

TRANSPORTATION PLANNING REPORT

Special Bridge Replacement Program
LOCAL ROUTE 0A053 – JOHN BUTLER RD.
BRIDGE OVER PROCTOR BRANCH @ L.M. 0.16
CLAY COUNTY
PIN: 011845.00



PREPARED BY
TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION

Approved by [Signature]

Date 3/14/13

Chief of Environment and Planning

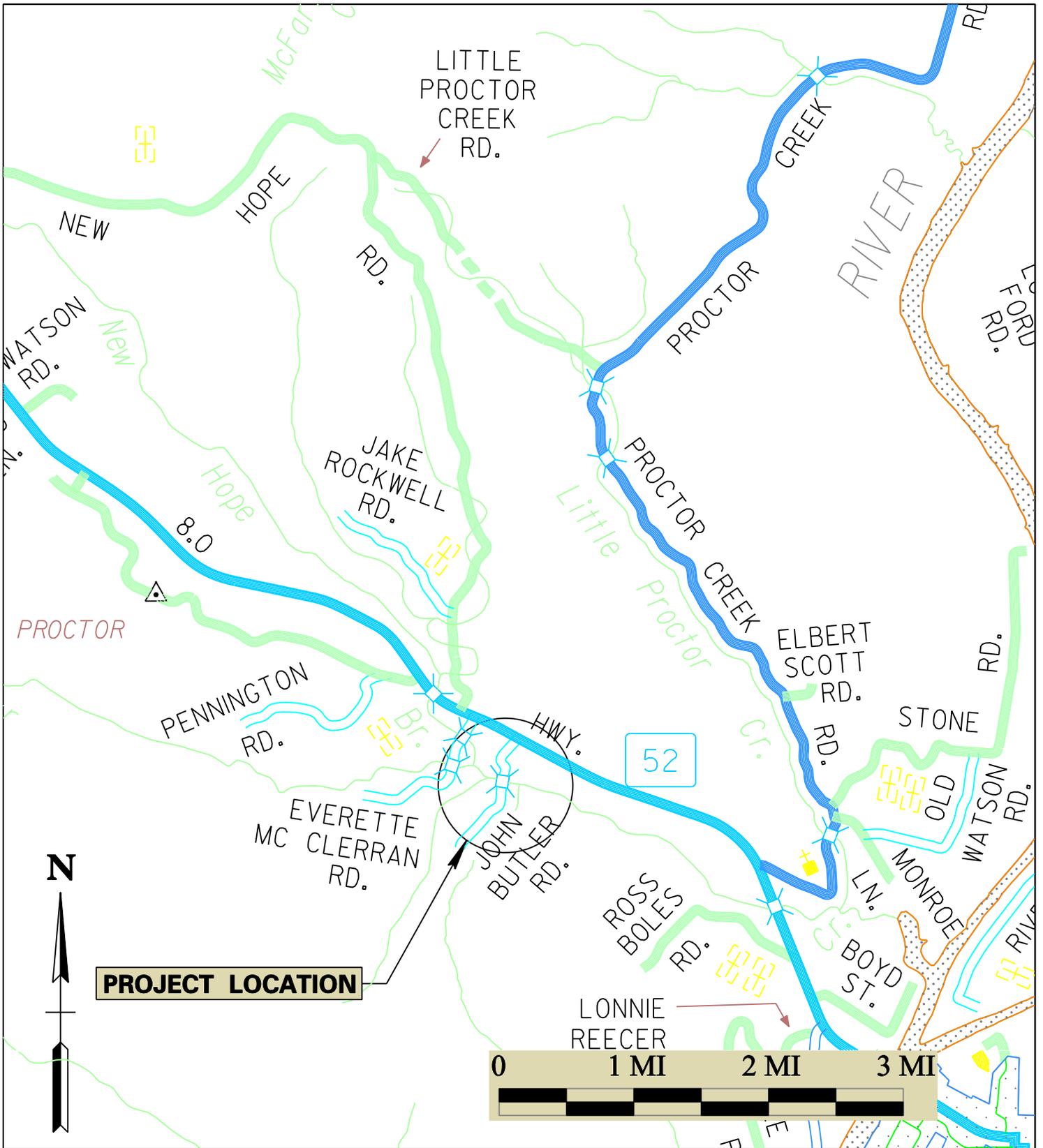
Approved by [Signature]

