TRANSPORTATION INVESTMENT REPORT

Special Bridge Replacement Program

Hamilton County / City of Chattanooga / City of East Ridge
PIN 124069.00

Interstate 24 Bridge
over South Germantown Road
Bridge ID: 33I00240055
Log Mile: 12.08

Belvoir Avenue Bridge
over Interstate 24
Bridge ID: 33I00240057
Log Mile: 1.01

PREPARED BY
BARGE DESIGN SOLUTIONS
For the
TENNESSEE DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

Approved by _____ *Date* 7-10-18
Deputy Commissioner Chief of Environment and Planning

Approved by _____ *Date* 7/6/18
Deputy Commissioner and Chief Engineer

Approved by:	Signature	DATE
Transportation Director **Strategic Transportation Investments Division**		6-20-18
Engineering Director **Design Division**	Wesley N. Hughes	6-20-18
Engineering Director **Structures Division**		6/20/18

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

TABLE OF CONTENTS

Executive Summary.....i
Functional Plans..... iv

SECTION 1 **Interstate 24 Bridge over South Germantown Road.....1**
Area Map.....2
Location Map.....3
Topographic Map.....4
Transportation Investment Report Memorandum.....5
Attachments
A. Bridge Figures.....8
B. Preliminary Cost Estimate.....14
C. Projected Traffic.....27
D. Bridge TIR Tables.....30
E. Stream Stats.....38
F. FEMA Map.....44
G. Site Photos.....46

SECTION 2 **Belvoir Avenue Bridge over Interstate 24.....60**
Area Map.....61
Location Map.....62
Topographic Map.....63
Transportation Investment Report Memorandum.....64
Attachments
A. Bridge Figures.....66
B. Preliminary Cost Estimate.....69
C. Projected Traffic.....73
D. Bridge TIR Tables.....75
E. Stream Stats.....81
F. FEMA Map.....87
G. Site Photos.....89

EXECUTIVE SUMMARY

Project Description

The Construction Manager/General Contractor (CM/GC) project on Interstate 24 in Hamilton County includes the Interstate 24 bridge over South Germantown Road and the Belvoir Avenue Bridge over Interstate 24. The proposed project includes the design and construction of the bridge replacement for both bridges. Accelerated Bridge Construction (ABC) techniques will be used to minimize impacts on vehicular traffic.

The purpose of this study is to review the existing structures and evaluate the recommended improvements. The proposed actions under consideration are as follows:

Interstate 24 Bridge over South Germantown Road

- Existing structure is four (4) span concrete bridge that is 166 feet long with eight (8) foot interior shoulders, three (3) twelve (12) foot lanes, and a three (3) foot outside shoulder in each direction.
- Proposed structure will either be a four (4) span concrete or two (2) span steel bridge that is 166 feet long with eight (8) foot interior shoulders, three (3) twelve (12) foot lanes, and a twelve (12) foot outside shoulder in each direction.
- The substructure will be designed and built to accommodate future roadway widening along Interstate 24.
- Proposed phased construction plan.
- Four (4) separate cost estimates were prepared for this bridge based on various construction alternates.
- Widening of eastbound exit ramp for Interstate 24 to South Germantown Road.
- Both intersections at the interchange will be updated to meet current signal and Americans with Disabilities Act (ADA) design standards.

Belvoir Avenue Bridge over Interstate 24

- Existing structure is four (4) span concrete bridge that is 190.5 feet long with ten (10) foot shoulders, four (4) twelve (12) foot lanes, and five (5) sidewalks on each side.
- Proposed structure will be a two (2) span bridge that is 152 feet long with four (4) eleven (11) foot lanes, two (2) foot shoulders, six (6) inch curbs, six (6) foot sidewalks on each side, and retaining walls beneath the bridge to accommodate for Interstate 24 being widened in the future.
- Local traffic will need to be detoured during construction.
- One cost estimate was prepared for this bridge.
- Both intersections on either side of the bridge will be updated to meet current signal and Americans with Disabilities Act (ADA) design standards.

Proposed Alternates

For the study, multiple build alternates were evaluated for proposed projects. The various costs associated with each build alternate was also assessed.

Build Alternates

The exact method of construction for each bridge has yet to be determined. For the purpose of this study, a few alternates were considered and evaluated.

Interstate 24 Bridge over South Germantown Road

There are multiple options for construction, bridge phase, and traffic phasing that have been evaluated for feasibility for the Interstate 24 Bridge over South Germantown Road. Accelerated Bridge Construction (ABC) techniques will be used to minimize impacts on vehicular traffic. The allowable configurations of the various categories can be seen in the following table.

Construction Alternates		Bridge Alternates	Traffic Phasing Plans
Concrete Bridge	Baseline	Alternate 1	*Road Closure* (Detour to Next Ramp) *Road Closure* (Temporary Ramp)
	Accelerated Bridge Construction	Alternate 2	*Slide* (Traffic Out then In)
Steel Bridge- Lateral Slide		Alternate 3	*Road Closure* (Detour to Next Ramp) *Road Closure* (Temporary Ramp) *Slide* (Traffic South then North)
Steel Bridge - SPMT		Alternate 4	*Road Closure* (Detour to Next Ramp) *Road Closure* (Temporary Ramp)

Belvoir Avenue Bridge over Interstate 24

At this time, there are no plans to use ABC techniques to build the Belvoir Avenue bridge over Interstate 24. It will be built using traditional construction, and traffic will be detoured to local roads while the bridge is closed to traffic for construction.

Cost Alternates

The build alternates allow for a "best" to "worst" case scenario regarding days under construction and probable construction costs. This type of cost analysis gives a broader analysis in regard to cost comparison. A comparison of the cost estimates can be seen in the following tables.

Interstate 24 Bridge over South Germantown Road	Cost (Millions)
BASELINE: TRADITIONAL CONSTRUCTION *Utilizing Traditional Techniques for Precast Concrete Box Beams and Cast-in-Place Deck*	$7.86
ALTERNATE 1: ACCELERATED BRIDGE CONSTRUCTION *Utilizing ABC Techniques for Precast Concrete Box Beams and Full Depth Deck Panels*	$13.15
ALTERNATE 2: ACCELERATED BRIDGE CONSTRUCTION *Utilizing ABC Techniques for Lateral Slide Steel Bridge*	$19.34
ALTERNATE 3: ACCELERATED BRIDGE CONSTRUCTION *Utilizing ABC Techniques for Steel Bridge SPMT move*	$17.12

Belvoir Avenue Bridge over Interstate 24	*Cost (Millions)*
BASELINE: TRADITIONAL CONSTRUCTION	$5.13

The total estimated construction cost for all construction alternatives are detailed in Attachment B for each section.

Alternative Contracting

The chosen contracting method for the project is CM/GC (Construction Manager/General Contractor). This contracting method involves a contractor in not only the construction phase of a project but also the design phase. The goal of the partnership between the client, the designer, and the contractor are to reduce risk, improve construction schedule, streamline the design process, and develop a project that keeps to budget. All design decisions are subject to change until the contractor is officially on board.

Index Of Sheets

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2-3	TYPICAL SECTIONS
4	AREA OF INFLUENCE
5-6	PROPOSED LAYOUTS
5A-5D	TRAFFIC CONTROL PLANS
6A	DETOUR MAP
7-10	I-24 BRIDGE PHASING PLANS

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING

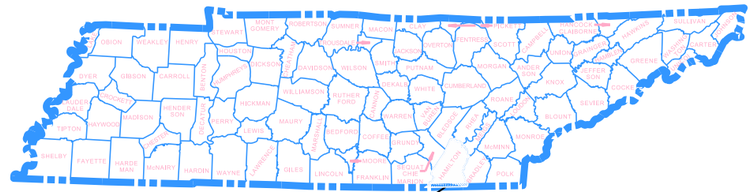
HAMILTON COUNTY

I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT

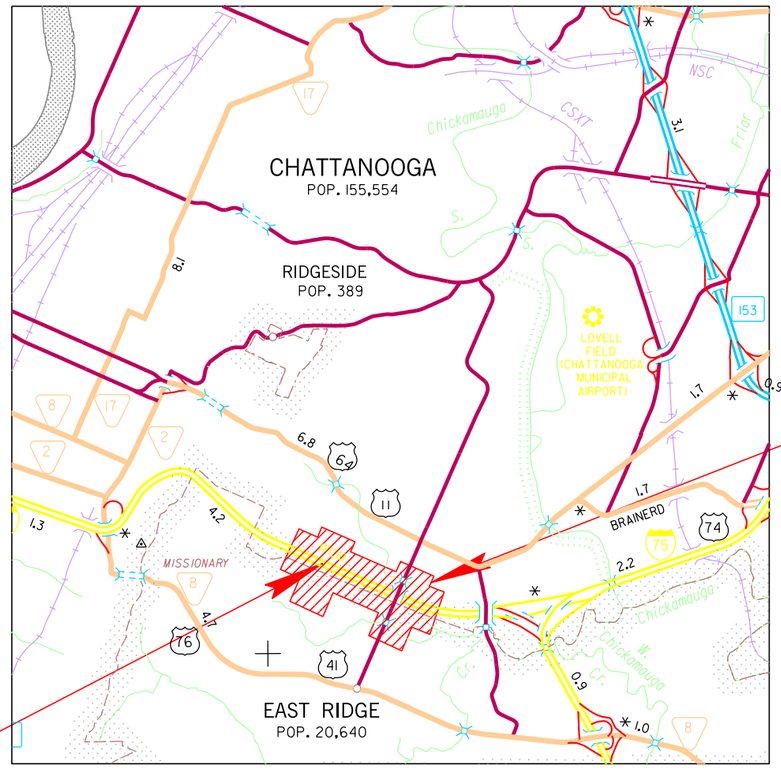
TRANSPORTATION INVESTMENT REPORT

F.A.H.S. NO. I0024

TENN.	YEAR	SHEET NO.
	2018	01
PIN NO.	124069.00	
STATE PROJ. NO.	BR - I-24 - 3(97)	



BRIDGE ID. # 33I00240055 & 33I00240057



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TYPE	YEAR	COUNTY	SHEET NO.
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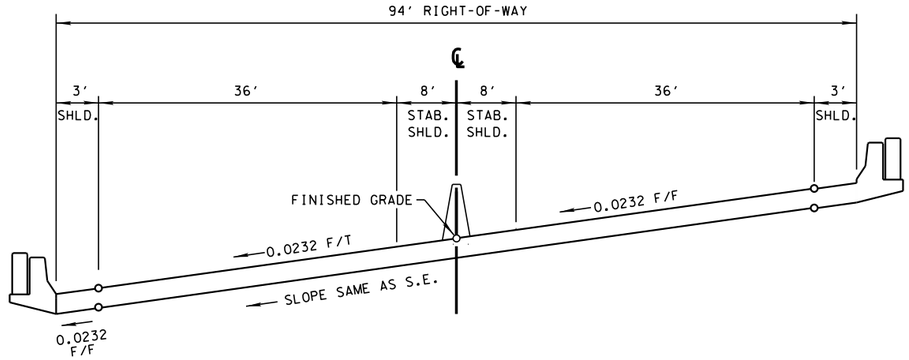
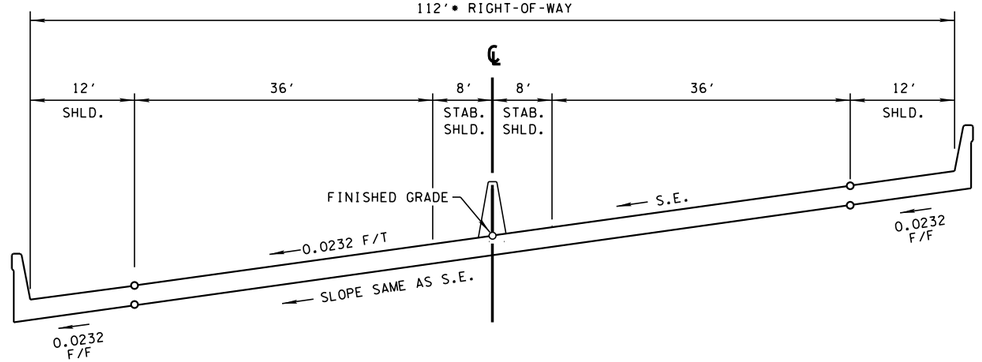


EXISTING SECTION - INTERSTATE 24

(BASED ON STD. DWG. RD01-TS-5B)



PROPOSED SECTION - INTERSTATE 24

(BASED ON STD. DWG. RD01-TS-5B)

*EXISTING INSIDE SHOULDER WIDTH IS 8'.
NEW TDOT STANDARDS CALL FOR 12' MINIMUM SHOULDERS.

TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

I-24 BRIDGE OVER
S GERMANTOWN RD

TYPICAL SECTIONS

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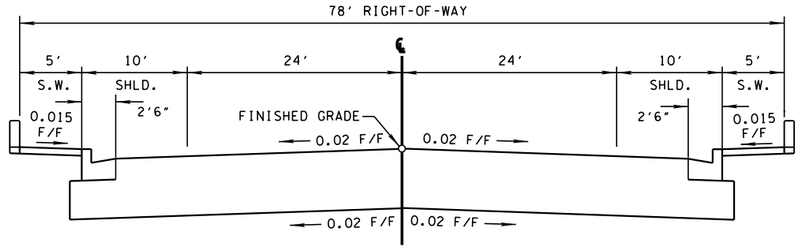
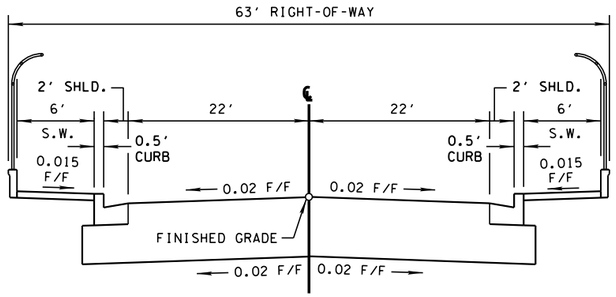
BRIDGE	2018	HAMILTON	03



EXISTING SECTION - BELVOIR AVENUE

(BASED ON STD. DWG. RD01-TS-6)



PROPOSED SECTION - BELVOIR AVENUE

(BASED ON STD. DWG. RD01-TS-6A)

TRANSPORTATION INVESTMENT REPORT

PIN 124069.00

I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT

HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

BELVOIR AVE
BRIDGE OVER I-24

TYPICAL SECTIONS

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TYPE	YEAR	COUNTY	SHEET NO.
BRIDGE	2018	HAMILTON	04

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TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

AREA OF
INFLUENCE MAP

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TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2018	HAMILTON	05

6 - 12 FT LANES
W/ 8 FT INSIDE SHOULDERS
W/ 12 FT OUTSIDE SHOULDERS

S GERMANTOWN RD

NORTH TERRACE

INTERSTATE 24

INTERSTATE 24

4 BRIDGE DESIGN ALTERNATES (SEE MEMO FOR FURTHER DETAIL)

SOUTH TERRACE

WIDENED TO ACCOMMODATE
2-12 FT LANES

PAVING DETAIL

FULL DEPTH

MILL & OVERLAY

BRIDGE DECK

0 100 200 300

N

TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

I-24 BRIDGE OVER
S GERMANTOWN RD

PROPOSED LAYOUT

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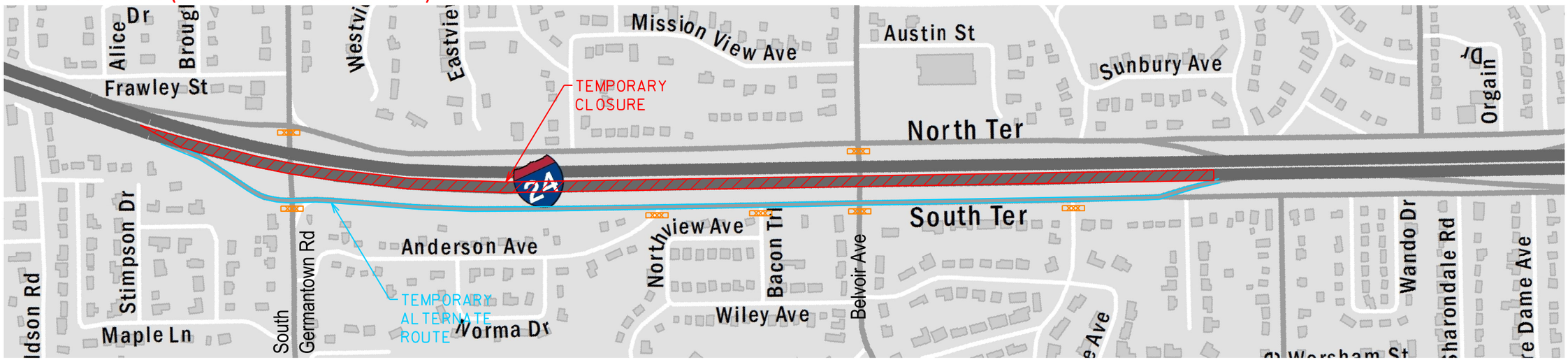
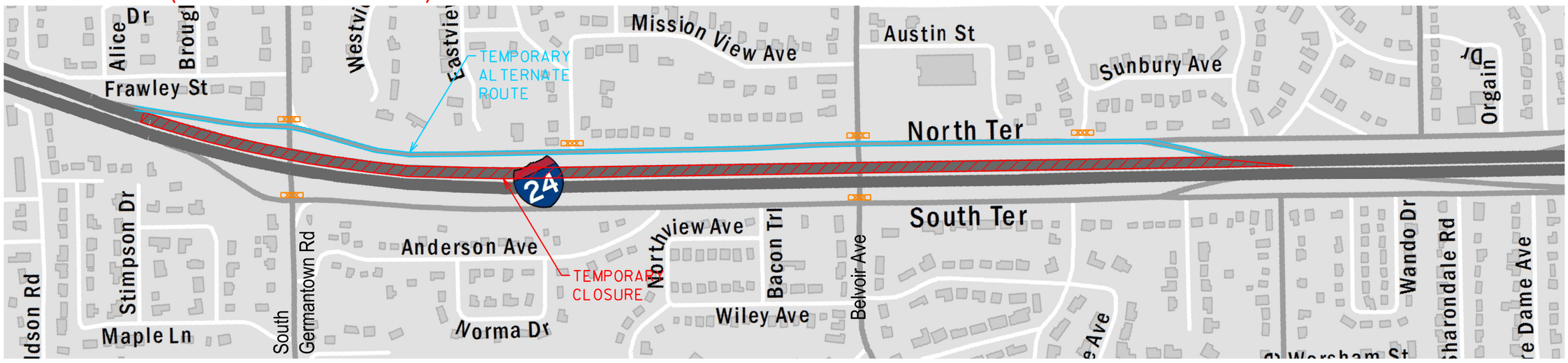
TYPE	YEAR	COUNTY	SHEET NO.
BRIDGE	2018	HAMILTON	05A

ROAD CLOSURE (DETOUR TO NEXT RAMP) - PHASE I



ROAD CLOSURE (DETOUR TO NEXT RAMP) - PHASE II



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TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-24 BRIDGE OVER S GERMANTOWN RD TRAFFIC CONTROL - CLOSURE 1

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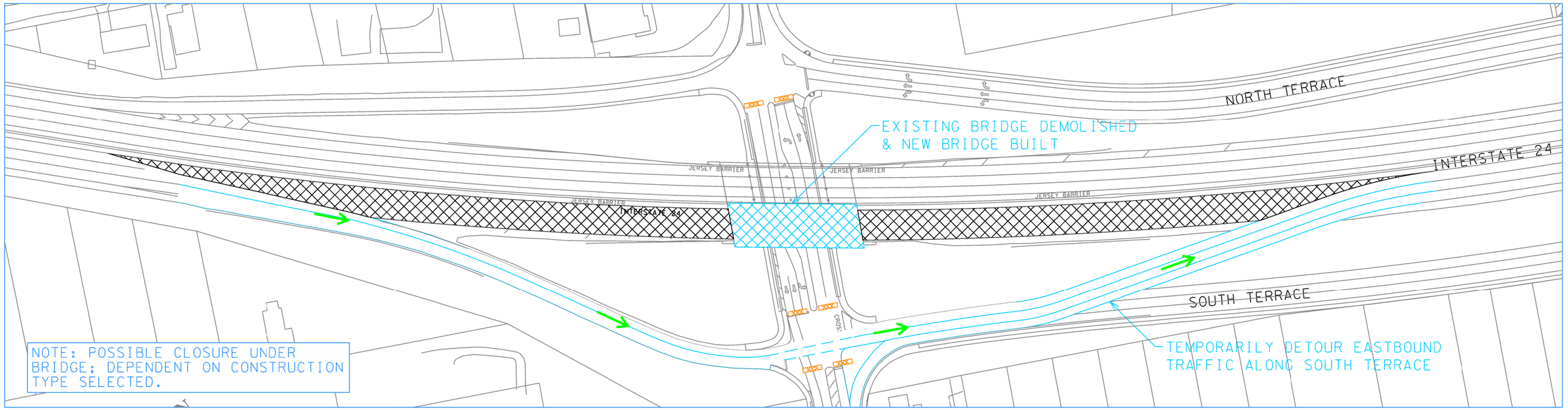
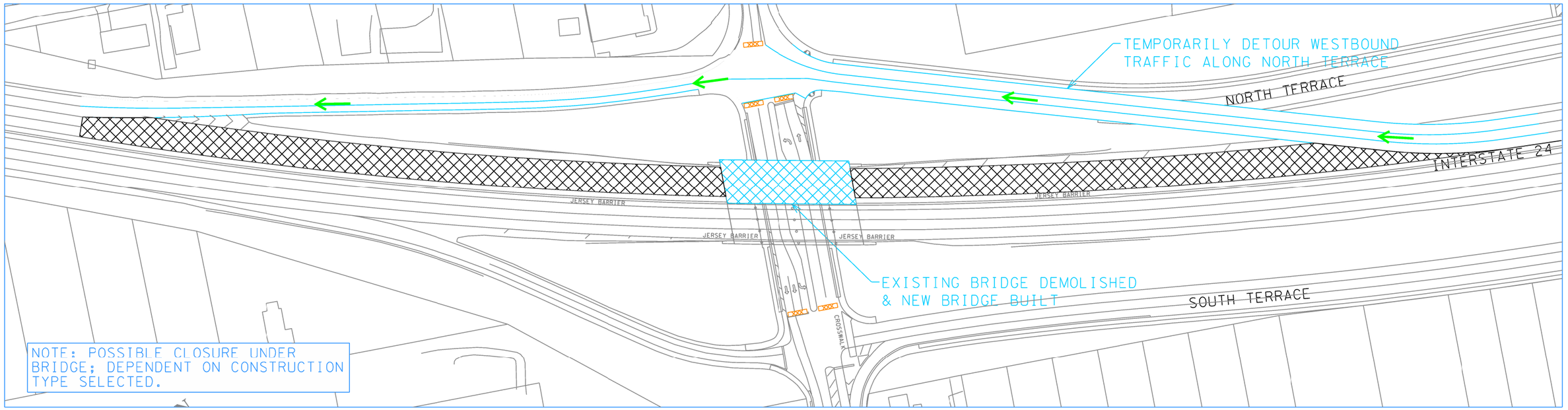
TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2018	HAMILTON	05B

ROAD CLOSURE (TEMPORARY RAMP) - PHASE I



ROAD CLOSURE (TEMPORARY RAMP) - PHASE II



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TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

I-24 BRIDGE OVER
S GERMANTOWN RD
TRAFFIC CONTROL -
CLOSURE 2

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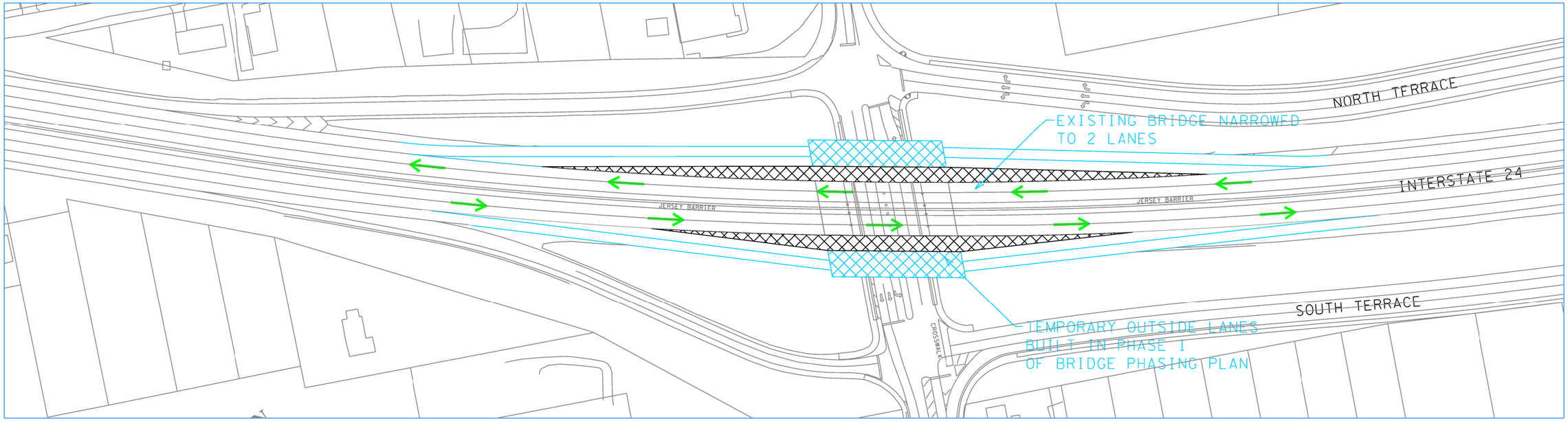
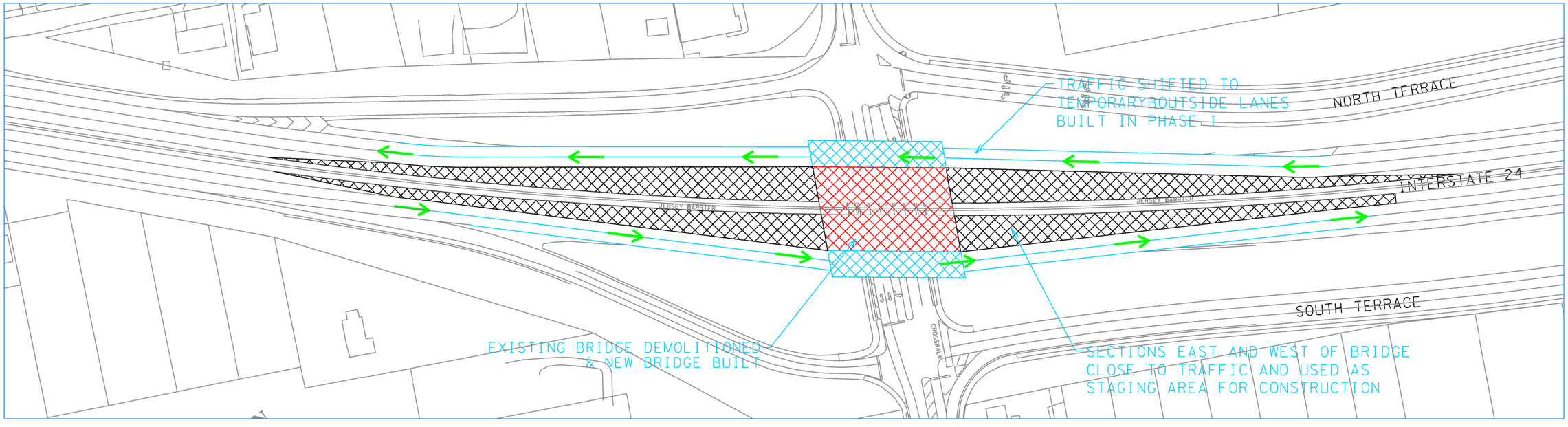
TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2018	HAMILTON	05C

