

Executive Summary
Transportation Planning Report (TPR)
State Route 170
From SR 62 to SR 9 (US 25W)
Oak Ridge, Anderson County, Tennessee

Purpose of the Study

The East Tennessee South Rural Planning Organization (RPO) initiated this Transportation Planning Report (TPR) through an annual assessment of major routes in their area. The RPO determined that a priority corridor existed on State Route 170 from SR 62 in Oak Ridge to SR 9 (US25W), and submitted the corridor to the Tennessee Department of Transportation (TDOT's) Long Range Planning Division for further study.

In June 2010, TDOT selected the No-Build Option for the anticipated SR 475 (Knoxville Parkway) corridor that would connect I-40/75 southwest of Knoxville to I-75 north of Knoxville. As a result, TDOT continued to evaluate corridors that would impact regional transportation routes and recommend improvements to these corridors. The widening of SR 170 was included in these recommendations.

Purpose of and Need for Improvement

The purpose of this Transportation Planning Report is to analyze existing and projected data and develop the purpose and need of improving the existing roadway system along the SR 170 (Edgemoor Road) corridor. The preferred build option will provide a transportation facility that enhances mobility within the region, supports economic development, improves safety, provides alternate modes of travel, and relieves traffic congestion. The goals and objectives of an improved SR 170 facility include:

- Geometric deficiencies;
- Promote safer operations for commuters;
- Accommodations for the efficient movement of people and freight.

Improvement Options

The options examined are summarized as:

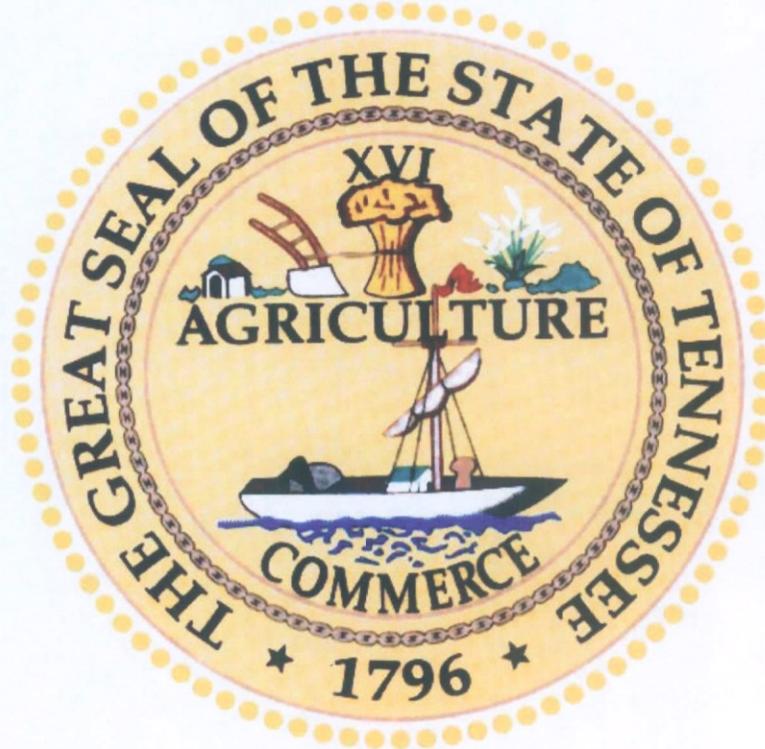
- **Option A: No Build**
 This option assumes no modifications or improvements are made over the planning horizon. There is no cost associated with this option.
- **Option B: Widening Along Existing Alignment**
 This improvement to a five (5) lane roadway section will provide continuity throughout the corridor and provide safer shoulder areas. This option also includes a new structure over the Clinch River Bridge. This build option estimate is \$40.1 million. The cost includes the reconstruction of the bridge over the Clinch River which is estimated to cost \$13,300,000.
- **Option C: Spot Improvements**
 Four (4) existing intersections were identified for spot improvements to improve safety and facilitate traffic flow on SR 170. The estimated construction costs for the four (4) spot improvements are listed as follows:

C1) SR-170 at Melton Lake Drive	\$322,000
C2) SR-170 at Walnut Valley Road	\$728,000
C3) SR-170 at Old Emory Road	\$265,000
C4)SR-170 at New Henderson Road	\$265,000
TOTAL	\$1,580,000

At this time, Option B best fulfills the purpose and need for improvement.

TRANSPORTATION PLANNING REPORT

STATE ROUTE 170
FROM SR 62 TO SR 9 (US25W)
ANDERSON COUNTY
TDOT PIN NO. 112889.00



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for the
EAST TENNESSEE SOUTH RURAL PLANNING ORGANIZATION
in cooperation with the
TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION

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This document is covered by 23 USC § 409 and its production pursuant to fulfilling public planning requirements does not waive the provisions of § 409.

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STUDY VICINITY MAP

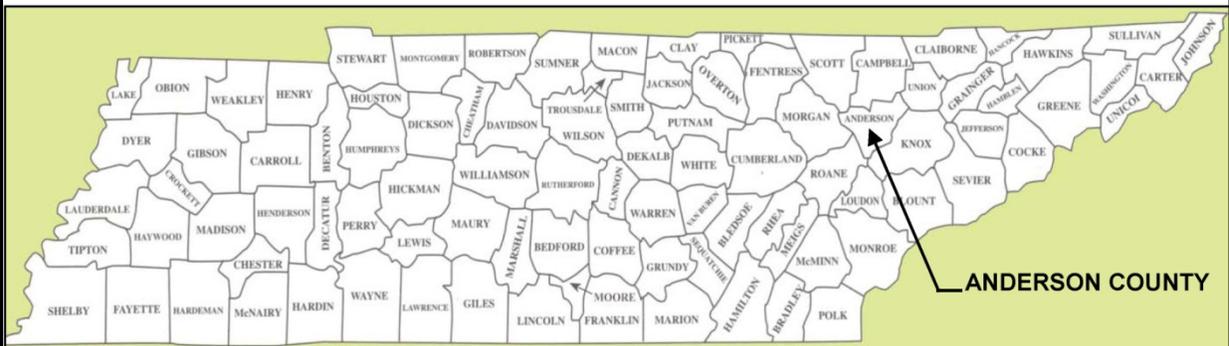
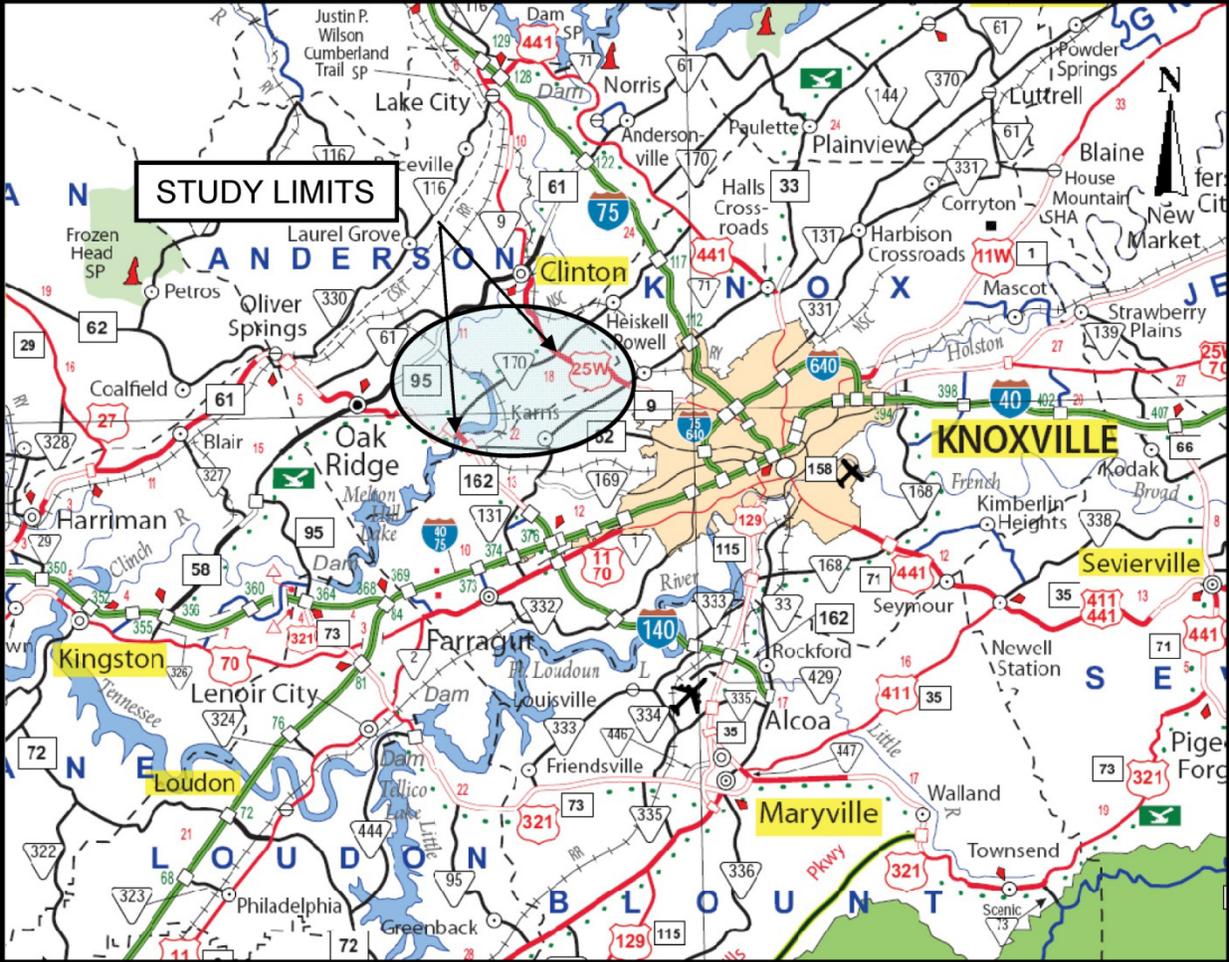
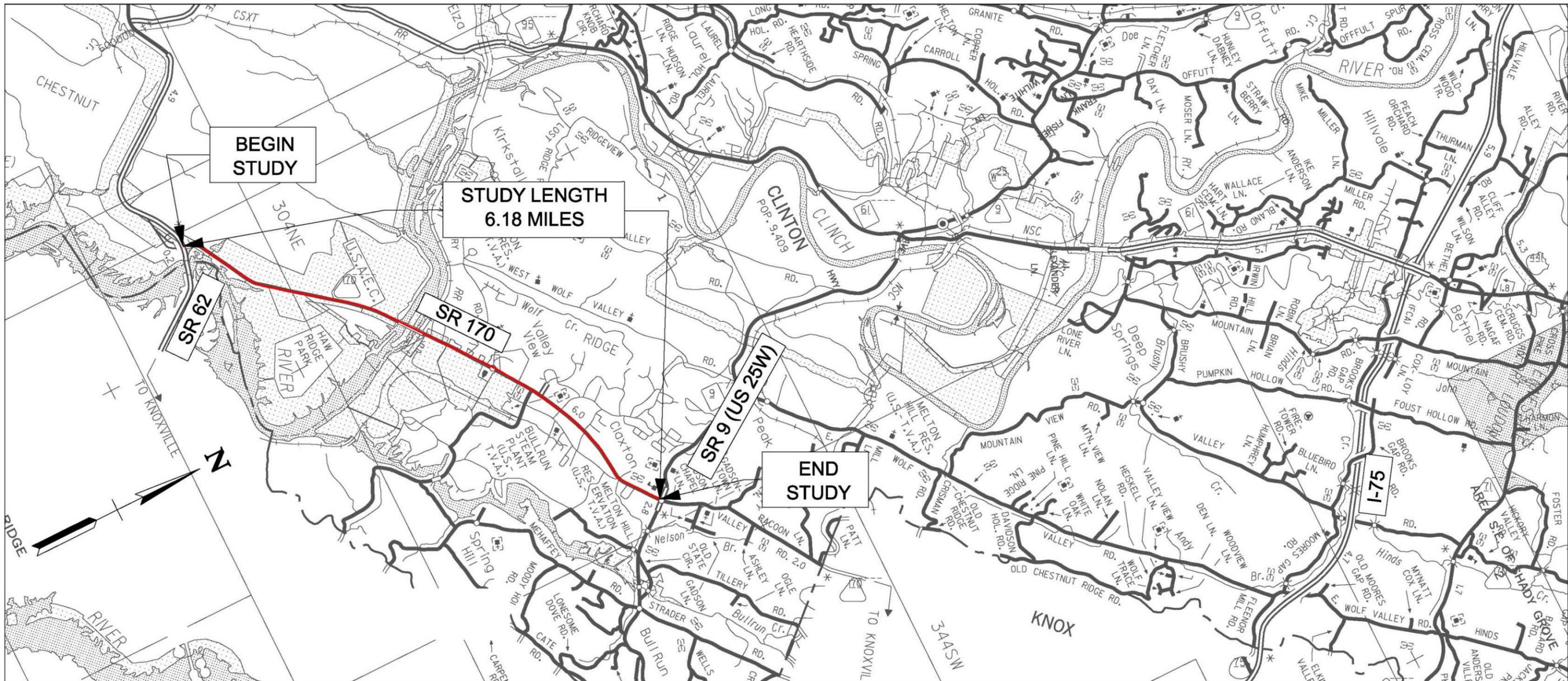


