

Executive Summary
State Route 331 (Tazewell Pike) at State Route 131 (Emory Road)
Harbison Crossroads, Knox County
PIN #109612.00

Purpose

Initiated by a request from Knox County, the Tennessee Department of Transportation (TDOT) has commissioned this study to develop options for improvements to the intersection of State Route 331 (Tazewell Pike) and State Route 131 (Emory Road) in Knox County, Tennessee. Improvements to the study intersection have been considered for several years by Knox County to improve capacity and increase safety.

Widening State Route 331 and State Route 131 in the vicinity of the study area is included in the 2005-2030 Knoxville Regional Long Range Transportation Plan Update. The Long Range Transportation Plan describes plans to widen both State Route 331 and 131 from two lanes to four lanes between the years 2014 and 2030.

The intersection of these arterial roadways experience high traffic volumes, especially during morning and afternoon peak hours. Each approach to the study intersection consists of a single lane. The intersection is controlled as an all-way stop. The elevation of the intersection is much higher than that of the approaches. Specifically, the vertical alignment of the eastbound and westbound approaches results in sight distance issues.

Improvement Options

Option 1 – No-Build: Capacity analyses of the intersection indicates that the AM and PM peak hours can be expected to operate at LOS F for both 2013 and 2033 if no improvements are made. No construction costs.

Option 2 – Traffic Signal Only: Installation of a traffic signal at the study intersection with no roadway improvements. The capacity analyses indicate that the intersection would operate at poor levels of service for the 2013 and 2033 conditions. Cost: \$159,000.

Option 3: Installation of a traffic signal and widening all approaches to include separate left and right turn lanes at the study intersection. The intersection can be expected to operate at good levels of service through 2013 and beyond. The analyses indicate the intersection will reach capacity as the year 2033 approaches. Cost: \$2,225,558.

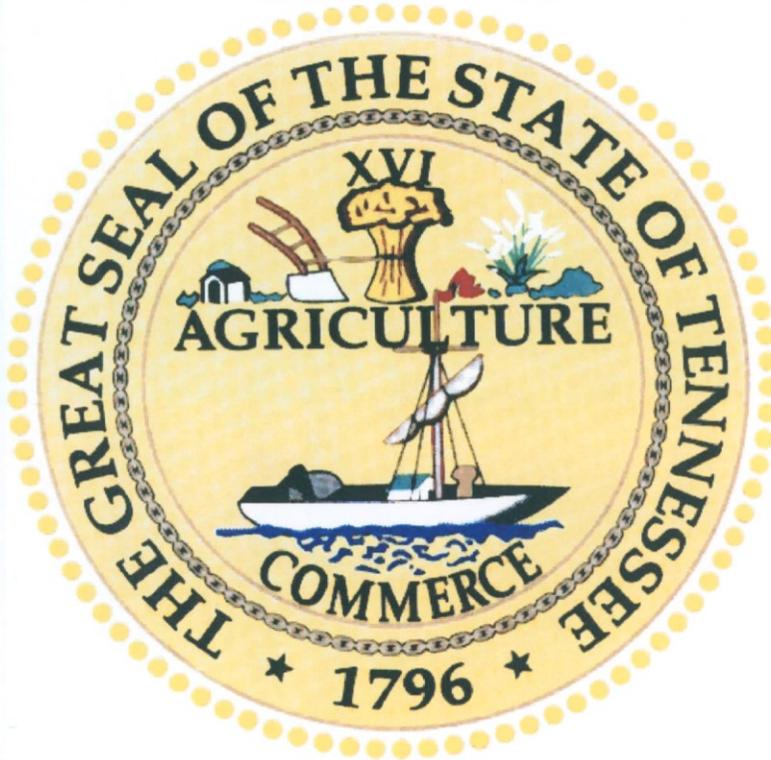
Option 4: Installation of a traffic signal and widening all approaches to include left and right turn lanes, as well as raising the eastbound and westbound approaches of the intersection to improve the vertical alignment and sight distance at the study intersection. Cost: \$2,627,022.

Option 5: Due to the future widening of both State Route 331 and 131 from two lanes to four lanes included in the Long Range Transportation Plan, an option has been included for installation of a traffic signal and widening all approaches to include a left turn lane, a through lane, and a shared through/right turn lane, as well as raising the eastbound and westbound approaches of the intersection to improve the vertical alignment and poor sight distance at the study intersection. Cost: \$4,301,730.

TRANSPORTATION PLANNING REPORT

*State Route 331 (Tazewell Pike) at
State Route 131 (Emory Road)*

*Harbison Crossroads
KNOX COUNTY
PIN# 109612.00*



*PREPARED BY
Neel-Schaffer, Inc.
For the*

*TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION*

Approved by:	Signature	DATE
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TABLE OF CONTENTS

Section	Page
1. PROJECT HISTORY & BACKGROUND INFORMATION.....	1
1.1 Purpose of Report.....	1
1.2 Study History.....	1
1.3 Study Area.....	1
1.4 Existing Transportation Conditions.....	1
1.5 Community Description.....	6
2. PURPOSE & NEED OF PROJECT.....	7
3. LEVEL OF SERVICE.....	8
4. PROPOSED IMPROVEMENTS.....	12
5. FIELD INVESTIGATION.....	17
6. ADDITIONAL CONDITIONS & ISSUES.....	18
6.1 Bicycle and Pedestrian Accommodation.....	18
6.2 Environmental Protection Agency Results.....	18
6.3 FEMA Flood Zone Results.....	18
7. ASSESSMENT OF OPTIONS.....	19
8. SUMMARY.....	21
APPENDIX.....	22
 SUPPLEMENTAL DATA*.....	 A

**Attached as separate document.*

LIST OF FIGURES

Figure	Page
1. Area Location Map.....	2
2. Project Location Map.....	3

LIST OF TABLES

Table	Page
1. Level of Service Criteria for Unsignalized Intersections.....	9
2. Level of Service Criteria for Signalized Intersections.....	10
3. Level of Service – Option 1 – No-Build.....	12
4. Level of Service – Option 2 – Traffic Signal Only.....	13
5. Level of Service – Option 3.....	14
6. Level of Service – Option 4.....	15
7. Level of Service – Option 5.....	16

1. STUDY HISTORY & BACKGROUND INFORMATION

1.1 Purpose of Report

Initiated by request from Knox County, the Tennessee Department of Transportation (TDOT) has commissioned this study to develop options for improvements to the intersection of State Route 331 (Tazewell Pike) and State Route 131 (Emory Road) in Knox County, Tennessee.

1.2 Study History

Improvements to the study intersection have been considered for several years by Knox County to improve capacity and increase safety. Conceptual plans for the intersection were developed by the County, but were never implemented.

This report documents the analyses conducted to evaluate the opportunities for improving transportation operations at the intersection of State Route 331 and State Route 131 in Harbison Crossroads, Knox County, Tennessee. Consideration has been given by Knox County and TDOT to improving this intersection to provide turn lanes and a traffic signal. Widening State Route 331 and State Route 131 in the vicinity of the study area is included in the 2005-2030 Knoxville Regional Long Range Transportation Plan Update. The Long Range Transportation Plan describes plans to widen both State Route 331 and 131 from two lanes to four lanes between the years 2014 and 2030.

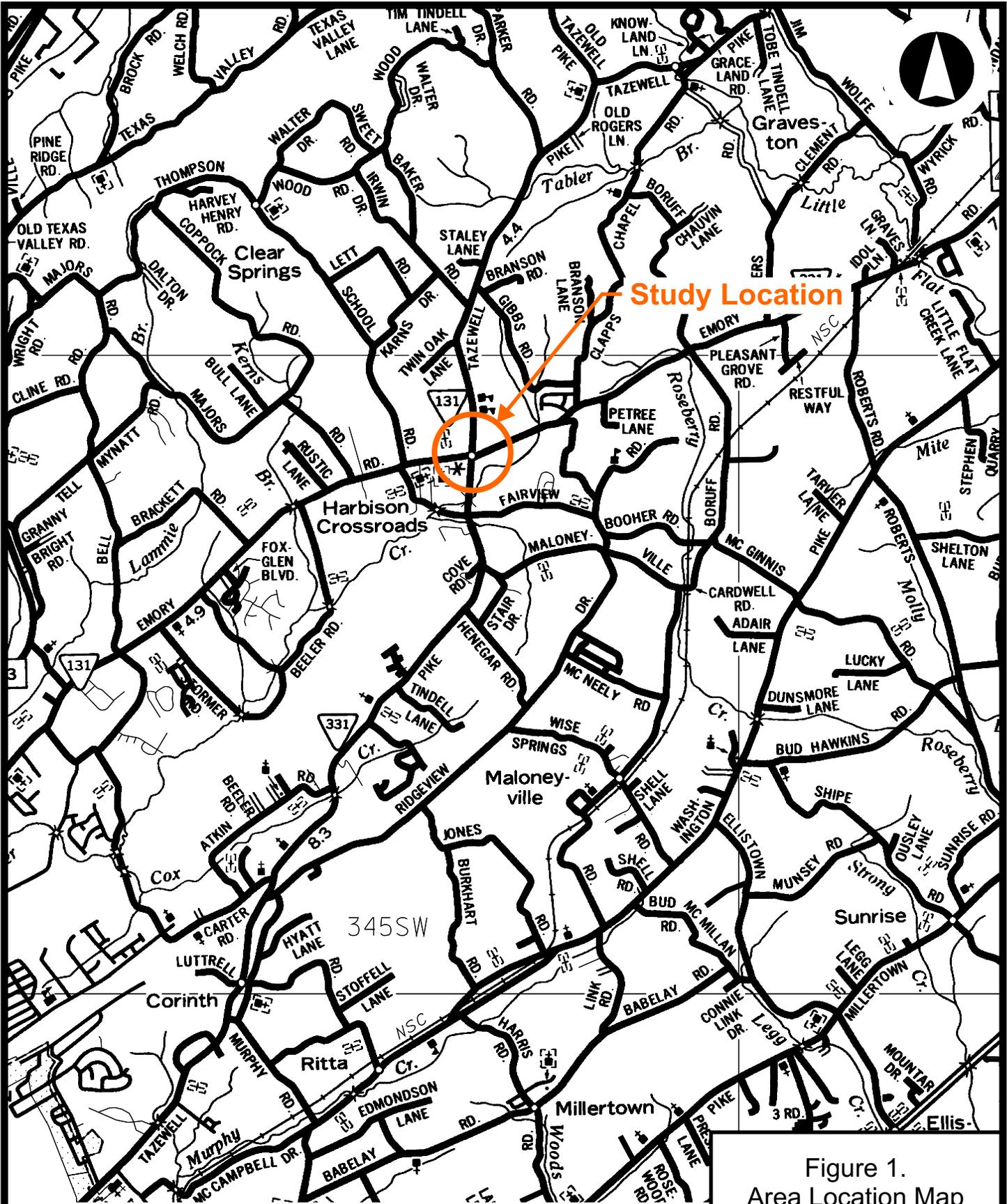
1.3 Study Area

The intersection under investigation is located in northern Knox County, in a primarily suburban residential area with related commercial and institutional uses. Adjacent to the intersection are several commercial developments, including a Weigel's Farm Store located on the southeast corner, Home Federal Bank located on the northeast corner, and an Exxon located on the northwest corner. Just north of the intersection is Gibbs Elementary School and Gibbs High School. An area location map is shown in Figure 1. Figure 2 shows the intersection under study in a study location map.

