

East-West Connector Alignment Feasibility Study

Prepared for:
Town of Mooresville, NC



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EXECUTIVE SUMMARY

The Town of Mooresville, North Carolina, is experiencing rapid growth in the South Iredell / Mt. Mourne area. Much of this growth was fueled by the announcement by Lowe's Companies to relocate its corporate headquarters to Mt. Mourne with a promise of 12,000 new jobs. However, long before the Lowe's announcement, other factors were at work changing the demographics and travel patterns in Mooresville. Through the 1990's, Mooresville's population increased by nearly 70%.

The implementation of an east-west connector road from I-77 (Exit 31 at Langtree Road) to NC Hwy 3 is a major component of improved east-west connectivity in the Town and particularly in the Mt. Mourne area. The East-West Connector has been identified in both the Mt. Mourne Small Area Plan and Mooresville's Comprehensive Transportation Plan.

The Project Study Area is located in the southern region of Iredell County, NC. It stretches from Langtree Road (SR 1102), east of the new Lowe's corporate headquarters entrance, to Shearers Road (SR 1125), a distance of approximately 3.7 miles. Approximately half of the study corridor is on new location, while the remainder is centered along existing roadway, namely Langtree Road, and Faith Road (SR 1136).

The alignment between Langtree Road and NC Hwy 115 was established under a previous study by the adjacent land owners. It was further refined under this study. Existing and proposed development, existing topography, highway geometry, existing railroad location and elevation, impacts, and future extension were primary considerations that dictated its location.

The alignment from NC Hwy 115 to Shearers Road was designed by:

1. Utilizing existing right-of-way where feasible,
2. Minimizing impacts on adjacent properties, and
3. Avoiding/minimizing impacts on environmental features such as wetlands and streams.



The estimated costs for the proposed East-West Connector are displayed in the following table.

Description	Cost
Roadway	\$ 22,216,000
Bridge(s)	\$ 1,134,000
Subtotal (Construction)	\$ 23,350,000
Right-of-Way & Utilities	\$ 2,650,000
TOTAL	\$ 26,000,000

Note: All costs are in 2008 dollars.

The proposed East-West Connector / Norfolk Southern (NS) rail/highway crossing is proposed to be at-grade. A Traffic Separation Study (TSS) was completed for the NS "O" line in 2004 in an effort by the Metropolitan Transit Commission/Charlotte Area Transit System (MTC/CATS) to initiate passenger rail service between Charlotte, NC and Mooresville, NC.

As part of the East-West Connector Alignment Study and the need for a new at-grade rail/highway crossing, the at-grade crossings within the Town of Mooresville were re-evaluated using elements of the TSS process.

The following public crossings are recommended for closure for the described reasons:

- Walnut Street (Crossing # 721675S) – Redundant, humped, alternative access,
- Catawba Avenue (Crossing # 721681V) – Redundant, humped, alternative access,
- Norman Drive (Crossing # 721687L) – Redundant, humped, alternative access,
- Crossrail Road (Crossing # 721696K) – Alternative access, new connection,

Along with railroad crossings, environmental impacts were evaluated. The field review and windshield survey identified the presence of eleven (11) jurisdictional streams. No jurisdictional wetlands or other jurisdictional features were identified within the project corridor.



During field studies, no definitive observations were made of any protected species; however, potential habitat for dwarf-flowered heartleaf and little sneezeweed was identified.

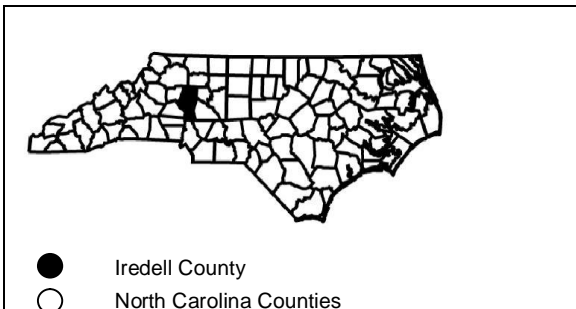
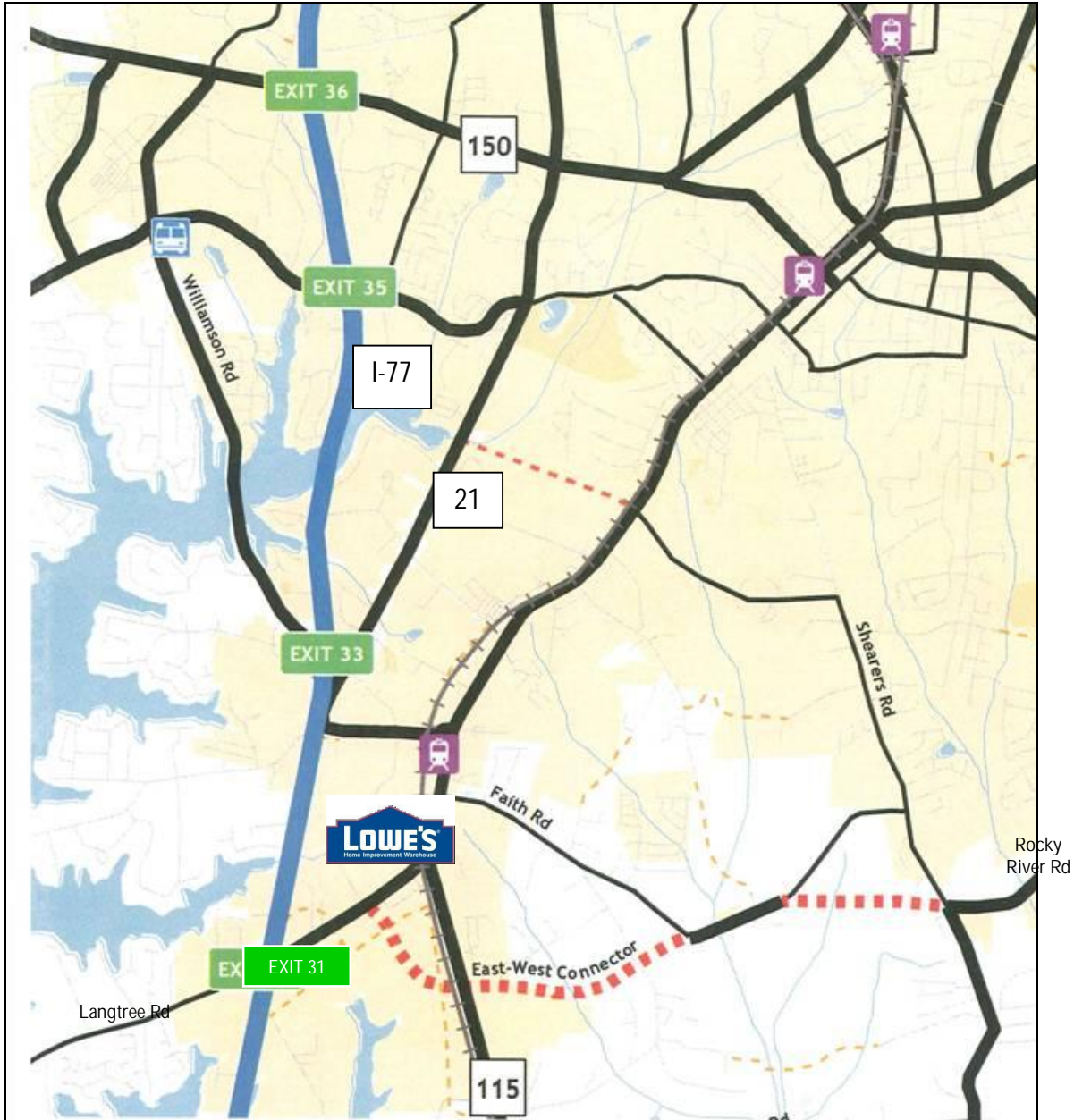
The State Historic Preservation Office (SHPO) indicated that there is a very high probability that archaeological sites exist based on topographical and hydrological conditions in the project area. SHPO recommended that a comprehensive archaeological survey be conducted if any earth moving activities are scheduled to occur.

Roadway projects, such as this one, may qualify for Nationwide Permit (NWP) 14 (linear transportation projects). Projects eligible for NWP 14 also require formal pre-construction notification to the North Carolina Division of Water Quality (NCDWQ) for State Water Quality Certification (WQC), pursuant to Section 401 of the Clean Water Act. For a project of this nature, the NCDWQ may require an indirect and cumulative impacts analysis as part of the pre-construction notification. Compensatory mitigation may be required.