Date 3/19/13

Deputy Commissioner and Chief Engineer

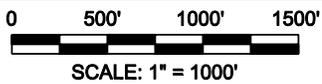
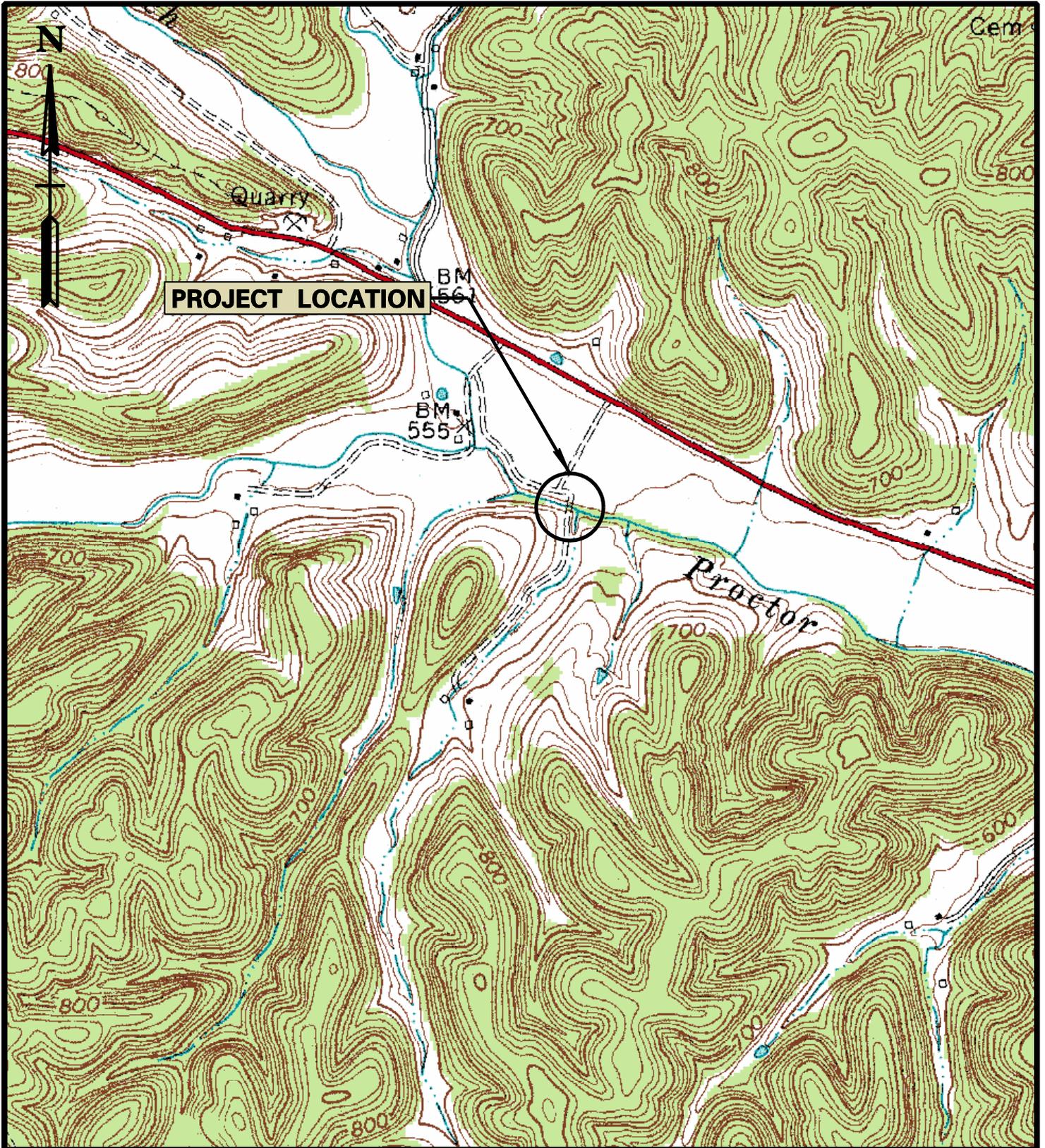
Approved by:	Signature	DATE
Transportation Director Project Planning Division	<u>[Signature]</u>	3-11-13
Engineering Director Design Division	<u>[Signature]</u>	3-11-13
Engineering Director Structures Division	<u>[Signature]</u>	3-12-13

