph to tie into the local roadway network matching the other minor thoroughfares that are posted 35 mph. Figure 1 in Appendix A shows the study area location.

## **II. BACKGROUND**

In August 1997, Gannett Fleming with NCDOT Rail Division prepared a Traffic Separation Study (TSS) for Kannapolis, North Carolina. A long-term recommendation from the Kannapolis TSS was a Crossing Consolidation Project for 22<sup>nd</sup> Street. The project would close the 18<sup>th</sup> Street, 22<sup>nd</sup> Street, and 29<sup>th</sup> Street crossings and build a new grade separated project at 22<sup>nd</sup> Street.

In August 1997, Gannett Fleming with NCDOT Rail Division prepared a TSS for Landis, North Carolina. A long-term recommendation from the Landis TSS was supporting the proposed Cannon Farms Road connector to Airport Drive south of Landis. It determined that the project will relieve traffic in downtown Landis.

In the Cabarrus-Rowan MPO (CRMPO) *Comprehensive Transportation Plan* (CTP), dated August 24, 2011 (see Figure 2 in Appendix A), there is a recommended minor thoroughfare from the intersection of SR 1197 (Cannon Farms Road) / Homer Corriher Road to the intersection of West A Street / Irish Creek Drive / Airport Road. This Airport Road – Homer Corriher Road Connector is listed as a project with a proposed cross-section of two-lane, undivided with 5 foot paved shoulders. The CRMPO is interested in upgrading the connection from West A Street to US 29 to improve the viability of this connector project in their LRTP. A request was to include bicycle and pedestrian facilities on the proposed connector. The bicycle and pedestrian facilities are proposed on other connecting roadways in the future.

The industrial park between S Chapel Street and the NCRR / NS corridor will generate higher than normal truck volumes on the proposed grade separation. The proposed alternatives near the industrial park will take into account truck access and truck turning templates for intersections or roundabouts.

HNTB met with the project Steering Committee, consisting of NCDOT Rail Division, NCDOT Division 9, NCDOT Transportation Planning Branch, NCDOT Project Development and

Environmental Analysis, CRMPO, City of Kannapolis, and Town of Landis, on numerous occasions to discuss the project and the Alternatives. Appendix B includes copies of the meeting minutes.

### III. DESCRIPTION OF ALTERNATIVES

#### PRELIMINARY STUDY ALTERNATIVES

HNTB considered numerous alternatives for a grade separation the NCRR / NSR corridor that improves the connectivity between Main Street and US 29 for the Town of Landis and the City of Kannapolis in Rowan County. Each alternative considered an over and under alternative.

The study area ranged from 5th Street in Landis and 22nd Street in Kannapolis. HNTB included all existing crossings as well as new location crossings that would tie existing intersections on the west side of the corridor to US 29. Tying the proposed grade separation directly into Main Street was not feasible for all alternatives and would require connecting roadways to be upgraded to provide access to the grade separation. Figure 1 in Appendix A shows Preliminary Study Alternatives ranging from 1 through 6, with slight variations ranging from “a” through “e”.

The grade of road is a measure of its incline or slope and is very important for the safety of the motorists that will be using it. The grades in this study were developed using an assumed a clearance of 25’ for crossing over the railroad allowing for potential double stacked rail cars, a clearance of 20’ for railroad bridges over the roadway, and a maximum desirable grade of 6% for pedestrians, Cells in Table 1 are highlighted to show alternatives eliminated due to steep grades. Additional grade considerations: Americans with Disabilities Act (ADA) requires handrails for any sidewalks with grades greater than 5%; per the ADA guidelines the maximum grade allowed for wheelchairs is 8.33%; and sidewalks with a grade between 5% and 8.33% require level landings every 30 to 40 feet.

**Table 1 – Estimated Grades of Preliminary Study Alternatives**

| <b>Alternative</b> | <b>Name</b>                     | <b>Color</b> | <b>Over or Under</b> | <b>Calculated Grade 1</b> | <b>Calculated Grade 2</b> |
|--------------------|---------------------------------|--------------|----------------------|---------------------------|---------------------------|
| 1a                 | 2 <sup>nd</sup> St              | Blue         | over                 | 1.41%                     | -7.88%                    |
| 1a                 | 2 <sup>nd</sup> St              | Blue         | under                | -7.32%                    | -1.77%                    |
| 1b                 | 5 <sup>th</sup> St              | Light Purple | over                 | 2.08%                     | -7.99%                    |
| 1b                 | 5 <sup>th</sup> St              | Light Purple | under                | -7.08%                    | -1.67%                    |
| 1c                 | 3rd St to Corriher St           | Light Blue   | over                 | 1.82%                     | -7.62%                    |
| 1c                 | 3rd St to Corriher St           | Light Blue   | under                | -7.35%                    | -2.71%                    |
| 2                  | Airport Rd to Hickory Rd        | Neon Green   | over                 | 2.54%                     | -5.59%                    |
| 2                  | Airport Rd to Hickory Rd        | Neon Green   | under                | -5.67%                    | 0.36%                     |
| 3                  | Airport Rd to Solution Works Dr | Red          | over                 | 2.22%                     | -4.92%                    |
| 3                  | Airport to Solution Works Dr    | Red          | under                | -4.83%                    | 1.26%                     |
| 4a                 | 29th loop to Landis             | Teal         | over                 | 2.87%                     | -5.26%                    |
| 4b                 | 29th Loop to Kannapolis         | Yellow       | over                 | 3.54%                     | -5.26%                    |
| 4c                 | 29th Loop to Kannapolis         | Orange       | over                 | 2.57%                     | -5.10%                    |
| 4d                 | 29th Loop to Kannapolis         | Maroon       | over                 | 2.99%                     | -5.10%                    |
| 5a                 | loop thru concrete plant        | Light Green  | over                 | 3.91%                     | -5.04%                    |
| 5b                 | diagonal thru concrete plant    | Periwinkle   | over                 | 4.32%                     | -5.11%                    |
| 5c                 | beside concrete plant           | Pink         | over                 | 4.32%                     | -5.11%                    |
| 5d                 | to 25 <sup>th</sup> St          | Tangerine    | over                 | 4.32%                     | -6.45%                    |
| 5e                 | to 24 <sup>th</sup> St          | Dark Purple  | over                 | 4.32%                     | -7.14%                    |
| 6a                 | 22 <sup>nd</sup> St             | Forest Green | over                 | 8.50%                     | -6.96%                    |
| 6a                 | 22 <sup>nd</sup> St             | Forest Green | under                | -2.50%                    | 4.04%                     |
| 6b                 | 22 <sup>nd</sup> St             | Dark Pink    | over                 | 5.46%                     | -6.96%                    |
| 6b                 | 22 <sup>nd</sup> St             | Dark Pink    | under                | -2.46%                    | 4.04%                     |

Grade 1 – west side of centerline of track  
 Grade 2 – east side of centerline of track  
 Grade – over 6%

Preliminary Study Alternates were then evaluated for impacts to community and constructability.

- Some Preliminary Study Alternates under the railroad were eliminated to avoid constructability issues with the railroad interlocking and spur track.
- Preliminary Study Alternates 1a, 1b, and 1c grades adversely impact residential communities and does not provide a direct connection to US 29.
- Preliminary Study Alternates 2 (over and under) and 3 (over and under) had less of an impact to the community and industrial park, direct access between Main Street and US 29, as well as connecting to the Airport Road – Homer Corriher Connector shown in the CRMPO CTP.
- Preliminary Study Alternates 4 utilize loops to direct Main Street traffic to the connector and adversely impact residential communities.
- Preliminary Study Alternates 5 either utilizes a loop or Summit Avenue to direct Main Street traffic to the connector. The loop (Alternate 5a) adversely impacts the residential community and the other alternatives access via Summit Avenue, which is not a state-maintained road. Construction of Alternates 5a, 5b, and 5c might impact operations of the UPS Customer Center and the BP gas station. Alternates 5d and 5e have steep grades. NS would not allow any under alternatives within 100 feet of the interlocking currently being constructed as part of the double track project.
- Preliminary Study Alternates 6 require steep grades if the connector crosses over the railroad. The grade for Alternate 6a over is steeper than 8.33 making it difficult to accommodate sidewalks on the bridge. There is insufficient room to construct an on-site railroad detour eliminating all Alternative 6 under options. Additionally, these alternates also do not have direct access to Main Street and several other roadways will need to be upgraded to 14 foot lanes, with curb and gutter and sidewalks on both sides to provide access to vehicles accessing Main Street. The memo included in Appendix C has additional information about why the alternatives at 22<sup>nd</sup> Street were not feasible.

After discussing these twenty-three alternatives with the Steering Committee, the group narrowed down the alternatives to five preferred alternatives to develop functional designs and estimates. These alternatives were:

- Preliminary Alternative 2 over,
- Preliminary Alternative 2 under,
- Preliminary Alternative 3 over,
- Preliminary Alternative 3 under, and
- Preliminary Alternative 4c over.

Alternatives 2 and 3 will include improvements to Airport Road from West A Street to N Main Street since the proposed alternatives would end at the intersection of N Main Street and Airport Road. Improving Airport Road allows the traffic to get from US 29 to West A Street. The Airport Road – Homer Corriher Road Connector shown in the CRMPO CTP plan could then connect to this proposed grade separation. After looking into these alternatives, Alternative 4c was excluded

from additional study because it does not allow for additional connectivity between US 29 and the west side of the corridor. Alternative 2 over was excluded from additional study because after fine-tuning the grades, the grade was over the 6% preferred grade.

### FUNCTIONAL DESIGN ALTERNATIVES

Kannapolis and Landis requested that HNTB consider roundabouts at all of the unsignalized intersections. Roundabouts options were provided at the intersections of N Main Street and S Chapel Street in the Functional Designs Alternatives to determine possible impacts and cost estimate. These alternatives used existing contours to develop the preliminary alignments and grades. No additional survey or LIDAR information was collected for the project. Right-of-way costs were not included at this stage for the Function Design Alternatives.

- Functional Design Alternative 1 (Preliminary Alternative 2 under) proposes a connector between Airport Road and Hickory Street. The connector begins at Main Street and Airport Road, goes under the railroad track, crosses through the industrial park, provides a cul-de-sac for Sprinkler Drive, connects with Hickory Street at S Chapel Street, and follows Hickory Street to US 29. Retaining walls may be needed on Hickory Street near US 29. An on-site detour for the railroad is proposed on the west side of existing tracks. The construction cost is estimated to be \$10,288,300 with intersections. The construction cost is estimated to be \$9,066,900 with roundabouts at both intersections. Approximately 17 properties will be acquired.
- Functional Design Alternative 2 (Preliminary Alternative 3 under) proposes a connector from Airport Road to the south side of the industrial park. The connector format the intersection of Main Street and Airport Road, goes under the railroad track, continues on new location between the industrial park and E 31st Street, connects with SolutionWorks Drive (private street) at S Chapel Street, and follows SolutionWorks Drive to connect to US 29. E 31st Street access to S Chapel Street will become a cul-de-sac and residences on E 31st Street will be provided access via E 30th Street. An on-site detour for the railroad is proposed on the east side of existing tracks. The construction cost is estimated to be \$11,015,800 with intersections. The construction cost is estimated to be \$10,145,500 with roundabouts at both intersections. Approximately 18 properties will be acquired.
- Functional Design Alternative 3 (Preliminary Alternative 3 over) proposes a connector from Airport Road to the south side of the industrial park. The connector begins at the intersection of Main Street and Airport Road, goes over the railroad track, crosses on new location between the industrial park and E. 31st Street, connects with SolutionWorks Drive (private street) at S Chapel Street, and connects to US 29. E 31st Street access to S Chapel Street will become a cul-de-sac and residences on E 31st Street will be provided access via E 30th Street. The construction cost is estimated to be \$6,646,600 with intersections. The construction cost is estimated to be \$7,008,700 with roundabouts at both intersections. Approximately 20 properties will be acquired.
- Along with each of the Functional Design Alternatives listed above, Airport Road will be upgraded to current roadway standards from West A Street to N Main Street with shared

bicycle lanes and sidewalks on both sides of Airport Road. The construction cost is estimated to be \$2,948,500 with and includes an intersection at West A Street. The construction cost would be 2,437,800 with a roundabout at West A Street. Approximately 5 properties will be acquired.

The three Functional Design Alternatives were shown at a Local Official's Meeting and a Public Meeting on November 17, 2015 at the Kannapolis Amtrak Station (see Figures 3 – 5 in Appendix A). The majority of commenters selected Alternative 3 as their preferred alternative. The comment forms and a summary are included in Appendix D. At a meeting on January 13, 2016, the Town of Landis and the City of Kannapolis discussed the three proposed Functional Design Alternatives. Based on comments received from the meetings and their own discussion, the following was discussed:

- The Airport Road extension was added to the project to improve the road network connectivity of north Kannapolis and south Landis. The upgrade would be included in any of the Functional Design Alternatives to improve the viability of the project and to improve the overall network connectivity.
- Functional Design Alternative 1 impacts Town of Landis' water pump station in the northwest quadrant of S Chapel Street and Hickory Street. The underpass under the railroad track would be expensive. Town of Landis and City of Kannapolis agreed to eliminate Alternative 1.
- Functional Design Alternative 2 impacts City of Kannapolis' water pump station in the northeast quadrant at S Chapel Street and SolutionWorks Drive. The underpass under the railroad track would be expensive.
- Function Design Alternative 3 reduced the impacts to the pump stations and was the least expensive alternative.

The group decided to proceed with the Preferred Functional Design Alternative 3 Over for 15% Plans with the Airport Road Extension and roundabouts located at both Main Street and West A Street.

#### 15% ROADWAY DESIGN PLANS OF PREFERRED ALTERNATIVE

Based on Functional Design Alternative 3 and comments received from NCDOT, the City of Kannapolis, and the Town of Landis, HNTB prepared 15% Roadway Design Plans for the alternative. HNTB also prepared a Hearing Map for the municipalities to use for discussion and to present the project to others. HNTB utilized retaining walls to reduce the property impacts next to the railroad corridor where the roadway would be at the highest point on a fill section. Also, retaining walls were used to try to reduce the impacts to the Kannapolis pump station in the northeast quadrant of the S Chapel Street / Solution Works Drive intersection. The pump station could not be saved and Kannapolis will need to use their other pump station to the south on S Chapel Street Approximately 92 properties are anticipated to be included in the Right-of-Way estimate by either right of way or easement requirements. Of those properties, 26 are proposed total takes with 23 relocations. The approach slab for the bridge is assumed to be 25 feet.

For the 15% roadway design plans, roundabout was assumed at West A Street / Airport Road / Irish Creek Drive and N Main Street / Airport Road (see Figure 6 in Appendix A). Included in the estimate is a 15% contingency for relocating utilities. The cost estimate is included in Appendix E. The estimated construction cost for the entire project is:

|                    |                     |
|--------------------|---------------------|
| Construction cost: | \$10,227,000        |
| Right-of-way cost: | \$ <u>6,315,876</u> |
| Total cost:        | \$16,542,876        |

#### **IV. TRAFFIC AND SAFETY ANALYSIS**

##### 2016 AND 2040 NO-BUILD TRAFFIC VOLUMES

Traffic counts were performed at the following four intersections that are in the project study area and will be impacted by the proposed grade separation. The intersections are:

- US 29 (Cannon Boulevard) / Solution Works Drive,
- S Chapel Street / Solution Works Drive,
- N Main Street / Airport Road, and
- West A Street / Airport Road / Irish Creek Drive.

Traffic count were performed by HNTB on February 25, 2016, and March 1-3, 2016. Traffic counts are included in Appendix F. Table 2 has the peak hours from the traffic counts in the study area.