Coordination with Town of Mooresville officials, NCDOT, representatives of local fire departments, and citizens was maintained throughout the project. Through meetings and public involvement, concerns were highlighted and incorporated into the project when feasible.

The proposed East-West Connector is feasible as confirmed by this study. It is very likely that NS will agree with the grade crossing closure plan as recommended and grant a “new” grade crossing. Funding will have to be identified since there is nothing scheduled or established for this project at this time. Also, utilities do not currently exist within the study area east of NC Hwy 115 that could support the development proposed in the Mt. Mourne Small Area Plan.

The East-West Connector is considered a long-term project except for the portion on the west side of NC Hwy 115. Developers and land owners have agreed to dedicate right-of-way and construct the proposed segment of the East-West Connector between Langtree Road and NC Hwy 115.



**PROJECT LOCATION
MAP**
East-West Connector Alignment
Langtree Road to Shearers Road
Mooresville, North Carolina

Figure 1



INTRODUCTION / BACKGROUND

The Town of Mooresville, North Carolina, is experiencing rapid growth in the South Iredell / Mt. Mourne area. Much of this growth was fueled by the announcement by Lowe's Companies to relocate its corporate headquarters to Mt. Mourne with a promise of 12,000 new jobs. However, long before the Lowes announcement, other factors were at work changing the demographics and travel patterns in Mooresville including:

1. The creation of Lake Norman in the early 1960's for hydroelectric power, water supply source, and recreation area,
2. Opening of Interstate 77 (I-77),
3. Mooresville's proximity to a metropolitan area (Charlotte, NC),
4. Proximity to a large, international airport (Charlotte-Douglas International Airport in Charlotte and Piedmont International Airport in Greensboro),
5. Opening of the Lake Norman Regional Medical Center,
6. Race City, USA as Mooresville has come to be known, is home to more than 60 race teams of the National Association of Stock Car Auto Racing (NASCAR) and the North Carolina Auto Racing Hall of Fame. This industry attracts over 180,000 tourists to Mooresville each year.

These factors contributed to Mooresville's growth from a small town with a downtown central business district centered around a railroad depot and textile mill to a more suburban area of residential subdivisions, shopping centers, and business parks. Through the 1990's, Mooresville's population increased by nearly 70%. Planned infrastructure improvements will help handle the increased traffic demand on area roadways as well as improve access and attract further development. Proposed improvements include:

1. A new I-77 interchange at Langtree Road (Exit 31) to serve as the entrance to the Lowe's Corporate Headquarters,



2. A new I-77 interchange at Brawley School Road and widening of Brawley School Road,
3. Proposed Charlotte Area Transit Station (CATS) in the Mt. Mourne area.

The implementation of an east-west connector road from I-77 (Exit 31 at Langtree Road) to NC Hwy 3 is a major component of improved east-west connectivity in the Town and particularly in the Mt. Mourne area. The East-West Connector has been identified in both the Mt. Mourne Small Area Plan and Mooresville's Comprehensive Transportation Plan. This Study examines the feasibility of constructing such a road by studying the alignment, reviewing preliminary environmental data, obtaining citizen input, assessing impacts on major utilities, and preparing cost estimates. A new at-grade rail/highway crossing will be required where the proposed East-West Connector alignment intersects the existing rail line owned and operated by Norfolk Southern Corporation (NS). In an effort to reach an agreement NS for the new at-grade rail/highway crossing, other existing at-grade rail/highway crossings will be reviewed to identify potential rail crossing closures to comply with crossing consolidation goals of the Federal Highway Administration (FHWA) and the Federal Railroad Administration (FRA).

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EXISTING CONDITIONS

The Project Study Area is located in the southern region of Iredell County, NC. It stretches from Langtree Road, east of the new Lowe's corporate headquarters entrance, to Shearers Road, a distance of approximately 3.7 miles. Approximately half of the study corridor is on new location, while the remainder is centered along existing roadway, namely Langtree Road, and Faith Road (see Project Location Map - Figure 1). The project corridor consists primarily of undeveloped woodland and agricultural fields, with several residences along the existing roadways. The next section of the proposed East-West Connector Alignment between Shearers Road and NC 152 will be the subject of a future study.

The topography can be characterized as "rolling" with gentle (0%-10%) to steep (> 10%) slopes throughout the area. NC Hwy 115 and the Norfolk Southern railroad were constructed on a ridge line that divides the Catawba River Basin to the west from the Rocky River Basin to the east. Much of the development in the area has occurred on the gentler/flatter slopes leaving the steeper slopes undeveloped.

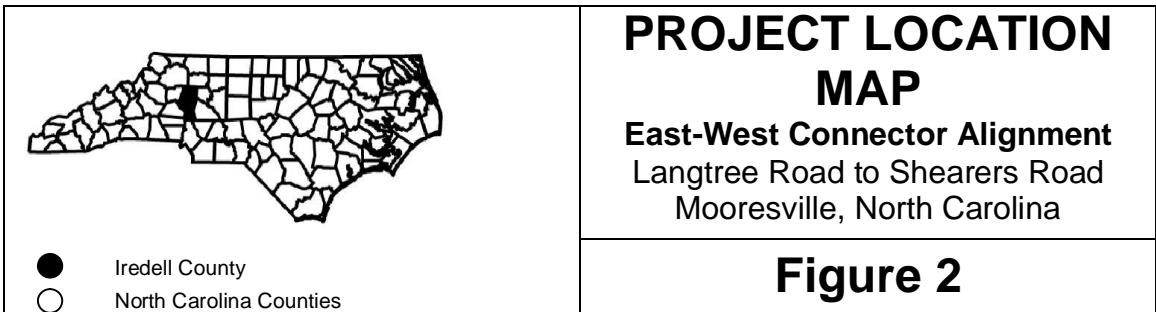
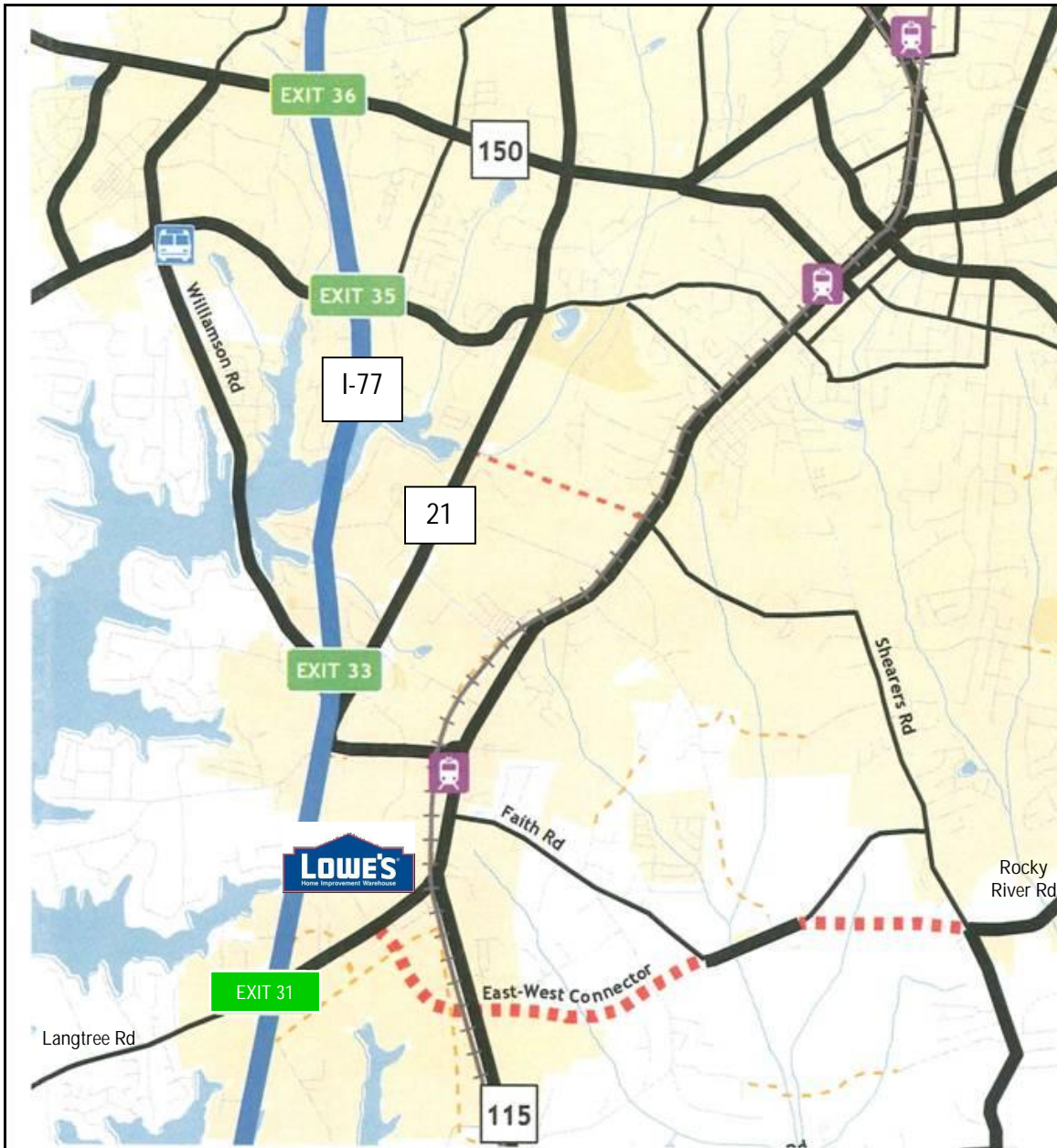
There are two major utilities that traverse the project area. Transco maintains an easement for a major gas pipeline that runs northeasterly through the western project area. The easement is parallel to Langtree Road and approximately 1000 feet south. Duke Power maintains a north-south easement near the eastern project terminus. The easement is for overhead transmission lines on steel towers.