FIGURE 1



STUDY LOCATION MAP
STATE ROUTE 170
FROM STATE ROUTE 62 IN OAK RIDGE
TO STATE ROUTE 9 (US 25W)
ANDERSON COUNTY

DATE: 07/02/09

REVISED: __ / __ / __

SHEET 1 OF 1

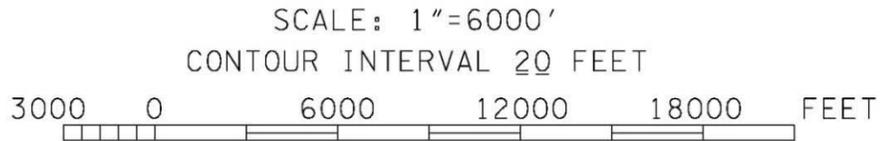
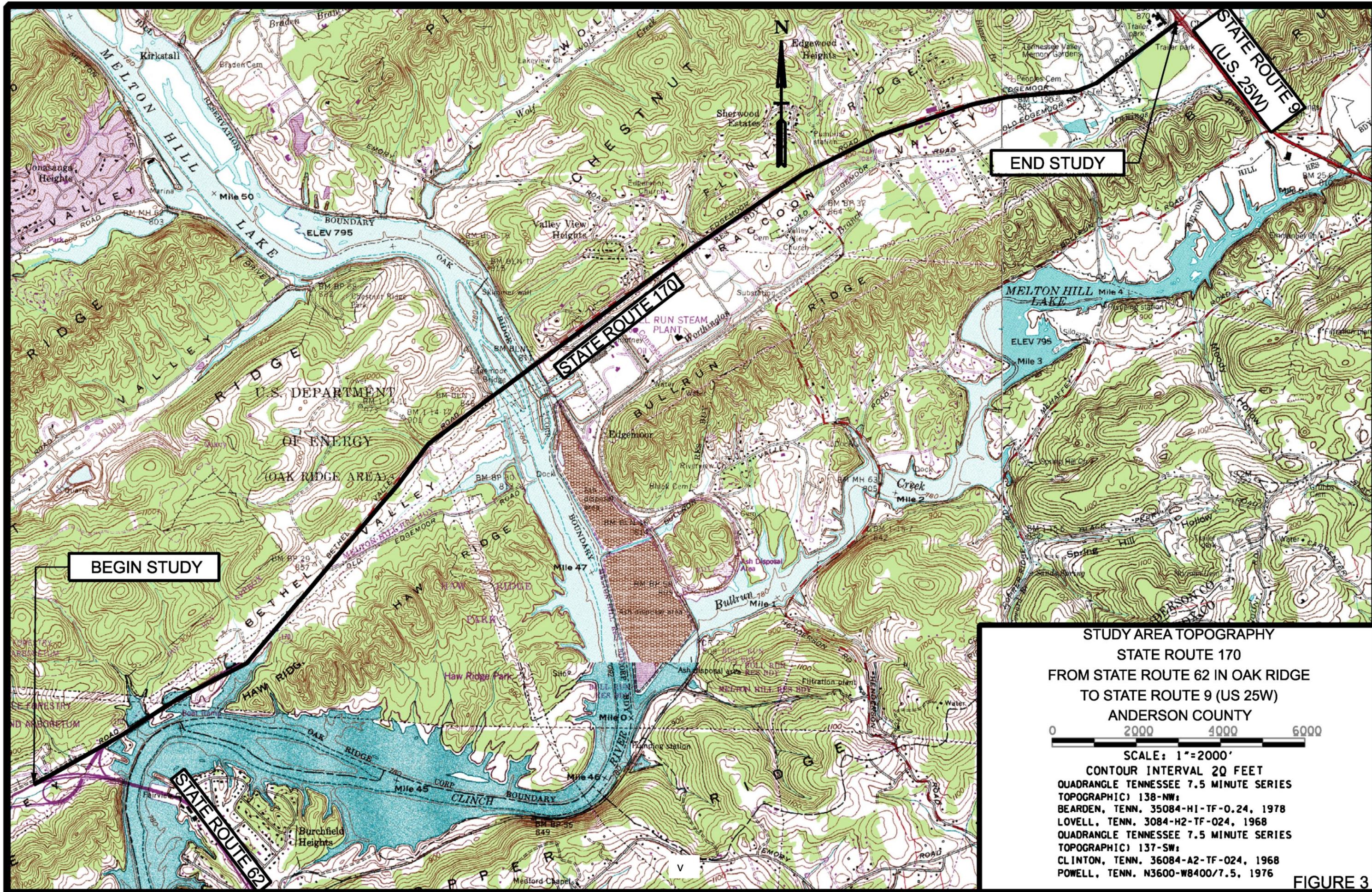


FIGURE 2



BEGIN STUDY

END STUDY

STUDY AREA TOPOGRAPHY
STATE ROUTE 170
FROM STATE ROUTE 62 IN OAK RIDGE
TO STATE ROUTE 9 (US 25W)
ANDERSON COUNTY

0 2000 4000 6000

SCALE: 1"=2000'

CONTOUR INTERVAL 20 FEET

QUADRANGLE TENNESSEE 7.5 MINUTE SERIES
 TOPOGRAPHIC) 138-NW;
 BEARDEN, TENN. 35084-HI-TF-0.24, 1978
 LOVELL, TENN. 3084-H2-TF-024, 1968
 QUADRANGLE TENNESSEE 7.5 MINUTE SERIES
 TOPOGRAPHIC) 137-SW;
 CLINTON, TENN. 36084-A2-TF-024, 1968
 POWELL, TENN. N3600-W8400/7.5, 1976

FIGURE 3

1.0 PURPOSE AND NEED FOR THE STUDY

This Transportation Planning Report (TPR) is being prepared to identify the purpose and need for improving the State Route 170 (Edgemoor Road) corridor from State Route 62 to State Route 9 (US 25W), a proposed study length of 6.18 miles. This report is being prepared in response to a request by the East Tennessee South Rural Planning Organization (RPO) in cooperation with the Tennessee Department of Transportation (TDOT).

The purpose of this TPR is to analyze existing and projected data and develop the purpose and need for the roadway system along SR 170. This report also evaluates the feasibility for the proposed options and documents how each option fills the purpose and need. SR 170 functions as an east-west facility that runs through the Oak Ridge Reservation and the Bull Run TVA Reservation and crosses the Clinch River connecting Oak Ridge to Clinton, Tennessee

TDOT performed a corridor study on the proposed SR 475 (Knoxville Parkway) that connected I-40/I-75 southwest of Knoxville, Tennessee to I-75 north of Knoxville, traversing the area near SR 170. In June 2010, TDOT selected the No-Build Option for the SR 475 route. As a result, TDOT continued to evaluate corridor plans to recommend other regional transportation improvements for I-40 and I-75 that were proposed to be served by the Knoxville Parkway. The widening of SR-170 was included in the recommendations. A map of the proposed I-40/I-75 improvements is in the Appendix.

Presently, the existing roadway is primarily two (2), twelve (12) foot lanes with intermittent twelve (12) foot paved turn lanes and shoulders. Traffic projections within the 20-year horizon will result in a LOS F on many segments of SR 170 unless capacity is added. To meet the existing and projected future traffic needs in the corridor, an additional through lane in each direction is needed along with appropriate turn lanes at principal intersections.

2.0 STUDY HISTORY AND BACKGROUND

Figure 1 displays the regional setting. A Study Location Map is shown in Figure 2. An Area Topography Map (consisting of USGS Quadrangle Maps Bearden, Lovell, Clinton and Powell, Tennessee) is shown in Figure 3.

The Tennessee Department of Transportation (TDOT) completed a feasibility study for the SR 170 corridor (Edgemoor Road) in August 2004 to determine the possibility of widening SR 170 from a two (2) lane to a four (4) lane facility. The feasibility study was requested by State Representative Jim Hackworth due to residents' concerns about increasing traffic volumes along Edgemoor Road. The 2004 study divided the corridor in four (4) sections extending from SR 62 to SR 9 (US 25W). Recommendations included a five (5) lane section with a center two (2) way, left turn lane (TWLTL) and shoulders, as well as replacement of the Clinch River Bridge. The TDOT feasibility study projected a design year of 2029.

This study lies within the jurisdiction of the East Tennessee South Rural Planning Organization (RPO). Based on the assessment of the feasibility study, the RPO Executive Board requested the SR 170 corridor be listed as a high priority corridor in efforts to move the planning process forward. This TPR is the product of that decision.

3.0 COMMUNITY PROFILE

Oak Ridge is located in Anderson and Roane counties in Tennessee. The portion of the city located in Anderson County is included in the Knoxville Metropolitan Area, while the portion located in Roane County is included in the Harriman, Tennessee Metropolitan Statistical Area as defined by the US Census Bureau.

According to the 2000 US Census, the City of Oak Ridge has approximately 27,400 people with a total area of 89.9 square miles (85.6 square miles of land; 4.3 square miles of water). The median income for a household was \$41,950. The per capita income for the city was \$24,800. About eight (8) percent of families and eleven (11) percent of the population were identified below the poverty line.

Oak Ridge was established in the early 1940s as a base for a US Government operation in the development and production of the atomic bomb as part of the now historic Manhattan Project. A community was created within the remote rural landscape with the wooded areas serving as a buffer between the government facilities and residential areas. Because of its function, the City of Oak Ridge was nicknamed the Secret City and was not visible on a map until it became open to the public in 1949.

Today, Oak Ridge's economy is experiencing a transition due to post Cold War restructuring of federal programs. The Oak Ridge National Laboratory (ORNL) remains as a major environmental research center. Additionally, the Y-12 National Security Complex, and the former K-25 site (a former uranium enrichment complex now being converted to private-sector use) remain part of the Department of Energy's (DOE) Oak Ridge Reservation.