**Table 2 – Peak Hour Traffic Counts in Study Area**

| Intersection                         | AM Peak Hour  | PM Peak Hour  |
|--------------------------------------|---------------|---------------|
| W A St & Irish Creek Dr / Airport Rd | 07:00 - 08:00 | 16:45 - 17:45 |
| N Main St & Airport Rd               | 07:15 - 08:15 | 16:30 - 17:30 |
| S Chapel St & Solution Works Dr      | 07:15 - 08:15 | 17:00 - 18:00 |
| N Cannon Blvd & Solution Works Dr    | 07:30 - 08:30 | 17:00 - 18:00 |

2016 volumes were grown to 2040 volumes using a 2 percent per year growth rate. The Average Annual Daily Traffic (AADT) in the study area actually shows a negative growth rate due to businesses and industries closing, but investments are occurring in the downtown Kannapolis. For estimating purposes, the growth rate was assumed to be positive to reflect future growth in the area. Figure 7 in Appendix A shows the 2016 No-Build traffic volumes and Figure 8 in Appendix A shows the 2040 No-Build traffic volumes.

## 2016 AND 2040 BUILD TRAFFIC VOLUMES

The 2016 Build peak hour volumes were estimated using an assumed proposed AADT of 3,000 vehicles per day (vpd) on the preferred alignment. This volume is in line with other east-west crossings of the corridor. This volume will be higher with a connection from West A Street / Irish Creek Drive to Homer - Corriher Road / Cannon Farm Road. Once this connection is made, the AADT will be closer to 5,000 vpd. One of the assumptions made for the bridge approach slab is that a longer slab is needed if the AADT is higher than 5,000 vpd. For cost estimating purposes, the longer approach slab is assumed.

Using the peak hour traffic counts compared to 2014 AADTs in the area, the Design Hourly Volume (DHV) ranged from 7 percent to over 20 percent. For this area, HNTB assumed using 10 percent of the daily volume occurred during the peak hour. Also, using the traffic counts, there is a 55% / 45% split on all of the roadways. In the PM, 55% of the traffic is heading northbound, except for US 29 (Cannon Boulevard) in which 55% is heading southbound. Then knowing the AADT of the grade separation, 30% of the traffic from the east is using S Chapel Street and 70% is using US 29 (Cannon Boulevard). From the west, 20% of the traffic is using West A Street, and 80% of the traffic is using N Main Street. Using all of these percentages, traffic was distributed through the study area intersections.

2040 Build Traffic Volumes were grown at 2% per year growth rate.

## CAPACITY ANALYSIS METHODOLOGY

Synchro Version 9.0 was utilized for the intersection capacity analysis results. The traffic analysis methodology was completed in accordance with the “NCDOT Congestion Management Capacity Analysis Guidelines” dated July 1, 2015. Analyses were performed for 2016 and 2040 No-Build weekday AM and PM peak hour scenarios. Intersection capacity analyses were conducted in the following manner:

- Created Synchro roadway network using appropriate geometric, signal timing and traffic volume data to include study area intersections.
- Used Synchro software to produce LOS and delay results for signalized intersection.
- Analyzed AM and PM 2016 and 2040 No-Build conditions for the existing intersections of US 29 (Cannon Boulevard) / Solution Works Drive, S Chapel Street / Solution Works Drive, N Main Street / Airport Road, and West A Street / Airport Road / Irish Creek Drive.
- Compiled capacity analysis results for intersection for the signalized intersection LOS and approach movement LOS for unsignalized intersections, based on Synchro and HCM outputs.

## Level-of-Service Description

Evaluating traffic operations on suburban arterials is generally done by the determination of level of service (LOS) criteria. The level of service on a freeway segment, arterial corridor, or individual intersection correlates qualitative aspects of traffic flow to quantitative terms. This enables transportation professionals to take the qualitative issues, such as congestion and substandard

geometrics, and translate them into measurable quantities, such as operating speeds, flow densities, and vehicular delays. The 2010 Highway Capacity Manual (HCM 2010) characterizes level of service by letter designations A through F. Level of service A represents ideal low-volume traffic operations, and level of service F represents over-saturated, high-volume traffic operations. Level of service letter designations and criteria for arterial intersections (seconds of delay per vehicle) are described in Table 3.

The results of this analysis are based on the LOS and delay procedures presented in the HCM 2010. To obtain optimized signal timings for the future traffic conditions, Synchro Professional Version 9.0 was used to evaluate an optimal cycle length and phasing for the projected 2040 peak hour traffic volumes.

NCDOT Congestion Management suggested timings were used as a basis for the 2016 and 2040 No-Build signalized intersection analysis. Signal timings were modified as necessary to accommodate projected traffic volumes, intersection modifications and roadway network changes for future scenarios.

**Table 3 – Intersection Level of Service (LOS) Characteristics**

| Level of Service Description   | Intersection                     |                                |
|--|----------------------------------|--------------------------------|
|  | Per Vehicle Delay Signal Control | Per Vehicle Delay Stop Control |
| <b>LOS A</b><br>➤ Free flow<br>➤ Freedom to select desired speed / maneuver is extremely high<br>➤ General comfort level & convenience for motorists is excellent  | <b>&lt; 10.0 seconds</b>         | <b>&lt; 10.0 seconds</b>       |
| <b>LOS B</b><br>➤ Stable flow<br>➤ Other vehicles in the traffic stream become noticeable<br>➤ Reduction in freedom to maneuver from LOS A   | <b>10.0 – 20.0 seconds</b>       | <b>10.0 – 15.0 seconds</b>     |
| <b>LOS C</b><br>➤ Stable flow<br>➤ Maneuverability / operating speed are significantly affected by other vehicles<br>➤ General level of comfort and convenience declines noticeably  | <b>20.0 – 35.0 seconds</b>       | <b>15.0 – 25.0 seconds</b>     |
| <b>LOS D</b><br>➤ High density but stable flow<br>➤ Speed and freedom to maneuver are severely restricted<br>➤ General level of comfort / convenience is poor<br>➤ Small traffic increases will generally cause operational problems                       | <b>35.0 – 55.0 seconds</b>       | <b>25.0 – 35.0 seconds</b>     |
| <b>LOS E</b><br>➤ Unstable flow<br>➤ Speed reduced to lower but relatively uniform value<br>➤ Volumes at or near capacity level<br>➤ Comfort and convenience are extremely poor<br>➤ Small flow increases/minor traffic disturbances will cause breakdowns | <b>55.0 – 80.0 seconds</b>       | <b>35.0 – 50.0 seconds</b>     |
| <b>LOS F</b><br>➤ Forced or breakdown flow<br>➤ Volumes exceed roadway capacity<br>➤ Formation of unstable queues<br>➤ Stoppages for long periods of time because of traffic congestion  | <b>&gt; 80.0 seconds</b>         | <b>&gt; 50.0 seconds</b>       |

Transportation Research Board, *Highway Capacity Manual*. Washington, D.C.: National Research Council, 2010.

**NO-BUILD INTERSECTION ANALYSIS RESULTS**

Intersection capacity analyses were performed using Synchro Professional Software Version 9.0 for all scenarios. GIS-based roadway centerline information and digital orthophotos was obtained to establish a base map for developing the proper spatial orientation of the Synchro roadway network for the project study area. Existing Synchro networks were created to contain existing geometrics and signal control parameters for intersection operation in the AM and PM peak hours.

2016 existing year traffic volume data for the AM and PM peak hours was entered into the Synchro networks. Figure 11 in Appendix A shows the existing laneage. Additional default values that comply with NCDOT Congestion Management practices and recommendations were also updated and include the following parameters:

- No Right-Turn-on-Red (RTOR) allowed
- Peak hour factor (PHF) set at 0.90 for all intersections
- Truck percentages set at a minimum of 2 percent by approach and adjusted to actual field collected data if higher than 2 percent
- Lost Time Calculation adjusted to result in 2.0 seconds of lost time per signal phase

2040 future year No-Build Alternative Synchro networks were created for AM and PM peak hour conditions by updating the 2016 existing year traffic volumes and reoptimizing the existing traffic signal.

Synchro output, including LOS and delay results for all analyses, is included in Appendix G. Table 4 summarizes the LOS for the study area intersection for 2016 and 2040 No-Build conditions.

**Table 4 – 2016 and 2040 No-Build LOS**

| Intersection                             | Approach Mvmt | 2016     |          | 2040     |          |
|--|---------------|----------|----------|----------|----------|
|  |               | AM       | PM       | AM       | PM       |
| US 29 (Cannon Blvd) / Solution Works Dr  | Overall       | A (8.1)  | B (11.3) | B (10.4) | B (16.3) |
| S Chapel St / Solution Works Dr*         | WB            | A (9.9)  | B (10.6) | B (11.3) | B (13.4) |
| N Main St / Airport Rd*                  | EB            | B (11.4) | B (12.5) | C (16.3) | C (19)   |
| West A St / Airport Rd / Irish Creek Dr* | EB            | A (8.9)  | A (9.3)  | A (9.3)  | A (9.8)  |
|  | WB            | A (9.6)  | A (9.7)  | B (10.4) | B (10.6) |

\* - Unsignalized intersection  
 LOS and Delay shown: LOS (Delay)  
 Delay Measured in Seconds Per Vehicle

The intersections operate at an acceptable LOS for 2016 and 2040.

**BUILD INTERSECTION ANALYSIS RESULTS**

2016 Build Alternative analysis for the AM and PM peak hours was entered into the Synchro networks. Figure 12 in Appendix A shows the proposed laneage. Changes to the network included the following parameters:

- Added the preferred alternative between N Main Street / Airport Road to S Chapel Street / Solution Works Drive,

- Changed the intersections at West A Street at Irish Creek Drive / Airport Road to a roundabout,
- Changed the intersection at N Main Street at Airport Road / preferred alternative to a roundabout, and
- Changed the intersection at S Chapel Street at Solution Works Drive / preferred alternative to a four-way stopped controlled intersection for the worst case scenario.

2040 Build Alternative Synchro networks were created for AM and PM peak hour conditions by updating the 2016 Build network traffic volumes and reoptimizing the traffic signal.

Synchro output, including LOS and delay results for all analyses, is included in Appendix G. Table 5 summarizes the LOS for the study area intersection for 2016 and 2040 No-Build conditions.

**Table 5 – 2016 and 2040 Build LOS**

| Intersection   | Approach Mvmt | 2016     |          | 2040     |          |
|--|---------------|----------|----------|----------|----------|
|  |               | AM       | PM       | AM       | PM       |
| US 29 (Cannon Blvd) / Solution Works Dr              | Overall       | B (13.4) | B (15.3) | B (17.3) | C (22.9) |
| S Chapel St / Solution Works Dr*                     | NB            | A (9.6)  | B (11.2) | B (13.9) | C (22.9) |
|  | SB            | A (9.9)  | B (10.7) | B (14.6) | C (18.5) |
|  | EB            | A (9.9)  | B (10.4) | B (14.5) | C (16.0) |
|  | WB            | A (9.6)  | B (10.8) | B (13.2) | C (18.7) |
| N Main St / Airport Rd <sup>+</sup>                  | NB            | A (6.6)  | A (8.8)  | B (10.5) | C (19.6) |
|  | SB            | A (8.1)  | A (9.1)  | C (15.6) | C (21.7) |
|  | EB            | A (6.2)  | A (6.2)  | A (9.9)  | A (9.8)  |
|  | WB            | A (5.8)  | A (7.8)  | A (8.4)  | C (15.4) |
| West A St / Airport Rd / Irish Creek Dr <sup>+</sup> | NB            | A (4.1)  | A (4.2)  | A (4.7)  | A (4.8)  |
|  | SB            | A (4.1)  | A (4.1)  | A (4.7)  | A (4.7)  |
|  | EB            | A (3.6)  | A (3.6)  | A (3.9)  | A (3.9)  |
|  | WB            | A (3.8)  | A (3.9)  | A (4.3)  | A (4.4)  |

\* - Unsignalized intersection

+ - Roundabout

LOS and Delay shown: LOS (Delay)

Delay Measured in Seconds Per Vehicle

The intersections operate at an acceptable LOS for 2016 and 2040 with the improvements.

**CRASH ANALYSIS**

As part of the traffic analysis, HNTB developed an analysis of existing crash patterns and rates along the US 29 (Cannon Boulevard) corridor, Chapel Street corridor, Airport Road corridor, Airport Road / Main Street intersection, and Airport Road / West A Street / Irish Creek Drive intersection. Crash data was prepared by HNTB and analyzed the results to compare crash rates along the US 29 (Cannon Boulevard) corridor to current NCDOT summary rates for comparable facilities. The following sections provide summary statistics for the three corridors and two intersections.

**US 29 (Cannon Boulevard) Corridor Analysis**

There were 6 crashes reported along US 29 (Cannon Boulevard) between 500 feet north of Solution Works Drive to 500 feet south of Solution Works Drive over the three-year period from 1/1/2014 to 12/31/2016. In this 1,000-foot segment, crash types were primarily rear end crashes (3 crashes), with 1 crash each of sideswipe in the same direction crashes, sideswipe in the opposite direction, and animal. There were no fatal crashes and no severe injury crashes (Class A) reported.

Table 6 presents a comparison between the US 29 (Cannon Boulevard) corridor study area crash rates and the latest North Carolina statewide rates for the period 2013-2015 (compiled by NCDOT Traffic Safety Unit). The crash rates along US 29 (Cannon Boulevard) in the project study area are about the same as the statewide averages for similar facilities in all categories. Raw crash data for the corridor can be found in Appendix H.

**Table 6 – Crash Rate Comparison for US 29 Corridor**

| Crash Type         | Crashes Per 100 Million Vehicle Miles Traveled |  |
|--------------------|--|--|
|                    | US 29 (Cannon Blvd) at Solution Works Dr       | North Carolina Statewide Average for Urban Primary Routes <sup>1</sup> |
|                    |  | 4+ Lanes Partial Control of Access                                     |
| Total              | 240.11   | 197.32   |
| Fatal              | 0.00   | 0.91   |
| Non-Fatal (Injury) | 0.00   | 61.16  |
| Night              | 40.02  | 49.80  |
| Wet                | 40.02  | 40.34  |

<sup>1</sup> Although Cannon Boulevard is a US route, operationally this section is more comparable to a Primary Route than a United States Route.

**Chapel Street Corridor Analysis**

There were 2 crashes reported along Chapel Street between 250 feet north of Solution Works Drive to 250 feet south of SR 1250 (30<sup>th</sup> Street) over the three-year period from 1/1/2014 to 12/31/2016. In this 500-foot segment, crash types were left-turn different roadways (1 crash) and pedestrian (1 crash). There were no fatal crashes and no severe injury crashes (Class A) reported.

Airport Road Corridor Analysis

There were 2 crashes reported along Airport Road between West A Street and Main Street over the three-year period from 1/1/2014 to 12/31/2016. In this 0.59-mile segment, crash types were sideswipe, same direction (1 crash) and other (1 crash). There were no fatal crashes and no severe injury crashes (Class A) reported.

Airport Road / Main Street Intersection Analysis

There were no crashes reported at Airport Road and Main Street over the three-year period from 1/1/2014 to 12/31/2016.

Airport Road / West A Street / Irish Creek Drive Intersection Analysis

There was one crash reported at Airport Road and West A Street and Irish Creek Drive over the three-year period from 1/1/2014 to 12/31/2016. At this intersection there was an animal crash.

## MEMORANDUM

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Date: May 18, 2021 Project #: 23480

To: Mike Haley  
North Carolina Department of Transportation

From: Justin Bansen, Josh Hurst, and Brandon Kelley (Kittelison & Associates, Inc.)

