ADDENDUM TO 2006 TRANSPORTATION PLANNING REPORT
SPECIAL BRIDGE REPLACEMENT PROGRAM

INTERSTATE 40 BRIDGE
OVER FRENCH BROAD RIVER, LOG MILE 14.70
Jefferson County
PIN 106301.00

PREPARED BY GRESHAM SMITH AND PARTNERS
FOR THE TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION

Approved by: _____ 6/15/10 _____ 6/21/10
Chief of Env. & Pln. Date Chief Engineer Date

REVISION

Recommended by:	INITIALS	DATE	Recommended by:	INITIALS	DATE
TRANS. DIRECTOR PLANNING DIVISION	SA	6-1-10	TRANS. DIRECTOR PLANNING DIVISION		
TRANS. DIRECTOR ENV. DIVISION	SBH	6/1/10	TRANS. DIRECTOR ENV. DIVISION		
ENG. DIRECTOR DESIGN DIVISION for	MM	6/4/10	ENG. DIRECTOR DESIGN DIVISION		
ENG. DIRECTOR STRUCTURES DIVISION	DJT	6/14/10	ENG. DIRECTOR STRUCTURES DIVISION		
TRANS. DIRECTOR PROG. DEV. DIVISION	JM	6/15/10	TRANS. DIRECTOR PROG. DEV. DIVISION		
ASSISTANT CHIEF ENGINEER			ASSISTANT CHIEF ENGINEER		
ASSISTANT CHIEF OF ENV. & PLN.			ASSISTANT CHIEF OF ENV. & PLN.		

Table of Contents

List of Figures

List of Tables

Attachment

1.0 BACKGROUND

The subject of this Transportation Planning Report (TPR) is the replacement of the Interstate 40 (I-40) bridge over the French Broad River, located at log mile 14.70 of I-40 in Jefferson County, Tennessee. Figure 1 shows the general location of the proposed project and Figure 2 shows the study area on an aerial photograph.

The Tennessee Department of Transportation (TDOT) built this bridge in 1960-61. The structure is a 2,416-foot long steel truss with concrete piers. The bridge has been proposed for replacement because it is structurally deficient, generally rated "poor" and is an interstate bridge rated for 15 tons. In addition, renovation of the bridge is not the preferred option.

I-40 is the major east-west interstate corridor in the state of Tennessee, connecting many of Tennessee's major cities including Memphis, Nashville and Knoxville. In the immediate study area, I-40 provides access to the Town of Dandridge and the community of Oak Grove via US 70/US 25W/State Route (SR) 9 (US 70 hereafter) and SR 113. It also provides a connection between many east Tennessee communities and destinations farther east including the Great Smoky Mountains National Park and western North Carolina.

In 2006, TDOT initiated the TPR Special Bridge Replacement Program process to examine possible alternatives for replacement of the I-40 bridge over the French Broad River. The 2006 TPR is in a stand-alone appendix (a CD) to this report.

The 2006 TPR examined three potential alternatives for the bridge replacement, including the interchange at SR 113:

- Alternative A: reconstruction of the bridge south of its existing location (existing loop ramp in northwest quadrant remains)
- Alternative B: reconstruction of the bridge south of its existing location (diamond interchange)
- Alternative C: reconstruction of the bridge north of its existing location (diamond interchange)

The TPR developed cost estimates for each of the proposed alternatives, but did not recommend a preferred alignment. The TPR also recommended modifications to the ramps at I-40 Exit 424, just beyond the west end of the bridge.

The purpose of this TPR Addendum is to recommend a single alternative for replacement of the bridge and to update functional plans and planning level cost estimates for the recommended alignment.

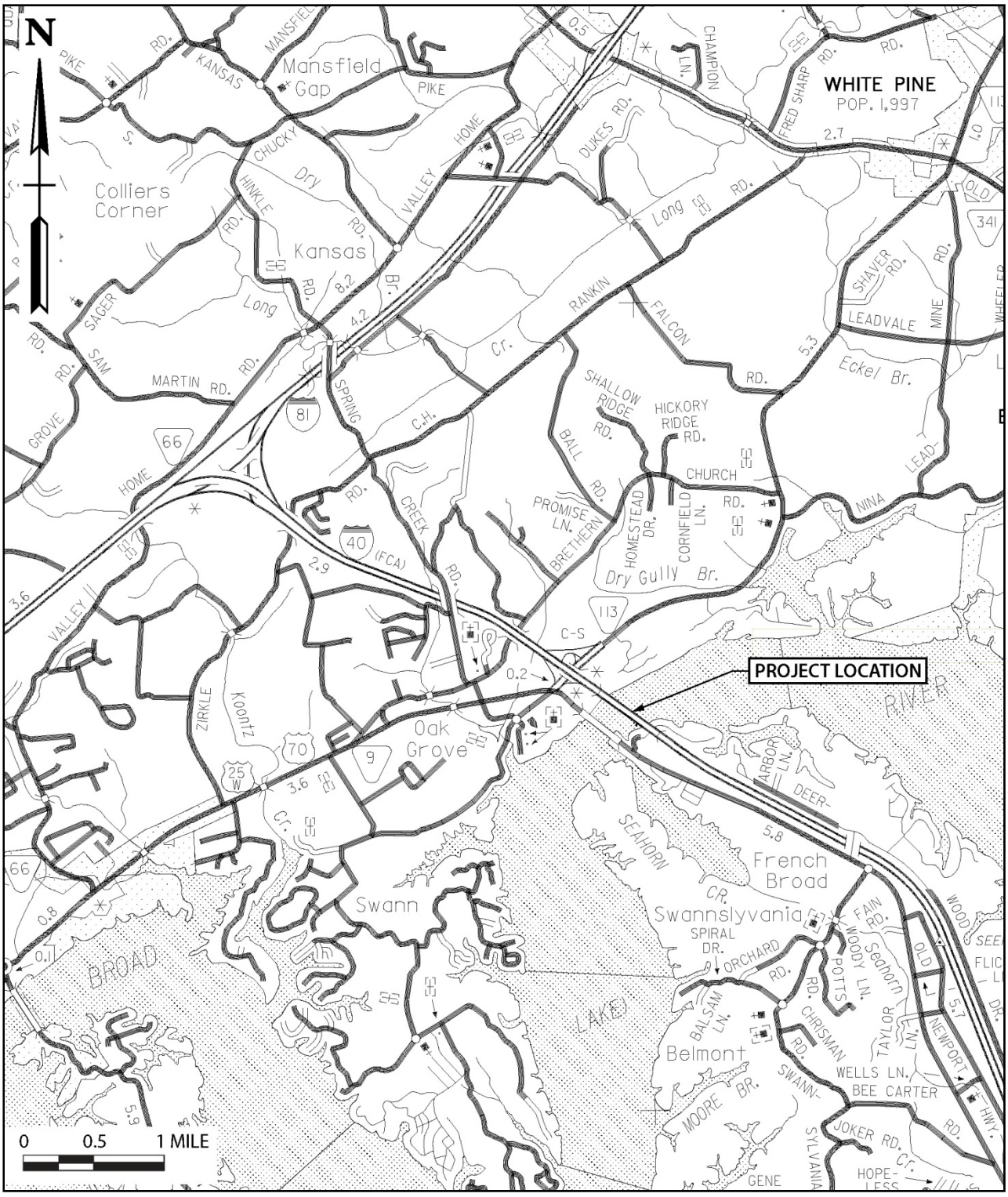


Figure 1. General Location of Proposed Bridge Replacement
I-40 Bridge over French Broad River, Log Mile 14.70, ID# 45100400019

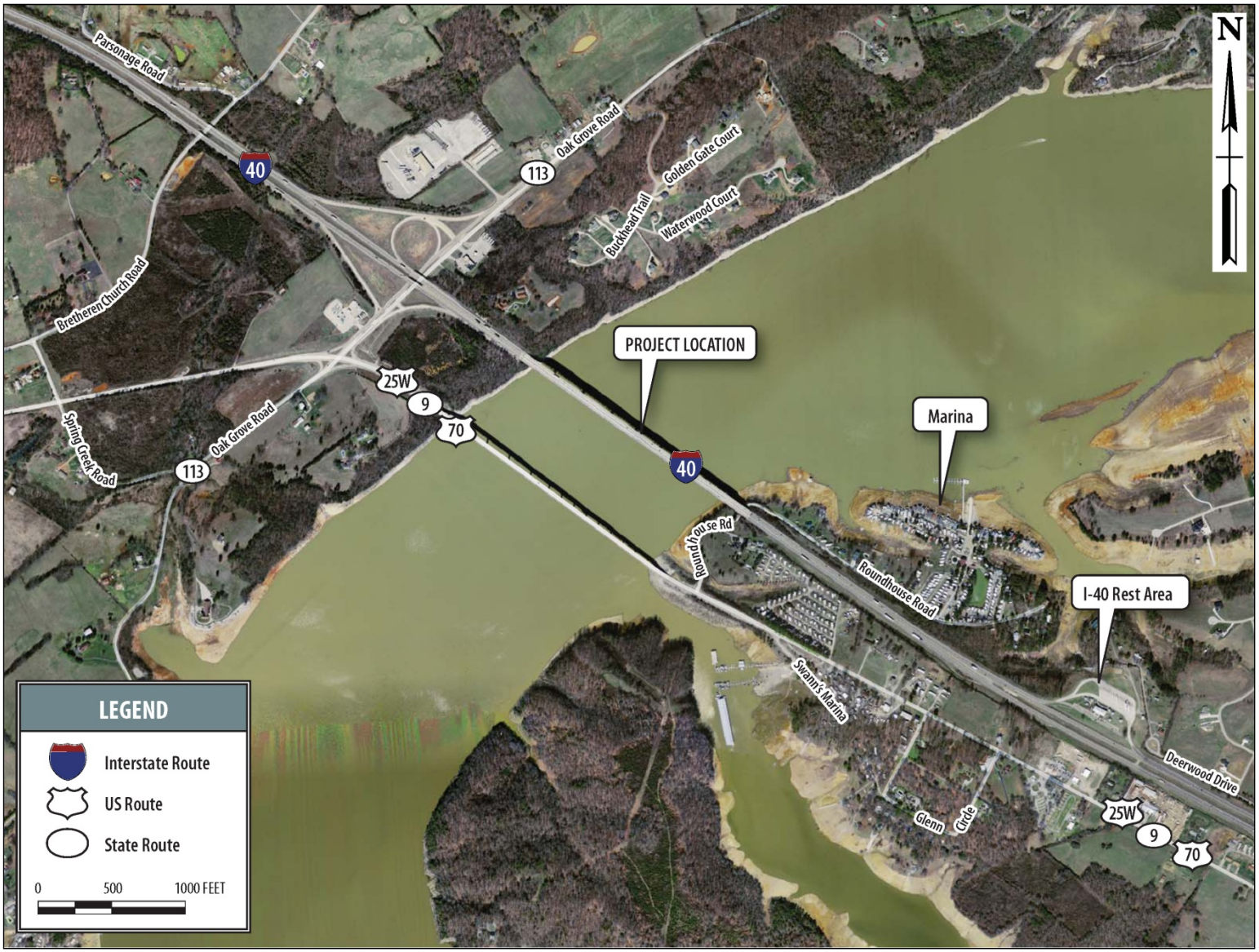


Figure 2. Bridge Location and Study Area on Aerial Photograph
I-40 Bridge over French Broad River, Log Mile 14.70, ID# 45100400019

2.0 STAKEHOLDER FIELD REVIEW

TDOT, assisted by its engineering consultant Gresham Smith and Partners (GS&P), conducted a field review at the site of the proposed project on Thursday, September 10, 2009, at 1:00 p.m. The purpose of the meeting was to gather input that would assist in the preparation of a Transportation Planning Report (TPR) Addendum. Attendees were:

TDOT:	Bill Hart and Brandon Darks (Project Planning), Ed Wasserman and Henry Pate (Structures) and Mike Agnew (Roadway)
Dandridge:	City Administrator Jim Hutchins
GS&P:	Mark Holloran, Ted Kniazewycz, Margaret Slater

Four major design considerations were discussed in depth during the field review. These include:

1. The I-40 Interchange at SR 113 (Exit 424) at the West End of the Bridge—The discussion focused on potential issues with the interchange due to its close proximity to the bridge. Several field review participants felt that the length of the east-bound on-ramp from SR 113 was inadequate to accommodate the acceleration of trucks up onto the bridge. The interchange may require some ramp work as part of the bridge replacement efforts. A number of possible interchange configurations were discussed. An Interchange Modification (IMOD) study may be required for this work. Participants also suggested considering a roundabout at the intersection of US 70 and SR 113 due to the sharp skew of the intersecting roads.

2. Rehabilitation/Replacement of the Existing Bridge—Attendees considered the possibility of rehabilitating the existing bridge rather than replacing the structure. TDOT representatives stated that some rehabilitation work had already been completed on the existing bridge, but that additional work would be needed within five to ten years. Because rehabilitation would extend the life of the bridge for only a short period, attendees reached a consensus that bridge replacement would be a more cost-effective, and therefore preferred, option.

3. Bridge Alignment and Staged Construction—Field review participants agreed that the preferred option would involve shifting the bridge south of its existing location in order to avoid potential impacts to an area containing housing and a marina which would lose access due to fill for the east approach should the bridge be shifted north of I-40. Participants also agreed that the Marina access road (Roundhouse Road) should be reconstructed to minimum design standards within the interstate right-of-way as part of the proposed project.

   Attendees also discussed whether the replacement bridge structure should have two or three through-lanes. Design year traffic will be used to determine the appropriate number of lanes. One attendee commented that if the on-ramps from the adjacent

interchange and Rest Area were carried across the length of the bridge, including the shoulders, there would be sufficient bridge width to restripe for a third through lane if required in the future. Depending on the width ultimately selected, attendees felt that it might not be worth the effort and expense required to phase construct.

4. Ramps from the I-40 Rest Area to I-40—The final major design consideration is the exit ramps from the I-40 Rest Area to I-40. Attendees discussed several ideas for the ramps including: considering 12-foot inside shoulders, recent FHWA directives that may require stabilized 12-foot outside shoulders, consideration of the acceleration length needed for the on-ramp, whether the on ramp could end prior to the bridge, transition of the median reduction, and ensuring sufficient sight/stopping distances on I-40 with a high median barrier which may justify a wider inside shoulder.

In addition to the major design considerations, attendees suggested that project planners include right-of-way cost estimates in the TPR and consider the possibility of using the US 70 bridge as a detour if I-40 could be closed during bridge construction.

3.0 ENVIRONMENTAL SCREENING

The primary source for environmental screening data was an Early Environmental Screening (EES) report prepared by TDOT staff. The report documents the potential for impacts to sensitive environmental resources within 1,000, 2,000, 4,000 and 10,000 feet of the study area. The full EES report, including maps of the resources identified, is at the end of this section. The findings of the EES report were supplemented with additional records checks as described in Table 1 below.

Table 1. Enhanced Environmental Screening Resources

Environmental Resource	Sources Consulted
Cultural Resources	*A Historic/Architectural Assessment for the Proposed bridge Replacement on Interstate 40* (2006 by TDOT) *Phase 1 Short Report [archaeology] for I-40 Bridge over the French Broad River, Log Mile 14.70, Jefferson County, Tennessee, PIN 106301.00* (2007 by TDOT)
Section 4(f)/6(f)	TVA records and Douglas Reservoir Land Management Plan; Jefferson County property records available in online GIS
Environmental Justice	US Census Data
Threatened and Endangered Species	TDEC Threatened and Endangered Species Observations Records
Floodplains	FEMA Flood Insurance Rate Maps
Wetlands	National Wetland Inventory
Hazardous Materials	EPA CERCLIS database; TDEC Promulgated Site List

3.1 Cultural Resources

The TPR guidance requires a review of on-going and previously prepared documentation regarding historic resources. At the request of TDOT, a check was also undertaken for previously completed archaeological studies.