Oak Ridge is home to several museums and art centers including the American Museum of Science and Energy, the East Tennessee Technology Park Overlook, the Children's Museum of Oak Ridge and the Oak Ridge Playhouse.

SR 170 is locally referred to as Edgemoor Road. During World War II, this roadway served as the checkpoint area for workers entering into Oak Ridge governmental facilities. Today, SR 170 is designated as a State Scenic Parkway showcasing natural resources and wildlife habitats along rolling terrain with scenic views of the Clinch River and Haw Ridge Park. SR 170 continues to serve as a major route for both workers of Oak Ridge and TVA facilities and for visitors to the neighboring recreational and wildlife areas.

Heading east from SR 62 to the end of the Clinch River Bridge, SR 170 is within the Oak Ridge City limits. From the bridge to SR 9 (US 25W), SR 170 passes through the Claxton community. Claxton is an unincorporated section of Anderson County south of the city of Clinton, northeast of Oak Ridge and bounded by Knox County.

The Bull Run Fossil Plant (Bull Run Steam Plant) is a coal-fired power station owned and operated by Tennessee Valley Authority (TVA). The facility sits on 750 acres

adjacent to the Clinch River (Melton Hill Lake) and across the ridge from Bull Run Creek. The power plant is the only single-generator coal-fired power plant in the TVA system and generates more than six (6) billion kilowatt-hours of electricity each year. The facility has 148 employees. Commuters to the Bull Run Steam plant and adjacent federal facilities in Oak Ridge utilize SR 170 on a daily basis. The TVA facility also has a Visitors Area and Overlook that lie adjacent to SR 170.

The completion of the Melton Hill Dam (along the Clinch River near Copper Ridge) in 1963 created Melton Hill Lake, which borders the city on the northeast and east. Lakefront areas are located along SR 170 at Solway Park and Haw Ridge Park to provide recreational areas for boating, bicycling, walking and picnic areas.

Tennessee Centennial Golf Course is a public golf course located on SR 170. The 6,600 yard course layout is designed among the natural forest and rolling hills of Oak Ridge.

Several new residential and commercial developments have been built, are undergoing construction or are being planned along SR 170. The city continues to support additional infrastructure improvements, including utilities to enhance job creation and economic vitality in the area.

4.0 PURPOSE AND NEED FOR IMPROVEMENT

4.1 Status

In August 2004, a feasibility study was performed to determine the need to widen the SR 170 corridor from SR 62 to SR 9 (US25W). Recommended improvements were proposed to provide for the efficient movement of people and freight through the area. Continued residential and recreational growth along SR 170 is dependent on transportation facilities to accommodate the needs of commuters. Improvements to this corridor are proposed to benefit the City of Oak Ridge and continue to spur economic growth. Without improvements, SR 170 is expected to operate at a Level of Service (LOS) E or F in both the 2015 base year and 2035 horizon year (See Table 2).

As a result of TDOT's No-Build selection for SR 475, SR 170 was listed for corridor improvements because of its close proximity to I-40 and I-75. Although the projected traffic volumes seemed low for the proposed SR 475 beltway project, over time the added traffic on SR 170 resulting from the No-Build decision of SR 475, will increase congestion and delays on SR 170 if it remains a two (2) lane roadway.

The purpose of this TPR is to analyze existing and projected data to determine the need to improve the existing SR 170 corridor to accommodate existing and future traffic demands, reduce travel delays and improve local and regional access for commuters.

4.2 Safety

In the latest three (3) years that crash data were available (2006, 2007, and 2008), there were one hundred eighty (180) crashes reported on SR 170 between Oak Ridge Highway (SR 62) and Clinton Highway (US 25 W). Of those one hundred eighty (180) crashes, one hundred twenty one (121) were property damage, fifty (50) were non-incapacitating, and nine (9) were incapacitating injuries.

Rear-end crashes are the most prevalent type of crash with seventy-six (76), or thirty-seven (37) percent, of the total crashes reported in the three (3) year period. The next most common crash is single vehicles hitting an object or losing control and crashing without involving another vehicle. This type of crash occurred in fifty-four (54) crashes, or thirty (30) percent, of the one hundred eighty (180) total crashes. Sideswipes, head-ons, and others make up the remainder of reported crashes on SR 170. The relatively small percent of serious crashes is consistent with the type of crashes reported. There were very few head-on crashes. The next most serious type of crash is angle, and this type accounts for a low number compared to the other types.

Almost eighty-four percent (84%) of the crashes on SR 170 in the three (3) year reporting period occurred under clear conditions. Twenty-three percent (23%) occurred in rain and four percent (4%) in fog. The others occurred in the dawn, dusk, or in dark but lighted conditions.

A crash rate, critical crash rate, and severity index calculation can be found in the appendix. Because the traffic volumes are similar at the two count stations, calculation for the entire 6.18 mile length of SR 170 was performed. Based on the 2006, 2007, and 2008 crash data, the crash rate on SR 170 is 1.662. This falls below the state-wide average crash rate of 2.389 for similar facilities.

Included in the appendix is a map of SR 170 with each crash in the three (3) year reporting period located by a log mile number. Twenty-three (23) crashes occurred at the intersection of SR 170 and Clinton Highway (US 25W). The next highest number of crashes occurred at the intersection of SR 170 and Melton Lake Drive where twenty-one (21) were reported. Intersections besides Clinton Highway and Melton Lake Drive that have experienced six (6) or more crashes in the three (3) year reporting period include:

- ◆ Oak Ridge Highway- 7
- ◆ Centennial Boulevard- 6
- ◆ Old Emory Road- 6
- ◆ New Henderson Road- 6
- ◆ Foust Carney Road- 8
- ◆ N. Dogwood Road- 6

The jug handle intersection of SR 170 and Melton Lake Drive was created to alleviate congestion as a result of left turns at the intersection. However as indicated, it experienced twenty-one crashes in the three (3) year reporting period. Further improvements to extend the eastbound jug handle ramp will reduce traffic queues that backup beyond the designated storage area. This spot improvement (see Section 7.1.3 Option C- Spot Improvements) will mitigate occurrences of the eastbound rear end crashes. However, the data indicates that a majority of the rear end crashes occur in the westbound direction.

From crash information, it is evident that a primary cause of crashes on SR 170 is the roadway geometry. Narrow shoulders and tight horizontal alignment due to the environmental features (lakes and parks) characterize much of the geometry along SR 170 from SR 62 to SR 9. Improvements to SR 170, as identified in this study, will provide twelve (12) foot lanes and wide shoulders, as well as the opportunity to improve horizontal alignment and realign roads not intersecting SR 170 at a ninety (90) degree

angle. Secondly, rear-end crashes are common, likely resulting from shared through/left turn lanes. The build options will likely reduce the number of crashes along this portion of SR 170.

4.3 Description of Study Area (Geometrics)

SR 170 runs from SR 62 to SR 9 (US 25W) in the Claxton community in Anderson County, Tennessee. The roadway length is approximately 6.18 miles along rolling terrain. The study corridor is predominately a two (2) lane facility with some segments having two (2) way left turn lanes (TWLTL).

SR 170 from SR 62 to the Clinch River Bridge is within Oak Ridge City Limits and classified as an Urban/Minor Arterial. The roadway segment from the Clinch River Bridge to SR 9 (US 25W) is classified as a Rural/Major Collector. The speed limit along this route varies between 50 and 55 MPH (See Appendix Volume II for the 50 and 55 MPH speed limit locations and an illustration of the typical sections and intersection geometry). The existing Right-Of-Way (ROW) along this corridor is 120 feet. There are also residential and fringe commercial land uses along the corridor.

Within the Oak Ridge city limits, the typical section includes two (2), twelve (12) foot traffic lanes with six (6) foot outside shoulders and a ditch drainage system. The existing Right-of-Way (ROW) is 120 feet. Along this portion of the SR 170, Haw Ridge Park is located on the southeast side of the corridor. Also, Solway Park has two (2) boat ramp facilities on the southeast side between SR 62 and Haw Ridge Park.

At its intersection with Old Edgemoor Road and Park Meade Drive, SR 170 has a typical section that includes two (2), twelve (12) foot traffic lanes and a twelve (12) foot center turn lane with five (5) foot outside shoulders. Tennessee Centennial Golf Course is a public golf course with a residential subdivision located on the northwest side and accessed by Park Meade Drive. To alleviate traffic congestion at this intersection, a westbound right turn lane was installed for motorists entering Park Meade Drive from SR170. The roadway tapers back to a two (2) lane section before approaching Melton Lake Drive.

SR 170 and Melton Lake Drive is a signalized intersection (See Figure 4). A “jug handle” designed intersection was created to alleviate congestion experienced at this intersection. Recommendations from the 2004 Feasibility Study included a ramp that would exit to the right of SR 170 approximately 850 feet southwest of the intersection and tie back in to the intersection creating a fourth leg (northbound approach) opposite Melton Lake Drive. The typical section includes two (2) twelve (12) foot traffic lanes with outside shoulders six (6) to eight (8) feet wide. A twelve (12) foot acceleration lane is provided for motorists turning from the southbound approach to westbound SR 170. With the construction of the “jug handle” ramp (See Figure 5), eastbound through traffic is not impeded by left turning vehicles.



Figure 4-Section of SR 170 as a 3-lane typical section to provide area for left turns and avoid conflicts with through movements



Figure 5- The “jug handle” intersection at SR 170 and Melton Lake Drive.

Located northeast of the SR 170 and Melton Lake Road intersection, the Clinch River Bridge crosses the Clinch River and the CSX Railroad. The bridge length is 1,439 feet (approximately 0.3 miles) with a roadway width of twenty-eight (28) feet. The roadway typical section in this area consists of two (2) twelve (12) foot traffic lanes and two (2) foot shoulders (outside) with curb, gutter and sidewalk on both sides. The existing ROW for the bridge structure is sixty (60) feet. The TVA Bull Run Steam Plant is located southeast of the Clinch River Bridge. The roadway typical section widens to a three (3) lane facility to provide westbound motorists a left turn lane for access to the TVA facility.

Between the Bull Run Steam Plant (Log Mile 3.07) and the Claxton Community Center (Log Mile 3.76) the roadway typical section varies between a two (2) lane undivided

facility and a three (3) lane facility. The two (2) lane section includes two (2), twelve (12) foot traffic lanes with six (6) foot outside shoulders and a ditch drainage system. There is a three (3) lane typical section that consists of two (2), ten (10) foot traffic lanes, a ten (10) foot center turn lane, two (2) foot paved shoulders with side ditch drainage located between New Henderson Road (L.M. 4.25) and Dogwood Lane (L.M. 4.98). The three (3) lane section between Walnut Valley Road (L.M. 3.44) and the Claxton Community Center (L.M. 3.76) consists of two (2), twelve (12) foot traffic lanes, twelve (12) foot turn lane, and six (6) foot paved shoulders with side ditch drainage (See Figure 6).



Figure 6-The three (3) lane section between Walnut Valley Road (Log Mile 3.44) and the Claxton Community Center (Log Mile 3.76).

Approximately one-half (1/2) mile from Peoples Cemetery (L.M. 5.58) to the SR 170 and SR 9 (US 25W) intersection, the roadway varies between a two (2) lane undivided section and a three (3) lane typical section. The two (2) lane typical section consists of two (2), twelve (12) foot traffic lanes, six (6) foot outside shoulders and a ditch drainage system. The three (3) lane section consists of two (2), twelve (12) foot traffic lanes, a twelve (12) foot painted median and two (2) foot outside shoulders. SR 170 approaching the SR 9 intersection consists of two (2), twelve (12) foot traffic lanes, one (1), twelve (12) foot left turn lane, one (1), twelve (12) foot right turn lane, an eight (8) foot outside shoulder (westbound) and a four (4) foot outside shoulder (eastbound). The existing ROW width at this westbound approach is sixty (60) feet.