The Cove Church, a non-denominational church, is located near the western project terminus. Its existing drive access is located along Langtree Road.

The Mt. Mourne Volunteer Fire Department (VFD) is located on the east side NC Hwy 115 just north of the existing Langtree Road/NC Hwy 115 intersection. It currently services the Langtree peninsula (unincorporated area of Iredell County west of I-77) as well as areas to the east of NC Hwy 115.

The Pine Lake Prep Charter School campus was recently completed with the 2008-2009 school year being its first year of operation.

It consists of an elementary, middle, and high school campus. It is located on the east side of NC Hwy 115 just south of the existing Langtree Road/NC Hwy 115 intersection.





ALIGNMENT STUDY

One alignment was studied within the corridor from Langtree Road to Shearers Road. A 4-lane, median divided typical section was utilized throughout the project, with a design speed of 45mph (40mph posted speed).

The East-West Connector alignment will begin on Langtree Road just east of the new entrance to Lowe's corporate headquarters. From Langtree Road, it will swing south on new location, then turn east crossing the NS "O" line and NC Hwy 115 approximately 0.70 miles south of the existing NC Hwy 115/Langtree Road intersection. The alignment between Langtree Road and NC Hwy 115 was established under a previous study and agreed to amongst the adjacent land owners. It was further refined under this study. Existing and proposed development, existing topography, highway geometry, existing railroad location and elevation, impacts, and future extension were primary considerations that dictated its location. The proposed East-West Connector / Norfolk Southern rail/highway crossing is proposed to be at-grade.

From NC Hwy 115, the East-West Connector will continue east on new location, crossing Midway Lake Road, to Faith Road. Utilizing the existing right-of-way of Faith Road, the alignment will follow existing Faith Road for approximately 3,000 feet. It will then depart existing Faith Road and head east on new location, intersecting Shearers Road across from Rocky River Road. The alignment from NC Hwy 115 to Rocky River Road was designed by:

1. Utilizing existing right-of-way where feasible,
2. Minimizing impacts on adjacent properties, and
3. Avoiding/minimizing impacts on environmental features such as wetlands and streams.

The proposed alignment intersects a number of streams and roads, as well as an existing transmission line easement. These physical features, i.e cross streets, driveways, streams, and major utilities, serve as "control points" for the vertical alignment / profile. Proper clearance above streams is required to provide adequate drainage during design flows and minimize linear impacts to our streams and waterways.



Matching existing elevations at intersecting roads is critical to minimizing the cost of the project by eliminating unnecessary embankment cuts and fills, reduces the need for guardrail, minimizes requirements for temporary pavement for maintenance of traffic normally associated with large earthwork moving operations during construction, and maintains existing vertical clearances. It is also critical to avoid impacts to transmission lines and towers by designing the vertical alignment to provide required clearances under any overhead transmission line. Achieving this, however, is not always practical when complying with design standards and may result in compromises elsewhere along the alignment. For example, matching the existing elevation under the transmission lines will require a 20-foot excavation immediately west of the transmission lines. This excavated material can be used in other areas for fill embankment.

COST ESTIMATES

A planning level opinion of probable costs was prepared for the studied alignment. Approximate quantities of major items of roadway and structure design elements were computed based on the functional level design plans. The unit costs are based on the unit prices for recently constructed similar facilities in the area and/or the latest average unit prices available on the NCDOT web site. Approximate right-of-way needs were estimated from the functional design plans. Right-of-way costs were estimated using values available on the Iredell County web site. The estimated costs for the proposed East-West Connector are displayed in the table below.

Table 1: Cost Estimates

Description	Cost
Roadway	\$ 22,216,000
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Note: All costs are in 2008 dollars.



RAILROAD CROSSING ANALYSIS

In 1994, the United States Department of Transportation's (USDOT) Grade Crossing Action Plan set a goal of closing 25 percent of public crossings to improve safety. In 1995, to identify specific candidate crossings for closure, the NCDOT Rail Division established a series of thorough steps to improve coordination, communication, and consistency with all stakeholders across the state. This process has become known as a Traffic Separation Study (TSS). Traffic Separation Studies are part of a comprehensive evaluation of traffic patterns and road usage at highway-rail grade crossings for an entire municipality or region to assess existing safety conditions. Traffic Separation Studies determine the need for improvements and/or elimination of public grade crossings based on specific criteria, which can include:

- Accident history;
- Existing and projected vehicular and train traffic;
- Types of roadways and crossings;
- Types of property being served;
- Emergency routes;
- School bus routes;
- Types of warning devices present;
- Feasibility for improvements;
- Economic impact on the community if the crossing is closed.

Most closures are completed on minor roads and they are usually redundant crossings. North Carolina Department of Transportation's (NCDOT) Rail Division considers a crossing redundant (and therefore a candidate for elimination) if it is within ¼ mile of another crossing connected to the same street network. Where possible, traffic is rerouted, or grade separations (bridges) or other enhanced warning devices are applied at the alternate crossings (such as flashers and gates, or enhanced devices, such as four quadrant gates or median separators).



While the NCDOT Rail Division was establishing their TSS model, the railroads adopted a “no new crossings” approach. Their goals in consolidating and reducing crossings are rooted in lower maintenance costs, reduced liability, and improving safety. Typically, the railroads will require three crossing closures for every new rail/highway grade crossing request from a public agency. A TSS was completed for the NS “O” line in 2004 in an effort by the Metropolitan Transit Commission/Charlotte Area Transit System’s (MTC/CATS) to initiate passenger rail service between Charlotte, NC and Mooresville, NC.

As part of the East-West Connector Alignment study and need for a new at-grade rail/highway crossing, the at-grade crossings within the Town of Mooresville were re-evaluated using elements of the TSS process. This section discusses the results of that effort.

1. Exposure Index

NCDOT uses an exposure index as one indicator to determine if a grade separation structure is warranted at highway/rail grade crossings. The exposure index is calculated by multiplying the number of trains per day by the number of vehicles per day that use the crossing. As a general rule, grade separations should be considered in RURAL areas when the exposure index is 15,000 or more. In URBAN areas grade separations should be considered when the exposure index is 30,000 or more. Other factors that need to be considered in the feasibility of grade separations are:

- Accident history
- Topography
- Adjacent land use
- Construction impacts
- Costs

The exposure index was calculated for each of the 26 crossings.

Table 2 displays the exposure index for the existing railroad crossings in the study area.