The TDOT EES report identified no potential for impacts to sites listed in or eligible for listing in the National Register of Historic Places (NRHP), cemetery sites, or cemetery properties, as none were identified in the study area.

In March of 2006, TDOT historians surveyed properties in the study area and prepared a report, *A Historic/Architectural Assessment for the Proposed Bridge Replacement on Interstate 40 Over the French Broad River,* documenting their findings. The report concluded that the proposed project would have no effect on any property listed or eligible for listing in the NRHP. Pursuant to Section 106 requirements, the report was sent to the Tennessee State Historic Preservation Office (SHPO) for review. In a letter to TDOT dated March 28, 2006, the SHPO concurred with the report's finding of no effect to historic architectural resources.

On July 23, 2007, TDOT archaeologists conducted an archaeological survey of the study area. The author of the survey report stated that no archaeological resources potentially eligible, determined eligible, or listed in the NRHP were identified within the potential

environmental impact area of the proposed project. In addition, no further archaeological resource surveys were recommended.

3.2 Section 4(f)/Section 6(f) Resources

There are no public parks or recreation areas located within the study area, as confirmed by the TDOT EES report. According to Jefferson County assessment and property records reviewed online, the only publicly held property near the study area is the I-40 Rest Area, owned by the State of Tennessee. The Rest Area sits adjacent to I-40 and ramps providing access to the center from I-40 will be evaluated for improvements as part of the proposed bridge replacement project. No adverse impacts to the property are anticipated.

All other land within the study area, including a developed recreation area, Swann's Marina, is privately owned. The Tennessee Valley Authority (TVA) holds flowage easements on privately held properties along much of the shoreline.

The TVA does own and manage a piece of shorefront property on the west side of the French Broad River, immediately south of the I-40 bridge and including the US 70 river bridge. This property, highlighted in green on Figure 3, is managed for Natural Resource Conservation purposes.

In a September 24, 2009, phone conversation between project planners and the TVA Program Manager and TVA Primary TDOT Contact, it was determined that the zoning designation of Natural Resource Conservation did not pose an obstacle to the proposed project, and could easily be changed to accommodate the bridge replacement. TVA officials stated that should a design be selected that moves the roadway and bridge onto TVA land, a permanent easement on the land would be required. The easement process can take anywhere from six months to a year and a half, depending on whether sensitive environmental resources are discovered in the area. TVA officials stated that they were not currently aware of any fatal environmental flaws in the study area.

3.3 Environmental Justice

The TDOT EES identified no potential impacts on environmental justice populations. U.S. Census data was also reviewed for the study area to determine whether the proposed project will have disproportionately high and adverse human health or environmental effects on minority or low-income populations.

Minority Populations

The average percentage minority population for Jefferson County was 4.3 percent in 2000, considerably lower than the statewide average of 19.8 percent. The map in Figure 4 illustrates the percent minority population by Census Block for the 2000 US Census. Only one Block within the study area (Census Tract 709, Block Group 1, Block 1010) had a minority population percentage higher than that of the surrounding county. Though this Block, shown in dark blue in Figure 4, has a minority population of 100 percent, only one individual resides within Block 1010.

Low-Income Populations

The average percentage of the population living below the poverty line in Jefferson County was 13.4 percent in 2000. The statewide average was 13.5 percent. Poverty status was mapped at the Census Block Group level for the study area. There are no

Block Groups within the study area with a greater percentage of the population living below the poverty line than Jefferson County as a whole.

3.4 Threatened and Endangered Species

The Tennessee Department of Environment and Conservation (TDEC) Natural Heritage Inventory Program maintains records of observations of threatened and endangered species across the state by United States Geological Society (USGS) Quadrangle. A review of these records for the White Pine Quadrangle, which encompasses the study area, revealed that there are no known occurrences of federal- or state-listed threatened or endangered species in the study area. The TDOT EES process revealed no potential for impacts to terrestrial threatened or endangered species within 4,000 feet of the study area and no potential for impacts to threatened or endangered aquatic species within 10,000 feet of the study area.

3.5 Floodplains

According to Federal Emergency Management Association (FEMA) Flood Insurance Rate Map (FIRM) number 47089C0200D, 100-year floodplains associated with the French Broad River are located in the study area. These floodplains and their relationship to the existing I-40 bridge are shown on the map in Figure 5.

3.6 Wetlands

US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps were used to identify wetlands within the study area. The wetland boundaries closely mirror those of the French Broad River and its floodplain.

The TDOT EES identifies approximately 20,400 acres of wetlands within 4,000 feet of the study area. The large acreage of wetlands located within the study area can be attributed to the presence of the French Broad River (controlled by a TVA dam and known as Douglas Reservoir at this location) within the study area. The proposed project involves replacement of an existing bridge and is not likely to result in wetland impacts beyond the scale of those associated with the existing structure. As indicated in the EES report, design effort will be needed to avoid or minimize impacts to wetlands to the maximum extent practicable.

3.7 Hazardous Materials

A review of the Environmental Protection Agency (EPA) CERCLIS database, the TDEC Promulgated Site List and other available records indicated no know hazardous materials sites within the study area. The TDOT EES report also indicated no potential for hazardous material impacts.

3.8 Pyritic Rock

The TDOT EES report identified low potential for encountering pyritic/acid-producing rock within 2,000 feet of the study area. The EES report does not indicate that the potential is high enough to constitute an obstacle to the proposed project.

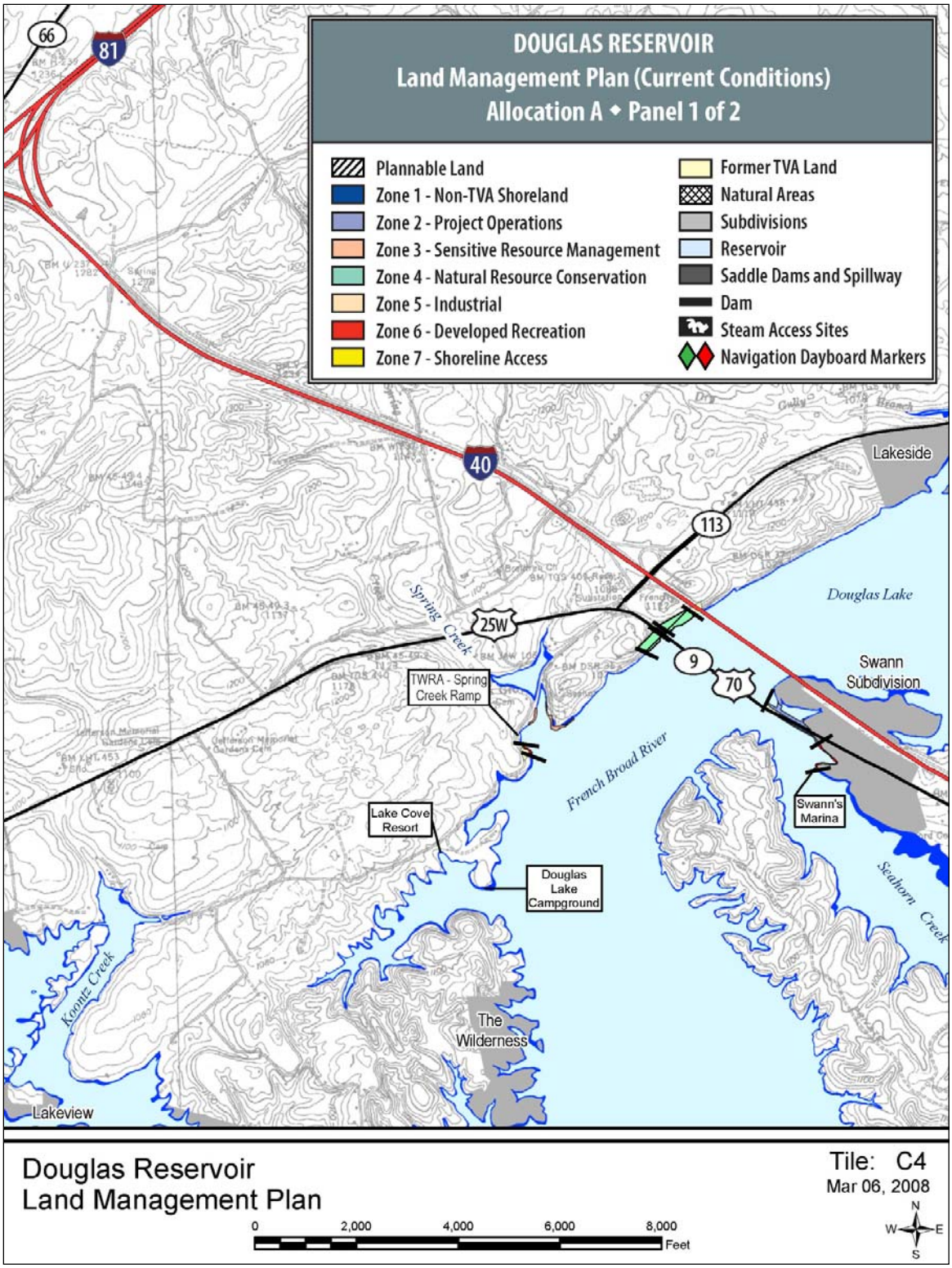


Figure 3. Map of TVA-Owned Lands in the Study area
Source: TVA Douglas Reservoir Land Management Plan

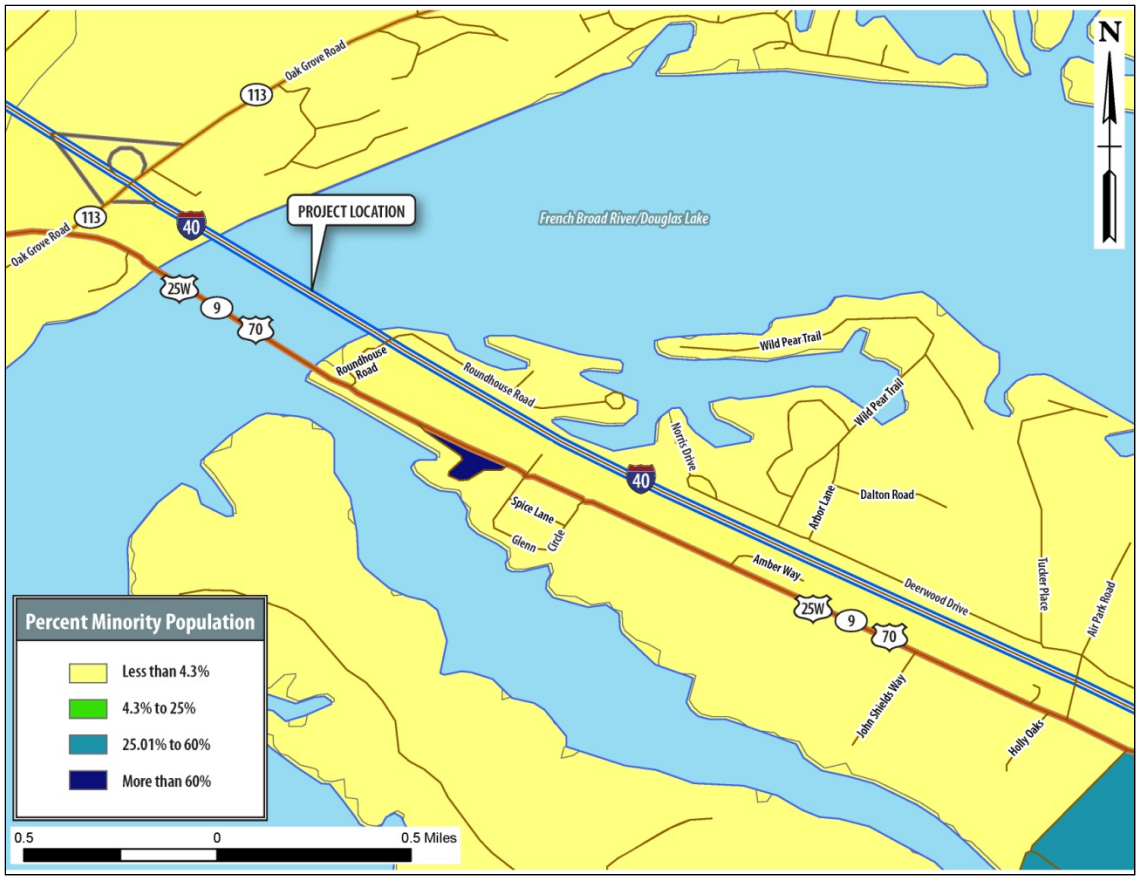


Figure 4. Minority Population in the Study Area by Census Block

.

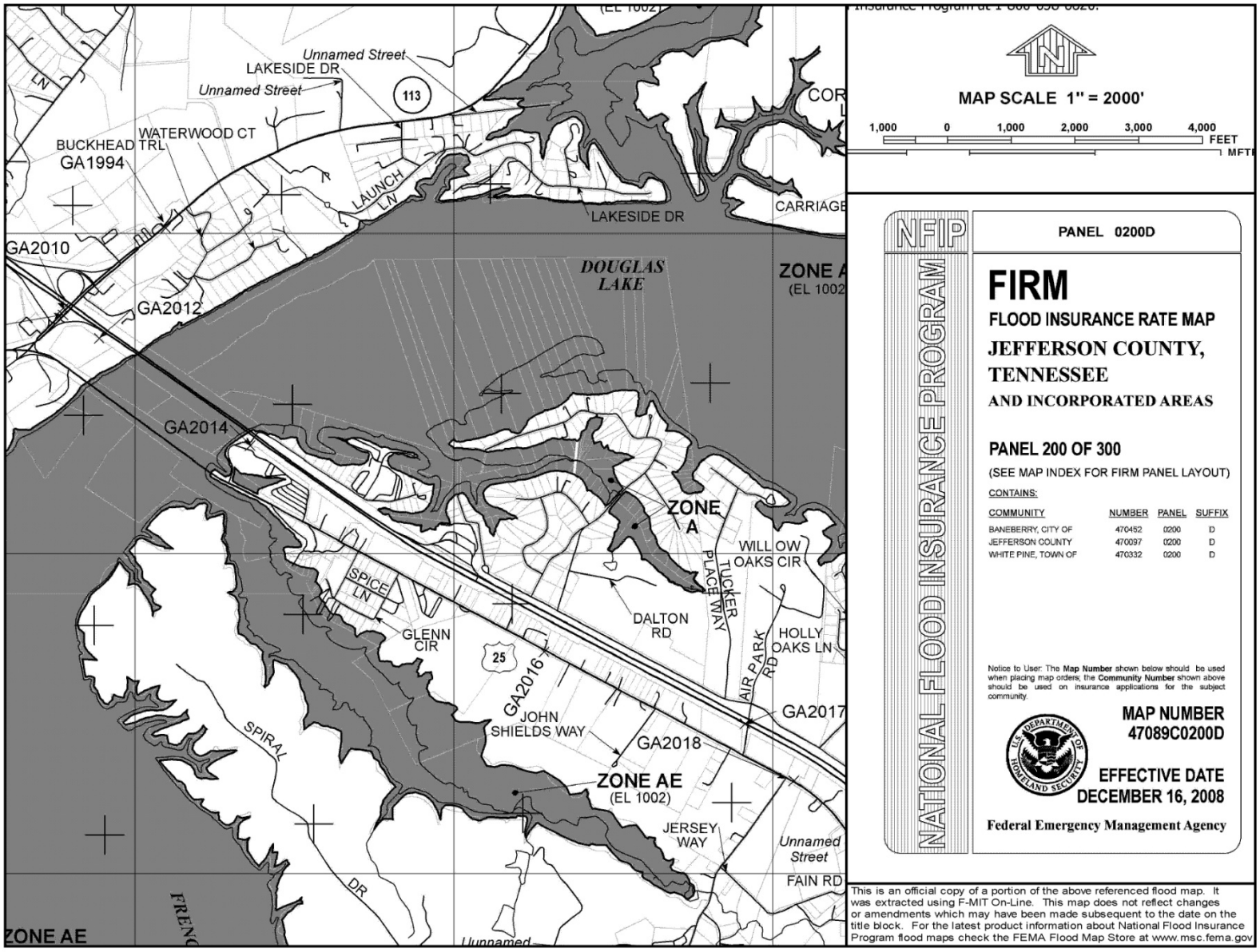


Figure 5. FIRM Depicting 100-Year Floodplains in the Study Area

Tennessee Department of Transportation
EARLY ENVIRONMENTAL SCREENING PROCESS (EES)
PROJECT SCORING

Project Score Factors

	Total Impacts Evaluated	Total Impacts to Evaluate	EES Evaluation
Project Impact Areas:	**15**	**15**	**Complete**
Date of Evaluation:	October 12, 2009		
Evaluation done by:	Chris Armstrong		
	Transportation Planner 4		
County:	Jefferson		
Route:	Interstate 40		
PIN:	106301.00		
Termini:	I-40 Bridge over the French Broad River		

Impact Ranking of Features Evaluated:	**Total by Rank**
Features with No Impact	**12**
Cemetery Sites & Cemetery Properties	
National Register Sites	
Bat	
Terrestrial Species	
Aquatic Species	
TDEC Conservation Sites & TDEC Scenic Waterways	
Superfund Sites	
Caves	
Railroads	
Tennessee Natural Areas Program	
Wildlife Management Areas	
TWRA Lakes & Other Public Lands	
Features with Low Impact	**1**

Pyritic Rock

Features with Moderate Impact	**0**

Features with Substantial Impact	**1**

Large Wetland Impacts

Community Impacts Present:

Institutions:

Populations:

No population present

Linguistically isolated populations

EES Project Impact:	**Complete**

Impacts Evaluated Within 1,000 Ft of Study Area

CEMETERY SITES & CEMETERY PROPERTIES

Impact

Project Impact (Environmental, Time, Cost, Design, and Maintenance)	☑ **None** - No impact on the project as there are no known cemetery sites within or abutting the project study area or corridor. It is anticipated that a 'normal' effort to complete this environmental review as part of NEPA.