Recent improvements to the SR 170 and SR 9 (US 25W) intersection were performed during the resurfacing of SR 170 (See Figure 7). The improvements included extending the shoulder and edge of pavement in the eastbound direction, relocating the median nose at the southbound approach on SR 9, and modification of the existing traffic signal. Several portions of the corridor have guardrail installed along both sides of the roadway to shield motorists from obstacles including the lake.

Tennessee Valley Authority (TVA) has utility lines that originate from the Bull Run Steam Plant. The transmission lines begin on the northwest side of the roadway near SR 62 and cross SR 170 near Haw Ridge Park, continuing on the southeast side. Power distribution lines from Bull Run Steam Plant are located on the Clinch River Bridge. Telephone lines are also attached to the bridge to cross the Clinch River. From the bridge, utility poles continue to line SR 170 on the north side then cross at Old Emory Road. The utility poles cross back to the north at Dogwood Lane. At Old Edgemoor Road, the lines split and run along both sides of SR 170 to the intersection of SR 9 (US 25W).



Figure 7-Recent improvements to the SR 170 and SR 9 (US 25W) intersection were performed during the resurfacing of SR 170.

An increase in residential development and recreational uses has occurred along SR 170. Along with the mixture of TVA and Oak Ridge National Laboratory (ORNL) facilities in the area, an increase in traffic demand has occurred in the area due to the many traffic generators located along the SR 170 corridor.

There are a number of planning reports or transportation projects performed in Oak Ridge and Anderson County as a result of both residential growth and traffic growth in the area, particularly in the vicinity of SR 170. These studies or projects are listed below:

- ◆ 2009-2034 Knoxville Regional Mobility Plan
The Regional Mobility Plan addresses all modes of transportation (streets, highways, public transportation, bicycle, pedestrians, air, water and freight). The plan also consists of a regional air quality conformity determination. Although, SR 170 is under guidance by the East Tennessee South RPO, the area is within the Knoxville TPO region with regards to regional air quality. The TPO has included SR 170 in the Knoxville Regional Travel Demand Model. Outputs from the model reveal that SR 170 will experience poor levels of operation and congestion by 2014.
- ◆ East Tennessee Development District (ETDD) Comprehensive Economic Development Strategy (2008-2009)
The ETDD provides sixteen (16) counties and fifty-six (56) municipalities with planning and development services. ETDD coordinates with the Rural Planning Organization (RPO) to make sure local projects are part of the state's transportation planning process. Anderson County is within the East Tennessee South RPO.

The 2007 study helped local governments plan for the future by coordinating and establishing project priorities within the fields of transportation planning and economic and community development. Table 1 lists the infrastructure needs identified by the ETDD.

**TABLE 1
ETTD INFRASTRUCTURE NEEDS**

Project Type	Project Name	Owner	Active Projects (Start/End)	Location	Project Code	Project Costs
Recreation	Pedestrian/Bicycle Facilities	Oak Ridge	2007/2010	Old Edgemoor Road	030405.01	\$812,500
Oak Ridge	Greenway Implementation Phase IV	Oak Ridge	2007/2012	Melton Lake	ET012050	\$965,000
Transportation	Bridge Replacement	TDOT	2019/2023	Clinch River and CSX RR	0002255	\$4,390,000

Source: ETTD Comprehensive Economic Development Strategy (2007)

- ◆ Advance Planning Report (APR): SR 170 (Edgemoor Road) at Melton Lake Drive in Oak Ridge, Intersection Improvement, Anderson County (1999)
In 1997, the intersection of SR 170 and Melton Lake Drive was identified as a High Hazard Location which warranted improvements. The recommended improvements were beyond the scope of state maintenance forces, therefore an Advance Planning Report (APR) was produced in 1999. The APR examined existing conditions at the intersection and determined the need and/or feasibility of improving the intersection. The report included a proposed plan for improvement, preliminary cost estimate, functional plans and identifies potential environmental concerns. The result of the APR was implementation of the existing jug handle intersection.
- ◆ Comprehensive Plan of Anderson County-Update
The comprehensive plan has not been updated since 1981, but an update for Anderson County is underway, establishing a new framework to guide land-based decision making that recognizes and integrates short and long-term land use, transportation, environmental, and economic development considerations. The updated plan will outline the needs of the community, set policies that address planning issues, and recommend appropriate actions to achieve a desired result. The plan will give an assessment of the existing infrastructure, residential, commercial, retail, and industrial lands uses and adopt development regulations in effort to establish a blueprint that will lead growth management and preservation of the area's natural resources.

Ongoing or planned projects include:

- ◆ Clinch River Bridge over Clinch River and CSX Railroad (Bridge Rehabilitation)
This project includes the repair and rehabilitation of the Clinch River Bridge on SR 170 which spans over the Clinch River and CSX RR. This project is included in TDOT Bridge Repair Funds (FY 2009-2010). This bridge project was 100 percent state funded. This project was completed in June 2010.
- ◆ Melton Lake Redevelopment Initiative (Oak Ridge Waterfront Master Plan)
The goal of this redevelopment project is to help provide new economic development opportunities along Oak Ridge's main lakeside corridor. The area includes a 16.5 acre park, marina and greenway. The Melton Lake Rowing Course is a nationally renowned rowing site which hosts several regional and national rowing events. The

city plans to widen the rowing course in efforts to make the area more appropriate for bigger events. The expansion will spur additional redevelopment in the area and create more economic development opportunities for the region. The TPO lists the construction of the Melton Lake Greenway in its FY 2008-2011 TIP. This greenway project is listed as a SAFETEA-LU Congressional Earmark Project (Plan Number E1).

◆ Centennial Village Master Plan-Traffic Impact Study (2008)

As an update to a 2003 Master Plan, the developers of Centennial Village developed additional retail space and residential units along Edgemoor Road. Construction is underway with phased development for build-out years of 2011 and 2015. By Year 2015, the total number of trips for the development is estimated to be over 25,600 vehicles a day. Impacts to the development include recommendations for a left turn lane on Edgemoor Road. By Year 2015, a traffic signal is recommended for the intersection of Edgemoor Road and the access point due to expected traffic generated by the proposed shopping center. Recommendations also include widening Edgemoor Road to include two (2) through lanes in each direction, an eastbound turn lane and a westbound right turn lane.

4.4 System Linkage

SR 170 runs east to west between SR 62 and US 441 (Norris Freeway) and continues to SR 33 (Maynardville Highway) where it terminates. Within the study area, SR 170, locally referred to as Edgemoor Road, is a heavily traveled roadway that traverses the southeastern edge of the City of Oak Ridge. SR 170 serves as a major east-west transportation link from Knox County and Interstate 75 to several government facilities in Oak Ridge including the Oak Ridge National Lab, BWXT Y-12 and the Bull Run Steam Plant. These government facilities in Oak Ridge are significant in terms of national security, so accessibility to them is essential. Two major interstates, Interstate 40 and Interstate 75 intersect just south of Oak Ridge providing easy access to both the north/south and east/west routes.

SR 170 also provides regional connectivity to an assortment of land uses including Methodist Medical Center of Oak Ridge and major medical centers in Knoxville; Roane State Community College, Pellissippi State Technical Community College, Oak Ridge Associated Universities and University of Tennessee, Knoxville, neighboring industries recreational facilities, and ORNL. Average annual daily traffic (AADT) on SR 170 between SR 62 and SR 9 is 14,500 vehicles per day (vpd).

SR 9 (US 25W) is more commonly known as Clinton Highway. This north-south US highway serves the eastern United States and spans from Ohio to Georgia. Within the study area, the more westerly US 25W route intersects at SR 170 and passes through Anderson and Knox counties. The 2009 TDOT traffic counts revealed the AADT on SR 9 (US 25W) ranges from 14,100 vpd, north of SR 170 to 16,200 vpd south of SR 170.

4.5 Level of Service Analyses

The existing (2009), base year (2015), and design year (2035) "Level of Service" (LOS) for the SR 170 corridor was analyzed for this report. A "Level of Service" (LOS) index was used to gauge the operational performance of each roadway segment. For two (2) lane highways, the LOS is a qualitative measure that describes traffic conditions related to speeds, ability to pass slower vehicles, and being delayed within a platoon of vehicles.

There are six (6) levels ranging from “A” to “F” with “F” being the worst. Each level represents a range of operating conditions. Table 2 shows the criteria related to each LOS as described in the **2000 Highway Capacity Manual (HCM), Special Report 209 published by the Transportation Research Board (TRB).**

**TABLE 2
LOS CRITERIA**

LOS	Traffic Flow Conditions
A	Free flow operations. Vehicles are almost completely unimpeded in their ability to maneuver with the traffic stream. The general level of physical and psychological comfort provided to the driver is high.
B	Reasonable free flow operations. The ability to maneuver within the traffic stream is only slightly restricted and the general level of physical and psychological comfort provided to the driver is still high.
C	Flow with speeds at or near free flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted and lane changes require more vigilance on the part of the driver. The driver notices an increase in tension.
D	Speeds decline with increasing traffic. Freedom to maneuver within the traffic stream is more noticeably limited. The driver experiences reduced physical and psychological comfort levels.
E	At lower boundary, the facility is at capacity. Operations are volatile because there are virtually no gaps in the traffic stream. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.
F	Breakdowns in traffic flow. The number of vehicles entering the highway section exceed the capacity or ability of the highway to accommodate that number of vehicles. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.

Source: 2000 Highway Capacity Manual, Special 209, Transportation Research Board (TRB)

In 2009, all segments of SR 170 operated at a LOS E in both the AM and PM peak hours.

In order to evaluate future traffic conditions, level of service (LOS) analysis was performed on the following segments of SR 170:

- ◆ Oak Ridge Highway (SR 62) to Melton Lake Drive
- ◆ Melton Lake Drive to Old Emory Road
- ◆ Old Emory Road to New Henderson Road
- ◆ New Henderson Road to Old Edgemoor Lane
- ◆ Old Edgemoor Lane to Clinton Highway (SR 9/ US 25W)

The LOS analysis completed for SR 170 utilized the projected base year (2015) design hour volumes (DHV) and design year (2035) DHV with existing geometry (No-Build Option) as well as with the proposed build optional improvements. In year 2035 all segments of SR 170 will operate at LOS C or LOS D indicating that the proposed Option B will fully accommodate the projected design year traffic at an acceptable LOS (See Table 3).

**TABLE 3
STATE ROUTE 170 LEVELS OF SERVICE (LOS) ANALYSES**

SR 170 SEGMENT	AADT			AM PEAK				PM PEAK			
				NO BUILD			OPTION B	NO BUILD			OPTION B
	2009	2015	2035	2009	2015	2035	2035	2009	2015	2035	2035
	2-Lane	2-Lane	2-Lane	5-Lane (1)	2-Lane	2-Lane	2-Lane	5-Lane (1)			
Oak Ridge Highway to Melton Lake Drive	13,000 (est)	18,860	22,630	E	E	F	C	E	E	F	C
Melton Lake Drive to Old Emory Road	14,622	21,250	25,750	E	E	F	D	E	E	F	D
Old Emory Road to New Henderson Road	14,300 (est)	20,830	25,230	E	F	F	D	E	E	F	D
New Henderson Road to Old Edgemoor Road	14,100 (est)	20,510	24,860	E	F	F	D	E	E	F	D
Old Edgemoor Road to Clinton Highway SR 9 (US 25W)	14,665	14,950	18,240	E	E	E	C	E	E	E	C

- (1) LOS B 10,500 to 18,000 vpd
- LOS C 18,000 to 24,000 vpd
- LOS D 24,000 to 30,000 vpd

4.6 Capacity (Defined by Level of Service)

SR 170 has one (1) traffic lane in each direction with two (2) way left turn lanes provided in the vicinity of Old Emory Road (approximately Log Mile 3.44 to beyond L.M. 3.76), Foust Carney Road (approximately L.M. 4.25 to L.M. 4.98), and Woodhaven Memorial Gardens (approximately L.M. 5.72 to beyond L.M. 5.85). The posted speed limit on SR 170 is 55 MPH for most of its 6.18 miles and 50 MPH in the Claxton Community from just east of N. Dogwood Road to SR 9 (US 25W).

