FINAL

BRIDGING DECISIONS AND ALIGNMENT REVIEW

From US 25 in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County

Henderson and Buncombe Counties

STIP Project I-4400/I-4700

North Carolina Department of Transportation

MERGER CONCURRENCE POINT 2A

February 11, 2015

TABLE OF CONTENTS

1. INTRODUCTION

The North Carolina Department of Transportation (NCDOT), in cooperation with the Federal Highway Administration (FHWA), proposes transportation improvements to a segment of the I-26 corridor from US 25 in Henderson County, north to I-40 in Buncombe County. This document is intended to include the information necessary for Merger Team members to make a determination for Concurrence Point 2A: Bridging Decisions and Alignment Review. As such, this document includes the following sections: 1) Introduction, 2) Merger Team Concurrences to Date, 3) Merger Concurrence Point 2A – Bridging Decisions and Alignment Review, and 4) Merger Project Team Agreement Signature Form.

1.1 PROJECT BACKGROUND

1.1.1 Project Setting

The project is located in northern Henderson County, just south of Hendersonville, and southern Buncombe County, just south of Asheville. **Figure 1-1** shows the general project vicinity. The Town of Fletcher is also in the nearby vicinity. The project study area boundaries consist of a generally 1,400ft wide corridor that follows existing I-26 along its footprint from US 25 in Henderson County, north to I-40 in Buncombe County. Expanded study areas have been included around interchanges incorporated into the I-26 project study as well as expanded study area around the Blue Ridge Parkway bridge, which has also been included in the project study. **Figures 1-2A**, **1-2B**, and **1-2C** illustrate the project study area.