1.4 Existing Transportation Conditions

State Route 331 is a two-lane urban minor arterial roadway that provides a connection between Interstate 640 north of Knoxville and Highway 11W in Grainger County. SR 131 is also a two-lane urban minor arterial roadway that provides a connection between Interstate 75 north of Knoxville and Union and Grainger counties. The intersection of these two arterial roadways experiences high traffic volumes, especially during morning and afternoon peak hours when commuters are traveling between rural areas outside of Knoxville and downtown Knoxville.

The Tennessee Roadway Information Management System (TRIMS) shows that the study intersection experienced 25 crashes in the three-year period from 2004 through 2006. The crash rate for this period at this intersection was 1.2, which is significantly higher than the statewide average for similar intersections of 0.5. There were five injury crashes with a total of eight injuries. Of the 25 crashes, 12 were rear-end collisions, which may be due to traffic congestion and sight distance approaching the intersection. Also, there were eight angle collisions.

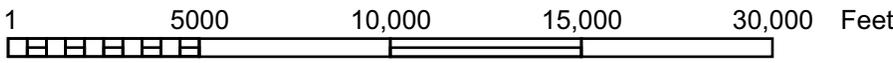


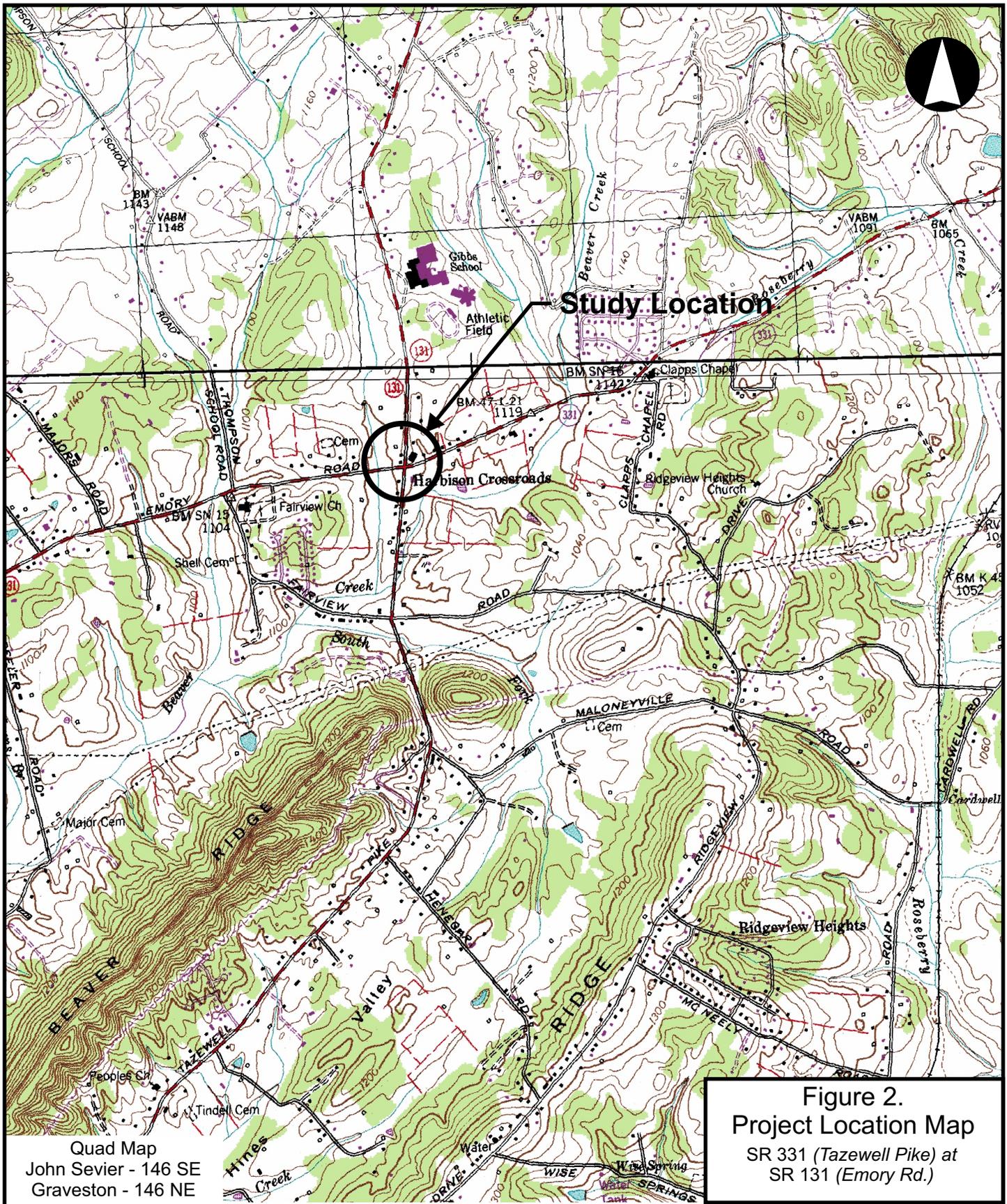
Study Location

345SW

Figure 1.
 Area Location Map
 SR 331 (Tazewell Pike)
 at
 SR 131 (Emory Rd.)
 Knox County

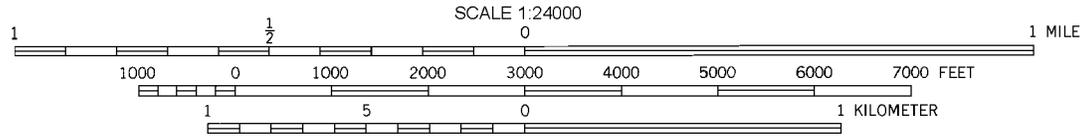
SCALE





Quad Map
 John Sevier - 146 SE
 Graveston - 146 NE

Figure 2.
Project Location Map
 SR 331 (Tazewell Pike) at
 SR 131 (Emory Rd.)



Each approach to the intersection consists of a single lane. The intersection is controlled as an all-way stop. The elevation of the intersection is much higher than that of the approaches. Specifically, the vertical alignment of the eastbound and westbound approaches results in sight distance problems. Photos of the intersection are shown below.



Northbound State Route 331



Westbound State Route 331



Southbound State Route 131



Eastbound State Route 131

1.5 Community Description

Knox County consists of a total of 526 square miles. Three major interstates traverse the county including, I-40, I-75, and I-81. With this interstate system, 40% of the nation's population is within 600 miles of Knox County. Knox County also has five US highways and 17 state routes traveling through the county. Barge shipping is facilitated by three local river terminals. Also serving the area are 125 truck lines, two railroads, and eight airlines.

Grainger and Union counties border Knox County and are accessed by State Route 331 and State Route 131. Knox, Grainger, and Union counties are experiencing growth rates higher than the statewide average of 6.1%. Specifically, between 2000 and 2006, Knox County has grown by 7.8%, Grainger County by 8.7%, and Union County by 7.2%. In addition, in 2006, Knox County granted 3,994 building permits within the county.

2. PURPOSE & NEED OF PROJECT

The purpose of this study is to identify the improvements to the intersection of State Route 331 (Tazewell Pike) and State Route 131 (Emory Road) needed to reduce or eliminate the identified deficiencies and improve capacity and safety. As a result of the intersection analysis performed in this study, it has been found that the intersection deficiencies are creating traffic problems for the motoring public using this section of the state highway system.

Field reviews, stake holder meetings and review and analysis of existing data substantiate the congestion, safety and operational issues being experienced at the study intersection. It has been determined that the projects deficiencies are valid for the following:

1. Safety – The analysis in this report shows that the crash rate at the study intersection exceeds the statewide crash rate for similar intersections. Furthermore, 12 of the 25 crashes were rear-end crashes. Improving the intersection of State Route 331 and State Route 131 should significantly improve the safety for motorists along these routes.

2. System Linkage – State Route 331 is a major connector to Interstate 640 north of Knoxville, and State Route 131 is a connector to Interstate 75 north of Knoxville. By improving a major connection to interstates, the area will be provided with increased connectivity and access. Improvements will provide regional mobility for Knox County as well as Grainger and Union Counties.

3. Capacity – The intersection of State Route 331 and State Route 131 has reached capacity during peak hours. As traffic volumes increase, this condition could extend the duration of peak traffic periods. By 2033, if no changes are made, this intersection is expected to continue to operate at poor levels of service with much higher delays. Improvements to the intersection are needed to provide capacity for existing traffic volumes as well as future expected volumes that will travel through the intersection.

4. Roadway Deficiencies – Each approach to the intersection consists of a single lane. The intersection is controlled as an all-way stop. The elevation of the intersection is much higher than that of the approaches. Specifically, the vertical alignment of the eastbound and westbound approaches results in sight distance problems. Improvements in capacity and vertical alignment are expected to decrease delays and improve safety once the improvements are implemented.

3. LEVEL OF SERVICE

As previously mentioned, State Route 331 provides a connection to Grainger County and State Route 131 to Union and Grainger counties. Each of the routes also provides access to existing and future residential neighborhoods in northern Knox County. Knox, Grainger, and Union counties are experiencing growth rates higher than the statewide average of 6.1%. The elevated growth rate, in combination with the number of residents commuting to work, is a contributing factor in the high peak hour traffic volumes at the study intersection.

Currently, congestion levels along State Route 331 and State Route 131 are concentrated near the study intersection. Based on 2003 turning movement counts provided by Knox County, the delays at this intersection can be characterized by a Level of Service "F" during the AM and PM peak hours (52.2 seconds and 56.9 seconds, respectively) and Level of Service "E" during the midday peak hour (36.4 seconds). The 2003 turning movement counts provided by Knox County are included in the Supplemental Data. The concept of Level of Service (LOS) is defined as a qualitative measure of traffic flow describing operational conditions based on traffic conditions and the perceptions of motorists. A LOS designation provides an index to the quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. Six levels of service are defined for signalized and unsignalized intersections. They are assigned letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst.

The levels of service of unsignalized intersections are determined by application of a procedure described in the 2000 *Highway Capacity Manual*. The procedure accounts for lane configuration on both the minor and major approaches, and conflicting traffic stream volumes. First, the theoretical maximum or "potential capacity" of vehicles for each minor approach lane is calculated based on a gap acceptance procedure. The capacities are then compared to the demand at the respective minor approaches to determine the average control delay for each vehicle. Average control delay is used as the criterion for estimating level of service for minor street traffic. Table 1 summarizes the relationship between control delay, description of delay, and level of service for an unsignalized intersection.

TABLE 1
Level of Service Criteria
Unsignalized Intersections

Level of Service	Average Control Delay (Seconds/Vehicle)	Description of Delay
A	≤ 10	Conditions with little or no delay on stop-controlled approaches
B	>10 and ≤ 15	Conditions with short delays on stop-controlled approaches
C	>15 and ≤ 25	Conditions with average delays on stop-controlled approaches
D	>25 and ≤ 35	Conditions with longer delays to stop-controlled approaches
E	>35 and ≤ 50	Operating conditions at or near capacity level, with very long delays for stopped-controlled traffic
F	>50	Conditions where traffic demand exceeds the capacity of an approach lane, with extreme delays resulting

Source: *Highway Capacity Manual*, TRB 2000

Levels of service for signalized intersections are calculated using the operational analysis methodology of the 2000 *Highway Capacity Manual (HCM)*. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix, and geometrics on delay. Level of service designations are based solely on the criterion of calculated average control-delay per vehicle since delay is a measure of driver discomfort, frustration, fuel consumption, and increased travel time. Table 2 summarizes the relationship between level of service, delay, and description of delay for a signalized intersection. The tabulated delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual approaches, or to entire intersections.