Table 2: Exposure Index of Existing RR Crossings

CROSSINGS IN MOORESVILLE, NC						
CROSSING DOT NUMBER	MP LOCATION	PUBLIC/PRIVATE CROSSING	STREET NAME	2008 ADT	24 HR TRAIN VOLUME	EXPOSURE INDEX
721704A	O 23.2	Public	Bridges Farm Rd	111	2	222
721703T	O 23.4	Private		0	2	0
721702L	O 23.8	Private		0	2	0
721701E	O 24.05	Private		0	2	0
721700X	O 24.5	Public	Langtree Rd SR 1102	4133	2	8266
721699F	O 24.55	Private	Quality La	0	2	0
721698Y	O 24.7	Private?	Shu La	0	2	0
721697S	O 24.99	Public	Fairview Rd SR 1108	8752	2	17504
721696K	O 25.3	Public	Crossrail Rd SR 1170	221	2	442
721695D	O 26.55	Public	Waterlynn Rd - SR 1135	8266	2	16532
721694W	O 26.01	Private		0	2	0
721693W	O 26.1	Private		0	2	0
721692H	O 26.3	Public	Foresquare Rd - SR 1132	579	2	1158
721691B	O 26.6	Private	Timber RD	0	2	0
721687L	O 27.27	Public	Norman/Doster Rd	7973	2	15946
721685X	O 27.4	Public	Brawley	8144	2	16288
721683J	O 27.58	Public	Mills Ave	2053	2	4106
721682C	O 27.8	Public	Wilson Ave	11,183	2	22366
721681V	O 27.99	Public	Catawba	2908	2	5816
721680N	O 28.2	Public	McClelland Ave	6807	2	13614
721679U	O 28.3	Public	Center St	4808	2	9616
721678M	O 28.35	Public	Moore Ave	2224	2	4448
721677F	O 28.5	Public	Iredell	10,433	2	20866
721676Y	O 28.32	Public	Oak Street	2395	2	4790
721675S	O 28.85	Public	Walnut St	172	2	344
721674K	O 28.97	Public	Patterson St	1711	2	3422



2. Delay Analysis

Level of Service is a measure of the operational efficiency of the highway/rail grade crossing. It is determined using procedures from the Highway Capacity Manual procedures. Level of Service is expressed as a letter ranging from A (free flowing) to F (severely congested) and is determined using the average delay for all vehicles. Table 3 summarizes the average delay and corresponding level of service.

Table 3: LOS and Average Delay

Level of Service	Avg. Delay/Vehicle (seconds)
A	10.0
B	>10.0 to 15.0
C	>15.0 to 25.0
D	>25.0 to 35.0
E	>35.0 to 50.0
F	>50.0

The delay calculations are based on the methodology developed for the Proposed Conrail Acquisition Draft Environmental Impact Statement (DEIS) by the Surface Transportation Board's Sections of Environmental Analysis (SEA) and modified as needed for this project.

The following values were calculated for existing and future conditions.

- Blocked crossing time per train
- Event time
- Average delay per day
- Maximum vehicle queue
- Total stopped vehicle delay per day
- Average delay for all vehicles
- Traffic level of service (LOS)

The level of service (LOS) for each of the 26 crossings was determined based on these computed values and the Highway Capacity Manual procedures. Table 4 (next page) displays the existing LOS for the railroad crossing within the study area.



Table 4: Existing LOS

East-West Connector RR crossing analysis - Existing																
Crossing #	Street Name	No. Lanes (one-way direction)	ADT	Arrival Rate (Veh/Min)	Departure Rate	Trains per day	Train Speed (miles/hr)	Train Length (feet)	Crossing Blockage Time (min) T _c	Event (Queue) Time (min) T _e	Total Stopped Vehicle Delay Per Day (min/day) D _T	Number Vehicles Delayed/Day V _D	Max. Peak Hr. Queue (veh/lane) Q	Average Delay / Stopped Veh. (mins) D _{AVG}	Avg. Delay/Veh. In Secs. (All Vehicles) D _V	LOS
721704A	Bridges Farm Rd	1	111	0.15	30.00	2	35.00	1,000	0.32	0.33	0.01	0	0	0.16	0.01	A
72103T	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721702L	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721701E	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721700X	Langtree Rd	1	4,133	5.74	30.00	2	35.00	1,000	0.32	0.40	0.46	2	1	0.20	0.01	A
721699F	Quality Ln (Private)	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721698Y	Shu Ln/Campus Ln (private)	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721697S	Fairview Rd	1	8,752	12.16	30.00	2	35.00	1,000	0.32	0.55	1.81	7	3	0.27	0.02	A
721696K	Crossrail Rd	1	221	0.31	30.00	2	35.00	1,000	0.32	0.33	0.02	0	0	0.16	0.01	A
721695D	Waterlynn Rd	1	8,266	11.48	30.00	2	35.00	1,000	0.32	0.53	1.59	6	3	0.26	0.02	A
721694W	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721693W	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721692H	Foursquare Rd	1	579	0.80	30.00	2	35.00	1,000	0.32	0.33	0.04	0	0	0.17	0.01	A
721691B	Timber Rd (private)	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	..
721687L	Norman Dr	1	7,973	11.07	30.00	2	35.00	1,000	0.32	0.51	1.47	6	3	0.26	0.02	A
721685X	Brawley Ave	1	8,144	11.31	30.00	2	35.00	1,000	0.32	0.52	1.54	6	3	0.26	0.02	A
721683J	Mills Ave	1	2,053	2.85	30.00	2	35.00	1,000	0.32	0.36	0.18	1	1	0.18	0.01	A
721682C	Wilson Ave	1	11,183	15.53	30.00	2	35.00	1,000	0.32	0.67	3.52	10	4	0.34	0.04	A
721681V	Catawba Ave	1	2,908	4.04	30.00	2	35.00	1,000	0.32	0.38	0.28	2	1	0.19	0.01	A
721680N	McClelland Ave	1	6,807	9.45	30.00	2	25.00	1,000	0.45	0.66	2.08	6	3	0.33	0.04	A
721679U	Center St	1	4,808	6.68	30.00	2	25.00	1,000	0.45	0.58	1.14	4	2	0.29	0.03	A
721678M	Moore Ave	1	2,224	3.09	30.00	2	25.00	1,000	0.45	0.51	0.40	2	1	0.25	0.02	A
721677F	Iredell Ave	1	10,433	14.49	30.00	2	25.00	1,000	0.45	0.88	5.60	13	5	0.44	0.06	A
721676Y	Oak St	1	2,395	3.33	30.00	2	25.00	1,000	0.45	0.51	0.43	2	1	0.26	0.02	A
721675S	Walnut St	1	172	0.24	30.00	2	25.00	1,000	0.45	0.46	0.03	0	0	0.23	0.02	A
721674K	Patterson St	1	1,711	2.38	30.00	2	25.00	1,000	0.45	0.49	0.29	1	1	0.25	0.02	A

closed



SAFETY AND MOBILITY ISSUES

There are several methods available to enhance railroad-crossing safety.

1. Vehicles Queuing across Railroad Tracks

The presence of nearby traffic signals, intersections, or parallel roadways can result in queues of stopped vehicles extending onto or across a highway/rail crossing.

2. Traffic Signal Preemption

Standard practice (based on *The Manual on Uniform Traffic Control Devices*) requires that traffic signals located within 200 feet of a highway/rail at-grade crossing be coordinated with the crossing's train detection and warning system to preempt normal operations of the traffic signal. The following crossings have signal preemption:

- Iredell Avenue (Crossing # 721677F)
- Moore Avenue (Crossing # 721678F)
- Center Street (Crossing # 721679U)
- McClelland Avenue (Crossing # 721680N)
- Wilson Avenue (Crossing # 721682C)
- Brawley Avenue (Crossing # 721685X)

3. Humped Crossings

A “humped” crossing exists where the elevation of the railroad is significantly higher than the crossing roadway, causing vehicles to ascend on one side of the tracks and descend on the other. The severity of this condition can range from discomfort at normal speeds, to “bottoming out” of vehicles with long wheelbases or low clearances.



Example: Humped Crossing
Norman Drive (Crossing # 721687L)



This dragging can damage vehicles, or cause them to become stuck on the crossing, creating a serious hazard. Routine track maintenance tends to exacerbate the problem over time, as track ballast work typically adds about three inches per occurrence. Over a ten-year period, the railroad may rise as much as one foot as a result of this routine maintenance.

Crest vertical curves across the tracks that do not create a need for the driver to reduce speed are not considered to be a humped profile. The combination of short crest and sag vertical curves caused by a buildup of the ballast and raising of the track create a need to reduce speed across the crossing. The following crossings have humped profiles:

- Walnut Street (Crossing # 721675S)
- Catawba Avenue (Crossing # 721681V)
- Mills Street (Crossing # 721683J)
- Norman Drive (Crossing # 721687L)
- Langtree Road (Crossing # 721700X)

4. Grade Crossing Condition

A poor grade crossing surface can result in a rough, uneven ride. This can increase wear and tear on vehicles, potentially create a traffic safety hazard, and may add to congestion by reducing travel speeds. The crossing materials used on these grade crossings include asphalt, concrete slab, and rubber. Even though some materials provide a slightly improved ride and longer term maintenance, the main safety issue is the condition of the crossing.