Project: H-171399 (Rowan County) S. Landis/N. Kannapolis Railroad Grade Separation Study

Subject: Project Status and Summary of Prior Work

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### *Background*

Kittelison is currently conducting a feasibility study on behalf of NCDOT to evaluate a new grade-separated rail crossing in the Landis/Kannapolis area of Rowan County to connect US 29 (Cannon Blvd) to US 29A (Main St). A previous study was completed in 2011 that evaluated 5 potential alignment alternatives for a new grade-separated crossing. The original intent of the current study was to revisit those alternatives and verify the preferred alignment.

Kittelison held a project team meeting with Division staff on January 9, 2020 to discuss initial alignment options and seek input on a variety of design considerations. During this team meeting, new information came to light that a study had been completed in 2017 by HNTB on behalf of the NCDOT Rail Division. Kittelison has since reviewed the prior HNTB study and key information is summarized in this memo along with a comparison to alternatives considered by Kittelison to date.

In the time since the January 9, 2020 team meeting, this project was put on hold for an extended period due to NCDOT budget considerations. Given the time since the last coordination with NCDOT staff, this memo is also intended to provide a project status update and summary of next steps.

### *HNTB Report Summary*

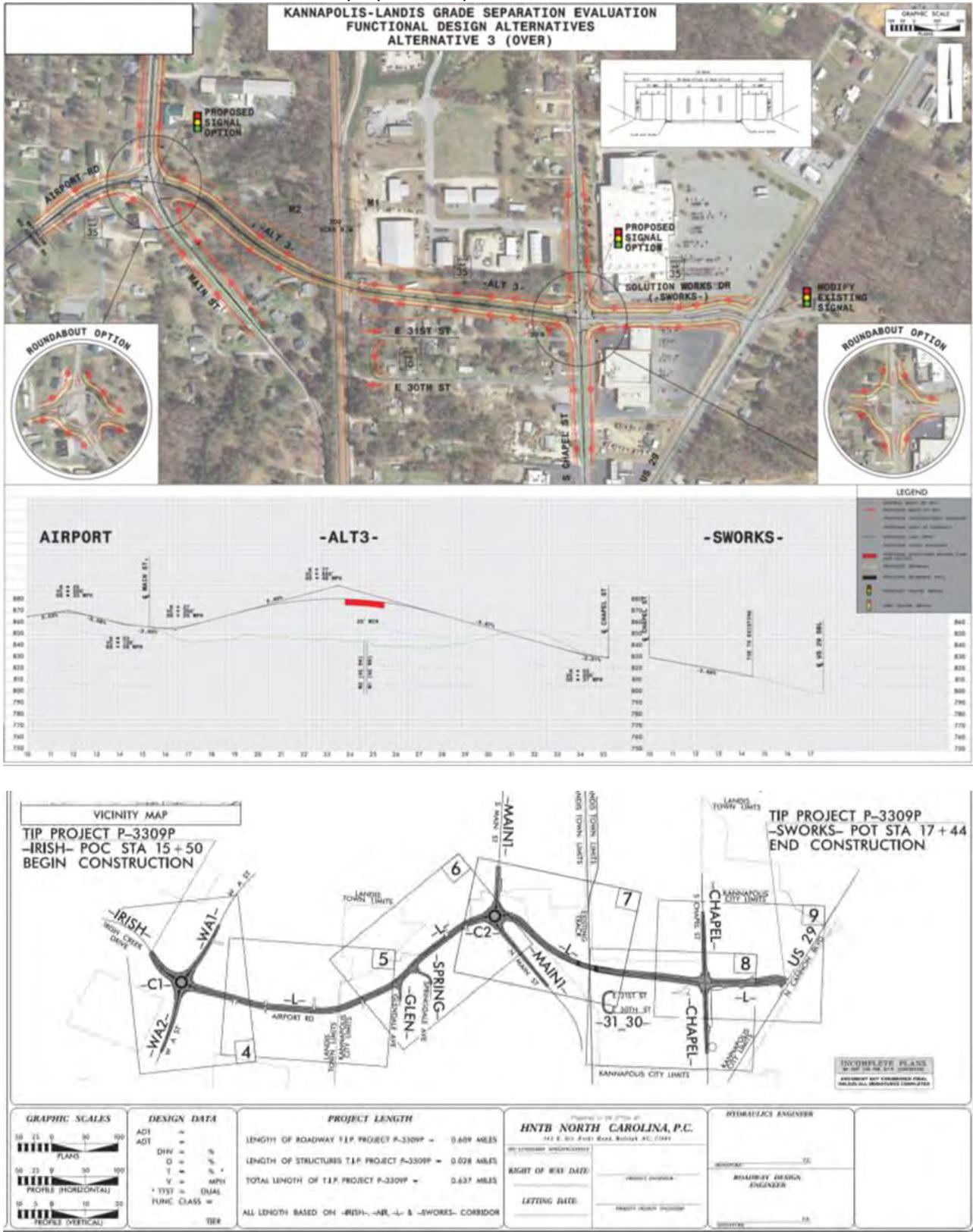
HNTB prepared and submitted a feasibility study for the Kannapolis/Landis Safety Rail Project in Rowan County for the NCDOT Rail Division. The purpose of the study was to analyze different locations for a new grade-separated crossing of the North Carolina Railroad and the Norfolk Southern Railway Railroad between N. Main Street and N. Cannon Blvd (US 29) within the area of Kannapolis and Landis. HNTB's report was submitted February 2017. The following is a brief overview of what was included within HNTB's report.

- A total of six (6) preliminary alternatives were considered, with additional over and under variations. Alternatives 1, 4, 5, & 6 had multiple variations for a total of twenty-three (23) considered alternatives.



- Alternatives with excess grades included alternatives 1a, 1b, 1c, 5d, 5e, 6a (over) and 6b (over).
- Discussion with a Steering Committee narrowed the HNTB alternatives down to five (5). Preliminary designs and cost estimates were prepared for the following:
  - **Alternative 2** – Over
  - **Alternative 2** – Under
  - **Alternative 3** – Over
  - **Alternative 3** – Under
  - **Alternative 4C** – Over
- Alternatives 2 (Over) and 4C were removed from consideration for the following reasons:
  - **Alternatives 2 (Over)** – After refining the profile, grades exceeded the preferred 6% slope.
  - **Alternative 4C** – Alternative would not allow for additional connectivity between US 29 and the west side of the project area.
- **Alternative 3**
  - Alternative 3 was advanced to a 15% design phase
  - *Description* – Alignment will connect Airport Road to the south side of the industrial park. The connector will begin at the intersection of Main Street and Airport Road, cross over the railroad track, and follow new alignment between the industrial park and E. 31st Street, connect with SolutionWorks Drive (private street) at S Chapel Street, and finally connect to US 29. E 31st Street access to S Chapel Street will become a cul-de-sac and residences on E 31st Street will be provided access via E 30th Street. Main intersections were designed as roundabouts.
  - *Cost*
    - Construction - \$10,227,000 with roundabouts
    - Right of Way – \$6,315,876
    - Total Cost - **\$16,542,876**
  - *Property impacts*
    - 26 total takes
    - 23 proposed relocated
  - *Design*
    - HNTB’s initial functional design concept for Alt 3 (top image next page) impacted approximately 20 properties with an estimated construction cost of \$6.6m to \$7m.

- The cover sheet for a 15% design was included in the report (bottom image below); however, no additional information provided. Note that the limits of the project were extended further west along Airport Road, increasing the construction cost to \$10.2 million and 26 properties impacted.



- Operations
  - Traffic counts were collected on February 25, 2016, and March 1-3, 2013, at the following intersections:

**Table 2 – Peak Hour Traffic Counts in Study Area**

| Intersection                         | AM Peak Hour  | PM Peak Hour  |
|--------------------------------------|---------------|---------------|
| W A St & Irish Creek Dr / Airport Rd | 07:00 - 08:00 | 16:45 - 17:45 |
| N Main St & Airport Rd               | 07:15 - 08:15 | 16:30 - 17:30 |
| S Chapel St & Solution Works Dr      | 07:15 - 08:15 | 17:00 - 18:00 |
| N Cannon Blvd & Solution Works Dr    | 07:30 - 08:30 | 17:00 - 18:00 |

- 2016 AADT – 5,000 vpd
- 2040 AADT – 9,650 vpd (based upon 2% yearly growth rate)
- LOS Analysis (Table 5 below pulled from HNTB’s feasibility study)

**Table 5 – 2016 and 2040 Build LOS**

| Intersection                             | Approach Mvmt | 2016     |          | 2040     |          |
|--|---------------|----------|----------|----------|----------|
|  |               | AM       | PM       | AM       | PM       |
| US 29 (Cannon Blvd) / Solution Works Dr  | Overall       | B (13.4) | B (15.3) | B (17.3) | C (22.9) |
| S Chapel St / Solution Works Dr*         | NB            | A (9.6)  | B (11.2) | B (13.9) | C (22.9) |
|  | SB            | A (9.9)  | B (10.7) | B (14.6) | C (18.5) |
|  | EB            | A (9.9)  | B (10.4) | B (14.5) | C (16.0) |
|  | WB            | A (9.6)  | B (10.8) | B (13.2) | C (18.7) |
| N Main St / Airport Rd*                  | NB            | A (6.6)  | A (8.8)  | B (10.5) | C (19.6) |
|  | SB            | A (8.1)  | A (9.1)  | C (15.6) | C (21.7) |
|  | EB            | A (6.2)  | A (6.2)  | A (9.9)  | A (9.8)  |
|  | WB            | A (5.8)  | A (7.8)  | A (8.4)  | C (15.4) |
| West A St / Airport Rd / Irish Creek Dr+ | NB            | A (4.1)  | A (4.2)  | A (4.7)  | A (4.8)  |
|  | SB            | A (4.1)  | A (4.1)  | A (4.7)  | A (4.7)  |
|  | EB            | A (3.6)  | A (3.6)  | A (3.9)  | A (3.9)  |
|  | WB            | A (3.8)  | A (3.9)  | A (4.3)  | A (4.4)  |

\* - Unsignalized intersection  
 + - Roundabout  
 LOS and Delay shown: LOS (Delay)  
 Delay Measured in Seconds Per Vehicle

- Public Engagement
  - Stakeholder meetings were held with NCDOT, the City of Kannapolis, and the Town of Landis.
  - There was a local officials’ meeting and public meeting held on November 17, 2017. Eight (8) government representatives attended the local officials’ meeting and fifty-four (54) locals attended the public meeting.
  - Local comments can be grouped into the following categories:
    - Preference of signals to roundabouts
    - General agreement with the need for a grade separated crossing

## HNTB & Kittelson Alternative Comparison

Without the benefit of the prior HNTB Study, Kittelson had initially prepared three (3) different preliminary alignments for consideration which were presented at the January 2020 team meeting. Factors involved in the development of the alignments included: grade, overpass length, pedestrian and cyclist accommodations, business access, and property impacts.

The alignments prepared by Kittelson closely match HNTB’s alternatives. Comparisons between the alignments is shown below.

| HNTB Preliminary Alternatives | Comparable To | Kittelson Alternatives |
|-------------------------------|---------------|------------------------|
| Alternative 2 (under)         |               | Alternative 1 (over)   |
| Alternative 1B (over)         |               | Alternative 2A (over)  |
| Alternative 3 (over)          |               | Alternative 3 (over)   |

Kittelson also identified a new Alternative 2B, shown in cyan color, which utilizes the same crossing point over the railroad as Kittelson Alt 2A, but connects to US 29 at Hickory St instead of Dial St. This option was not considered in the previous HNTB study. It appears to reduce residential impacts but crosses a stream and wooded area. Grades between the railroad and Chapel Street exceeding 6% may also impact viability of this option.



HNTB had previously eliminated the northern options (e.g. HNTB Alt 1B) due to grades and impacts to residential communities along Dial St. While it would not resolve the grade issues, Kittelson Alt 2B would address the residential impacts. It would provide a more direct connection to US 29 via the existing Hickory St intersection and avoid impacts to the industrial park and Town water pump station near Chapel St/Hickory St. A five-legged single-lane roundabout at Dial St/Chapel St/Connector Rd would be one alternative for the modified intersection configuration.

The central options (HNTB Alt 2 and Kittelson Alt 1) both cut through a newly constructed commercial business which was under construction in the aerial photo on the previous page. This results in additional business damages for that Alternative that were not included in the prior HNTB study. Both alternatives would also impact the Town of Landis' water pump station in the northwest quadrant of Chapel Street/Hickory St which was part of the consideration in the Town of Landis and City of Kannapolis previously agreeing to eliminate this alternative. The Kittelson Alt 1 had thus far only explored an option over the rail line. Based upon HNTBs prior analysis, an option under the rail appears to provide benefits for slightly lower grades and connectivity to adjacent parcels. If retained for further consideration, the "under" alternative is recommended for further evaluation following the HNTB alignment.

The southern options (HNTB Alt 3 and Kittelson Alt 3) would both have the highest number residential parcel impacts. HNTB evaluate both over and under options, but recommended the "over" option due to lower cost and reduced impacts to the Town's water pump station. From a context perspective, the "under" option would better tie into the adjacent residential community compared to the "over" option which would create a new structure rising 30 to 40 feet behind residential homes. The initial Kittelson option crossed the railroad at more of a skew, but intersected Main St with less of a skew to better facilitate intersection turning movements. The HNTB also avoided additional residential structures; however, given the proximity of the new roadway it is possible that full takes would be needed under either alignment. A blending of the two alternatives to use a straighter alignment crossing the railroad (similar) to HNTB Alt 3, but adjusting the intersection with Airport Rd is one potential refinement.

### ***Recommended Study Next Steps***

- Further develop the new Kittelson Alternative 2B to consider grades, parcel impacts and environmental impacts in comparison to the previously considered alternatives by HNTB.
- Kittelson Alternative 1 (HNTB Alt 2) was previously eliminated from consideration due to impacts to the Town water pump station and costs. Recent business construction in the location of this alternative further increase costs and impacts. However, for completeness, we recommend carrying forward the previous HNTB Alt 2 (under) concept with updated costs, identification of property impacts, and environmental screening for comparison purposes. No new concept will be developed. The studied concept will follow the previous HNTB alignment and profile.
- Develop a hybrid alignment from Kittelson Alt 3 and HNTB Alt 3. Continue to consider both over and under profile options to document updated costs and impacts. Although the prior HNTB study recommended to "over" alignment, continued consideration of the "under" alignment is intended to carry forward an option that is more context sensitive to the adjacent residential community.

- Update the Opinion of Probable Construction Costs – Costs from HNTB study are approaching 5 years old. Unit prices for bridge and for drainage in HNTB study also appear low.
- Conduct Environmental Screening – No documentation related to environmental screening was included in the HNTB report provided to Kittelson. It is unclear whether any environmental screening was completed as part of a separate effort by HNTB or others.

### ***Topics for Follow-up with NCDOT and/or Local Agency Staff***

- HNTB previously prepared 15% plans for the project to include improvements along Airport Rd. Has design progressed beyond the 15% design information provided from HNTB's study in 2017?
- Have any concerns been communicated by North Carolina Railroad and Norfolk Southern Railway Railroad regarding the previous HNTB study or conclusions?
- Has any further coordination occurred with the City of Kannapolis and the Town of Landis since the conclusion of HNTB's report?
- Is there any additional development activity in the area that has been proposed over the past year within the study area that needs to be considered?
- HNTB previously completed traffic forecasting and analysis at the key study intersections for the recommended Alternative 3 alignment. Additional coordination with NCDOT is needed regarding the level of additional traffic analysis desired as part of the current study.