SLIDE (TRAFFIC OUT THEN IN) - PHASE I



SLIDE (TRAFFIC OUT THEN IN) - PHASE II



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TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

I-24 BRIDGE OVER
S GERMANTOWN RD
TRAFFIC CONTROL -
SHIFT 1

5/25/2018
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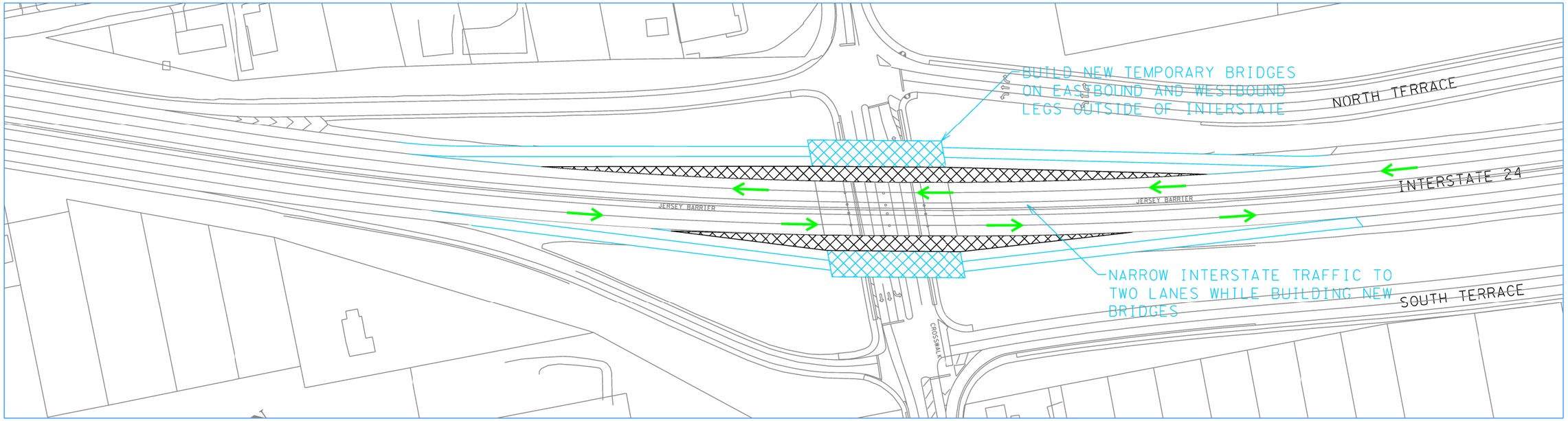
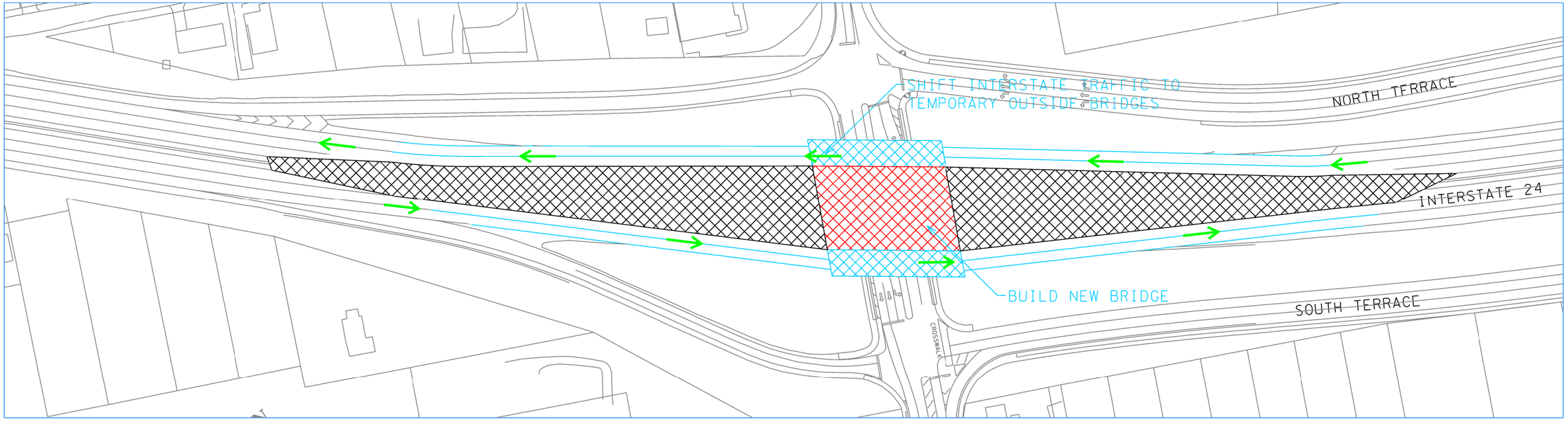
TYPE	YEAR	COUNTY	FIGURE NO.
BRIDGE	2018	HAMILTON	05D

SLIDE (TRAFFIC NORTH THEN SOUTH) - PHASE I



SLIDE (TRAFFIC NORTH THEN SOUTH) - PHASE II



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TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-24 BRIDGE OVER S GERMANTOWN RD TRAFFIC CONTROL - SHIFT 2

5/25/2018
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TYPE	YEAR	COUNTY	SHEET NO.
BRIDGE	2018	HAMILTON	06

BELVOIR AVE

NORTH TERRACE

4 - 11 FT LANES
W/ 2 FT SHOULDER
W/ 0.5 FT CURB
W/ 6 FT SIDEWALKS

INTERSTATE 24

152'
2 SPANS
(76',76')

SOUTH TERRACE

PAVING DETAIL

FULL DEPTH

MILL & OVERLAY

BRIDGE DECK

NOTE: NO ADDITIONAL PAVING WILL BE REQUIRED UNDER BELVOIR AVENUE ALONG INTERSTATE 24.

0 100 200 300

TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

BELVOIR AVE
BRIDGE OVER I-24

PROPOSED LAYOUT

5/25/2018
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TYPE	YEAR	COUNTY	SHEET NO.
BRIDGE	2018	HAMILTON	06A

BRIDGE ID: 33I00240057
(BRIDGE OVER INTERSTATE 24)

NORTH TERRACE

INTERSTATE 24

SOUTH TERRACE

SOUTH TERRACE
MAXIMUM DETOUR DISTANCE: APPROX. 1.6 MILES
DETOUR TIME: APPROX. 3 MINUTES

NORTH TERRACE
MAXIMUM DETOUR DISTANCE: APPROX. 1.1 MILES
DETOUR TIME: APPROX. 2 MINUTES

0 500 1000 1500

TRANSPORTATION INVESTMENT REPORT

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

BELVOIR AVE
BRIDGE OVER I-24

DETOUR MAP

5/25/2018
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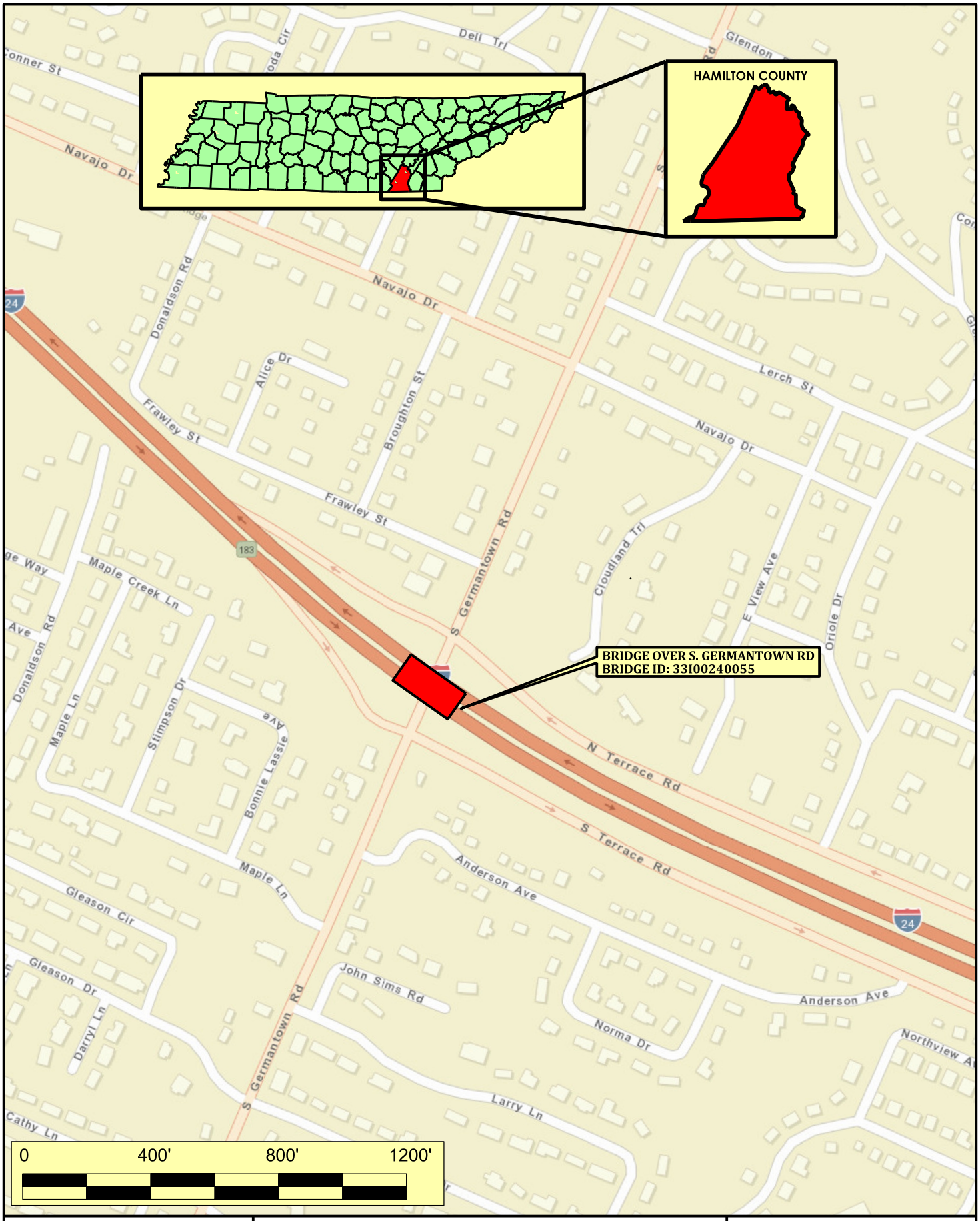
SECTION 1

Interstate 24 Bridge

over South Germantown Road

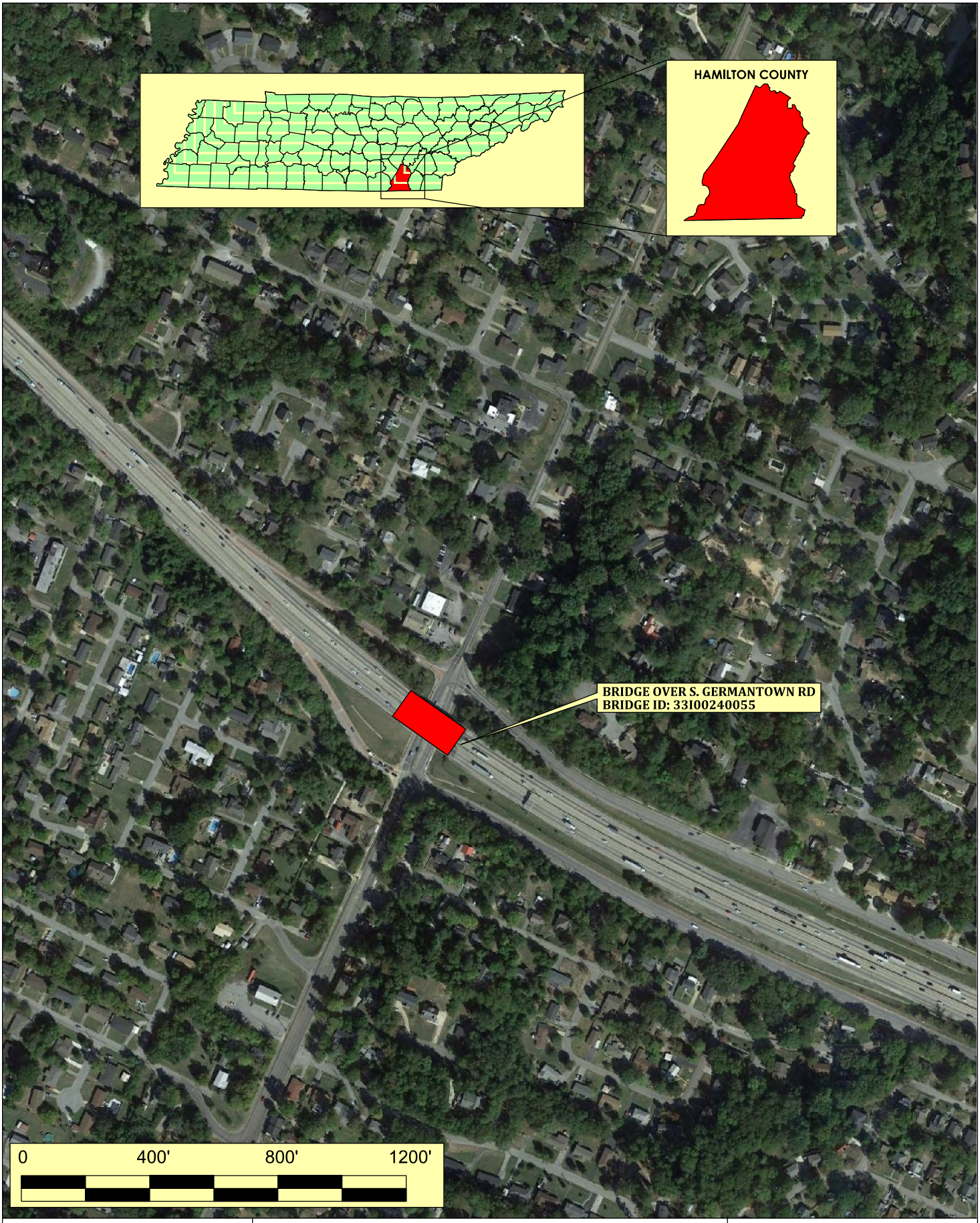
PIN 124069.00

Bridge ID: 33I00240055



AREA MAP
BRIDGE TIR
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

TN TDOT Department of Transportation



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LOCATION MAP
BRIDGE TIR
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

TN TDOT Department of Transportation

TOPOGRAPHIC MAP
BRIDGE TIR
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

TN TDOT Department of Transportation

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
SUITE 1000, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TN 37243
(615) 741-2208

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

MEMORANDUM

TO: Steve Allen, Transportation Director
Strategic Transportation Investments Division

FROM: Lia Obaid, Asst. Director of Construction
Construction Division

DATE: June 11, 2018

SUBJECT: TIR Field Review (Special Bridge Replacement Program)
Interstate 24 Bridge over South Germantown Road
Log Mile 12.08
Bridge ID: 33I00240055
Hamilton County
PIN 124069.00

A field review was held for the above-mentioned project on Thursday, April 5, 2018.

The existing structure is a four (4) span concrete bridge that is 166 feet long at a 79 degree skew with eight (8) foot interior shoulders, three (3) twelve (12) foot lanes, and a three (3) foot outside shoulder in each direction. The current right of way (R.O.W.) is 300 feet. The current posted speed on Interstate 24 is fifty-five (55) miles per hour. This structure crosses South Germantown Road in Hamilton County and is within Chattanooga city limits. The existing structure has an out-to-out width of 100 feet. The sufficiency rating of this bridge is 30.9 according to the last bridge inspection report. There exists a stream that is piped and runs diagonally below Interstate 24. The culvert will be assessed during the design phase to determine if replacement is necessary. This stream is not anticipated to be impacted by the project in question. The Q10, Q50, and Q100 are 154 cfs, 240 cfs and 284 cfs, respectively; these values were collected from Streamstats.

The proposed bridge will be designed to meet TDOT standard RD01-TS-5B. The substructure will be designed and built to accommodate future roadway widening along Interstate 24. The

proposed structure's centerline will match the existing. Laneage will likely be shifted to accommodate traffic as part of the phased construction. There are four (4) phasing plans that have been proposed for the bridge. Two (2) phasing plans include temporarily closing the structure and detouring traffic and two (2) of the phasing plans include shifting traffic. If traffic is shifted, the laneage will potentially need to narrow to two (2) lanes in each direction during certain parts of the construction phasing. For more information, see the functional plans at the beginning of the study. The route has a 2022 base year AADT of 114,670 vehicles per day and a 2042 design year AADT of 142,650 vehicles per day. A baseline alternative was proposed for the bridge utilizing traditional construction methods and was analyzed for cost comparison purposes, but it is the intention to construct the structure by Accelerated Bridge Construction (ABC) methods.

1. The baseline proposed structure is a four (4) span concrete cast-in-place box beam bridge that is 166 feet long and would be built using traditional construction methods.

There are three (3) Accelerated Bridge Construction (ABC) proposed alternates for the structure.

1. The proposed structure for the first accelerated bridge construction (ABC) alternate is a four (4) span concrete box beam bridge that is 166 feet long.
2. The second alternate proposes a two (2) span steel girder bridge that is 166 feet long to be constructed using the lateral slide method, which is an accelerated bridge construction (ABC) technique.
3. The third alternate also proposes a two (2) span steel girder bridge that is 166 feet long. However, construction of the bridge will utilize self-propelled modular transporter (SPMT), another accelerated bridge construction (ABC) technique.

The proposed alignment will remain for the replacement structure the same as the existing structure including the 79° skew. The proposed typical section for each alternate consists of eight (8) foot interior shoulders, three (3) twelve (12) foot lanes, and a twelve (12) foot outside shoulder in each direction. A design exception will be required due to the proposed eight (8) foot interior shoulder, as a minimum twelve (12) foot shoulder is currently required based on design standards. Eight (8) foot shoulders will limit the area of impact. No additional R.O.W. is anticipated. The posted speed is anticipated to remain 55 mph. The project will tie into the existing concrete pavement of Interstate 24. It is also estimated that overhead and underground utilities will need to be relocated.

Both intersections at the interchange will be updated to meet current signal and Americans with Disabilities Act (ADA) design standards.

The bridge has been selected for replacement utilizing the CM/GC (Construction Manager/General Contractor) Method for design phase and the ABC (Accelerated Bridge Construction) technique for the construction phase in an effort to minimize negative long-term traffic impacts during construction. At this time the design team is anticipating closing the South Germantown Road bridge to local traffic during the construction phase, but this is subject to change as the design phase continues. A preliminary detour map is attached. It is not the intention of the design team to have simultaneous lane closures and detours for both bridges. However, this analysis is also subject to change during the CM/GC design process. Once a CM

(Construction Manager) has been selected, the formal design process will begin and a final traffic control plan will be determined.

A total cost for the bridge replacement, including approach work, estimated replacement, and preliminary engineering, was conducted for each alternate. A man day estimate cannot be conducted until the CM (Construction Manager) is selected for the project.

Baseline:	$ 7,856,000
Alternate #1:	$ 13,150,000
Alternate #2:	$ 19,338,000
Alternate #3:	$ 17,117,000

ATTACHMENT 1-A

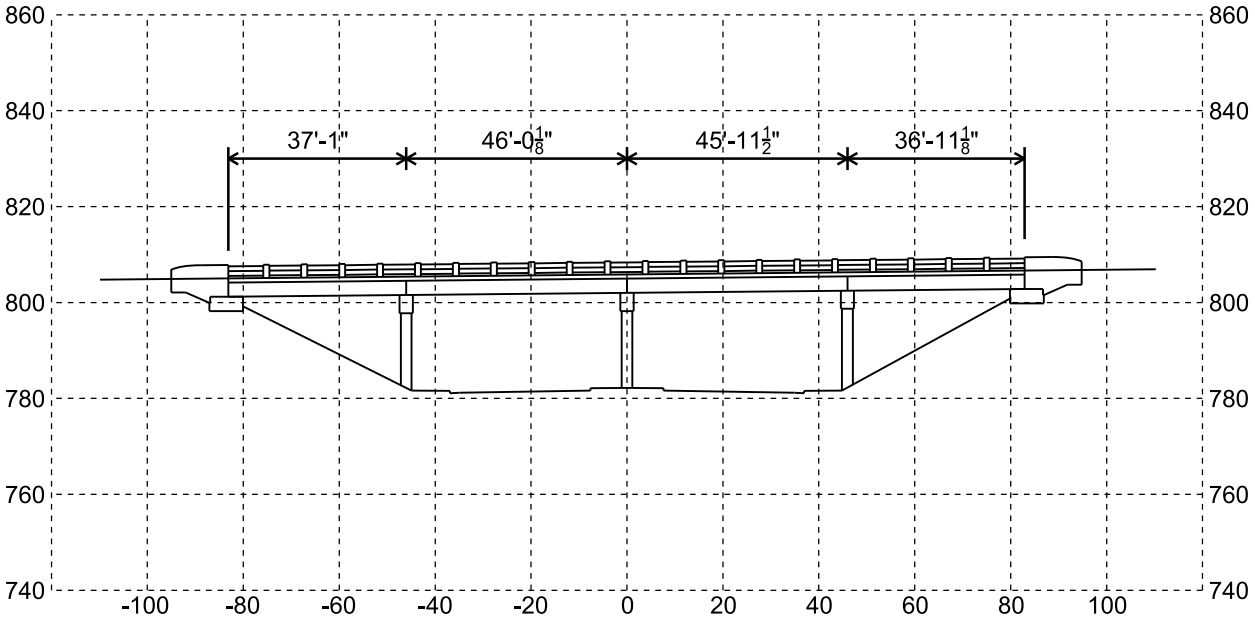
Bridge Figures

PIN 124069.00

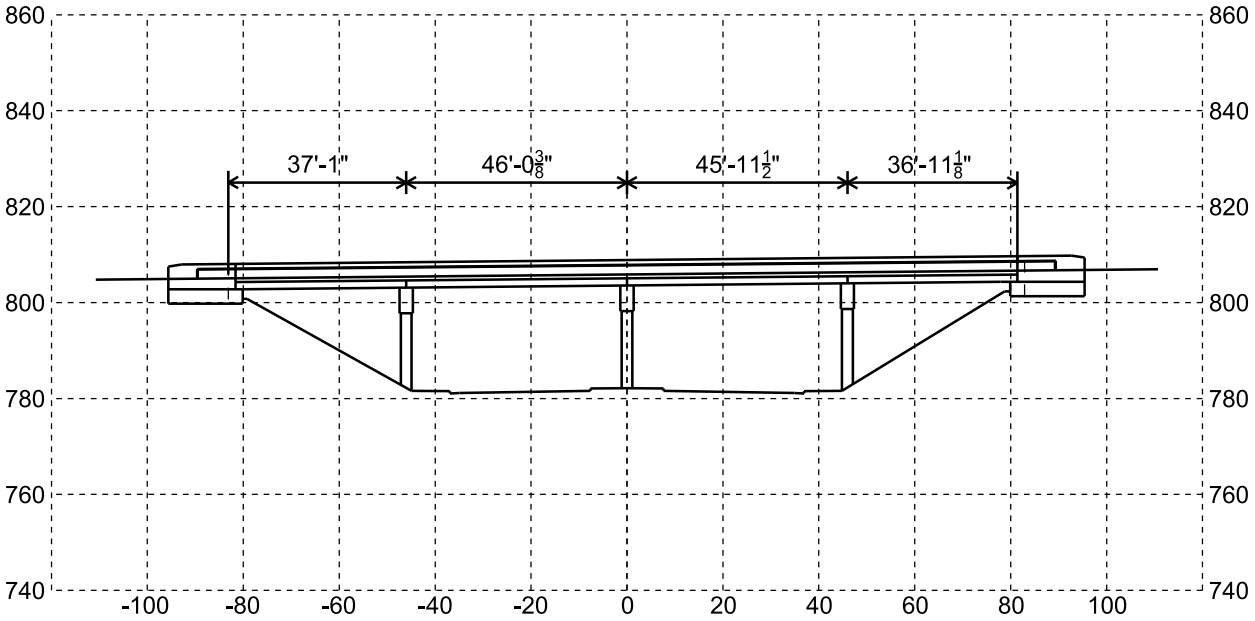
Bridge ID: 33I00240055

INTERSTATE 24 BRIDGE OVER SOUTH GERMANTOWN ROAD

EXISTING STRUCTURE



PROPOSED STRUCTURE
4 SPAN PRECAST CONCRETE BOX BEAMS



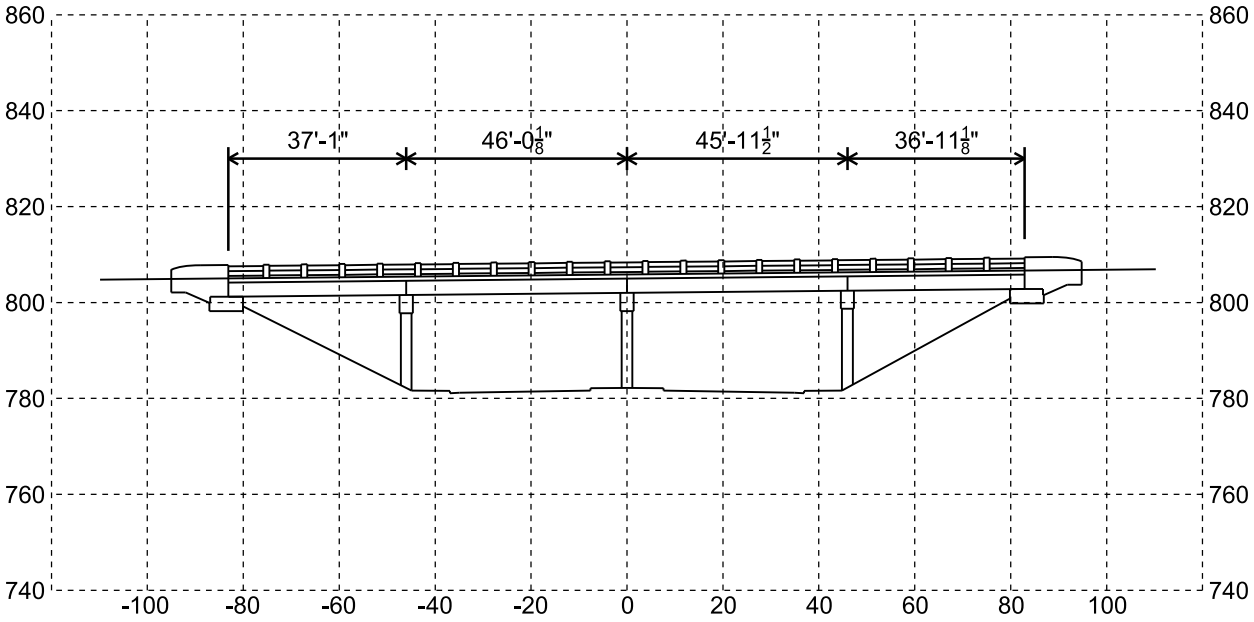
NOTE: PROPOSED BRIDGE NEEDS TO BE LENGTHENED TO ACCOMODATE FUTURE BIKE LANES SHOWN IN THE CITY OF CHATTANOOGA'S BIKE PLAN