INSTITUTIONS & SENSITIVE COMMUNITY POPULATIONS

Sensitive Populations Project Impact:	**Present**	**Not Present**
Institutions:		
Hospital	☐	☑
School	☐	☑
Church	☐	☑
Public Building	☐	☑
Populations:		
No population present	☑	☐
65 and older populations	☐	☑
Disability populations	☐	☑
Households without a vehicle	☐	☑
Minority populations 24%	☐	☑
Linguistically isolated populations	☑	☐
Populations below poverty - State average - 13%	☐	☑
Populations below poverty - State average - 27%	☐	☑

BAT

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No project impact is anticipated. There is no occurrence of Indiana or gray bats within 4 miles of the proposed project study area or corridor.

RAILROADS

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No impact on the project is anticipated. There are no railroads located within the project study area or corridor.

Impacts Evaluated Within 2,000 Ft of Study Area

NATIONAL REGISTER SITES

Impact

Project Impact (Environmental, Time, Cost, Design, and Maintenance)	☑ **None** – No project impact is anticipated as there are no National Register listed properties abutting or within the project study area or corridor.

SUPERFUND SITES

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No project impact is anticipated as there are no known contaminated land tracts abutting or within the project study area or corridor.

PYRITIC ROCK

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **Low** – Small project impact is anticipated. Pyritic rock (symbolized as yellow) has low probability to occur in the study area/corridor or the project does not involve excavation.

TWRA LAKES & OTHER PUBLIC LANDS

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No impact on the project is anticipated as there area no parks located within or abutting the project study area or corridor.

Impacts Evaluated Within 4,000 Ft of Study Area

TERRESTRIAL SPECIES

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** - No impact to the project is anticipated. There is no known occurrence of a rare, state, or federally-protected terrestrial species within the proposed transportation study area or corridor.

TDEC CONSERVATION SITES & TDEC SCENIC WATERWAYS

Impact

Project Impact (Environment, Time, Cost, Design, Maintenance)	☑ **None** – No project impact is expected as there are no scenic waterways or TDEC Conservation Sites within project study area or corridor.

LARGE WETLAND IMPACTS

Impact

Project Impact (Environment, Time, Cost, Design, Maintenance)	☑ **Substantial** – Regions 1, 2, and 3: A substantial impact to the project is probable as there is greater than 2 acres of wetlands within the project study area or corridor. Compensatory mitigation will be required. Design effort will be needed to avoid and minimize impacts to wetlands to the maximum extent practicable. If a floodplain is crossed by the project, floodplain culverts may be necessary.

TENNESSEE NATURAL AREAS PROGRAM

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No impact on the project is anticipated as the project study area or corridor does not include a Natural Area.

WILDLIFE MANAGEMENT AREAS

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No project impact is anticipated as a WMA does not abut nor is located within the project study area or corridor.

Impacts Evaluated Within 10,000 Ft of Study Area

AQUATIC SPECIES

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** - No impact to the project is anticipated. There is no known occurrence of a rare, state, or federally-protected aquatic species within the project study area or corridor.

CAVES

Impact

Project Impact (Environment, Time, Cost, Design, and Maintenance)	☑ **None** – No project impact is anticipated as there are no caves in the project study area or corridor.

EES Report

PIN 106301.00

1,000 Foot Corridor

Study Line ID: 106301_4501V01

Version Date: September 22, 2009

Created by: JONATHAN RODGERS

Cemetery Sites & Cemetery Properties

Cemeteries	None were found
Cemetery Property	None were found

Institutions & Sensitive Community Populations

Institutions	None were found
Populations:	
No population present	Present
65 & older populations	None were found
Disability populations	None were found
Households without a vehicle	None were found
Minority populuations 24%	None were found
Linguistically isolated populations	Present
Populations below poverty-State average-13%	None were found
Populations below poverty-State average-27%	None were found

Bat

None were found

Railroads

None were found

Interstate 40 Bridge over the French Broad River

EES Report

PIN 106301.00

2,000 Foot Corridor

Study Line ID: 106301_4501V01

Version Date: September 22, 2009

Created by: JONATHAN RODGERS

National Register Sites — None were found

Superfund Sites — None were found

Pyritic Rock — Classification — Total= 3

Dolomite

Mascot, Longview, and Chepultepec Dolomite, and Kingstport and Newala Formations

Copper Ridge Dolomite

May Contain Potentially Acid Producing Rock

Sevier Formation

TWRA Lakes & Other Public Lands

TWRA Lakes — None were found

Other Public Lands — None were found

Interstate 40 Bridge over the French Broad River

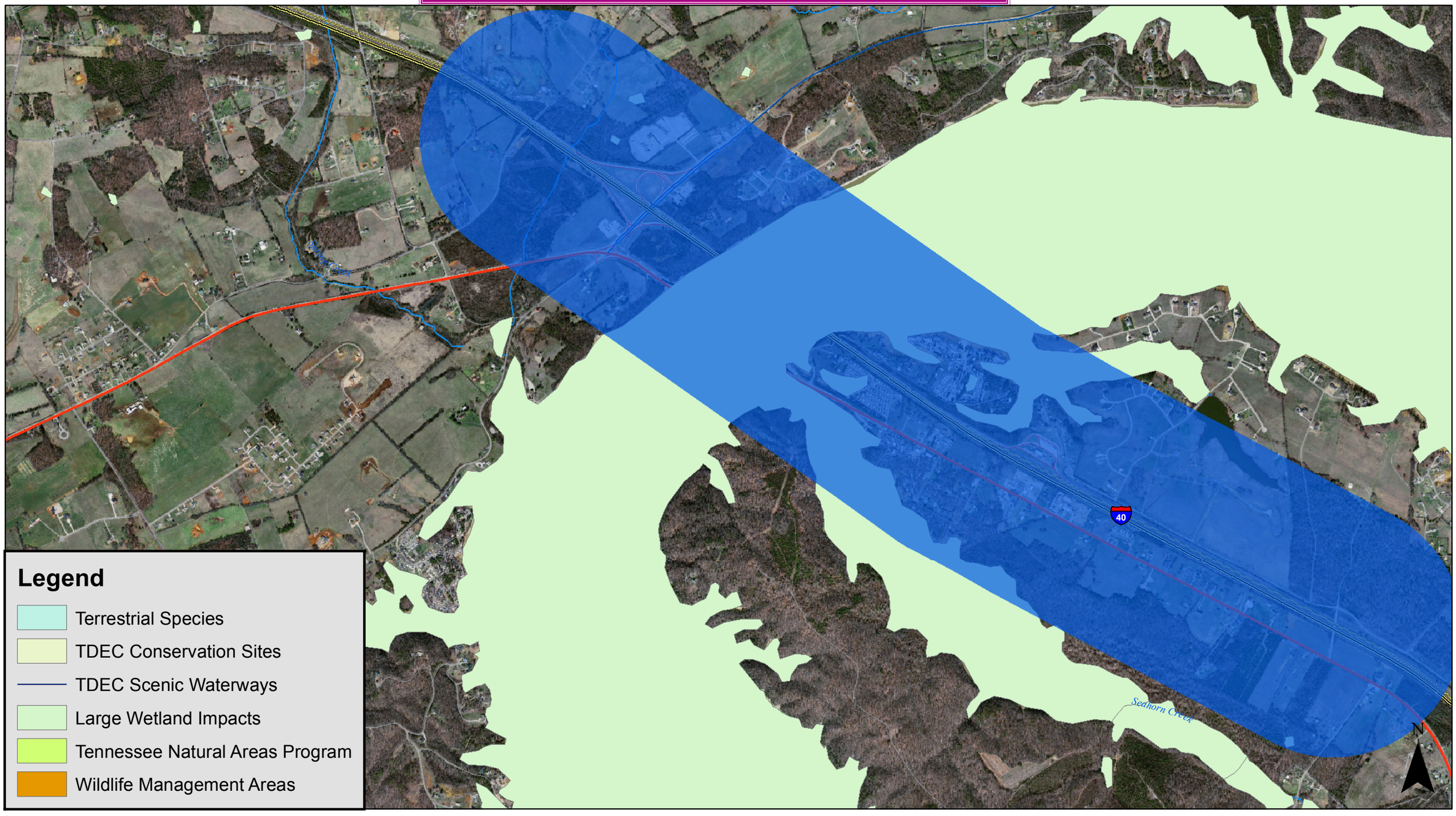
Legend

- National Register Sites
- Superfund Sites
- Formation that contains acid producing rock
- Includes formations that contain acid producing rock
- Formation that may contain potentially acid producing rock
- Includes formations that may contain acid producing rock
- Limestone
- Dolomite
- TWRA Lakes
- Recreation
- Nature
- Federal
- State

Formation that contains acid

0 0.25 0.5 1 Miles

Interstate 40 Bridge over the French Broad River



EES Report

PIN 106301.00

4,000 Foot Corridor

Study Line ID: 106301_4501V01

Version Date: September 22, 2009

Created by: JONATHAN RODGERS

Terrestrial Species — None were found

TDEC Conservation Sites & TDEC Scenic Waterways

TDEC Conservation Sites — None were found

TDEC Scenic Waterways — None were found

Large Wetland Impacts — **Total Acerage**= 20,373.92

L1UBHh	20,367.55	acres
PEM1F	0.34	acres
PEM1F	0.75	acres
PUBHh	0.78	acres
PUBHh	4.00	acres
PUBHh	0.50	acres

Tennessee Natural Areas Program — None were found

Wildlife Management Areas — None were found

4.0 TRAFFIC ANALYSIS

4.1 Base and Design Year Traffic Conditions for the Proposed Project

The Average Annual Daily Traffic (AADT) and the Design Hour Volumes (DHV) on Interstate 40 (I-40) over the French Broad River for 2009 and 2029 were provided by TDOT. TDOT used an annual growth rate of 2.376 percent. This growth rate was used to develop the base year (2015) and design year (2035) AADT and DHV traffic volumes.

I-40 is a four-lane divided highway over the French Broad River and is projected to carry an AADT of 40,296 vehicles per day and a DHV of 3,627 vehicles per hour in the base year of 2015. In the design year of 2035, it is projected that this section of I-40 will carry an AADT of 64,449 and a DHV of 5,800.

Turning movement counts were collected by All Traffic Data Services, Inc. for all four entrance and exit ramps of the I-40/SR 113 interchange. Additionally, turning movement data was collected for the two-way stop-controlled intersection of SR 113 and US 70, which is located just south of the I-40/SR 113 interchange.

4.2 Level of Service

The 2015 and 2035 DHV for both the AM and PM peak hours were projected for each of the ramp movements within the study limits of the proposed project using the collected turning movement counts and growing them using the TDOT annual growth percentage provided in the 2009/2029 counts (i.e., 2.376 percent). Using the peak hour traffic data, Levels of Service (LOS) were determined for the existing and proposed I-40 freeway mainline segment over the French Broad River, each of the ramp movements, the unsignalized intersections of the EB and WB ramps at their intersection with SR 113 (2035 Build), and the unsignalized intersection of SR 113 and US 70 using the Highway Capacity Software (HCS+).

The results of the LOS analysis are also summarized in Table 2.

The LOS analysis shows that the mainline section of I-40 over the French Broad River, the ramp merge and diverge areas as well as the northbound left (NBL) and southbound left (SBL) turns of SR 113 at the stop controlled approaches of the SR 113 and US 70 intersection operate at an acceptable LOS in the 2015 AM and PM Peak periods.

The capacity of the merge/diverge areas is always controlled by the capacity of the freeway segments upstream and downstream of the ramps, or by the capacity of the ramp itself. Under the 2035 No-Build AM Peak condition, the merge for the I-40 WB on-ramp operates at LOS F. Under both the 2035 No-Build AM and PM Peak conditions, the merge and diverge areas for the I-40 EB ramps operate at LOS E. Under both the 2035 No-Build AM and PM Peak conditions, the merge and diverge areas for the I-40 WB off-ramp operates at LOS E. The I-40 WB on-ramp operates at LOS F under the 2035 No-Build AM Peak condition, while it operates at LOS D in the PM Peak condition. The poor LOS projected for the ramp movements in the 2035 No-Build condition is due primarily to the level of projected mainline traffic on I-40.

Under the 2035 Build AM Peak condition with the proposed diamond interchange layout, the merge for the I-40 WB on-ramp operates at LOS F, which is due to the level of projected mainline traffic on I-40. No changes to the acceleration lane length are proposed for this ramp as part of the proposed project. It should be noted that the projected 2035 I-40 WB mainline peak hour volume of 3,480 vehicles per hour is slightly more than the threshold used by the HCS software of 3,350 vehicles per hour, which would attain a merge LOS D.

The proposed diamond interchange layout slightly changes the location of the ramp termini on SR 113. Both the intersection of the I-40 WB ramps and SR 113 and the I-40 EB ramps and SR 113 were analyzed as unsignalized intersections in the 2035 Build AM and PM Peak conditions. All of the movements operate at acceptable levels of service under the analyzed conditions.

Additionally, the unsignalized intersection of SR 113 and US 70 was analyzed under all conditions. Although the SBL stop-controlled movement operates at a LOS D in the 2035 AM Peak and at LOS F in the 2035 PM Peak, the queue length is not anticipated to extend past the I-40 EB off-ramp.

Turning movement counts and the HCS output are included as a stand-alone appendix (a CD) to this report.