TABLE 2
Level of Service Criteria
Signalized Intersections

Level of Service	Control Delay (Seconds/Vehicle)	Description of Delay
A	≤ 10	Operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all.
B	>10 and ≤ 20	Operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.
C	>20 and ≤ 35	Operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though may still pass through the intersection without stopping.
D	>35 and ≤ 55	Operations with delay greater that 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	>55 and ≤ 80	Operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered to be the limit of acceptable delay. In rural areas or areas where congestion is not widely experienced, this condition can be considered unacceptable. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	>80	Operations with delay greater than 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, which is when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delay levels.

Source: *Highway Capacity Manual*, TRB 2000

In analyzing the forecasted traffic provided by TDOT through the 2033 design year, traffic operational conditions worsen. By 2033, if no changes are made, this intersection is expected to continue to operate at a LOS F during the AM and PM peak periods but with much higher delays of 530.6 seconds (8.8 minutes) and 829.1 seconds (13.8 minutes), respectively. The 2033 forecasted traffic volumes provided by TDOT are included in the Supplemental Data for this report. The capacity analysis worksheets are also included in the Supplemental Data.

In addition to the delays shown by the results of the capacity analyses, Knox County performed its own delay study showing existing delays high enough to meet one of the traffic signal warrants. The delay study conducted by Knox County is included in the Supplemental Data.

In addition to significant delays at the intersection of State Route 331 and State Route 131, the vertical alignment of the eastbound and westbound approaches causes the approaches to be much lower than the actual intersection. This results in substantial sight distance issues for motorists approaching the intersection. Improvements in capacity and vertical alignment are expected to decrease delays and decrease the crash rate once the improvements are implemented.

4. PROPOSED IMPROVEMENTS

Based on the analysis in this report as well as the delay study conducted by Knox County, improvements are justified at the intersection of State Route 331 and State Route 131. Five scenarios have been analyzed for the study intersection: No-Build, Traffic Signal Option, and three Build Options. Traffic volumes for the analysis in this section are based on the 2033 forecasted peak hour traffic volumes provided by TDOT. It should be noted that 2013 forecasted peak hour turning movement volumes were derived from the growth rate used for the AADT volumes.

Option 1 – No-Build

The intersection of State Route 331 and State Route 131 is currently all-way stop controlled. Each approach to the intersection consists of a single lane. The vertical alignment of the approaches results in sight distance and operational issues.

Capacity analyses of the intersection indicates that the AM and PM peak hours can be expected to operate at LOS F in 2013 and 2033 if no improvements are made. The results are detailed in Table 3 below. It can be expected that, in addition to the increased delay and congestion, the number of crashes will increase with increased congestion. The capacity analysis worksheets are included in the Supplemental Data for this report.

No construction costs would be incurred for the No-Build option.

**TABLE 3
Level of Service
Option 1 – No-Build**

	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
2013	F	191.0	F	367.7
2033	F	530.6	F	829.1

Option 2 – Traffic Signal Only

Installation of a traffic signal at the study intersection with no roadway improvements was considered as an option. As previously discussed, the existing intersection consists of a one-lane approach on all approaches. With no turn lanes, a traffic signal would likely operate as a two-phase signal. However, given the sight distance issues for the eastbound and westbound approaches, these approaches would likely need to operate as split-phase. This would limit the capacity at the intersection. The capacity analysis indicates that the intersection can be expected to operate at poor levels of service in both 2013 and 2033 under this option. The analysis is summarized in the Table 4 below.

TABLE 4
Level of Service
Option 2 – Traffic Signal

	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
2013	E	55.5	F	157.7
2033	F	299.5	F	611.6

The conceptual layout of Option 2 – Traffic Signal Only is included in Appendix A. The estimated project cost of this option is \$159,000. The cost estimate includes the installation of a traffic signal with span wires, detector loops and advanced detector loops, and the right-of-way cost associated with installation of signal poles. The cost estimate worksheet for Option 2 is included as Appendix B.

Option 3 – Build

Installation of a traffic signal and widening all approaches to include separate left and right turn lanes at the study intersection was considered as an option. As previously discussed, the existing intersection consists of a one-lane approach on all approaches. By adding turn lanes, left turn signal phases could be added to all approaches, thereby increasing the capacity of the intersection. Since the vertical alignment of the eastbound and westbound approaches is not being improved with this option, these two approaches will likely need to operate as split-phase. The analysis is summarized in Table 5 below. As shown in Table 5, the intersection can be expected to operate at good levels of service through 2013 and beyond under this option. The analyses indicate the intersection will reach capacity near 2033. However, as previously mentioned, the Knoxville Regional Long Range Transportation Plan indicates that both State Route 331 and State Route 131 will be widened to four lanes by 2030. As a result, future roadway improvements may provide additional capacity as traffic volumes and demand increase.

**TABLE 5
Level of Service
Option 3**

	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
2013	C	23.5	C	29.5
2033	D	39.9	E	74.6

The conceptual layout of Option 3 is included in Appendix A. The estimated project cost of this option is \$2,225,558. It should be noted that this build option includes 12-foot travel lanes, four-foot bike lanes, and curb-and-gutter. This option also includes the installation of a traffic signal utilizing span wires, detector loops and advanced detector loops. The cost estimate worksheets for Option 3 are included as Appendix B.

It should be noted that additional analyses were conducted for installation of left turn lanes on all approaches with no separate right turn lanes. For this scenario, each approach would include a left turn lane and a shared through/right turn lane. The analysis for this scenario indicates that the queues for the through/right turn lane would exceed capacity by 2013 and the intersection would operate at LOS F by 2033. The results of the capacity analyses are included in the Supplemental Data for this report. Additional analysis also shows that dual left turn lanes did not improve the queues or levels of service. As a result, the scenario of single or dual left turn lanes without right turn lanes was not considered as an option.

Option 4 – Build

Installation of a traffic signal and widening all approaches to include left and right turn lanes, as well as raising the eastbound and westbound approaches of the intersection to improve the vertical alignment at the study intersection was considered as an option. The capacity analyses of Option 4 are shown in Table 6. Improving the vertical alignment will improve the sight distance issues currently experienced at this intersection and improve capacity by removing the need for the split-phase operation. Improving sight distance should improve safety and should also, according to the capacity analysis, improve traffic operations at the intersection.

**TABLE 6
Level of Service
Option 4**

	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
2013	C	20.1	C	24.2
2033	C	32.8	E	63.5

The conceptual layout of Option 4 is included in Appendix A. The estimated project cost of this option is \$2,627,022. It should be noted that Option 4 includes 12-foot travel lanes, four-foot bike lanes, and curb-and-gutter. This option also includes the installation of a traffic signal utilizing span wires, detector loops and advanced detector loops. The cost estimate worksheets for Option 4 are included as Appendix B.

Option 5 – Build

As previously mentioned, widening State Route 331 and State Route 131 in the vicinity of the study area is included in the 2005-2030 Knoxville Regional Long Range Transportation Plan Update. The Long Range Transportation Plan list describes plans to widen both State Route 331 and 131 from two lanes to four lanes between the years 2014 and 2030. Due to the existing plans for the future widening of these routes, an option to match the future roadway cross-section was included. This option would include the installation of a traffic signal and widening all approaches to include a left turn lane, a through lane, and a shared through/right turn lane, as well as raising the eastbound and westbound approaches of the intersection to improve the vertical alignment at the intersection. The capacity analyses of Option 5 are shown in Table 7. Adding an additional through lane should significantly improve the capacity at the intersection. Improving the vertical alignment will improve the sight distance issues currently experienced at this intersection and improve capacity by removing the need for the split-phase operation. Improving sight distance should improve safety and should also, according to the capacity analyses, improve traffic operations at the intersection.

**TABLE 7
Level of Service
Option 5**

	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
2013	B	16.6	B	19.9
2033	C	26.4	C	34.1

The conceptual layout of Option 5 is included in Appendix A. The estimated project cost of this option is \$4,301,730. It should be noted that Option 5 includes 12-foot travel lanes, four-foot bike lanes, and curb-and-gutter. Also, additional right-of-way was included for future installation of a sidewalk upon implementation of the Long Range Transportation Plan improvements. It was assumed that the roadways would be widened to accommodate the full four-lane cross-section and would transition to two-lane with roadway striping until the widening included in the Long Range Plan is implemented. This option also includes the installation of a traffic signal utilizing span wires, detector loops and advanced detector loops. The cost estimate worksheets for Option 5 are included as Appendix B.

5. FIELD INVESTIGATION

As part of this study, a field investigation was made by:

Gena Gilliam, TDOT Planning

Chris Armstrong, TDOT Planning

Liz Smith, TDOT Planning

Nathan Vatter, TDOT Traffic

Daniel Oliver, TDOT Surveys

Randy Plummer, TDOT Design

Cindy Pionke, Knox County

John Sexton, Knox County

Nathan Benditz, Knoxville Regional Transportation Planning Organization

Dyan Damron, Neel-Schaffer, Inc.

At the field review, the history of the intersection, previous studies and findings were discussed. All legs of the study intersection were found to be included in the TPO's Long Range Transportation Plan list of highway projects. Specifically, the routes are shown to be widened from two lanes to four lanes. All approaches to the study intersection were found to include grading issues. Of primary concern were the eastbound and westbound approaches where each is significantly lower than the intersection. The elevation difference causes concern for sight distance and drainage.

A wet area was located in the southeast quadrant of the intersection. There was an existing bridge located across the eastbound approach (west leg) on State Route 131 (Emory Road). A property owner located just east of the study intersection has reported drainage problems and has made provisions to improve the drainage.

There is an elementary school and a high school located on State Route 131 (Tazewell Pike) just north of the study intersection. It was indicated that a new middle school will likely be constructed soon. The County indicated that there have been several new developments approved in the vicinity of the study intersection. Upon construction, these new developments would impact the traffic volumes traveling through the study intersection.

The field review notes are included as Appendix C.

6. ADDITIONAL CONDITIONS AND ISSUES

6.1 Bicycle and Pedestrian Accommodation

Bicycle lanes have been provided in each of the build options analyzed in this report. However, due to lack of pedestrian connectivity along the existing facilities and the limited length of construction of this study, pedestrian accommodations are not included in the options analyzed. As previously discussed, there are existing schools located just north of the intersection with an additional school to be constructed in the near future. Given the proximity of these schools, the design of the intersection should not preclude the addition of these facilities if/when corridor improvements are made at a later date. As a result, Option 5, which includes consideration of the 2005-2030 Knoxville Regional Long Range Transportation Plan Update, includes additional right-of-way for installation of future sidewalks.

6.2 Environmental Protection Agency Results

A search of occurrences of Environmental Protection Agency (EPA) items within the study area resulted in no locations found. The EPA results indicate that there are no Superfund National Priorities List (NPL) sites located within the study area. Also, there were no Toxics Release Inventory (TRI) locations within the study area.