The 2009 AADT at Station 53, near Claxton and Station 56, near the Clinch River on SR 170 is almost identical at 14,665 vehicles per day and 14,622 vehicles per day, respectively. At Station 53, the AM peak hour two (2) directional volumes in 2009 were reported to be 1,336 vehicles per day (vpd). Likewise, the PM peak hour two (2) directional volume was 1,568 vehicles per day. Based on these two volumes, SR 170 currently operates at LOS E in both the AM and PM peak hours.

At the signalized intersection of SR 170 and Melton Lake Drive significant delays are experienced during peak hours, making it a key bottleneck in the corridor. City of Oak Ridge officials indicate that the greatest traffic delays in the city are experienced at this intersection. No detailed intersection analyses were conducted for this TPR.

4.7 Transportation Demand

The East Tennessee South Rural Planning Organization (RPO) classifies this project as a high priority. The Knoxville Regional TPO also recognizes this project as a regional project within the TPO's non-attainment area. This project is identified in the adopted **Knoxville Regional Mobility Plan 2009-2034, Project Number 101** to expand the existing two (2) lane facility to a four (4) lane roadway with curb and gutter, bike lanes and sidewalks along each side.

4.8 Social Demands or Economic Development

According to the US 2000 Census, about 8,115 (26.4 percent) of employed Anderson County residents commute to Knox County for work each day. Also, more than 11,000 (25.2 percent) Knox County residents are employed in Anderson County. These large commuting patterns are visible during morning and afternoon peak hours resulting in long traffic queues and congestion on SR 170 in the vicinity of the Bull Run Steam Plant.

4.9 Modal Inter-relationships

Public transportation is available through the East Tennessee Human Resource Agency (ETHRA). Improvements to the SR 170 corridor will increase the possibility to expand and enhance the services currently available.

Bicycle and Pedestrian facilities are not present along SR 170, except for the sidewalks on the bridge. However, several locations along the corridor have shoulders wide enough for bicyclists to share the roadway. Haw Ridge Park, Melton Hill Lake and Solway Park are some of the recreational features that could be further enhanced with the addition of pedestrian and bicycle facilities. Achieving overall pedestrian and bicycle connectivity along this route by adding twelve (12) foot shoulders on both sides in Option B will increase safety and improve the transportation system along this route as well as improve the quality of life and community livability for residents.

The twelve (12) foot shoulders for bikes and pedestrians will improve mobility, specifically in the area of the parks and other recreational facilities. Finally, Option B's twelve (12) foot shoulders will provide bicycle facilities as an alternative mode for students traveling to and from Claxton Elementary School, as well as workers living in the study area who wish to commute to and from work.

5.0 EXISTING CONDITIONS

5.1 Major Structures

Information pertaining to the location of bridges and culverts within the study area were obtained using the TDOT TRIMS database. The Clinch River Bridge (10-Span Steel Plate Girder (SPG) and 5-Span Concrete Deck Girder (CPG), 01-SR170-2.58 (01S24740001) - Log Mile 2.58 was repaired this year (See Figure 8).

The bridge spans over the Clinch River and CSX Transportation (CSX) Railroad lines. The bridge length is 1,439 feet (approximately 0.3 miles) with a (curb to curb) bridge width of 28.5 feet and an out-to-out bridge width of 34.4 feet.

The structure was constructed in 1958. The structure's condition was recorded as fair with a sufficiency rating of 47.7 on a scale of 100. Therefore, long-term improvements will likely include replacing the structure rather than widening. The 2010 repairs included removing existing asphalt, performing deck repairs, installing new asphalt with a membrane seal, blast cleaning and repairing steel, repairing the expansion joints, replacing navigation lighting and constructing railroad crash walls. Additionally, a pedestrian fence was installed on the parapet walls for safety.

Four (4) culverts crossing blue line streams within the project study limits will have to be evaluated for reconstruction or modification as part of the proposed roadway improvements. These culverts are identified in Table 4.



Figure 8- Bridge over Clinch River (TVA Bull Run Steam Plant and TVA Transmission Lines in the background)

**TABLE 4
STATE ROUTE 170 SMALL STRUCTURES (CULVERTS)**

Structure Number	Structure Description	Log Mile	Overall Condition
01CULV080054	1 @ 8' X 4' Concrete Box	2.55	Fair
01CULV080074	1 @ 6' X 6' Concrete Box	3.70	Good
01CULV080114	1 @ 8' x 4' Concrete Box	4.60	Good
01CULV080154	1 @ 10' X 5' Concrete Box	5.98	Good

According to TDOT, small structures on state routes do not get inspected if the length is less than three (3) feet along the centerline of the road or the fill over the structure is more than sixteen (16) feet for one (1) barrel culvert or thirty-three feet (33) for multiple barrel culverts.

5.2 Multi-modal Facilities

5.2.1 Greenbelts/Greenways/Parks

Oak Ridge has over 1,275 acres of natural areas reserved as greenbelts. As part of the City of Oak Ridge Zoning Ordinance (Chapter 7, Section 6-700, Greenbelt Districts), certain parcels were designated greenbelts to preserve and enhance the natural surroundings of an area. Black Oak Ridge contains a federally designated National Recreation trail, the North Ridge Trail which extends 7.5 miles along the city's northern boundary. The University of Tennessee Arboretum in Oak Ridge consists of two hundred fifty (250) acres featuring eight hundred (800) species of trees, shrubs and flowering plants within four (4) nature trails. Two (2) city parks, Solway Park and Melton Lake Park have waterfront access to the Melton Hill Reservoir.

Oak Ridge has eleven (11) greenways accumulating to nearly thirty-five (35) miles of walking trails, paths and greenways. The city has several other greenways awaiting construction or being planned. Overall, the city has forty-eight (48) greenbelt districts

adding up to approximately 1,566 acres. The greenways in the vicinity of the SR 170 corridor are:

Haw Ridge Greenway- Natural wooded path (5.5 miles)

The 865-acre facility contains undeveloped land and wildlife with approximately twenty-eight (28) miles of waterfront access to the Clinch River. This greenway consists of a natural wooded path of varying difficulty but suitable for mountain biking and horses. Uses include accommodations for bicyclists, pedestrians and pets. However, the greenway does not meet ADA guidelines.

Melton Hill Greenway-Multiuse paved (8 foot wide) greenway

Phases 1, 2, and 3 of this greenway have been constructed and run along the western shore of the Melton Hill Lake from Oak Ridge Turnpike to Edgemoor Road. The pathway is an easy to moderate course and portions (except the southeastern mile) meet ADA guidelines.

The City has funding for Phase 4 of the Melton Lake Greenway to extend the greenway 2.3 miles south under the Clinch River Bridge to Old Edgemoor Road and Edgemoor Road to Solway Park connecting to the Haw Ridge Park kiosk/parking area. Construction is underway.

5.2.2 Railroads

Passenger rail service is not available in the region. However, CSX Railroad carries freight through Anderson, Blount, Campbell, Knox, Loudon, and Monroe counties. The SR 170 Bridge spans over a CSX railroad double track line that runs along the north side of the Clinch River. Approximately eighty-one (81) trains per day travel on this rail line. The double track begins just south of the bridge and continues north for approximately 2.8 miles heading toward several industries in the area that connect to the mainline tracks. These tracks are described as signaled tracks, meaning that electricity and underground utilities are provided. Bridge and utility reconstruction will likely have some impact on railroad operations during the construction of the bridge, therefore cooperation and coordination with TDOT, CSX railroad and utility representatives are necessary.

5.2.3 Public Transportation

The City of Oak Ridge provides public transportation for its residents through the East Tennessee Human Resources Agency (ETHRA). ETHRA Public Transit is a rural and public demand response transportation program. Within the City of Oak Ridge, ETHRA operates two (2) buses for daily demand-response operations (Monday through Friday from 8:00 AM- 5:00 PM and Saturdays from 8:00 AM-1:00 PM). In efforts to help citizens meet their mobility needs, ETHRA provides demand-response public transportation services over a sixteen (16) county area. These counties include Anderson, Blount, Campbell, Claiborne, Cocke, Grainger, Hamblen, Jefferson, Knox, Loudon, Monroe, Morgan, Roane, Scott, Sevier and Union.

5.2.4 Air Transportation

McGhee Tyson Airport is the regional commercial airport facility in East Tennessee. Located in Knoxville (thirty-two (32) miles away from Oak Ridge) the airport handles commercial airline, air cargo, military aviation and general aviation air traffic. McGhee Tyson Airport has eight (8) major airlines serving several non-stop destinations including

Atlanta, Dallas, Chicago, Denver, Orlando, New York and Washington, D.C. The airport handles more than one hundred twenty (120) arrivals and departures daily.

5.2.5 Pedestrian/Bicycle Facilities

SR 170 is not classified as a Tennessee State Bicycle Route, and no designated bike lanes or sidewalks existing along the study corridor. The recreational facilities in the area make this corridor attractive for cyclists. However, there are only short sections of the existing roadway that contain shoulder widths of six (6) feet to provide some accommodation for bicyclists and pedestrians to share the roadway. The western terminus of the project is partially access controlled. Additionally, the eastern terminus is located at an intersection with an elementary school, residences and businesses and should include crosswalks and sidewalks.

The City of Oak Ridge, the Bicycle Pedestrian Technical Advisory Committee and the Knoxville TPO have joined forces to prepare a Bicycle Pedestrian Master Plan for the City of Oak Ridge. The city plans to integrate more bicycle and pedestrian facilities in the area to provide residents and businesses safe, efficient and usable multi-modal facilities. The goal of the Bicycle and Pedestrian Plan will focus on bicycle and pedestrian connections in specific areas to provide residents that may have fewer transportation options (seniors, low-income, neighborhoods, etc) is to incorporate non-motorized modes of transportation along state facilities, including the development and installation of bicycle and pedestrian facilities to improve mobility and safety of non-motorized traffic. TDOT is committed to improving conditions for bicycles and pedestrians by integrating these facilities into new construction or reconstruction roadway projects.

Option B proposes to accommodate both bicycles and pedestrians on twelve (12) foot paved shoulders to offer an alternate mode of transportation and to enhance the economic investment for the area. Accommodating bikes and pedestrians on SR 170 will have a positive effect on nearby properties as homebuyers and business owners realize the value that such facilities bring to a community.

6 FIELD REVIEW INFORMATION

A preliminary field investigation of the study area was performed on Thursday, August 13, 2009. The meeting attendees included representatives from TDOT, City of Oak Ridge, Tennessee Valley Authority, East Tennessee South RPO, Anderson County, Knoxville TPO, Oak Ridge Electric, and residents. A listing of the meeting attendees is in the Appendix. The field review consisted of two (2) parts: A Pre-Site Visit and the Field Review.