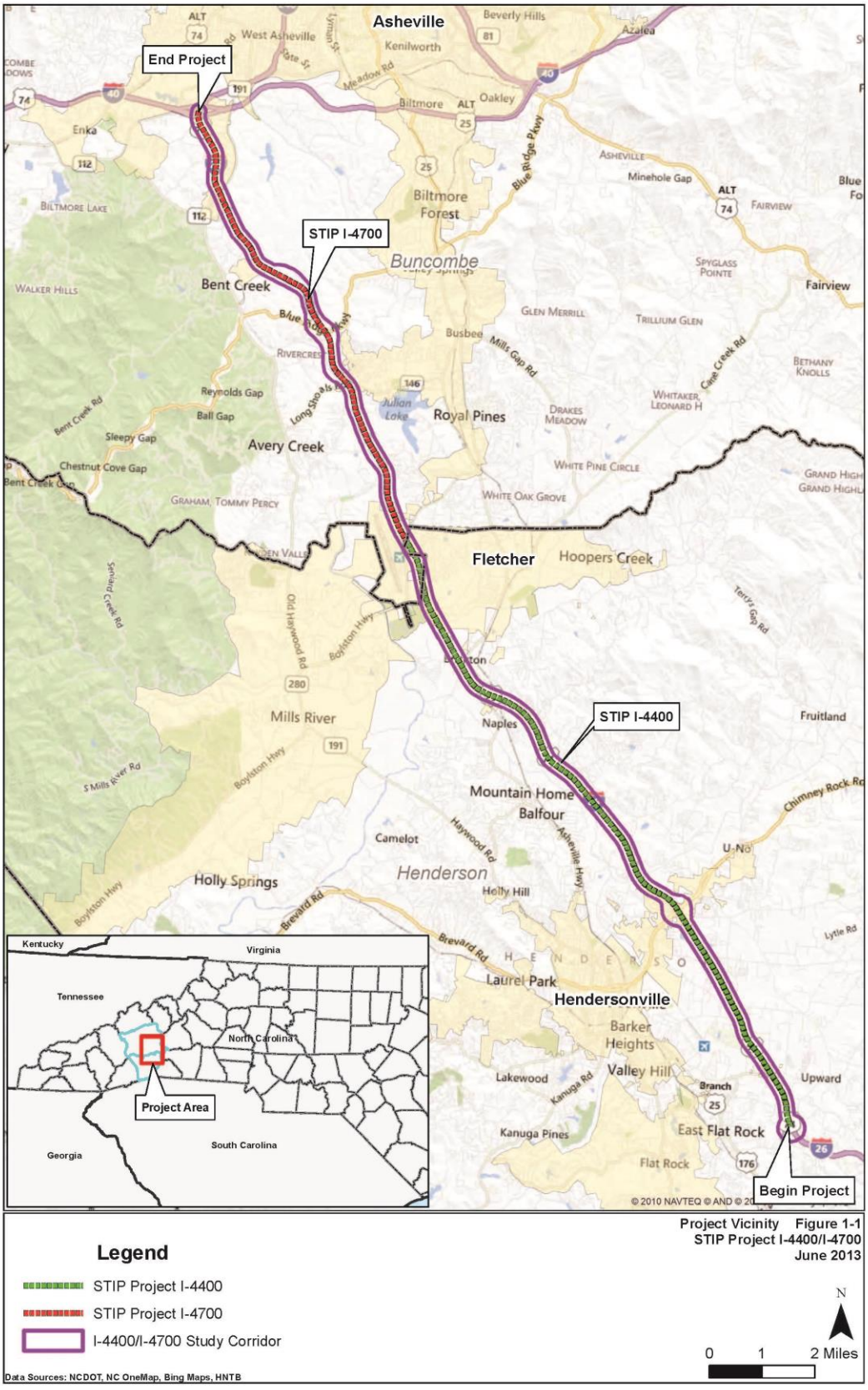
1.1.2 Project History

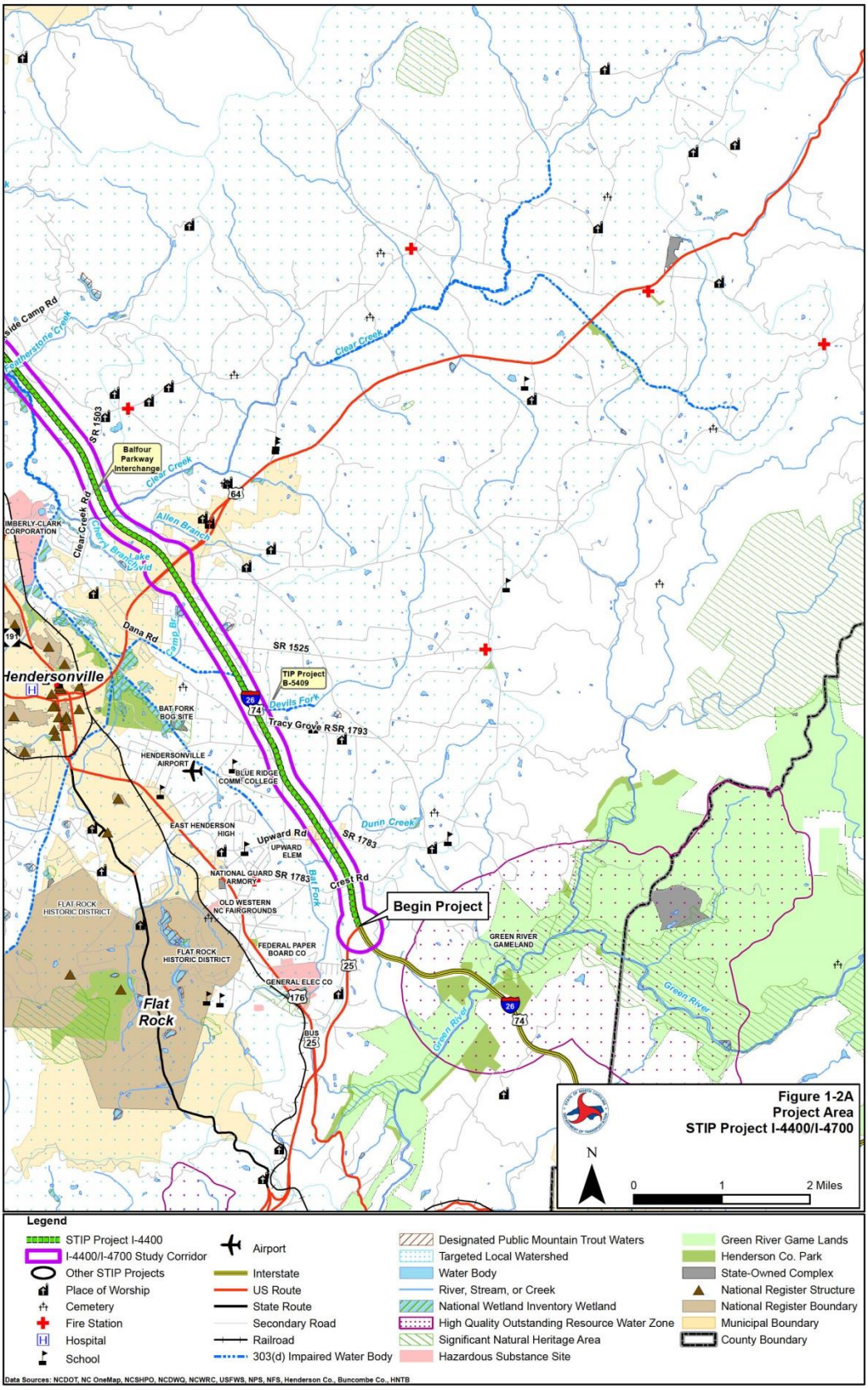
An Environmental Assessment was completed for STIP I-4400 (the 13.6 mile segment between US 25 and NC 280) in May 2001. A Finding of No Significant Impact was completed in January 2002 and, subsequently, the project was advertised as a Design-Build project by NCDOT. A lawsuit and resulting judgment in 2003 found that NCDOT should conduct a broader analysis of the cumulative impacts and logical termini, or project limits, of the overall expansion of the I-26 corridor. The project was subsequently placed on hold due to financial constraints. However, the growing need for improvements to the I-26 corridor was recognized and the project was reinitiated and included in the Draft NCDOT 2013-2023 STIP. In order to address the 2003 judgment, the NCDOT concluded to combine the analysis of STIP I-4400 with STIP I-4700 (the 8.6-mile segment between NC 280 and I-40) into one comprehensive Environmental Impact Statement (EIS). The EIS will address logical termini and cumulative effects in accordance with NEPA.

1.2 PROJECT SCHEDULE

The following bullets outline the tentative project schedule. These major milestone target dates are preliminary and subject to change.

- Project Technical Reports 2013 – 2015
- Draft Environmental Impact Statement Late 2015
- Public Hearing 2016
- Final Environmental Impact Statement Late 2016
- Record of Decision 2017
- Begin Right-of-Way Acquisition 2018
- Begin Construction 2020