6.3 FEMA Flood Zone Results

A review of the Federal Emergency Management Agency (FEMA) flood maps indicates that the study intersection is not located within a published flood plain, according to Map Number 47093C0151F effective May 2, 2007. However, the intersection is located approximately 1,250 feet from the detailed study limit of a published flood plain.

7. ASSESSMENT OF OPTIONS

Seven Guiding Principles

TDOT has adopted seven guiding principles against which all transportation projects are to be evaluated. These guiding principles are discussed below as they relate to the intersection improvements discussed in this report.

1. Preserve and Manage the Existing Transportation System – The intersection of State Route 331 and State Route 131 has reached capacity during peak hours. As traffic volumes increase, this condition could extend the duration of peak traffic periods. The options presented in this report for improving the intersection of State Route 331 at State Route 131 will enhance the existing roadway system and the movement of goods and people. All build options – Options 3, 4, and 5 – emphasize safety and efficiency by improving sight distance and reducing congestion. The options also highlight the existing environment since they both consider widening along the existing roadway. As a result, no new roadway will be constructed. All build options and the signal only option are favorable in relation to this guiding principle.

2. Move a Growing, Diverse, and Active Population – The counties that are served by the study intersection are currently experiencing population growth rates higher than the statewide average. The community continues to thrive with the addition of neighborhoods and schools. As the population grows, the demand on the local infrastructure increases. The roadway improvement options discussed in this report will effectively reduce congestion by increasing the capacity through the intersection of State Route 331 and State Route 131. All options will optimize service and operation, as indicated by the level of service analysis. State Route 331 is a major connector to Interstate 640 north of Knoxville, and State Route 131 is a connector to Interstate 75 north of Knoxville. By improving a major connection to interstates, the area will be provided with increased connectivity and access. The options provide regional mobility for Knox County as well as Grainger and Union Counties.

3. Support the State's Economy – Improving the intersection of State Route 331 at State Route 131 will enhance the transportation network for all users and will improve access to the existing and future residential developments along the route. Approximately 4-5% of the traffic traveling through the study intersection is heavy vehicles. As a result, by 2033, the number of heavy vehicles on each leg of the intersection will range from 385-750 vehicles per day. This is an indication of heavy reliance upon this intersection for freight movement. Transportation improvement projects such as the study intersection help support Tennessee's economy by providing enhanced travel conditions for the work force and the movement of freight in Knox County and the surrounding counties.

4. Maximize Safety and Security – Improving the intersection of State Route 331 and State Route 131 should significantly improve the safety for motorists along these routes. The analysis in this report shows that the crash rate at the study intersection exceeds the statewide crash rate for similar intersections. Furthermore,

12 of the 25 crashes were rear-end crashes. All build options could improve capacity as well as sight distance issues that are currently experienced at the intersection.

5. Build Partnerships for Livable Communities – TDOT's Long Range Transportation Plan promotes and encourages projects that have public and community support. While no formal public involvement process has been initiated at this time, there is little known opposition at this time. The build options are anticipated to have minor impacts to the surrounding community. The overall improvement will benefit the majority of the community by relieving congestion and improving safety conditions. The public involvement process mandated by the provisions of the National Environmental Policy Act (NEPA) will continue as this study advances.

6. Promote Stewardship of the Environment – This report includes preliminary review of environmental issues within the study area. The purpose of this review was to identify any known environmental concerns as early as possible in the planning process. A search of occurrences of Environmental Protection Agency (EPA) items within the study area resulted in no locations found. Further environmental studies will be required if state and/or federal funds are to be used for this project.

7. Promote Financial Responsibility – Cost estimates based on various roadway typical sections were calculated for this report. The cost estimates, as depicted in this report, are offered for comparison purposes and will fluctuate with inflation and any unexpected conditions. It is the Department's goal to follow a comprehensive transportation planning process, promote coordination among public and private operators of transportation systems and support efforts to provide stable funding for the public component of the transportation system. This entails exercising financial responsibility in the development and implementation of roadway projects and minimizing costs to taxpayers..

8. SUMMARY

Consideration has been given by Knox County and TDOT to improve the intersection of State Route 331 and State Route 131 to include a traffic signal and turn lanes. Widening State Route 331 and State Route 131 in the vicinity of the study area is included in the 2005-2030 Knoxville Regional Long Range Transportation Plan Update. The Long Range Transportation Plan lists plans to widen both State Route 331 and 131 from two lanes to four lanes between the years 2014 and 2030.

Currently, congestion levels along State Route 331 and State Route 131 are highest and are concentrated near the study intersection. The existing intersection currently operates at LOS F during the AM and PM peak hours. Analysis of the forecasted traffic provided by TDOT through the 2033 design year, traffic operational conditions worsen. By 2033, if no changes are made, this intersection is expected to operate at a LOS F during the AM and PM peak periods with a delay of 530.6 seconds (8.8 minutes) and 829.1 seconds (13.8 minutes), respectively.

In addition to significant delays at the intersection of State Route 331 and State Route 131, the vertical alignment of the eastbound and westbound approaches causes the legs to be much lower than the actual intersection. This creates sight issues for motorists approaching the intersection. Improvements in capacity and vertical alignment are expected to decrease delays and improve safety once the improvements are implemented.

The improvement options discussed in this report should provide increased capacity and improved safety at the intersection of State Route 331 and State Route 131. The functionals for each of the improvement options are included in Appendix A.

APPENDIX

- A. Conceptual Layouts
- B. Cost Estimate Worksheets
- C. Field Review Notes

Appendix A

Conceptual Layouts

Index Of Sheets

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	TYPICAL SECTION
3	OPTION 2
4	OPTION 3
5	OPTION 3
6	OPTION 4
7	OPTION 4
8	OPTION 5
9	OPTION 5
10	OPTION 5

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION BUREAU OF ENGINEERING

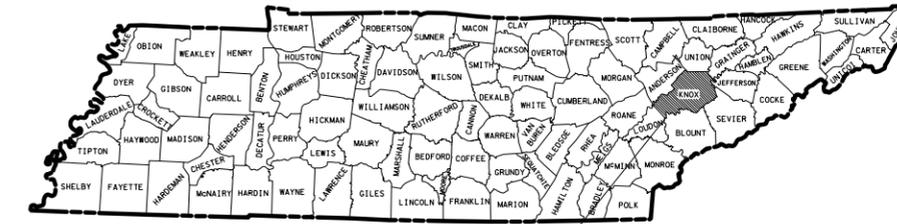
KNOX COUNTY

TENN.	YEAR	SHEET NO.
	2008	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

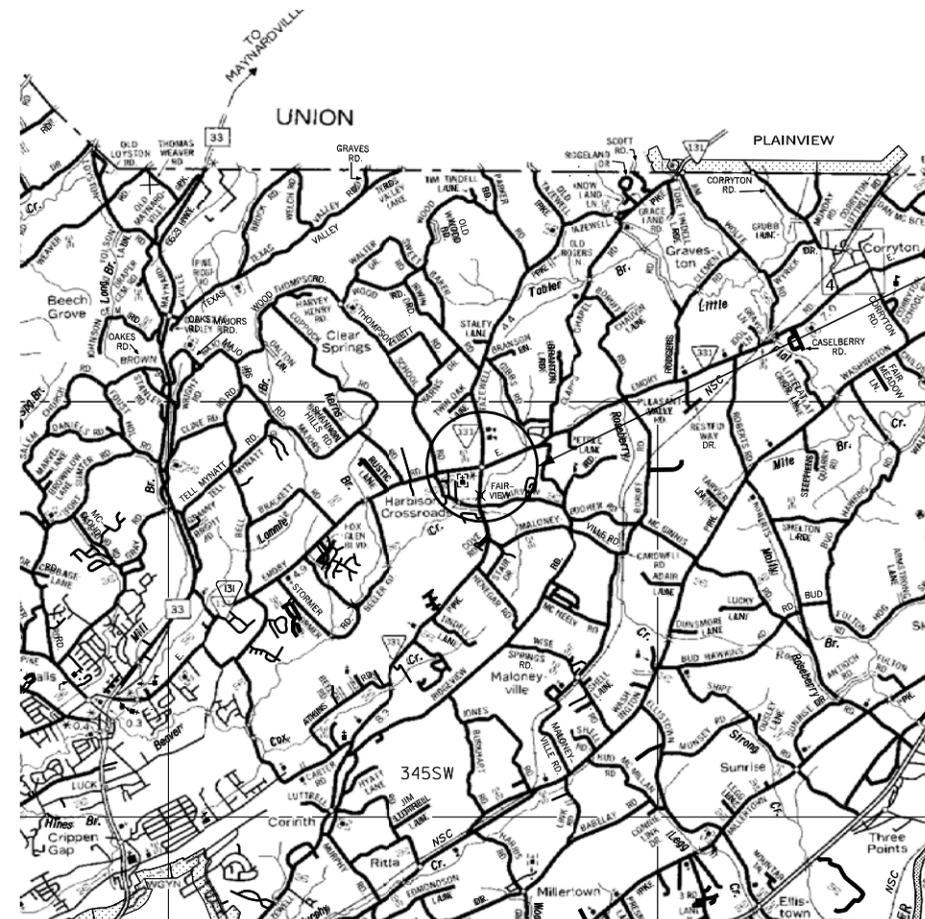
STATE ROUTE 331 AT STATE ROUTE 131

CONCEPT DRAWING

STATE HIGHWAY NO. 331 F.A.H.S. NO.



KNOX COUNTY



STUDY LOCATION

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 1995 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT

SCALE: 1" = 1 MILE

STUDY LENGTH INTERSECTION DESIGN SPEED: 45 MPH

TDOT ROAD SP. SV. 2 _____
 DESIGNER NEEL-SCHAFFER INC. CHECKED BY _____
 P.E. NO. _____

APPROVED: _____
 CHIEF ENGINEER

DATE: _____

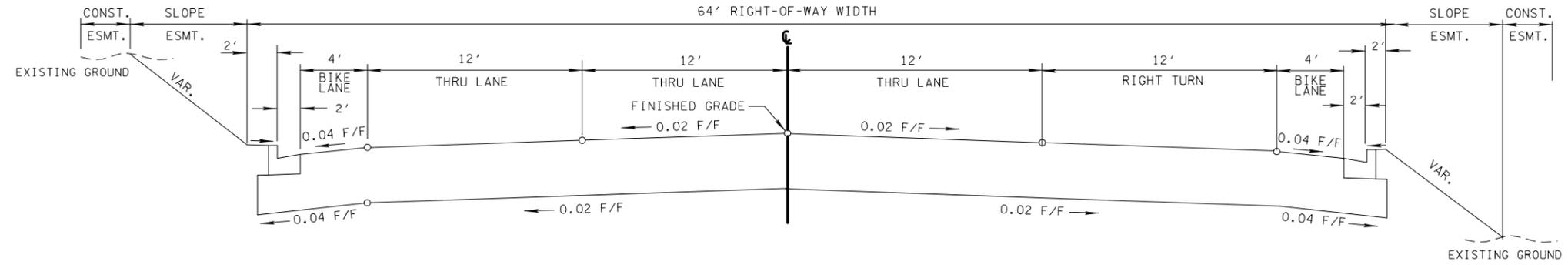
APPROVED: _____
 COMMISSIONER

U.S. DEPARTMENT OF TRANSPORTATION
 FEDERAL HIGHWAY ADMINISTRATION

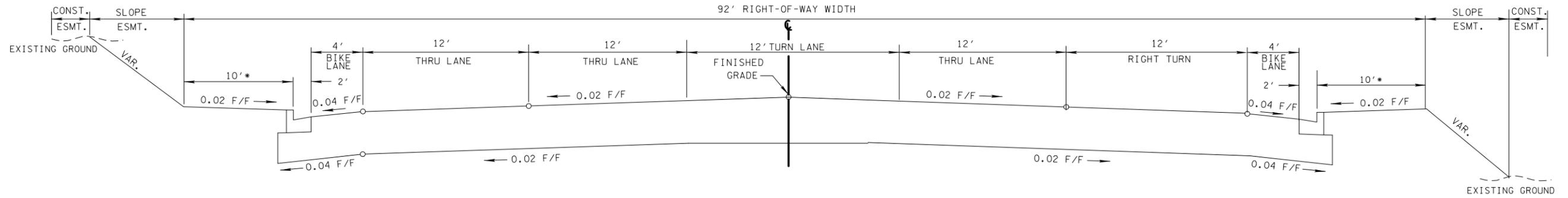
APPROVED: _____
 DIVISION ADMINISTRATOR DATE

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2008		2

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.