## **APPENDIX B- MEETING MINUTES**



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To: Attendees Date: April 9, 2015  
From: Natasha Simmons  
Subject: Kannapolis/Landis Safety Rail Project Meeting Minutes NCDOT TIP No.: P-3309  
January 23, 2015 Meeting

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The project kickoff meeting for the Kannapolis-Landis Safety project was held January 23, 2015 at 1:30 PM in the Kannapolis Train Station on 201 S. Main Street. Attendees included:

|                 |                     |              |                           |
|-----------------|---------------------|--------------|---------------------------|
| Jahmal Pullen   | NCDOT Rail Division | 919-715-8748 | jmpullen@ncdot.gov        |
| Nancy Horne     | NCDOT Rail Division | 919-715-3686 | nhorne@ncdot.gov          |
| James Bridges   | NCDOT Rail Division | 919-707-4716 | jfbridges@ncdot.gov       |
| Pat Ivey        | NCDOT Div 9         | 336-747-7800 | pivey@ncdot.gov           |
| Diane Hampton   | NCDOT Div 9         | 336-747-7800 | dkhampton@ncdot.gov       |
| Linda Dosse     | NCDOT TPB           | 919-707-0973 | ldosse@ncdot.gov          |
| Mike Legg       | City of Kannapolis  | 704-920-9333 | mlegg@kannapolisnc.gov    |
| Michael Rattler | City of Kannapolis  | 704-920-4200 | mrattler@kannapolisnc.gov |
| David Lipe      | City of Kannapolis  | 704-938-1519 | dlipe@awck.com            |
| Reed Linn       | Town of Landis      | 704-857-2411 | drlinn@townoflandis.com   |
| Ginger Gibson   | Town of Landis      | 704-857-2411 | ginger@townoflandis.com   |
| Natasha Simmons | HNTB                | 919-424-0468 | nsimmons@hntb.com         |
| Rhonda Early    | HNTB                | 919-424-0426 | rearly@hntb.com           |
| Enrico Roque    | HNTB                | 919-424-0442 | eroque@hntb.com           |
| Paul Barber     | HNTB                | 919-424-0421 | pbarber@hntb.com          |

1. Safety Briefing

- Natasha started the meeting with a safety briefing.

2. Introductions

- Everyone went around the table and introduced themselves.

3. Project History

- Jahmal gave a project history. The early meetings designated the project study area and worked with the MPO. The project is in the STIP (P-3309). Linda said that the NCDOT BOT will adopt the new Cabarrus-Rowan MPO Comprehensive Transportation Plan (CTP) by the end of the year.

#### 4. Current Scope

- Discussion of Current Scope
  - NCDOT will do the environmental screening process. It will include cultural resources.
  - HNTB will conduct stakeholder meeting separately with police, fire, schools, etc so that they are not competing with the citizens at the public meetings. Natasha needs a list from Kannapolis and Landis of groups that she should talk to.
  - 15% plans will be prepared for 3 alternatives. Right-of-way estimates will be provided for each alternative. Then one alternative will be taken to preliminary plans and an estimate provided. Linda said the alternatives needed to follow the Complete Streets Criteria. Linda said she would email the document to Natasha to email to the project team.
  - A summary report will contain the information from the Stakeholder meetings, public meetings, and discussions.
  - The project is estimated to take 1 ½ years. The next step would be to find federal funds for the project to include in the STIP. Someone from PDEA will be added to the project team.
  - NEPA document will move forward after this study.
- Discussion of potential sites
  - Kannapolis and Landis would like to look at the alternatives before the design starts.
  - Kannapolis and Landis will look into combining the presentations to the elected officials and possibly adding the Rowan Board of Commissioners. HNTB will make two presentations at separate times: once for the 3 alternatives before they go the public workshop and then again for the preferred alternative before the public meeting.

#### 5. Next Steps

- Develop Schedule
- Develop Potential Alternatives and present to project team
- Prepare three alternatives
- Schedule 1<sup>st</sup> Stakeholder meeting

Action Items

- Natasha will draft a project schedule
- Jahmal/Nancy will confirm the project limits with the project team
- HNTB will start data collection
- Linda will email Natasha the Complete Streets Criteria that has the approved cross-sections
- Kannapolis and Landis will draft stakeholder lists and proposed land uses
- Natasha will add PDEA to the group
- Diane will email the TCC chair contact information
- Natasha will coordinate with Phil Conrad and give a project overview

If there are any revisions or additional items that have not been included in the minutes please let me know and I will send out a revised summary.

nrs



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To: Attendees Date: April 14, 2015  
From: Natasha Simmons  
Subject: Kannapolis/Landis Safety Rail Project Meeting Minutes NCDOT TIP No.: P-3309  
April 13, 2015 Meeting

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The project kickoff meeting for the Kannapolis-Landis Safety project was held January 23, 2015 at 1:30 PM in the Kannapolis Train Station on 201 S. Main Street. Attendees included:

|                    |                                       |              |                          |
|--------------------|---------------------------------------|--------------|--------------------------|
| Kumar Trivedi      | NCDOT Rail Division                   | 919-715-0296 | katrivedi@ncdot.gov      |
| Nancy Horne        | NCDOT Rail Division                   | 919-715-3686 | nhorne@ncdot.gov         |
| James Bridges      | NCDOT Rail Division                   | 919-707-4716 | jfbbridges@ncdot.gov     |
| Pat Ivey           | NCDOT Div 9                           | 336-747-7800 | pivey@ncdot.gov          |
| Diane Hampton      | NCDOT Div 9                           | 336-747-7800 | dkhampton@ncdot.gov      |
| Linda Dosse        | NCDOT TPB                             | 919-707-0973 | ldosse@ncdot.gov         |
| Karen Reynolds     | NCDOT PDEA                            | 919-707-6038 | kreynolds@ncdot.gov      |
| Phil Conrad        | Cabarrus-Rowan MPO -<br>MBL Solutions | 704-795-7529 | pconrad@mblsolution.com  |
| Wilmer Melton, III | City of Kannapolis                    | 704-920-4200 | wmelton@kannapolisnc.gov |
| Reed Linn          | Town of Landis                        | 704-857-2411 | drlinn@townoflandis.com  |
| Ginger Gibson      | Town of Landis                        | 704-857-2411 | ginger@townoflandis.com  |
| Steve Rowland      | Town of Landis                        | 704-857-0131 | wsr@townoflandis.com     |
| Natasha Simmons    | HNTB                                  | 919-424-0468 | nsimmons@hntb.com        |
| Rhonda Early       | HNTB                                  | 919-424-0426 | rearly@hntb.com          |
| Corey Vernier      | HNTB                                  | 919-424-0429 | cvernier@hntb.com        |
| Trace Howell       | HNTB                                  | 919-424-0440 | trhowell@hntb.com        |

1. Safety Briefing

- Corey started the meeting with a safety briefing.

2. Introductions

- Everyone went around the table and introduced themselves.

3. Discuss Proposed Schedule

- Natasha passed around a proposed schedule and discussed the upcoming date in July to have the alternatives completed and submitted to NCDOT for review.
- Pat was concerned that the public would go through the public involvement process and think that they were done with the project. He wanted to educate

them on the process. This process will only come out with a recommendation to be used in the NEPA process. There was some discussion using the name “recommended corridor” instead of “alignment”. There needs to be education of the public officials and that there could be changes later during the NEPA process because of environmental concerns in the “recommended alignment”. This probably will not go through the merger process.

#### 4. Alternatives Discussion

- Review Study Alternatives
  - Natasha and Rhonda presented the Alternatives.
    - New location alternatives are designed for 40 mph design speed and 35 mph posted.
    - Corey discussed the issues with the interlocking and needing to be 100 feet away from the interlocking between 29<sup>th</sup> Street and 22<sup>nd</sup> Street restricted the location of some of the alternatives.
    - Cannot do a temporary railroad detour for construction of an underpass within the vicinity of the interlocking which restricts the locations of the underpass alternative.
    - Rhonda discussed the proposed grades and potential takes for each alternative.
  - Concerns from the group were:
    - Moving the loop tie-in to Main Street out of the curve
    - If the new grade-separated crossing will tie into Airport Road, Airport Road will need to be upgraded to match the new roadway
    - Would like a roundabout at Airport Road at 5<sup>th</sup> Street/W A Street which will lead to the backside of Kannapolis’s new campus
    - Look at roundabouts at all intersections except with US 29-74
    - Look at costs and relocations
    - Concerned about relocations with Alternative #2
    - Would like to look at moving the driveway for Alternative #2
- Select 3 Preferred Alternatives
  - The group decided to proceed with Alternatives 2, 3, and 4c
  - The group decided to choose Alternatives 2 and 3 as the over and under pass options

## 5. Next Steps

- Discuss alternatives with Police Departments, Fire Departments, EMS Departments, School Districts, Planning, and Chamber of Commerce to see if any issues.
- Send out a revised map including additional alternatives discussed in the meeting
- Prepare plans for Alternatives #2, 3, and 4c
- Prepare plans for upgrading Airport Road
- Prepare roundabout intersection designs
- Prepare over and under pass options
- Present alternatives to MPO

### Action Items

- Natasha will send out updated alternatives map updated per meeting discussion

If there are any revisions or additional items that have not been included in the minutes please let me know and I will send out a revised summary.

nrs



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To: Attendees Date: January 11, 2016  
From: Natasha Simmons  
Subject: Kannapolis/Landis Safety Rail Project Meeting Minutes NCDOT TIP No.: P-3309P  
October 12, 2015 Meeting

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The project meeting for the Kannapolis-Landis Safety project was held October 12, 2015 at 10:30 AM in the Kannapolis Train Station on 201 S. Main Street. Attendees included:

|                    |                                       |              |                          |
|--------------------|---------------------------------------|--------------|--------------------------|
| Nancy Horne        | NCDOT Rail Division                   | 919-715-3686 | nhorne@ncdot.gov         |
| James Bridges      | NCDOT Rail Division                   | 919-707-4716 | jfbridges@ncdot.gov      |
| Pat Ivey           | NCDOT Div 9                           | 336-747-7800 | pivey@ncdot.gov          |
| Diane Hampton      | NCDOT Div 9                           | 336-747-7800 | dkhampton@ncdot.gov      |
| Linda Dosse        | NCDOT TPB                             | 919-707-0973 | ldosse@ncdot.gov         |
| Karen Reynolds     | NCDOT PDEA                            | 919-707-6038 | kreynolds@ncdot.gov      |
| Phil Conrad        | Cabarrus-Rowan MPO -<br>MBL Solutions | 704-795-7529 | pconrad@mblsolution.com  |
| Mike Legg          | City of Kannapolis                    | 704-920-4333 | mlegg@kannapolisnc.gov   |
| Wilmer Melton, III | City of Kannapolis                    | 704-920-4200 | wmelton@kannapolisnc.gov |
| Natasha Simmons    | HNTB                                  | 919-424-0468 | nsimmons@hntb.com        |
| Rhonda Early       | HNTB                                  | 919-424-0426 | rearly@hntb.com          |
| Trace Howell       | HNTB                                  | 919-424-0440 | trhowell@hntb.com        |

## 1. Safety Briefing

- Nancy started the meeting with a safety briefing.

## 2. Alternatives Discussion

- Review Study Alternatives – 3 Over and 2 Under
  - Natasha and Rhonda presented the alternatives. Comments on the alternatives were:
    - The existing signal at Solution Works Drive is an issue since it is 600' south of Alternative 1. The existing signal needs to be removed and a left-over installed for Alternative 1 at this intersection.
    - On Main Street and Chapel Street for the traffic signals alternative, left-turn lanes need to be included.

- Adjust the profile on Hickory Street to accommodate a 40 mph design speed.
- There is a pump station in the Northeast Quadrant at Chapel Street and Solution Works Drive. There is a pump station in the Northwest Quadrant at Chapel Street and Hickory Street for Landis. The roundabouts need to be shifted away from the pump stations on Chapel Street.
- Show 3 lanes on Solution Works Drive and Hickory Street with sidewalks all the way to US 29. Show the right-of-way from Chapel Street to US 29 on both alternatives. Solution Works Drive would become a public street.
- There is still some question on how frequently the spur line is used into the paper/cardboard recycling plant.
- The current vertical profile on Hickory Street restricts the design speed. Changing the profile will increase the design speed.
- Incorporate turns for larger trucks at all intersections.
- For Alternative 3, as part of the closure at 29<sup>th</sup> Street for the double track project, a hammerhead will be installed.
- Improvements are needed on Solution Works Drive for Alternative 3. Since Alternative 3 would cut Chapel Street from US 29, traffic would use Solution Works Drive.
- A signal would be required at Alternative 3/28<sup>th</sup> Street at US 29. There is a tower near the intersection that would have to be avoided on the east side of US 29.
- Linda said that the current CTP shows a new location facility for the Homer Corriher Connector near the existing intersection of Airport Road/Irish Creek Drive at West A Street to the existing Homer Corriher Road at Cannon Farm Road. A roundabout will accommodate a 5<sup>th</sup> leg.
  - Show left turn lanes at Airport Road/West A Street.
  - Include Airport Road in Alternatives 1 and 2.
    - Rhonda reviewed the cost estimates.
- The group narrowed down to 3 Preferred Alternatives to present to the public
  - The group decided to proceed with Alternatives 1 under, 2 over, and 2 under.
  - Alternative 1 over was dropped because of the steeper grades than the others and Alternative 3 does not meet the purpose and need of the project with connectivity to West A Street so Alternative 3 was dropped.

### 3. Next Steps

- Send out the Public Meeting Request
- Update Alternatives 1 under, 2 over and 2 under for the Public Meeting

#### Action Items

- Natasha will send out the Public Meeting Request
- HNTB will update the Alternatives to reflect the changes

If there are any revisions or additional items that have not been included in the minutes please let me know and I will send out a revised summary.

nrs

## **Kannapolis – Landis Safety Rail Project**

for a Grade Separation between 5<sup>th</sup> Street in Landis  
and 22<sup>nd</sup> Street in Kannapolis

State Transportation Improvement Project Number P-3309P

### Meeting Summary

A Local Officials’ Meeting and a Public Meeting were held for State Transportation Improvement Project (STIP) Project P-3309P, Kannapolis-Landis Safety Rail Project for a grade separation between 5<sup>th</sup> Street in Landis and 22<sup>nd</sup> Street in Kannapolis, on November 17, 2015 at the Amtrak Station in Kannapolis, North Carolina. The Local Official’s Meeting was held from 2:00 to 3:00 p.m. and the Public Meeting followed from 4:00 to 6:00 p.m.

Fifteen (15) attendees signed in at the Local Officials’ Meeting, eight (8) were representatives from Kannapolis, Landis, or Rowan County. The proposed design alternatives were presented, followed by a question and answer period. Local officials were able to review the project alternative designs and speak with the NCDOT staff and engineering team before and after the more formal presentation. Handouts included an invitation to provide comments, project contacts, alternative descriptions, a map of the study area, and project next steps. No comment sheets were returned at the Local Officials’ Meeting.

Fifty-four (54) citizens signed in at the Public Meeting. The meeting was informal, open house format and no presentation was given. Attendees were invited to view the alternative designs and speak with NCDOT representatives. Meeting participants included residents, business owners, local government officials, and the media. Participants received a handout, comment sheet, and Title VI sheet. Handouts included an invitation to provide comments, project contacts, alternative descriptions, a map of the study area, and project next steps. The deadline for comments was December 18, 2015.

Verbal comments made during the Public Meeting were predominantly centered on what other grade crossings would be closed as a result of a double track project currently under construction. Seventeen citizen comments were received during the comment period. The following table is a summary of the alternative preference (Alternative 1, 2, or 3) and additional comments of each commenter. One commenter provided comments at the meeting and during the comment period and is only represented once. As noted in the table below, the majority (8) of commenters selected Alternative 3 as their preferred alternative.