End Project
STIP I-4700
STIP I-4400
Begin Project
Asheville
Biltmore Forest
Buncombe
Bent Creek
Fletcher
Hoopers Creek
Avery Creek
Royal Pines
Mills River
Naples
Fruitland
Mountain Home
Balfour
Camelot
Henderson
Holly Springs
Laurel Park
Hendersonville
Barker Heights
Valley Hill
Lakewood
Kanuga Pines
East Flat Rock
Flat Rock
Upward
Fairview
Enka
Biltmore Lake
Walker Hills
Reynolds Gap
Ball Gap
Sleepy Gap
Chestnut Cove Gap
Graham, Tommy Percy
White Oak Grove
White Pine Circle
Drakes Meadow
Julian
Busbee
Glen Merrill
Trillium Glen
Spyglass Pointe
Minehole Gap
Oakley
Beverly Hills
Azalea
Kenilworth
West Asheville
Meadow Rd
Biltmore
Blue Ridge Pkwy
Long Shoals Rd
Mills Gap Rd
Cane Creek Rd
Bethany Knolls
Whitaker, Leonard H
Old Haywood Rd
Boylston Hwy
Haywood Rd
Asheville Hwy
Brevard Rd
Kanuga Rd
Chimney Rock Rd
Lyle Rd
Terry's Gap Rd
Senator Creek Rd
Bent Creek Rd
S Mills River Rd
Kentucky
Virginia
Tennessee
North Carolina
South Carolina
Georgia
Project Area
© 2010 NAVTEQ © AND © 20
Legend
STIP Project I-4400
STIP Project I-4700
I-4400/I-4700 Study Corridor
Data Sources: NCDOT, NC OneMap, Bing Maps, HNTB
Project Vicinity Figure 1-1
STIP Project I-4400/I-4700
June 2013
N
0 1 2 Miles


Begin Project
Balfour Parkway Interchange
SR 1503
SR 1525
SR 1783
SR 1793
TIP Project B-5409
Hendersonville
Flat Rock
Clear Creek
Allen Branch
Devils Fork
Dunn Creek
Green River
Dana Rd
Upward Rd
Crest Rd
Clear Creek Rd
Tracy Grove Rd
Bat Fork
BAT FORK BOG SITE
HENDERSONVILLE AIRPORT
BLUE RIDGE COMM. COLLEGE
EAST HENDERSON HIGH
UPWARD ELEM
NATIONAL GUARD ARMORY
OLD WESTERN NC FAIRGROUNDS
FLAT ROCK HISTORIC DISTRICT
FEDERAL PAPER BOARD CO
GENERAL ELEC CO
GREEN RIVER GAMELAND
IMBERLY-CLARK CORPORATION
Figure 1-2A
Project Area
STIP Project I-4400/I-4700
N
0
1
2 Miles
Legend
STIP Project I-4400
I-4400/I-4700 Study Corridor
Other STIP Projects
Place of Worship
Cemetery
Fire Station
Hospital
School
Airport
Interstate
US Route
State Route
Secondary Road
Railroad
303(d) Impaired Water Body
Designated Public Mountain Trout Waters
Targeted Local Watershed
Water Body
River, Stream, or Creek
National Wetland Inventory Wetland
High Quality Outstanding Resource Water Zone
Significant Natural Heritage Area
Hazardous Substance Site
Green River Game Lands
Henderson Co. Park
State-Owned Complex
National Register Structure
National Register Boundary
Municipal Boundary
County Boundary
Data Sources: NCDOT, NC OneMap, NCSHPO, NCDWQ, NCWRC, USFWS, NPS, NFS, Henderson Co., Buncombe Co., HNTB