PROFILE

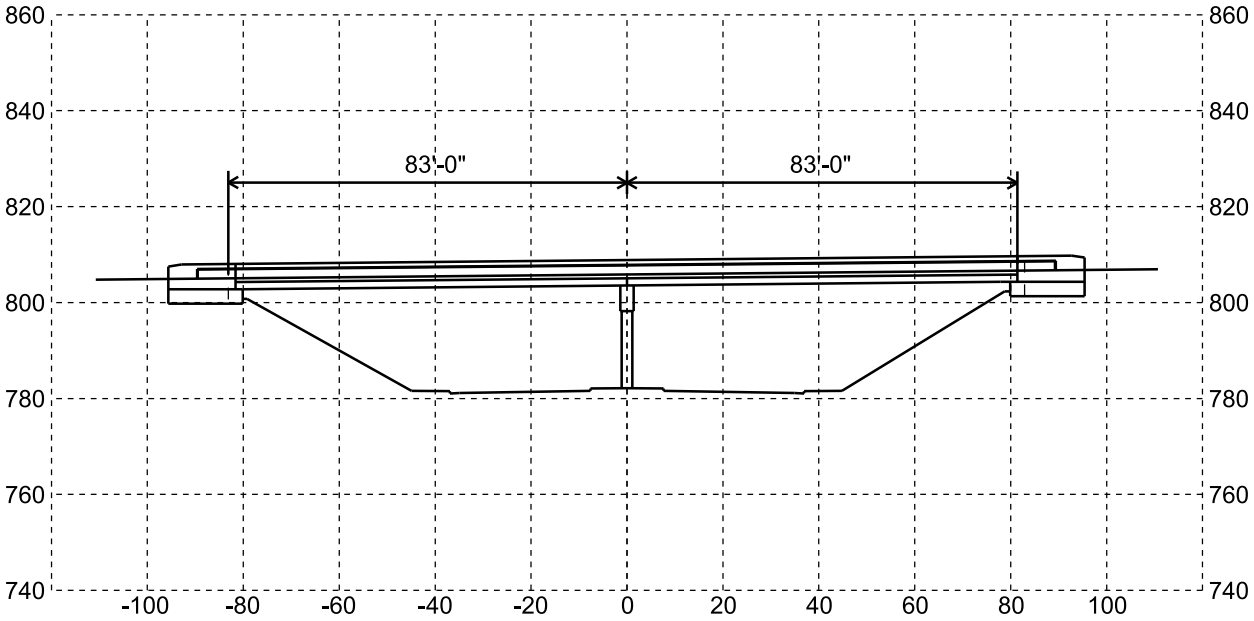
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

INTERSTATE 24 BRIDGE OVER SOUTH GERMANTOWN ROAD

EXISTING STRUCTURE



PROPOSED STRUCTURE
2 SPAN STEEL



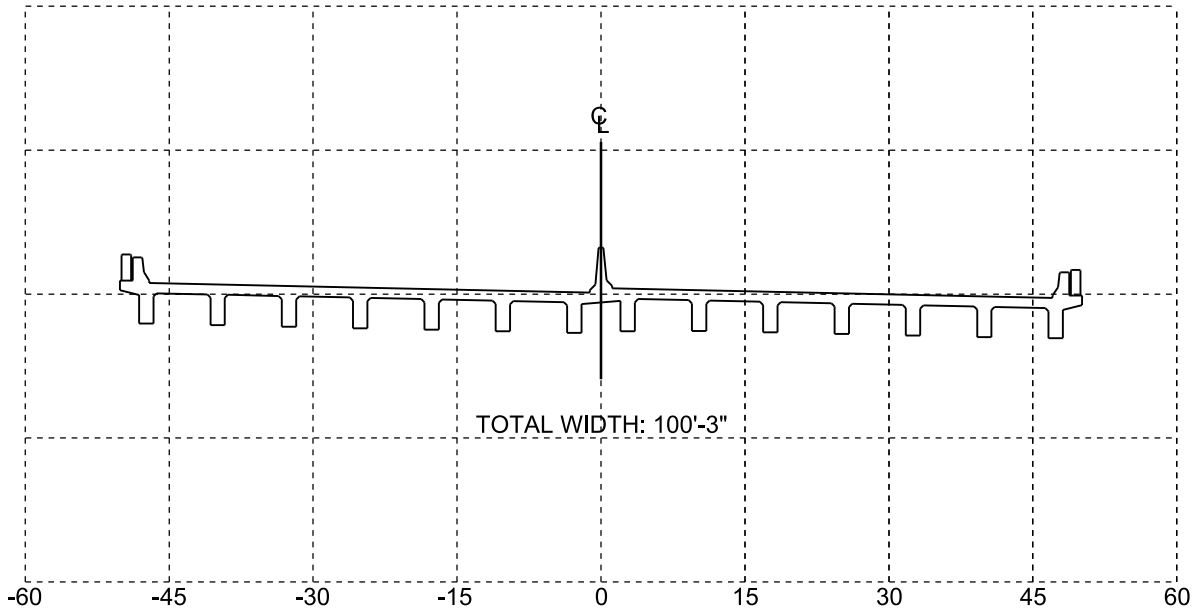
NOTE: PROPOSED BRIDGE NEEDS TO BE LENGTHENED TO ACCOMODATE FUTURE BIKE LANES SHOWN IN THE CITY OF CHATTANOOGA'S BIKE PLAN

PROFILE

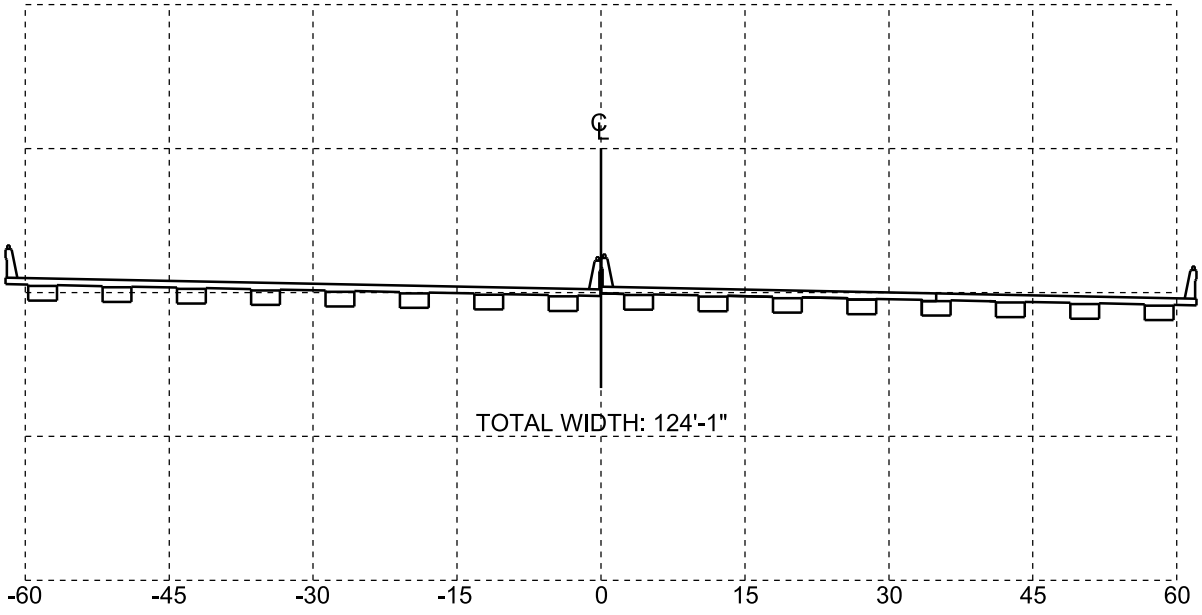
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

INTERSTATE 24 BRIDGE OVER SOUTH GERMANTOWN ROAD

EXISTING STRUCTURE



PROPOSED STRUCTURE
BASELINE: TRADITIONAL CONSTRUCTION - PCC BOX BEAMS

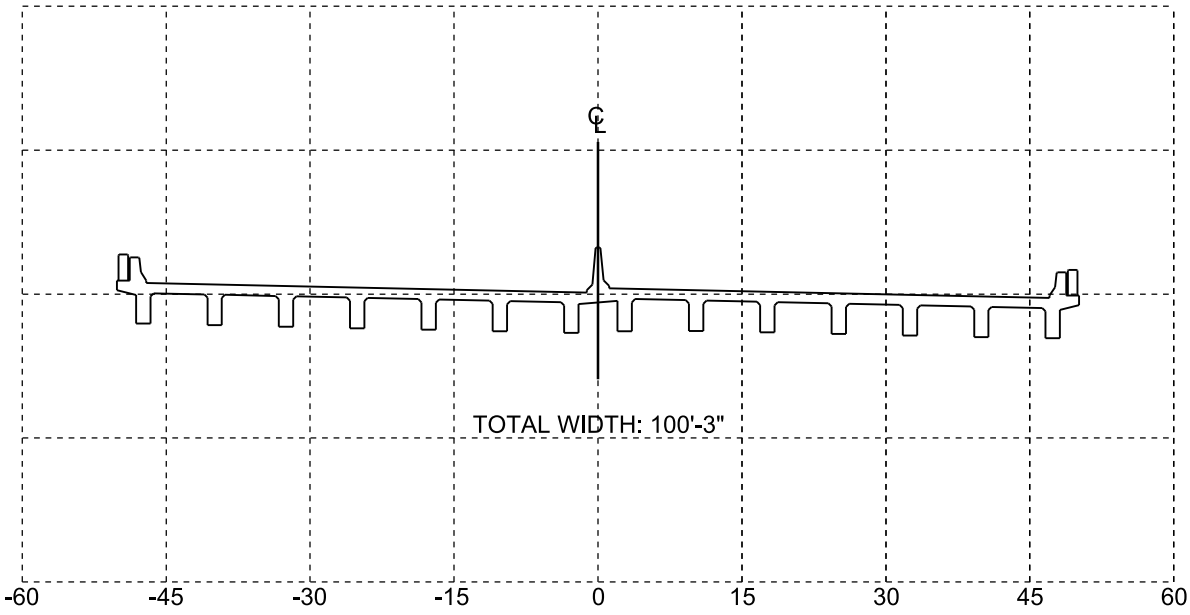


TYPICAL SECTION

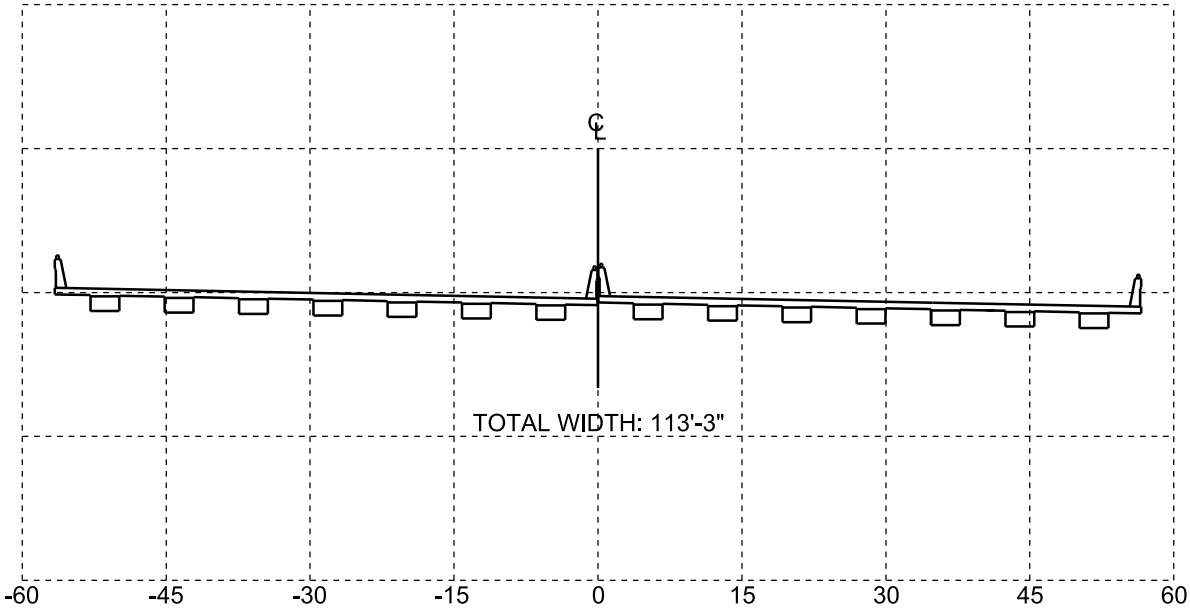
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

INTERSTATE 24 BRIDGE OVER SOUTH GERMANTOWN ROAD

EXISTING STRUCTURE



PROPOSED STRUCTURE
ALTERNATE 1: ABC - PRECAST CONCRETE BOX BEAMS

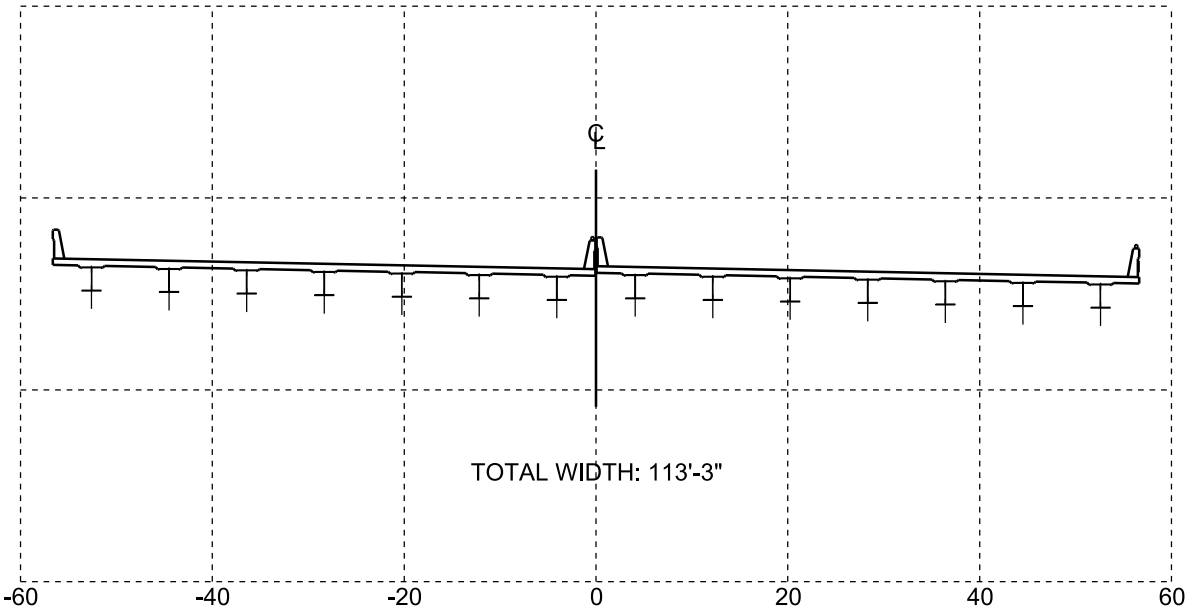


TYPICAL SECTION

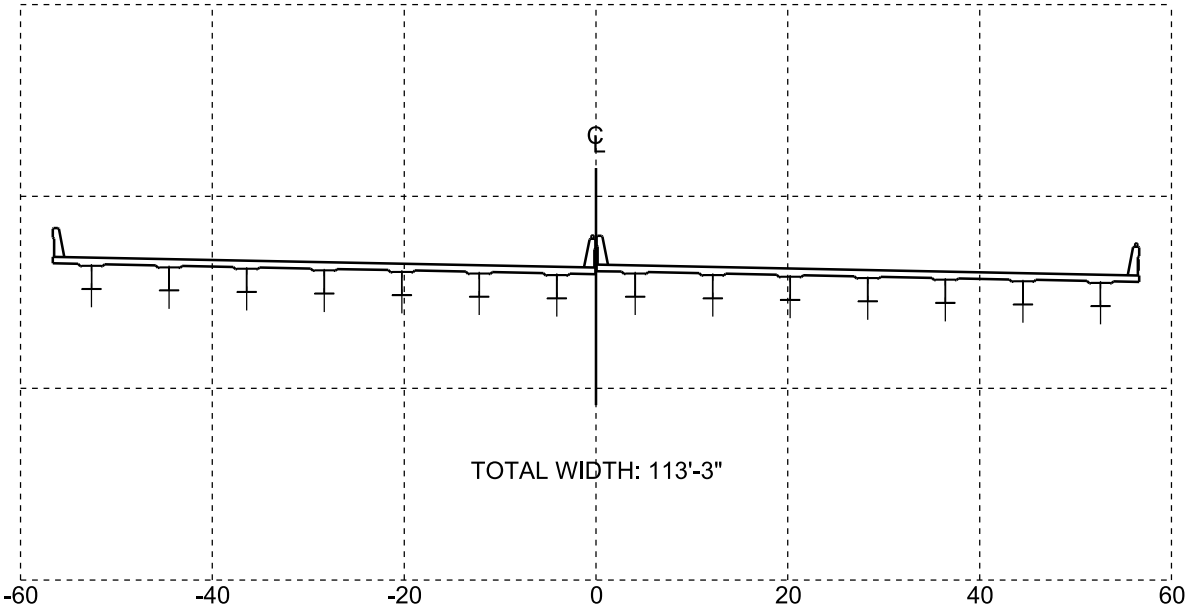
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

INTERSTATE 24 BRIDGE OVER SOUTH GERMANTOWN ROAD

PROPOSED STRUCTURE
ALTERNATE 2: LATERAL SLIDE - 2 SPAN STEEL



PROPOSED STRUCTURE
ALTERNATE 3: SPMT - 2 SPAN STEEL



TYPICAL SECTION

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

ATTACHMENT 1-B

Preliminary Cost Estimate

PIN 124069.00

Bridge ID: 33I00240055

COST ESTIMATE SUMMARY
(BASELINE: TRADITIONAL CONSTRUCTION)

Route:	**Interstate 24 over South Germantown Road**
Description:	**PIN 124069.00 - Interstate 24 over Germantown Rd**
	Log Mile 12.08
County:	**Hamilton**
Length:	
Date:	**June 8, 2018**

DESCRIPTION	LOCAL 0%	STATE 0%	FEDERAL 100%	TOTAL
Construction Items				
Pavement Removal	$0	$0	$159,200	$159,200
Asphalt Paving[4]	$0	$0	$195,000	$195,000
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$0	$54,600	$54,600
Appurtenances	$0	$0	$691,800	$691,800
Structures[3]	$0	$0	$2,692,900	$2,692,900
Fencing	$0	$0	$0	$0
Lighting, Signalization, & ITS	$0	$0	$228,500	$228,500
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$0	$328,800	$328,800
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$0	$0	$0
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$0	$22,000	$22,000
Signing	$0	$0	$4,400	$4,400
Pavement Markings[1]	$0	$0	$11,600	$11,600
Maintenance of Traffic	$0	$0	$294,200	$294,200
Mobilization (5%)	$0	$0	$234,200	$234,200
Other Items[2] = 10%	$0	$0	$491,700	$491,700
Const. Contingency[2] = 15%	$0	$0	$407,400	$407,400
Construction Estimate	$0	$0	$5,816,300	$5,816,300
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$730,700	$730,700
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 10%	$0	$0	$654,700	$654,700
Const. Eng. & Inspec. 10%	$0	$0	$654,700	$654,700
Total Project Cost	$0	$0	$7,856,400	$ 7,856,000

[1] Additional quantities were added to the 'Pavement Markings' pay item to account for temporary traffic control.

[2] 'Other Items' and 'Const. Contingency' were not increased to account for CM/GC method. The price of 'New Bridge (Concrete Girder)' on the following 'Pay Items' spreadsheet in the pay item table reflects the change in preices for various construction methods.

[3] The cost for bridge construction types are as follows and can be seen on the following pay items tables:

Traditional : $125.00/s.f.
ABC 1 (PCC Box Beams & Panels) : $300.00/s.f.
ABC 2 (Lateral Slide) : $500.00/s.f.
ABC 3 (SPMT) : $450.00/s.f.

[4] All traffic phasing options, including temporary ramps, were taken into consideration.

PAY ITEM SUMMARY
(BASELINE: TRADITIONAL CONSTRUCTION)

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	TOOL QUANTITIES	ADDITIONAL QUANTITIES	TOOL QUANTITIES + ADDITIONAL QUANTITIES	Statewide UNIT COST	TOTAL COST
Pavment Removal							
202-08.15	Removal of Curb and Gutter	LF		682	682	$ 5.45	$ 3,717.47
415-01.02	Cold Planning Bituminous Pavement	SY	0	21919.27833	21919	$ 7.09	$ 155,382.84
					PAVEMENT REMOVAL TOTAL (ROUNDED)		$ 159,200
Asphalt Roads							
307-03.08	Asphalt Conc MX (PG76-22)(BPMB-HM) GR B-M2	TON		95.50072583	96	$ 78.53	$ 7,499.52
403-01	Bituminous Material For Tack Coat (TC)	TON	0	7.331722222	7	$ 777.06	$ 5,697.19
411-01.07	ACS (PG64-22) GR "E"	TON	0	313.5	314	$ 111.16	$ 34,849.37
411-02.10	ACS Mix(PG70-22) Grading D	TON	0	1221	1221	$ 113.26	$ 138,286.03
411-03.08	ACS Mix (PG70-22) Thin Lift CS Asphalt	TON		89.58475167	90	$ 96.75	$ 8,667.32
					PAVING TOTAL (ROUNDED)		$ 195,000
Concrete Roads							
					CONCRETE RAMPS AND ROADWAYS TOTAL (ROUNDED)		$ -
Drainage							
607-03.30	18" Pipe Culvert	LF		300	300	$ 52.65	$ 15,793.57
611-09.01	ADJUSTMENT OF EXISTING CATCHBASIN	EA		5	5	$ 736.91	$ 3,684.54
611-09.02	REWORK CATCHBASIN	EA		7	7	$ 1,104.68	$ 7,732.74
611-09.03	CAPPING EXISTING CATCHBASIN	EA		7	7	$ 1,354.35	$ 9,480.42
611-10.01	Catch Basins, Type 10, 0' -4' Depth	EA		6	6	$ 2,973.64	$ 17,841.84
					DRAINAGE TOTAL (ROUNDED)		$ 54,600
Appurtenances							
202-03	Removal of Rigid Pvmt, Sidewalk, Etc	SY		820	820	$ 9.53	$ 7,813.10
701-01.01	Concrete Sidewalk (4")	SF	0	820	820	$ 7.40	$ 6,063.91
701-02.03	Concrete Handicap Ramp	SF		570	570	$ 17.74	$ 10,112.84
702-01	Concrete Curb	CY		25	25	$ 334.36	$ 8,358.93
702-03	Concrete Combined Curb & Gutter	CY	0	40	40	$ 374.57	$ 14,982.88
711-05.01	Removal & Disposal of Concrete Median Barrier	LF		2600	2600	$ 152.55	$ 396,630.00
711-05.71	51" Single Slope Concrete Barrier Wall	LF	0	2600	2600	$ 95.30	$ 247,777.73
					ROADWAY AND PAVEMENT APPURTENANCES TOTAL (ROUNDED)		$ 691,800
Earthwork & Mineral							
203-01	Road & Drainage Excavation (Unclassified)	CY	0	9186.672652	9187	$ 16.73	$ 153,664.94
203-03	Borrow Excavation (Unclassified)	CY	0	11691.06056	11691	$ 14.97	$ 175,064.29
					EARTHWORK & MINERAL TOTAL (ROUNDED)		$ 328,800
Structures							
N/A	Removal of Bridge	SF	0	16642	16642	$ 20.00	$ 332,840.00
N/A	**New Bridge (Box):**	**SF**	**0**	**18880**	**18880**	***$ 125.00***	**$ 2,360,000.00**
					STRUCTURES TOTAL (ROUNDED)		$ 2,692,900
Interchanges and Unique Intersections							
					INTERCHANGES AND UNIQUE INTERSECTIONS TOTAL (ROUNDED)		$ -
Lighting & Signalization							
714-01.32	Structural Lighting	LS		1	1	$ 9,743.29	$ 9,743.29
714-03.01	Direct Brl Conduit (2" PVC, Schedule 40)	LF		250	250	$ 6.67	$ 1,666.42
714-05.04	Pull Boxes (Type C)	EA		4	4	$ 620.37	$ 2,481.49
714-06.05	Cable (1/C # 6 AWG)	LF		500	500	$ 1.05	$ 525.00
714-08.01	Light Standards (45' MH, 15' ARM)	EA		3	3	$ 3,722.26	$ 11,166.78
714-08.28	Found for Light Standards - Roadway	EA		3	3	$ 1,384.42	$ 4,153.26
714-08.30	Remove and Relocate Light Standard	EA		3	3	$ 2,046.75	$ 6,140.25
714-09.03	Luminaires (250 WATT)	EA		3	3	$ 472.73	$ 1,418.19
714-25	Electrical Connection	EA		1	1	$ 599.06	$ 599.06
714-26.05	Temporary Roadway Lighting	LS		1	1	$ 6,825.00	$ 6,825.00
730-01.02	Removal of Signal Equipment	EA		2	2	$ 1,957.79	$ 3,915.58
730-02.09	Signal Head Assembly (130 With Backplate)	EA		10	10	$ 807.65	$ 8,076.53
730-02.17	Signal Head Assembly (150 A2H With Backplate)	EA		2	2	$ 1,313.83	$ 2,627.67
730-03.20	Install Pull Box (Type A)	EA		4	4	$ 385.67	$ 1,542.67
730-03.21	Install Pull Box (Type B)	EA		4	4	$ 481.62	$ 1,926.47
730-05.01	Electrical Service Connection	EA		2	2	$ 2,023.65	$ 4,047.30
730-08.03	Signal Cable - 7 Conductor	LF		800	800	$ 1.65	$ 1,323.59
730-08.30	Interconnect Cable (Copper-Twisted Pair)	LF		1000	1000	$ 2.67	$ 2,670.00
730-12.14	Conduit 3" Diameter (Jack and Bore)	LF		400	400	$ 25.74	$ 10,296.16
730-12.16	Conduit (2" Conduit Schedule 80)	LF		200	200	$ 13.80	$ 2,760.38
730-13.01	VEHICLE LOOP DETECTOR (SHELF MOUNT)	EA		4	4	$ 178.62	$ 714.49
730-14.01	Shielded Detector Cable	LF		350	350	$ 1.27	$ 444.66
730-14.02	Saw Slot	LF		2000	2000	$ 2.89	$ 5,779.41
730-15.32	Cabinet (Eight Phase Base Mounted)	EA		2	2	$ 13,544.50	$ 27,089.00
730-16.02	Eight Phase Actuated Controller	EA		2	2	$ 4,736.56	$ 9,473.13
730-23.88	Cantilever Signal Support (1 ARM @ 45')	EA		3	3	$ 14,116.19	$ 42,348.57
730-23.96	Cantilever Signal Support (1 ARM @ 50')	EA		3	3	$ 19,551.62	$ 58,654.85
					LIGHTING & SIGNALIZATION TOTAL (ROUNDED)		$ 228,500
Guardrail							
705-01.01	Guardrail at Bridge Ends	LF	100		100	$ 73.64	$ 7,364.49
705-04.07	Tan Energy Absg Term (NCHRP, 350, TL3)	EA	4		4	$ 2,352.59	$ 9,410.38
705-04.09	Earth Pad for Type 38 GR End Treatment	EA	4		4	$ 1,294.80	$ 5,179.21
					GUARDRAIL TOTAL (ROUNDED)		$ 22,000
Seeding and Sodding							
					SODDING TOTAL (ROUNDED)		$ -
Maintenace of Traffic							
N/A	Traffic Control	LS	1		1		$ 94,232.64
712-02.02	Interconnected Portable Barrier Rail	LF	0	5200	5200	$ 31.79	$ 165,297.44
712-04.50	Portable Barrier Rail Delineator	EA		100	100	$ 11.17	$ 1,117.27
712-09.01	Removable Pavement Marking Line	LF		16000	16000	$ 2.09	$ 33,494.26
					MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)		$ 294,200
Signs							
Not Listed	Signs (Construction)	LS	1		1	$ -	$ 4,400
					SIGNING TOTAL (ROUNDED)		$ 4,400