TANGENT SECTION
(BASED ON STD. DWG. RD-TS-6A)
OPTION 3 & 4



TANGENT SECTION
(BASED ON STD. DWG. RD-TS-6A)
OPTION 5

* FOR FUTURE SIDEWALK AS
MPO IMPROVEMENTS ARE
IMPLEMENTED.

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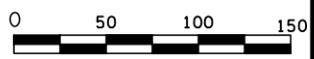
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

**TYPICAL
SECTION**

TYPE	YEAR	PROJECT NO.	SHEET NO.
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STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

OPTION 2

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CONCEPT	2008		4



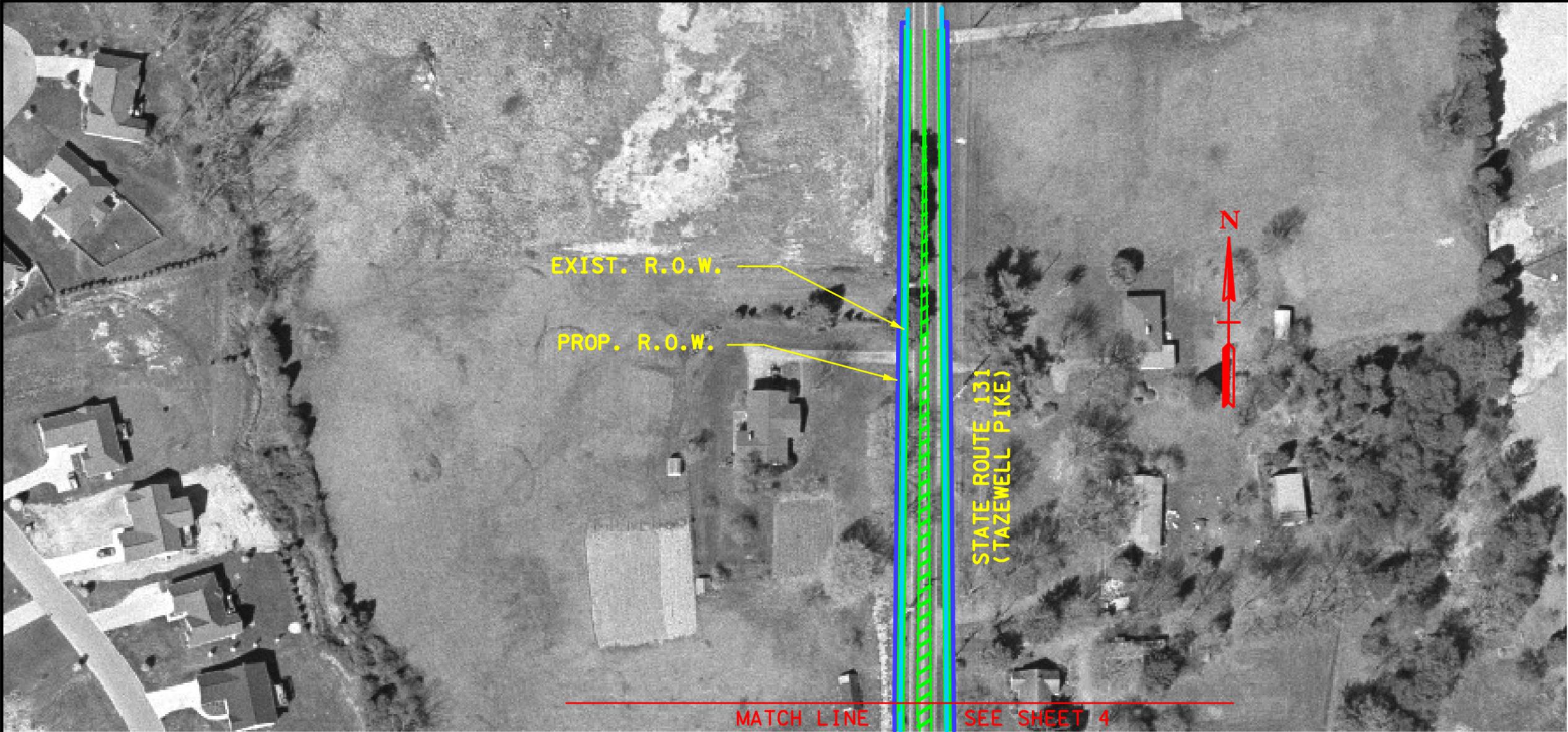
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STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

OPTION 3

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CONCEPT	2008		5



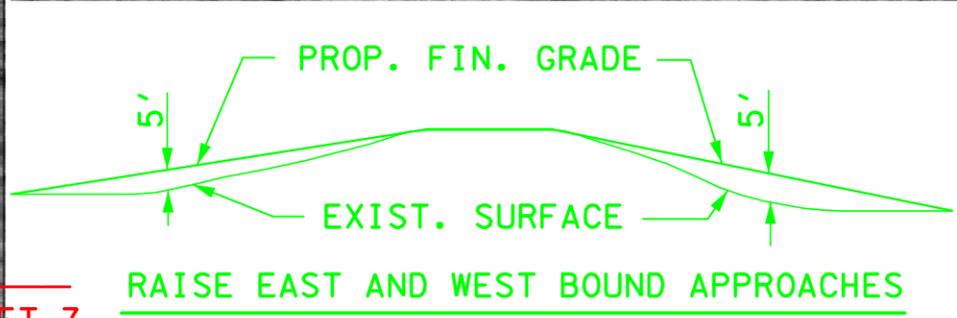
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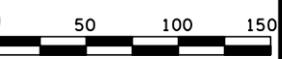
STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

OPTION 3

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2008		6



RAISE EAST AND WEST BOUND APPROACHES



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

OPTION 4

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2008		7



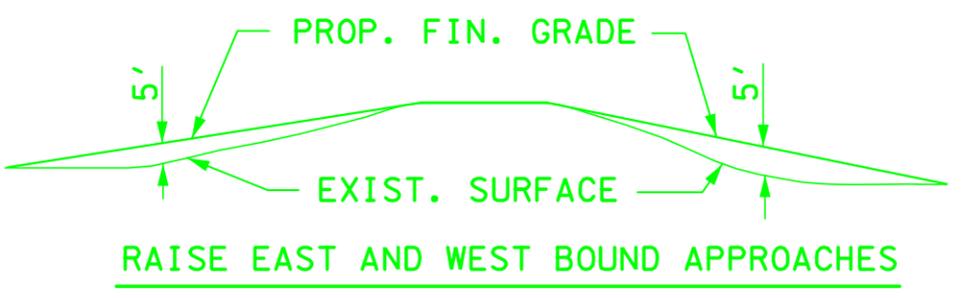
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STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