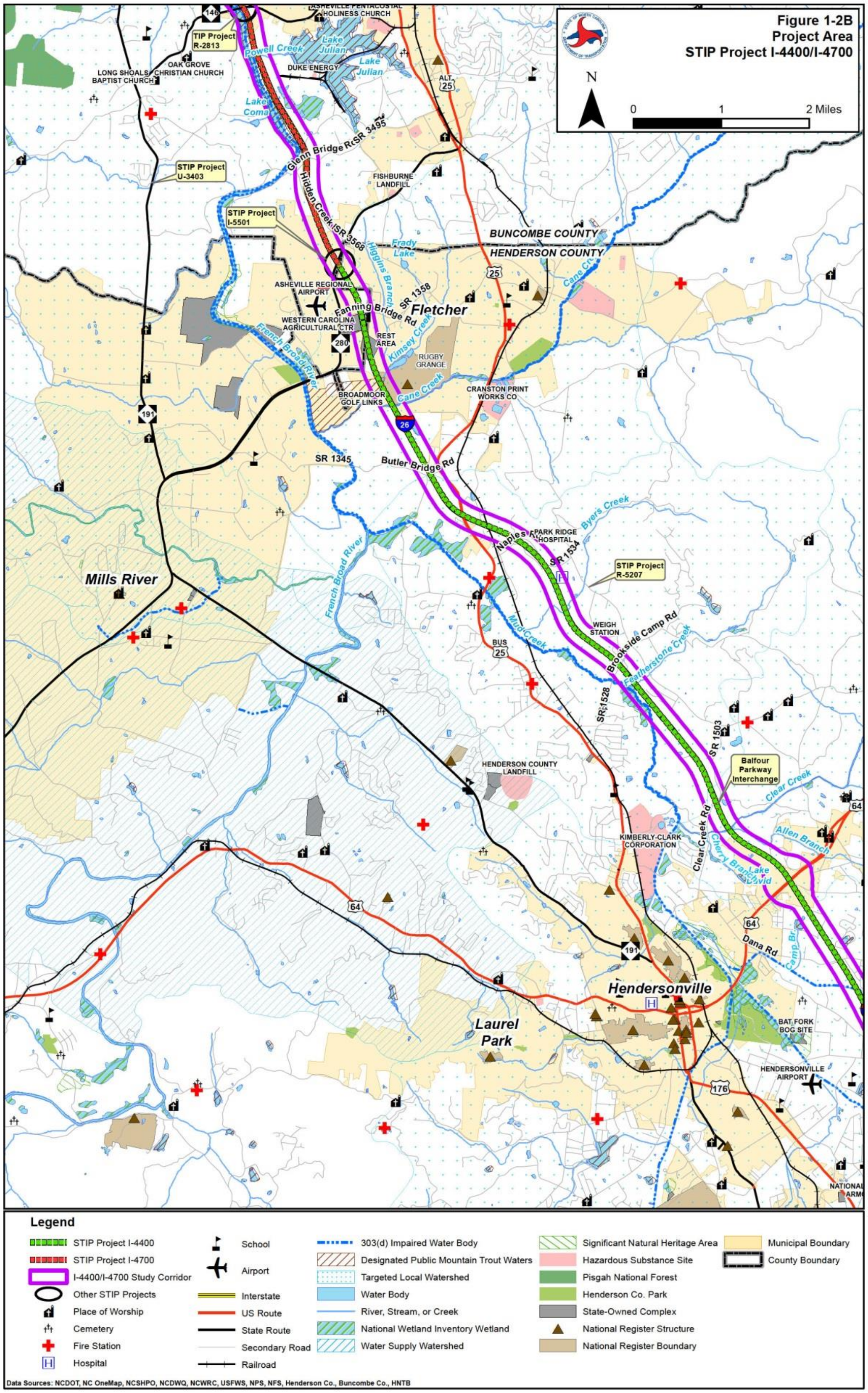


Figure 1-2B
Project Area
STIP Project I-4400/I-4700
N
0
1
2 Miles
BUNCOMBE COUNTY
HENDERSON COUNTY
Fletcher
Mills River
Hendersonville
Laurel Park
ASHEVILLE REGIONAL AIRPORT
WESTERN CAROLINA AGRICULTURAL CTR
REST AREA
RUGBY GRANGE
BROADMOOR GOLF LINKS
CRANSTON PRINT WORKS CO
FISHBURNE LANDFILL
DUKE ENERGY
PARK RIDGE HOSPITAL
WEIGH STATION
HENDERSON COUNTY LANDFILL
KIMBERLY-CLARK CORPORATION
BAT FORK BOG SITE
HENDERSONVILLE AIRPORT
STIP Project R-2813
STIP Project U-3403
STIP Project I-5501
STIP Project R-5207
Balfour Parkway Interchange
Glenn Bridge Rd
Hidden Creek/SR 3568
Fanning Bridge Rd
Butler Bridge Rd
SR 1345
SR 1358
Naples Rd
SR 1534
Brookside Camp Rd
SR 1528
SR 1503
Clear Creek Rd
Dana Rd
French Broad River
Cane Creek
Mud Creek
Featherstone Creek
Byers Creek
Clear Creek
Allen Branch
Higgins Branch
Kimsey Creek
Lake Julian
Frady Lake
Lake David
Legend
STIP Project I-4400
STIP Project I-4700
I-4400/I-4700 Study Corridor
Other STIP Projects
Place of Worship
Cemetery
Fire Station
Hospital
School
Airport
Interstate
US Route
State Route
Secondary Road
Railroad
303(d) Impaired Water Body
Designated Public Mountain Trout Waters
Targeted Local Watershed
Water Body
River, Stream, or Creek
National Wetland Inventory Wetland
Water Supply Watershed
Significant Natural Heritage Area
Hazardous Substance Site
Pisgah National Forest
Henderson Co. Park
State-Owned Complex
National Register Structure
National Register Boundary
Municipal Boundary
County Boundary
Data Sources: NCDOT, NC OneMap, NCSHPO, NCDWQ, NCWRC, USFWS, NPS, NFS, Henderson Co., Buncombe Co., HNTB