Table 1. Comment and Alternative Choice Summary

| <b>Name</b>  | <b>Alternative Choice</b> | <b>Additional Comments</b>                                    |
|--------------|---------------------------|---|
| Faulkner, A. | 3                         |   |
| Faulkner, D. | 3                         | No Alternative that would affect 1111 S. Main Street, Landis. |

Table 1. Comment and Alternative Choice Summary

| Name           | Alternative Choice | Additional Comments   |
|----------------|--------------------|---|
| Smith, D. & M. | 2                  | [Bridge] Either over or under. Believes it is the safest and most convenient way to connect to US 29/29A. Also creates the best exit from Food Lion to US 29/29A. Please move the high, thick shrubbery at the corner of 22 <sup>nd</sup> Street and Linda Avenue. The bushes are a visual hazard that makes an accident very probable at this intersection.  |
| Overcash, L.A. |                    | No roundabouts on Main Street. Believes choosing an alternative is irrelevant, "you [NCDOT] will do what you [it] want[s]."   |
| Caldwell, F.   | 1                  | Alternatives 2 and 3 include a road on new location behind his property at 2998 N. Main Street and he noted there would be adverse effects of noise and runoff from the bridge to his property. He feels that the project is to benefit the Irish Creek Country Club community by giving them access to US 29. He does not believe that this project is part of a future plan to connect to Homer Corriher Road and create a loop around Landis. He requests that his neighborhood be left alone. |
| Bennett        | 1                  | Does not want signals, roundabouts, or concrete barriers. Would prefer a 4-way or 2-way stop. If there must be a roundabout, it should be at Airport Road and 5 <sup>th</sup> Street. Roundabouts must accommodate tractor trailer traffic.   |
| Cobb, J.       | 3                  | Prefers signals to roundabouts. Roundabouts are confusing to the elderly. How long before construction of the project would begin?  |
| Murphy, M.     | 3                  | Which rail crossings will be closed between the north crossing in Landis and the underpass on the Rowan/Cabarrus line?  |
| Brown, A.      |                    | No preference stated. Suggests an up-to-date real estate appraisal on E. 31 <sup>st</sup> Street before the project takes place. Several homes on 31 <sup>st</sup> Street are vacant and she feels they are uninhabitable. She wonders if the project will increase property values and therefore real estate taxes due to the proposed cul de sac, or if any other city or county resources (e.g. fire hydrants, municipal water) will be brought to the neighborhood.                           |
| Anonymous      | 3                  | Prefers signals to roundabouts.   |
| Bentley, L.    | 3                  | Prefers signals to roundabouts.   |
| Bently, M.S.   | 3                  | Prefers signals to roundabouts.   |
| Alexander, J.  | 3                  | The neighborhood on or around East 31 <sup>st</sup> Street has changed significantly. She asks why she was not sent a postcard. She also wonders what will happen to the neighborhood if Alternative 1 is chosen, if construction will occur while they live in their houses, and if East 30 <sup>th</sup> and 31 <sup>st</sup> Streets are closed will the houses be demolished.   |
| Gillispie, E.  | 1                  | Will 401 Helen Street be included in the rail project?  |
| Cherry, N.     | 2                  | Prefers signals. Will the Town of Landis be required to maintain the proposed sidewalk from West A Street to Main Street?   |
| Sloan, B.R.    | 1                  | Does not want to move. Felt that there was poor communication or proper notification regarding the meeting held November 17, 2015.  |



## Kannapolis – Landis Safety Rail Project

for a Grade Separation between 5<sup>th</sup> Street in Landis  
and 22<sup>nd</sup> Street in Kannapolis

State Transportation Improvement Project (STIP) Number P-3309P

November 17, 2015

### Welcome

Thank you for attending today's Public Meeting for the proposed Kannapolis – Landis Safety Rail project. This meeting is being held by the North Carolina Department of Transportation (NCDOT) to provide information about the project and obtain public input. Please review project maps and displays, speak with project team members, and offer your comments.

### Please Provide Your Comments

We look forward to receiving your input. Please complete a comment form. The information you provide will help identify key concerns regarding the project. You can fill out the comment form and submit it tonight or you can mail or email your comment to either address below. **Please submit your comments no later than December 18, 2015:**

**Nancy Horne, PE**  
NCDOT Rail Division  
1556 Mail Service Center  
Raleigh, NC 27699  
[nhorne@ncdot.gov](mailto:nhorne@ncdot.gov)  
Phone: 919.715.3686

**Natasha Simmons, PE, PTOE**  
HNTB NC PC  
343 E. Six Forks Road, Ste 200  
Raleigh, NC 27609  
[nsimmons@hntb.com](mailto:nsimmons@hntb.com)  
Phone: 919.424.0468

### Project Information

*Project Purpose* – To improve long-term connectivity in the area by providing a grade separated railroad crossing, as identified in the Landis Traffic Separation Study (1997).

*Project Description* – The NCDOT is conducting a study that includes an environmental screening and functional designs to determine the best location for a new grade separation of the Norfolk Southern operated railroad. The project also proposes to improve Airport Road from West A Street to Main Street

Improvements to **Airport Road** include: increasing lane width to 14 feet, to accommodate a bicycle lane in each direction; adding curb and gutter; and adding a 5-foot wide sidewalk on each side of the road. The intersection of Airport Road and West A Street has an option of either a signal or a roundabout.

Three alternatives have been identified for the grade separated crossing:

#### Alternative 1:

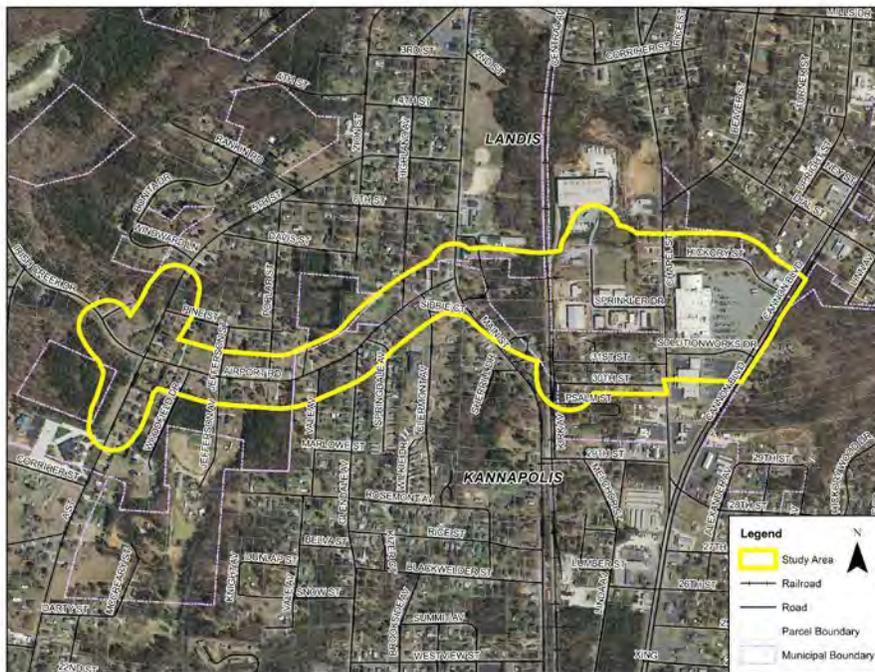
- Road on new location from the intersection of Airport Road and Main Street to the intersection of Hickory Street and South Chapel Street.
- The new road would go **under** the railroad tracks.
- Sprinkler Drive would be reconfigured with an offset where the new road crosses.
- Hickory Street would be realigned from South Chapel Street to US 29.
- The intersections of Airport Road and Main Street and Hickory Street and South Chapel Street have the option of a signal or roundabout.
- A left turn lane would be added from US 29 to Hickory Street.

**Alternative 2:**

- Road on new location from the intersection of Airport Road and Main Street to the intersection of Solution Works Drive and South Chapel Street.
- The new road would go **under** the railroad tracks.
- The intersections of Airport Road and Main Street and Solution Works Drive and South Chapel Street have the option of a signal or roundabout.
- East 31<sup>st</sup> Street would be closed in a cul de sac, a connection would be made between East 30<sup>th</sup> Street and East 31<sup>st</sup> Street near the railroad.

**Alternative 3:** Is the same as Alternative 2 EXCEPT that the new road would go **over** the railroad tracks.

*Project Study Area:*



*Project Next Steps*– This project is not currently funded and therefore is not programmed. However, the steps below outline the general process this project would follow, should it receive funding.

Landis Traffic Separation Study

Conduct a Feasibility Study

Design Alternatives

Present Alternatives to the public

Develop a Preferred Alternative

Present Preferred Alternative to the public

Include project in the STIP with potential funding sources

Comply with the National Environmental Policy Act

Acquire right of way

Begin construction





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To: Attendees Date: August 9, 2016  
From: Natasha Simmons  
Subject: Kannapolis/Landis Safety Rail Project Meeting Minutes NCDOT TIP No.: P-3309P  
January 13, 2016 Meeting

---

The project meeting for the Kannapolis-Landis Safety project was held January 13, 2016 at 2:00 PM in the Landis Town Hall on 312 S. Main Street. Attendees included:

|                    |                     |              |                           |
|--------------------|---------------------|--------------|---------------------------|
| Nancy Horne        | NCDOT Rail Division | 919-715-3686 | nhorne@ncdot.gov          |
| Pat Ivey           | NCDOT Div 9         | 336-747-7800 | pivey@ncdot.gov           |
| Diane Hampton      | NCDOT Div 9         | 336-747-7800 | dkhampton@ncdot.gov       |
| Karen Reynolds     | NCDOT PDEA          | 919-707-6038 | kreynolds@ncdot.gov       |
| Mayor Hinnant      | City of Kannapolis  | 704-920-4319 | dhinnant@kannapolisnc.gov |
| Mike Legg          | City of Kannapolis  | 704-920-4333 | mlegg@kannapolisnc.gov    |
| Wilmer Melton, III | City of Kannapolis  | 704-920-4200 | wmelton@kannapolisnc.gov  |
| Reed Linn          | Town of Landis      | 704-857-2411 | drlinn@townoflandis.com   |
| Ginger Gibson      | Town of Landis      | 704-857-2411 | ginger@townoflandis.com   |
| Ron Miller         | Town of Landis      | 704-794-2013 | rmiller@townoflandis.com  |
| Natasha Simmons    | HNTB                | 919-424-0468 | nsimmons@hntb.com         |
| Rhonda Early       | HNTB                | 919-424-0426 | rearly@hntb.com           |

1. Safety Briefing

- Nancy started the meeting with a safety briefing.

2. Discuss Public Meeting Comments

- Natasha passed out a summary of the comments from the public meeting. There were a total of 16 comments collected from the public meeting. They discussed some of the comments.
- Wilmer summarized Kannapolis's Resolution #2016-01 supporting that 18<sup>th</sup> St and 22<sup>nd</sup> St crossings remain open and improvements made to 22<sup>nd</sup> St.
  - All the alternatives are at the extreme end of Kannapolis.
  - They would prefer the realignment of 22nd St to provide east-west connectivity. The next crossing down is 18th St.
  - The City would like to see Rogers Lake Rd grade separation south of downtown Kannapolis before this grade separation.

- Nancy stated that the 18th St and the 22nd St crossings would not be closed with the location of the 3 alternatives north of 22nd St. NCDOT will include it in the agreement for the project.

### 3. Discuss Alternatives

- Alternative 1 impacts the water pump stations.
- Landis and Kannapolis do not like Alternative 1.
- The group agreed to throw out Alternative 1.
- Alternative 2 is more expensive since it goes underneath the railroad tracks.
- Alternative 3 goes over the tracks.

### 4. Next Steps

- Prepare plans for the Preferred Alternative 3.

### Action Items

- HNTB will prepare the plans for the Preferred Alternative 3
- HNTB will schedule the next meeting after the plans are complete to present to the group.

If there are any revisions or additional items that have not been included in the minutes please let me know and I will send out a revised summary.

nrs



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To: Attendees Date: September 20, 2016  
From: Natasha Simmons  
Subject: Kannapolis/Landis Safety Rail Project Meeting Minutes NCDOT TIP No.: P-3309P  
August 8, 2016 Meeting

---

The project meeting for the Kannapolis-Landis Safety project was held August 8, 2016 at 10:30 AM in the Kannapolis City Offices on 401 Laureate Way. Attendees included:

|                    |                                       |              |                          |
|--------------------|---------------------------------------|--------------|--------------------------|
| Nancy Horne        | NCDOT Rail Division                   | 919-715-3686 | nhorne@ncdot.gov         |
| Kumar Trivedi      | NCDOT Rail Division                   | 919-715-0296 | katrivedi@ncdot.gov      |
| James Bridges      | NCDOT Rail Division                   | 919-707-4716 | jfbridges@ncdot.gov      |
| Diane Hampton      | NCDOT Div 9                           | 336-747-7800 | dkhampton@ncdot.gov      |
| Karen Reynolds     | NCDOT PDEA                            | 919-707-6038 | kreynolds@ncdot.gov      |
| Phil Conrad        | Cabarrus-Rowan MPO -<br>MBL Solutions | 704-795-7529 | pconrad@mblsolution.com  |
| Reuben Crummy      | NCDOT TPB                             | 919-707-0971 | rcrummy@ncdot.gov        |
| Wilmer Melton, III | City of Kannapolis                    | 704-920-4200 | wmelton@kannapolisnc.gov |
| Reed Linn          | Town of Landis                        | 704-857-2411 | drlinn@townoflandis.com  |
| Ginger Gibson      | Town of Landis                        | 704-857-2411 | ginger@townoflandis.com  |
| Ron Miller         | Town of Landis                        | 704-794-2013 | rmiller@townoflandis.com |
| Natasha Simmons    | HNTB                                  | 919-424-0468 | nsimmons@hntb.com        |
| Rhonda Early       | HNTB                                  | 919-424-0426 | rearly@hntb.com          |
| Paul Barber        | HNTB                                  | 919-424-0421 | pbarber@hntb.com         |

1. Safety Briefing

- Natasha and Wilmer started the meeting with a safety briefing.

2. Discuss Preferred Alternative 15% Plans

- Rhonda passed out the 15% plans for the preferred alternative, a cost estimate, and an estimate of the property takes. She went over a summary of the roadway plans. Paul went over the structure plans. The group went over some recommended changes and Rhonda noted a few items that needed to be changed.
- Rhonda reviewed the estimate and will remove the highlights from the estimate as requested.

- Ron asked how utilities in the right-of-way would be paid for to relocate. The smaller municipalities do not have a way to pay to relocate them before a project. Diane told him that she would check on it and let him know.
- The group asked about the right-of-way cost. Rhonda will include the right-of-way cost in the estimate using GIS data.
- Phil asked how this project relates. Nancy said that this was to determine if a project was reasonable and feasible. Some of the work can be reused in the NEPA process.
- HNTB will prepare a summary report.
- The group discussed a Public Hearing. They decided to have a Public Hearing. Landis will send a resolution of support for the project. Nancy already has Kannapolis's resolution.

### 3. Next Steps

- Update the plans and estimate based on the comments.
- Finalize the Public Hearing Map.
- Prepare a summary report.
- Send the files to the group.

### Action Items

- Once the files are complete, submit them to NCDOT for review.