Table 2. Level of Service for Base Year and Design Year

HCS Analysis Description	Level of Service					
	2015		2035 No-Build		2035 Build	
	AM	PM	AM	PM	AM	PM
I-40 Mainline over French Broad River	C	C	E	E	E	E
I-40/SR 133 Interchange						
I-40 EB On-Ramp (Merge)	C	C	E	E	A	A
I-40 EB Off-Ramp (Diverge)	C	C	E	E	A	A
I-40 WB On-Ramp (Merge)	B	B	F	D	F	D
I-40 WB Off-Ramp (Diverge)	C	C	E	E	A	A
I-40 EB Ramps/SR 113 Intersection (EB Approach/SBL)	-	-	-	-	B/A	B/A
I-40 WB Ramps/SR 113 Intersection (WB Approach/NBL)	-	-	-	-	C/A	B/A

5.0 RECOMMENDED CONCEPT

Currently, the typical section of I-40 in the study area consists of a four-lane, depressed median section west of Exit 424 (12-foot travel lanes, 12-foot outside shoulders, 6-foot inside shoulders and a 48-foot median). That section transitions to a 4-lane, flush median section with barrier rail; (12-foot travel lanes, 6-foot inside and 12-foot outside shoulders); and continues across the bridge to approximately 1,450 feet east of the bridge where it transitions back to the same depressed median section described above near the I-40 Rest Area.

The 2006 TPR examined three potential alternatives for bridge replacement, including the interchange at SR 113:

- Alternative A: reconstruction of the bridge south of its existing location (existing loop ramp in northwest quadrant remains)
- Alternative B: reconstruction of the bridge south of its existing location (diamond interchange)
- Alternative C: reconstruction of the bridge north of its existing location (diamond interchange)

The 2006 TPR developed cost estimates for each of the proposed alternatives, but did not recommend a preferred alignment. The TPR also recommended modifications to the ramps at I-40 Exit 424, just beyond the west end of the bridge.

5.1 Alternatives Considered and Rejected

Based upon the September 6, 2009, field review, input from stakeholders and the analysis of the potential alternatives discussed in the February 2006 TPR prepared for this proposed bridge replacement project, Alternatives A and C were removed from consideration for the reasons described below.

Alternative A: Reconstruction of the Bridge South of its Existing Location (retain existing loop ramp in northwest quadrant)
Alternative A consists of the construction of a new bridge south of the existing bridge with the centerline offset such that the new bridge can be built without phase construction. This alternative does not maximize the utilization of the existing bridge approach fills or the existing EB roadway as does the preferred alternative and the existing interchange loop ramp configuration on the north side of I-40 provides the potential for wrong way movements.

Alternative C: Reconstruction of the Bridge North of its Existing Location (diamond interchange)
Alternative C consists of the construction of a new bridge north of the existing bridge. This alternative does not maximize the utilization of the existing bridge approach fills, and it also requires more right-of-way acquisition. The major issue associated with this alternative is that the new interstate roadway would be built on top of Roundhouse Road. This road is the only roadway access to the marina and the residences on this peninsula. There is insufficient land available to reconstruct it, and there is no other point from which access could be developed. This alternative would cut off all access to the marina and the residential area.

Additional Recommendations for the Intersection of SR 113 and US 70

Although outside the proposed project limits of the 2006 TPR and this addendum, two concepts were developed at the request of TDOT for improving the intersection of US 70 and SR 113 just south of the SR 113 interchange with I-40. These two concepts are presented in an attachment at the end of this report.

5.2 Recommended Alternative—Modified 2006 TPR Alternative B

Based upon the field review, stakeholders input and the factors discussed above, this TPR amendment recommends a modified version of 2006 TPR Alternative B, (referred to hereafter as the "Preferred Alternative"), which shifts the centerline alignment of I-40 and the bridge approximately 52 feet to the south of the existing location. There are two major differences between Alternative B and the Preferred Alternative. First, Alternative B depicted a concept that would include the construction of a new bridge entirely to the south of the existing structure. The Preferred Alternative proposes to stage construct the proposed bridge, thereby reducing right-of-way impacts along the south side of I-40 throughout the proposed project limits. (The desirability of using staged construction had been questioned at the early field review, but after the completion of an engineering analysis, it was determined that right-of-way impacts without staged construction would be much greater.) The second modification consists of proposing a six-lane section from east of Exit 424 across the river and eventually transitioning back to a four-lane depressed median section near the Rest Area.

Additional lanes will be added and dropped based on the following scenario. An additional I-40 EB lane will be added via the reconstructed parallel entrance ramp from SR 113 to EB I-40 at the SR 113 interchange (Ramp B), and will be dropped after crossing the bridge on the east side of the river. This will provide more than adequate acceleration length for trucks merging onto EB I-40 and will provide enough width on the new bridge should I-40 be widened in the future. The additional I-40 WB lane will be added via the reconstructed parallel entrance ramp from the Rest Area which will continue across the bridge and be dropped at SR 113 via the exit ramp, Ramp A. The scenario for adding this lane to EB I-40 will have the same benefits as the proposed improvements to WB I-40 in that it will accommodate future widening and provide additional acceleration length for motorists entering WB I-40 from the Rest Area.

A set of concept plans for the I-40 Bridge and interchange and bridge details are found at the end of Section 5.

5.2.1 I-40 Bridge

The existing I-40 bridge over the French Broad River is a deck truss bridge supported on concrete piers. The bridge type precludes staged demolition of the existing truss to accommodate traffic. Consequently, the centerline of the new bridge is proposed to be offset from the existing centerline by 52 feet to the south, allowing phased construction of the replacement bridge while maintaining four lanes of traffic at all times on I-40. A configuration of the existing US 70 bridge and two photographs are shown in Figure 6. Numerous additional photographs of the bridge are in located in the 2006 TPR, which is in a stand-alone appendix (a CD) to this report.

Based on available information from the bridge inspection report and existing bridge layout, the new structure would have a total length of approximately 2,420 feet with

View northwest from Roundhouse Road.

View northeast from Roundhouse Road.

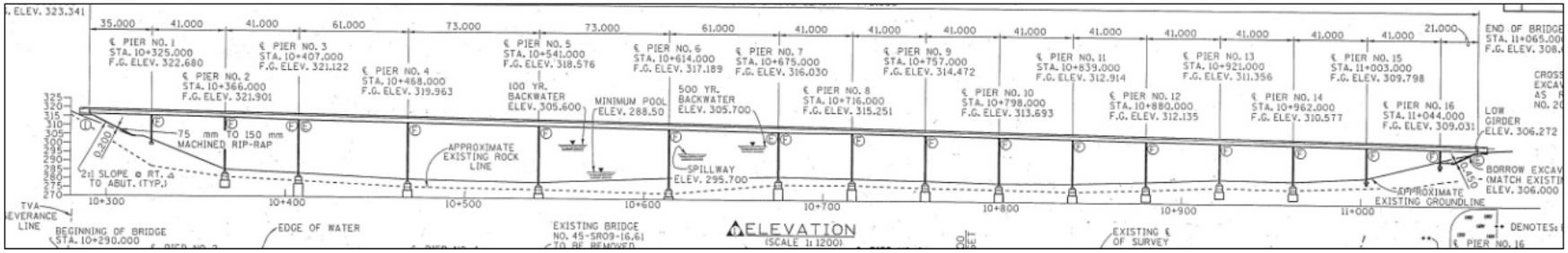


Figure 6. Photographs and Configuration of Existing US 70 Bridge over French Broad River.

arrangement of spans similar to the US 70 bridge, which is just downstream of this crossing.

The proposed bridge will utilize a welded plate girder unit for the main channel crossing and 72-inch bulb-tee beams for the approach spans. The spans can be arranged to avoid conflicts with the existing substructures during Phase I Construction. The western approach will consist of three bulb-tee spans totaling 330 feet. The main span unit will consist of three spans of welded plate girder beams with a total length of 860 feet. The eastern approach spans will consist of nine bulb-tee spans totaling 1,230 feet.

Construction will be phased to minimize the need to acquire additional right of way beyond that needed for the approach roadway alignment. During the phased construction, a minimum of two 11-foot lanes will be maintained in both directions. For details of the proposed bridge phasing, the concept plans follow this section.

For the final bridge configuration, there will be two 12-foot lanes in each direction along with one 12-foot auxiliary lane in each direction for ramp acceleration and deceleration. Fourteen foot inside shoulders and 12-foot outside shoulders are proposed and the total out-to-out bridge width is 125 feet-3 inches. The bridge rail and the median barrier will be the single slope type.

5.2.2 Exit 424, I-40

Interchange Bridges: The existing I-40 bridges over SR 113 are cast-in-place deck girders supported on concrete piers. The bridge type precludes widening based on available vertical clearance along with the transition of the alignment shift from the river bridge construction. This requires the centerline of the new bridge over SR 113 to be offset from the existing centerline by 52 feet to the south. This will allow the phased construction of the replacement bridge.

Based on available information from the bridge inspection report, the new bridge would be a two-span structure with a total length of approximately 160 feet. The proposed bridge will utilize 63-inch bulb-tee beams. The spans can be arranged to avoid conflicts with the existing substructures during Phase I Construction.

Construction will be phased to minimize disruptions to traffic flow. During all phases of construction, two 12-foot lanes will be maintained in both directions.

For the final bridge configuration, there will be two 12-foot lanes in each direction with 14-foot inside shoulders and 12-foot outside shoulders. The total out-to-out bridge width is 101 feet-3 inches. The bridge rail will be STD-1-1SS and the median barrier will also be the single slope type.

Interchange Roadway and Ramps: Improvements to the interchange itself consist of eliminating the existing loop ramp in the northwest quadrant and reconstructing the WB off and on ramps to provide a diamond interchange. The EB off-ramp will be reworked to accommodate the shifting of I-40 to the south in order to facilitate the bridge construction scenario described in Section 5.2.1. The EB on-ramp will be re-aligned significantly and additional acceleration length has been added by extending the ramp lane across the bridge over the river before merging. The WB off-ramp will be reconstructed to eliminate the loop ramp and additional deceleration length has been

added by carrying the on ramp from the Rest Area across the bridge over the river and dropping it via the WB off-ramp to SR 113.

5.2.3 I-40 Westbound Rest Area

The entrance and exit ramps to the I-40 WB Rest Area just east of the bridge over the river are proposed to be reconstructed as part of this proposed project. The existing entrance ramp will be lengthened to provide sufficient deceleration distance for the design speed. The exit ramp from the Rest Area will be reconstructed such that it becomes a third auxiliary lane across the bridge.

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

Index Of Sheets

SHEET NO.	DESCRIPTION
1	..... TITLE SHEET
2	..... TYPICAL SECTIONS
3-6	..... FUNCTIONAL LAYOUTS

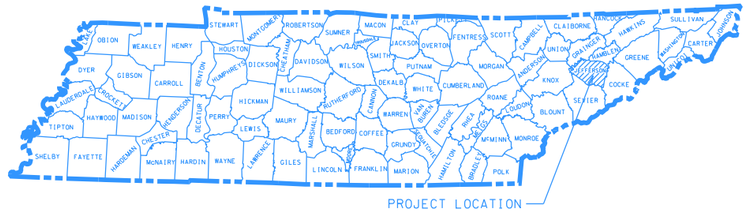
FUNCTIONAL CONCEPT SET

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING

JEFFERSON COUNTY

INTERSTATE 40 BRIDGE OVER THE FRENCH BROAD RIVER

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

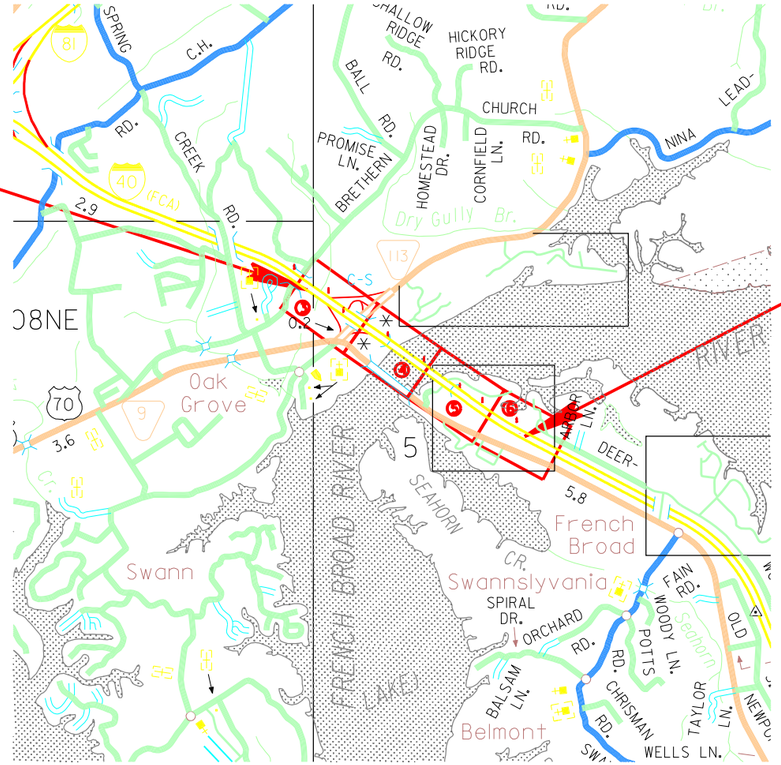


TPR AMENDMENT

STATE HIGHWAY NO. I-40 F.A.H.S. NO. I-40

BEGIN PROJ.
I-40 STA. 131+00.00

END PROJ.
I-40 STA. 222+39.93



SCALE: 1"= 1 MILE

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, 2006 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT.

TDOT C.E. MANAGER 1 OR
TDOT DESIGN MANAGER 1 _____
TDOT ROAD SP. SV. 2 _____
DESIGNED BY _____
DESIGNER GRESHAM, SMITH, AND PARTNERS CHECKED BY _____

P.E. NO. _____

PIN NO. _____

ROADWAY LENGTH	1.246 MILES
BRIDGE LENGTH	0.485 MILES
PROJECT LENGTH	1.731 MILES

TRAFFIC DATA	
ADT (2015)	35,000
ADT (2035)	55,980
DHV (2035)	5,038
D	-
T (ADT)	38 %
T (DHV)	25 %
V	70 MPH

APPROVED: _____
CHIEF ENGINEER

DATE: _____

APPROVED: _____
COMMISSIONER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

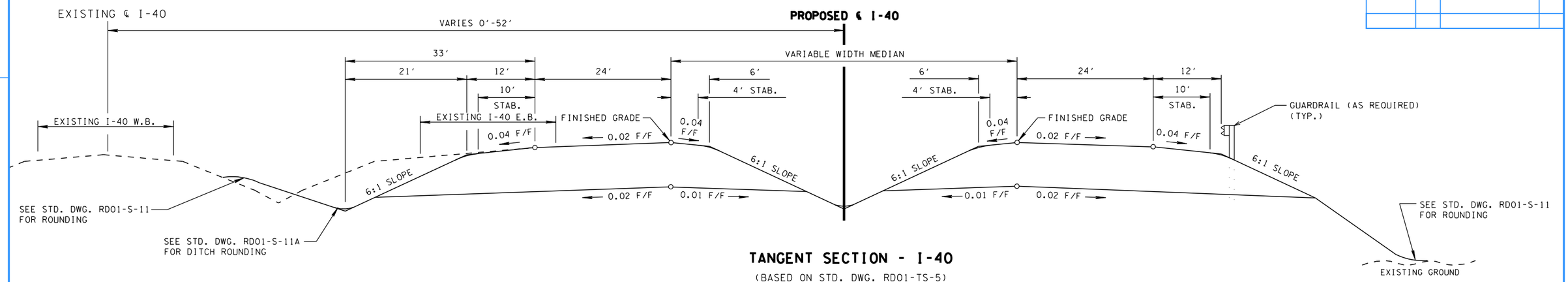
APPROVED: _____ _____
DIVISION ADMINISTRATOR DATE