PAY ITEM SUMMARY
(BASELINE: TRADITIONAL CONSTRUCTION)

Pavement Markings

716-09.31	STOP LINE	LF		200	200	$ 16.65	$ 3,330.00
716-13.06	Spray Thermo P.M. (40 mil 4")	LM	0.0	2	2.0	$ 2,878.11	$ 5,756.23
716-13.07	Spray Thermo P.M. (40 mil 6")	LM		2	2	$ 1,237.50	$ 2,475.00
						PAVEMENT MARKINGS TOTAL (ROUNDED)	$ 11,600

Fencing

						FENCE TOTAL (ROUNDED)	$ -

Rip-Rap

						RIP-RAP & SLOPE PROTECTION TOTAL (ROUNDED)	$ -

Clearing and Grubing

						CLEAR AND GRUBBING TOTAL (ROUNDED)	$ -

Railroad At-Grade Crossing

						RAILROAD CROSSING OR SEPARATION TOTAL (ROUNDED)	$ -

Utilties

N/A	Overhead Distribution	LM	0.25		0.25	$ 375,000	$ 93,750
N/A	Overhead Transmission	LM	0.25		0.25	$ 750,000	$ 187,500
N/A	Underground Power	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Communication	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Gas	LM	0.25		0.25	$ 250,000	$ 62,500
N/A	Underground Water	LM	0.25		0.25	$ 237,600	$ 59,400
N/A	Underground Sewer	LM	0.25		0.25	$ 310,200	$ 77,550
						UTILITIES TOTAL (ROUNDED)	$ 730,700.00

Right-of-Way

N/A	Right-of-Way	LS	1		1	$ -	$ -
						RIGHT-OF-WAY TOTAL (ROUNDED)	$ -

COST ESTIMATE SUMMARY
(ABC 1 - PCC BOX BEAMS AND PANELS)

Route:	**Interstate 24 over South Germantown Road**
Description:	**PIN 124069.00 - Interstate 24 over Germantown Rd**
	Log Mile 12.08
County:	**Hamilton**
Length:	
Date:	**June 11, 2018**

DESCRIPTION	LOCAL 0%	STATE 0%	FEDERAL 100%	TOTAL
Construction Items				
Pavement Removal	$0	$0	$148,000	$148,000
Asphalt Paving[4]	$0	$0	$195,000	$195,000
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$0	$54,600	$54,600
Appurtenances	$0	$0	$691,800	$691,800
Structures[3]	$0	$0	$6,472,100	$6,472,100
Fencing	$0	$0	$0	$0
Lighting, Signalization, & ITS	$0	$0	$228,500	$228,500
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$0	$328,800	$328,800
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$0	$0	$0
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$0	$22,000	$22,000
Signing	$0	$0	$8,100	$8,100
Pavement Markings[1]	$0	$0	$11,600	$11,600
Maintenance of Traffic	$0	$0	$323,600	$323,600
Mobilization (5%)	$0	$0	$424,200	$424,200
Other Items[2] = 10%	$0	$0	$890,800	$890,800
Const. Contingency[2] = 15%	$0	$0	$499,100	$499,100
Construction Estimate	$0	$0	$10,298,200	$10,298,200
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$730,700	$730,700
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 9%	$0	$0	$1,017,700	$1,017,700
Const. Eng. & Inspec. 10%	$0	$0	$1,102,900	$1,102,900
Total Project Cost	$0	$0	$13,149,500	$ 13,150,000

[1] Additional quantities were added to the 'Pavement Markings' pay item to account for temporary traffic control.

[2] 'Other Items' and 'Const. Contingency' were not increased to account for CM/GC method. The price of 'New Bridge (Concrete Girder)' on the following 'Pay Items' spreadsheet in the pay item table reflects the change in preices for various construction methods.

[3] The cost for bridge construction types are as follows and can be seen on the following pay items tables:

Traditional : $125.00/s.f.
ABC 1 (PCC Box Beams & Panels) : $300.00/s.f.
ABC 2 (Lateral Slide) : $500.00/s.f.
ABC 3 (SPMT) : $450.00/s.f.

(4) All traffic phasing options, including temporary ramps, were taken into consideration.

PAY ITEM SUMMARY
(ABC 1 - PCC BOX BEAMS AND PANELS)

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	TOOL QUANTITIES	ADDITIONAL QUANTITIES	TOOL QUANTITIES + ADDITIONAL QUANTITIES	Statewide UNIT COST	TOTAL COST
Pavment Removal							
202-08.15	Removal of Curb and Gutter	LF		682	682	$ 5.45	$ 3,717.47
415-01.02	Cold Planning Bituminous Pavement	SY	0	20229	20229	$ 7.13	$ 144,274.47
						PAVEMENT REMOVAL TOTAL (ROUNDED)	**$ 148,000**
Asphalt Roads							
307-03.08	Asphalt Conc MX (PG76-22)(BPMB-HM) GR B-M2	TON		95.50072583	96	$ 78.53	$ 7,499.52
403-01	Bituminous Material For Tack Coat (TC)	TON	0	7.331722222	7	$ 777.06	$ 5,697.19
411-01.07	ACS (PG64-22) GR "E"	TON	0	313.5	314	$ 111.16	$ 34,849.37
411-02.10	ACS Mix(PG70-22) Grading D	TON	0	1221	1221	$ 113.26	$ 138,286.03
411-03.08	ACS Mix (PG70-22) Thin Lift CS Asphalt	TON		89.58475167	90	$ 96.75	$ 8,667.32
						PAVING TOTAL (ROUNDED)	**$ 195,000**
Concrete Roads							
						CONCRETE RAMPS AND ROADWAYS TOTAL (ROUNDED)	**$ -**
Drainage							
607-03.30	18" Pipe Culvert	LF		300	300	$ 52.65	$ 15,793.57
611-09.01	ADJUSTMENT OF EXISTING CATCHBASIN	EA		5	5	$ 736.91	$ 3,684.54
611-09.02	REWORK CATCHBASIN	EA		7	7	$ 1,104.68	$ 7,732.74
611-09.03	CAPPING EXISTING CATCHBASIN	EA		7	7	$ 1,354.35	$ 9,480.42
611-10.01	Catch Basins, Type 10, 0' -4' Depth	EA		6	6	$ 2,973.64	$ 17,841.84
						DRAINAGE TOTAL (ROUNDED)	**$ 54,600**
Appurtenances							
202-03	Removal of Rigid Pvmt, Sidewalk, Etc	SY		820	820	$ 9.53	$ 7,813.10
701-01.01	Concrete Sidewalk (4")	SF	0	820	820	$ 7.40	$ 6,063.91
701-02.03	Concrete Handicap Ramp	SF		570	570	$ 17.74	$ 10,112.84
702-01	Concrete Curb	CY		25	25	$ 334.36	$ 8,358.93
702-03	Concrete Combined Curb & Gutter	CY	0	40	40	$ 374.57	$ 14,982.88
711-05.01	Removal & Disposal of Concrete Median Barrier	LF		2600	2600	$ 152.55	$ 396,630.00
711-05.71	51" Single Slope Concrete Barrier Wall	LF	0	2600	2600	$ 95.30	$ 247,777.73
						ROADWAY AND PAVEMENT APPURTENANCES TOTAL (ROUNDED)	**$ 691,800**
Earthwork & Mineral							
203-01	Road & Drainage Excavation (Unclassified)	CY	0	9186.672652	9187	$ 16.73	$ 153,664.94
203-03	Borrow Excavation (Unclassified)	CY	0	11691.06056	11691	$ 14.97	$ 175,064.29
						EARTHWORK & MINERAL TOTAL (ROUNDED)	**$ 328,800**
Structures							
N/A	Removal of Bridge	SF	0	16642	16642	$ 50.00	$ 832,100.00
N/A	**New Bridge (Box):**	**SF**	**0**	**18800**	**18800**	***$ 300.00***	**$ 5,640,000.00**
						STRUCTURES TOTAL (ROUNDED)	**$ 6,472,100**
Interchanges and Unique Intersections							
						INTERCHANGES AND UNIQUE INTERSECTIONS TOTAL (ROUNDED)	**$ -**
Lighting & Signalization							
714-01.32	Structural Lighting	LS		1	1	$ 9,743.29	$ 9,743.29
714-03.01	Direct Brl Conduit (2" PVC, Schedule 40)	LF		250	250	$ 6.67	$ 1,666.42
714-05.04	Pull Boxes (Type C)	EA		4	4	$ 620.37	$ 2,481.49
714-06.05	Cable (1/C # 6 AWG)	LF		500	500	$ 1.05	$ 525.00
714-08.01	Light Standards (45' MH, 15' ARM)	EA		3	3	$ 3,722.26	$ 11,166.78
714-08.28	Found for Light Standards - Roadway	EA		3	3	$ 1,384.42	$ 4,153.26
714-08.30	Remove and Relocate Light Standard	EA		3	3	$ 2,046.75	$ 6,140.25
714-09.03	Luminaires (250 WATT)	EA		3	3	$ 472.73	$ 1,418.19
714-25	Electrical Connection	EA		1	1	$ 599.06	$ 599.06
714-26.05	Temporary Roadway Lighting	LS		1	1	$ 6,825.00	$ 6,825.00
730-01.02	Removal of Signal Equipment	EA		2	2	$ 1,957.79	$ 3,915.58
730-02.09	Signal Head Assembly (130 With Backplate)	EA		10	10	$ 807.65	$ 8,076.53
730-02.17	Signal Head Assembly (150 A2H With Backplate)	EA		2	2	$ 1,313.83	$ 2,627.67
730-03.20	Install Pull Box (Type A)	EA		4	4	$ 385.67	$ 1,542.67
730-03.21	Install Pull Box (Type B)	EA		4	4	$ 481.62	$ 1,926.47
730-05.01	Electrical Service Connection	EA		2	2	$ 2,023.65	$ 4,047.30
730-08.03	Signal Cable - 7 Conductor	LF		800	800	$ 1.65	$ 1,323.59
730-08.30	Interconnect Cable (Copper-Twisted Pair)	LF		1000	1000	$ 2.67	$ 2,670.00
730-12.14	Conduit 3" Diameter (Jack and Bore)	LF		400	400	$ 25.74	$ 10,296.16
730-12.16	Conduit (2" Conduit Schedule 80)	LF		200	200	$ 13.80	$ 2,760.38
730-13.01	VEHICLE LOOP DETECTOR (SHELF MOUNT)	EA		4	4	$ 178.62	$ 714.49
730-14.01	Shielded Detector Cable	LF		350	350	$ 1.27	$ 444.66
730-14.02	Saw Slot	LF		2000	2000	$ 2.89	$ 5,779.41
730-15.32	Cabinet (Eight Phase Base Mounted)	EA		2	2	$ 13,544.50	$ 27,089.00
730-16.02	Eight Phase Actuated Controller	EA		2	2	$ 4,736.56	$ 9,473.13
730-23.88	Cantilever Signal Support (1 ARM @ 45')	EA		3	3	$ 14,116.19	$ 42,348.57
730-23.96	Cantilever Signal Support (1 ARM @ 50')	EA		3	3	$ 19,551.62	$ 58,654.85
						LIGHTING & SIGNALIZATION TOTAL (ROUNDED)	**$ 228,500**
Guardrail							
705-01.01	Guardrail at Bridge Ends	LF	100		100	$ 73.64	$ 7,364.49
705-04.07	Tan Energy Absg Term (NCHRP, 350, TL3)	EA	4		4	$ 2,352.59	$ 9,410.38
705-04.09	Earth Pad for Type 38 GR End Treatment	EA	4		4	$ 1,294.80	$ 5,179.21
						GUARDRAIL TOTAL (ROUNDED)	**$ 22,000**
Seeding and Sodding							
						SODDING TOTAL (ROUNDED)	**$ -**
Maintenace of Traffic							
N/A	Traffic Control	LS	1		1		$ 123,651.90
712-02.02	Interconnected Portable Barrier Rail	LF	0	5200	5200	$ 31.79	$ 165,297.44
712-04.50	Portable Barrier Rail Delineator	EA		100	100	$ 11.17	$ 1,117.27
712-09.01	Removable Pavement Marking Line	LF		16000	16000	$ 2.09	$ 33,494.26
						MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)	**$ 323,600**
Signs							
Not Listed	Signs (Construction)	LS	1		1	$ -	$ 8,100
						SIGNING TOTAL (ROUNDED)	**$ 8,100**

PAY ITEM SUMMARY
(ABC 1 - PCC BOX BEAMS AND PANELS)

Pavement Markings

716-09.31	STOP LINE	LF		200	200	$ 16.65	$ 3,330.00
716-13.06	Spray Thermo P.M. (40 mil 4")	LM	0.0	2	2.0	$ 2,878.11	$ 5,756.23
716-13.07	Spray Thermo P.M. (40 mil 6")	LM		2	2	$ 1,237.50	$ 2,475.00
						PAVEMENT MARKINGS TOTAL (ROUNDED)	**$ 11,600**

Fencing

						FENCE TOTAL (ROUNDED)	**$ -**

Rip-Rap

						RIP-RAP & SLOPE PROTECTION TOTAL (ROUNDED)	**$ -**

Clearing and Grubing

						CLEAR AND GRUBBING TOTAL (ROUNDED)	**$ -**

Railroad At-Grade Crossing

						RAILROAD CROSSING OR SEPARATION TOTAL (ROUNDED)	**$ -**

Utilties

N/A	Overhead Distribution	LM	0.25		0.25	$ 375,000	$ 93,750
N/A	Overhead Transmission	LM	0.25		0.25	$ 750,000	$ 187,500
N/A	Underground Power	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Communication	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Gas	LM	0.25		0.25	$ 250,000	$ 62,500
N/A	Underground Water	LM	0.25		0.25	$ 237,600	$ 59,400
N/A	Underground Sewer	LM	0.25		0.25	$ 310,200	$ 77,550
						UTILITIES TOTAL (ROUNDED)	**$ 730,700.00**

Right-of-Way

N/A	Right-of-Way	LS	1		1	$ -	$ -
						RIGHT-OF-WAY TOTAL (ROUNDED)	**$ -**

COST ESTIMATE SUMMARY
(ABC 2 - LATERAL SLIDE)

Route:	**Interstate 24 over South Germantown Road**
Description:	**PIN 124069.00 - Interstate 24 over Germantown Rd**
	Log Mile 12.08
County:	**Hamilton**
Length:	
Date:	**June 11, 2018**

DESCRIPTION	LOCAL 0%	STATE 0%	FEDERAL 100%	TOTAL
Construction Items				
Pavement Removal[5]	$0	$0	$606,100	$606,100
Asphalt Paving[4][5]	$0	$0	$305,200	$305,200
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$0	$54,600	$54,600
Appurtenances	$0	$0	$691,800	$691,800
Structures[3]	$0	$0	$10,232,100	$10,232,100
Fencing	$0	$0	$0	$0
Lighting, Signalization, & ITS	$0	$0	$228,500	$228,500
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$0	$328,800	$328,800
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$0	$0	$0
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$0	$22,000	$22,000
Signing	$0	$0	$12,500	$12,500
Pavement Markings[1]	$0	$0	$15,300	$15,300
Maintenance of Traffic	$0	$0	$357,400	$357,400
Mobilization (5%)	$0	$0	$642,700	$642,700
Other Items[2] = 10%	$0	$0	$1,349,700	$1,349,700
Const. Contingency[2] = 15%	$0	$0	$692,200	$692,200
Construction Estimate	$0	$0	$15,538,900	$15,538,900
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$730,700	$730,700
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 9%	$0	$0	$1,441,700	$1,441,700
Const. Eng. & Inspec. 10%	$0	$0	$1,627,000	$1,627,000
Total Project Cost	$0	$0	$19,338,300	$ 19,338,000

[1] Additional quantities were added to the 'Pavement Markings' pay item to account for temporary traffic control.

[2] 'Other Items' and 'Const. Contingency' were not increased to account for CM/GC method. The price of 'New Bridge (Concrete Girder)' on the following 'Pay Items' spreadsheet in the pay item table reflects the change in preices for various construction methods.

[3] The cost for bridge construction types are as follows and can be seen on the following pay items tables:

Traditional : $125.00/s.f.
ABC 1 (PCC Box Beams & Panels) : $300.00/s.f.
ABC 2 (Lateral Slide) : $500.00/s.f.
ABC 3 (SPMT) : $450.00/s.f.

[4] All traffic phasing options, including temporary ramps, were taken into consideration.

[5] For the ABC 2 - Lateral Slide construction option, quantities for 'Pavement Removal' and 'Asphalt Paving' would be larger because temporary structures must be built and later removed.

PAY ITEM SUMMARY
(ABC 2 - LATERAL SLIDE)

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	TOOL QUANTITIES	ADDITIONAL QUANTITIES	TOOL QUANTITIES + ADDITIONAL QUANTITIES	Statewide UNIT COST	TOTAL COST
Pavment Removal							
202-03.01	Removal of Asphalt Pavement	SY	0	84480	84480	$ 5.42	$ 458,100.13
202-08.15	Removal of Curb and Gutter	LF		682	682	$ 5.45	$ 3,717.47
415-01.02	Cold Planning Bituminous Pavement	SY	0	20229	20229	$ 7.13	$ 144,274.47
						PAVEMENT REMOVAL TOTAL (ROUNDED)	$ 606,100
Asphalt Roads							
307-01.08	Asphalt Conc MIX (PG64-22) (BPMB-HM) GR B-M2	TON		95.50072583	95.50072583	$ 77.20	$ 7,372.19
403-01	Bituminous Material For Tack Coat (TC)	TON	0	11.73172222	12	$ 774.46	$ 9,085.71
411-01.07	ACS (PG64-22) GR "E"	TON	0	797.5	798	$ 108.88	$ 86,830.76
411-02.10	ACS Mix(PG70-22) Grading D	TON	0	1719.3	1719	$ 112.39	$ 193,227.27
411-03.08	ACS Mix (PG70-22) Thin Lift CS Asphalt	TON		89.58475167	90	$ 96.75	$ 8,667.32
						PAVING TOTAL (ROUNDED)	$ 305,200
Concrete Roads							
						CONCRETE RAMPS AND ROADWAYS TOTAL (ROUNDED)	$ -
Drainage							
607-03.30	18" Pipe Culvert	LF		300	300	$ 52.65	$ 15,793.57
611-09.01	ADJUSTMENT OF EXISTING CATCHBASIN	EA		5	5	$ 736.91	$ 3,684.54
611-09.02	REWORK CATCHBASIN	EA		7	7	$ 1,104.68	$ 7,732.74
611-09.03	CAPPING EXISTING CATCHBASIN	EA		7	7	$ 1,354.35	$ 9,480.42
611-10.01	Catch Basins, Type 10, 0' -4' Depth	EA		6	6	$ 2,973.64	$ 17,841.84
						DRAINAGE TOTAL (ROUNDED)	$ 54,600
Appurtenances							
202-03	Removal of Rigid Pvmt, Sidewalk, Etc	SY		820	820	$ 9.53	$ 7,813.10
701-01.01	Concrete Sidewalk (4")	SF	0	820	820	$ 7.40	$ 6,063.91
701-02.03	Concrete Handicap Ramp	SF		570	570	$ 17.74	$ 10,112.84
702-01	Concrete Curb	CY		25	25	$ 334.36	$ 8,358.93
702-03	Concrete Combined Curb & Gutter	CY	0	40	40	$ 374.57	$ 14,982.88
711-05.01	Removal & Disposal of Concrete Median Barrier	LF		2600	2600	$ 152.55	$ 396,630.00
711-05.71	51" Single Slope Concrete Barrier Wall	LF	0	2600	2600	$ 95.30	$ 247,777.73
						ROADWAY AND PAVEMENT APPURTENANCES TOTAL (ROUNDED)	$ 691,800
Earthwork & Mineral							
203-01	Road & Drainage Excavation (Unclassified)	CY	0	9186.672652	9187	$ 16.73	$ 153,664.94
203-03	Borrow Excavation (Unclassified)	CY	0	11691.06056	11691	$ 14.97	$ 175,064.29
						EARTHWORK & MINERAL TOTAL (ROUNDED)	$ 328,800
Structures							
N/A	Removal of Bridge	SF	0	16642	16642	$ 50.00	$ 832,100.00
N/A	**New Bridge (Steel Girder):**	**SF**	**0**	**18800**	**18800**	***$ 500.00***	**$ 9,400,000.00**
						STRUCTURES TOTAL (ROUNDED)	$ 10,232,100
Interchanges and Unique Intersections							
						INTERCHANGES AND UNIQUE INTERSECTIONS TOTAL (ROUNDED)	$ -
Lighting & Signalization							
714-01.32	Structural Lighting	LS		1	1	$ 9,743.29	$ 9,743.29
714-03.01	Direct Brl Conduit (2" PVC, Schedule 40)	LF		250	250	$ 6.67	$ 1,666.42
714-05.04	Pull Boxes (Type C)	EA		4	4	$ 620.37	$ 2,481.49
714-06.05	Cable (1/C # 6 AWG)	LF		500	500	$ 1.05	$ 525.00
714-08.01	Light Standards (45' MH, 15' ARM)	EA		3	3	$ 3,722.26	$ 11,166.78
714-08.28	Found for Light Standards - Roadway	EA		3	3	$ 1,384.42	$ 4,153.26
714-08.30	Remove and Relocate Light Standard	EA		3	3	$ 2,046.75	$ 6,140.25
714-09.03	Luminaires (250 WATT)	EA		3	3	$ 472.73	$ 1,418.19
714-25	Electrical Connection	EA		1	1	$ 599.06	$ 599.06
714-26.05	Temporary Roadway Lighting	LS		1	1	$ 6,825.00	$ 6,825.00
730-01.02	Removal of Signal Equipment	EA		2	2	$ 1,957.79	$ 3,915.58
730-02.09	Signal Head Assembly (130 With Backplate)	EA		10	10	$ 807.65	$ 8,076.53
730-02.17	Signal Head Assembly (150 A2H With Backplate)	EA		2	2	$ 1,313.83	$ 2,627.67
730-03.20	Install Pull Box (Type A)	EA		4	4	$ 385.67	$ 1,542.67
730-03.21	Install Pull Box (Type B)	EA		4	4	$ 481.62	$ 1,926.47
730-05.01	Electrical Service Connection	EA		2	2	$ 2,023.65	$ 4,047.30
730-08.03	Signal Cable - 7 Conductor	LF		800	800	$ 1.65	$ 1,323.59
730-08.30	Interconnect Cable (Copper-Twisted Pair)	LF		1000	1000	$ 2.67	$ 2,670.00
730-12.14	Conduit 3" Diameter (Jack and Bore)	LF		400	400	$ 25.74	$ 10,296.16
730-12.16	Conduit (2" Conduit Schedule 80)	LF		200	200	$ 13.80	$ 2,760.38
730-13.01	VEHICLE LOOP DETECTOR (SHELF MOUNT)	EA		4	4	$ 178.62	$ 714.49
730-14.01	Shielded Detector Cable	LF		350	350	$ 1.27	$ 444.66
730-14.02	Saw Slot	LF		2000	2000	$ 2.89	$ 5,779.41
730-15.32	Cabinet (Eight Phase Base Mounted)	EA		2	2	$ 13,544.50	$ 27,089.00
730-16.02	Eight Phase Actuated Controller	EA		2	2	$ 4,736.56	$ 9,473.13
730-23.88	Cantilever Signal Support (1 ARM @ 45')	EA		3	3	$ 14,116.19	$ 42,348.57
730-23.96	Cantilever Signal Support (1 ARM @ 50')	EA		3	3	$ 19,551.62	$ 58,654.85
						LIGHTING & SIGNALIZATION TOTAL (ROUNDED)	$ 228,500
Guardrail							
705-01.01	Guardrail at Bridge Ends	LF	100		100	$ 73.64	$ 7,364.49
705-04.07	Tan Energy Absg Term (NCHRP, 350, TL3)	EA	4		4	$ 2,352.59	$ 9,410.38
705-04.09	Earth Pad for Type 38 GR End Treatment	EA	4		4	$ 1,294.80	$ 5,179.21
						GUARDRAIL TOTAL (ROUNDED)	$ 22,000
Seeding and Sodding							
						SODDING TOTAL (ROUNDED)	$ -
Maintenace of Traffic							
N/A	Traffic Control	LS	1		1		$ 157,475.82
712-02.02	Interconnected Portable Barrier Rail	LF	0	5200	5200	$ 31.79	$ 165,297.44
712-04.50	Portable Barrier Rail Delineator	EA		100	100	$ 11.17	$ 1,117.27
712-09.01	Removable Pavement Marking Line	LF		16000	16000	$ 2.09	$ 33,494.26
						MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)	$ 357,400
Signs							
Not Listed	Signs (Construction)	LS	1		1	$ -	$ 12,500