If there are any revisions or additional items that have not been included in the minutes, please let me know and I will send out a revised summary.

nrs

**From:** [Andrew Bell](#)  
**To:** [Clara Meier](#)  
**Subject:** FW: H171399/P-3309 Kan-Lan RR Grade Separation Re-Initiation  
**Date:** Tuesday, June 13, 2023 2:24:26 PM  
**Attachments:** [2022 - Feasibility Study Alt A Hickory 5th St.pdf](#)  
[2022 - Feasibility Study Alt B Hickory 5th St.pdf](#)  
[2022 - Feasibility Study Alt C Solution Works Airport.pdf](#)  
[2017 - P3309P Kannapolis-Landis 22nd St to 5th St Study Alternatives.pdf](#)  
[2017 - P3309P Preferred Alternative Public Hearing Map.pdf](#)  
[2021 - Kannapolis Landis Rail Crossing Feasibility Status Memo.pdf](#)  
[image001.png](#)

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**From:** Andrew Bell  
**Sent:** Wednesday, March 15, 2023 7:43 AM  
**To:** pconrad@rlcassoc.com  
**Cc:** Craver, Phillip W <pwcraver@ncdot.gov>; Howes, Michelle N <mnhowes@ncdot.gov>; Desai, Rupal P <rpdesai@ncdot.gov>; Natasha Simmons <nsimmons@HNTB.com>; Matt Pickens <mpickens@hntb.com>; Rachel Nance <rnance@HNTB.com>; Jones, Matthew W <mwjones2@ncdot.gov>; Blanton, William A <wablanton@ncdot.gov>; Gackstetter, Brian E <begackstetter@ncdot.gov>; Pullen, Jahmal M <jmpullen@ncdot.gov>; katrivedi@ncdot.gov; wendy@millerbarefoot.com  
**Subject:** RE: H171399/P-3309 Kan-Lan RR Grade Separation Re-Initiation

Hi Phil,

Thanks for meeting with us this afternoon to discuss the proposed RR Grade Separation project in Kannapolis and Landis. Based on our discussion, we are passing along several files that will be helpful as you determine how you'd like to see this project proceed:

- **2017 - P3309P Kannapolis-Landis 22nd St to 5th St Study Alternatives.pdf** – This is a map of the alignments that were preliminarily under consideration during the initial study that was finalized in 2017. The alternatives to the north are largely representative of the three concepts under consideration in the express designs.
- **2017 - P3309P Preferred Alternative Public Hearing Map.pdf** – This is the map of the alternative that was preferred based on the 2017 study, which was submitted for scoring in P5.0. This alignment most closely aligns with Alternative C from our most recent express designs.
- **2021 - Kannapolis Landis Rail Crossing Feasibility Status Memo.pdf** – This memo was prepared by Kittelson and Associates, and recommended narrowing the study of the express designs to three options near the boundary between Kannapolis and Landis.
- **2022 - Feasibility Study Alt A Hickory 5th St.pdf** – Alternative A from the 2022 express designs based on further refinements of the alignments from the Kittelson and Associates memo.
- **2022 - Feasibility Study Alt B Hickory 5th St.pdf** – Alternative B from the 2022 express designs based on further refinements of the alignments from the Kittelson and Associates memo .
- **2022 - Feasibility Study Alt C Solution Works Airport.pdf** – Alternative C from the 2022

express designs based on further refinements of the alignments from the Kittelson and Associates memo.

I've also placed these files [on my OneDrive here](#). Below is a rundown of next steps so that we can prepare a submittal and a cost estimate request:

- Coordination with Kannapolis and Landis regarding concepts
- Review of the 2022 express designs Alternatives A, B & C and any comments are requested by 3/31/23
- Decision on which alternative(s) will be submitted in P7.0 are requested by 4/14/23
- HNTB will prepare cost estimate requests by 4/28/23 to submit to NCDOT due to lead time needed for cost estimate preparation
- P7.0 projects need to be submitted to NCDOT from July – September 2023
- Any potential project that would provide a crossing near 22<sup>nd</sup> Street in Kannapolis would require a new SPOT request and Express Design evaluation

Please let us know if you have any questions regarding this, and keep us posted on your conversations with Kannapolis and Landis so that we can keep things moving.

Thanks,

**Andrew Bell, PE, PTOE**

Section Manager - Engineering

Tel (919) 424-0485 Cell (919) 616-3090 Email [aabell@hntb.com](mailto:aabell@hntb.com)

-----Original Appointment-----

**From:** Andrew Bell

**Sent:** Friday, March 10, 2023 4:04 PM

**To:** Andrew Bell; Craver, Phillip W; Howes, Michelle N; Desai, Rupal P; Natasha Simmons; Matt Pickens; Rachel Nance; Jones, Matthew W; Blanton, William A; Gackstetter, Brian E; Pullen, Jahmal M; [katrivedi@ncdot.gov](mailto:katrivedi@ncdot.gov); [wendy@millerbarefoot.com](mailto:wendy@millerbarefoot.com); [pconrad@rlcassoc.com](mailto:pconrad@rlcassoc.com)

**Cc:** 'WMelton@kannapolisnc.gov'

**Subject:** H171399/P-3309 Kan-Lan RR Grade Separation Re-Initiation

**When:** Tuesday, March 14, 2023 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** MS Teams

Good Afternoon,

I'm going to go ahead and reserve this time since it looks to be the best for most folks. We can select a different time if this ends up not working out, but I know how quickly calendars can fill up. Looking forward to our conversation.

Thanks,

**Andrew Bell, PE, PTOE**

Project Manager - Engineering

Tel (919) 424-0485 Cell (919) 616-3090 Email [aabell@hntb.com](mailto:aabell@hntb.com)

---

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Video Conference ID: 113 280 625 1

[Alternate VTC instructions](#)

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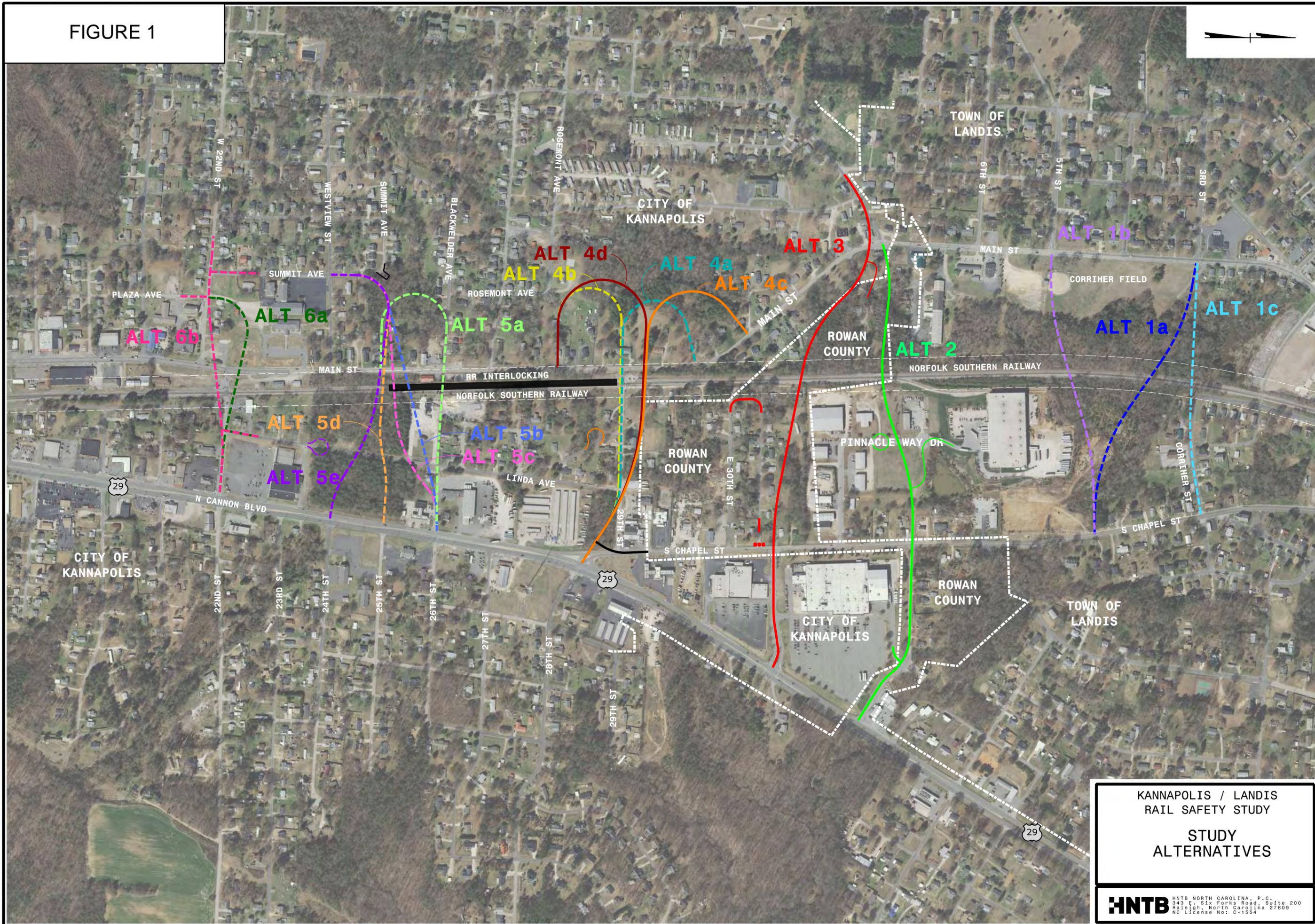
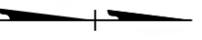
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FIGURE 1



KANNAPOLIS / LANDIS  
RAIL SAFETY STUDY

STUDY  
ALTERNATIVES

**CORRIDOR PUBLIC HEARING MAP**  
P-3309P

ROWAN COUNTY  
Grade Separation over North Carolina  
Railroad Corridor connecting US 29 and  
West A Street



- |                              |                          |                              |                          |                          |                         |                               |                         |                              |                                  |                               |                                |                           |                                   |                        |
|------------------------------|--------------------------|------------------------------|--------------------------|--------------------------|-------------------------|-------------------------------|-------------------------|------------------------------|----------------------------------|-------------------------------|--------------------------------|---------------------------|-----------------------------------|------------------------|
| 1 ATLANTIC AMERICAN PROP INC | 12 FAGGART JOHNNY R & WF | 23 FOWLER CURTIS D & WF      | 34 LEBLANC RODNEY C & WF | 45 MR RONALD E WILHELM   | 56 TYSON DEBORAH WILSON | 67 ATLANTIC AMERICAN PROP INC | 78 MILES JIMMY G & WF   | 89 BOST MEL GLENN &          | 100 MCDANIEL ANNIE S             | 113 JOHNSON RUTH HORTON & HUS | 124 ALBRANO CHARLES            | 135 SLOAN MINNIE LOTTA &  | 148 LONG IDA MAE                  | 160 KANNAPOLIS CITY OF |
| 2 ATLANTIC AMERICAN PROP INC | FAGGART CYNTHIA M        | 24 HENDERS ROBERT LARRY JR & | HALL JOHN HENRY & WF     | LANDIS BUSINESS PARK INC | BUTLER OPHELIA S        | 68 ATLANTIC AMERICAN PROP INC | 79 MILES JIMMY G & WF   | BOST EVEL GLENN              | 101 WRIGHT SYLVESTER LEE & WF    | 114 JOHNSON BRYAN W           | 125 CALDWELL MARGARET JACKSON  | 137 BROWN ROBERTA         | 149 LANE LYNZIA Z                 |                        |
| 3 ATLANTIC AMERICAN PROP INC | SIDES BILLY G            | 25 HENDERS ROBERT LARRY JR & | HALL SHARON              | GILLISPE WALTER A &      | SLOAN DEBERRI LAMONT    | 69 ATLANTIC AMERICAN PROP INC | 80 BANNER JUSTIN T & WF | BOST EVEL GLENN              | 102 FALLS DAVID L JR             | 115 UNITED BAPTIST CHURCH OF  | 126 ROBERTS JAMES D & WF       | 138 MELTON HARRIE L & WF  | 150 HAINSTON LUCY                 |                        |
| 4 ATLANTIC AMERICAN PROP INC | FARMER LARRY GENE & WF   | 26 NANCE JOHN THOMAS JR & WF | LANCASTER LEONARD M & WF | GILLISPE ELIZABETH       | SLOAN BILLY RAY         | 70 ATLANTIC AMERICAN PROP INC | 81 MILLER ANNY M        | ENGELHARDT CONRAD            | 103 STEELE BEBECCA BENNETT & HUS | 116 WOODIE HELEN C            | 127 CARPENTER BEVERLY CALDWELL | 139 WHITE SHARON D        | 151 SAAVEDRA MA CONCEPCION        |                        |
| 5 ATLANTIC AMERICAN PROP INC | FARMER MARGARET          | 27 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | ALANSON BILLY RAY        | MR RONALD E WILHELM     | 71 KANNAPOLIS WEST A STREET   | 82 COBB JAMIE L & WF    | RUNDERBURK Y J & WF          | 104 STEELE BEBECCA BENNETT & HUS | 117 WOODIE HELEN C            | 128 ROBERTS JAMES D & WF       | 140 ROBS LILLIE MAE HEIRS | 152 NEW PINE GROVE BAPT CH        |                        |
| 6 ATLANTIC AMERICAN PROP INC | SNOW MARY ELAINE         | 28 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | LANDIS BUSINESS PARK INC | MR RONALD E WILHELM     | 72 LANDIS TOWN OF             | 83 COBB JAMIE L & WF    | GLONDALE RENTAL SOLUTIONS LP | 105 BENNETT ELIZABETH            | 118 WOODIE HELEN C            | 129 ROBERTS ELIZABETH          | 141 WILDERD C BARNES      | 153 HORTON BARBARA BUTLER         |                        |
| 7 ATLANTIC AMERICAN PROP INC | SNOW MARY J              | 29 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | MR RONALD E WILHELM      | LANE JULIE BAXTER       | 73 LANDIS TOWN OF             | 84 COBB JAMIE L & WF    | GLONDALE RENTAL SOLUTIONS LP | 106 BENNETT ELIZABETH            | 119 WOODIE HELEN C            | 130 ROBERTS ELIZABETH          | 142 WARD JONATHAN E & WF  | 154 HORTON BARBARA BUTLER         |                        |
| 8 GARVEY THOMAS LUTHER & WF  | BOGER BLENDIA NESBITT    | 30 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | LANDIS BUSINESS PARK INC | YATES LINDA BAXTER      | 74 LANDIS TOWN OF             | 85 MILLER ANNY M        | GLONDALE RENTAL SOLUTIONS LP | 107 MCCOY CHRISTIANA             | 120 WOODIE HELEN C            | 131 ROBERTS ELIZABETH          | 143 BERRY MINNIE REID     | 155 BROADWAY HAROLD LEONARD       |                        |
| 9 GARVEY THOMAS LUTHER & WF  | CLINE BETTY D            | 31 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | MR RONALD E WILHELM      | LANE JULIE BAXTER       | 75 LANDIS TOWN OF             | 86 MILLER ANNY M        | GLONDALE RENTAL SOLUTIONS LP | 108 ROSS JANIE P                 | 121 WOODIE HELEN C            | 132 ROBERTS ELIZABETH          | 144 WARD JONATHAN E & WF  | 156 BROADWAY HAROLD LEONARD       |                        |
| 10 GARVEY THOMAS LUTHER & WF | DRAPER OSCAR RODNEY & WF | 32 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | MR RONALD E WILHELM      | LANE JULIE BAXTER       | 76 LANDIS TOWN OF             | 87 MILLER ANNY M        | GLONDALE RENTAL SOLUTIONS LP | 109 ALEXANDER TRAVIS             | 122 WOODIE HELEN C            | 133 ROBERTS ELIZABETH          | 145 WARD JONATHAN E & WF  | 157 NEW PINE GROVE BAPT CH        |                        |
| 11 FAGGART JOHNNY RAY & WF   | DRAPER OSCAR RODNEY & WF | 33 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | MR RONALD E WILHELM      | LANE JULIE BAXTER       | 77 LANDIS TOWN OF             | 88 MILLER ANNY M        | GLONDALE RENTAL SOLUTIONS LP | 110 ALEXANDER TRAVIS             | 123 WOODIE HELEN C            | 134 ROBERTS ELIZABETH          | 146 WARD JONATHAN E & WF  | 158 NEW PINE GROVE BAPT CHURCH    |                        |
| 12 FAGGART JOHNNY RAY & WF   | DRAPER OSCAR RODNEY & WF | 34 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | MR RONALD E WILHELM      | LANE JULIE BAXTER       | 78 LANDIS TOWN OF             | 89 MILLER ANNY M        | GLONDALE RENTAL SOLUTIONS LP | 111 ALEXANDER TRAVIS             | 124 WOODIE HELEN C            | 135 ROBERTS ELIZABETH          | 147 WARD JONATHAN E & WF  | 159 WILCOHES LLC #364 #361-A #366 |                        |
| 13 FAGGART JOHNNY RAY & WF   | DRAPER OSCAR RODNEY & WF | 35 NANCE JOHN THOMAS JR & WF | LANCASTER SHARON M & WF  | MR RONALD E WILHELM      | LANE JULIE BAXTER       | 79 LANDIS TOWN OF             | 90 MILLER ANNY M        | GLONDALE RENTAL SOLUTIONS LP | 112 ALEXANDER TRAVIS             | 125 WOODIE HELEN C            | 136 ROBERTS ELIZABETH          | 148 WARD JONATHAN E & WF  | 160 KANNAPOLIS CITY OF            |                        |