5. Vehicles Driving Around Automated Gates

Several situations can lead to the circumvention of automated gates by motorists:

- Gates are lowered, but no train is visible
- Gates fail, and remain in the lowered position
- Gates are lowered and train is visible, but motorist is too impatient to wait



6. Improved Signs and Markings

The effectiveness of required warning signs, markings, signals, and other devices depends heavily on proper installation and maintenance by state and municipal transportation departments and the railroads. Sign and/or marking improvements are recommended at the following location:

- Waterlynn Road (Crossing # 721695D)

7. Roadway Grade Separation

To fully eliminate the potential for train/vehicle collisions while still maintaining access across the tracks, construction of grade separations should be evaluated. However, modifications to mainline railway grades or profiles are severely constrained by strict design standards. Highway overpasses of railroads require a vertical clearance of 23 feet, while railroad overpasses of highways typically require 16 to 17 feet. Due to sight distance requirements for safe stopping, a “crest” curve on a roadway overpass is longer than a “sag” curve at a comparable underpass, thereby involving a longer approach distance. This can have important implications with respect to property access and street network connectivity. Other considerations include visual and noise impacts of roadway overpasses, especially in neighborhoods, downtowns, or historic areas.

There are many factors that need to be considered along with the exposure index when looking at grade separations. These include accident history, topography, adjacent land uses, construction impacts, and costs.

8. Community Services

Locations of hospitals, schools, fire and rescue stations, and parks have been identified as part of this study to determine the potential impacts on Mooresville residents who would be affected by changes in the crossing status of the 26 existing highway/rail grade crossings. The studies included a field survey in the vicinity of the identified rail crossings and an investigation of all adjacent neighborhoods on foot and photography to establish general demographic patterns in the neighborhoods. Community facilities and/or other features that may have a focal role in the neighborhood or add to the sense of community are identified.



This study is intended only to provide basic data, to assist in deciding the need for additional studies; it will not include any statistical analysis of demographic data, or attempt to analyze the ramifications of proposed highway/rail grade crossing modifications on the communities identified.

9. Traffic Volumes

An exposure index is employed by NCDOT as one factor in determining whether or not grade separation should be considered in place of highway/rail crossings. This index is calculated by multiplying the number of trains per day by the number of crossing vehicles per day, in the design year. Current policy identifies an exposure index of 15,000 as the threshold for considering grade separation in rural areas. In urban areas, an exposure index of 30,000 or greater identifies a potential grade separation.

10. Crossing Consolidation & Elimination

Many low-volume crossings are unnecessary due to the availability of alternative access across the tracks. Typically, a crossing is considered redundant (and therefore a candidate for elimination) if it is within a reasonable distance of another crossing connected to the same street network. Generally, “redundancy” is defined as four or more crossings per mile.

Crossing consolidations eliminate the potential for train/vehicle collisions. Crossing-related installation and maintenance costs are reduced, and by concentrating traffic at fewer, higher-volume crossings, more expensive active warning treatments and roadway improvements can be justified.

Crossings with high potential for elimination include:

- Redundant crossings near parallel crossings or grade separations, or where traffic can be safely and efficiently diverted to another crossing;
- Skewed crossings, or those where sight distance is limited by horizontal/vertical curvature, vegetation, or permanent obstructions;
- Crossings with a history of accidents;
- Crossings adjacent to a newly constructed crossing or grade separation;



- Private crossings with no identifiable owner, or where the owner is unwilling or unable to fund crossing upgrades (and where alternative access is reasonably available); closing of these crossings is determined by the railroad and property owner if identified.
- Complex crossings that cannot be effectively served by warning devices due to multiple tracks, extensive switching operations, etc.

The following public crossings are recommended for closure for the described reasons:

- Walnut Street (Crossing # 721675S) – Redundant, humped, alternative access
- Catawba Avenue (Crossing # 721681V) – Redundant, humped, alternative access
- Norman Drive (Crossing # 721687L) – Redundant, humped, alternative access
- Crossrail Road (Crossing # 721696K) – Alternative access, new connection

Along with a few private crossings, the closure of the public crossings listed above will help to get approval for a new public crossing for the proposed East-West Connector.

The exposure index was re-evaluated for the proposed new crossing as well as the other existing crossings that will handle the additional traffic from the closed crossings. Table 5 displays the exposure index for the crossing after the four recommended crossings are closed.

Table 6 displays the existing LOS for the railroad crossing within the study area.



Table 5: Exposure Index of RR Crossings with Recommended Closures

CROSSINGS IN MOORESVILLE, NC									
CROSSING DOT NUMBER	MP LOCATION	PUBLIC/PRIVATE CROSSING	STREET NAME	2008 ADT	24 HR TRAIN VOLUME	EXPOSURE INDEX	close?	new 2008 ADT	NEW EXPOSURE INDEX
721704A	O 23.2	Public	Bridges Farm Rd	111	2	222	no	111	222
721703T	O 23.4	Private		0	2	0	no		0
721702L	O 23.8	Private		0	2	0	yes		0
721701E	O 24.05	Private		0	2	0	yes		0
721700X	O 24.5	Public	Langtree Rd SR 1102	4133	2	8266	yes	4133	8266
721699F	O 24.55	Private	Quality La	0	2	0	no		0
721698Y	O 24.7	Private?	Shu La	0	2	0	no		0
721697S	O 24.99	Public	Fairview Rd SR 1108	8752	2	17504	no	8863	17726
721696K	O 25.3	Public	Crossrail Rd SR 1170	221	2	442	yes	0	0
721695D	O 26.55	Public	Waterlynn Rd - SR 1135	8266	2	16532	no	8376	16752
721694W	O 26.01	Private		0	2	0	yes		0
721693W	O 26.1	Private		0	2	0	no		0
721692H	O 26.3	Public	Foresquare Rd - SR 1132	579	2	1158	no	579	1158
721691B	O 26.6	Private	Timber RD	0	2	0	no		0
721687L	O 27.27	Public	Norman/Doster Rd	7973	2	15946	yes	0	0
721685X	O 27.4	Public	Brawley	8144	2	16288	no	16117	32234
721683J	O 27.58	Public	Mills Ave	2053	2	4106	no	2053	4106
721682C	O 27.8	Public	Wilson Ave	11,183	2	22366	no	12637	25274
721681V	O 27.99	Public	Catawba	2908	2	5816	yes	0	0
721680N	O 28.2	Public	McClelland Ave	6807	2	13614	no	8261	16522
721679U	O 28.3	Public	Center St	4808	2	9616	no	4808	9616
721678M	O 28.35	Public	Moore Ave	2224	2	4448	no	2224	4448
721677F	O 28.5	Public	Iredell	10,433	2	20866	no	10433	20866
721676Y	O 28.32	Public	Oak Street	2395	2	4790	no	2481	4962
721675S	O 28.85	Public	Walnut St	172	2	344	yes	0	0
721674K	O 28.97	Public	Patterson St	1711	2	3422	no	1797	3594