6.1 Pre-Site Visit Meeting

Representatives were given an overview of the study scope for the TPR document. The Pre-Site Visit meeting helped representatives discuss the study with TDOT officials and to provide suggestions for build options. The meeting also assisted in establishing timelines to provide supporting information that will be helpful for the TPR document. The attendees gathered to offer suggestions and give comments regarding previous residential developments, environmental features and potential design constraints. Topics of discussion included the recommendations from the 2004 Feasibility Study and the future construction the Melton Lake Greenway (Phase Four) and the reconstruction of the Clinch River Bridge.

6.2 Field Review

Representatives stopped at several existing intersections on SR 170 to address concerns and give suggestions for improvement. Topics of discussions included the potential impacts to Haw Ridge Park, new residential development adjacent to Centennial Golf Course (public), Melton Hill Greenway and existing commercial developments. Utility representatives discussed services located within the study corridor. Based on the proposed build option, utility relocation costs will be determined.

Notes from the Pre-Site Meeting and the Field Review are in the Appendix.

7 OPTIONS FOR IMPROVEMENT (SPOT AND CORRIDOR)

7.1 Corridor Improvements

This TPR document examines operational and safety improvement options along SR 170. The study corridor is approximately 6.18 miles and bounded by commercial, industrial, residential and public uses.

During the field review, several environmental resources were identified in the study area as particular areas of constraint including existing residential and commercial properties, waterways, schools, recreation areas, cemeteries, geological and geotechnical constraints, services and public utilities (TVA) and topographical constraints.

Consensus among the field meeting attendees resulted in the recommendation to widen the roadway along its existing alignment. Therefore, the location of these resources dictated that no new location alternatives for horizontal alignment be considered. Besides the no-build option (Option A), one build option (Option B- Widening along existing alignment) will be evaluated. However, for a short-term option, Spot improvements (Option C) are also considered.

7.1.1 Option A: No-Build Option

As the name implies, this option denotes that only minor improvements including safety improvements and normal maintenance will be made to the existing road and its study intersections. Option A does not meet the purpose and need of the study, and it will not provide the needed capacity, safety and operational improvements to handle the full demands on SR 170, or provide the needed regional connectivity to Oak Ridge.

7.1.2 Option B: Widen Along Existing Alignment

Option B proposes that SR 170 be widened to a five (5) lane typical section. This includes twelve (12) foot travel lanes, a fourteen (14) foot center turn lane and two (2), twelve (12) foot outside paved shoulders (some areas including curb and gutter). Bicyclists and pedestrians will be expected to share the shoulders, as the City of Oak Ridge continues to evaluate the need to provide safe accommodations for users of non-transportation modes. The Right-of-Way (ROW) estimated for the proposed typical section is approximately one hundred sixty (160) feet. However, additional ROW may be required for slope and construction easements. Additional recommendations include replacing the existing bridge crossing the Clinch River and CSX railroad with a new structure. With the onset of new residential development near Melton Hill Lake, the opportunity to create multi-user paths adjacent to the shoulders near the lake and parks

will be beneficial for pedestrian traffic. The conceptual layout for Option B is shown in Figures 1A-5A.

7.1.3 Option C: Spot Improvements

- **C1-Intersection of SR 170 at Melton Lake Drive (Log Mile 2.55)**
Lengthening the eastbound jug handle ramp at Melton Lake Drive is proposed because traffic queues exceed available storage during peak times. Figure 9 shows a conceptual design of this proposal. Several other more extensive spot improvements were considered at this critical intersection, however none were deemed viable for further development. One improvement considered was relocating Melton Lake Drive east of this existing alignment so that a westbound right lane could be constructed on SR 170. This is not prudent now because it will require structural modification of the Clinch River Bridge. Rock out-crops and recent development makes this option unfeasible. A second improvement considered was adding a loop ramp under the Clinch River Bridge to serve the high-volume southbound to eastbound movement. This option was eliminated because a steep grade will exist on the loop ramp and the merge onto SR 170 will operate at a poor LOS. Moreover, a traffic signal will still be required.
- **C2-SR 170 at Walnut Valley Road (Log Mile 3.44)**
Rear end crashes occur on SR 170 between Lakeview Circle (east) and Lakeview Circle (west). Consequently, the two (2) way left turn lane that ends at Walnut Valley Road should be extended to the west as shown in Figure 10.
- **C3-Traffic Signalization (SR 170 and Old Emory Road)**
Add a traffic signal at SR 170 and Old Emory Road Log Mile 3.76. This intersection qualifies for a signal now. The conceptual layout for the intersection improvement is shown in Figure 11.
- **C4-Traffic Signalization (SR 170 and New Henderson Road)**
Add a traffic signal at SR 170 and New Henderson Road Log Mile 4.25. This intersection qualifies for a signal in 2015. See Figure 12 for a conceptual layout of the improvement.

7.2 Traffic Signal Warrant Analyses

Eight (8) hour turning movement counts were conducted for the intersections of Old Emory Road and New Henderson Road for the purpose of conducting traffic signal warrant analyses.

There are nine (9) traffic signal warrants published in the Manual on Uniform Traffic Control Devices, 2009 Edition. Three (3) traffic volume warrants were examined: 1) the Eight (8) hour Traffic Volume Warrant consisting of the Minimum Volume (Warrant 1A), Interruption to Continuous Traffic Flow (Warrant 1B), Combination (Warrant 1C, combination of parts A & B); 2) Four-Hour (Warrant 2); and 3) the Peak-Hour Volume (Warrant 3B).

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2010	SPOT IMPROVEMENT	

MELTON HILL
LAKE GREENWAY
AND PARK

CLINCH RIVER

RESIDENTIAL / COMMERCIAL

STATE ROUTE 170 (S.R. 170) LENGTHEN RIGHT-TURN STORAGE FOR JUGHANDLE CONFIGURATION. WIDEN TO THE SOUTH OF S.R. 170. LENGTHEN RIGHT-TURN LANE 440 FT. OVERLAY EXIST. S.R.170 AND RESTRIPE. PROVIDE 6 FT SHOULDERS AND TAPER OF 660FT. (TOTAL LENGTH OF CONSTRUCTION ON S.R. 170 = 1120 FT)

CENTENNIAL BLVD.

MELTON HILL DRIVE

BEGIN JUGHANDLE STORAGE
S.R. 170 SPOT IMPROVEMENT

100' EXIST. .
R.O.W.

PROP.
R.O.W. (VARIES)

END JUGHANDLE STORAGE
S.R. 170 SPOT IMPROVEMENT

EXIST. JUGHANDLE AND
INTERSECTION

EXIST. R.O.W. VARIES

TVA PROPERTY



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

**OPTION C
SPOT
IMPROVEMENT
FIGURE 9**

S.R. 170 / MELTON LAKE DR.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2010	SPOT IMPROVEMENT	

ANDERSON COUNTY

VALLEYVIEW HEIGHTS

WIDEN STATE ROUTE 170 (S.R. 170) FROM 2-LANE SECTION TO A 3-LANE SECTION. WIDEN TO BOTH SIDES OF S.R. 170. PROVIDE LEFT-TURN LANES FOR WALNUT VALLEY RD AND LAKE VIEW CIRCLE. PROVIDE 6 FT SHOULDERS AND GUARDRAIL ON SOUTH SIDE. (TOTAL LENGTH OF CONSTRUCTION ON S.R. 170 = 2800 FT)

BEGIN WALNUT VALLEY RD. S.R. 170 SPOT IMPROVEMENT

LAKE VIEW CIRCLE

LAKE VIEW CIRCLE

EXIST. R.O.W. VARIES

WALNUT VALLEY ROAD

VISITOR OVERLOOK

135' EXIST. & PROP. R.O.W.

135' EXIST. & PROP. R.O.W.

T.V.A. PROPERTY

T.V.A. BULL RUN STEAM PLANT

END WALNUT VALLEY RD. S.R. 170 SPOT IMPROVEMENT



IPR	2016	0



STATE OF TENNESSEE
 DEPARTMENT OF TRANSPORTATION
 BUREAU OF PLANNING & DEVELOPMENT

PROPOSED SIGNAL

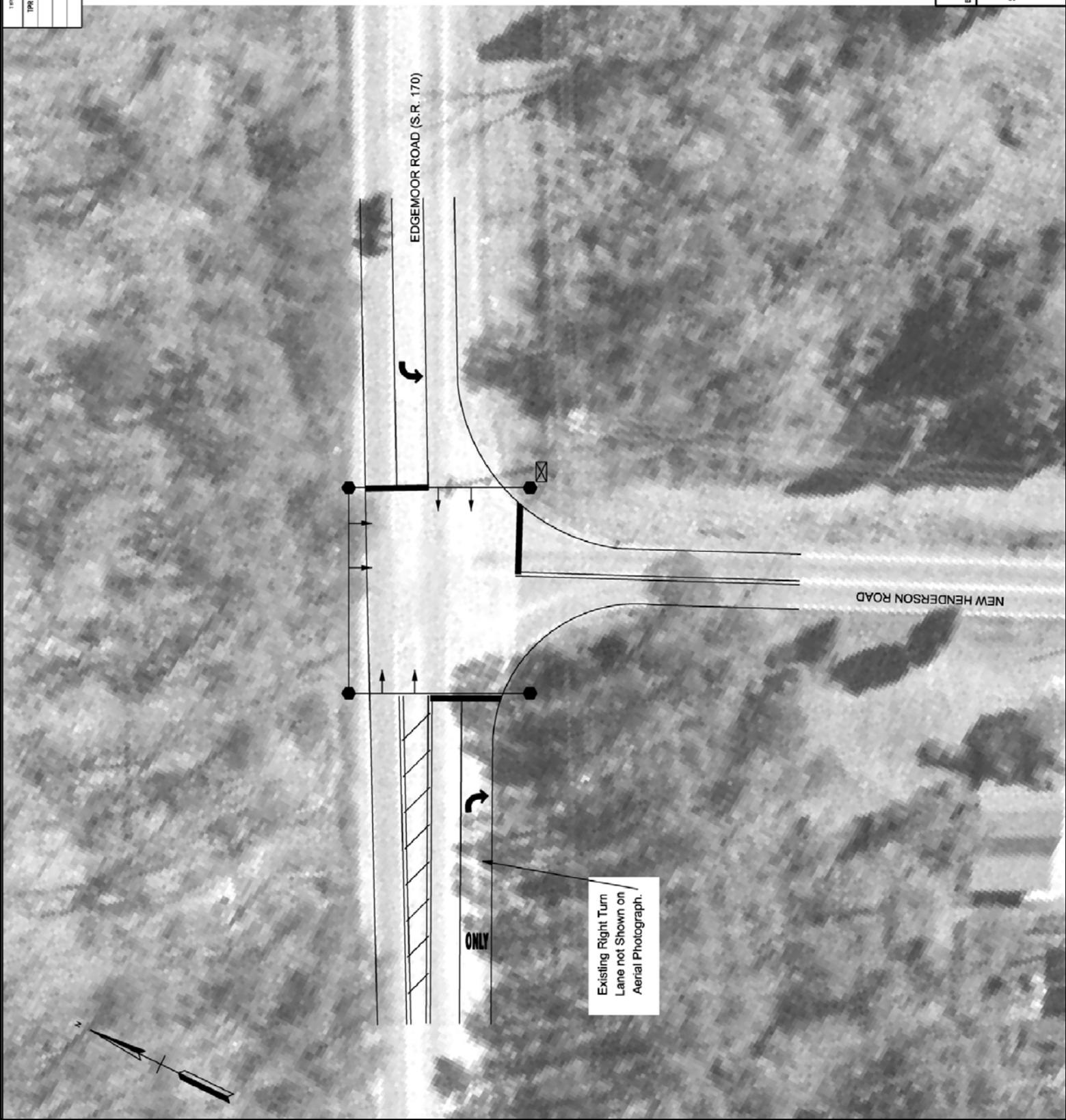
SR 170 AND OLD EMORY RD.
 FIGURE 11

TYPE	PLSP	PROJECT NO.	SHEET NO.
TPR	2010		0

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

PROPOSED SIGNAL
SR 170 AND NEW HENDERSON RD.
FIGURE 12

SCALE: 1"=50'



Any part of Warrant 1 volumes must be met for a minimum of eight (8) hours. Warrant 2 must be met for four (4) hours, and one (1) hour must be met for the Peak-Hour Warrant (Warrant 3B). The volume thresholds required to satisfy the volume warrants are reduced when prevailing speeds are in excess of 40mph.