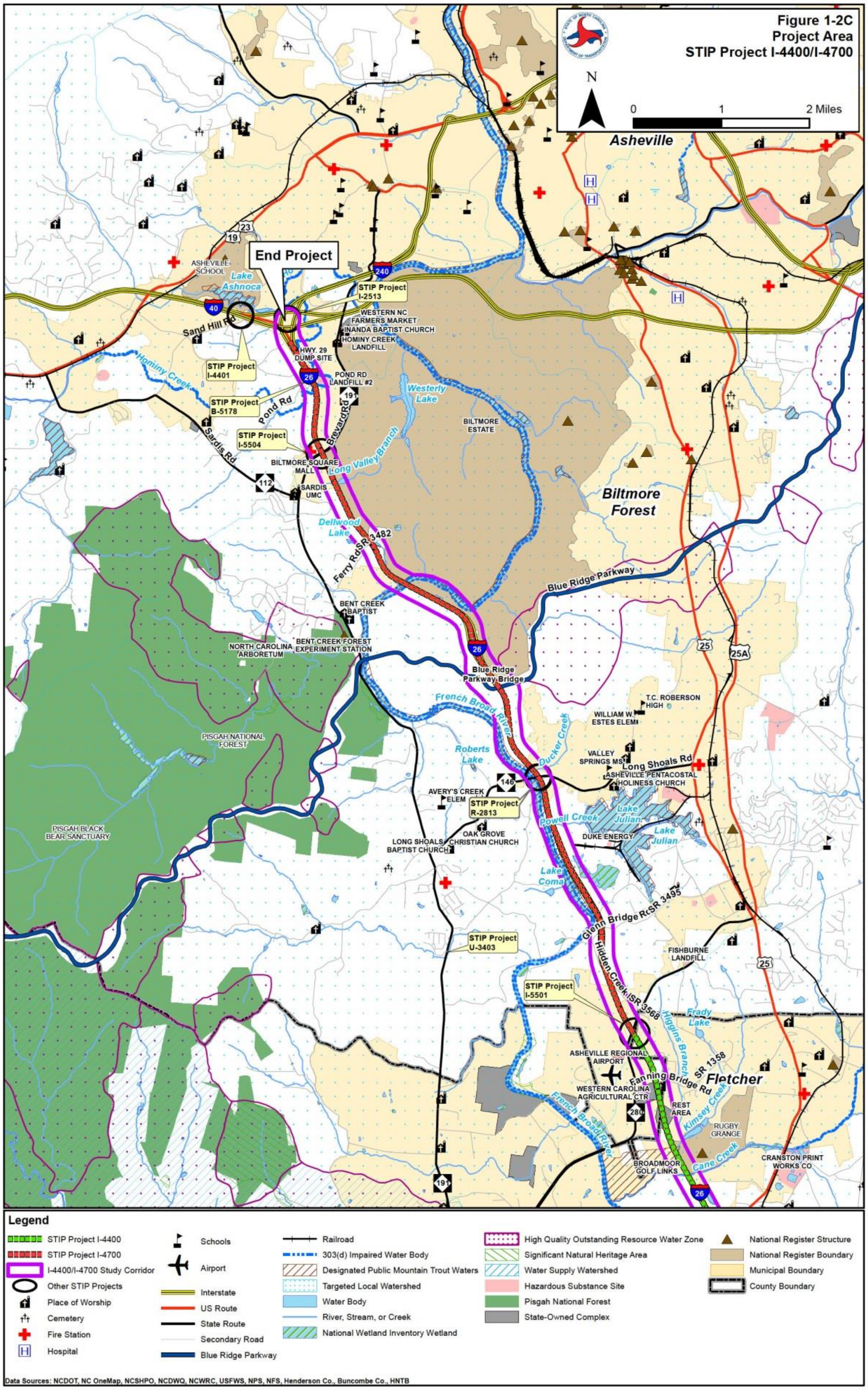


Figure 1-2C
Project Area
STIP Project I-4400/I-4700
N
0
1
2 Miles
Asheville
End Project
ASHEVILLE SCHOOL
Lake Ashnoca
Sand Hill Rd
STIP Project I-2513
STIP Project I-4401
STIP Project B-5178
STIP Project I-5504
WESTERN NC FARMERS MARKET
INANDA BAPTIST CHURCH
HOMINY CREEK LANDFILL
HWY. 29 DUMP SITE
POND RD LANDFILL #2
Hominy Creek
Pond Rd
Brevard Rd
Sardis Rd
BILTMORE SQUARE MALL
Long Valley Branch
SARDIS UMC
Westerly Lake
BILTMORE ESTATE
Biltmore Forest
Dellwood Lake
Ferry Rd/SR 3482
Blue Ridge Parkway
BENT CREEK BAPTIST
NORTH CAROLINA ARBORETUM
BENT CREEK FOREST EXPERIMENT STATION
Blue Ridge Parkway Bridge
French Broad River
PISGAH NATIONAL FOREST
PISGAH BLACK BEAR SANCTUARY
T.C. ROBERSON HIGH
WILLIAM W. ESTES ELEM
Roberts Lake
Ducker Creek
VALLEY SPRINGS MS
Long Shoals Rd
ASHEVILLE PENTACOSTAL HOLINESS CHURCH
AVERY'S CREEK ELEM
STIP Project R-2813
Lake Julian
Powell Creek
DUKE ENERGY
LONG SHOALS BAPTIST CHURCH
OAK GROVE CHRISTIAN CHURCH
Lake Coma
Glenn Bridge Rd/SR 3495
STIP Project U-3403
FISHBURNE LANDFILL
Hidden Creek/SR 3568
STIP Project I-5501
Frady Lake
Higgins Branch
ASHEVILLE REGIONAL AIRPORT
SR 1358
Fletcher
Fanning Bridge Rd
WESTERN CAROLINA AGRICULTURAL CTR
REST AREA
Kimsey Creek
RUGBY GRANGE
BROADMOOR GOLF LINKS
Cane Creek
CRANSTON PRINT WORKS CO
Legend
STIP Project I-4400
STIP Project I-4700
I-4400/I-4700 Study Corridor
Other STIP Projects
Place of Worship
Cemetery
Fire Station
Hospital
Schools
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Interstate
US Route
State Route
Secondary Road
Blue Ridge Parkway
Railroad
303(d) Impaired Water Body
Designated Public Mountain Trout Waters
Targeted Local Watershed
Water Body
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Significant Natural Heritage Area
Water Supply Watershed
Hazardous Substance Site
Pisgah National Forest
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National Register Boundary
Municipal Boundary
County Boundary
Data Sources: NCDOT, NC OneMap, NCSHPO, NCDWQ, NCWRC, USFWS, NPS, NFS, Henderson Co., Buncombe Co., HNTB