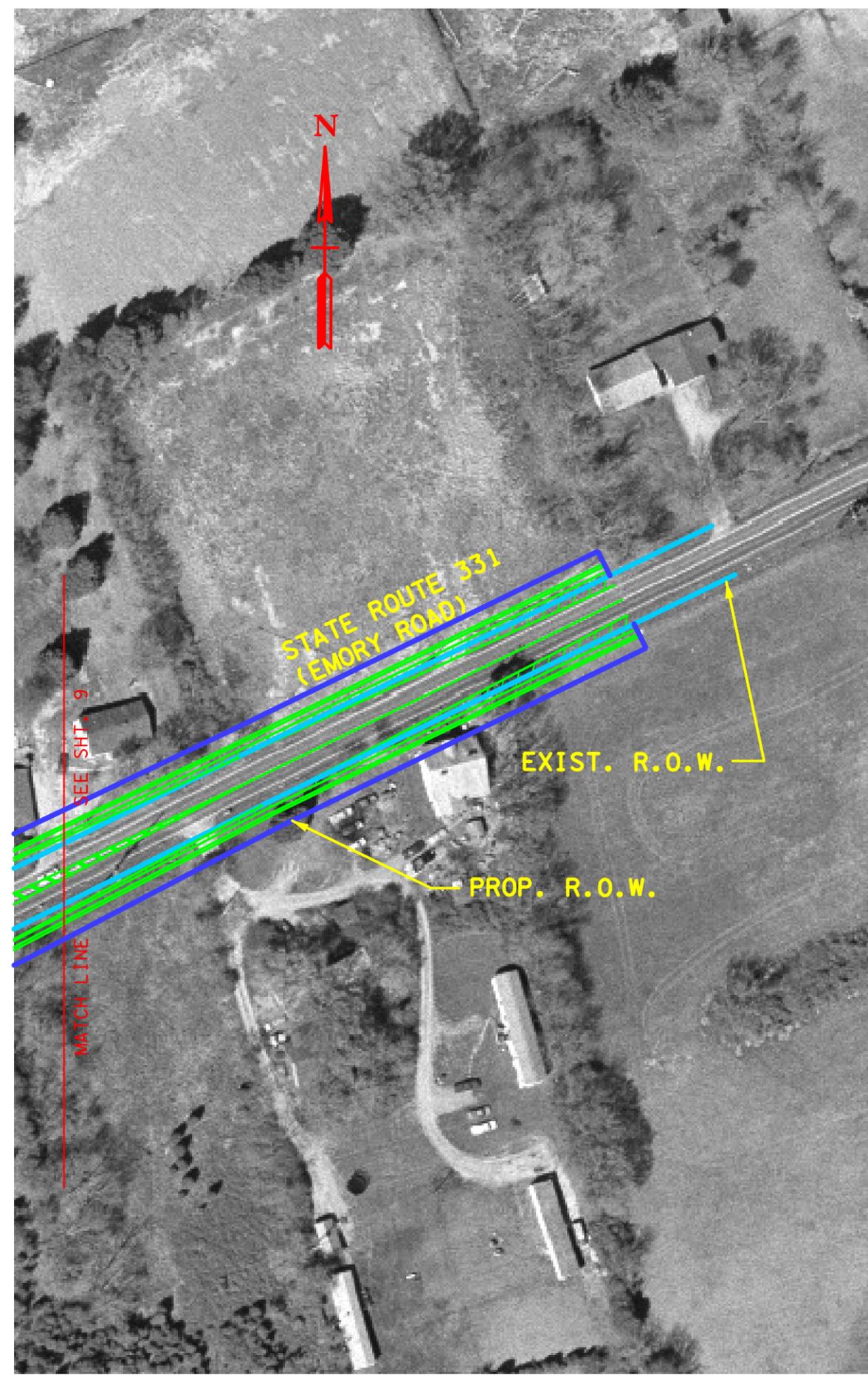
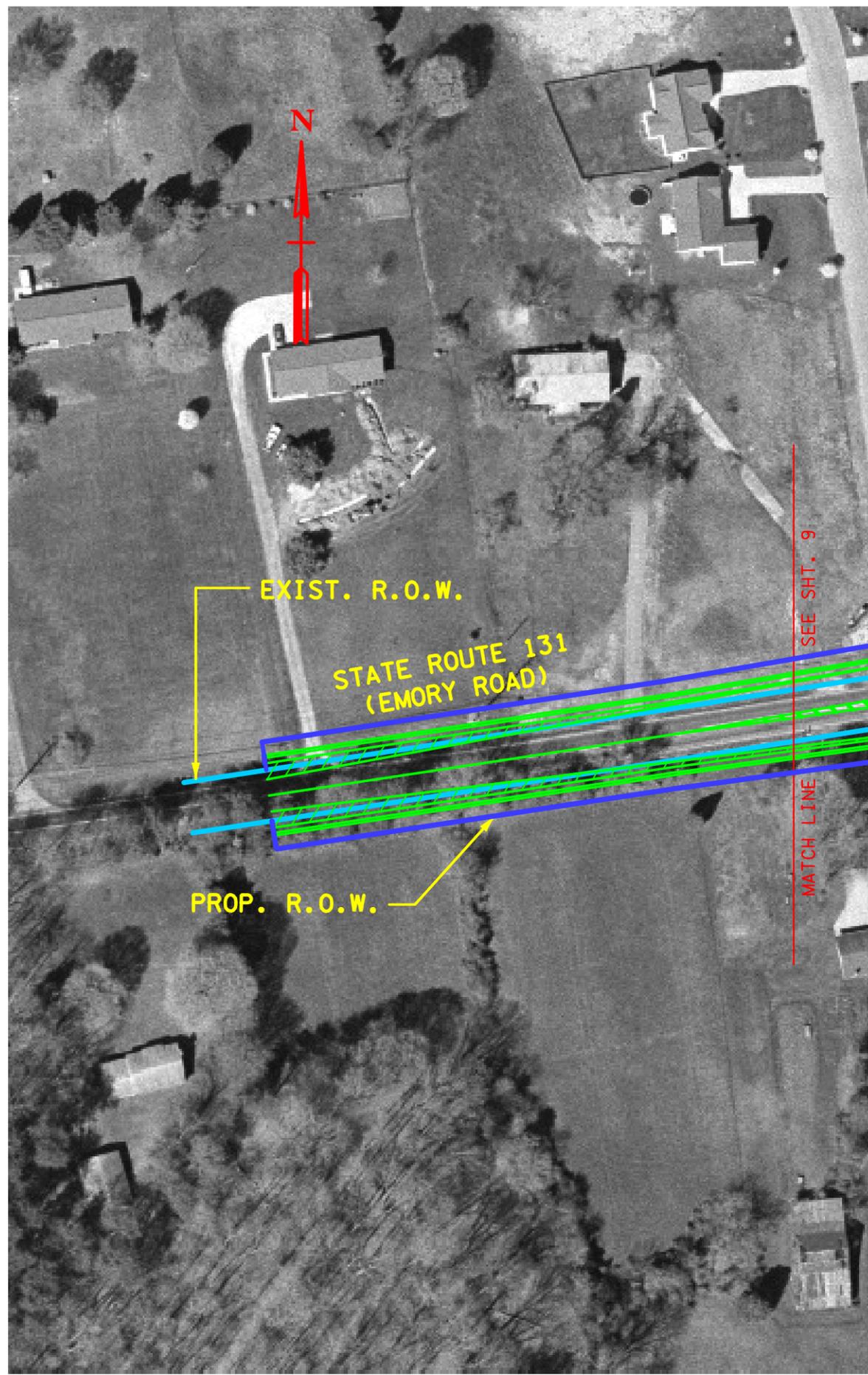
OPTION 4

TYPE	YEAR	PROJECT NO.	SHEET NO.
CONCEPT	2008		8



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

OPTION 5

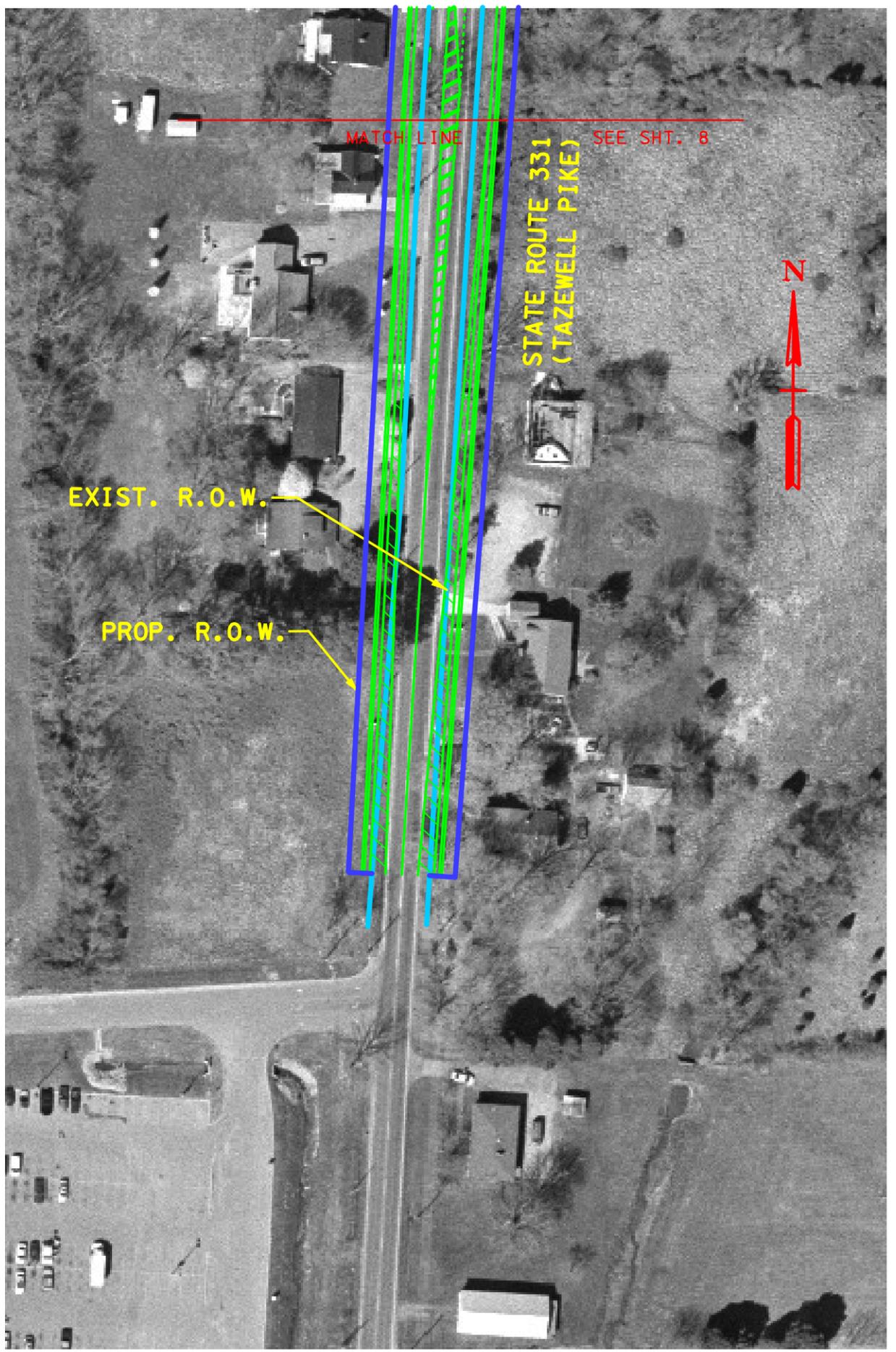
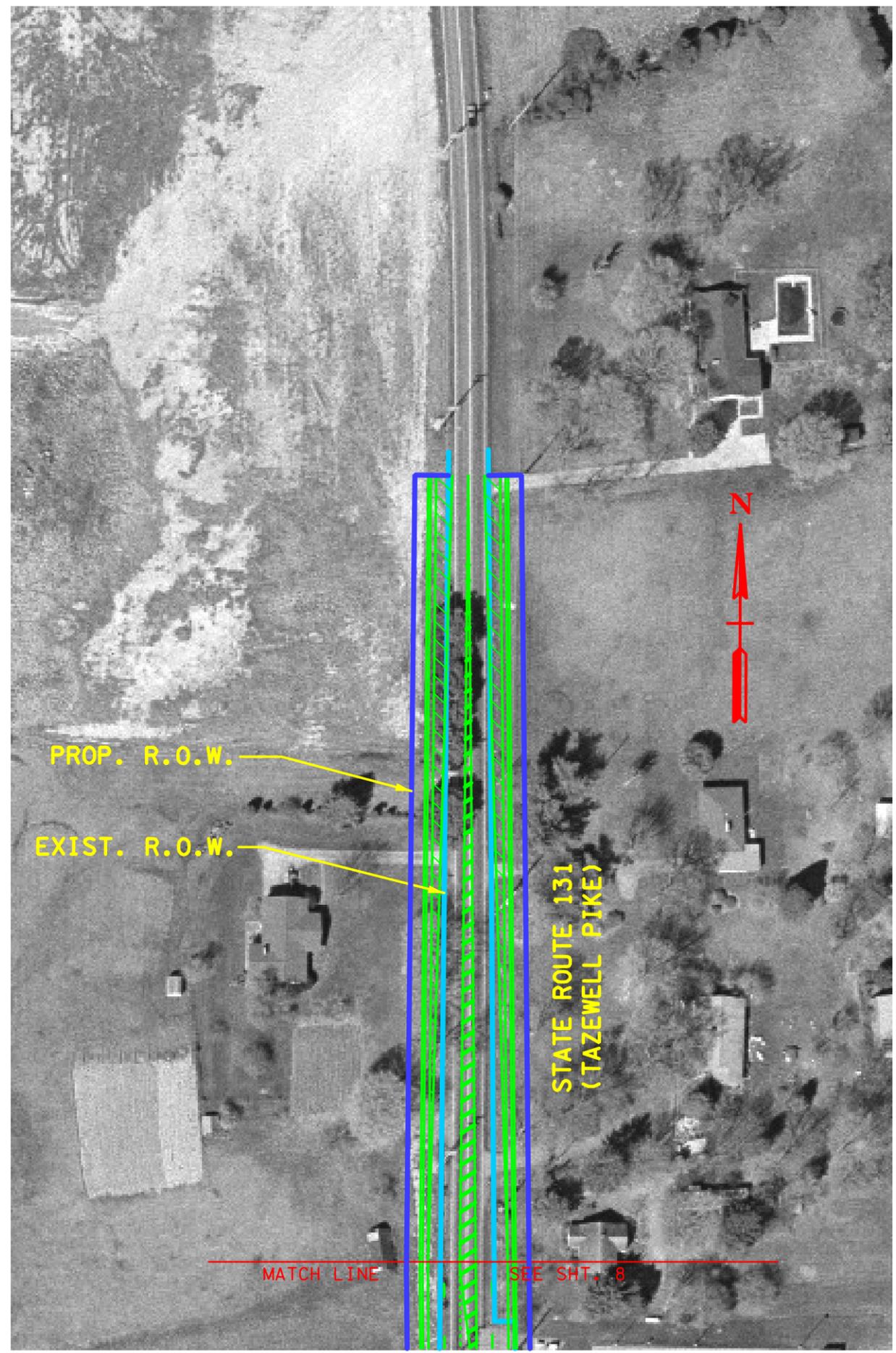