Signal warrant analyses also consider the number of lanes on the major and minor approaches. The analyses conducted for this evaluation used single-lane approaches. Because the posted speed limit is 50mph, volume thresholds used for the analyses conducted were reduced to 70-percent of the required volumes, 105 and 53 vehicles per hour for the minor approaches. Table 5 summarizes the traffic signal warrant results.

**TABLE 5
SIGNAL WARRANT SUMMARY
SR170 and Old Emory Road**

Warrant	2010	2015	2035
	Hours Satisfied	Hours Satisfied	Hours Satisfied
A Minimum Volume	1	1	3
1 B Interruption	5	5	7
C Combination	3	3	3
2 Four-Hour Volume	3	3	4
3 B Peak-Hour Volume	1	2	3

SR 170 and New Henderson Road

Warrant	2010	2015	2035
	Hours Satisfied	Hours Satisfied	Hours Satisfied
A Minimum Volume	0	0	1
1 B Interruption	3	3	5
C Combination	1	1	2
2 Four-Hour Volume	1	1	2
3 B Peak-Hour Volume	0	0	1

The intersection of Old Emory Road currently (2010) satisfies the Peak-Hour warrant and traffic volumes are approaching the requirements of the Interruption to Continuous Traffic Flow and Four (4) Hour warrants. There were not any significant changes in the signal warrant analyses for 2015, but for 2035, the Four (4) Hour warrant is satisfied and the Interruption to Continuous Traffic Flow Warrant meets seven (7) out of eight (8) hours and is at ninety-four (94) percent for the eighth (8th) hour.

The intersection of New Henderson Road does not currently (2010) satisfy any signal warrants. The Peak-Hour warrant is approaching threshold volumes in 2015. The signal warrant evaluation for 2035 found that the Peak-Hour warrant is satisfied and the Interruption to Continuous Traffic Flow warrant is approaching the threshold volumes.

7.3 Bicycle and Pedestrians

Although, SR 170 is not classified as a Tennessee State Bicycle Route, the proposed typical section will provide adequate shoulder width for bicyclists to share the road.

Proper signage indicating the shared use of the shoulder is recommended. TDOT's Bicycle Plan lists the American Museum of Science and Energy (AMSE) in Oak Ridge as a regional attractor and generator. The City of Oak Ridge is continuing efforts to plan and implement programs to accommodate bicyclists and pedestrians when accessing such popular facilities.

In addition to the spot improvements previously mentioned, consideration should be given to adding marked bike lanes along the existing shoulders on both sides of SR 170. This enhancement will provide a safe travel lane for bicyclists. Appropriate signing and marking will be required along the existing facility.

As part of the extension of the Melton Lake Greenway, Phase 4 includes encompassing a portion of SR 170 to extend the greenway under the Clinch River Bridge. The City of Oak Ridge has requested approval for this request in which TDOT will require certain legal restrictions to avoid environmental problems and easement disputes in the future. Coordination of this effort is ongoing with TDOT's Right-of-Way Office, Structures Division and the Excess Land Committee.

The City of Oak Ridge, the Bicycle Pedestrian Technical Advisory Committee, and the Knoxville Transportation Planning Organization have joined forces to prepare a Bicycle Pedestrian Master Plan for the City of Oak Ridge.

A presentation of the Oak Ridge Bicycle and Pedestrian Plan was given at a public forum on January 5, 2010. The presentation is available via the City of Oak Ridge's website (www.cortn.org)

7.4 Discussion of Structural Impacts (Bridges, Railroad Crossings, Major Rock Cuts)

It is proposed that the Clinch River Bridge, be replaced with a new structure. The existing structure is over fifty (50) years old. Cost estimates include demolishing the existing bridge and rebuilding a new bridge (88 feet out-to-out width) over the Clinch River and the CSX railroad. The bridge cost will include the relocation of any utility lines attached to the bridge.

For Option B, the new bridge structure is proposed to include four (4) twelve (12) foot travel lanes, a fourteen (14) foot raised median and twelve (12) foot outside shoulders. Bicyclists and pedestrians will be accommodated by sharing the shoulders. The existing bridge will remain open during the staged construction of the new bridge to maintain traffic.

Additionally, the Bull Run Steam Plant has water intakes, slurry pools, mixing pools and other outlets to produce coolant water near the bridge. These areas need to be avoided if possible.

7.5 Disposition of Existing Route

Recommended improvements along SR 170 will generally follow the existing alignment. No portions of the roadway or side streets are proposed to be closed or abandoned.

8 EARLY ENVIRONMENTAL SCREENING

In preparation of Transportation Planning Reports (TPR), the Tennessee Department of Transportation (TDOT) has introduced an early environmental screening (EES) process for the study area. By screening the latest available Geographic Information Systems (GIS) environmental data during the early stages of study planning, TDOT and the public will be better prepared to anticipate potential environmental issues and mitigation requirements. This screening process involves using GIS to assess environmental data as it spatially relates to the project's Area of Potential Effect (APE). In broad terms, the GIS environmental data reviewed in this TPR include the following layers:

8.1 1,000 ft ESS Corridor

- Cemetery Sites and Cemetery Properties
Peoples Cemetery, Haven Chapel Cemetery and Memorial Gardens are located on the north side of SR 170 approaching SR 9 (US 25W). Oak Ridge Memorial Park, Woodhaven Memorial Gardens and Zion Cemetery are also located within the study area. It is possible to avoid direct impact to these sites. An environmental impact may still result and necessitate an archaeological review as part of the National Environmental Policy Act (NEPA) process. A moderate level of environmental documentation and time will be required to proceed with development of the project, including steps to reach "no adverse effect" and /or *de minimus* impact determination to the cemeteries.
- Institutions (Schools and Churches)
Claxton Elementary School is located at the east end of the project terminus at SR 170 and SR 9 (US 25W/Clinton Highway). The school educates approximately 450 students (Grades Kindergarten through 5), and has been part of the Claxton Community since 1915. Buses enter from SR 9 and exit onto SR 170. Buses drop off in the mornings from 6:30 AM to 7:30 AM and in the afternoons from 2:00 PM to 2:30 PM. Population growth in the area has been such that Claxton School is the largest elementary school in the county. Haven Chapel Church is also located within the project study area. Impacts to the school and church properties are likely. Additional design will be needed to locate and design the proposed transportation improvements in such a way that avoids or minimizes the adverse effects to the church and/or potential [Section 4(f)] takes of the school property. A Section 4(f) refers to a policy of the US Department of Transportation Act of 1966 which established the requirement for consideration of park and recreational lands, wildlife and waterfowl refuges, and historic sites in project development. Use of a Section 4 (f) property occurs: (1) when land is permanently taken for a transportation facility;(2) when there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; (3) when there is a constructive use (a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired).
- Sensitive Community Populations-Residential Neighborhoods
Impacts to sensitive community populations cannot be avoided. Preliminary Early Environmental Screening (EES) maps reveal that the study area contains a minority population of twenty-four (24) percent. Residents within the study area were also identified as linguistically isolated. The maps also revealed that there

are some residents within the study area living below the average state poverty level of 14.5 percent.

- Bats

A substantial impact on the project is probable as there is a known occurrence of Indiana or gray bats (*Myotis grisescens*) within four (4) miles of the proposed study area. It is anticipated that avoidance or minimization of potential impacts to the species may be required; surveys for the species may be required; coordination with the US Fish and Wildlife Service (USFWS) and a biological conclusion (Section 7) will be needed. Additionally, seasonal construction limitations will likely be necessary.

Section 7 of the Endangered Species Act (ESA) Act, called “Interagency Cooperation”, is the mechanism by which Federal agencies must consult with US Fish and Wildlife Service when any action the agency carries out, funds or authorizes (such as through a permit) may affect a listed endangered or threatened species.

- Railroads

CSX railroad lines are located within the project study area and run along the north side of the Clinch River. The bridge along SR 170 spans across the Clinch River and two CSX rail lines. Impacts to the railroad can be avoided or minimized. Although the proposed project will be greater than two hundred (200) feet from the railroad, there is the remote possibility of minor involvement on railroad property to accommodate drainage. However no at-grade crossing is proposed.

- TVA Bull Run Fossil Plant

Bull Run Fossil Plant is located on Bull Run Creek within the Claxton Community. The facility generates more than six (6) billion kilowatt-hours of electricity a year. The plant uses approximately 7,300 tons of coal daily. Because of adjacent land uses, TVA has actively implemented methods to reduce harmful sulfur dioxide (SO₂), Nitrogen Oxide (NO_x) and other emissions associated with the plant to ensure that the power supply is generated as clean as possible.

8.2 2,000 ft EES Corridor

- National Register Sites

No impact is anticipated as there are no National Register listed properties abutting or within the study corridor.

- Superfund Sites

No impact is anticipated as there are no known contaminated land tracts abutting or within the study corridor.

- Pyritic Rock

No impact is anticipated. Pyritic rock is not known to occur in the study corridor. However, during construction there may be some excavation of a rock bluff near the south end of the Clinch River Bridge. Limestone (symbolized as dark green) and dolomite (symbolized as light green) are present. Dolomite class includes: Mascot, Longview, Chepultepec, Kingsport, and Newala Formations.

- TWRA Lakes and Other Public Lands
There are no TWRA Lakes located within the study corridor. However, there are several public parks located within the study area including Haw Ridge Park, Solway Park, Centennial Golf Course and Claxton Community Park. Minimal impacts to one resource, Haw Ridge Park, are anticipated as the park abuts the study corridor.

8.3 4,000 ft EES Corridor

- Terrestrial Species
A substantial impact is probable as there are ten (10) federally- and state-protected terrestrial species located within the corridor. Additional alternatives and design will likely not eliminate impacts to the species; additional design will be needed to minimize any impacts. A survey will be required. Extensive consultation with the USFWS and the Tennessee Department of Environment and Conservation (TDEC) will be required and special construction considerations will likely be required.
- TDEC Conservation Sites and TDEC Scenic Waterways
Medium impact is anticipated as a scenic waterway, the Clinch River and two (2) TDEC Conservation Sites (ORR Solway Bend Bluffs and Clinch State Scenic River) are within the study corridor. The Clinch River is classified as a Class III (Developed River Area) from the Melton Hill Dam upstream to Pellissippi Parkway (Interstate 140). Impacts to the scenic waterway or TDEC Conservation Site cannot be avoided but will likely be minor. Examples include replacing a bridge structure in its existing location. Determination of study impacts will include analysis, coordination, and negotiation to resolve Section 4(f) issues associated with the crossing of a scenic waterway.
- Large Wetland Impacts
Twenty-one (21) large wetlands totaling 4,188.39 acres are listed within the study area. A substantial impact is probable as there is greater than two (2) acres of wetlands within the study area. Compensatory mitigation may be required. Design efforts will be needed to avoid and minimize impacts to wetlands to the maximum extent practical. If a floodplain is crossed by the project, floodplain culverts may be necessary.
- Tennessee Natural Area Program
No impact is anticipated as the study area does not include a Natural Area.
- Wildlife Management Areas (WMA)
The Oak Ridge Wildlife Management Area (WMA) is located within the study area. Minimal impact is anticipated to this resource. However, there is the potential to avoid any takings or impacts to the wildlife management area through more detailed location and design of the proposed roadway improvements. With additional effort to locate and design the project, there should be no impacts to the wildlife management area.