PAY ITEM SUMMARY
(ABC 2 - LATERAL SLIDE)

					SIGNING TOTAL (ROUNDED)	$	12,500
Pavement Markings							
716-09.31	STOP LINE	LF		200	200	$ 16.65	$ 3,330.00
716-13.06	Spray Thermo P.M. (40 mil 4")	LM	0.0	2	2	$ 2,878.11	$ 5,756.23
716-13.07	Spray Thermo P.M. (40 mil 6")	LM		5	5	$ 1,237.50	$ 6,187.50
					PAVEMENT MARKINGS TOTAL (ROUNDED)	$	15,300
Fencing							
					FENCE TOTAL (ROUNDED)	$	-
Rip-Rap							
					RIP-RAP & SLOPE PROTECTION TOTAL (ROUNDED)	$	-
Clearing and Grubing							
					CLEAR AND GRUBBING TOTAL (ROUNDED)	$	-
Railroad At-Grade Crossing							
					RAILROAD CROSSING OR SEPARATION TOTAL (ROUNDED)	$	-
Utilties							
N/A	Overhead Distribution	LM	0.25		0.25	$ 375,000	$ 93,750
N/A	Overhead Transmission	LM	0.25		0.25	$ 750,000	$ 187,500
N/A	Underground Power	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Communication	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Gas	LM	0.25		0.25	$ 250,000	$ 62,500
N/A	Underground Water	LM	0.25		0.25	$ 237,600	$ 59,400
N/A	Underground Sewer	LM	0.25		0.25	$ 310,200	$ 77,550
					UTILITIES TOTAL (ROUNDED)	$	730,700.00
Right-of-Way							
N/A	Right-of-Way	LS	1		1	$ -	$ -
					RIGHT-OF-WAY TOTAL (ROUNDED)	$	-

COST ESTIMATE SUMMARY
(ABC 3 - SPMT)

Route:	**Interstate 24 over South Germantown Road**
Description:	**PIN 124069.00 - Interstate 24 over Germantown Rd**
	Log Mile 12.08
County:	**Hamilton**
Length:	
Date:	**June 11, 2018**

DESCRIPTION	LOCAL 0%	STATE 0%	FEDERAL 100%	TOTAL
Construction Items				
Pavement Removal	$0	$0	$148,000	$148,000
Asphalt Paving[4]	$0	$0	$195,000	$195,000
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$0	$54,600	$54,600
Appurtenances	$0	$0	$691,800	$691,800
Structures[3]	$0	$0	$9,292,100	$9,292,100
Fencing	$0	$0	$0	$0
Lighting, Signalization, & ITS	$0	$0	$228,500	$228,500
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$0	$328,800	$328,800
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$0	$0	$0
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$0	$22,000	$22,000
Signing	$0	$0	$11,000	$11,000
Pavement Markings[1]	$0	$0	$11,600	$11,600
Maintenance of Traffic	$0	$0	$345,600	$345,600
Mobilization (5%)	$0	$0	$566,500	$566,500
Other Items[2] = 10%	$0	$0	$1,189,600	$1,189,600
Const. Contingency[2] = 15%	$0	$0	$569,000	$569,000
Construction Estimate	$0	$0	$13,654,100	$13,654,100
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$730,700	$730,700
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 9%	$0	$0	$1,293,600	$1,293,600
Const. Eng. & Inspec. 10%	$0	$0	$1,438,500	$1,438,500
Total Project Cost	$0	$0	$17,116,900	$ 17,117,000

[1] Additional quantities were added to the 'Pavement Markings' pay item to account for temporary traffic control.

[2] 'Other Items' and 'Const. Contingency' were not increased to account for CM/GC method. The price of 'New Bridge (Concrete Girder)' on the following 'Pay Items' spreadsheet in the pay item table reflects the change in preices for various construction methods.

[3] The cost for bridge construction types are as follows and can be seen on the following pay items tables:

Traditional : $125.00/s.f.
ABC 1 (PCC Box Beams & Panels) : $300.00/s.f.
ABC 2 (Lateral Slide) : $500.00/s.f.
ABC 3 (SPMT) : $450.00/s.f.

[4] All traffic phasing options, including temporary ramps, were taken into consideration.

PAY ITEM SUMMARY
(ABC 3 - SPMT)

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	TOOL QUANTITIES	ADDITIONAL QUANTITIES	TOOL QUANTITIES + ADDITIONAL QUANTITIES	Statewide UNIT COST	TOTAL COST
Pavment Removal							
202-08.15	Removal of Curb and Gutter	LF		682	682	$ 5.45	$ 3,717.47
415-01.02	Cold Planning Bituminous Pavement	SY	0	20229	20229	$ 7.13	$ 144,274.47
						PAVEMENT REMOVAL TOTAL (ROUNDED)	**$ 148,000**
Asphalt Roads							
307-03.08	Asphalt Conc MX (PG76-22)(BPMB-HM) GR B-M2	TON		95.50072583	96	$ 78.53	$ 7,499.52
403-01	Bituminous Material For Tack Coat (TC)	TON	0	7.331722222	7	$ 777.06	$ 5,697.19
411-01.07	ACS (PG64-22) GR "E"	TON	0	313.5	314	$ 111.16	$ 34,849.37
411-02.10	ACS Mix(PG70-22) Grading D	TON	0	1221	1221	$ 113.26	$ 138,286.03
411-03.08	ACS Mix (PG70-22) Thin Lift CS Asphalt	TON		89.58475167	90	$ 96.75	$ 8,667.32
						PAVING TOTAL (ROUNDED)	**$ 195,000**
Concrete Roads							
						CONCRETE RAMPS AND ROADWAYS TOTAL (ROUNDED)	**$ -**
Drainage							
607-03.30	18" Pipe Culvert	LF		300	300	$ 52.65	$ 15,793.57
611-09.01	ADJUSTMENT OF EXISTING CATCHBASIN	EA		5	5	$ 736.91	$ 3,684.54
611-09.02	REWORK CATCHBASIN	EA		7	7	$ 1,104.68	$ 7,732.74
611-09.03	CAPPING EXISTING CATCHBASIN	EA		7	7	$ 1,354.35	$ 9,480.42
611-10.01	Catch Basins, Type 10, 0' -4' Depth	EA		6	6	$ 2,973.64	$ 17,841.84
						DRAINAGE TOTAL (ROUNDED)	**$ 54,600**
Appurtenances							
202-03	Removal of Rigid Pvmt, Sidewalk, Etc	SY		820	820	$ 9.53	$ 7,813.10
701-01.01	Concrete Sidewalk (4")	SF	0	820	820	$ 7.40	$ 6,063.91
701-02.03	Concrete Handicap Ramp	SF		570	570	$ 17.74	$ 10,112.84
702-01	Concrete Curb	CY		25	25	$ 334.36	$ 8,358.93
702-03	Concrete Combined Curb & Gutter	CY	0	40	40	$ 374.57	$ 14,982.88
711-05.01	Removal & Disposal of Concrete Median Barrier	LF		2600	2600	$ 152.55	$ 396,630.00
711-05.71	51" Single Slope Concrete Barrier Wall	LF	0	2600	2600	$ 95.30	$ 247,777.73
						ROADWAY AND PAVEMENT APPURTENANCES TOTAL (ROUNDED)	**$ 691,800**
Earthwork & Mineral							
203-01	Road & Drainage Excavation (Unclassified)	CY	0	9186.672652	9187	$ 16.73	$ 153,664.94
203-03	Borrow Excavation (Unclassified)	CY	0	11691.06056	11691	$ 14.97	$ 175,064.29
						EARTHWORK & MINERAL TOTAL (ROUNDED)	**$ 328,800**
Structures							
N/A	Removal of Bridge	SF	0	16642	16642	$ 50.00	$ 832,100.00
N/A	**New Bridge (Steel Girder):**	**SF**	**0**	**18800**	**18800**	***$ 450.00***	**$ 8,460,000.00**
						STRUCTURES TOTAL (ROUNDED)	**$ 9,292,100**
Interchanges and Unique Intersections							
						INTERCHANGES AND UNIQUE INTERSECTIONS TOTAL (ROUNDED)	**$ -**
Lighting & Signalization							
714-01.32	Structural Lighting	LS		1	1	$ 9,743.29	$ 9,743.29
714-03.01	Direct Brl Conduit (2" PVC, Schedule 40)	LF		250	250	$ 6.67	$ 1,666.42
714-05.04	Pull Boxes (Type C)	EA		4	4	$ 620.37	$ 2,481.49
714-06.05	Cable (1/C # 6 AWG)	LF		500	500	$ 1.05	$ 525.00
714-08.01	Light Standards (45' MH, 15' ARM)	EA		3	3	$ 3,722.26	$ 11,166.78
714-08.28	Found for Light Standards - Roadway	EA		3	3	$ 1,384.42	$ 4,153.26
714-08.30	Remove and Relocate Light Standard	EA		3	3	$ 2,046.75	$ 6,140.25
714-09.03	Luminaires (250 WATT)	EA		3	3	$ 472.73	$ 1,418.19
714-25	Electrical Connection	EA		1	1	$ 599.06	$ 599.06
714-26.05	Temporary Roadway Lighting	LS		1	1	$ 6,825.00	$ 6,825.00
730-01.02	Removal of Signal Equipment	EA		2	2	$ 1,957.79	$ 3,915.58
730-02.09	Signal Head Assembly (130 With Backplate)	EA		10	10	$ 807.65	$ 8,076.53
730-02.17	Signal Head Assembly (150 A2H With Backplate)	EA		2	2	$ 1,313.83	$ 2,627.67
730-03.20	Install Pull Box (Type A)	EA		4	4	$ 385.67	$ 1,542.67
730-03.21	Install Pull Box (Type B)	EA		4	4	$ 481.62	$ 1,926.47
730-05.01	Electrical Service Connection	EA		2	2	$ 2,023.65	$ 4,047.30
730-08.03	Signal Cable - 7 Conductor	LF		800	800	$ 1.65	$ 1,323.59
730-08.30	Interconnect Cable (Copper-Twisted Pair)	LF		1000	1000	$ 2.67	$ 2,670.00
730-12.14	Conduit 3" Diameter (Jack and Bore)	LF		400	400	$ 25.74	$ 10,296.16
730-12.16	Conduit (2" Conduit Schedule 80)	LF		200	200	$ 13.80	$ 2,760.38
730-13.01	VEHICLE LOOP DETECTOR (SHELF MOUNT)	EA		4	4	$ 178.62	$ 714.49
730-14.01	Shielded Detector Cable	LF		350	350	$ 1.27	$ 444.66
730-14.02	Saw Slot	LF		2000	2000	$ 2.89	$ 5,779.41
730-15.32	Cabinet (Eight Phase Base Mounted)	EA		2	2	$ 13,544.50	$ 27,089.00
730-16.02	Eight Phase Actuated Controller	EA		2	2	$ 4,736.56	$ 9,473.13
730-23.88	Cantilever Signal Support (1 ARM @ 45')	EA		3	3	$ 14,116.19	$ 42,348.57
730-23.96	Cantilever Signal Support (1 ARM @ 50')	EA		3	3	$ 19,551.62	$ 58,654.85
						LIGHTING & SIGNALIZATION TOTAL (ROUNDED)	**$ 228,500**
Guardrail							
705-01.01	Guardrail at Bridge Ends	LF	100		100	$ 73.64	$ 7,364.49
705-04.07	Tan Energy Absg Term (NCHRP, 350, TL3)	EA	4		4	$ 2,352.59	$ 9,410.38
705-04.09	Earth Pad for Type 38 GR End Treatment	EA	4		4	$ 1,294.80	$ 5,179.21
						GUARDRAIL TOTAL (ROUNDED)	**$ 22,000**
Seeding and Sodding							
						SODDING TOTAL (ROUNDED)	**$ -**
Maintenace of Traffic							
N/A	Traffic Control	LS	1		1		$ 145,670.52
712-02.02	Interconnected Portable Barrier Rail	LF	0	5200	5200	$ 31.79	$ 165,297.44
712-04.50	Portable Barrier Rail Delineator	EA		100	100	$ 11.17	$ 1,117.27
712-09.01	Removable Pavement Marking Line	LF		16000	16000	$ 2.09	$ 33,494.26
						MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)	**$ 345,600**
Signs							
Not Listed	Signs (Construction)	LS	1		1	$ -	$ 11,000
						SIGNING TOTAL (ROUNDED)	**$ 11,000**

PAY ITEM SUMMARY
(ABC 3 - SPMT)

Pavement Markings

716-09.31	STOP LINE	LF		200	200	$ 16.65	$ 3,330.00
716-13.06	Spray Thermo P.M. (40 mil 4")	LM	0.0	2	2.0	$ 2,878.11	$ 5,756.23
716-13.07	Spray Thermo P.M. (40 mil 6")	LM		2	2	$ 1,237.50	$ 2,475.00
						PAVEMENT MARKINGS TOTAL (ROUNDED)	$ 11,600

Fencing

						FENCE TOTAL (ROUNDED)	$ -

Rip-Rap

						RIP-RAP & SLOPE PROTECTION TOTAL (ROUNDED)	$ -

Clearing and Grubing

						CLEAR AND GRUBBING TOTAL (ROUNDED)	$ -

Railroad At-Grade Crossing

						RAILROAD CROSSING OR SEPARATION TOTAL (ROUNDED)	$ -

Utilties

N/A	Overhead Distribution	LM	0.25		0.25	$ 375,000	$ 93,750
N/A	Overhead Transmission	LM	0.25		0.25	$ 750,000	$ 187,500
N/A	Underground Power	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Communication	LM	0.25		0.25	$ 500,000	$ 125,000
N/A	Underground Gas	LM	0.25		0.25	$ 250,000	$ 62,500
N/A	Underground Water	LM	0.25		0.25	$ 237,600	$ 59,400
N/A	Underground Sewer	LM	0.25		0.25	$ 310,200	$ 77,550
						UTILITIES TOTAL (ROUNDED)	$ 730,700.00

Right-of-Way

N/A	Right-of-Way	LS	1		1	$ -	$ -
						RIGHT-OF-WAY TOTAL (ROUNDED)	$ -

ATTACHMENT 1-C

Projected Traffic

PIN 124069.00

Bridge ID: 33I00240055

TENNESSEE DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

PROJECT NO.: BR-I-24-3(97) : 33003-0166-44 ROUTE: I-24 & BELVOIR AVE. BRIDGES
COUNTY: HAMILTON CITY: CHATTANOOGA
PROJECT PIN NUMBER: 124069.00
PROJECT DESCRIPTION: [1] I-24 BRIDGE OVER GERMANTOWN RD @ L.M. 12.08 TRAFFIC DATA.
[2] BELVOIR AVE. BRIDGE OVER I-24 @ L.M. 1.01 TRAFFIC DATA.

DIVISION REQUESTING:

MAINTENANCE	☐	PAVEMENT DESIGN	☐
S.T.I.D.	☐	STRUCTURES	☐
PROG. DEVELOPMENT & ADM.	☐	SURVEY & ROADWAY DESIGN	☐
PUBLIC TRANS. & AERO.	☐	TRAFFIC SIGNAL DESIGN	☐
		OTHER CONSULTANT	☒

YEAR PROJECT PROGRAMMED FOR CONSTRUCTION:
PROJECTED LETTING DATE:

TRAFFIC ASSIGNMENT:

	BASE YEAR		DESIGN YEAR					DESIGN ROADWAY % TRUCKS		DESIGN AVERAGE DAILY LOADS	
	AADT	YEAR	AADT	DHV	%	YEAR	DIR.DIST.	DHV	AADT	FLEX	RIGID
[1]	114,670	2022	142,650	12,830	9	2042	65-35	15	23	8,840	13,414
[2]	9,300	2022	10,230	1,125	11	2042	70-30	2	3	88	112

REQUESTED BY: NAME LAUREN GAINES DATE 2/14/18
DIVISION BARGE DESIGN SOLUTIONS
ADDRESS 615 3rd AVE. S. SUITE 700
NASHVILLE TN 37210

REVIEWED BY: TONY ARMSTRONG Tony Armstrong DATE 2·15·18
TRANSPORTATION MANAGER 1
SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: JIM WATERS for DATE 2-15-18
ASSISTANT DIRECTOR
SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

THIS TRAFFIC WAS TAKEN FROM TWO PREVIOUS PROJECTS PREPARED FOR S.T.I.D. DATED 11/28/2017 AND 1/3/2018 WITH THE ADDITION OF ADL's FOR PAVEMENT DESIGN.

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. (REV. 2/22/17)

TENNESSEE DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

PROJECT NO.: BR-I-24-3(97) : 33003-0166-44 ROUTE NO.: I-24 [1]
COUNTY: HAMILTON CITY: CHATTANOOGA
PROJECT DESCRIPTION: BRIDGE OVER GERMANTOWN ROAD @ L.M. 12.08.

Interstate

Pavement Structural Design

Calculation of Equivalent Daily 18 Kip Single Axle Loads

Type Vehicle		ADT (No. Counted)	Flexible 18-kip Factor	Flexible ADL	Rigid 18-kip Factor	Rigid ADL
Pass. cars and motorcycles (1-2)		59,183	0.001	59	0.001	59
Pick-up, Panel, Van (3)		39,885	0.004	160	0.005	199
Sing. Unit	Buses (4)	579	0.300	174	0.300	174
	2-axle, 6-tire (5)	3,409	0.170	580	0.170	580
	3-axle or more (6-7)	1,351	0.700	946	1.000	1,351
Comb.	4-axle (8)	820	0.700	574	0.780	640
	5-axle or more (9-13)	23,433	1.100	25,776	1.780	41,711
Totals (202 AADT)		128,660		28,268		44,713

Suggested Percentages of Trucks in Design Lane

	4 Lane	6 Lane	8 Lane
5,000 or less ADT	90%	75%	70%
5,000 - 10,000 ADT	80%	70%	65%
10,000 - 15,000 ADT	75%	65%	60%
15,000 - 20,000 ADT	75%	65%	55%
20,000 - 30,000 ADT	70%	60%	50%
30,000 Plus ADT	65%	60%	50%

No. of Lanes: 6
% Trucks in Design Lane: 60%
ADL in Design Lane:

FLEX:	0.5	X	0.60	X	28268.0	=	8,480
RIGID:	0.5	X	0.60	X	44713.2	=	13,414

ADL Calculations By: RANDY BOGUSKIE Date: 2/14/2018
Reviewed By: Tony Kuntz Date: 2-15-18
[REV. 7-1-14]

ATTACHMENT 1-D

Bridge TIR Tables

PIN 124069.00

Bridge ID: 33I00240055

BRIDGE TIR

LOCATION			
Bridge #:	33I00240055	Feature Crossed:	S. Germantown Road (FAU3577)
Road Name:	I-24	Log mile:	12.08
Route ID:	I0024	System:	NHS Route
City:	Chattanooga	Functional Class:	Urban Interstate
County:	Hamilton	State Project Number	BR-I-24-3(97)
PIN:	124069.00		

ROADWAY		
	Existing	**Proposed (Preliminary Design Estimate)**
Design Standard		RD01-TS-5B
Route Characteristics		
AADT:	114,670	142,650
AADT Year:	2022	2042
Terrain:	Rolling	Rolling
No. Lanes:	6 total (3 in each direction)	6 total (3 in each direction)
Speed(Posted):	55	55
Speed (Design):		55
Approach Character.		
Lane Width (ft):	12	12
Shoulder Width (ft):	3 (outside) |8 (inside)	12 (outside) | 8 (inside)
ROW Width (ft):	300	300
ROW Tracts Affected		0
ROW Required (acre)		n/a
Cross Section Width (ft):	94	112
Approach Length (ft):		24 - Each Approach
Alignment:	1˚ Curve, Vertical Curve	1˚ Curve, Vertical Curve
Grade:		Vertical Curve
Surface Material:	Asphalt	Asphalt
Sidewalks (R/L):	No	No
App. Lower Than Structure	No	No
Utilities (list)	OH: Distribution & Transmission; UG: Communication, Electric, Gas, & Water;	OH: Distribution & Transmission; UG: Communication, Gas, & Water;
Utilities to be Relocated		OH: Distribution & Transmission; UG: Communication & Water;
Comments		

STRUCTURE (BASELINE: TRADITIONAL CONSTRUCTION)		
	Existing	**Proposed (Preliminary Design Estimate)**
Bridge Characteristics		
Year Built	1965	
Load Limit	20 tons	
Sufficiency Rating	30.9	
Skew	79˚	79˚
Structure Type	Span Concrete Bridge	Span Concrete Bridge
Structures in Channel	n/a	n/a
Length (ft)	166	166
No. Spans (App./Main)	0 | 4	0 | 4
Width (curb to curb) (ft)	94.1	121.58
Width (o to o) (ft)	100.33	124.08
Sidewalks on Structure	No	No
Vert. Clearance (ft)	14.44	TBD
Superstructure Depth (in)	51.5	28
Girder Depth (in)	38	18
Finish Grade-Low Girder (in)	51.5	28
High Water Marks	n/a	
Bridge Rail Type	STD-1-1	STD-1-1
Bridge Rail Height (ft)	2.67	3
Indication Overtopping	n/a	
Local Scour	No	
Obstructions	n/a	
Other Structures		stream running in pipe under Interstate 24; not anticipated to be impacted by this project.
Comments		Construction Manager/General Contractor (CM/GC) Project

STRUCTURE (ALTERNATE #1: ABC PRE-CAST BOX BEAMS)		
	Existing	**Proposed (Preliminary Design Estimate)**
Bridge Characteristics		
Year Built	1965	
Load Limit	20 tons	
Sufficiency Rating	30.9	
Skew	79˚	79˚
Structure Type	Span Concrete Bridge	Span Concrete Bridge
Structures in Channel	n/a	n/a
Length (ft)	166	166
No. Spans (App./Main)	0 | 4	0 | 4
Width (curb to curb) (ft)	94.1	110.75
Width (o to o) (ft)	100.33	113.25
Sidewalks on Structure	No	No
Vert. Clearance (ft)	14.44	TBD
Superstructure Depth (in)	51.5	28
Girder Depth (in)	38	18
Finish Grade-Low Girder (in)	51.5	28
High Water Marks	n/a	
Bridge Rail Type	STD-1-1	STD-1-1
Bridge Rail Height (ft)	2.67	3
Indication Overtopping	n/a	
Local Scour	No	
Obstructions	n/a	
Other Structures		stream running in pipe under Interstate 24; not anticipated to be impacted by this project.
Comments		Construction Manager/General Contractor (CM/GC) Project

STRUCTURE (ALTERNATE #2: LATERAL SLIDE CONSTRUCTION)		
	Existing	**Proposed (Preliminary Design Estimate)**
Bridge Characteristics		
Year Built	1965	
Load Limit	20 tons	
Sufficiency Rating	30.9	
Skew	79˚	79˚
Structure Type	Span Concrete Bridge	Span Steel (WPG) Bridge
Structures in Channel	n/a	n/a
Length (ft)	166	166
No. Spans (App./Main)	0 | 4	0 | 2
Width (curb to curb) (ft)	94.1	112
Width (o to o) (ft)	100.33	113.25
Sidewalks on Structure	No	No
Vert. Clearance (ft)	14.44	TBD
Superstructure Depth (in)	51.5	46
Girder Depth (in)	38	36
Finish Grade-Low Girder (in)	51.5	46
High Water Marks	n/a	
Bridge Rail Type	STD-1-1	STD-1-1
Bridge Rail Height (ft)	2.67	3
Indication Overtopping	n/a	
Local Scour	No	
Obstructions	n/a	
Other Structures		stream running in pipe under Interstate 24; not anticipated to be impacted by this project.
Comments		Construction Manager/General Contractor (CM/GC) Project

STRUCTURE (ALTERNATE #3: SPMT CONSTRUCTION)		
	Existing	**Proposed (Preliminary Design Estimate)**
Bridge Characteristics		
Year Built	1965	
Load Limit	20 tons	
Sufficiency Rating	30.9	
Skew	79˚	79˚
Structure Type	Span Concrete Bridge	Span Steel (WPG) Bridge
Structures in Channel	n/a	n/a
Length (ft)	166	166
No. Spans (App./Main)	0 | 4	0 | 2
Width (curb to curb) (ft)	94.1	112
Width (o to o) (ft)	100.33	113.25
Sidewalks on Structure	No	No
Vert. Clearance (ft)	14.44	TBD
Superstructure Depth (in)	51.5	46
Girder Depth (in)	38	36
Finish Grade-Low Girder (in)	51.5	46
High Water Marks	n/a	
Bridge Rail Type	STD-1-1	STD-1-1
Bridge Rail Height (ft)	2.67	3
Indication Overtopping	n/a	
Local Scour	No	
Obstructions	n/a	
Other Structures		stream running in pipe under Interstate 24; not anticipated to be impacted by this project.
Comments		Construction Manager/General Contractor (CM/GC) Project

FLOW RATES (from USGS StreamStats Program Version 3)	
Drainage Area (sq. miles)	0.38
10 Year Discharge Rate (Q10) cfs	154
50 Year Discharge Rate (Q50) cfs	240
100 Year Discharge Rate (Q100) cfs	284

CHANNEL	
Depth (ft)	n/a
Width of Normal Flow (ft)	n/a
Depth of Normal Flow (ft)	n/a
Skew of Channel with Roadway	n/a
Type of Material in Stream Bed	n/a
Type of Vegetation on Banks	n/a
Are Channel Banks Stable	n/a
Signs of Stream Aggradation	n/a
Signs of Stream Degradation	n/a
Drift or Drift Potential	n/a
Comments	

FLOODPLAIN	
Skew Same as Channel	n/a
Symmetrical About Channel	n/a
Approx. Floor Elevations	n/a
Type of Vegetation in Floodplain	n/a
Any Buildings in Floodplain	n/a
Flood Information From Locals	n/a
Comments	According to the FEMA Map, there is not a floodplain in the area of the site.