**LEGEND**

- BUILDINGS
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- ALL EASEMENTS
- EXISTING ROADWAY
- EXISTING ROADWAY TO BE REMOVED
- EXISTING ROADWAY TO BE RESURFACED
- PROPOSED ROADWAY
- EXISTING STRUCTURES, ISLAND, CURB AND GUTTER TO BE REMOVED
- PROPOSED STRUCTURES, ISLAND, CURB AND GUTTER
- NCRR RAILROAD RIGHT OF WAY
- EXISTING PUMP STATION
- PROPOSED RIGHT OF WAY
- PROPERTY LINES
- NORFOLK SOUTHERN EXISTING RAIL ROAD TRACKS
- NORFOLK SOUTHERN FUTURE RAIL ROAD TRACKS
- MUNICIPAL BOUNDARY
- EXISTING TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL

**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

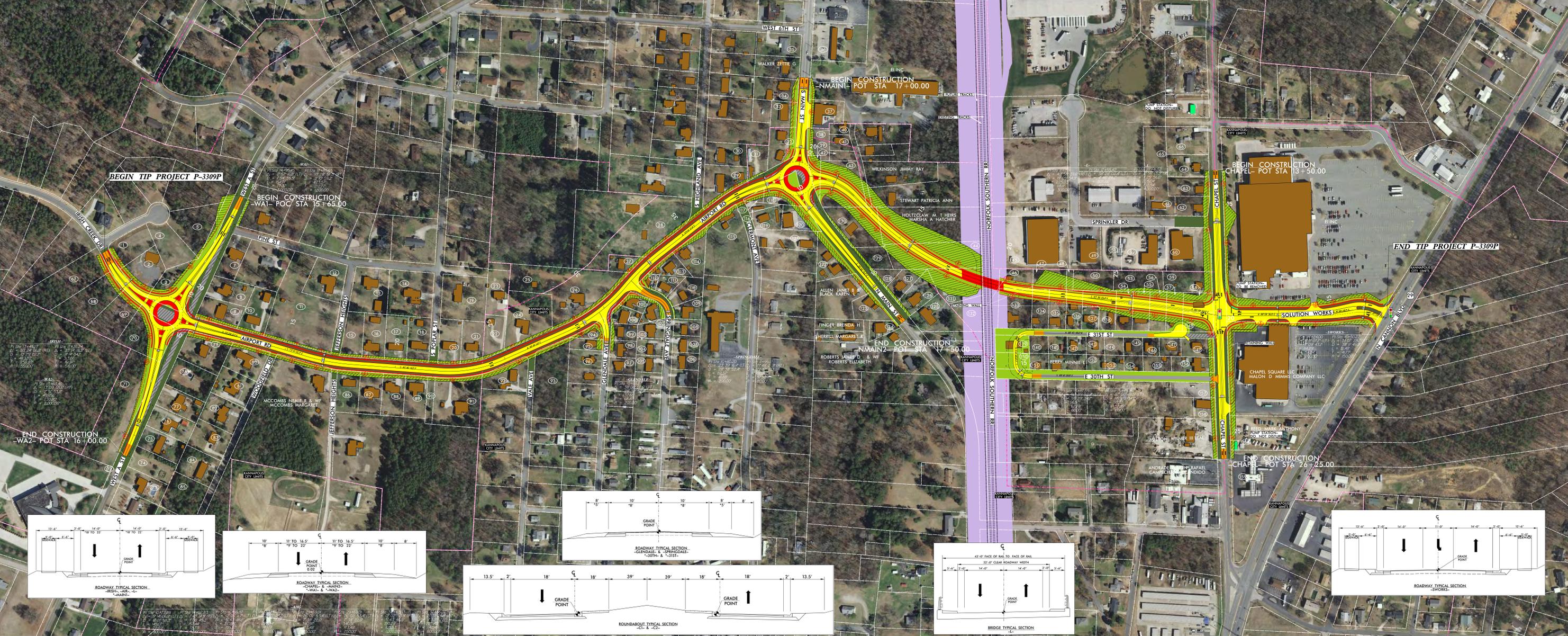
200' 0' 200' 400'

100'

**(ENGLISH)**

**DESIGN DATA**

Functional Class. = MINOR ARTERIAL  
Design Speed. = 40 MPH  
Max Superelev. = 0.04



**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

200' 0' 200' 400'

100'

**(ENGLISH)**

**DESIGN DATA**

Functional Class. = MINOR ARTERIAL  
Design Speed. = 40 MPH  
Max Superelev. = 0.04

8/17/09

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

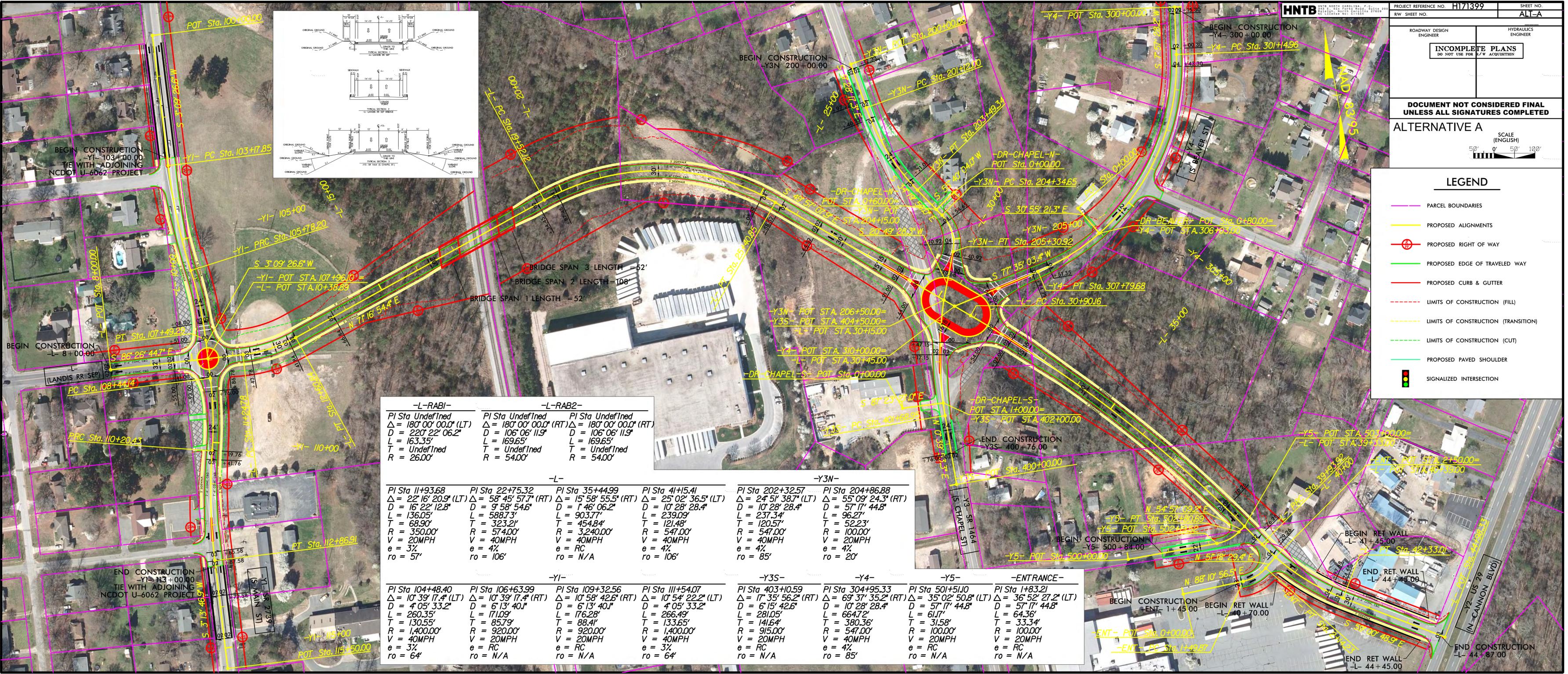
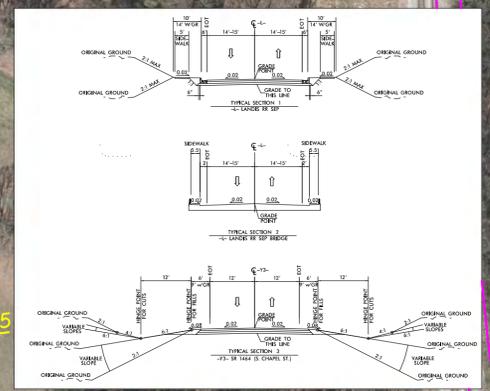
**DOCUMENT NOT CONSIDERED FINAL**  
**UNLESS ALL SIGNATURES COMPLETED**

**ALTERNATIVE A**

SCALE (ENGLISH)  
50' 0' 50' 100'

**LEGEND**

- PARCEL BOUNDARIES
- PROPOSED ALIGNMENTS
- PROPOSED RIGHT OF WAY
- PROPOSED EDGE OF TRAVELED WAY
- PROPOSED CURB & GUTTER
- LIMITS OF CONSTRUCTION (FILL)
- LIMITS OF CONSTRUCTION (TRANSITION)
- LIMITS OF CONSTRUCTION (CUT)
- PROPOSED PAVED SHOULDER
- SIGNALIZED INTERSECTION



| -L-RAB1-           |  | -L-RAB2-           |  | -Y3N-             |                                       | -Y4-              |                                       | -Y5-              |                                       | -ENTRANCE-        |                                       |
|--------------------|--|--------------------|--|-------------------|---------------------------------------|-------------------|---------------------------------------|-------------------|---------------------------------------|-------------------|---------------------------------------|
| PI Sta Undefined   | $\Delta = 180^{\circ} 00' 00.0''$ (LT) | PI Sta Undefined   | $\Delta = 180^{\circ} 00' 00.0''$ (RT) | PI Sta 202+32.57  | $\Delta = 24^{\circ} 51' 38.7''$ (LT) | PI Sta 304+95.33  | $\Delta = 69^{\circ} 37' 35.2''$ (RT) | PI Sta 501+51.10  | $\Delta = 35^{\circ} 02' 50.8''$ (LT) | PI Sta 1+83.21    | $\Delta = 36^{\circ} 52' 27.2''$ (LT) |
| D = 220' 22' 06.2" |  | D = 106' 06' 11.9" |  | D = 10' 28' 28.4" |                                       | D = 10' 28' 28.4" |                                       | D = 57' 17' 44.8" |                                       | D = 57' 17' 44.8" |                                       |
| L = 163.35'        |  | L = 169.65'        |  | L = 239.09'       |                                       | L = 237.34'       |                                       | L = 96.27'        |                                       | L = 52.23'        |                                       |
| T = Undefined      |  | T = Undefined      |  | T = 121.48'       |                                       | T = 120.57'       |                                       | T = 52.23'        |                                       | T = 31.58'        |                                       |
| R = 26.00'         |  | R = 54.00'         |  | R = 547.00'       |                                       | R = 547.00'       |                                       | R = 100.00'       |                                       | R = 100.00'       |                                       |
| V = 20MPH          |  | V = 40MPH          |  | V = 40MPH         |                                       | V = 40MPH         |                                       | V = 20MPH         |                                       | V = 20MPH         |                                       |
| e = 3%             |  | e = 4%             |  | e = 4%            |                                       | e = 4%            |                                       | e = 4%            |                                       | e = 4%            |                                       |
| ro = 57'           |  | ro = 106'          |  | ro = 85'          |                                       | ro = 85'          |                                       | ro = N/A          |                                       | ro = N/A          |                                       |

8/17/09

**HNTB** NORTH CAROLINA, P.C.  
 10000 WOODHOLLOW EXPLORES DRIVE  
 RALEIGH, NC 27617-5000

PROJECT REFERENCE NO. **H171399** SHEET NO. **ALT-B**  
 RW SHEET NO.

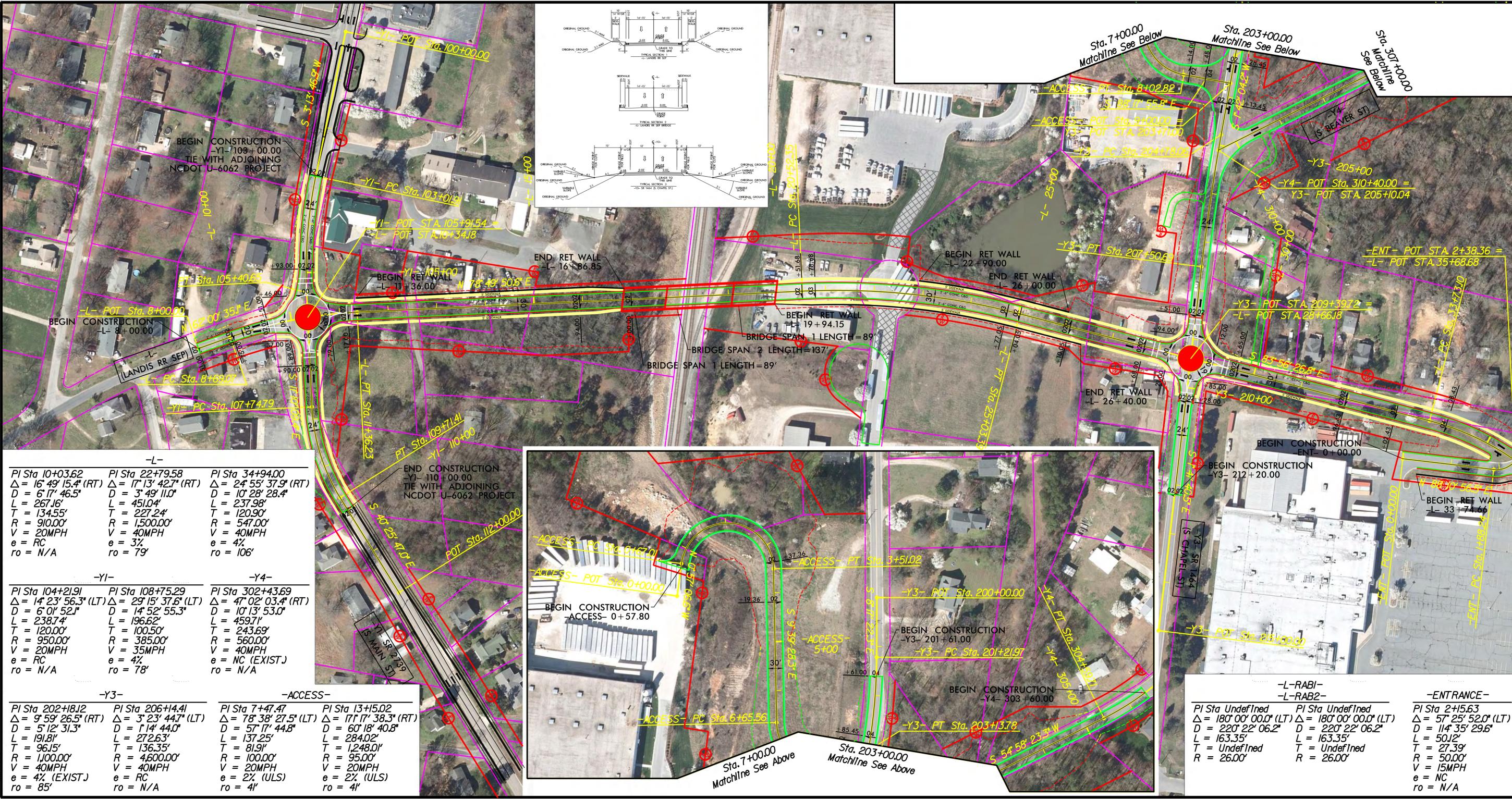
ROADWAY DESIGN ENGINEER  
 HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
 DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL**  
**UNLESS ALL SIGNATURES COMPLETED**