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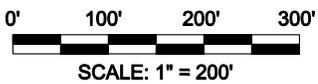
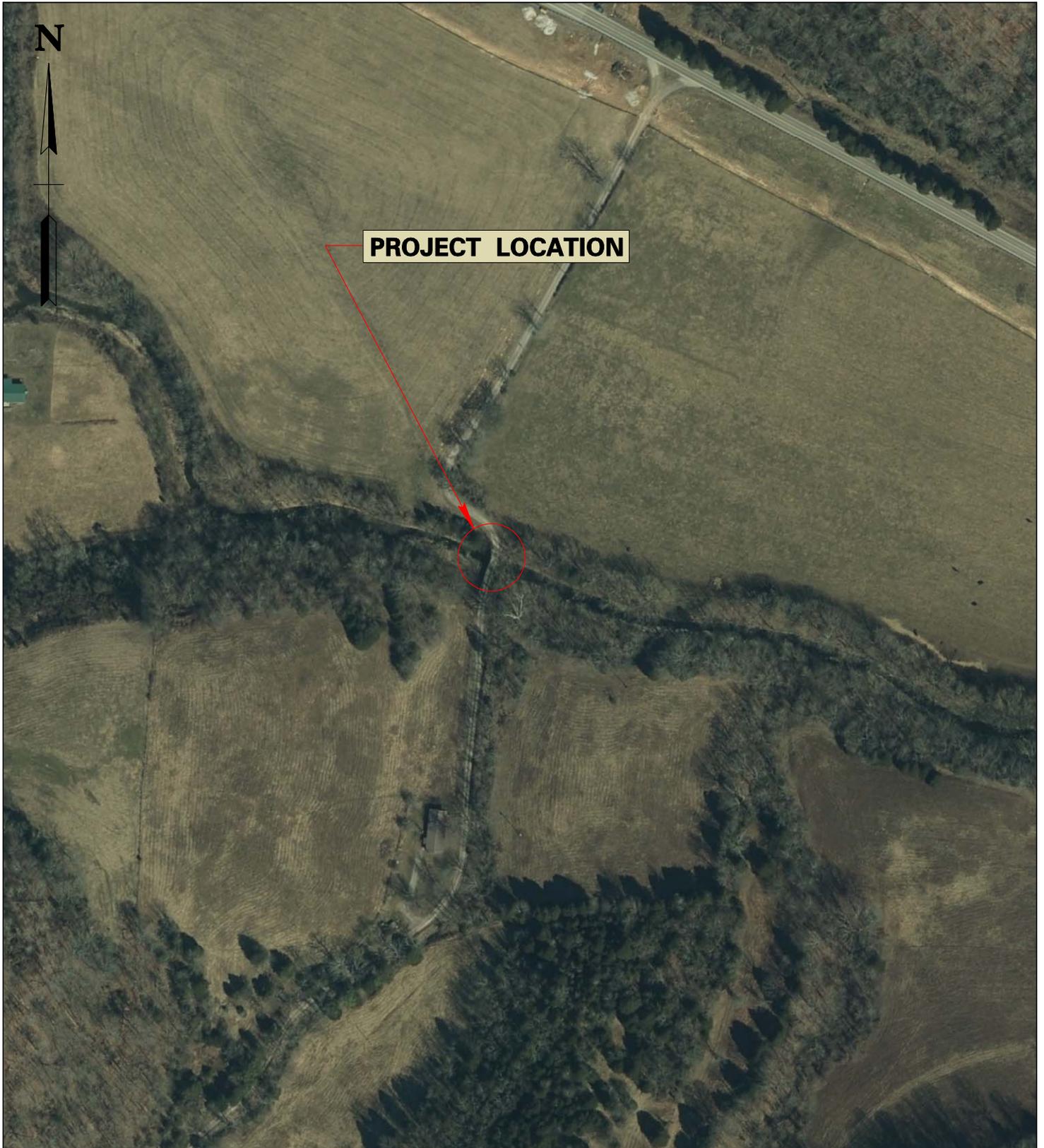


AREA MAP

**JOHN BUTLER RD. (0A053) CLAY COUNTY
 BRIDGE OVER PROCTOR BRANCH @ L.M. 0.16
 BRIDGE ID 140A0530001**



PROJECT MAP
JOHN BUTLER RD. (0A053) CLAY COUNTY
BRIDGE OVER PROCTOR BRANCH @ L.M. 0.16
BRIDGE ID 140A0530001



AERIAL MAP

**STATE ROUTE 53 (SR53) CLAY COUNTY
BRIDGE OVER PROCTOR BRANCH
@ JOHN BUTLER ROAD L.M. 0.16
BRIDGE ID 140A0530001**

**TRANSPORTATION PLANNING WORKSHEET
BRIDGE REPLACEMENT ANALYSIS, NEEDS, AND COSTS**

County: Clay Route: John Butler Rd. (0A053) Log Mile: 0.16
 Feature Crossed: Proctor Branch System: Local
 Functional Class: Rural / Local Bridge ID: 140A0530001

EXISTING CONDITIONS

2017 AADT: 10 App. Cross Section: 12' / 16' / 30' No. Lanes: 1
 Approach Alignment: Curves on each approach. Year Built: 1950 Load Limit: H10
 Width (out to out): 13.1' Sidewalks: Right -- Left -- Length: 60'
 No. Spans: Approach: -- Main: 2
 Substructure: Concrete Abutments / Piers Vertical Clearance: 9.8' Sufficiency Rating: 24.7
 Other: A single overhead telephone line and one unlocated, underground waterline will be relocated.

PROPOSED IMPROVEMENTS

STANDARDS FROM RD01-TS- 1A Type of Work: Replace
 Design Year: 2037 Design AADT: 20 Terrain Rolling ADL (F): -- (R): --
 Project Length: 580' Bridge Length: 80' ft Approach Length: 2 @ 250'
 Design Speed (MPH): 20 Posted Speed (MPH): N/A
 Approach Width: 18' / 18' / As Req'd Bridge Width (O to O): 21 ft No. Lanes: 2
 Right-of-Way Required: 0.5 acres Tract(s) 2 Structure Type: Prestressed Concrete

MAINTENANCE OF TRAFFIC

Temporary Detour: Temporary Runaround: Stage Construct:
 Alternate Route: _____

Remarks: The new structure will be built with the centerline shifted approximately 45 feet to the west. Traffic will continue to traverse over the current structure until the proposed structure is competed.

ESTIMATED COST

Right-of-Way: \$20,000 Approaches: \$221,500 Structure: \$263,800
 Preliminary Engineering: \$72,100 Utilities: \$54,000 Misc./Cont.: \$144,500
 Mobilization: \$17,600 Total: \$793,500

Remarks: The total pavement width is to be increased to 18 feet over the structure and on the approaches in order to meet design standard RD01-TS-1A. The centerline is to be shifted approx. 45 ft to the west and the grade is to be raised approx. 2.3 ft to improve the clearance. One overhead telephone line will be relocated as well as the possibility of one underground waterline near the structure.