Table 6: Railroad Crossing LOS

East-West Connector RR crossing closures																
Crossing #	Street Name	No. Lanes (one-way direction)	ADT	Arrival Rate (Veh/M in) 2x uniform	Departure Rate	Trains per day	Train Speed (miles/hr)	Train Length (feet)	Crossing Blockage Time (min) Tc	Event Time (min) Tq	Total Stopped Per Day (m in/day) Dt	Number Vehicles Delayed/Day Vd	Max. Peak Hr. Queue (veh/lane) Q	Average Delay / Stopped Veh. (mins) Davg	Avg. Delay/Veh. In Secs. (All Vehicles)	LOS
721704A	Bridges Farm Rd	1	111	0.15	30.00	2	35.00	1,000	0.32	0.33	0.01	0	0	0.16	0.01	A
72103T	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721702L	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721701E	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721700X	Langtree Rd	2	4,133	5.74	60.00	2	35.00	1,000	0.32	0.40	0.46	2	1	0.20	0.01	A
721699F	Quality Ln (Private)	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721698Y	Shu Ln/Campus Ln (private)	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721697S	Fairview Rd	1	8,863	12.31	30.00	2	35.00	1,000	0.32	0.55	1.87	7	3	0.28	0.03	A
721696K	Crossrail Rd	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721695D	Waterlynn Rd	1	8,376	11.63	30.00	2	35.00	1,000	0.32	0.53	1.64	6	3	0.27	0.02	A
721694W	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721693W	Private	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721692H	Foursquare Rd	1	579	0.80	30.00	2	35.00	1,000	0.32	0.33	0.04	0	0	0.17	0.01	A
721691B	Timber Rd (private)	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721687L	Norman Dr	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721686X	Brawley Ave	1	16,117	22.38	30.00	2	35.00	1,000	0.32	1.28	18.31	29	5	0.64	0.14	A
721683J	Mills Ave	1	2,063	2.85	30.00	2	35.00	1,000	0.32	0.36	0.18	1	1	0.18	0.01	A
721682C	Wilson Ave	1	12,637	17.55	30.00	2	35.00	1,000	0.32	0.78	5.37	14	4	0.39	0.05	A
721681V	Catawba Ave	1	-	0.00	30.00	2	35.00	1,000	0.32	0.32	0.00	0	0	0.16	-	-
721680N	McClelland Ave	1	8,261	11.47	30.00	2	25.00	1,000	0.45	0.74	3.11	8	4	0.37	0.05	A
721679U	Center St	1	4,808	6.68	30.00	2	25.00	1,000	0.45	0.58	1.14	4	2	0.29	0.03	A
721678M	Moore Ave	1	2,224	3.09	30.00	2	25.00	1,000	0.45	0.51	0.40	2	1	0.25	0.02	A
721677F	Iredell Ave	1	10,433	14.49	30.00	2	25.00	1,000	0.45	0.88	5.60	13	5	0.44	0.06	A
721676Y	Oak St	1	2,481	3.45	30.00	2	25.00	1,000	0.45	0.51	0.45	2	1	0.26	0.02	A
721676S	Walnut St	1	-	0.00	30.00	2	25.00	1,000	0.45	0.45	0.00	0	0	0.23	-	-
721674K	Patterson St	1	1,979	2.75	30.00	2	25.00	1,000	0.45	0.50	0.34	1	1	0.25	0.02	A

closed
new crossing
recommended closure



ENVIRONMENTAL IMPACTS

The Preliminary Environmental Analysis included reference reviews, windshield surveys, and preliminary field assessments, to determine the possible presence of wetlands and other significant natural resources, potential threatened and endangered species habitat, and potential cultural resources, in the project area.

Jurisdictional Waters and Wetlands

Field studies and windshield surveys were conducted on September 9 and 12, 2008, to identify potential jurisdictional wetlands and other jurisdictional waters of the U.S. (e.g., perennial and intermittent streams, lakes, ponds, etc.). Jurisdictional wetlands are identified in the field as areas that contain three parameters: hydric soils, hydrophytic vegetation, and wetland hydrology. A jurisdictional delineation was not conducted (i.e., no flagging or boundary survey of wetlands/waters was conducted).

The field review and windshield survey identified the presence of eleven (11) jurisdictional streams. No jurisdictional wetlands or other jurisdictional features were identified within the project corridor. The jurisdictional streams have been preliminarily classified by JJG as either intermittent or perennial (see Table 7). Prior to proceeding with project design and permitting, these streams should be classified in the field using the United States Army Corp of Engineers (USACE) Stream Quality Assessment Worksheet and the North Carolina Division of Water Quality (NCDWQ) Stream Identification Form, and verified by each agency.

The approximate centerline locations of Streams 1 through 6 were surveyed with a Trimble GeoXHTM handheld Global Positioning System (GPS) and field mapped. The locations of Streams 7 through 11 were approximated in the field and mapped using Geographic Information Systems (GIS) stream and topographic mapping layers obtained from the Iredell County GIS department. The jurisdictional streams are summarized in Table 7.

Photographs are included in Appendix B.



Streams 1 through 4 are unnamed tributaries (UTs) to Davidson Creek, and are each located between Langtree Road and NC 115 in the western-most portion of the study corridor. Overstory riparian vegetation along these streams includes sweetgum (*Liquidambar styraciflua*), southern red oak (*Quercus falcata*), hickory (*Carya* sp.), tulip-poplar (*Liriodendron tulipifera*), and red maple (*Acer rubrum*). Understory vegetation includes flowering dogwood (*Cornus florida*), Chinese privet (*Ligustrum sinense*), persimmon (*Diospyros virginiana*), greenbriar (*Smilax rotundifolia*), and muscadine (*Vitis rotundifolia*). Herbaceous vegetation includes Christmas fern (*Polystichum acrostichoides*), blackberry (*Rubus* sp.), and Nepal grass (*Eulalia viminea*).

Streams 5 and 6, situated between NC 115 and Faith Road in the west-central portion of the study corridor, and Streams 8 and 9, situated between Faith Road and Rocky River Road in the east-central portion, are unnamed tributaries to West Branch Rocky River (Stream 7). Dye Creek (Stream 10) and Rocky River (Stream 11) are located in the eastern portion of the study corridor and transect Rocky River Road.

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Table 7: Summary of Jurisdictional Streams

Stream Number	Stream Name	Intermittent or Perennial	Substrate	Estimated Channel Bottom Width (feet)	Estimated Width at OHWM* (feet)	Estimate Channel Depth from OHWM* (feet)
#1	UT #1 to Davidson Creek	Intermittent	Gravel, coarse sand, weathered rock	2 - 8	4 - 8	1 - 2
#2	UT #2 to Davidson Creek	Intermittent	Gravel, coarse sand, cobble	2 - 6	3 - 8	1
#3	UT #3 to Davidson Creek	Intermittent	Coarse sand	3 - 8	4 - 10	1
#4	UT #4 to Davidson Creek	Intermittent	Sand, silt	2 - 4	2 - 6	1
#5	UT #1 to West Branch Rocky River	Perennial	Clay, coarse sand	2 - 8	4 - 10	1 - 3
#6	UT #2 to West Branch Rocky River	Perennial	Coarse sand	4 - 10	6 - 12	2 - 3
#7	West Branch Rocky River	Perennial	Not Determined	7 - 12	10 - 20	Not Determined
#8	UT #3 to West Branch Rocky River	Perennial	Course sand	4 - 6	6 - 8	2
#9	UT #4 to West Branch Rocky River	Intermittent	Silt, sand	2 - 3	2 - 4	2
#10	Dye Creek	Perennial	Not Determined	12 - 20	25+	Not Determined
#11	Rocky River	Perennial	Not Determined	8 - 20	25+	Not Determined

* OHWM (Ordinary High Water Mark) represents the lateral limits of jurisdiction within a stream channel absent adjacent wetlands, generally measured from bank-to-bank.

Overstory riparian vegetation along Streams 5, 6, and 8 includes tulip-poplar, red maple, hickory, and green ash (*Fraxinus pennsylvanica*). Understory vegetation includes Chinese privet, flowering dogwood, wild rose (*Rosa multiflora*), spicebush (*Lindra benzoin*), paw paw (*Asimina triloba*), and mimosa (*Mimosa* sp.). Herbaceous vegetation includes Christmas fern, Nepal grass, yellow-root (*Xanthorhiza simplicissima*), wingstem (*Verbesina alterniflora*), and pokeweed (*Phytolacca americana*).



Vegetation along Stream 9 consisted of herbaceous vegetation, including blackberry, goldenrod (*Solidago*), pokeweed, honeysuckle, and wingstem.

Riparian vegetation along Streams 7, 10, and 11 included an overstory of box elder (*Acer negundo*), American sycamore (*Platanus occidentalis*), American elm (*Ulmus Americana*), and walnut (*Juglans nigra*), with an understory of Chinese privet, Japanese honeysuckle (*Lonicera japonica*), and black willow (*Salix nigra*). Herbaceous vegetation includes Nepal grass, wingstem, and goldenrod. The floodplain along Streams 7 (West Branch Rocky River) and 10 (Dye Creek) are partially comprised of pastureland. The floodplain of Stream 11 (Rocky River) has been impacted by sanitary sewer installation to the north of Rocky River Road. In addition, the floodplain of Rocky River south of Rocky River Road is dominated by kudzu (*Pueraria Montana*).

Mapped Soils within the Project Area

The *Soil Survey of Iredell County, North Carolina* (USDA, 1964) was consulted to determine soil series within the project area. These soil series were compared to the National Hydric Soils List by State for North Carolina (USDA-NRCS, 2008) to determine if hydric soils are known to occur within the study area. According to the Soil Survey, the predominant soil series in the eastern portion of the study corridor along Rocky River Road and within the proposed new location between Rocky River Road and Faith Road is the Lloyd Series. Lloyd Series soils are also the predominant soils in the western-most portion of the study corridor between Langtree Road and Mecklenburg Highway (NC 115). Lloyd Series soils are deep, gently sloping to moderately steep, well-drained soils of the uplands. The predominant soil series in the central and west-central portions of the study corridor is the Cecil Series, located along Faith Road and within the proposed new location between Faith Road and Mecklenburg Highway. Cecil Series soils are deep, nearly level to steep, well-drained soils of the uplands. Other soils mapped in the study corridor include Mecklenburg Series, Wilkes Series, Colfax Series, and Chewacla Series soils, as well as moderately gullied land, severely gullied land, local alluvial land, and mixed alluvial land (wet).