**ALTERNATIVE B**

SCALE (ENGLISH)  
 50' 0' 50' 100'



**LEGEND**

- PARCEL BOUNDARIES
- PROPOSED ALIGNMENTS
- PROPOSED RIGHT OF WAY
- PROPOSED EDGE OF TRAVELED WAY
- PROPOSED CURB & GUTTER
- LIMITS OF CONSTRUCTION (FILL)
- LIMITS OF CONSTRUCTION (TRANSITION)
- LIMITS OF CONSTRUCTION (CUT)
- PROPOSED PAVED SHOULDER
- SIGNALIZED INTERSECTION

**-L-**

|   |  |   |
|---|--|---|
| PI Sta 10+03.62<br>Δ = 16° 49' 15.4" (RT)<br>D = 6' 17' 46.5"<br>L = 267.16'<br>T = 134.55'<br>R = 910.00'<br>V = 20MPH<br>e = RC<br>ro = N/A | PI Sta 22+79.58<br>Δ = 17° 13' 42.7" (RT)<br>D = 3' 49' 11.0"<br>L = 451.04'<br>T = 227.24'<br>R = 1500.00'<br>V = 40MPH<br>e = 3%<br>ro = 79' | PI Sta 34+94.00<br>Δ = 24° 55' 37.9" (RT)<br>D = 10' 28' 28.4"<br>L = 237.98'<br>T = 120.90'<br>R = 547.00'<br>V = 40MPH<br>e = 4%<br>ro = 106' |
|---|--|---|

**-Y1-**

|  |   |  |
|--|---|--|
| PI Sta 104+21.91<br>Δ = 14° 23' 56.3" (LT)<br>D = 6' 01' 52.1"<br>L = 238.74'<br>T = 120.00'<br>R = 950.00'<br>V = 20MPH<br>e = RC<br>ro = N/A | PI Sta 108+75.29<br>Δ = 29° 15' 37.6" (LT)<br>D = 14° 52' 55.3"<br>L = 196.62'<br>T = 100.50'<br>R = 385.00'<br>V = 35MPH<br>e = 4%<br>ro = 78' | PI Sta 302+43.69<br>Δ = 47° 02' 03.4" (RT)<br>D = 10' 13' 53.0"<br>L = 459.71'<br>T = 243.69'<br>R = 560.00'<br>V = 40MPH<br>e = NC (EXIST.)<br>ro = N/A |
|--|---|--|

**-Y3-**

|  |  |  |   |
|--|--|--|---|
| PI Sta 202+18.12<br>Δ = 9° 59' 26.5" (RT)<br>D = 5' 12' 31.3"<br>L = 191.81'<br>T = 96.15'<br>R = 1100.00'<br>V = 40MPH<br>e = 4% (EXIST.)<br>ro = 85' | PI Sta 206+14.41<br>Δ = 3° 23' 44.7" (LT)<br>D = 1' 14' 44.0"<br>L = 272.63'<br>T = 136.35'<br>R = 4600.00'<br>V = 40MPH<br>e = RC<br>ro = N/A | PI Sta 7+47.47<br>Δ = 78° 38' 27.5" (LT)<br>D = 57° 17' 44.8"<br>L = 137.25'<br>T = 81.91'<br>R = 100.00'<br>V = 20MPH<br>e = 2% (ULS)<br>ro = 41' | PI Sta 13+15.02<br>Δ = 17° 17' 38.3" (RT)<br>D = 60' 18' 40.8"<br>L = 284.02'<br>T = 124.80'<br>R = 95.00'<br>V = 20MPH<br>e = 2% (ULS)<br>ro = 41' |
|--|--|--|---|

**-Y4-**

|  |   |  |
|--|---|--|
| PI Sta 104+21.91<br>Δ = 14° 23' 56.3" (LT)<br>D = 6' 01' 52.1"<br>L = 238.74'<br>T = 120.00'<br>R = 950.00'<br>V = 20MPH<br>e = RC<br>ro = N/A | PI Sta 108+75.29<br>Δ = 29° 15' 37.6" (LT)<br>D = 14° 52' 55.3"<br>L = 196.62'<br>T = 100.50'<br>R = 385.00'<br>V = 35MPH<br>e = 4%<br>ro = 78' | PI Sta 302+43.69<br>Δ = 47° 02' 03.4" (RT)<br>D = 10' 13' 53.0"<br>L = 459.71'<br>T = 243.69'<br>R = 560.00'<br>V = 40MPH<br>e = NC (EXIST.)<br>ro = N/A |
|--|---|--|

**-ACCESS-**

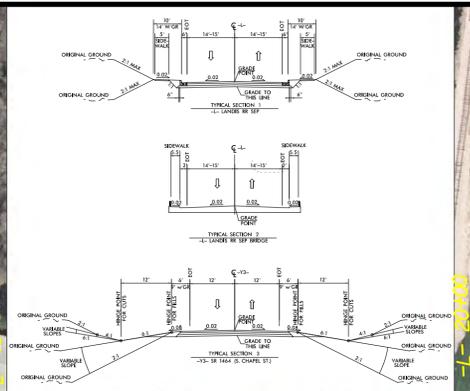
|  |   |
|--|---|
| PI Sta 7+47.47<br>Δ = 78° 38' 27.5" (LT)<br>D = 57° 17' 44.8"<br>L = 137.25'<br>T = 81.91'<br>R = 100.00'<br>V = 20MPH<br>e = 2% (ULS)<br>ro = 41' | PI Sta 13+15.02<br>Δ = 17° 17' 38.3" (RT)<br>D = 60' 18' 40.8"<br>L = 284.02'<br>T = 124.80'<br>R = 95.00'<br>V = 20MPH<br>e = 2% (ULS)<br>ro = 41' |
|--|---|

**-ENTRANCE-**

|   |
|---|
| PI Sta 2+15.63<br>Δ = 57° 25' 52.0" (LT)<br>D = 114' 35' 29.6"<br>L = 50.12'<br>T = 27.39'<br>R = 50.00'<br>V = 15MPH<br>e = NC<br>ro = N/A |
|---|

**-L-RABI-**

|  |   |   |
|--|---|---|
| PI Sta Undefined<br>Δ = 180° 00' 00.0" (LT)<br>D = 220' 22' 06.2"<br>L = 163.35'<br>T = 26.00'<br>R = 26.00' | PI Sta Undefined<br>Δ = 180° 00' 00.0" (LT)<br>D = 220' 22' 06.2"<br>L = 163.35'<br>T = Undefined<br>R = 26.00' | PI Sta 2+15.63<br>Δ = 57° 25' 52.0" (LT)<br>D = 114' 35' 29.6"<br>L = 50.12'<br>T = 27.39'<br>R = 50.00'<br>V = 15MPH<br>e = NC<br>ro = N/A |
|--|---|---|



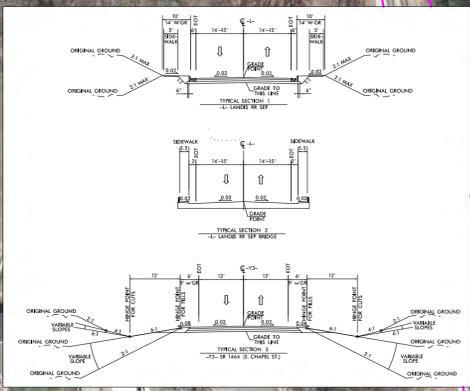
8/17/09

8/17/99

|                                |                     |
|--------------------------------|---------------------|
| ROADWAY DESIGN ENGINEER        | HYDRAULICS ENGINEER |
| <b>INCOMPLETE PLANS</b>        |                     |
| DO NOT USE FOR R/W ACQUISITION |                     |

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

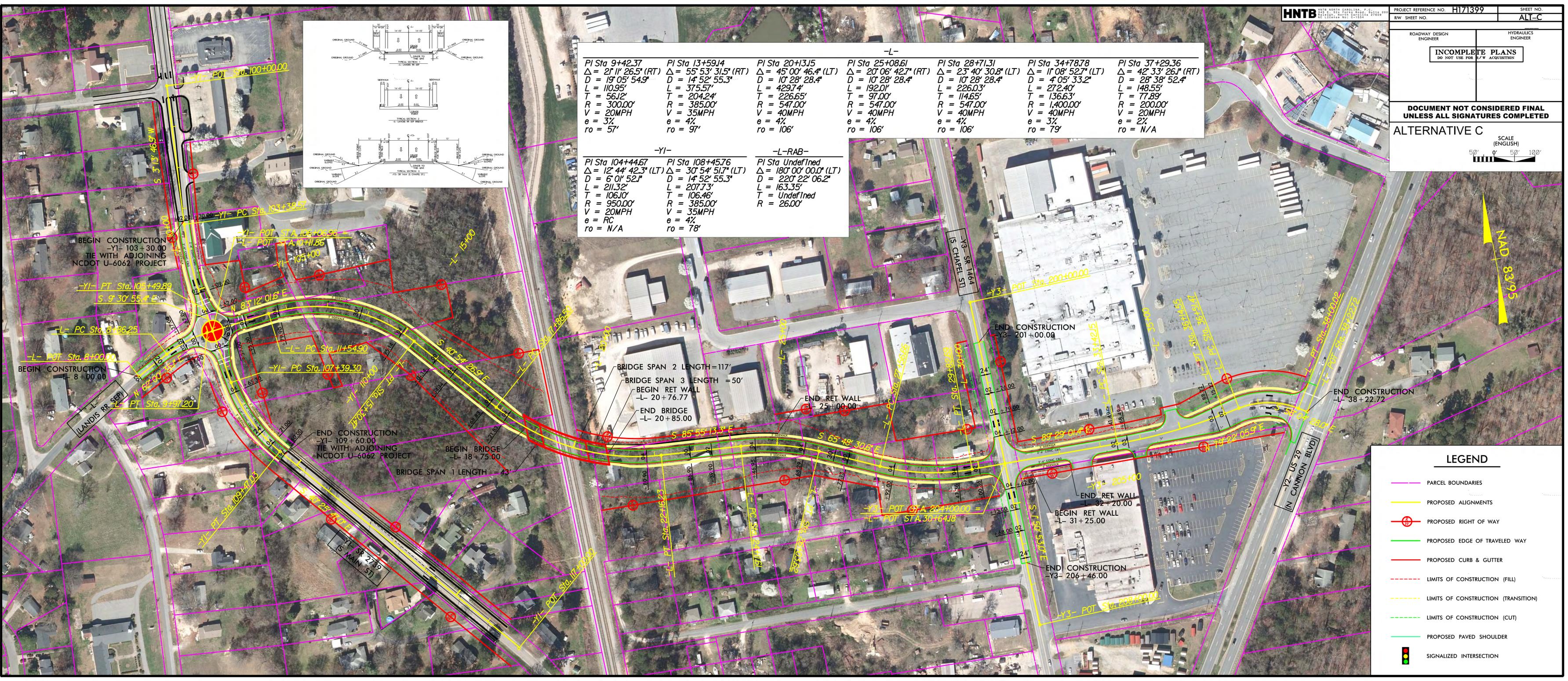
**ALTERNATIVE C**



| -L-                           |                               |                               |                               |                               |                               |                               |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| PI Sta 9+42.37                | PI Sta 13+59.14               | PI Sta 20+13.15               | PI Sta 25+08.61               | PI Sta 28+71.31               | PI Sta 34+78.78               | PI Sta 37+29.36               |
| $\Delta = 21' 11" 26.5" (RT)$ | $\Delta = 55' 53' 31.5" (RT)$ | $\Delta = 45' 00' 46.4" (LT)$ | $\Delta = 20' 06' 42.7" (RT)$ | $\Delta = 23' 40' 30.8" (LT)$ | $\Delta = 11' 08' 52.7" (LT)$ | $\Delta = 42' 33' 26.1" (RT)$ |
| D = 19' 05' 54.9"             | D = 14' 52' 55.3"             | D = 10' 28' 28.4"             | D = 10' 28' 28.4"             | D = 10' 28' 28.4"             | D = 4' 05' 33.2"              | D = 28' 38' 52.4"             |
| L = 110.95'                   | L = 375.57'                   | L = 429.74'                   | L = 192.01'                   | L = 226.03'                   | L = 272.40'                   | L = 148.55'                   |
| T = 56.12'                    | T = 204.24'                   | T = 226.65'                   | T = 97.00'                    | T = 114.65'                   | T = 136.63'                   | T = 77.89'                    |
| R = 300.00'                   | R = 385.00'                   | R = 547.00'                   | R = 547.00'                   | R = 547.00'                   | R = 1,400.00'                 | R = 200.00'                   |
| V = 20MPH                     | V = 35MPH                     | V = 40MPH                     | V = 40MPH                     | V = 40MPH                     | V = 40MPH                     | V = 20MPH                     |
| e = 3%                        | e = 4%                        | e = 4%                        | e = 4%                        | e = 4%                        | e = 3%                        | e = 2%                        |
| ro = 57'                      | ro = 97'                      | ro = 106'                     | ro = 106'                     | ro = 106'                     | ro = 79'                      | ro = N/A                      |

| -YI-                          |                               | -L-RAB-                        |                                |
|-------------------------------|-------------------------------|--------------------------------|--------------------------------|
| PI Sta 104+44.67              | PI Sta 108+45.76              | PI Sta Undefined               | PI Sta Undefined               |
| $\Delta = 12' 44' 42.3" (LT)$ | $\Delta = 30' 54' 51.7" (LT)$ | $\Delta = 180' 00' 00.0" (LT)$ | $\Delta = 220' 22' 06.2" (LT)$ |
| D = 6' 01' 52.1"              | D = 14' 52' 55.3"             | D = 220' 22' 06.2"             | D = 163.35'                    |
| L = 211.32'                   | L = 207.73'                   | L = 163.35'                    | T = Undefined                  |
| T = 106.10'                   | T = 106.46'                   | T = Undefined                  | R = 26.00'                     |
| R = 950.00'                   | R = 385.00'                   |                                |                                |
| V = 20MPH                     | V = 35MPH                     |                                |                                |
| e = RC                        | e = 4%                        |                                |                                |
| ro = N/A                      | ro = 78'                      |                                |                                |



**LEGEND**

- PARCEL BOUNDARIES
- PROPOSED ALIGNMENTS
- PROPOSED RIGHT OF WAY
- PROPOSED EDGE OF TRAVELED WAY
- PROPOSED CURB & GUTTER
- LIMITS OF CONSTRUCTION (FILL)
- LIMITS OF CONSTRUCTION (TRANSITION)
- LIMITS OF CONSTRUCTION (CUT)
- PROPOSED PAVED SHOULDER
- SIGNALIZED INTERSECTION

8/17/99