Field Investigation by: Robert Hamilton Jr. (Reg. 2 Survey), Barry McClendon (Reg. 2 Survey), Gary Chapman (Reg. 2 Survey), Landon Castelberry (Reg. 2 Traffic), Alan Wolfe (Reg. 2 Traffic), Ernest Garrison (Clay Cnty Hwy. Dept.), Lori Krauss (Center Hill / Dale Hollow RPO), David D. Duncan (TDOT Planning), Mike Gilbert (TDOT Planning)

Route:	John Butler Rd. (0A053)
Description:	Bridge over Proctor Branch (140A0530001)
	L.M. 0.16
County:	CLAY
Length:	580 FT
Date:	August 22, 2012

<u>DESCRIPTION</u>	<u>LOCAL</u>	<u>STATE</u>	<u>FEDERAL</u>	<u>TOTAL</u>
Right-of-Way	\$ 4,000	\$ -	\$ 16,000	\$ 20,000
Clearing and Grubbing	\$ 6,000	\$ -	\$ 24,000	\$ 30,000
Earthwork	\$ 7,500	\$ -	\$ 30,000	\$ 37,500
Railroad Crossing or Separation	\$ -	\$ -	\$ -	\$ -
Drainage	\$ 920	\$ -	\$ 3,680	\$ 4,600
Utilities	\$ 10,800	\$ -	\$ 43,200	\$ 54,000
Structures	\$ 52,800	\$ -	\$ 211,000	\$ 263,800
Pavement Removal	\$ -	\$ -	\$ -	\$ -
Paving	\$ 11,100	\$ -	\$ 44,600	\$ 55,700
Roadway and Pavement Appurtenances	\$ -	\$ -	\$ -	\$ -
Retaining Walls	\$ -	\$ -	\$ -	\$ -
Topsoil	\$ 700	\$ -	\$ 2,800	\$ 3,500
Seeding	\$ 1,220	\$ -	\$ 4,880	\$ 6,100
Sodding	\$ 800	\$ -	\$ 3,200	\$ 4,000
Rip-Rap or Slope Protection	\$ 6,000	\$ -	\$ 24,000	\$ 30,000
Fencing	\$ -	\$ -	\$ -	\$ -
Signing	\$ -	\$ -	\$ -	\$ -
Pavement Markings	\$ -	\$ -	\$ -	\$ -
Lighting	\$ -	\$ -	\$ -	\$ -
Signalization	\$ -	\$ -	\$ -	\$ -
Guardrail	\$ 3,300	\$ -	\$ 13,200	\$ 16,500
Other Construction Items (15%)	\$ 15,800	\$ -	\$ 63,100	\$ 78,900
Maintenance of Traffic	\$ 4,000	\$ -	\$ 16,000	\$ 20,000
Mobilization (5%)	\$ 6,200	\$ -	\$ 25,000	\$ 31,200
CONSTRUCTION COST (rounded)	\$ 131,100	\$ -	\$ 524,700	\$ 655,800
Engineering and Contingency (10%)	\$ 13,100	\$ -	\$ 52,500	\$ 65,600
TOTAL CONSTRUCTION COST (rounded)	\$ 144,200	\$ -	\$ 577,200	\$ 721,400
Preliminary Engineering (10%)	\$ 14,400	\$ -	\$ 57,700	\$ 72,100
PROJECT COST ¹(rounded)	\$158,600	\$ -	\$ 634,900	\$ 793,500

¹ For estimating future project costs, a compounded inflation rate of 10 % should be applied from the date of this estimate.