MAINTENANCE OF TRAFFIC	
Method of Maintaining Traffic	temporary detour
Description	Temporary detour/On site detour/Shift centerline: there are currently 4 various options for construction phasing. Two (2) options include types of road closures, and two (2) other options include shifting traffic in different stages. The official traffic control will be decided once a CM (construction manager) is on board.
Comments	Construction Manager/General Contractor (CM/GC) Project

SITE VISIT ATTENDEES			DATE: 4/5/2018
Name	Organization	Phone	Email
Mike Gilbert	TDOT STID	615.741.0772	michael.gilbert@tn.gov
Jeremy Sims	TDOT Region 2	423.510.1227	jeremy.sims@tn.gov
Alan Wolfe	TDOT Region 2 Traffic	423.510.1139	alan.wolfe@tn.gov
Zach Johnson	TDOT Region 2 Traffic	423.510.6914	zach.johnson@tn.gov
Robert Rodgers	TDOT Region 2 Design	423.510.1138	robert.rodger@tn.gov
Michael Cloud	TDOT Region 2	615.532.1676	michael.cloud@tn.gov
Garris Bugg	TDOT Region 2		garris.bugg@tn.gov
Wade Goss	TDOT Region 2		wade.goss@tn.gov
Ben Taylor	City of Chattanooga	423.643.5557	bgtaylor@chattanooga.gov
Wes Hughen	TDOT Region 2	423.510.1133	wesley.hughen@tn.gov
Adam Casteel	TDOT R2 Operations	423.208.6113	adam.casteel@tn.gov
Jamie Fitzpatrick	TDOT HQ Construction	615.741.0781	jamie.fitzpatrick@tn.gov
Robert LeFevre	TDOT Structures	615.741.0798	robert.lefevre@tn.gov
Nitaya Chayangkura	TDOT HQ Construction	615.532.8848	nitaya.chayangkura@tn.gov
Joe Deering	TDOT Region 2	423.892.3430	joe.deering@tn.gov
Gary Chapman	TDOT Region 2 Survey	423.510.1144	gary.chapman@tn.gov
Ken Flynn	TDOT R2 Operations	423.510.1217	ken.flynn@tn.gov
Scott Medlin	TDOT R2 Environmental	423.570.1118	scott.medlin@tn.gov
Doug Ford	TDOT Region 2 Survey	423.298.3279	douglas.ford@tn.gov
Jonathan Haycraft	Barge Design	615.252.4242	jonathan.haycraft@bargedesign.com
Kevin McAlister	Barge Design	615.252.4294	kevin.mcalister@bargedesign.com
Lauren Gaines	Barge Design	615.252.4243	lauren.gaines@bargedesign.com
Patrick Leap	Barge Design	615.252.4260	patrick.leap@bargedesign.com

ATTACHMENT 1-E

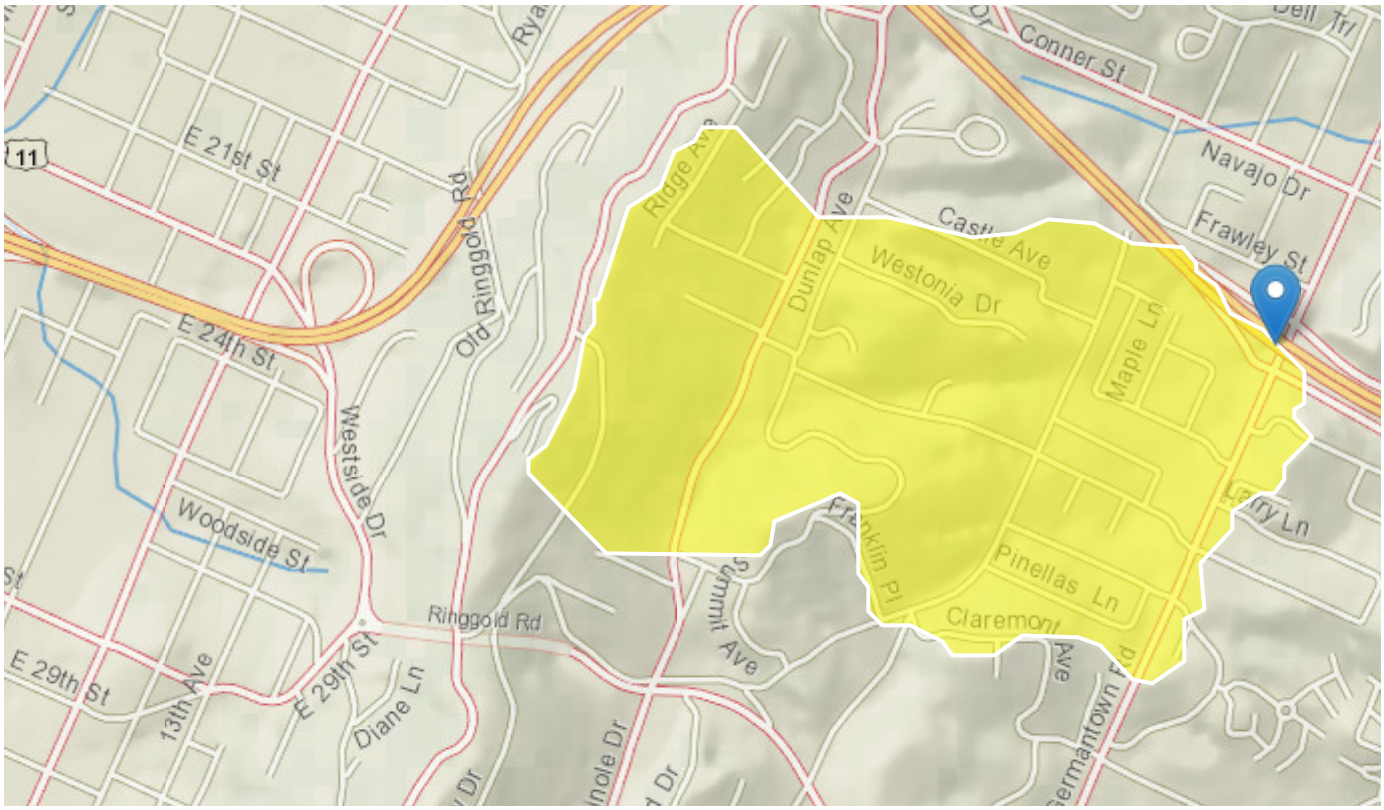
Stream Stats

PIN 124069.00

Bridge ID: 33I00240055

StreamStats Report

Region ID: TN
Workspace ID: TN20180205194623319000
Clicked Point (Latitude, Longitude): 35.01425, -85.25202
Time: 2018-02-05 13:46:37 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CONTDA	Area that contributes flow to a point on a stream	0.38	square miles
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	209.22	feet per mi
CLIMFAC2YR	Two-year climate factor from Lichy and Karlinger (1990)	2.351	dimensionless
DRNAREA	Area that drains to a point on a stream	0.38	square miles
RECESS	Number of days required for streamflow to recede one order of magnitude when hydrograph is plotted on logarithmic scale	112	days per log cycle
SOILPERM	Average Soil Permeability	1.97	inches per hour
PERMGTE2IN	Percent of area underlain by soils with permeability greater than or equal to 2 inches per hour	100.005	percent

Peak-Flow Statistics Parameters [MultiVariable Area 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	0.38	square miles	0.2	9000
CSL10_85	Stream Slope 10 and 85 Method	209.22	feet per mi	3.29	950
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.06	2.32

Peak-Flow Statistics Disclaimers [MultiVariable Area 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [MultiVariable Area 1]

Statistic	Value	Unit
2 Year Peak Flood	72.6	ft^3/s
5 Year Peak Flood	119	ft^3/s
10 Year Peak Flood	154	ft^3/s
25 Year Peak Flood	203	ft^3/s
50 Year Peak Flood	240	ft^3/s
100 Year Peak Flood	284	ft^3/s
500 Year Peak Flood	388	ft^3/s

Peak-Flow Statistics Citations

Law, G.S., and Tasker G.D.,2003, Flood-Frequency Prediction Methods for Unregulated Streams of Tennessee, 2000: U.S. Geological Survey Water-Resources Investigations Report 03-4176, 79p. (http://pubs.usgs.gov/wri/wri034176/)

Low-Flow Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.38	square miles	1.3	14441
RECESS	Recession Index	112	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72
PERMGTE2IN	Percent permeability gte 2 in per hr	100.005	percent	2	100

Low-Flow Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
7 Day 10 Year Low Flow	0.0555	ft^3/s
30 Day 5 Year Low Flow	0.0746	ft^3/s

Low-Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

Annual Flow Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.38	square miles	1.3	14441
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72

Annual Flow Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Annual Flow Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
Mean Annual Flow	0.62	ft^3/s

Annual Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

Seasonal Flow Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.38	square miles	1.3	14441
RECESS	Recession Index	112	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72

Seasonal Flow Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Seasonal Flow Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
Summer Mean Flow	0.241	ft^3/s

Seasonal Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

Flow-Duration Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.38	square miles	1.3	14441
RECESS	Recession Index	112	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72
PERMGTE2IN	Percent permeability gte 2 in per hr	100.005	percent	2	100

Flow-Duration Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Flow-Duration Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
99.5 Percent Duration	0.0533	ft^3/s
99 Percent Duration	0.0571	ft^3/s
98 Percent Duration	0.0648	ft^3/s
95 Percent Duration	0.0745	ft^3/s
90 Percent Duration	0.0876	ft^3/s
80 Percent Duration	0.104	ft^3/s
70 Percent Duration	0.133	ft^3/s
60 Percent Duration	0.174	ft^3/s
50 Percent Duration	0.242	ft^3/s
40 Percent Duration	0.35	ft^3/s
30 Percent Duration	0.509	ft^3/s

Statistic	Value	Unit
20 Percent Duration	0.756	ft^3/s
10 Percent Duration	1.23	ft^3/s

Flow-Duration Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

ATTACHMENT 1-F

FEMA Map

PIN 124069.00

Bridge ID: 33I00240055

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross-sections and interpolated between cross-sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NVNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

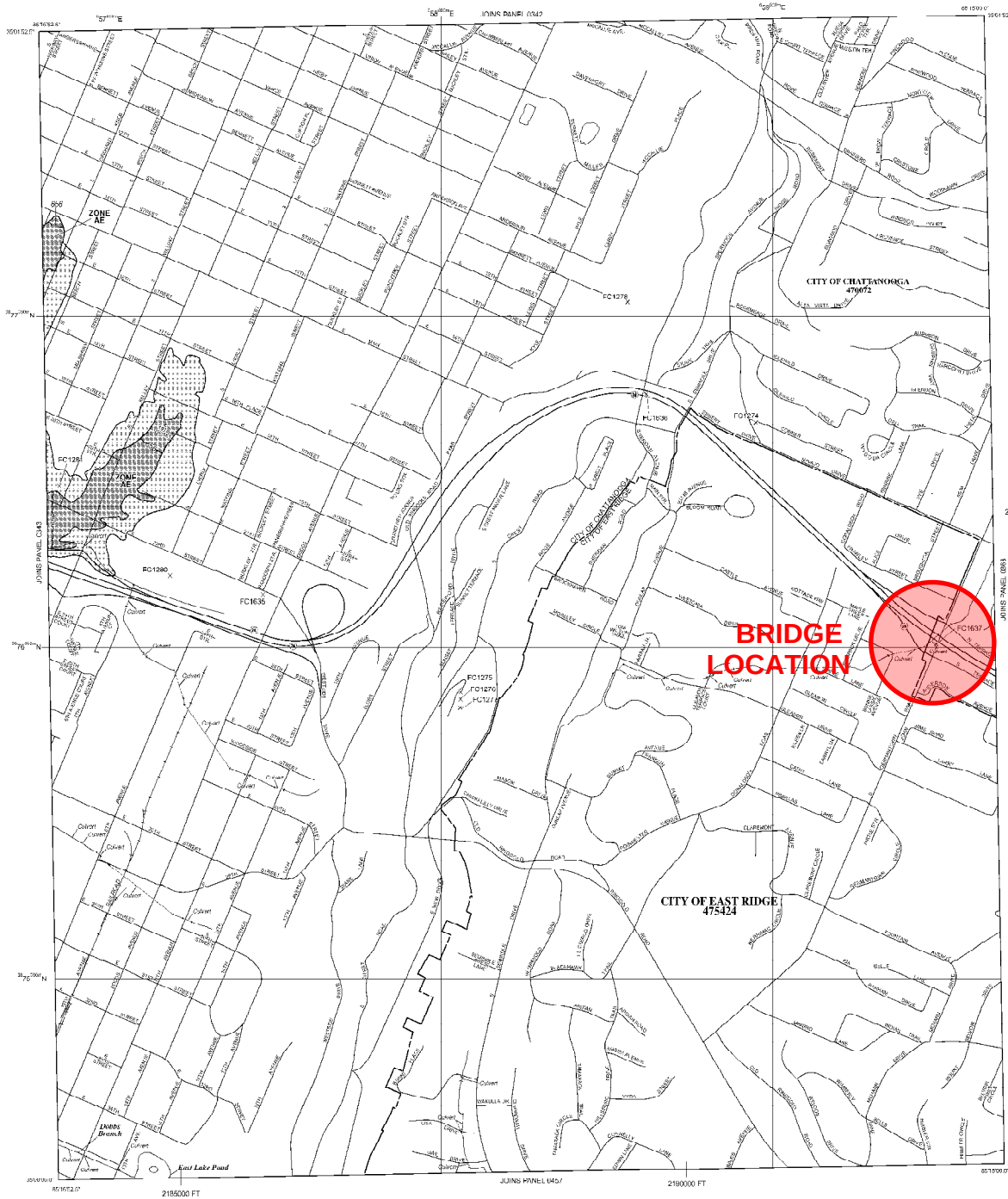
To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map data was provided by Hamilton County GIS. New vector information was compiled in 2008 - 2013 by Hamilton County GIS. Some effective base map features have been used in effective portions of the map. These features were compiled at a scale of 1:1,200 from aerial photograph dated March 1997. This map may reflect more detailed or up to date stream channel configurations than those shown on the previous FIRM. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to those new stream channel configurations and improved topographic data. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the **FEMA Map Service Center** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the **FEMA Map Service Center** website or by calling the FEMA Map Information eXchange.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mN — 1000 meter Universal Transverse Mercator grid values, zone 16
- 6000000 FT — 5000-foot grid ticks: Tennessee State Plane coordinate system, (FIPSZONE 4100), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index.

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
November 7, 2013
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 3, 2016 - to update corporate limits and to add roads and road names

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0344G

FIRM
FLOOD INSURANCE RATE MAP
HAMILTON COUNTY, TENNESSEE
AND INCORPORATED AREAS

PANEL 344 OF 520
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHATTANOOGA, CITY OF	470072	0344	G
EAST RIDGE, CITY OF	475424	0344	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47065C0344G

MAP REVISED
FEBRUARY 3, 2016

Federal Emergency Management Agency

ATTACHMENT 1-G

Site Photos

PIN 124069.00

Bridge ID: 33I00240055

Looking East over Bridge

Looking East over Bridge

Looking South under Bridge

Looking at Abutment No. 1

Looking at Abutment No. 2

Looking at Abutment No. 2

Looking at Bents No. 1 and No. 2

Underside of Bent Cap

Widened Bent Caps

Abutment No. 2

Abutment No. 2

Abutment No. 1

Looking North under the Bridge

Drain at Southwest side of Bridge

Looking East at On-Ramp

Looking at Bent No. 1

Overhead Utilities

Utilities Mounted to Bridge

Abutment No. 1

Looking under Bridge at Bents

Concrete Slope Paving

Looking at Underside of Deck

Looking at Bent and Beam Supports

Sidewalk Under Bridge

Looking at North at Bent No. 3

Looking North at Bent No. 2

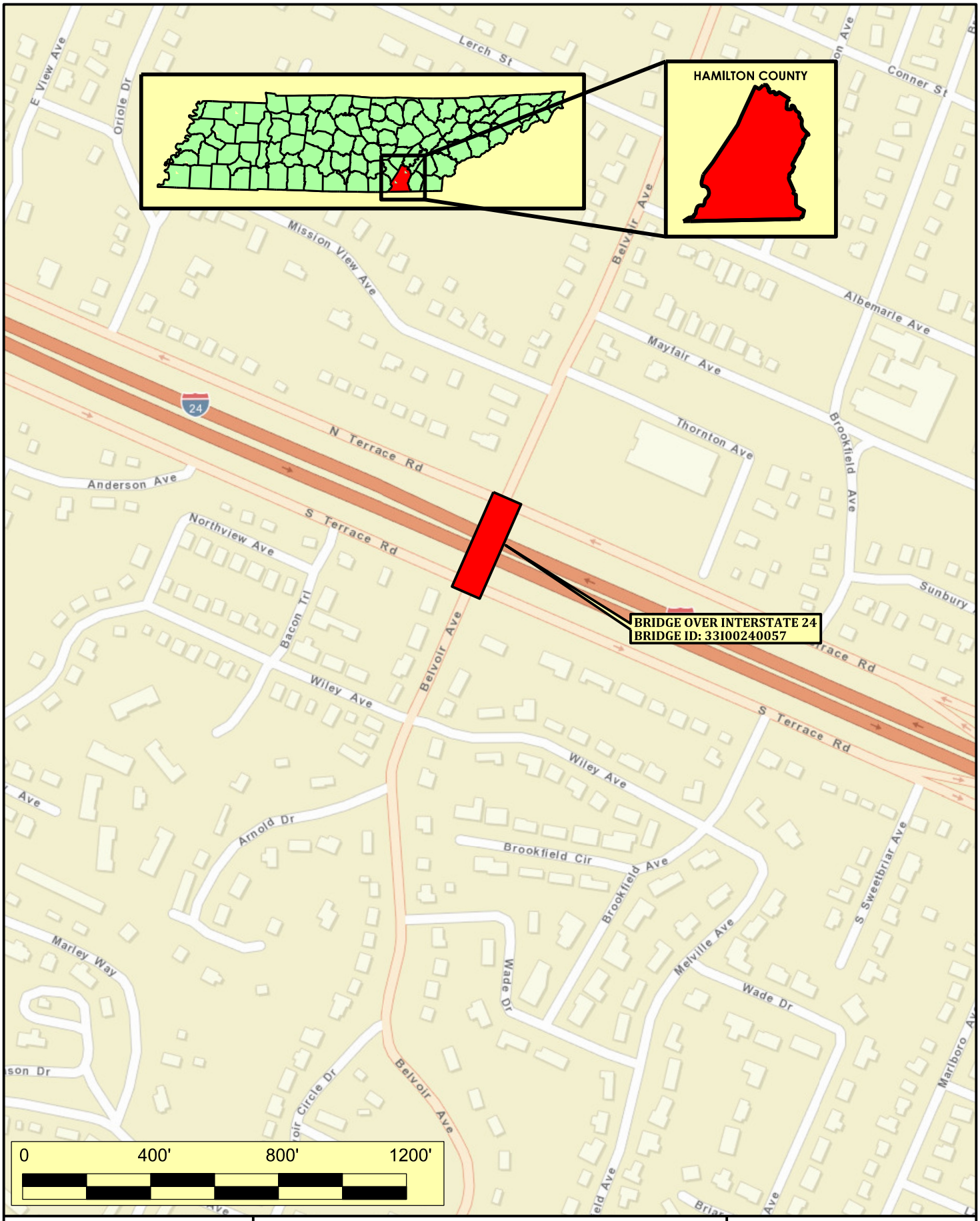
SECTION 2

Belvoir Avenue Bridge

over Interstate 24

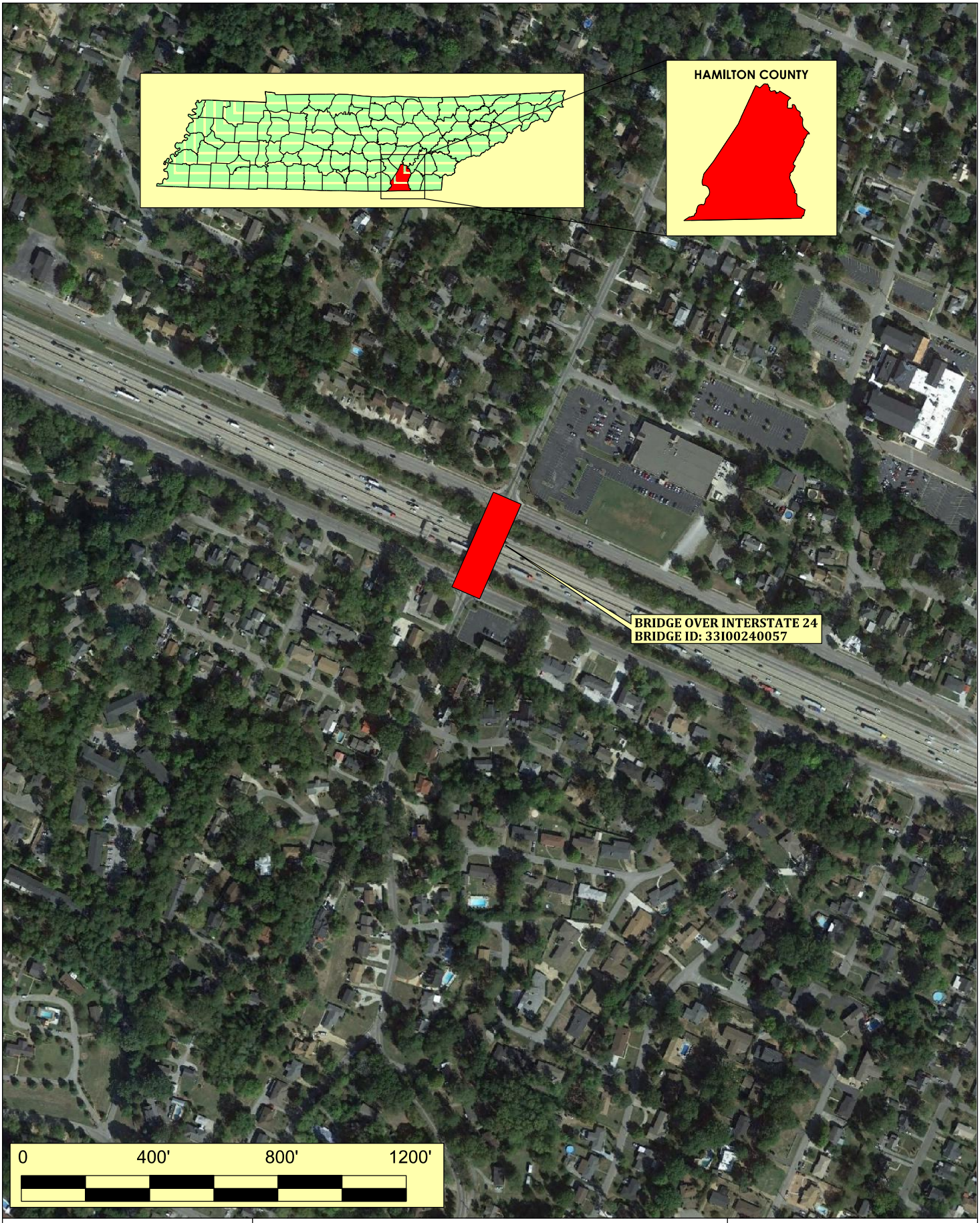
PIN 124069.00

Bridge ID: 33I00240057



AREA MAP
BRIDGE TIR
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

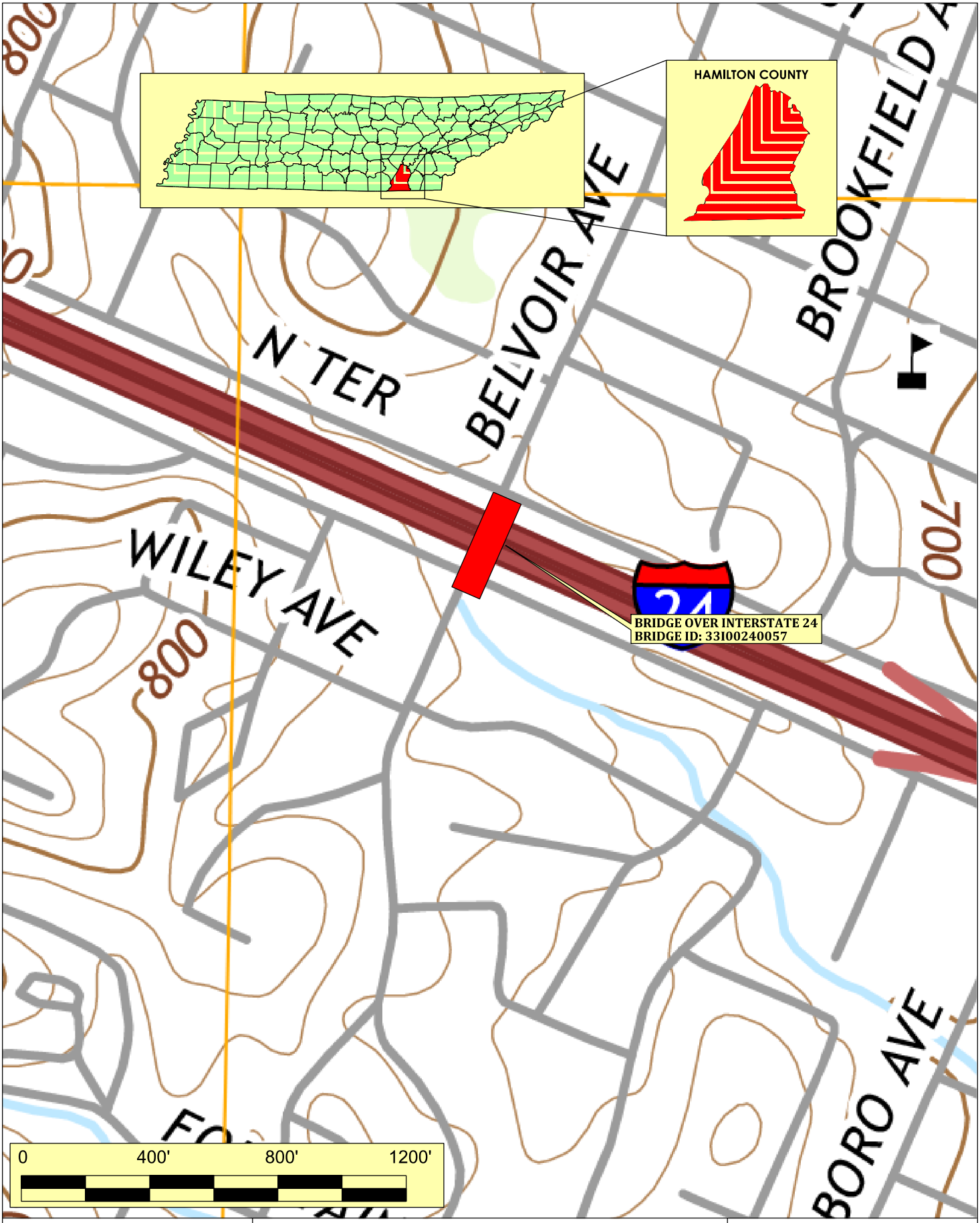
TN TDOT Department of Transportation



N

LOCATION MAP
BRIDGE TIR
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

TN TDOT Department of Transportation



TOPOGRAPHIC MAP
BRIDGE TIR
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

TN TDOT Department of Transportation

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION
SUITE 1000, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TN 37243
(615) 741-2208

JOHN C. SCHROER
COMMISSIONER

BILL HASLAM
GOVERNOR

MEMORANDUM

TO: Steve Allen, Transportation Director
Strategic Transportation Investments Division

FROM: Lia Obaid, Asst. Director of Construction
Construction Division

DATE: June 11, 2018

SUBJECT: TIR Field Review (Special Bridge Replacement Program)
Belvoir Avenue Bridge over Interstate 24
Log Mile 1.01
Bridge ID: 33I00240057
Hamilton County
PIN 124069.00

A field review was held for the above-mentioned project on Thursday, April 5, 2018.