5/11/2010 4:44:06 PM
q:\2700106\1\001.sht

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

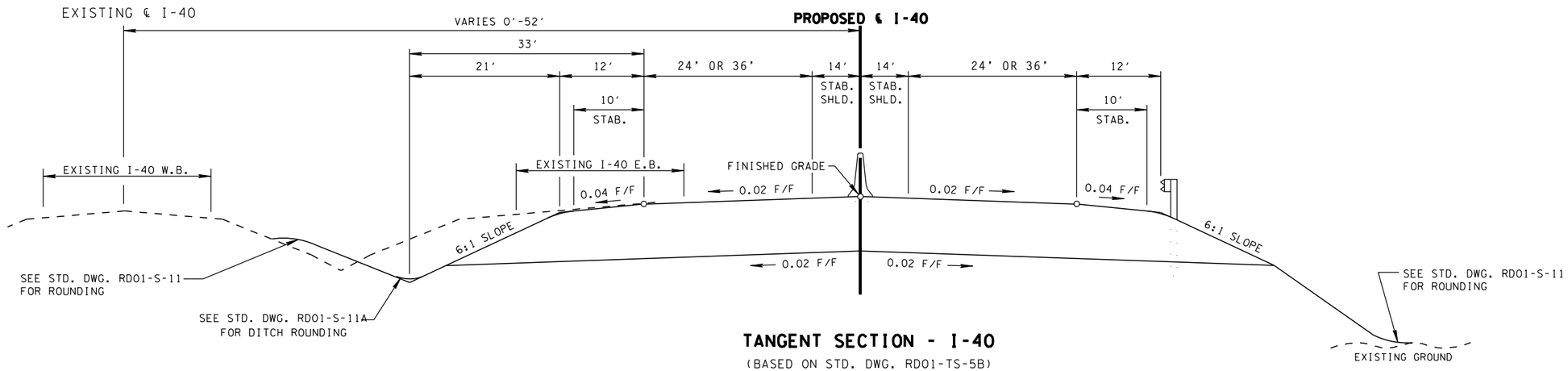
FUNCTIONAL CONCEPT SET

TYPE	YEAR	PROJECT NO.	SHEET NO.
T.P.R.	2009		2



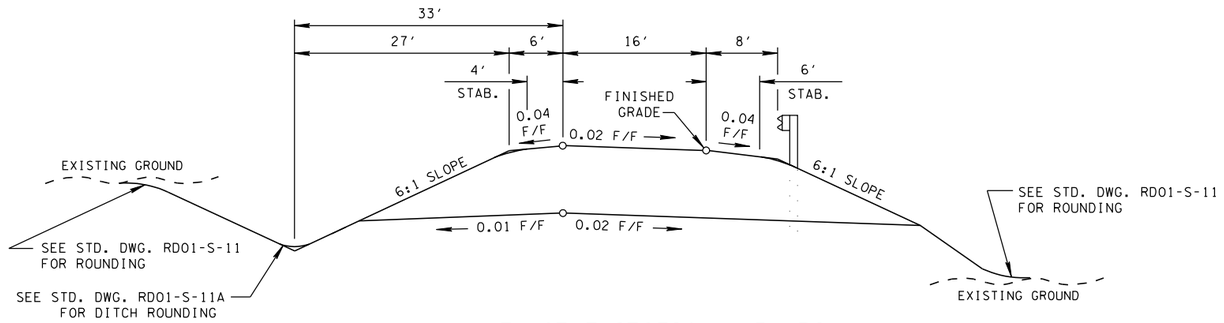
TANGENT SECTION - I-40

(BASED ON STD. DWG. RD01-TS-5)
FROM I40 STA. 131+00 TO STA. 147+78.55
FROM 209+79.93 TO STA. 233+65.00



TANGENT SECTION - I-40

(BASED ON STD. DWG. RD01-TS-5B)
FROM I-40 STA. 147+78.55 TO STA. 209+79.93



TANGENT SECTION - RAMPS

(BASED ON STD. DWG. RD01-TS-4)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS

5/11/2010 4:44:21 PM
q:\270006\Y\002.sht

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

FUNCTIONAL CONCEPT SET

TYPE	YEAR	PROJECT NO.	SHEET NO.
T.P.R.	2009		3

130 135 140 145 150

CURVE I-40-3
PI 145+27.09
N 634,133.0600
E 2,753,441.8591
Δ 2° 30' 54" (LT)
D 0° 30' 00"
R 11,459.16
L 502.99
T 251.54
SE RC
DESIGN SPEED 70 MPH
TRANS. LENGTH 200

CURVE RAMPD-1
PI 35+24.50
N 634,477.8729
E 2,753,137.1132
Δ 27° 50' 30" (RT)
D 6° 00' 00"
R 954.93
L 464.03
T 236.69
SE 0.077 FT/FT
DESIGN SPEED 50 MPH
TRANS. LENGTH 235

END (C.A.) & FENCE
(EXIST. LIMIT-TO REMAIN)

PARSONAGE RD.
BRETHREN CHURCH RD.
SR-113
PROP. C.A. & FENCE

BEGIN PROJ.
STA. 131+00.00

PRESENT & PROP. R.O.W. (C.A.) & FENCE

BEGIN PROP.MEDIAN BARRIER
STA. 147+78.55
OFF 0.00'

PT 43+38.90
PC 40+21.68

PRESENT & PROP. R.O.W. (C.A.) & FENCE

EXIST. (C.A.) & FENCE LIMIT

SCARIFY
AND
OBLITERATE

RAMP D
RAMP A
RAMP B
RAMP C

N 64° 35' 37" W
N 54° 59' 42" W
S 54° 59' 42" E
S 52° 33' 03" E
S 49° 19' 12" E
S 34° 17' 28" E
S 74° 23' 53" E

16'
136'
24'

END PROP. BR.
STA. 152+63.56

BEGIN PROP. BR.
STA. 151+01.24

I-40 W.B.
I-40 E.B.

MATCH LINE STA. 154+00 SEE SHEET NO. 4

JAYNES DONALD L
& HANNAH
(1)

PRESENT & PROP. R.O.W. (C.A.) & FENCE

PROP. R.O.W. (C.A.) & FENCE

POT 20+00.00
PC 25+52.93
PT 29+28.36
POT 34+74.03
POT 10+00.00

(2)
TVA SUB STATION

BEGIN (C.A.) & FENCE
(EXIST. LIMIT-TO REMAIN)

BEGIN (C.A.) & FENCE
(EXIST. LIMIT-TO REMAIN)

SR-9/US-70/US-25W

CURVE I-40-2
PI 135+51.19
N 634,726.5112
E 2,752,667.0342
Δ 2° 26' 39" (RT)
D 0° 30' 00"
R 11,459.16
L 488.81
T 244.44
SE RC
DESIGN SPEED 70 MPH
TRANS. LENGTH 200

CURVE RAMPC-1
PI 27+41.58
N 634,112.9876
E 2,753,317.8045
Δ 15° 01' 44" (RT)
D 4° 00' 00"
R 1,432.39
L 375.72
T 188.95
SE 0.078 FT/FT
DESIGN SPEED 60 MPH
TRANS. LENGTH 265

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FUNCTIONAL LAYOUT

B.O.P. TO STA.154+00

SCALE: 1"=200'

5/11/2010 4:44:28 PM
q:\2700106\t\003.sht

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

FUNCTIONAL CONCEPT SET

TYPE	YEAR	PROJECT NO.	SHEET NO.
T.P.R.	2009		4

155 160 165 170 175 180

50 45 40 20 15

PRESENT R.O.W.

BEGIN PROP. (C.A.) & FENCE

PROP. R.O.W.

PROP. R.O.W.

PROP. C.A. & FENCE

PT 46+42.17

PCC 44+29.27

CURVE RAMPH-1
PI 42+43.05
N 633,985.6618
E 2,753,736.7047
Δ 77° 44' 13" (RT)
D 19° 00' 00"
R 301.56
L 409.14
T 243.05
SE 0.078 FT/FT
DESIGN SPEED 30 MPH
TRANS. LENGTH 180

PRESENT & PROP.R.O.W. (C.A.) & FENCE

PRESENT & PROP. R.O.W. (C.A.)

END PROP. (C.A.) & FENCE
(TIE TO EXIST. CA. & FENCE)

RAMP A

N 34° 43' 41" W

16'

S 42° 35' 21" E

154+00 SEE SHEET NO. 3

MATCH LINE STA. 154+00

181+00 SEE SHEET NO. 5

MATCH LINE STA. 181+00

24' 24' 24' 24'

36' 36' 36' 36'

I-40 W.B.

I-40 E.B.

BEGIN PROP. BR.
STA. 162+83.56

RAMP B

S 19° 42' 33" E

PRESENT & PROP.R.O.W. (C.A.) & FENCE

PROP. R.O.W. (C.A.) & FENCE

PC 15+82.71

PCC 19+35.27

PT 22+46.48

CURVE RAMPB-1
PI 17+59.88
N 633,314.4188
E 2,754,467.0045
Δ 14° 06' 09" (RT)
D 4° 00' 00"
R 1,432.39
L 352.56
T 177.18
SE 0.078 FT/FT
DESIGN SPEED 60 MPH
TRANS. LENGTH 265

CURVE RAMPH-2
PI 44+92.44
N 634,286.0972
E 2,753,864.1089
Δ 45° 57' 09" (RT)
D 29° 09' 52"
R 196.46
L 157.56
T 83.30
SE 0.068 FT/FT
DESIGN SPEED 25 MPH
TRANS. LENGTH 145

PRESENT & PROP. R.O.W. (C.A.)

TVA ④

③ BHIMJI PROPERTIES INC.

SR-9/US-70/US-25W

CURVE RAMPB-2
PI 20+91.03
N 633,154.4845
E 2,754,759.0119
Δ 6° 13' 28" (RT)
D 2° 00' 00"
R 2,864.79
L 311.22
T 155.76
SE 0.065 FT/FT
DESIGN SPEED 70 MPH
TRANS. LENGTH 255

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FUNCTIONAL LAYOUT

STA. 154+00 TO STA. 181+00

SCALE: 1"=200'

5/11/2010 4:44:35 PM
q:\2700106\Y\004.sht

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

FUNCTIONAL CONCEPT SET

TYPE	YEAR	PROJECT NO.	SHEET NO.
T.P.R.	2009		5

185 190 195 200 205

N

CURVE I-40-4
PI 207+39.84
N 630,575.3820
E 2,758,535.2027
Δ 7° 30' 40" (LT)
D 0° 15' 00"
R 22,918.31
L 3,004.49
T 1,504.40
SE NC
DESIGN SPEED 70 MPH
TRANS. LENGTH N/A

SCARIFY AND OBLITERATE

END PROP. BR.
STA. 186+83.56

PRESENT R.O.W. (C.A.) & FENCE

ROUNDHOUSE RD.

MATCH LINE STA. 181+00 SEE SHEET NO. 4

MATCH LINE STA. 208+00 SEE SHEET NO. 6

36' I-40 W.B.

36' I-40 E.B.

36'

PROP. R.O.W. (C.A.)

PRESENT R.O.W. (C.A.) & FENCE

PROP. R.O.W. (C.A.) & FENCE

BEGIN TRANS.
STA. 200+50

840' TRANS.

FANCHER'S FAMILY LP (5)

ROUNDHOUSE RD

FANCHER'S FAMILY LP (6)

MURPH BOBBY ETAL (7)

HUTSELL GEORGE (8)

SR-9/US-70/US-25W

5/11/2010 4:44:46 PM
q:\2700106\Y\005.sht

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FUNCTIONAL LAYOUT

STA. 181+00 TO STA. 208+00

SCALE: 1"=200'

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

FUNCTIONAL CONCEPT SET

TYPE	YEAR	PROJECT NO.	SHEET NO.
T.P.R.	2009		6

210 215 220 225 230

ROUNDHOUSE RD.

PRESENT & PROP. R.O.W.

REST AREA

NORRIS DR.

N

END PROP. MEDIAN BARRIER
STA. 209+79.93
OFF 0.00'

18'

DEARWOOD DR. PRESENT & PROP. R.O.W.

520' DECEL. LANE

180' TRANS.

36'

24'

I-40 W.B.

I-40 E.B.

S 62° 34' 38" E

MATCH LINE STA. 208+00 SEE SHEET NO. 5

END TRANS.
STA. 208+90

TIE TO EXIST.
STA. 222+39.93
(E.B. LANES ONLY)

END PROJ.
STA. 233+65.00

PRESENT & PROP. R.O.W.

HUTSELL
GEORGE
8

SR-9/US-70/US-25W

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

FUNCTIONAL LAYOUT

STA. 208+00 TO E.O.P.

SCALE: 1"=200'

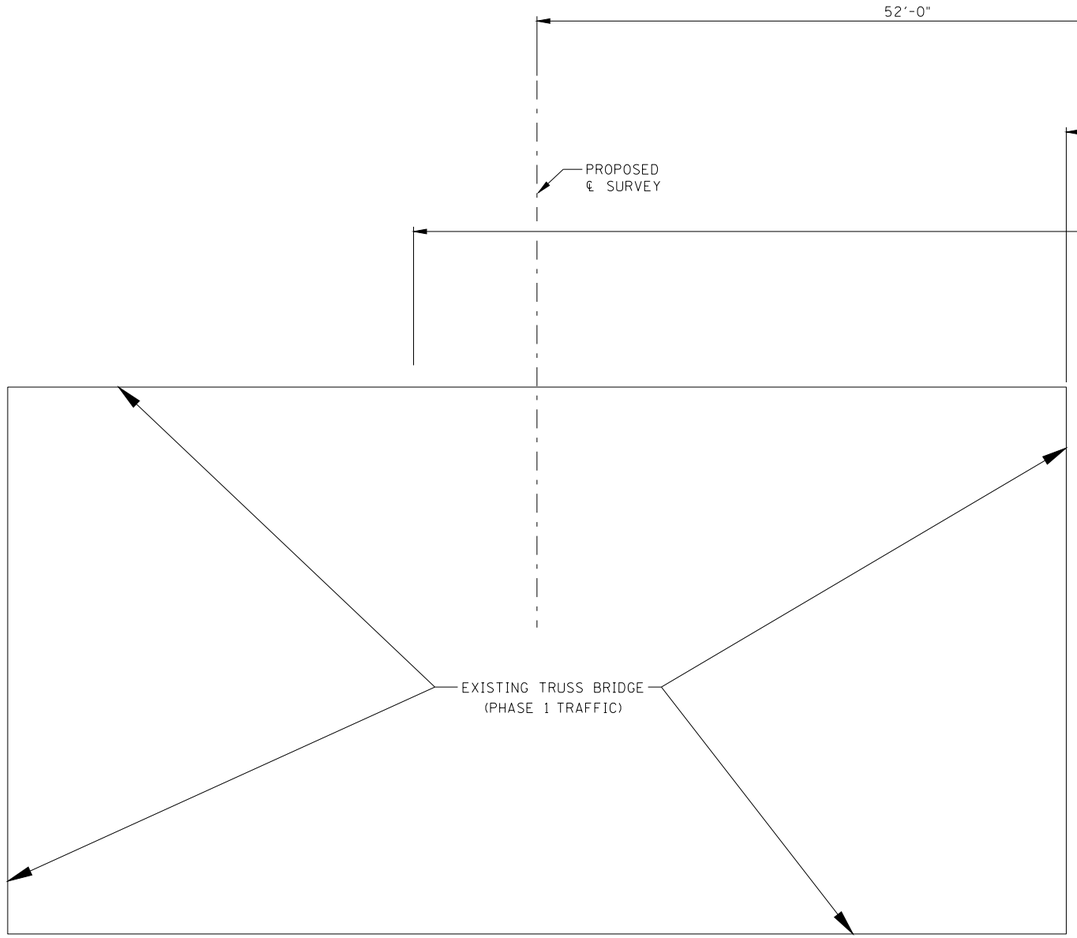
5/11/2010 4:44:53 PM
q:\2700106\t\006.sht