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
-	Right-of-Way (0.5 Acres)	LS	LS	\$ 20,000.00	\$ 20,000
RIGHT-OF-WAY TOTAL (ROUNDED)					\$ 20,000
201-01	Clearing and Grubbing	LS	LS	\$ 30,000.00	\$ 30,000
CLEAR AND GRUBBING TOTAL (ROUNDED)					\$ 30,000
203-03	Borrow Excavation (Unclassified)	CY	2500	\$ 15.00	\$ 37,500
EARTHWORK TOTAL (ROUNDED)					\$ 37,500
PAVEMENT REMOVAL TOTAL (ROUNDED)					\$ -
209-08.02	Temporary Silt Fence (w/ backing)		1400	\$ 3.25	\$ 4,550
DRAINAGE TOTAL (ROUNDED)					\$ 4,600
---	Above Ground Utilities	LF	1000	\$ 10.00	\$ 10,000
	Underground Utilites	LF	600	\$ 40.00	\$ 24,000
770-18.10	35FT Wood Pole	EA	4	\$ 5,000.00	\$ 20,000
UTILITIES TOTAL (ROUNDED)					\$ 54,000
---	Removal of Existing Bridge	SF	786	\$ 15.00	\$ 11,790
---	125' (3 Span) Prestressed Concrete Bridge	SF	1,680	\$ 150.00	\$ 252,000
STRUCTURES TOTAL (ROUNDED)					\$ 263,800
Asphalt					
--	Full Depth Paving	SY	1040	\$ 40.00	\$ 41,600
403-01	Bituminous Material for Tack Coat (TC)	TON	0.5	\$ 480.00	\$ 240
303-01	Mineral Aggregate, TY A Base, Grading D	TON	924.8	\$ 14.93	\$ 13,807
PAVING TOTAL (ROUNDED)					\$ 55,700
RETAINING WALLS TOTAL (ROUNDED)					\$ -
712-01	Traffic Control	LS		\$ 20,000.00	\$ 20,000
MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)					\$ 20,000
203-07	Furnishing & Spreading Topsoil	CY	350	\$ 10.00	\$ 3,500
TOPSOIL TOTAL (ROUNDED)					\$ 3,500
801-01	Seeding (With Mulch)	UNIT	150	\$ 40.00	\$ 6,000
801-03	Water	MG	5	\$ 7.00	\$ 35
SEEDING TOTAL (ROUNDED)					\$ 6,100
803-01	Sodding (New Sod)	SY	1,000	\$ 4.00	\$ 4,000
SODDING TOTAL (ROUNDED)					\$ 4,000
SIGNING TOTAL (ROUNDED)					\$ -
PAVEMENT MARKINGS TOTAL (ROUNDED)					\$ -
LIGHTING TOTAL (ROUNDED)					\$ -
SIGNALIZATION TOTAL (ROUNDED)					\$ -
FENCE TOTAL (ROUNDED)					\$ -
705-02.02	Single Guardrail (Type 2)	LF	200	\$ 15.55	\$ 3,110
705-04.04	Guardrail Terminal (Type 21)	EACH	4	\$ 1,773.47	\$ 7,094
705-01.01	Guardrail at Bridge Ends	LF	110	\$ 56.85	\$ 6,254
GUARDRAIL TOTAL (ROUNDED)					\$ 16,500
709-05.06	Machined Rip-Rap (Class A-1)	TON	1,000	\$ 30.00	\$ 30,000
RIP-RAP OR SLOPE PROTECTION TOTAL (ROUNDED)					\$ 30,000



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0350

MEMORANDUM

TO: Project Planning Office

FROM: Mike Gilbert, Roadway Specialist Supervisor 1
Conceptual Planning Office

DATE: March 4, 2013

SUBJECT: TPR Field Review (Special Bridge Replacement Program)
John Butler Rd. (0A593) over Proctor Branch
Log Mile 0.16
Clay County
Pin #: 011845.00

A field review was held for the above mentioned project on July 31, 2012.

The existing bridge consists of a two (2) span, steel I-beam structure with an out-to-out width of 13.1 feet. The overall bridge length is sixty (60) feet and the sufficiency rating for this bridge is 24.7. The 10-year and 100-year discharges and depths of flow for the drainage basin were determined using the appropriate regression equations. It was determined that the 100-year flow depth is 10.8 feet and the 10-year flow depth is 8 feet.

The proposed alignment is to be shifted approximately forty-five (45) feet to the west and the grade for this structure is to be raised 2.3 feet in order to improve the clearance from 9.8 feet to 10.8 feet. As a result of shifting the centerline, the existing structure will remain open during construction, and the alignment will improve by shifting and decreasing the curvature of the approaches on each side of the structure. All other options for maintaining traffic during construction were eliminated due to the current alignment of the structure. Approximately 0.5 acres of right-of-way will be acquired due to shifting the centerline. An overhead telephone line will require relocation and a possible underground waterline as well; there are no existing utilities attached to the structure.

The route has a base year (2017) AADT of ten (10) and a design year (2037) AADT of twenty (20). The bridge over Proctor Branch will be designed to meet Road Design Standard RD01-TS-1A (ADT \leq 400). The structure is to consist of a two (2) span prestressed concrete structure with each span measuring forty (40) feet. The total length of the structure will be eighty (80) feet. The structure will have a total out-to-out width of

twenty-one (21) feet with the total travel width over the structure and approaches to be eighteen (18) feet.

The required approach work, utility relocations, estimated replacement cost, and preliminary engineering for this bridge are approximately \$793,500.

MG

cc: file

CHECK LIST OF DETERMINANTS FOR LOCATION STUDY

If any of the following facilities or ESE categories are located within the project area or corridor, place an "x" in the blank opposite the item. Where more than one alternate is to be considered, place its letter designation in the blank.

1.	Agricultural land usage	X
2.	Airport (existing or proposed)	
3.	Commercial area, shopping center	
4.	Floodplains	
5.	Forested land	
6.	Historical, cultural, or natural landmark	
7.	Industrial park, factory	
8.	Institutional usages	
	a. School or other educational institution	
	b. Church or other religious institution (Cemetery)	
	c. Hospital or other medical facility	
	d. Public building, e.g., fire station	
	e. Defense installation	
9.	Recreation usages	
	a. Park or recreational area	
	b. Game preserve or wildlife area	
10.	Residential establishment	
11.	Urban area, town, city, or community	
12.	Waterway, lake, pond, river, stream, spring	X
	Permit required: Coast Guard	
	Section 404	X
	TVA Section 26a review	
	NPDES	X
	Aquatic Resource Alteration	X
13.	Other	
14.	Location coordinated with local officials	
15.	Railroad crossings	
16.	Hazardous materials site	

**TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION**

PROJECT NO.: _____ ROUTE: John Butler Rd. (0A053)
 COUNTY: Clay CITY: Celina
 PROJECT PIN NUMBER: 011845.00
 PROJECT DESCRIPTION: Special Bridge Replacement Program
Bridge over Proctor Creek
L.M. 0.16

DIVISION REQUESTING:

MAINTENANCE PAVEMENT DESIGN
 PLANNING STRUCTURES
 PROG. DEVELOPMENT & ADM. SURVEY & DESIGN
 PUBLIC TRANS. & AERO. TRAFFIC SIGNAL DESIGN
 YEAR PROJECT PROGRAMMED FOR CONSTRUCTION: _____ OTHER
 PROJECTED LETTING DATE: _____

TRAFFIC ASSIGNMENT:

BASE YEAR	DESIGN YEAR			DIR. DIST.	DESIGN ROADWAY % TRUCKS		DESIGN AVERAGE DAILY LOADS	
	AADT	DHV	%		DHV	AADT	FLEX	RIGID
10	20	3	14	2037	65-35	3	4	

REQUESTED BY: NAME Michael Gilbert DATE 4/12/12
 DIVISION Planning
 ADDRESS 10th Floor
J.K. Polk Bldg

REVIEWED BY: Tony Armstrong DATE 4-20-12
 TONY ARMSTRONG
 TRANSPORTATION MANAGER 1
 SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: Dudley Daniel DATE 20 Apr 12
 DUDLEY DANIEL
 TRANSPORTATION MANAGER 2
 SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

This Traffic Based on 2006 Cycle Count. The Future Traffic is based on Growth Rate from the ADAM Computer Program.

DHV'S ARE NOT REQUIRED FOR SIDE ROADS LESS THAN 1000 AADT.

NOTE: FOR BRIDGE REPLACEMENT PROJECTS, ADLs ARE NOT REQUIRED FOR ADTs OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS.

SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS.

TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2012	CLAY	1

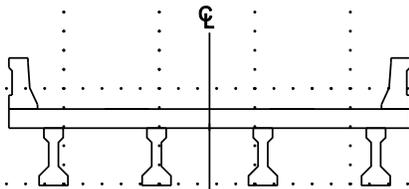
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BRIDGE REPLACEMENT

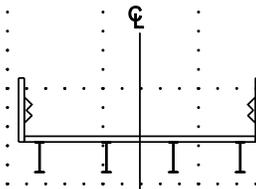
JOHN BUTLER RD. (OA053)
BRIDGE I.D. 140A0530001 (L.M. 0.16)
CLAY COUNTY

COMPLETED PROPOSED
STRUCTURE

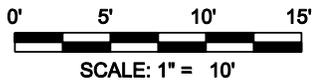


TOTAL WIDTH: 21.0'

EXISTING STRUCTURE



SHIFT CENTERLINE
45 FT WEST



STAGE CONSTRUCTION DETAIL
JOHN BUTLER RD. (0A053) CLAY COUNTY
BRIDGE OVER PROCTOR BRANCH @ L.M. 0.16
BRIDGE ID 140A0530001

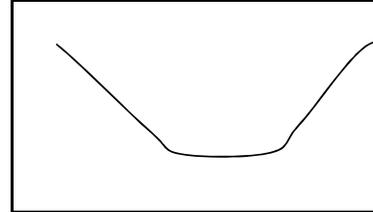


SITE INSPECTION

INSPECTION MADE BY: Mike Gilbert BRIDGE ID: 140A0530001 COUNTY: Clay
 Date: 3/4/13 Route Name: John Butler Rd. (0A053) Stream Name: Proctor Branch @ L.M. 0.16

CHANNEL

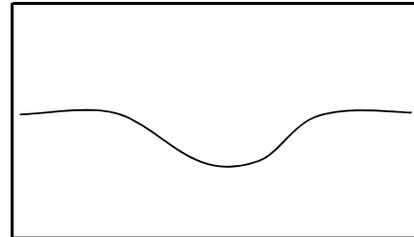
Approx depth and width of channel: Horizontal: 54' Vertical: 9'
 Depth of normal flow: 0.5' In Reservoir: Yes No
 Depth of Ordinary High Water: N/A
 Type of material in stream bed: Earth Channel (Clean)
 Type of vegetation on banks: Trees
 "N" factor of the channel: 0.022
 Are channel banks stable: Yes No
 If the streambed is gravel: $D_{30} =$ -- $D_{85} =$ --
 Skew of the channel with the roadway: 90°



Channel Shape Sketch

FLOODPLAIN

Is the skew same as the channel? Yes No
 Is it symmetrical about the channel? Yes No
 Type of vegetation in the floodplain and "N" factors
 Left U.S.: Trees - 0.15 Right U.S.: Trees - 0.15
 Left D.S.: Trees - 0.15 Right D.S.: Trees - 0.15
 Are roadway approaches lower than the structure? Yes No
 Are there any buildings in the floodplain? Yes No
 Approx. floor elevations: --
 Flood information from local residents:
 (elevations & dates) --