Chewacla soils, Colfax sandy loam, and mixed alluvial land (wet) are considered hydric soils or have inclusions of hydric soils within their map units. Reference Table 8 for additional information regarding these soils.

Table 8: Summary of Hydric Soils

Soil Map Unit	Percent of Map Unit Considered Hydric	Typical Landform Found Within	Location Mapped Within Study Corridor
Chewacla soils	90	Depressions, Floodplains	Along Rocky River, West Branch Rocky River, and Dye Creek
Colfax sandy loam	5	Depressions	Within drainage way in western-most portion of corridor
Mixed Alluvial Land (Wet)	85	Depressions, Floodplains	Within several drainage ways that transect the corridor

Threatened and Endangered Species

Prior to the field studies, an office review of available resources was performed to develop a list of potential federal- and state-listed protected species for Iredell County. The list of known federal protected species was obtained on July 28, 2008 from the United States Fish and Wildlife Service (USFWS) county database. The list of known state protected species was obtained on August 26, 2008 from the North Carolina Natural Heritage Program (NCNHP). Please refer to Table 9 for a summary of the federal- or state-listed species for Iredell County, North Carolina.

Field studies were conducted on September 9 and 12, 2008 to determine the presence of suitable habitat and potential occurrence of protected species known from Iredell County. The portion of the study corridor proposed on new location was traversed on foot to evaluate the potential occurrence of protected species. Windshield surveys and limited field reviews were conducted in portions of the study corridor proposed on existing roadways. During field studies, no definitive observations were made of any protected species; however, potential habitat for dwarf-flowered heartleaf and little sneezeweed was identified. Habitat for dwarf-flowered heartleaf was identified along the hillsides adjacent to Streams 1, 2, 3, 4, 6, and 8.



Numerous individuals of *Hexastylis* sp. were observed on the east-facing hillsides adjacent to Stream 6 (reference Figure 2C); however the specific species could not be identified. Although the mapped soil types, and the soil characteristics identified during the field review, do not match those of the preferred habitat, a survey conducted during the flowering season (March – June) would be needed to positively identify the *Hexastylis* species observed adjacent to Stream 6. Potential habitat for little sneezeweed is located along the banks of streams in the corridor. The flowering season of little sneezeweed is May through June. Little sneezeweed is afforded no federal protection. Habitat for cone-shaped sedge and bog turtle was not identified.

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Table 9: Summary of Protected Species for Iredell County

Scientific Name	Common Name	Federal Status	State Status	Potential Habitat Present (Yes/No)	Preferred Habitat ^{1, 2, 3}
<i>Carex conoidea</i>	Cone-shaped sedge	None	ST / S1	No	Isolated areas; bogs; wet to seasonally wet grass lands, meadows, wet prairies.
<i>Clemmys muhlenbergii</i>	Bog turtle	T (S/A)	T/S2	No	Shallow, spring-fed fens, sphagnaceous bogs, marshy meadows and pastures, crossed by slow, muddy-bottom streams with aquatic and semi-aquatic plants.
<i>Helenium brevifolium</i>	Littleleaf sneezeweed	None	SE / S2	Yes	Stream banks and bogs; seeps.
<i>Hexastylis naniflora</i>	Dwarf-flowered heartleaf	T	None	Yes	Along bluffs and north-facing slopes, boggy areas along streams, and adjacent hillsides and ravines with acid, sandy loam soils in deciduous forests. Typically found on Pacolet or Madison gravelly sandy loam, or Musella fine sandy loam.
<p>E= federal endangered; T= federal threatened; T (S/A) = federal threatened due to similarity of appearance; SE= state endangered; ST= state threatened; S1= critically imperiled globally; S2= imperiled globally</p> <p>Sources: ¹ N.C. Natural Heritage Program, Division of Parks and Recreation. "Guide to Federally Listed Endangered and Threatened Species of North Carolina." Raleigh, NC. 2001. ² Radford, Albert E., et al. "Manual of the Vascular Flora of the Carolinas." University of North Carolina Press. Chapel Hill, NC. 1968. ³ U.S. Department of Agriculture, Natural Resources Conservation Service. Plants Database accessed August 26, 2008 at http://plants.usda.gov.</p>					

Correspondence was forwarded to the USFWS and the NCNHP on August 27, 2008, requesting written response concerning impacts of the proposed project on threatened and endangered species, and critical habitats.



In a letter dated September 5, 2008, the NCNHP indicated that they have no record of rare species, significant natural communities, significant natural heritage areas, or conservation/managed areas in the project corridor or within one mile of the project area. No reply has been received from the USFWS as of the date of this report.

Cultural Resources

Correspondence was forwarded to the North Carolina State Historic Preservation Office (SHPO) on August 27, 2008, requesting written response concerning impacts of the proposed project on historic, archeological, and cultural resources. In their response letter dated October 14, 2008, SHPO indicated that there is a very high probability that archaeological sites exist based on topographical and hydrological conditions in the project area. SHPO recommended that a comprehensive archaeological survey be conducted if any earth moving activities are scheduled to occur.

Anticipated U.S. Army Corp of Engineers and N.C. Division of Water Quality Permitting Requirements

Projects impacting jurisdictional wetlands and other waters of the U.S. (e.g., streams, ponds, lakes, etc.) are regulated by the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act. Depending on the type and extent of jurisdictional wetlands and waters to be impacted, Section 404 permitting requirements can range from activities that are considered preauthorized, to those requiring pre-construction notification (PCN) for a Nationwide Permit (NWP) or a Section 404 Standard Individual Permit (IP) from the USACE.

Minor jurisdictional impacts are typically eligible for the Nationwide Permit (NWP) Program. Roadway projects, such as this one, may qualify for NWP 14 (linear transportation projects). In North Carolina, NWP 14 has an impact threshold of 0.5 acre of non-tidal wetlands and 300 linear feet of perennial streambed or intermittent streambed exhibiting important aquatic functions¹ per crossing of distinct waterbody or wetland. Impacts exceeding 0.10 acre of waters, 150 linear feet of intermittent or perennial stream, or any impacts to wetlands require formal notification to the USACE. Compensatory mitigation may be required.

¹ The USACE Wilmington District currently uses the “Stream Quality Assessment Worksheet” to aid in determining aquatic function within intermittent stream channels.



Specific provisions, and general and regional conditions established for NWP 14 must also be met. Typically, a Nationwide Permit can be obtained in 45 to 60 days.

Projects eligible for NWP 14 also require formal pre-construction notification to the North Carolina Division of Water Quality (NCDWQ) for State Water Quality Certification (WQC), pursuant to Section 401 of the Clean Water Act. The NCDWQ has established General WQC # 3704, including specific conditions, for projects eligible for NWP 14. For a project of this nature, the NCDWQ may require an indirect and cumulative impacts analysis as part of the pre-construction notification.

Impacts exceeding 300 linear feet of stream as described above, or exceeding 0.5 acre of wetlands would require a Standard Individual Permit (IP) from the USACE. An IP typically takes from 6 to 12 months to obtain and requires a public notice process. IPs take longer to obtain due to agency coordination and required USACE internal documentation related to the National Environmental Policy Act (NEPA). Similarly, projects that are eligible for NWP 14 but unable to meet the conditions of State WQC # 3704 may require an Individual State WQC, including a public notice period. Permit requirements for the proposed project cannot be determined until a final concept has been prepared.

Water Quality Considerations

Information contained in this section was obtained from the following sources:

- “Yadkin-Pee Dee River Basinwide Water Quality Plan,” 2003 (NCDWQ)
- “Catawba River Basinwide Water Quality Plan,” 2004 (NCDWQ)
- “North Carolina Waterbodies Listed by County” available at <http://h2o.enr.state.nc.us/bims/reports/reportsWB.html>
- “Final North Carolina Water Quality Assessment and Impaired Waters List (2006 Integrated 305(b) and 303(d) Report),” Approved May 17, 2007 (NCDWQ)



The majority of the study corridor is located in the Yadkin-Pee Dee River Basin, and generally drains toward the south via several waterbodies that transect the corridor, including Rocky River, West Branch Rocky River, Dye Creek, and several unnamed tributaries. West Branch Rocky River, Dye Creek, and the unnamed tributaries all drain into Rocky River south of the study corridor. Rocky River eventually drains toward the east-southeast into the Pee Dee River south of Lake Tillery.