The existing structure is a four (4) span prestressed concrete bridge that is 190.5 feet long at a 90 degree skew with four (4), twelve (12) foot lanes, ten (10) foot shoulders, and five (5) foot sidewalks. The current right of way (R.O.W.) is 80 feet. The current posted speed on Belvoir Avenue is 30 miles per hour. This structure crosses Interstate 24 in Hamilton County and is within Chattanooga city limits. The existing structure has an out-to-out width of 79.5 feet. The sufficiency rating of this bridge is 86.6.

The proposed bridge will be designed to meet TDOT standard RD01-TS-6A. The proposed centerline will remain the same. The bridge will be closed during construction and traffic will be detoured to local streets. See the functional plans in the executive summary for a detour map. The route has a 2022 base year AADT of 9,300 vehicles per day and a 2042 design year AADT of 10,230 vehicles per day. The proposed structure will be a two (2) span bridge that is 152 feet long at a 90° skew. The proposed typical section consists of four (4) eleven (11) foot lanes, two (2) foot outside shoulders, six (6) inch curbs, and six (6) foot sidewalks. At the request of

TDOT's Region 2 office, the proposed substructure will be designed and built to accommodate future road widening along Interstate 24 below the Belvoir Avenue bridge. The proposed structure is narrower than the existing structure. This is due to the ten (10) foot shoulders being removed from the bridge and the lanes being narrowed from twelve (12) to eleven (11) feet. The proposed structure is also shorter than the existing structure. This is due to a retaining wall being placed under the bridge. It is the opinion of the TDOT and the City of Chattanooga that narrower lanes will slow down traffic through this area which is residential in nature thereby increasing safety along the route. No additional R.O.W. is anticipated and utilities will be relocated as necessary. An overhead message sign may also need to be replaced along Interstate 24 as part of this project (and has been included in the cost estimate). The posted speed is anticipated to remain 30 mph. The project will tie into Belvoir Avenue by mill and overlay.

Both intersections on either side of the bridge will be updated to meet current signal and American with Disabilities Act (ADA) design standards.

The bridge has been selected for replacement utilizing the CM/GC (Construction Manager/General Contractor) Method for design phase and the ABC (Accelerated Bridge Construction) technique for the construction phase in an effort to minimize negative long-term traffic impacts during construction. At this time the design team is anticipating closing the Belvoir Avenue bridge to local traffic during the construction phase, but this is subject to change as the design phase continues. A preliminary detour map is attached. It is not the intention of the design team to have simultaneous lane closures and detours for both bridges. However, this analysis is also subject to change during the CM/GC design process. Once a CM (Construction Manager) has been selected, the formal design process will begin and a final traffic control plan will be determined.

The total cost for this bridge replacement, including approach work, estimated replacement, and preliminary engineering, is approximately $5,125,000. A man day estimate cannot be conducted until the CM (Construction Manager) is selected for the project.

ATTACHMENT 2-A

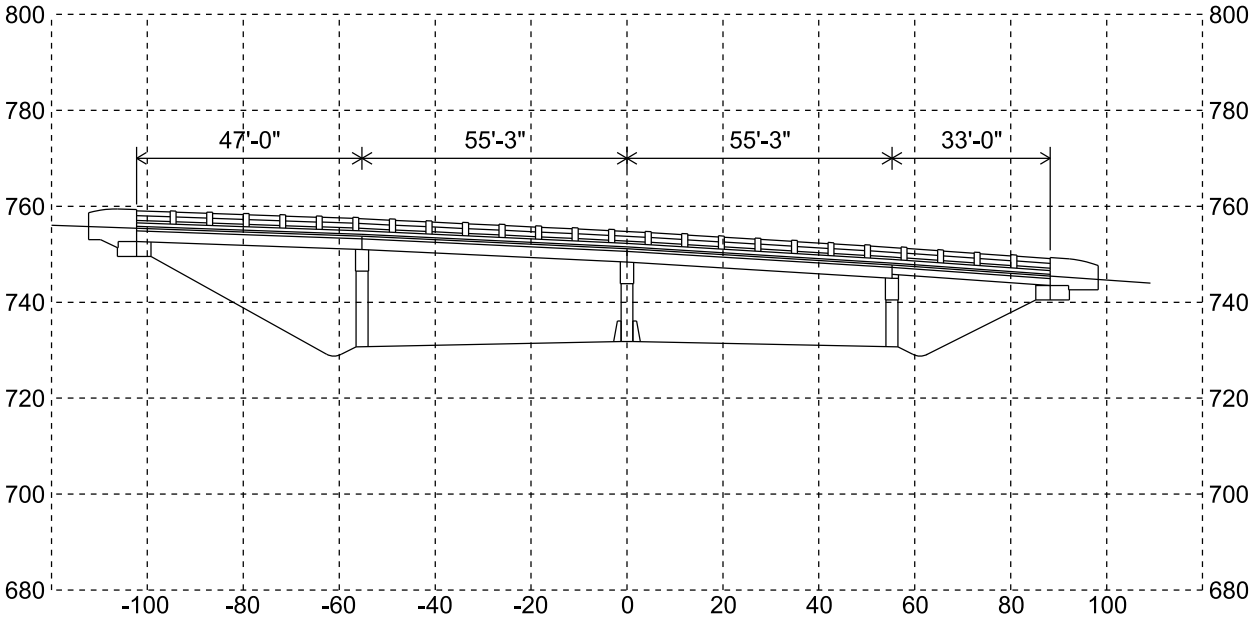
Bridge Figures

PIN 124069.00

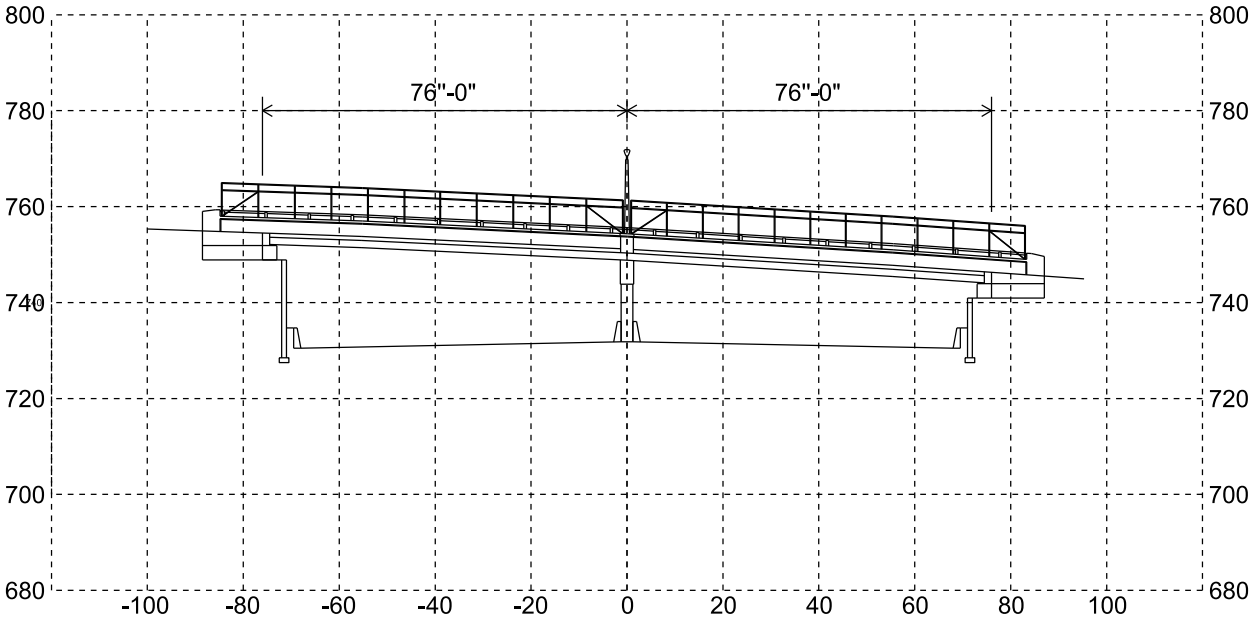
Bridge ID: 33I00240057

BELVOIR AVENUE BRIDGE OVER INTERSTATE 24

EXISTING STRUCTURE (OUTLET)



PROPOSED STRUCTURE (OUTLET)

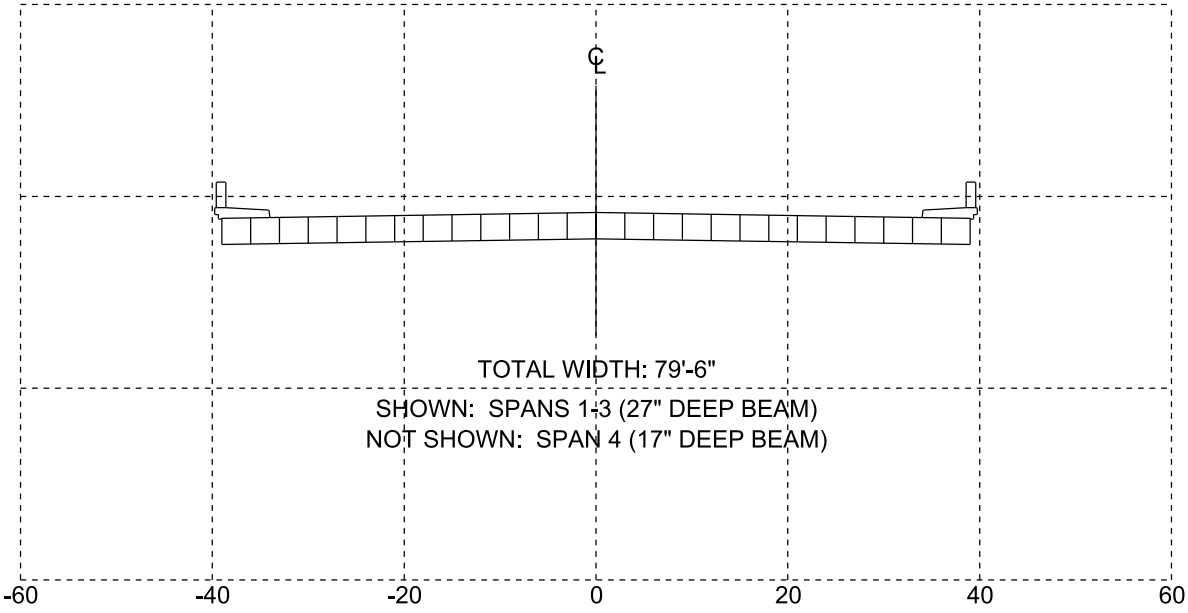


PROFILE

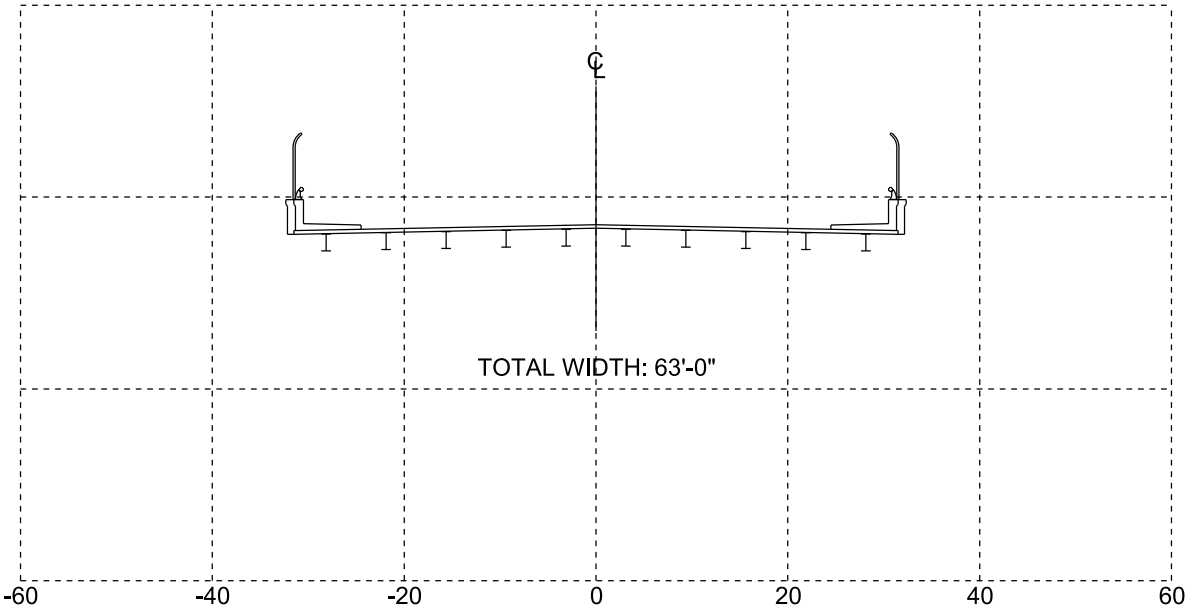
PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

BELVOIR AVENUE BRIDGE OVER INTERSTATE 24

EXISTING STRUCTURE



PROPOSED STRUCTURE



TYPICAL SECTION

PIN 124069.00
I-24 OVER S. GERMANTOWN ROAD CM/GC PROJECT
HAMILTON COUNTY

ATTACHMENT 2-B

Preliminary Cost Estimate

PIN 124069.00

Bridge ID: 33I00240057

COST ESTIMATE SUMMARY
(BELVOIR AVE - TRADITIONAL CONSTRUCTION)

Route:	Belvoir Avenue Bridge over Interstate 24
Description:	PIN 124069.00 - Interstate 24 over Germantown Rd (CM/GC)
	Log Mile 1.01
County:	Hamilton
Length:	
Date:	June 11, 2018

DESCRIPTION	LOCAL 0%	STATE 0%	FEDERAL 100%	TOTAL
Construction Items				
Pavement Removal	$0	$0	$85,100	$85,100
Asphalt Paving	$0	$0	$108,600	$108,600
Concrete Pavement	$0	$0	$0	$0
Drainage	$0	$0	$1,500	$1,500
Appurtenances	$0	$0	$25,300	$25,300
Structures	$0	$0	$2,456,700	$2,456,700
Fencing	$0	$0	$72,600	$72,600
Signalization	$0	$0	$430,900	$430,900
Railroad Crossing or Separation	$0	$0	$0	$0
Earthwork	$0	$0	$33,100	$33,100
Clearing and Grubbing	$0	$0	$0	$0
Seeding & Sodding	$0	$0	$0	$0
Rip-Rap or Slope Protection	$0	$0	$0	$0
Guardrail	$0	$0	$22,000	$22,000
Signing	$0	$0	$3,200	$3,200
Pavement Markings[1]	$0	$0	$9,100	$9,100
Maintenance of Traffic	$0	$0	$85,400	$85,400
Mobilization (5%)	$0	$0	$166,700	$166,700
Other Items[2] = 10%	$0	$0	$350,000	$350,000
Const. Contingency[2] = 15%	$0	$0	$209,000	$209,000
Construction Estimate	$0	$0	$4,059,200	$4,059,200
Interchanges & Unique Intersections				
Roundabouts	$0	$0	$0	$0
Interchanges	$0	$0	$0	$0
Right-of-Way & Utilties	**LOCAL 0%**	**STATE 0%**	**FEDERAL 100%**	**TOTAL**
Right-of-Way	$0	$0	$0	$0
Utilities	$0	$0	$211,300	$211,300
Preliminary & Construction Engineering and Inspection				
Prelim. Eng. 10%	$0	$0	$427,100	$427,100
Const. Eng. & Inspec. 10%	$0	$0	$427,100	$427,100
Total Project Cost	$0	$0	$5,124,700	$ 5,125,000

[1] Additional quantities were added to the 'Pavement Markings' pay item to account for temporary traffic control.

[2] 'Other Items' and 'Const. Contingency' were not increased to account for CM/GC method. There is no plan at this time to build the Belvoir

PAY ITEM SUMMARY
(BELVOIR AVE - TRADITIONAL CONSTRUCTION)

TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	TOOL QUANTITIES	ADDITIONAL QUANTITIES	TOOL QUANTITIES + ADDITIONAL QUANTITIES	Statewide UNIT COST	TOTAL COST
Pavment Removal							
415-01.02	Cold Planning Bituminous Pavement	SY	0	11568	11568	$ 7.35	$ 85,064.06
						PAVEMENT REMOVAL TOTAL (ROUNDED)	$ 85,100
Asphalt Roads							
403-01	Bituminous Material For Tack Coat (TC)	TON	0	5	5	$ 778.44	$ 3,892.20
411-02.10	ACS Mix(PG70-22) Grading D	TON	0	920	920	$ 113.78	$ 104,678.90
						PAVING TOTAL (ROUNDED)	$ 108,600
Concrete Roads							
						CONCRETE RAMPS AND ROADWAYS TOTAL (ROUNDED)	$ -
Drainage							
611-09.01	ADJUSTMENT OF EXISTING CATCHBASIN	EA		2	2	$ 736.91	$ 1,473.82
						DRAINAGE TOTAL (ROUNDED)	$ 1,500
Appurtenances							
202-03	Removal of Rigid Pvmt, Sidewalk, Etc	SY		240	240	$ 9.53	$ 2,286.76
701-01.01	Concrete Sidewalk (4")	SF	0	240	240	$ 7.41	$ 1,778.93
701-02.03	Concrete Handicap Ramp	SF		890	890	$ 17.74	$ 15,790.22
702-01	Concrete Curb	CY		16	16	$ 334.36	$ 5,349.72
						ROADWAY AND PAVEMENT APPURTENANCES TOTAL (ROUNDED)	$ 25,300
Earthwork & Mineral							
203-01	Road & Drainage Excavation (Unclassified)	CY	0	918.667	919	$ 16.79	$ 15,428.43
203-03	Borrow Excavation (Unclassified)	CY	0	1169.106	1169	$ 15.04	$ 17,584.91
						EARTHWORK & MINERAL TOTAL (ROUNDED)	$ 33,100
Structures							
604-07.01	Retaining Wall	SF		4000	4000	$ 95.00	$ 380,000.00
N/A	Removal of Bridge	SF	0	15145	15145	$ 50.00	$ 757,250.00
N/A	New Bridge (Steel):	SF	0	9424	9424	$ 140.00	$ 1,319,360.00
						STRUCTURES TOTAL (ROUNDED)	$ 2,456,700
Interchanges and Unique Intersections							
						INTERCHANGES AND UNIQUE INTERSECTIONS TOTAL (ROUNDED)	$ -
Lighting & Signalization							
714-01.32	Structural Lighting	LS		1	1	$ 9,743.29	$ 9,743.29
714-03.01	Direct Brl Conduit (2" PVC, Schedule 40)	LF		250	250	$ 6.67	$ 1,666.42
714-05.04	Pull Boxes (Type C)	EA		4	4	$ 620.37	$ 2,481.49
714-06.05	Cable (1/C # 6 AWG)	LF		500	500	$ 1.05	$ 525.00
714-08.01	Light Standards (45' MH, 15' ARM)	EA		3	3	$ 3,722.26	$ 11,166.78
714-08.28	Found for Light Standards - Roadway	EA		3	3	$ 1,384.42	$ 4,153.26
714-08.30	Remove and Relocate Light Standard	EA		3	3	$ 2,046.75	$ 6,140.25
714-09.03	Luminaires (250 WATT)	EA		3	3	$ 472.73	$ 1,418.19
714-25	Electrical Connection	EA		1	1	$ 599.06	$ 599.06
714-26.05	Temporary Roadway Lighting	LS		1	1	$ 6,825.00	$ 6,825.00
725-20.24	Steel Overhead Sign Structure (Spans 91ft to 110ft)	EA		1	1	$ 80,000.00	$ 80,000.00
725-20.44	Pull Box (Type D)	EA		1	1	$ 1,400.00	$ 1,400.00
725-20.45	Pull Box (Type E)	EA		2	2	$ 1,700.00	$ 3,400.00
725-20.75	Communication Connection (Temp Comm Connections)	LS		1	1	$ 3,000.00	$ 3,000.00
725-21.01	Dynamic Messaging Sign	EA		1	1	$ 80,000.00	$ 80,000.00
725-21.04	Dynamic Messaging Sign Removal	EA		1	1	$ 10,000.00	$ 10,000.00
725-21.11	Network Switch (Type A)	EA		1	1	$ 3,000.00	$ 3,000.00
725-21.49	Modify Electrical Demarcation Point	EA		1	1	$ 1,500.00	$ 1,500.00
725-22.24	Conduit Bank (Type 4)	LF		50	50	$ 7.00	$ 350.00
725-22.34	Conduit Bank Bored (Type 4)	LF		150	150	$ 25.00	$ 3,750.00
725-22.50	DMS Conduit Bank	LF		150	150	$ 15.00	$ 2,250.00
725-22.74	2in Conduit w/ Bank	LF		150	150	$ 2.50	$ 375.00
725-23.10	Fiber Optic Cable (72 F)	LF		200	200	$ 10.00	$ 2,000.00
725-23.21	Fiber Optic Drop Cable (12ft)	LF		100	100	$ 3.00	$ 300.00
725-23.25	Fiber Optic Closure (72 F)	EA		1	1	$ 750.00	$ 750.00
725-23.28	Fiber Optic Splice Fusion	EA		148	148	$ 50.00	$ 7,400.00
725-24.51	System Integration	LS		1	1	$ 3,000.00	$ 3,000.00
730-01.02	Removal of Signal Equipment	EA		2	2	$ 1,957.79	$ 3,915.58
730-02.09	Signal Head Assembly (130 With Backplate)	EA		10	10	$ 807.65	$ 8,076.53
730-02.17	Signal Head Assembly (150 A2H With Backplate)	EA		2	2	$ 1,313.83	$ 2,627.67
730-03.20	Install Pull Box (Type A)	EA		4	4	$ 385.67	$ 1,542.67
730-03.21	Install Pull Box (Type B)	EA		4	4	$ 481.62	$ 1,926.47
730-05.01	Electrical Service Connection	EA		2	2	$ 2,023.65	$ 4,047.30
730-08.03	Signal Cable - 7 Conductor	LF		800	800	$ 1.65	$ 1,323.59
730-08.30	Interconnect Cable (Copper-Twisted Pair)	LF		1000	1000	$ 2.67	$ 2,670.00
730-12.14	Conduit 3" Diameter (Jack and Bore)	LF		400	400	$ 25.74	$ 10,296.16
730-12.16	Conduit (2" Conduit Schedule 80)	LF		200	200	$ 13.80	$ 2,760.38
730-13.01	VEHICLE LOOP DETECTOR (SHELF MOUNT)	EA		4	4	$ 178.62	$ 714.49
730-14.01	Shielded Detector Cable	LF		350	350	$ 1.27	$ 444.66
730-14.02	Saw Slot	LF		2000	2000	$ 2.89	$ 5,779.41
730-15.32	Cabinet (Eight Phase Base Mounted)	EA		2	2	$ 13,544.50	$ 27,089.00
730-16.02	Eight Phase Actuated Controller	EA		2	2	$ 4,736.56	$ 9,473.13
730-23.88	Cantilever Signal Support (1 ARM @ 45')	EA		3	3	$ 14,116.19	$ 42,348.57
730-23.96	Cantilever Signal Support (1 ARM @ 50')	EA		3	3	$ 19,551.62	$ 58,654.85
						LIGHTING & SIGNALIZATION TOTAL (ROUNDED)	$ 430,900
Guardrail							
705-01.01	Guardrail at Bridge Ends	LF	100		100	$ 73.64	$ 7,364.49
705-04.07	Tan Energy Absg Term (NCHRP, 350, TL3)	EA	4		4	$ 2,352.59	$ 9,410.38
705-04.09	Earth Pad for Type 38 GR End Treatment	EA	4		4	$ 1,294.80	$ 5,179.21
						GUARDRAIL TOTAL (ROUNDED)	$ 22,000
Seeding and Sodding							
						SODDING TOTAL (ROUNDED)	$ -
Maintenace of Traffic							
N/A	Traffic Control	LS	1		1		$ 85,335.18
						MAINTENANCE OF TRAFFIC TOTAL (ROUNDED)	$ 85,400

PAY ITEM SUMMARY
(BELVOIR AVE - TRADITIONAL CONSTRUCTION)

Signs

Not Listed	Signs (Construction)	LS	1		1	$ -	$ 3,200
						SIGNING TOTAL (ROUNDED)	$ 3,200

Pavement Markings

716-09.31	STOP LINE	LF		200	200	$ 16.65	$ 3,330.00
716-13.06	Spray Thermo P.M. (40 mil 4")	LM	0.0	2	2.0	$ 2,878.11	$ 5,756.23
						PAVEMENT MARKINGS TOTAL (ROUNDED)	$ 9,100

Fencing

707-07.01	Chain-Link Fence (Bridges)	SF		1728	1728	$ 42.00	$ 72,576.00
						FENCE TOTAL (ROUNDED)	$ 72,600.00

Rip-Rap

						RIP-RAP & SLOPE PROTECTION TOTAL (ROUNDED)	$ -

Clearing and Grubing

						CLEAR AND GRUBBING TOTAL (ROUNDED)	$ -

Railroad At-Grade Crossing

						RAILROAD CROSSING OR SEPARATION TOTAL (ROUNDED)	$ -

Utilties

N/A	Overhead Distribution	LM	0.1		0.1	$ 375,000	$ 37,500
N/A	Overhead Transmission	LM	0.1		0.1	$ 750,000	$ 75,000
N/A	Underground Communication	LM	0.1		0.1	$ 500,000	$ 50,000
N/A	Underground Gas	LM	0.1		0.1	$ 250,000	$ 25,000
N/A	Underground Water	LM	0.1		0.1	$ 237,600	$ 23,760
						UTILITIES TOTAL (ROUNDED)	$ 211,300.00

Right-of-Way

N/A	Right-of-Way	LS	1		1	$ -	$ -
						RIGHT-OF-WAY TOTAL (ROUNDED)	$ -

ATTACHMENT 2-C

Projected Traffic

PIN 124069.00

Bridge ID: 33I00240057

TENNESSEE DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

PROJECT NO.: BR-I-24-3(97) : 33003-0166-44 ROUTE: I-24 & BELVOIR AVE. BRIDGES
COUNTY: HAMILTON CITY: CHATTANOOGA
PROJECT PIN NUMBER: 124069.00
PROJECT DESCRIPTION: [1] I-24 BRIDGE OVER GERMANTOWN RD @ L.M. 12.08 TRAFFIC DATA.
[2] BELVOIR AVE. BRIDGE OVER I-24 @ L.M. 1.01 TRAFFIC DATA.