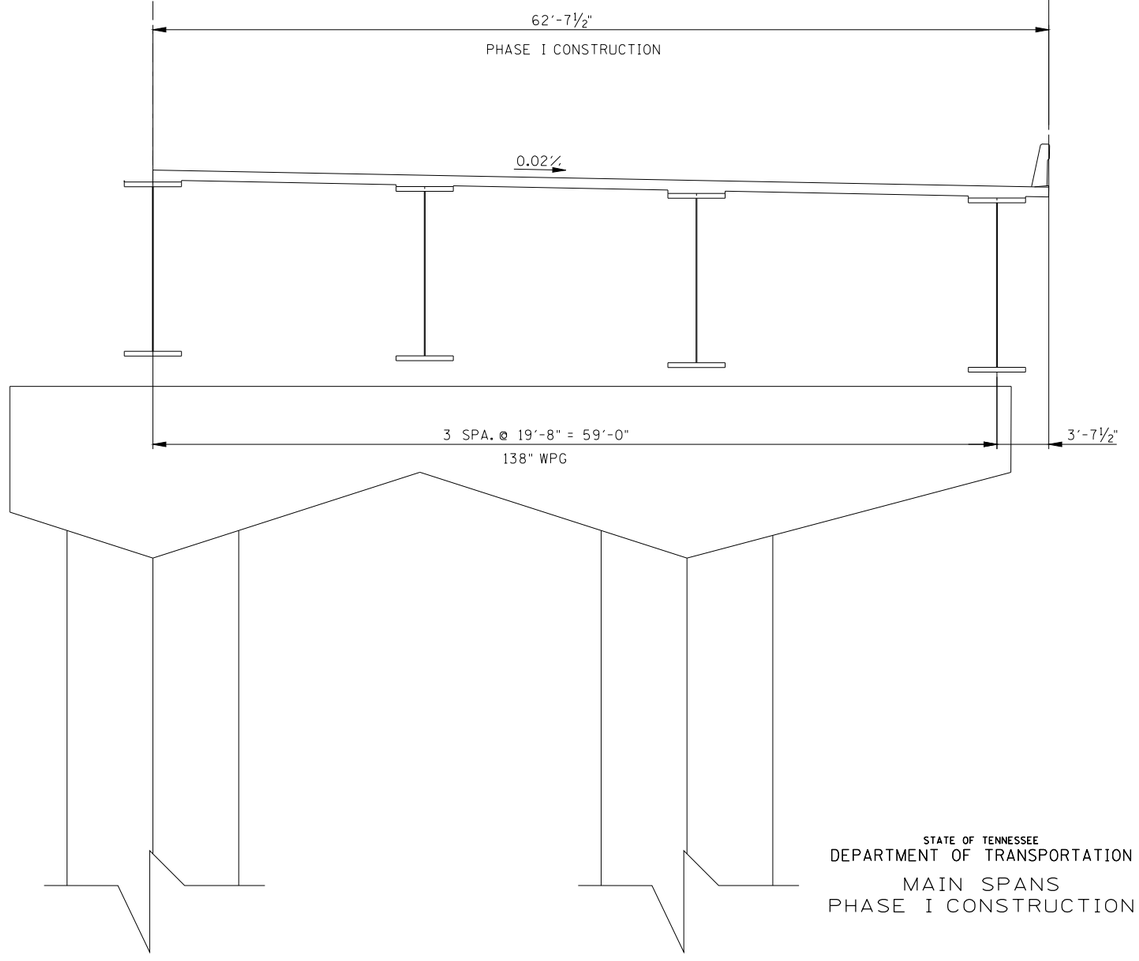
BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION





TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MAIN SPANS
PHASE I CONSTRUCTION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45I00400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

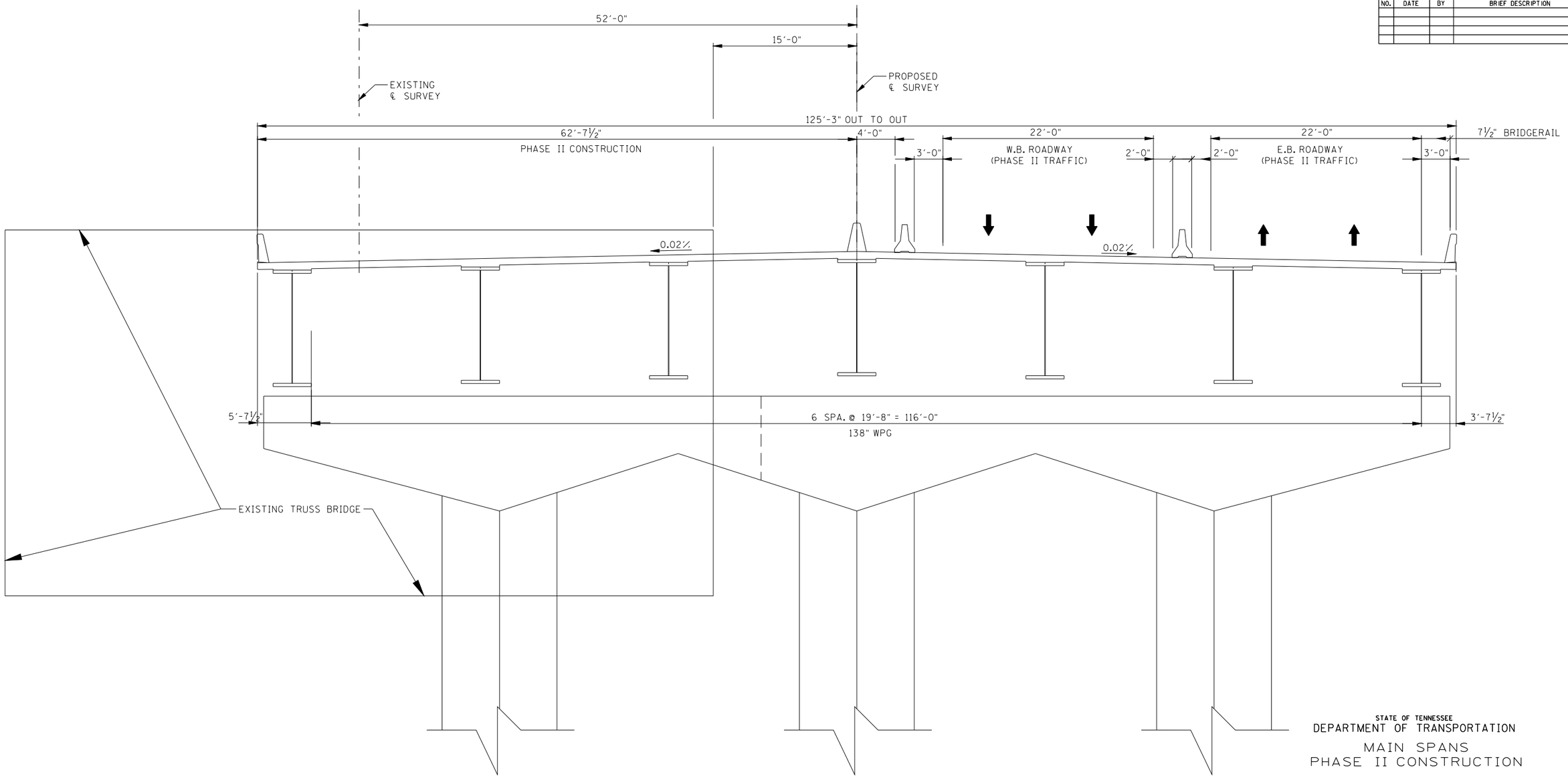
BR SHT-1

BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MAIN SPANS
PHASE II CONSTRUCTION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45100400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

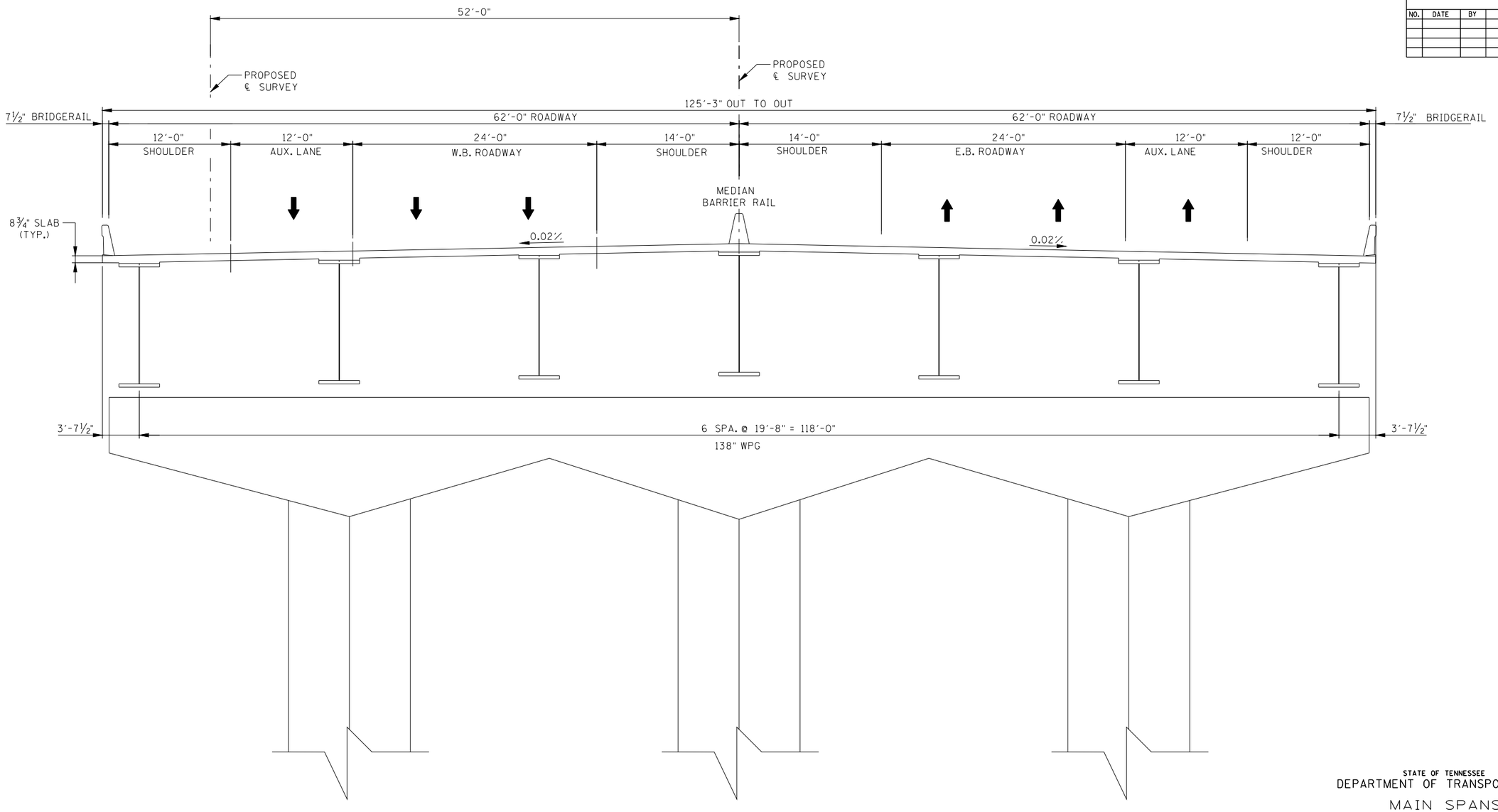
BR SHT-2

BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

MAIN SPANS
FINAL CONFIGURATION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45100400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

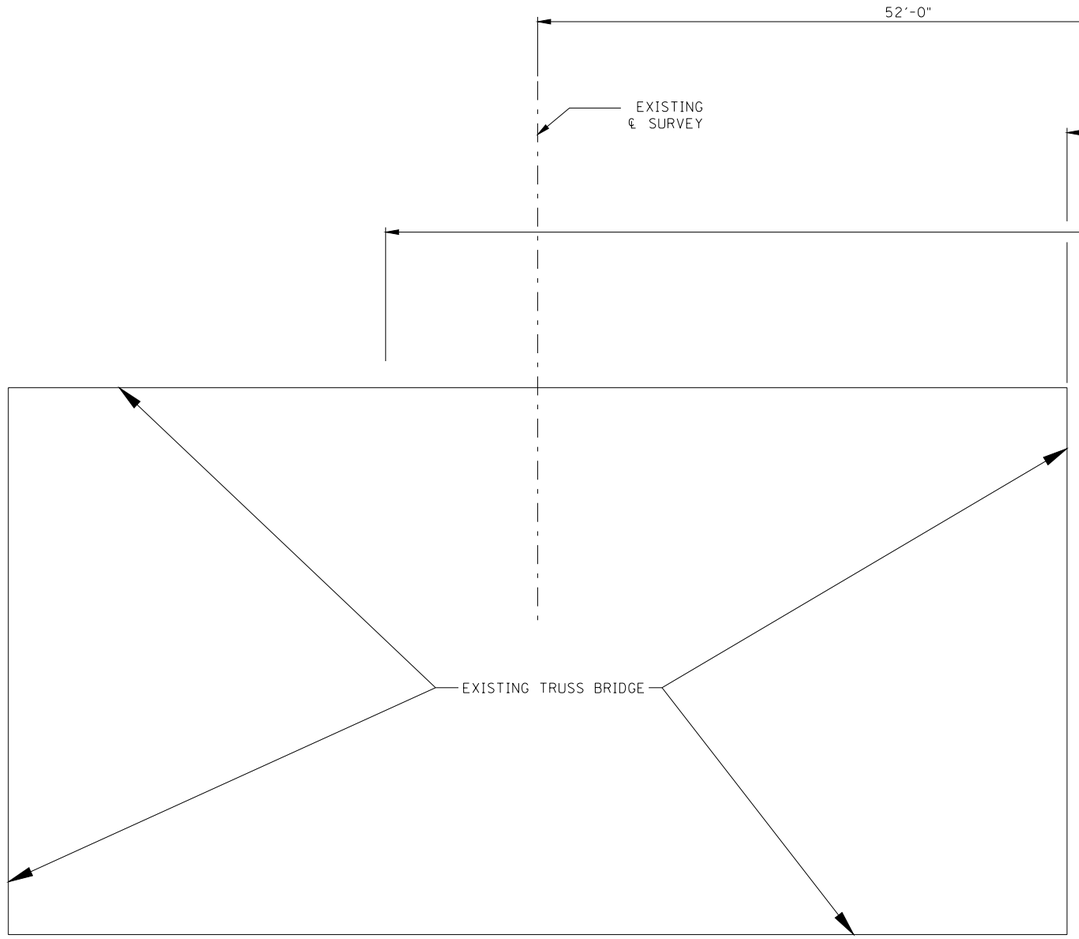
BR SHT-3

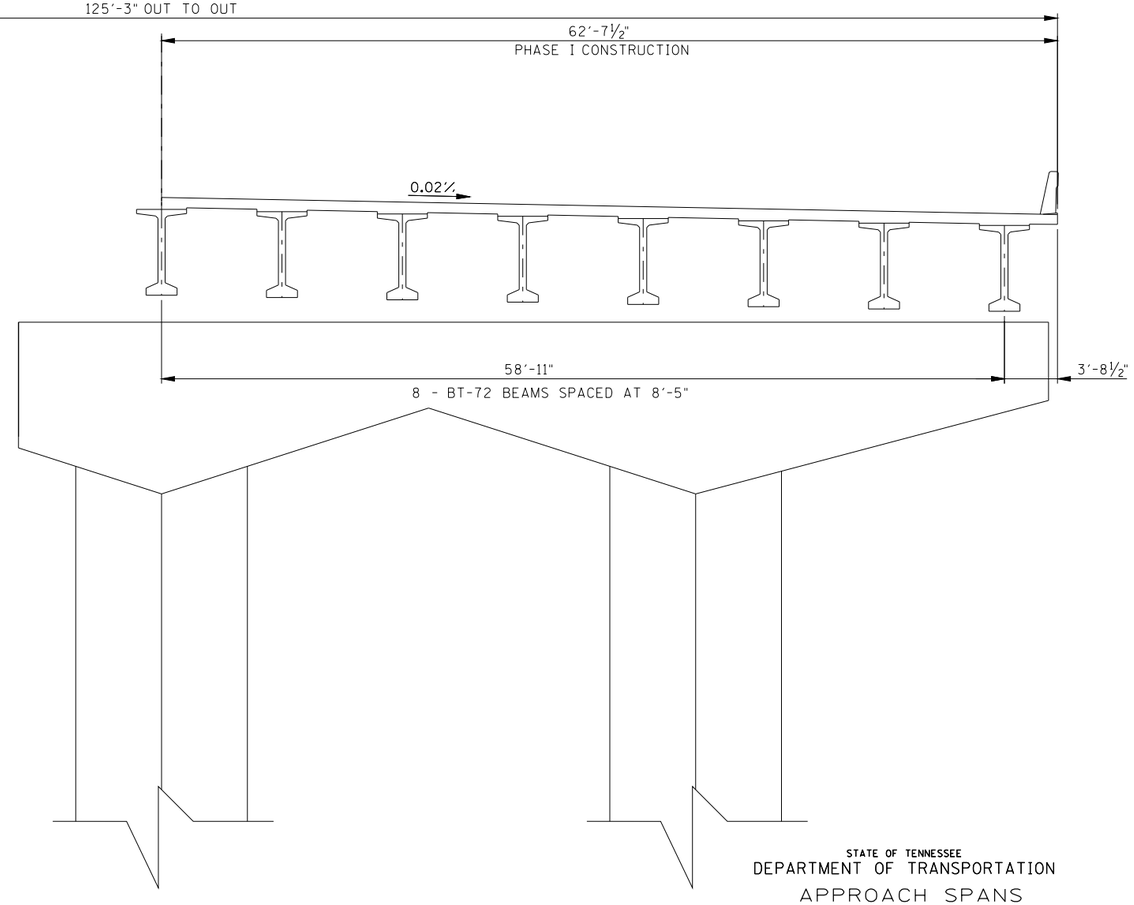
BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION





TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
APPROACH SPANS
PHASE I CONSTRUCTION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45I00400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

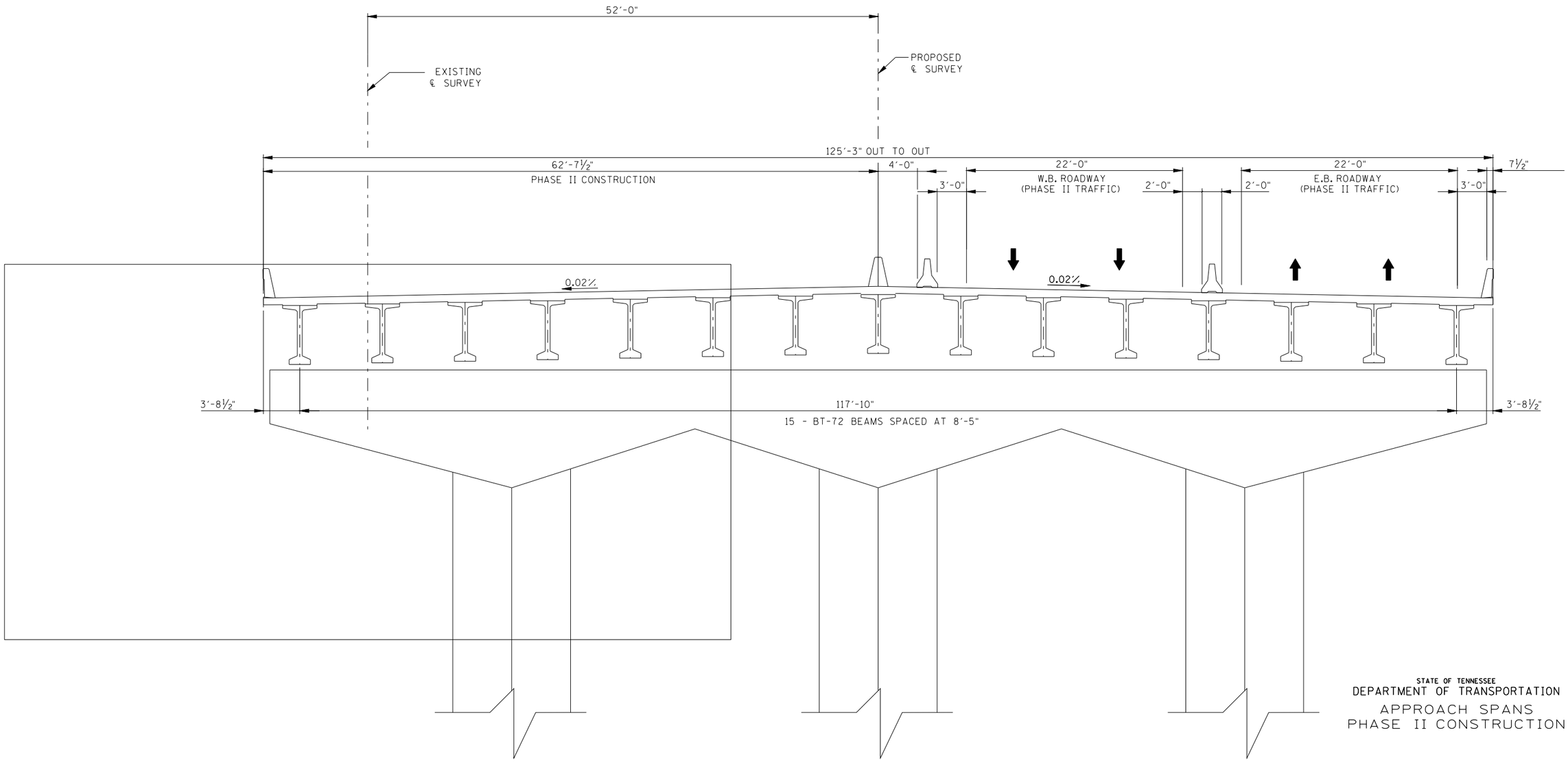
BR SHT- 4

BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

APPROACH SPANS
PHASE II CONSTRUCTION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45I00400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

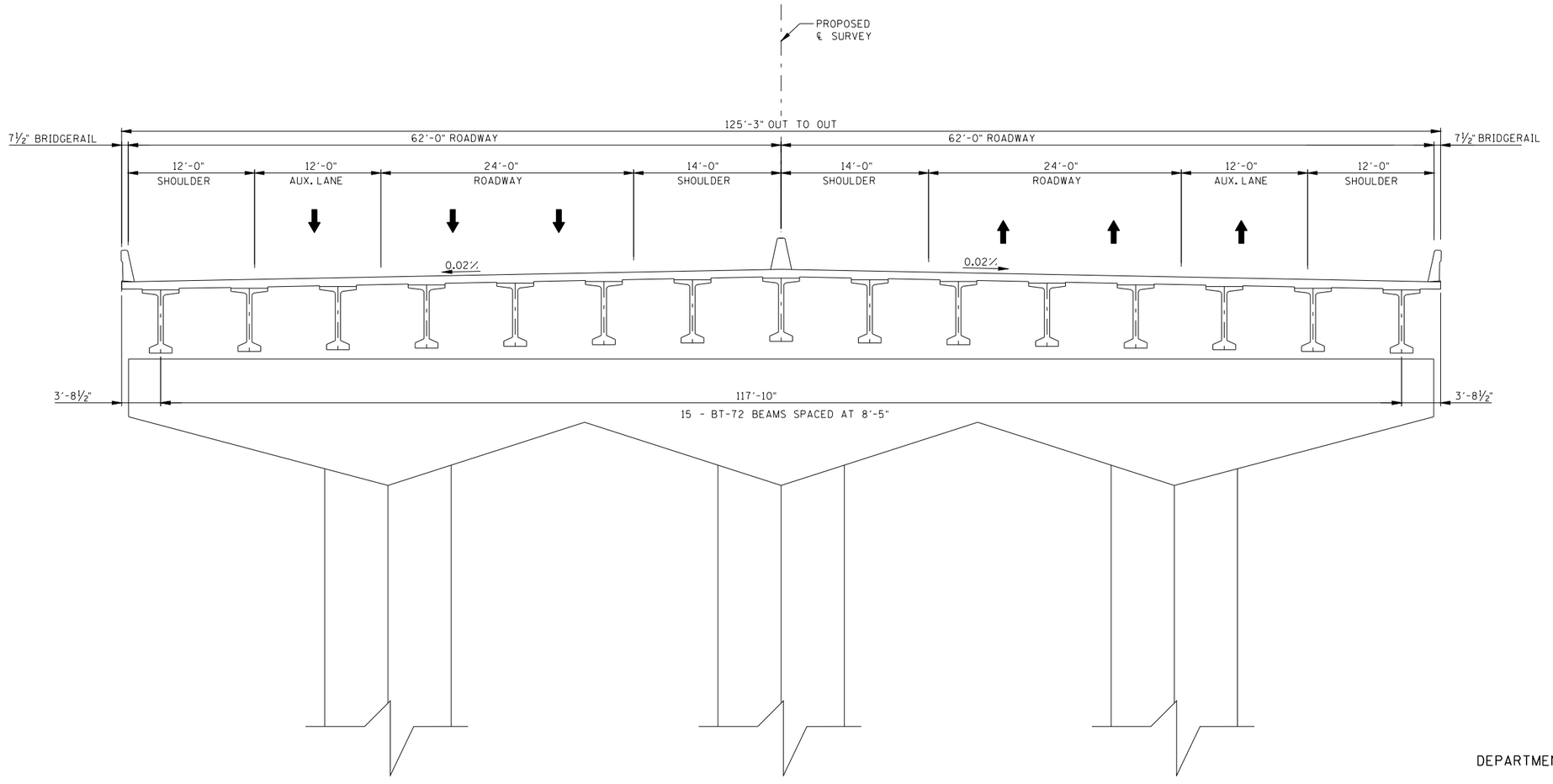
BR SHT-5

BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

APPROACH SPANS
FINAL CONFIGURATION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45100400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

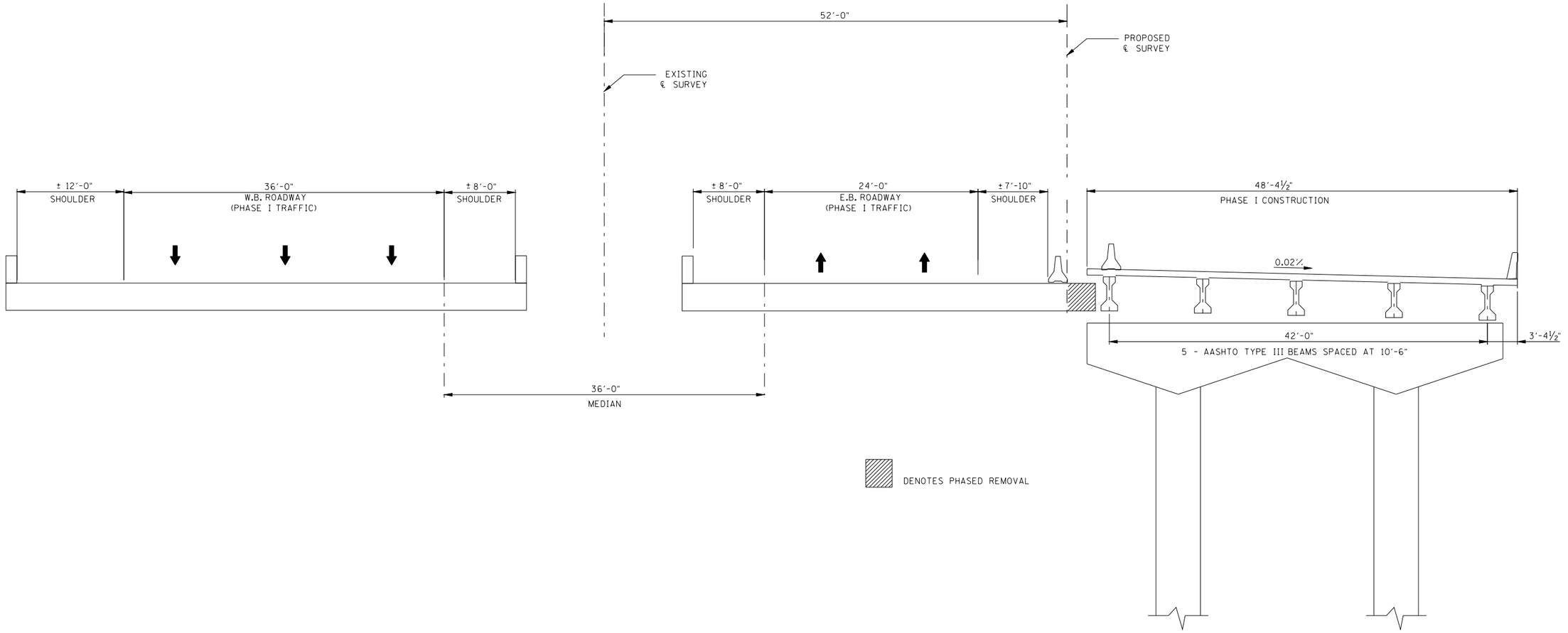
BR SHT- 6

BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-40/SR 113 INTERCHANGE
PHASE I CONSTRUCTION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45100400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

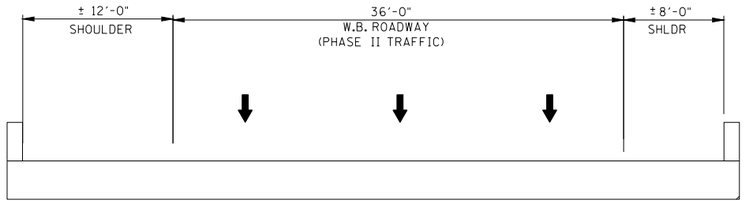
BR SHT- 7

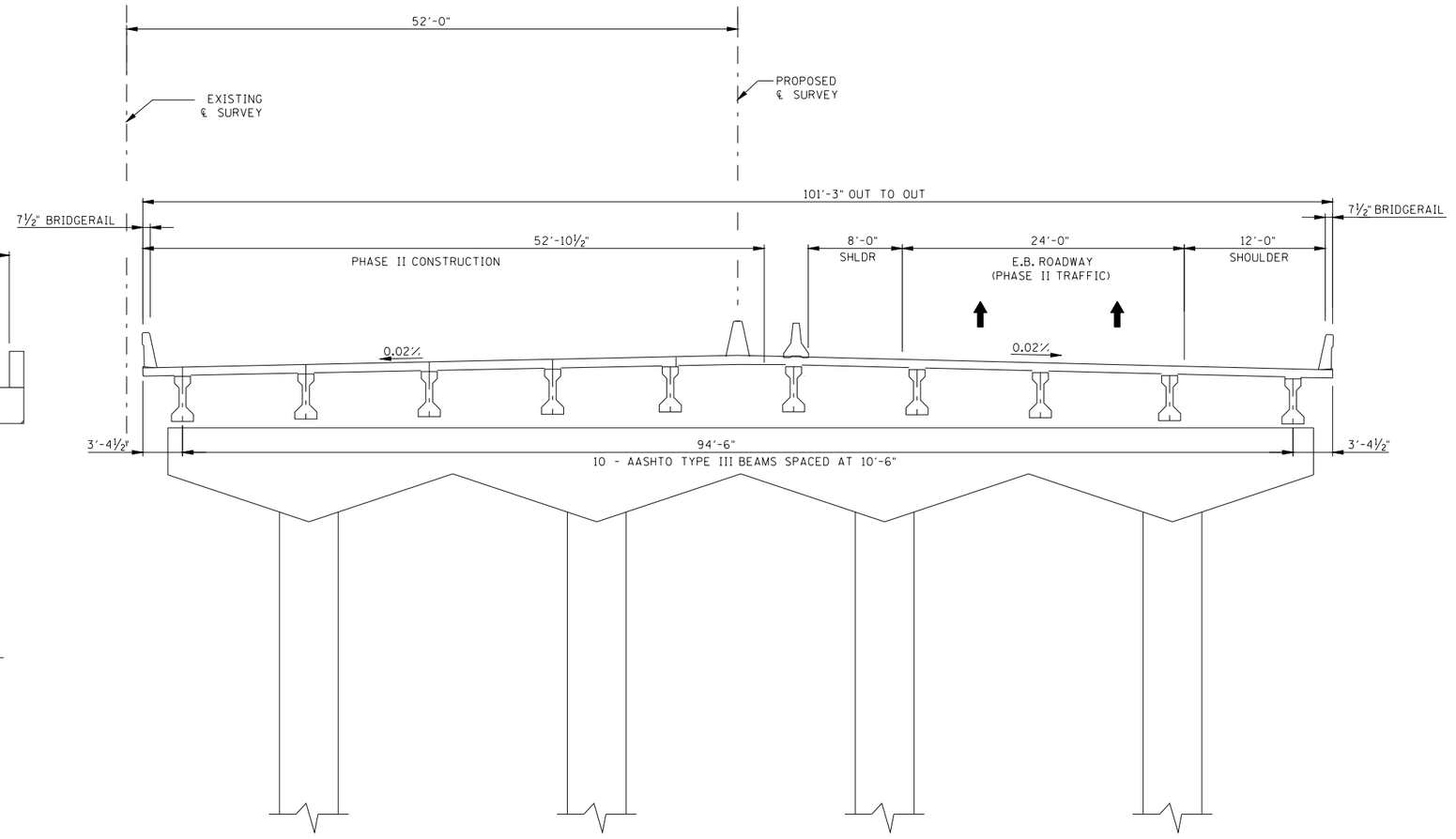
BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION





DENOTES PHASED REMOVAL

TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-40/SR 113 INTERCHANGE
PHASE II CONSTRUCTION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45I00400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

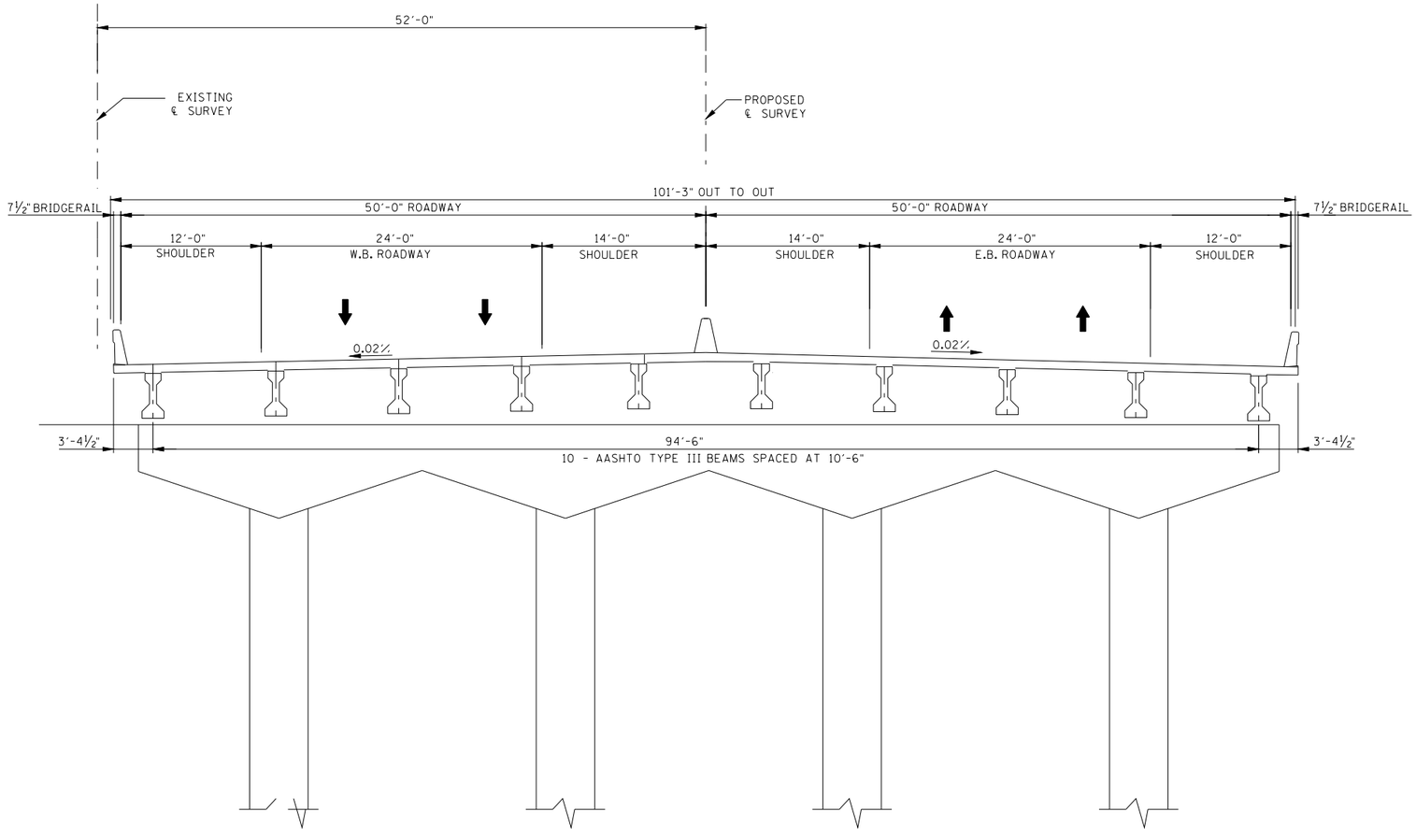
BR SHT-8

BRIDGE CONCEPT SET

PROJECT NO.	YEAR	SHEET NO.
	2010	

REVISIONS

NO.	DATE	BY	BRIEF DESCRIPTION



TYPICAL SECTION
(LOOKING FORWARD ON SURVEY)

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-40/SR 113 INTERCHANGE
FINAL CONFIGURATION

INTERSTATE 40 OVER
FRENCH BROAD RIVER
BRIDGE ID NO. 45100400019
LOG MILE 14.68
JEFFERSON COUNTY
2010

$USER$
DGN
$DATE$
PRF

DESIGNED BY	GS&P	DATE	11/2009
DRAWN BY	GARY YOUNG	DATE	11/2009
SUPERVISED BY	TED KNIAZEWYCZ	DATE	5/2010
CHECKED BY	MARK HOLLORAN	DATE	5/2010

GRESHAM SMITH AND PARTNERS

BR SHT-9

6.0 COSTS

Cost estimates were prepared using TPR cost development guidelines and using input from the TDOT Structures Division on unit costs for the bridges. These costs include the I-40 bridge over the French Broad River, the bridges over SR 113 and the modifications to the interchange at I-40 and SR 113. The costs are included on the following pages. (Costs are not included for the SR 113 and US 70 intersection improvements concepts, as these are outside the scope of this study.)

BRIDGE TPR COST ESTIMATE

Route:	**I-40**
Description:	**I-40 over French Broad River at L.M. 14.70**
County:	**Jefferson**
Length:	**1.944 Miles**
Date:	**5/20/2010**

	UNIT	PREFERRED ALT.	UNIT COST	PREFERRED ALT. TOTAL
RIGHT-OF-WAY COST				
LAND	AC	6.5	$15,000	$ 97,500
COMMERCIAL	EACH	2	$1,000,000	$ 2,000,000
RESIDENTIAL	EACH	1	$200,000	$ 200,000
TRACTS (INCIDENTALS)	EACH	10	$4,300	$ 43,000
			SUBTOTAL	**$ 2,340,500**
CONSTRUCTION COST				
CLEAR AND GRUBBING				$ 18,400
EARTHWORK				$ 403,588
PAVEMENT REMOVAL				$ 134,528
DRAINAGE (INCLUDING EROSION CONTROL)				$ 325,070
STRUCTURES				$ 38,134,450
RAILROAD CROSSING OR SEPARATION				$ -
PAVING (INCLUDING CURB, GUTTER AND SIDEWALK)				$ 5,543,792
RETAINING WALLS				$ -
MAINTENANCE OF TRAFFIC				$ 465,225
TOPSOIL				$ -
SEEDING				$ 29,400
SODDING				$ -
SIGNING				$ 58,450
LIGHTING				$ -
SIGNALIZATION				$ -
FENCE				$ 52,050
GUARDRAIL				$ 63,730
RIP RAP OR SLOPE PROTECTION				$ 267,840
OTHER CONST. ITEMS (15%)				$ 6,824,478
			SUBTOTAL	**$ 52,321,000**
UTILITY COST				
OVERHEAD ELECTRIC	MI.	0.75	$135,000	$ 101,250
TELEPHONE	MI.	0	$75,000	$ -
WATER	MI.	0.25	$275,000	$ 68,750
SEWER	MI.	0	$165,000	$ -
CABLE	MI.	0	$25,000	$ -
GAS	MI.	0.25	$212,000	$ 53,000
			SUBTOTAL	**$ 223,000**
MOBILIZATION				
BASED ON SP 717, CALCULATED FOR TOTAL COST			**SUBTOTAL**	**$ 1,749,630**
CONTINGENCY (10% OF CONSTRUCTION COST AND UTILITIES)				**$ 5,429,363**
TOTAL CONSTRUCTION COST				**$ 59,722,993**
PRELIMINARY ENGINEERING (10% OF TOTAL CONSTRUCTION COST)				**$ 5,972,299**
TOTAL COST*				**$ 68,035,793**

**** For estimating future project costs, a compounded inflation rate of 10% per year will be applied from the date of this estimate.***

BRIDGE TPR COST ESTIMATE

Summary of Detailed Cost Estimates

Preferred Alternative: New alignment south of exist. I-40. Stage construct prop. bridge

	UNIT	QUANTITY	UNIT COST	TOTAL
CLEAR AND GRUBBING				
100' x 3700' & 50' x 600'	AC	9.2	$2,000.00	$18,400
			SUBTOTAL	**$18,400**
EARTHWORK				
ROAD AND DRAINAGE UNCLASSIFIED	CY	38400	$4.00	$153,600
BORROW EXCAVATION	CY	35000	$7.00	$245,000
PRESPLITTING OF ROCK EXCAVATION	SY	665	$7.50	$4,988
			SUBTOTAL	**$403,588**
PAVEMENT REMOVAL				
AREA	SY	29895	$4.50	$134,528
			SUBTOTAL	**$134,528**
DRAINAGE (INCLUDING EROSION CONTROL				
RCBC	SF	0	$60.00	$0
RCP	LF	500	$65.00	$32,500
SIDE DRAINS	LF	350	$40.00	$14,000
SILT FENCE	LF	65000	$1.40	$91,000
SILT FENCE WITH BACKING	LF	2500	$3.40	$8,500
SEDIMENT REMOVAL	CY	550	$4.40	$2,420
CATCH BASIN PROTECTION	EACH	15	$500.00	$7,500
CHECK DAMS	EACH	350	$325.00	$113,750
SEDIMENT FILTER BAGS	EACH	6	$900.00	$5,400
EROSION CONTROL BLANKET	SY	25000	$2.00	$50,000
			SUBTOTAL	**$325,070**
STRUCTURES				
BRIDGES (NEW STRUCTURES)	SF	325090	$105.00	$34,134,450
REMOVAL OF EXIST. BRIDGE OVER FRENCH BROAD RIVER	LS	1	$3,600,000.00	$3,600,000
REMOVAL OF EXIST. BRIDGE OVER SR 113	LS	1	$400,000.00	$400,000
			SUBTOTAL	**$38,134,450**
RAILROAD CROSSING OR SEPARATION				
NONE	SF	0	$85.00	$0
			SUBTOTAL	**$0**
PAVING (INCLUDES CURB, GUTTER & SIDEWALK)				
1.25" ASPHALTIC CONCRETE SURFACE (411-02.10)	TON	6200	$77.00	$477,400
2" ASPHALT BASE BINDER (307-02.08)	TON	8585	$68.00	$583,780
7" ASPHALT BASE A-MIX (307-02.01)	TON	23690	$65.00	$1,539,850
8" MINERAL AGGREGATE BASE (303-01)	TON	105850	$15.00	$1,587,750
PORTLAND CEMENT CONCRETE PAVEMENT (10")	SY	11020	$48.00	$528,960
TREATED PERMEABLE BASE	SY	11020	$16.00	$176,320
TACK COAT	TON	23	$464.00	$10,672
PRIME COAT	TON	125	$500.00	$62,500
UNDERDRAIN	LF	16080	$5.00	$80,400
CURB AND GUTTER	CY	0	$162.50	$0
CONCRETE MEDIAN BARRIER	LF	6202	$80.00	$496,160
SIDEWALK	SF	0	$2.50	$0
			SUBTOTAL	**$5,543,792**
RETAINING WALLS				
NONE	SF	0	$45.00	$0
			SUBTOTAL	**$0**
MAINTENANCE OF TRAFFIC				
TRAFFIC CONTROL	LS	1	$100,000.00	$100,000
TRAFFIC CONTROL SIGNAGE	SF	850	$8.50	$7,225
PORTABLE BARRIER RAIL	LF	12000	$22.00	$264,000
FLEXIBLE DRUMS	EACH	500	$30.00	$15,000
WARNING LIGHTS	EACH	500	$22.00	$11,000
ARROW BOARD	EACH	6	$900.00	$5,400
CHANGEABLE MESSAGE SIGN UNIT	EACH	4	$4,400.00	$17,600
TEMPORARY STRIPING	LF	36000	$1.25	$45,000
			SUBTOTAL	**$465,225**
TOPSOIL				
TOPSOIL	CY	0	$2.75	$0
			SUBTOTAL	**$0**
SEEDING				
SEEDING WITH MULCH	UNIT	1200	$21.00	$25,200
WATER	M.G.	700	$6.00	$4,200
			SUBTOTAL	**$29,400**
SODDING				
SODDING	SY	0	$2.50	$0
WATER	M.G.	0	$8.00	$0
			SUBTOTAL	**$0**
SIGNING				
SIGNS	SF	1600	$11.50	$18,400
STRIPING	LM	9	$4,450.00	$40,050
			SUBTOTAL	**$58,450**
LIGHTING				
NONE	LS	0	$0.00	$0
			SUBTOTAL	**$0**
SIGNALIZATION				
NONE	LS	0	$0.00	$0
			SUBTOTAL	**$0**
FENCE				
NONE	LF	3470	$15.00	$52,050
			SUBTOTAL	**$52,050**
GUARDRAIL				
GUARDRAIL	LF	1300	$18.50	$24,050
END TERMINALS	EACH	12	$2,000.00	$24,000
GUARDRAIL AT BRIDGE ENDS	LF	280	$56.00	$15,680
			SUBTOTAL	**$63,730**
RIP RAP OR SLOPE PROTECTION				
RIP RAP	TON	9920	$27.00	$267,840
			SUBTOTAL	**$267,840**

ATTACHMENT
Concepts for Improving
US 70 and SR 113 Intersection

Concepts for Improving Intersection of US 70 and SR 113

Although outside the study area limits of the 2006 TPR and this addendum, two concepts are presented for consideration for improving the intersection of US 70 and SR 113. Attendees of the field review expressed concerns about the safety of this intersection, because of the close proximity to the interchange ramps and the skew of the existing intersection. Two potential solutions, a reconfiguration of the four-way intersection and a roundabout, are depicted in the two following concepts.

Reconfiguration of four-way US 70 and SR 113 Intersection

Roundabout at US 70 and SR 113 Intersection