8.4 10,000 ft EES Corridor

- Aquatic Species

A substantial impact is likely as there are eleven (11) federally-protected aquatic species listed within the project study area. The species are listed in Table 6 below.

**TABLE 6
AQUATIC SPECIES LISTING**

Aquatic Species	USESA	State Protected
Lampsilis abrupta	LE	E
Cumberlandia monodonta	C	
Dromus dromas	LE	E
Cumberlandia monodonta	C	
Fusconaia cuneolus	LE	E
Plethobasus cicatricosus	LE	E
Io fluvialis		
Plethobasus cooperianus	LE	E
Fusconaia cor	LE	E
Dromus dromas	LE	E
Hemistena lata	LE	E

LE=Endangered Species Listing

E=Endangered Species C=Candidate Species

The potential of locating a population of the species during field surveys in the study corridor exists. Impacts to the species will be difficult to avoid even with additional alternatives. Extensive consultation with the USFWS and TDEC will be necessary. Additional design that minimizes or eliminates impacts to the streams will likely be required based on field surveys and consultation with USFWS and TDEC. Special construction considerations may be required.

- Caves

No impacts are anticipated as there are no known caves in the study corridor.

As of the publication of this document, the GIS data within each layer was up to date relevant to date of its publication. This data will be updated as part of the ongoing project development process.

9 ASSESSMENT OF CORRIDOR OPTIONS

9.1 TDOT's Seven Guiding Principles

The Tennessee Department of Transportation has adopted seven (7) guiding principles against which all transportation projects are to be evaluated. These guiding principles address concerns for system management, mobility, economic growth, safety, community, environmental stewardship, and fiscal responsibility. These guiding principles are discussed in the following paragraphs as they relate to Option B for improving the corridor within the study area.

9.2 Guiding Principle 1: Preserve and Manage the Transportation System

The existing 6.18 mile section of SR 170 between SR 62 and SR 9 (US 25W) currently has congestion issues during the morning and afternoon peak hours and is experiencing

near and long term capacity deficiencies within its 25-year planning horizon. The option of widening SR 170 to provide a five (5) lane typical section is consistent with TDOT's goal of preserving the existing transportation system. Widening will provide the needed additional capacity to service existing and future traffic volumes.

Addressing the safety and operational needs of SR 170 will improve the overall transportation system in the region by providing the infrastructure to adequately address movement of people and goods. The No Build decision for SR 475 prioritized the improvement to SR 170 to preserve this existing corridor while considering improvements that benefit both the safety and operations of SR 170.

9.3 Guiding Principle 2: Move a Growing, Diverse, and Active Population

The No-Build Option (Option A) does not address the need for improved connectivity for passenger or commercial vehicles throughout the region. Option B provides for this connectivity and will improve access along the SR 170 corridor. An improved SR 170 will help facilitate the movement of goods – such as materials to and from the TVA Bull Run Steam Plant.

The SR 170 corridor is important to the surrounding communities and provides regional mobility and economic opportunities for both residents and industry. Presently, the characteristics of the corridor have limited facilities for bicycles and pedestrians. Option B offers an additional level of safety above the existing conditions for alternative uses.

9.4 Guiding Principle 3: Support the State's Economy

The US Department of Energy's (DOE) primary presence in Oak Ridge continues to provide economic benefits to the area. The spillover of economic benefits into the region and state can be attributed to the numerous programs offered by DOE to companies located within the state. Knox and Anderson counties have very strong ties in terms of employment. According to the US Census, approximately twenty-six (26) percent of Anderson County residents commute to Knox County. Also more than 11,000 Knox County residents work in Anderson County accounting for approximately twenty-five (25) percent of the Anderson County employment base. These commuting patterns are evident along SR 170 especially during morning and afternoon peak hour periods when motorists experience congestion along the corridor. Investment in a safe and efficient state highway system will provide more efficient routes for passenger and freight movement in the area's transportation network.

9.5 Guiding Principle 4: Maximize Safety and Security

Recommended widening improvements along SR 170 are expected to improve roadway safety and congestion. Structural improvements to the Clinch River Bridge will primarily increase the safety of the bridge and expand the capacity and viability of the roadway network. During the three (3) year period from 2006 through 2008, one hundred eighty (180) crashes were reported along the project corridor. Of the total number of crashes, fifty-nine (59), thirty-three (33) percent involved injuries, and one hundred twenty one (121), sixty-seven (67) percent reported property damage. Analyses calculated the crash rate to be 1.662. This can be compared to the statewide average rate of 2.389 for this type of facility. Previous improvements to some intersections have alleviated congestion and reduced the possibility of crashes. As traffic volumes increase along the corridor, it is expected that without additional improvements the crash rate will also

increase. Recommendations of the Option B would anticipate a lower crash rate and facilitate safer travel for motorists.

Rear-end crashes are common on SR 170 most likely resulting from shared through/ left turn lanes. Option B proposes to reduce the number of crashes along the two-lane sections of the route. Additionally, shoulders on each side of SR 170 will serve as a buffer for pedestrians and bicyclists traveling to and from nearby land uses, and provides additional opportunity to increase the distance between pedestrian and vehicles.

9.6 Guiding Principle 5: Build Partnerships for Livable Communities

TDOT's planning process encourages public involvement in all transportation projects. This process provides insight as a study moves forward into project development based on factors that reflect the priorities of the affected public.

This study, originated by the RPO was identified as a need for the region when TDOT announced the No Build decision for SR 475. This decision is also supported by local public officials to identify objectives for improving the region's transportation system to I-40 and I-75. Option B will incorporate an improved regional transportation facility that will increase safety for motorists, pedestrians and bicyclists as well as enhance the quality of life for the community by integrating growth with the conservation of resources. Following this study, the public involvement process will continue to develop partnerships as each option is further evaluated and a build option is chosen.

9.7 Guiding Principle 6: Promote Stewardship of the Environment

Several areas within the study area should be avoided, if possible. These areas include cemeteries, a public golf course, a public elementary school, public recreational areas (parks and ball fields) which are considered Section 4(f) resources. An appropriate environmental document will be prepared to fully address the impact of the considered build option. A more comprehensive analysis of the impacts will be completed at a later date to comply with the National Environmental Policy Act (NEPA). This analysis will require the consideration of environmental values in the decision-making processes by taking into account the environmental impacts of the proposed actions and reasonable alternatives to those actions. Additional environmental issues including social, economic, displacements, and land use impacts will be evaluated as part of the NEPA document.

9.8 Guiding Principle 7: Promote Financial Responsibility

It is TDOT'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. The preparation of this TPR, and the cost estimates contained herein, initiate the promotion of financial responsibility in the scheduling and development of roadway projects and minimizing costs to taxpayers.

10 COST ESTIMATE

10.1 Option A: No Build

No cost is associated with this option.

10.2 Option B: Widening Along Existing Alignment

The cost estimate for Option B was developed by using an estimated minimum right-of-way width of approximately 160 feet for the five (5) lane typical section from SR 62 to SR 9. This was based on the overall pavement width and drainage areas and an average of ten (10) feet on both sides to match the slope lines. Since several Section 4(f) resources exist along the corridor, the ROW was determined by avoiding impacts to the Section 4(f) resources which included the Centennial Golf Course, Solway Park boat ramp areas, Haw Ridge Park, Claxton Community Center (and ball fields) and the cemeteries.

The construction costs are based on the existing topography, road alignment and proposed typical sections. Construction costs include mobilization, pavement removal, earthwork, drainage, paving, utility relocation, traffic signals, guardrail and other construction items. The estimated total construction costs for this build option is \$40.1 million which includes \$13.3 million to construct a new bridge over the Clinch River.

10.3 Option C: Spot Improvements

The cost estimates for the spot improvements provides for the reconstructing and mitigation of four (4) existing intersections on SR-170. Construction costs include mobilization, pavement removal, earthwork, drainage, paving, traffic signals, guardrail, utility relocation and other construction items. A comparison of the estimated construction costs to build the four (4) preferred spot improvements are provided in the Table 7.

A Project Cost Sheet provides a breakdown for the particular construction costs for both build options and is shown on the Data Tables in this report.

**TABLE 7
OPTION C: SPOT IMPROVEMENTS**

	LOCATION	TYPE OF IMPROVEMENT	CONSTRUCTION COSTS*
C1	SR-170 at Melton Lake Drive	Storage length improvement	\$322,000
C2	SR-170 at Walnut Valley Road	Storage length improvement	\$728,000
C3	SR-170 at Old Emory Road	Intersection modification/signalization Qualifies for signal now	\$265,000
C4	SR-170 at New Henderson Road	Intersection modification/signalization Qualifies for signal in 2015	\$265,000
TOTAL			\$1,580,000

* A compounded inflation rate of 10% per year should be applied.

11 SUMMARY

11.1 *Option A: No Build Option*

Option A, the No-Build Option does not meet the purpose, needs and goals of the study. Future improvements to the existing SR 170 corridor are necessary to accommodate for the continuing growth in the Oak Ridge and Claxton communities.

Option A assumes no modifications or improvements are made over the planning horizon. Normal maintenance will continue without disruption to the area. Option A will not increase mobility between the SR 62 and SR 9 (US 25W) in the Oak Ridge and Claxton communities. No cost is associated with this option.

11.2 *Option B: Widening Along Existing Alignment*

The proposed improvements include a five (5) lane typical section, adding two (2) additional travel lanes, a center two (2) way left turn lane and shoulders. Bicyclists and pedestrians will be expected to share the road. For estimating purposes, the proposed right-of-way (ROW) for this typical section is approximately one hundred sixty (160) feet. Due to the topography of the area retaining walls may be needed. There are several environmental resources in the area.

It is proposed that the existing structure crossing the Clinch River and the CSX railroad be replaced with a new bridge structure. The proposed bridge structure will have eighty-six (86) feet of roadway (four (4), twelve (12) foot travel lanes, a fourteen (14) foot raised median, and twelve (12) foot shoulders) with an out to out width of eighty-eight (88) feet.

The proposed roadway improvements to SR 170 will:

- Provide economic growth potential for the City of Oak Ridge and the Claxton Community by improving a major arterial to attract residential, commercial, industrial and retail development opportunities;
- Increase capacity on the existing SR 170 corridor to meet future traffic demands;
- Provide an improved Level of Service (LOS) for motorists and truck traffic; and,
- Alleviate traffic congestion during peak hours, particularly for commuters.

11.3 *Option C: Spot Improvements*

Funding to support Option B may be limited, but traffic operations and safety on SR 170 can be improved with spot intersection improvements (Option C). A portion of the problems identified are due to isolated conditions at individual intersections, rather than stemming from consistently heavy traffic volumes being found throughout the length of the roadway. Through appropriate intersection design, the types of congestion, delay and motorist inconvenience experienced along SR 170 will be alleviated. These are described in **Section 7.1.3** of this report but include adding a two (2) way left turn lane near Lakeview Circle, adding traffic signals at Old Emory Road (warranted in 2010) and New Henderson Road (warranted in 2015), and enhancing the Melton Lake Drive intersection.

At this time, Option B best fulfills the purpose and need for roadway improvements to the SR 170 area. If chosen in the NEPA process as the preferred option, Option B will be further evaluated under future studies for horizontal and vertical alignment, right-of-way, utility relocations, environmental concerns and structures.