Floodplain Sketch

EXISTING STRUCTURE

Length: 60' No. of spans: 2 Structure type: Steel I-Beam No. of lanes: 1 Skew: 90°
 Width (out to out): 13.1' Width (curb to curb): 12.4' Approach: paved graveled
 Sidewalks on Structure: Yes No Bridgerail type: Metal Guardrail Bridgerail height = 2.5'
 Superstructure depth: 4.5' Finished Grade to low girder = 2.0' Girder depth = 1.5'
 Are any substructures in the channel? Yes No Vertical Clearance = 9.8 ft
 Indications of overtopping: None
 High water marks: N/A
 Local scour: Yes, _____ No
 Any signs of stream aggradation or degradation? None
 Any drift or drift potential? Yes, _____ No
 Any obstructions (pipes, stock fences, etc.)? None

PROPOSED STRUCTURE

Replacement Rehabilitate Widening New Location
 Bridge length: 80 ft Bridge type: Prestressed Conc. Span arrangement: 2 @ 40 ft Skew: 64°
 Bridge width: 21.0 ft Sidewalks: No Design Speed (MPH): 20 ADT (2037) = 20
 Proposed grade: Raise 2.3 ft Proposed alignment: Shift C.L. to the West 45 ft
 Method of maintaining traffic: Stage construction On site detour Close road Shift Centerline 45' West
 Cost of proposed Structure: \$150 per ft² X 80 / 21.0 length (ft) / width (ft) Cost = \$252,000
 Cost of bridge removal: \$15 per ft² X 60 / 13.1 length (ft) / width (ft) Cost = \$11,800
 Detour structure: Type and size = N/A Cost = \$0

Total Structure Cost = \$263,800

**Bridge TPR Flow Calculations
For Hydrologic Area 2
Area > 300 Acres**

County: Clay
 Bridge ID: 140A0530001
 Route: John Butler Rd. (0A053)
 Feature Crossed: Proctor Branch
 Log Mile: 0.16

By: MG
 Date: 7/26/12
 PIN: 011845.00

DRAINAGE BASIN

Measurement from quad = 5,159 acres
 Contributing Drainage Area, CDA = acres/640 = 8.06 sq. mi.

USGS REGRESSION EQUATIONS FOR FLOW

$Q_2 = 207(CDA)^{0.725} = 940$ cfs
 $Q_5 = 344(CDA)^{0.715} = 1,530$ cfs
 $Q_{10} = 444(CDA)^{0.711} = 1,958$ cfs
 $Q_{25} = 578(CDA)^{0.708} = 2,533$ cfs
 $Q_{50} = 682(CDA)^{0.706} = 2,976$ cfs
 $Q_{100} = 788(CDA)^{0.705} = 3,432$ cfs

DEPTH OF FLOW EQUATIONS

10-Year Flood Depth = $5.33(CDA)^{0.197} = 8.0$ ft
 100-Year Flood Depth = $7.43(CDA)^{0.181} = 10.8$ ft