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CONCEPT	2008		9

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CONCEPT	2008		10

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STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION

OPTION 5

Appendix B

Cost Estimate Worksheets

COST DATA SHEET

Project Total

PROJECT: SR-331 AT SR-131 Option '2'

LENGTH: 0 CROSS-SECTION:

Right-of-Way

Land, Improvements and Damages (0.017± Acres).....	\$	5,100.00
Incidentals (2 Tracts).....	\$	7,000.00
Relocation Payments: (0 Residences).....	\$	
(0 Business)		
(0 Non-Profits)		
TOTAL RIGHT-OF-WAY COST.....	\$	12,100.00

Utility Relocation

Reimbursable.....	\$	-
Non-Reimbursable.....	\$	-
TOTAL ADJUSTMENT COST.....	\$	-

Construction

Clearing and Grubbing.....	\$	-
Earthwork.....	\$	-
Drainage (Includes Erosion Control).....	\$	500.00
Paving.....	\$	-
Maintenance of Traffic.....	\$	1,500.00
Sodding.....	\$	-
Signing.....	\$	-
Signalization	\$	105,000.00
Guardrail.....	\$	-
Other Construction Items (8.5%).....	\$	9,100.00
CONSTRUCTION SUB TOTAL		116,100.00
Mobilization.....	\$	5,810.00
10% Engineering and Contingencies.....	\$	11,610.00
TOTAL CONSTRUCTION COST.....	\$	133,520.00

Preliminary Engineering (10%)..... \$ 13,400.00

TOTAL PROJECT COST..... \$ 159,000.00

COST DATA SHEET

Project Total

PROJECT: SR-331 AT SR-131

Option 3

LENGTH: 0.34 MILES

CROSS-SECTION: _____

Right-of-Way

Land, Improvements and Damages (1.74± Acres).....	\$	223,900.00
Incidentals (22 Tracts).....	\$	77,000.00
Relocation Payments: (0 Residences).....	\$	
(0 Business)		
(0 Non-Profits)		
TOTAL RIGHT-OF-WAY COST	\$	<u><u>300,900.00</u></u>

Utility Relocation

Reimbursable.....	\$	-
Non-Reimbursable.....	\$	293,000.00
TOTAL ADJUSTMENT COST	\$	<u><u>293,000.00</u></u>

Construction

Clearing and Grubbing.....	\$	52,000.00
Earthwork.....	\$	97,000.00
Drainage (Includes Erosion Control).....	\$	310,800.00
Paving.....	\$	467,500.00
Maintenance of Traffic.....	\$	44,500.00
Sodding.....	\$	34,000.00
Signing.....	\$	22,200.00
Signalization	\$	150,000.00
Guardrail.....	\$	10,800.00
Other Construction Items (8.5%).....	\$	101,048.00
CONSTRUCTION SUB TOTAL		1,289,848.00
Mobilization.....	\$	64,492.00
10% Engineering and Contingencies.....	\$	128,985.00
TOTAL CONSTRUCTION COST	\$	<u><u>1,483,325.00</u></u>

Preliminary Engineering (10%)..... \$ 148,333.00

TOTAL PROJECT COST..... \$ \$2,225,558.00

SR-331 AT SR-131
ENGINEERS OPINION OF COST
OPTION 3 6/30/2008

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
ROADWAY:					
----- CLEARING AND GRUBBING					
201-01	CLEARING AND GRUBBING	LS	1	\$ 52,000	\$ 52,000
----- EARTHWORK					
105-01	CONSTRUCTION STAKES, LINES AND GRADES	LS	1	\$ 26,000	\$ 26,000
203-01	ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED)	C.Y.	7100	\$ 10	\$ 71,000
----- DRAINAGE (INCLUDES EROSION CONTROL)					
209-01.10	EROSION AND SILTATION CONTROL	LS	1	\$ 33,400	\$ 33,400
604-02.01	CLASS A CONCRETE (BOX BRIDGES)	C.Y.	39	\$ 573	\$ 22,300
604-02.02	STEEL BAR REINFORCEMENT (BOX BRIDGES)	LB.	5775	\$ 1	\$ 5,800
607-03.02	18" CONCRETE PIPE CULVERT (CLASS III)	L.F.	2250	\$ 61	\$ 137,300
607-05.02	24" CONCRETE PIPE CULVERT (CLASS III)	L.F.	450	\$ 59	\$ 26,600
607-06.02	30" CONCRETE PIPE CULVERT (CLASS III)	L.F.	300	\$ 50	\$ 15,000
611-07.01	CLASS A CONCRETE (PIPE ENDWALLS)	C.Y.	4	\$ 717	\$ 2,900
611-07.02	STEEL BAR REINFORCEMENT (PIPE ENDWALLS)	LB.	511	\$ 1	\$ 700
611-12.01	CATCH BASINS, TYPE 12, 0' - 4' DEPTH	EACH	26	\$ 2,000	\$ 52,000
611-14.02	CATCH BASINS, TYPE 14, > 4' - 8' DEPTH	EACH	4	\$ 3,700	\$ 14,800
----- PAVING					
303-01	MINERAL AGGREGATE, TYPE A BASE, GRADING D	TON	4808	\$ 19	\$ 91,400
307-02.01	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING A	TON	1410	\$ 73	\$ 102,900
307-02.08	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING B-M2	TON	925	\$ 92	\$ 85,100
411-02.10	ACS MIX(PG70-22) GRADING D	TON	1101	\$ 66	\$ 72,700
702-03	CONCRETE COMBINED CURB & GUTTER	C.Y.	405	\$ 285	\$ 115,400
----- MAINTENANCE OF TRAFFIC					
712-01	TRAFFIC CONTROL	LS	1	\$ -	\$ 44,500
----- SODDING					
803-01	SODDING (NEW SOD)	S.Y.	8500	\$ 4	\$ 34,000
----- SIGNING					
713-16.20	SIGNS (VARIES)	EACH	12	\$ 300	\$ 3,600
716-02.01	PLASTIC PAVEMENT MARKING (4" LINE)	L.M.	4	\$ 2,500	\$ 10,000
716-02.04	PLASTIC PAVEMENT MARKING(CHANNELIZATION STRIPING)	S.Y.	121	\$ 18	\$ 2,200
716-02.05	PLASTIC PAVEMENT MARKING (STOP LINE)	L.F.	144	\$ 10	\$ 1,400
716-02.06	PLASTIC PAVEMENT MARKING (TURN LANE ARROW)	EACH	20	\$ 160	\$ 3,200
716-05.01	PAINTED PAVEMENT MARKING (4" LINE)	L.M.	2	\$ 900	\$ 1,800
----- SIGNALIZATION					
730-01	TRAFFIC SIGNALS	LS	1	\$ 150,000	\$ 150,000
----- GUARDRAIL					
705-02.02	SINGLE GUARDRAIL (TYPE 2)	L.F.	100	\$ 18	\$ 1,800
705-04.07	TAN ENERGY ABSORBING TERM (NCHRP 350, TL3)	EACH	4	\$ 2,250	\$ 9,000
ROADWAY SUBTOTAL					\$ 1,188,800

ESTIMATE BASED ON TDOT AVERAGE UNIT PRICES - 2007 AWARDED CONTRACTS.

COST DATA SHEET

Project Total

PROJECT: SR-331 AT SR-131

Option 4

LENGTH: 0.34 MILES

CROSS-SECTION: _____

Right-of-Way

Land, Improvements and Damages (1.74± Acres).....	\$	223,900.00
Incidentals (22 Tracts).....	\$	77,000.00
Relocation Payments: (0 Residences).....	\$	
(0 Business)		
(0 Non-Profits)		
TOTAL RIGHT-OF-WAY COST	\$	<u><u>300,900.00</u></u>

Utility Relocation

Reimbursable.....	\$	-
Non-Reimbursable.....	\$	293,000.00
TOTAL ADJUSTMENT COST	\$	<u><u>293,000.00</u></u>

Construction

Clearing and Grubbing.....	\$	52,000.00
Earthwork.....	\$	247,500.00
Drainage (Includes Erosion Control).....	\$	338,400.00
Paving.....	\$	547,500.00
Maintenance of Traffic.....	\$	55,400.00
Sodding.....	\$	56,600.00
Signing.....	\$	22,200.00
Signalization	\$	150,000.00
Guardrail.....	\$	11,700.00
Other Construction Items (8.5%).....	\$	125,911.00
CONSTRUCTION SUB TOTAL		1,607,211.00
Mobilization.....	\$	80,361.00
10% Engineering and Contingencies.....	\$	<u>160,721.00</u>
TOTAL CONSTRUCTION COST	\$	<u><u>1,848,293.00</u></u>