Rocky River, West Branch Rocky River, and Dye Creek are each classified as Class C waters by the NCDWQ. Class C waters are freshwaters protected for uses such as secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

Rocky River and Dye Creek are both included on the 2006 303(d) list of impaired waters, identified as not meeting water quality uses for propagation of aquatic life. The reason for the listing of Rocky River is a standard violation of the State's water quality standards for turbidity. The reason for the listing of Dye Creek is its impaired biological integrity due to minor municipal point source discharges and urban runoff/storm sewers. West Branch Rocky River is not included on the 303(d) list.

The western-most portion of the study corridor, between Langtree Road and Mecklenburg Highway, is located in the Catawba River Basin. This portion of the project study areas drains via unnamed tributaries to Davidson Creek, a tributary of Lake Norman. Davidson Creek is located less than one mile from the study corridor.

Both Davidson Creek and Lake Norman in the vicinity of the project area are classified by the NCDWQ as Class WS-IV waters. WS-IV waters include waters protected as water supplies that are generally located in moderately to highly developed watersheds. Local programs to control nonpoint sources and storm water discharges of pollution are required. Lake Norman is also classified as Class B waters, which include freshwaters protected for primary recreation, including swimming on a frequent or organized basis.



Class B and Class WS-IV waters are also protected for all Class C uses. Davidson Creek and Lake Norman are also designated as Critical Areas (CAs) by NCDWQ. Neither Davidson Creek nor Lake Norman is included on the 303(d) list.

According to the Iredell County Watersheds Map, the western-most portion of the study corridor, between Langtree Road and Mecklenburg Highway, is located within a WS IV Critical Area (WS-IV-CA) watershed. No other portion of the study corridor is located within a designated watershed. Areas west of NC Highway 3, beyond the limits of the study corridor, are located within the Coddle Creek WS II watershed.

Development is restricted within WS-IV-CA and WS-II watersheds, and vegetative buffers are required along perennial streams. Public projects such as road crossings and greenways are allowable in the buffer where no practical alternative exists.

Summary of Environmental Concerns

Field studies conducted by JJG determined that eleven (11) jurisdictional stream occur within the project study corridor. No jurisdictional wetlands or other waters of the U.S. were identified. If the proposed project requires impacts to these streams, coordination with the USACE and NCDWQ would be required. Impacts to these jurisdictional features could be permitted under Nationwide Permit 14 (Linear Transportation Crossing) if the final design cannot avoid jurisdictional impacts. Impacts exceeding 0.5 acre or 300 linear feet per single and complete crossing would require an Individual Permit.

Habitat for the federal-protected *Hexastylis naniflora* was identified on the hillside adjacent to several streams in the study corridor. In addition, numerous individuals of *Hexastylis* sp. were observed adjacent to Stream 6; however the specific species could not be identified at the time of the field review. Surveys conducted during the flowering season (March – June) would be needed to determine if the protected *Hexastylis naniflora* is present in the project study corridor. Habitat for the state-protected *Helenium brevifolium* was also identified adjacent to streams in the corridor.

Rocky River and Dye Creek are both included on the 2006 303(d) list of impaired waters.



According to the Iredell County Watersheds Map, the western-most portion of the study corridor (west of NC Hwy 115) is located within a WS IV Critical Area (WS-IV-CA) watershed. Development is restricted within WS-IV-CA watersheds, and vegetative buffers are required along perennial streams.

COMMUNITY INVOLVEMENT

NCDOT Coordination

A coordination meeting with NCDOT was held on October 20, 2008 in the NCDOT District 2 office in Statesville, NC. Representatives of NCDOT, the Town of Mooresville, and WSP SELLS were present. The purpose of the meeting was to introduce the project to the NCDOT. WSP SELLS provided a project overview, discussed the scope of work, progress to date, and what tasks remain. The NCDOT encouraged coordination with the NCDOT Rail Division since several rail/highway at-grade crossings are state maintained roadways.

Community Stakeholders Meeting

On November 24, 2008 individuals representing the Town of Mooresville, Iredell County Fire Marshall office, Mooresville Graded School District, WSP SELLS, and Rail Safety Consultants met at Mooresville Town Hall. The purpose of the meeting was to provide a summary of preliminary recommendations on at-grade rail crossing closures within Town limits and identify any concerns of emergency responders and school bus transportation. The only concern raised was over the potential Langtree Road crossing closure.

A subsequent meeting was held at Mooresville Town Hall on January 23, 2009 with developers who have a controlling interest on parcels south of Langtree Rd. and west of NC Hwy 115. The purpose of the meeting was to provide an update on the progress of the project.



Town Board Pre-Agenda Meeting

A summary of the project recommendations was presented to the Town Board at the July 2, 2009 Pre-Agenda Meeting. There was one concern raised with regard to the proposed closing of the Norman Ave. at-grade crossing. Norman Dr. (a severely humped crossing) provides a popular cut-through route between Wilson Ave. and NC 115 (Main St.). Traffic that normally used Norman Dr. would shift to Brawley Ave. (the next crossing north). The concern was if the Brawley Ave. crossing could handle the additional traffic from Norman Ave. The results of a traffic analysis were documented in an August 11, 2009 Memo from the Town of Mooresville Transportation Planner to the Town Board of Commissioners.

Citizens Information Workshop

An informal, drop-in style Citizens Informational Workshop was held at the Charles Mack Citizens Center on Thursday, August 20, 2009 to present the subject project to the public and receive comments regarding the proposed roadway alignment and rail crossings closures. North Carolina Department of Transportation (NCDOT), the Town of Mooresville, and WSP-SELLS representatives were in attendance to present the project details and accept public comments.

One hundred fifty-two (152) private citizens attended the workshop. Thirteen (13) comments and/or concerns were either submitted in writing at the workshop or were received via mail or email. There was also a petition submitted by Ms. Jean Mayo, Trustee of the Caldwell Chapel African Methodist Zion Church with forty-two (42) signatures opposing the closure of the railroad crossing at SR 1102 (Langtree Road) in Mt. Mourne. Individual comments are included in Appendix C.



CONCLUSIONS & RECOMMENDATIONS

The Study confirms the feasibility of a new roadway alignment that satisfies the needs established in the Town of Mooresville Comprehensive Plan and the Mt. Mourne Small Area Plan. All indications are that NS will agree with the grade crossing closure plan as recommended in this study and grant a “new” grade crossing for the proposed East-West Connector.

Funding sources will need to be identified since no funding or schedule has been established for the project at the time of this report. Utilities (water, sewer, and gas) do not exist in the corridor/study area east of NC Hwy 115 that can support the development shown on the Mt. Mourne Small Area Plan. It is the Town of Mooresville’s desire that the proposed East-West Connector is privately funded and then, if necessary, uses public funding to fill in the gaps. The current 2008-2009 economy indicates that:

1. Development will be slow with tighter restrictions on lending,
2. Public revenues are down due to loss of jobs and slow economy, and
3. Utilities will not likely be extended without need and/or reimbursement from private sources.

For the reasons stated above, the East-West Connector is considered to be a long-term (> 10 years) project. The exception is on the west side of NC Hwy 115 where a group of developers/land owners have agreed to dedicate the right-of-way and construct the proposed segment of the East-West Connector between Langtree Road and NC Hwy 115. This could occur in the short term (< 5 years). For the remainder of the proposed East-West Connector, the following steps are recommended:

1. Conduct further environmental investigations on natural and cultural resources,
2. Prepare preliminary design plans,
3. Execute grade crossing agreement with NS,
4. Coordinate with public review agencies (i.e. NCDOT, NCDWQ, USACOE, SHPO, etc.),
5. Gain public approval,
6. Prepare an environmental document and “corridor map”,



7. Identify potential funding sources for non-private sections to be constructed,
8. Complete environmental permits
9. Work with local development community to preserve right-of-way and construct their portion of the facility,
10. Prepare construction plans to “fill in the gaps”.

The Town of Mooresville should be commended on its effort to avoid the pitfalls of a disjointed approach typically associated with “build as you go” transportation facilities. The steps outlined above will help to ensure a coordinated, “holistic” approach for implementation of the East-West Connector facility.



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APPENDICES