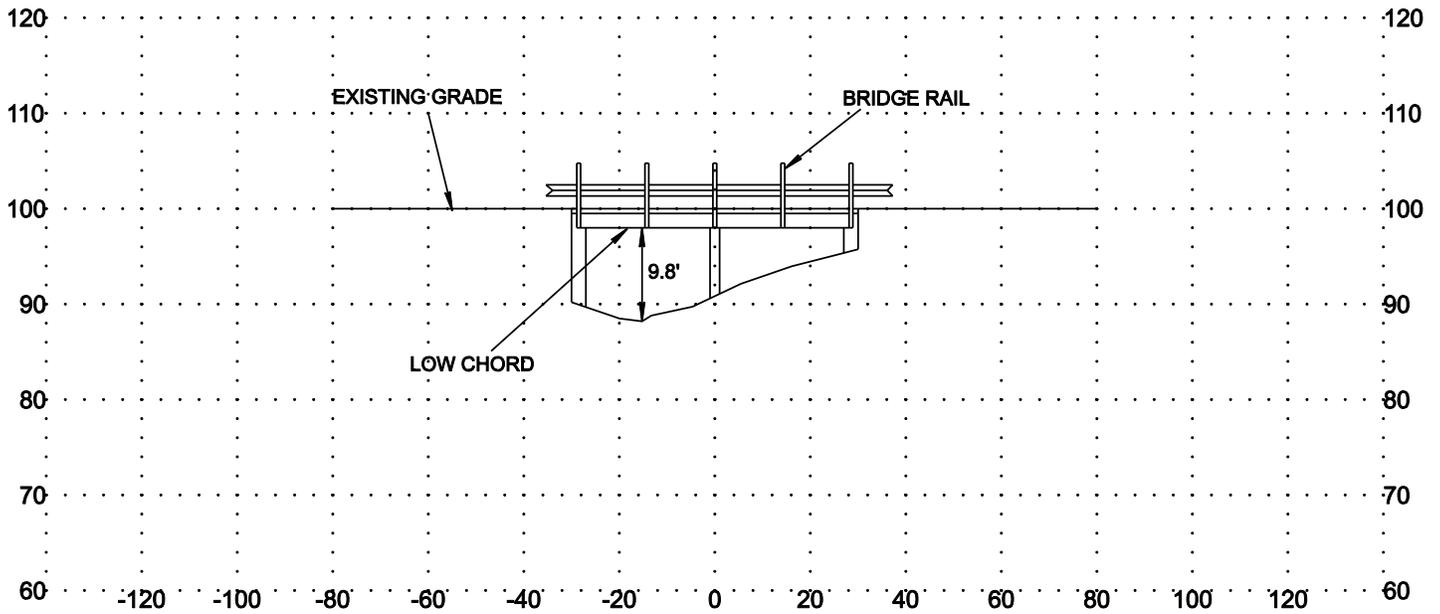
AREAS

Existing Area Below Low Chord = 566 ft²
 Proposed Area Below Low Chord = 570 ft²
 Proposed 10-Year Flood Area, $A_{10} = 183$ ft²
 Proposed 100-Year Flood Area, $A_{100} = 303$ ft²

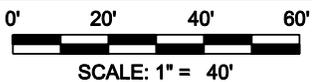
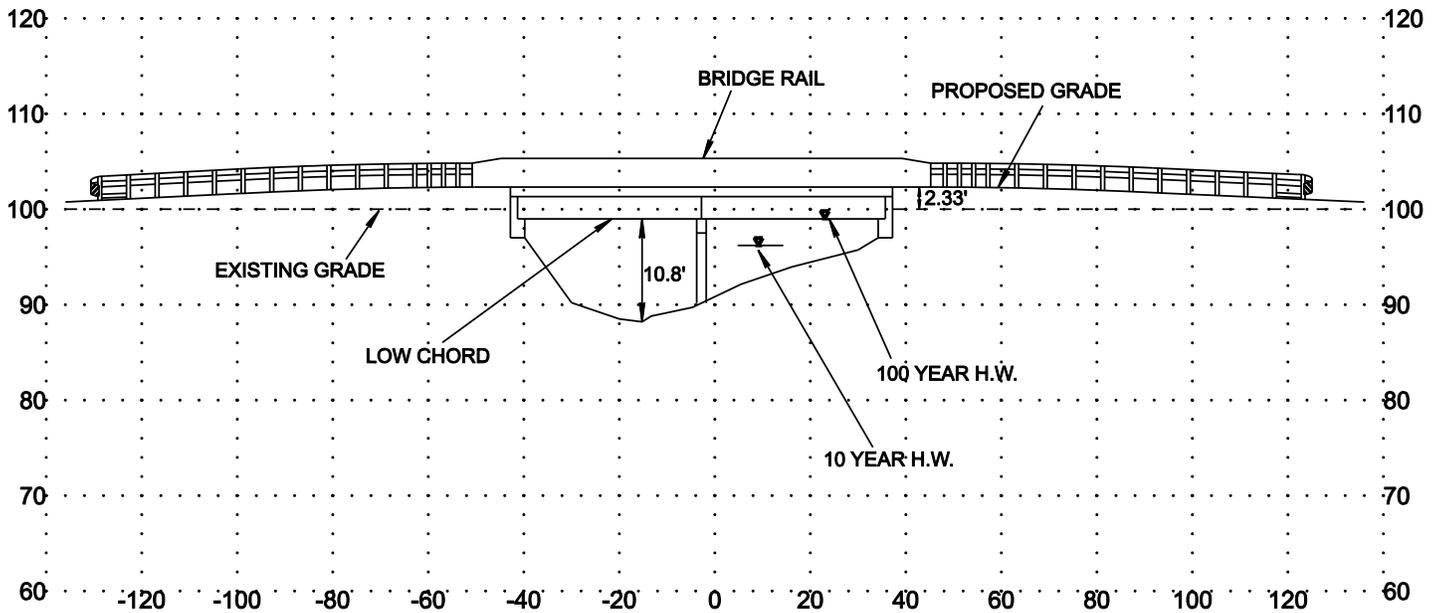
VELOCITIES

Proposed 10-Year Flood Velocity, $V_{10} = Q_{10}/A_{10} = 10.7$ fps
 Proposed 100-Year Flood Velocity, $V_{100} = Q_{100}/A_{100} = 11.3$ fps

EXISTING STRUCTURE (INLET)



PROPOSED STRUCTURE (INLET)



BRIDGE SECTIONS
 JOHN BUTLER RD. (0A053) CLAY COUNTY
 BRIDGE OVER PROCTOR BRANCH @ L.M. 0.16
 BRIDGE ID 140A0530001

Bridge ID: 140A0530001

Clay County



View of Structure



Bridge Number

Bridge ID: 140A0530001
Clay County



Northbound Bridge Approach on John Butler Rd.



Southbound Bridge Approach on John Butler Rd.

Bridge ID: 140A0530001

Clay County



Bridge Looking North on John Butler Rd.



Bridge Looking South on John Butler Rd.

Bridge ID: 140A0530001
Clay County



Bridge Rail



Structure

Bridge ID: 140A0530001

Clay County



Substructure



Utilities

Bridge ID: 140A0530001

Clay County



Inlet



Outlet

Bridge ID: 140A0530001
Clay County



Upstream



Upstream Right

Bridge ID: 140A0530001

Clay County



Upstream Left



Downstream

Bridge ID: 140A0530001

Clay County



Downstream Right



Downstream Left