DIVISION REQUESTING:

MAINTENANCE	☐	PAVEMENT DESIGN	☐
S.T.I.D.	☐	STRUCTURES	☐
PROG. DEVELOPMENT & ADM.	☐	SURVEY & ROADWAY DESIGN	☐
PUBLIC TRANS. & AERO.	☐	TRAFFIC SIGNAL DESIGN	☐
		OTHER CONSULTANT	☒

YEAR PROJECT PROGRAMMED FOR CONSTRUCTION:
PROJECTED LETTING DATE:

TRAFFIC ASSIGNMENT:

	BASE YEAR		DESIGN YEAR					DESIGN ROADWAY % TRUCKS		DESIGN AVERAGE DAILY LOADS	
	AADT	YEAR	AADT	DHV	%	YEAR	DIR.DIST.	DHV	AADT	FLEX	RIGID
[1]	114,670	2022	142,650	12,830	9	2042	65-35	15	23	8,840	13,414
[2]	9,300	2022	10,230	1,125	11	2042	70-30	2	3	88	112

REQUESTED BY: NAME LAUREN GAINES DATE 2/14/18
DIVISION BARGE DESIGN SOLUTIONS
ADDRESS 615 3rd AVE. S. SUITE 700
NASHVILLE TN 37210

REVIEWED BY: TONY ARMSTRONG Tony Armstrong DATE 2·15·18
TRANSPORTATION MANAGER 1
SUITE 1000, JAMES K. POLK BUILDING

APPROVED BY: JIM WATERS for [signature] DATE 2-15-18
ASSISTANT DIRECTOR
SUITE 1000, JAMES K. POLK BUILDING

COMMENTS:

THIS TRAFFIC WAS TAKEN FROM TWO PREVIOUS PROJECTS PREPARED FOR S.T.I.D. DATED 11/28/2017 AND 1/3/2018 WITH THE ADDITION OF ADL's FOR PAVEMENT DESIGN.

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. (REV. 2/22/17)

TENNESSEE DEPARTMENT OF TRANSPORTATION
STRATEGIC TRANSPORTATION INVESTMENT DIVISION

PROJECT NO.: BR-I-24-3(97) : 33003-0166-44 ROUTE NO.:BELVOIR AVE. [3611] [2]
COUNTY: HAMILTON CITY: CHATTANOOGA
PROJECT DESCRIPTION: BRIDGE OVER I-24 @ L.M. 1.01.

FAP Urban

Pavement Structural Design

Calculation of Equivalent Daily 18 Kip Single Axle Loads

Type Vehicle		ADT (No. Counted)	Flexible 18-kip Factor	Flexible ADL	Rigid 18-kip Factor	Rigid ADL
Pass. cars and motorcycles (1-2)		5,566	0.001	6	0.001	6
Pick-up, Panel, Van (3)		3,906	0.004	16	0.004	16
Sing. Unit	Buses (4)	27	0.300	8	0.300	8
	2-axle, 6-tire (5)	139	0.260	36	0.260	36
	3-axle or more (6-7)	55	1.000	55	1.500	83
Comb.	4-axle (8)	56	0.640	36	0.800	45
	5-axle or more (9-13)	16	1.200	19	1.900	30
Totals (2032 AADT)		9,765		175		223

Suggested Percentages of Trucks in Design Lane

5,000 or less ADT	95%
5,000 - 10,000 ADT	90%
10,000 - 15,000 ADT	85%
15,000 - 20,000 ADT	80%
20,000 - 30,000 ADT	75%
30,000 - 40,000 ADT	70%
40,000 Plus	60%

No. of Lanes: 2
% Trucks in Design Lane: 100%
ADL in Design Lane:

FLEX:	0.5	X	1.00	X	175.5	=	88
RIGID:	0.5	X	1.00	X	223.1	=	112

ADL Calculations By: RANDY BOGUSKIE Date: 2/14/2018
Reviewed By: Tony Armstrong Date: 2·15·18
[REV. 7/1/14]

ATTACHMENT 2-D

Bridge TIR Tables

PIN 124069.00

Bridge ID: 33I00240057

BRIDGE TIR

LOCATION			
Bridge #:	33I00240057	Feature Crossed:	Interstate 24 (I0024)
Road Name:	Belvoir Avenue	Log mile:	1.01
Route ID:	O3611	System:	NOT A NHS ROUTE
City:	Chattanooga	Functional Class:	Urban Minor Arterial
County:	Hamilton	State Project Number	BR-I-24-3(97)
PIN:	124069.00		

ROADWAY		
	Existing	**Proposed (Preliminary Design Estimate)**
Design Standard		RD01-TS-6
Route Characteristics		
AADT:	9,300	10,230
AADT Year:	2022	2042
Terrain:	Rolling	Rolling
No. Lanes:	4	4
Speed(Posted):	30	30
Speed (Design):		30
Approach Character.		
Lane Width (ft):	12	12
Shoulder Width (ft):	10	0
ROW Width (ft):	79.5	79.5
ROW Tracts Affected		n/a
ROW Required (acre)		n/a
Cross Section Width (ft):	79.5	70
Approach Length (ft):		n/a
Alignment:	Tangent + Intersection Each End	Same as Existing
Grade:		???
Surface Material:	Asphalt	Asphalt
Sidewalks (R/L):	4'/4'	4'/4'
App. Lower Than Structure	No	No
Utilities (list)	OH: distribution, transmission; UG: water, gas, communication;	OH: distribution, transmission; UG: water, gas, communication;
Utilities to be Relocated		OH: distribution, transmission; UG: water, gas, communication;
Comments		Construction Manager/General Contractor (CM/GC) Project

STRUCTURE		
	Existing	**Proposed (Preliminary Design Estimate)**
Bridge Characteristics		
Year Built	1965	
Load Limit	20 tons	
Sufficiency Rating	86.6	
Skew	90˚	90˚
Structure Type	Prestressed Concrete	Steel (WPG)
Structures in Channel	n/a	n/a
Length (ft)	190.5	152
No. Spans (App./Main)	0 | 4	0 | 2
Width (curb to curb) (ft)	67.833	48
Width (o to o) (ft)	79.33	62
Sidewalks on Structure	Yes	Yes
Vert. Clearance (ft)	16.33	16.2
Superstructure Depth (in)	Spans 1-3 = 29 / Span 4 = 19	31
Girder Depth (in)	27/17	21
Finish Grade-Low Girder (in)	29/19	31
High Water Marks	n/a	
Bridge Rail Type	Post-Beam	STD-11-1
Bridge Rail Height (ft)	2.67	3.8
Indication Overtopping	n/a	
Local Scour	No	
Obstructions	No	
Other Structures		Fencing to be added to outside of fence railing at the request of TDOT Region 2
Comments		Construction Manager/General Contractor (CM/GC) Project

FLOW RATES (from USGS StreamStats Program Version 3)	
Drainage Area (sq. miles)	0.14
10 Year Discharge Rate (Q10) cfs	68.3
50 Year Discharge Rate (Q50) cfs	108
100 Year Discharge Rate (Q100) cfs	128

CHANNEL	
Depth (ft)	n/a
Width of Normal Flow (ft)	n/a
Depth of Normal Flow (ft)	n/a
Skew of Channel with Roadway	n/a
Type of Material in Stream Bed	n/a
Type of Vegetation on Banks	n/a
Are Channel Banks Stable	n/a
Signs of Stream Aggradation	n/a
Signs of Stream Degradation	n/a
Drift or Drift Potential	n/a
Comments	

FLOODPLAIN	
Skew Same as Channel	n/a
Symmetrical About Channel	n/a
Approx. Floor Elevations	n/a
Type of Vegetation in Floodplain	n/a
Any Buildings in Floodplain	n/a
Flood Information From Locals	n/a
Comments	According to the FEMA Map, there is not a floodplain in the area of the site.

MAINTENANCE OF TRAFFIC	
Method of Maintaining Traffic	temporary detour
Description	The current plan is to close the Belvoir Avenue bridge over Interstate 24 and detour the traffic along South Terrace and North Terrace. A detour map is shown in the functional plans in the preface of this study. This plan is subject to change once a CM (construction manager) is on board.
Comments	Construction Manager/General Contractor (CM/GC)

SITE VISIT ATTENDEES			DATE: 4/5/2018
Name	Organization	Phone	Email
Mike Gilbert	TDOT STID	615.741.0772	michael.gilbert@tn.gov
Jeremy Sims	TDOT Region 2	423.510.1227	jeremy.sims@tn.gov
Alan Wolfe	TDOT Region 2 Traffic	423.510.1139	alan.wolfe@tn.gov
Zach Johnson	TDOT Region 2 Traffic	423.510.6914	zach.johnson@tn.gov
Robert Rodgers	TDOT Region 2 Design	423.510.1138	robert.rodger@tn.gov
Michael Cloud	TDOT Region 2	615.532.1676	michael.cloud@tn.gov
Garris Bugg	TDOT Region 2		garris.bugg@tn.gov
Wade Goss	TDOT Region 2		wade.goss@tn.gov
Ben Taylor	City of Chattanooga	423.643.5557	bgtaylor@chattanooga.gov
Wes Hughen	TDOT Region 2	423.510.1133	wesley.hughen@tn.gov
Adam Casteel	TDOT R2 Operations	423.208.6113	adam.casteel@tn.gov
Jamie Fitzpatrick	TDOT HQ Construction	615.741.0781	jamie.fitzpatrick@tn.gov
Robert LeFevre	TDOT Structures	615.741.0798	robert.lefevre@tn.gov
Nitaya Chayangkura	TDOT HQ Construction	615.532.8848	nitaya.chayangkura@tn.gov
Joe Deering	TDOT Region 2	423.892.3430	joe.deering@tn.gov
Gary Chapman	TDOT Region 2 Survey	423.510.1144	gary.chapman@tn.gov
Ken Flynn	TDOT R2 Operations	423.510.1217	ken.flynn@tn.gov
Scott Medlin	TDOT R2 Environmental	423.570.1118	scott.medlin@tn.gov
Doug Ford	TDOT Region 2 Survey	423.298.3279	douglas.ford@tn.gov
Jonathan Haycraft	Barge Design	615.252.4242	jonathan.haycraft@bargedesign.com
Kevin McAlister	Barge Design	615.252.4294	kevin.mcalister@bargedesign.com
Lauren Gaines	Barge Design	615.252.4243	lauren.gaines@bargedesign.com
Patrick Leap	Barge Design	615.252.4260	patrick.leap@bargedesign.com

ATTACHMENT 2-E

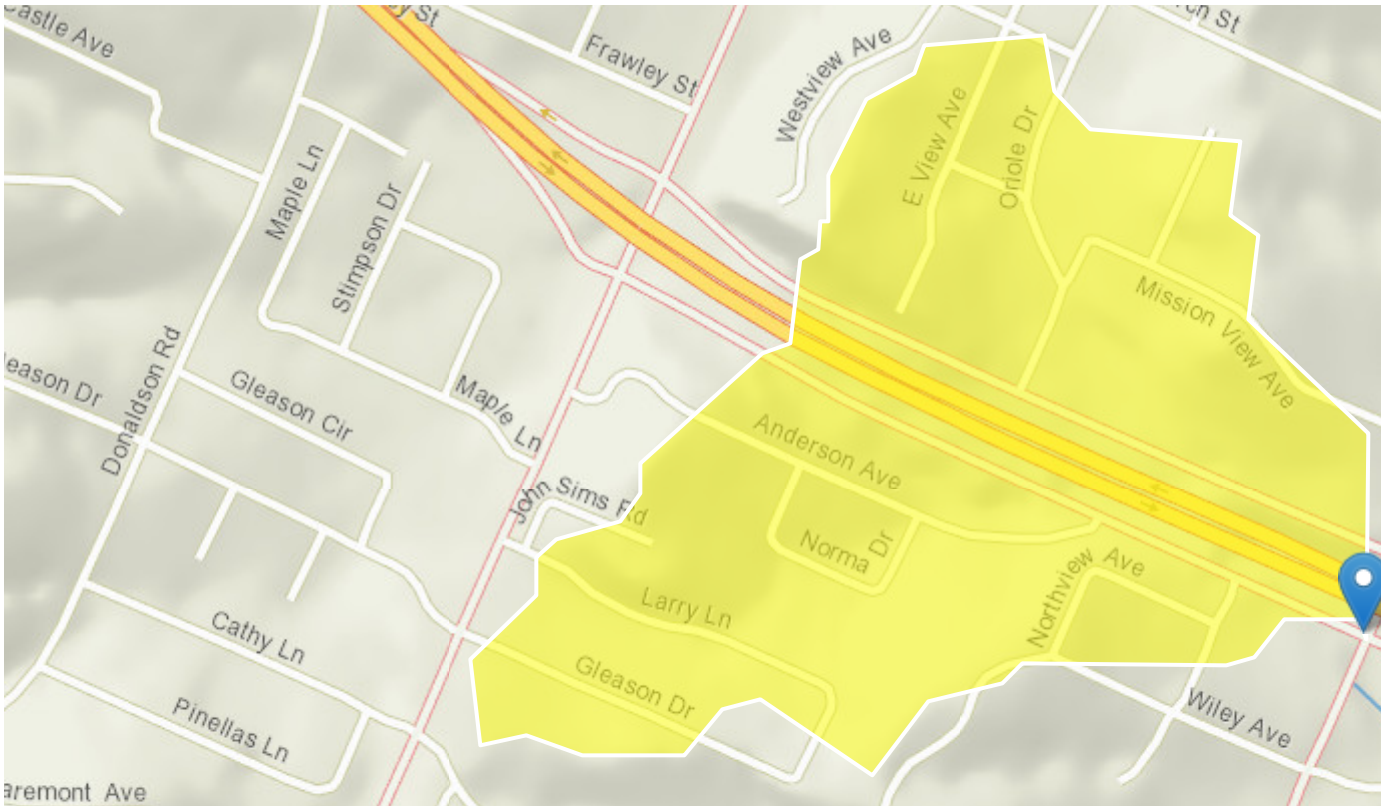
Stream Stats

PIN 124069.00

Bridge ID: 33I00240057

StreamStats Report

Region ID: TN
Workspace ID: TN20180205195938744000
Clicked Point (Latitude, Longitude): 35.01075, -85.24395
Time: 2018-02-05 13:59:52 -0600



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CONTDA	Area that contributes flow to a point on a stream	0.14	square miles
CSL10_85	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known	147.46	feet per mi
CLIMFAC2YR	Two-year climate factor from Lichy and Karlinger (1990)	2.351	dimensionless
DRNAREA	Area that drains to a point on a stream	0.14	square miles
RECESS	Number of days required for streamflow to recede one order of magnitude when hydrograph is plotted on logarithmic scale	80	days per log cycle
SOILPERM	Average Soil Permeability	1.97	inches per hour
PERMGTE2IN	Percent of area underlain by soils with permeability greater than or equal to 2 inches per hour	100.005	percent
TNCLFACT2	Tennessee climate factor, 2-year interval	2.351	
TNSOILFAC	Tennessee soil factor, percentage of area underlain by a soil permeability greater than or equal to 2 inches per hour	100	

Peak-Flow Statistics Parameters [MultiVariable Area 1]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	0.14	square miles	0.2	9000
CSL10_85	Stream Slope 10 and 85 Method	147.46	feet per mi	3.29	950
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.06	2.32

Peak-Flow Statistics Disclaimers [MultiVariable Area 1]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Peak-Flow Statistics Flow Report [MultiVariable Area 1]

Statistic	Value	Unit
2 Year Peak Flood	31.5	ft^3/s
5 Year Peak Flood	52.4	ft^3/s
10 Year Peak Flood	68.3	ft^3/s
25 Year Peak Flood	90.5	ft^3/s
50 Year Peak Flood	108	ft^3/s
100 Year Peak Flood	128	ft^3/s
500 Year Peak Flood	178	ft^3/s

Peak-Flow Statistics Citations

Law, G.S., and Tasker G.D.,2003, Flood-Frequency Prediction Methods for Unregulated Streams of Tennessee, 2000: U.S. Geological Survey Water-Resources Investigations Report 03-4176, 79p. (http://pubs.usgs.gov/wri/wri034176/)

Low-Flow Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.14	square miles	1.3	14441
RECESS	Recession Index	80	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72
PERMGTE2IN	Percent permeability gte 2 in per hr	100.005	percent	2	100

Low-Flow Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
7 Day 10 Year Low Flow	0.0116	ft^3/s
30 Day 5 Year Low Flow	0.0173	ft^3/s

Low-Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

Annual Flow Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.14	square miles	1.3	14441
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72

Annual Flow Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Annual Flow Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
Mean Annual Flow	0.225	ft^3/s

Annual Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

Seasonal Flow Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.14	square miles	1.3	14441
RECESS	Recession Index	80	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72

Seasonal Flow Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Seasonal Flow Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
Summer Mean Flow	0.0765	ft^3/s

Seasonal Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

Flow-Duration Statistics Parameters [Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	0.14	square miles	1.3	14441
RECESS	Recession Index	80	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.351	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.97	inches per hour	0.45	9.72
PERMGTE2IN	Percent permeability gte 2 in per hr	100.005	percent	2	100

Flow-Duration Statistics Disclaimers [Low Flow Central and East Regions 2009 5159]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Flow-Duration Statistics Flow Report [Low Flow Central and East Regions 2009 5159]

Statistic	Value	Unit
99.5 Percent Duration	0.0113	ft^3/s
99 Percent Duration	0.0125	ft^3/s
98 Percent Duration	0.0146	ft^3/s
95 Percent Duration	0.0175	ft^3/s
90 Percent Duration	0.0215	ft^3/s
80 Percent Duration	0.0274	ft^3/s
70 Percent Duration	0.0373	ft^3/s

Statistic	Value	Unit
60 Percent Duration	0.0521	ft^3/s
50 Percent Duration	0.0764	ft^3/s
40 Percent Duration	0.117	ft^3/s
30 Percent Duration	0.176	ft^3/s
20 Percent Duration	0.274	ft^3/s
10 Percent Duration	0.455	ft^3/s

Flow-Duration Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl. (http://pubs.usgs.gov/sir/2009/5159/)

ATTACHMENT 2-F

FEMA Map

PIN 124069.00

Bridge ID: 33I00240057

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross-sections and interpolated between cross-sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NVGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

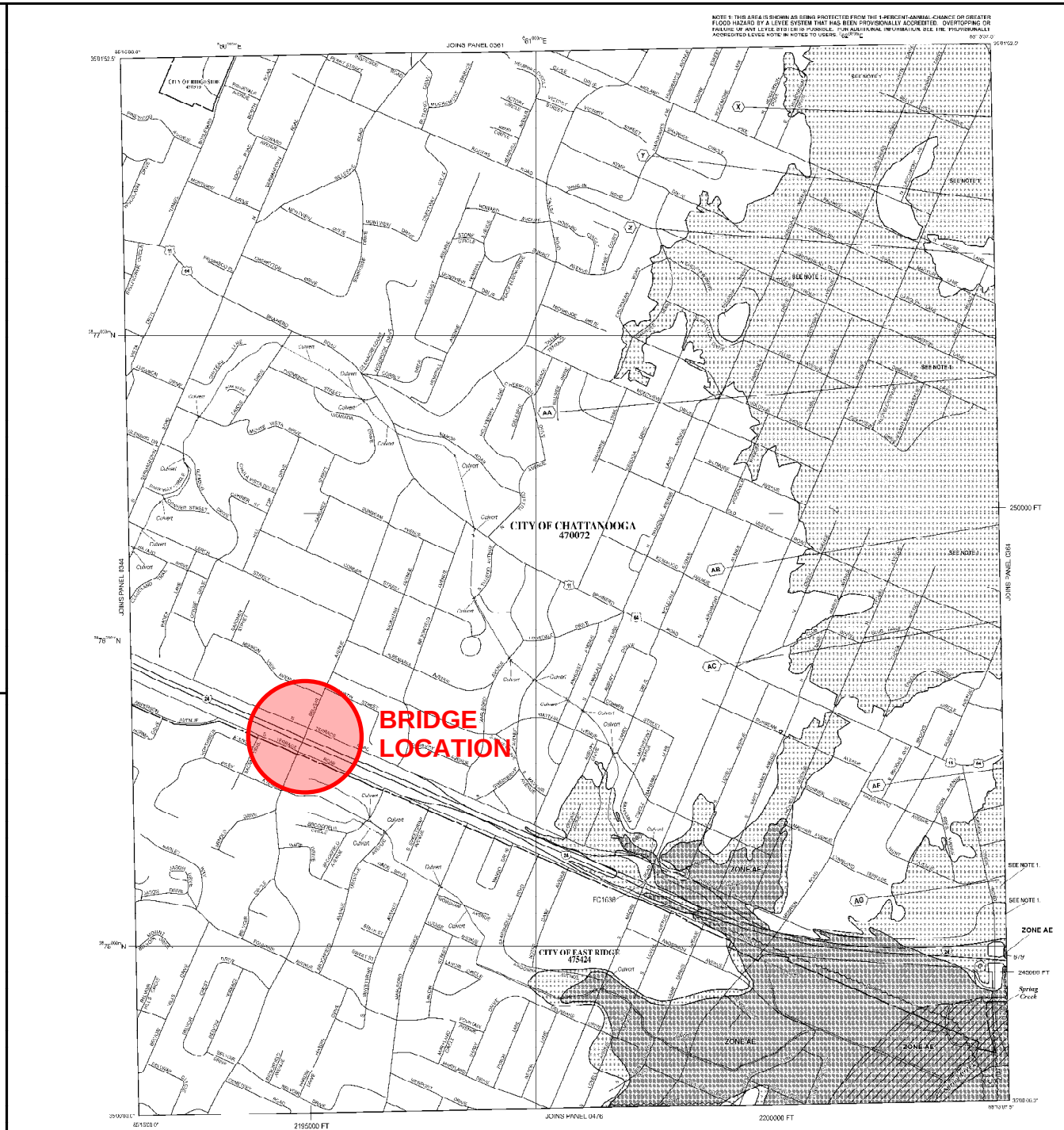
Base map data was provided by Hamilton County GIS. New vector information was compiled in 2008 - 2013 by Hamilton County GIS. Some effective base map features have been used in effective portions of the map. These features were compiled at a scale of 1:1,200 from aerial photograph dated March 1997.
This map may reflect more detailed or up to date stream channel configurations than those shown on the previous FIRM. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to those new stream channel configurations and improved topographic data. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the **FEMA Map Service Center** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the **FEMA Map Service Center** website or by calling the FEMA Map Information eXchange.

Provisionally Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP regulations by May 22, 2016. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A — No Base Flood Elevations determined.
- ZONE AE — Base Flood Elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4276000mN — 1000 meter Universal Transverse Mercator grid values, zone 16
- 6000000 FT — 5000 foot grid ticks: Tennessee State Plane coordinate system, (FIPSZONE 4100), Lambert Conformal Conic
- DX5510 — Bench mark (see explanation in Notes to Users section of this Index panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
November 7, 2013

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
February 3, 2016 - to add roads and road names, to update corporate limits, to change Base Flood Elevations, to change floodway and to change Special Flood Hazard Areas

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0363G

FIRM
FLOOD INSURANCE RATE MAP
HAMILTON COUNTY, TENNESSEE
AND INCORPORATED AREAS

PANEL 363 OF 520
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHATTANOOGA, CITY OF	470072	0363	G
EAST RIDGE, CITY OF	475424	0363	G
HIGH SHIRE, CITY OF	470319	0363	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
47065C0363G
MAP REVISED
FEBRUARY 3, 2016

Federal Emergency Management Agency

ATTACHMENT 2-G

Site Photos

PIN 124069.00

Bridge ID: 33I00240057

No. 1 Right Side

Top of Deck - Northbound

Bottom of Deck / Clearance - Eastbound

Top of Deck - Southbound

Bottom of Deck / Clearance – Westbound

Bottom of Deck / Clearance – Westbound (Right Side)

Bottom of Deck / Clearance – Westbound (Left Side)

Abutment No. 2

Span No. 3 / Bent No. 2

Bent No. 1

Bent No. 1

Approach No. 1

Bridge Surface

Bridge Rail

Approach No. 2

Approach No. 2

Bent No. 3

Bent No. 2