Preliminary Engineering (10%)..... \$ 184,829.00

TOTAL PROJECT COST..... \$ 2,627,022.00

**SR-331 AT SR-131
ENGINEERS OPINION OF COST
OPTION 4 6/30/2008**

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
ROADWAY:					
-----	CLEARING AND GRUBBING				
201-01	CLEARING AND GRUBBING	LS	1	\$ 52,000	\$ 52,000
-----	EARTHWORK				
105-01	CONSTRUCTION STAKES, LINES AND GRADES	LS	1	\$ 26,000	\$ 26,000
203-01	ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED)	C.Y.	7100	\$ 10	\$ 71,000
203-03	BORROW EXCAVATION (UNCLASSIFIED)	C.Y.	7167	\$ 21	\$ 150,500
-----	DRAINAGE (INCLUDES EROSION CONTROL				
209-01.10	EROSION AND SILTATION CONTROL	LS	1	\$ 41,550	\$ 41,600
604-02.01	CLASS A CONCRETE (BOX BRIDGES)	C.Y.	64	\$ 573	\$ 36,700
604-02.02	STEEL BAR REINFORCEMENT (BOX BRIDGES)	LB.	10793	\$ 1	\$ 10,800
607-03.02	18" CONCRETE PIPE CULVERT (CLASS III)	L.F.	2250	\$ 61	\$ 137,300
607-05.02	24" CONCRETE PIPE CULVERT (CLASS III)	L.F.	450	\$ 59	\$ 26,600
607-06.02	30" CONCRETE PIPE CULVERT (CLASS III)	L.F.	300	\$ 50	\$ 15,000
611-07.01	CLASS A CONCRETE (PIPE ENDWALLS)	C.Y.	4	\$ 717	\$ 2,900
611-07.02	STEEL BAR REINFORCEMENT (PIPE ENDWALLS)	LB.	511	\$ 1	\$ 700
611-12.01	CATCH BASINS, TYPE 12, 0' - 4' DEPTH	EACH	26	\$ 2,000	\$ 52,000
611-14.02	CATCH BASINS, TYPE 14, > 4' - 8' DEPTH	EACH	4	\$ 3,700	\$ 14,800
-----	PAVING				
303-01	MINERAL AGGREGATE, TYPE A BASE, GRADING D	TON	5950	\$ 19	\$ 113,100
307-02.01	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING A	TON	1846	\$ 73	\$ 134,800
307-02.08	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING B-M2	TON	1212	\$ 92	\$ 111,500
411-02.10	ACS MIX(PG70-22) GRADING D	TON	1101	\$ 66	\$ 72,700
702-03	CONCRETE COMBINED CURB & GUTTER	C.Y.	405	\$ 285	\$ 115,400
-----	MAINTENANCE OF TRAFFIC				
712-01	TRAFFIC CONTROL	LS	1	\$ 55,400	\$ 55,400
-----	SODDING				
803-01	SODDING (NEW SOD)	S.Y.	14156	\$ 4	\$ 56,600
-----	SIGNING				
713-16.20	SIGNS (VARIES)	EACH	12	\$ 300	\$ 3,600
716-02.01	PLASTIC PAVEMENT MARKING (4" LINE)	L.M.	4	\$ 2,500	\$ 10,000
716-02.04	PLASTIC PAVEMENT MARKING(CHANNELIZATION STRIPING)	S.Y.	121	\$ 18	\$ 2,200
716-02.05	PLASTIC PAVEMENT MARKING (STOP LINE)	L.F.	144	\$ 10	\$ 1,400
716-02.06	PLASTIC PAVEMENT MARKING (TURN LANE ARROW)	EACH	20	\$ 160	\$ 3,200
716-05.01	PAINTED PAVEMENT MARKING (4" LINE)	L.M.	2	\$ 900	\$ 1,800
-----	SIGNALIZATION				
730-01	TRAFFIC SIGNALS	LS	1	\$ 150,000	\$ 150,000
-----	GUARDRAIL				
705-02.02	SINGLE GUARDRAIL (TYPE 2)	L.F.	150	\$ 18	\$ 2,700
705-04.07	TAN ENERGY ABSORBING TERM (NCHRP 350, TL3)	EACH	4	\$ 2,250	\$ 9,000
	ROADWAY SUBTOTAL				\$ 1,481,300

ESTIMATE BASED ON TDOT AVERAGE UNIT PRICES - 2007 AWARDED CONTRACTS.

COST DATA SHEET

Project Total

PROJECT: SR-331 AT SR-131

Option 5

LENGTH: 0.34 MILES

CROSS-SECTION: _____

Right-of-Way

Land, Improvements and Damages (4.94± Acres).....	\$	537,200.00
Incidentals (28 Tracts).....	\$	98,000.00
Relocation Payments: (0 Residences).....	\$	
(0 Business)		
(0 Non-Profits)		
TOTAL RIGHT-OF-WAY COST	\$	<u><u>635,200.00</u></u>

Utility Relocation

Reimbursable.....	\$	-
Non-Reimbursable.....	\$	293,000.00
TOTAL ADJUSTMENT COST	\$	<u><u>293,000.00</u></u>

Construction

Clearing and Grubbing.....	\$	52,000.00
Earthwork.....	\$	350,800.00
Drainage (Includes Erosion Control).....	\$	480,300.00
Paving.....	\$	1,219,000.00
Maintenance of Traffic.....	\$	55,400.00
Sodding.....	\$	43,200.00
Signing.....	\$	95,500.00
Signalization	\$	150,000.00
Guardrail.....	\$	11,700.00
Other Construction Items (8.5%).....	\$	208,922.00
CONSTRUCTION SUB TOTAL		2,666,822.00
Mobilization.....	\$	133,341.00
10% Engineering and Contingencies.....	\$	266,682.00

TOTAL CONSTRUCTION COST..... \$ 3,066,845.00

Preliminary Engineering (10%)..... \$ 306,685.00

TOTAL PROJECT COST..... \$ 4,301,730.00

**SR-331 AT SR-131
ENGINEERS OPINION OF COST
OPTION 5 9/01/2008**

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	AMOUNT
ROADWAY:					
-----	CLEARING AND GRUBBING				
201-01	CLEARING AND GRUBBING	LS	1	\$ 52,000	\$ 52,000
-----	EARTHWORK				
105-01	CONSTRUCTION STAKES, LINES AND GRADES	LS	1	\$ 26,000	\$ 26,000
203-01	ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED)	C.Y.	19875	\$ 10	\$ 198,800
203-03	BORROW EXCAVATION (UNCLASSIFIED)	C.Y.	6000	\$ 21	\$ 126,000
-----	DRAINAGE (INCLUDES EROSION CONTROL				
209-01.10	EROSION AND SILTATION CONTROL	LS	1	\$ 41,550	\$ 41,600
604-02.01	CLASS A CONCRETE (BOX BRIDGES)	C.Y.	95	\$ 573	\$ 54,400
604-02.02	STEEL BAR REINFORCEMENT (BOX BRIDGES)	LB.	17162	\$ 1	\$ 17,200
607-03.02	18" CONCRETE PIPE CULVERT (CLASS III)	L.F.	4050	\$ 61	\$ 247,100
607-05.02	24" CONCRETE PIPE CULVERT (CLASS III)	L.F.	450	\$ 59	\$ 26,600
607-06.02	30" CONCRETE PIPE CULVERT (CLASS III)	L.F.	300	\$ 50	\$ 15,000
611-07.01	CLASS A CONCRETE (PIPE ENDWALLS)	C.Y.	4	\$ 717	\$ 2,900
611-07.02	STEEL BAR REINFORCEMENT (PIPE ENDWALLS)	LB.	511	\$ 1	\$ 700
611-12.01	CATCH BASINS, TYPE 12, 0' - 4' DEPTH	EACH	30	\$ 2,000	\$ 60,000
611-14.02	CATCH BASINS, TYPE 14, > 4' - 8' DEPTH	EACH	4	\$ 3,700	\$ 14,800
-----	PAVING				
303-01	MINERAL AGGREGATE, TYPE A BASE, GRADING D	TON	13456	\$ 19	\$ 255,700
307-02.01	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING A	TON	5150	\$ 73	\$ 376,000
307-02.08	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING B-M2	TON	3376	\$ 92	\$ 310,600
411-02.10	ACS MIX(PG70-22) GRADING D	TON	1972	\$ 66	\$ 130,200
702-03	CONCRETE COMBINED CURB & GUTTER	C.Y.	514	\$ 285	\$ 146,500
-----	MAINTENANCE OF TRAFFIC				
712-01	TRAFFIC CONTROL	LS	1	\$ 55,400	\$ 55,400
-----	SODDING				
803-01	SODDING (NEW SOD)	S.Y.	10803	\$ 4	\$ 43,200
-----	SIGNING				
713-16.20	SIGNS (VARIES)	EACH	12	\$ 300	\$ 3,600
716-02.01	PLASTIC PAVEMENT MARKING (4" LINE)	L.M.	4.3	\$ 2,500	\$ 10,800
716-02.04	PLASTIC PAVEMENT MARKING(CHANNELIZATION STRIPING)	S.Y.	4149	\$ 18	\$ 74,700
716-02.05	PLASTIC PAVEMENT MARKING (STOP LINE)	L.F.	144	\$ 10	\$ 1,400
716-02.06	PLASTIC PAVEMENT MARKING (TURN LANE ARROW)	EACH	20	\$ 160	\$ 3,200
716-05.01	PAINTED PAVEMENT MARKING (4" LINE)	L.M.	2	\$ 900	\$ 1,800
-----	SIGNALIZATION				
730-01	TRAFFIC SIGNALS	LS	1	\$ 150,000	\$ 150,000
-----	GUARDRAIL				
705-02.02	SINGLE GUARDRAIL (TYPE 2)	L.F.	150	\$ 18	\$ 2,700
705-04.07	TAN ENERGY ABSORBING TERM (NCHRP 350, TL3)	EACH	4	\$ 2,250	\$ 9,000
	ROADWAY SUBTOTAL				\$ 2,457,900

ESTIMATE BASED ON TDOT AVERAGE UNIT PRICES - 2007 AWARDED CONTRACTS.

Appendix C
Field Review Notes

MEMORANDUM

TO: Gena Gilliam, TDOT Planning
FROM: Dyan Damron, Neel-Schaffer
DATE: March 17, 2008
SUBJECT: SR 331 at SR 131 TPR Field Review

**State Route 331 at State Route 131 TPR
Initial Field Review & Stakeholder Meeting
Thursday, March 13, 2008
10:00 a.m. (EST)
On-Site (Intersection of State Route 331 and State Route 131)**

Attendees:

Gena Gilliam, TDOT Planning
Chris Armstrong, TDOT Planning
Liz Smith, TDOT Planning
Nathan Vatter, TDOT Traffic
Daniel Oliver, TDOT Surveys
Randy Plummer, TDOT Design
Cindy Pionke, Knox County
John Sexton, Knox County
Nathan Benditz, Knoxville Regional Transportation Planning Organization
Dyan Damron, Neel-Schaffer (N-S)

The following are highlights of the meeting/field review that was held:

1. **Review of TPR Scope** – N-S reviewed the general scope of work for the TPR being conducted for State Route 331 at State Route 131. The history of the intersection, previous studies and findings were discussed by Knox County. Sketches of cross-section and conceptual intersection layout were provided by the County.
2. **Location listed on Long Range Transportation Plan** – All legs of the study intersection are included in the TPO's Long Range Transportation Plan list of highway projects. Specifically, the routes are shown to be widened from two lanes to four lanes with some locations to include a center turn lane.
3. **Grade** – All approaches to the study intersection have grading issues that will need to be addressed. Of primary concern are the eastbound and westbound approaches where each is significantly lower than the intersection. The elevation difference causes concern for sight distance and drainage.
4. **Drainage** – There are several drainage concerns within the study area.
 - A wet area is located in the southeast quadrant of the intersection. Observations indicate that water has drained from the north and west on appears to have collected there at times.
 - There is an existing bridge located across the eastbound approach (west leg) on State Route 131 (Emory Road). A photo of the bridge is attached.
 - An existing home located just east of the study intersection has reported drainage problems and has made provisions to improve the drainage on his property. A photo of this property is attached.

5. **Schools** – There is an elementary school and a high school located on State Route 131 (Tazewell Pike) just north of the study intersection. It was indicated that a new middle school will likely be constructed soon.

**Knox County will provide enrollment numbers for the existing schools*

6. **Future Development** – The County indicated that there have been several new developments approved in the vicinity of the study intersection. These new development may impact the traffic volumes traveling through the study intersection.

**The County will provide a list of the proposed development within a 3-5 mile radius of the intersection of State Route 331 and State Route 131. The list will include location, land use, and size.*

**If anyone has any changes, corrections, or additions, please contact Neel-Schaffer as soon as possible. Otherwise, Neel-Schaffer will proceed with the State Route 331 at State Route 131 TPR assuming the above data is correct.*





Westbound view of bridge across State Route 131 (Emory Road) west of the study intersection



Eastbound view of the property experiencing drainage problems on State Route 331 (Emory Road) east of the study intersection