1.1.3 Public Involvement

The project was reinitiated in late 2012. Public comment was solicited at the first Citizens Informational Workshop held in January 2013. The consensus of the comments was in favor and support of the project and the expectation that the improvements and widening of I-26 in the project study area would facilitate improved traffic flow in the area. An additional Citizens Informational Workshop to gather further public input on detailed study alternatives is anticipated, as well as a Public Hearing after preparation of the Draft EIS.

2. MERGER TEAM CONCURRENCES TO DATE

2.1 CONCURRENCE POINT 1: Project Purpose And Need

The Project Team concurred on the following Purpose and Need Statement on June 20, 2013:

The needs to be addressed by this project include:

- Improve existing and projected roadway capacity deficiencies.
- Improve insufficient pavement structure and deteriorating existing road surface conditions.

The purpose of the proposed improvements to I-26, from US 25 in Henderson County north to I-40 in Buncombe County, is to reduce congestion, with a goal of achieving an overall LOS D in the design year (2040), and improve the pavement structure.

2.2 CONCURRENCE POINT 2: Preliminary Alternatives To Be Studied In Detail

On June 20, 2013, the Project Team also concurred on the following alternatives to be carried forward:

Build Alternative 1 – "Best Fit" 6-Lane Widening Alternative: Alternative 1 would widen I-26 along the full project corridor to a 6-lane facility asymmetrically at locations that "best fit" the current roadway location and surrounding land uses. "Best Fit" locations will be evaluated and selected to improve the existing highway alignment, minimize impacts, and accommodate maintenance of traffic during construction.

Build Alternative 2 – "Best Fit" 8-Lane Widening Alternative: Alternative 2 would widen I-26 along the full project corridor to an 8-lane facility asymmetrically at locations that "best fit" the current roadway location and surrounding land uses. "Best Fit" locations will be evaluated and selected to improve the existing highway alignment, minimize impacts, and accommodate maintenance of traffic during construction.

Build Alternative 3 – "Best Fit" Traffic Report Recommendations Widening Alternative: Alternative 3 would widen I-26 as a hybrid of 6- or 8-lane segments at different locations along the project corridor. Widening to 6- or 8-lanes will be asymmetrical at locations that "best fit" the current roadway location and surrounding land uses and as outlined in the traffic report recommendations in specific areas. "Best Fit" locations will be evaluated and selected to improve the existing highway alignment, minimize impacts, and accommodate maintenance of traffic during construction. Build Alternative 3 is also referred to as the Hybrid 6-/8-Lane Widening Alternative.

Typical roadway sections are included in **Appendix A**.

3. MERGER CONCURRENCE POINT 2A – Bridging Decisions and Alignment Review

3.1 EXISTING DRAINAGE CROSSINGS

Local land use plans for the study area and the Natural Resources Technical Report (NCDOT, August 2014) prepared for the project indicate that the contributing drainage areas are predominantly urban in nature and will continue to be so at build out. Most streams in the study area drain areas less than five acres, including seven streams that drain less than one acre. There are no known flooding issues associated with any of the studied crossings.

Field investigations and preliminary hydraulic studies (Hydraulic Technical Memorandum, HNTB, May 2014 and Addendum to Hydraulic Technical Memorandum, HNTB, November 2014) were conducted for 28 stream crossings in the project corridor. Of these, four are bridges, 15 are major culvert crossings (conveyance greater than or equal to a 72-inch pipe), and nine are 66-inch pipes. One of the 66-inch pipes is combined with a 14' x 14' vehicle underpass that also allows flows under I-26. The other 66-inch crossings were determined not to require a conveyance equal to or greater than a 72-inch pipe; therefore, these crossings are not addressed in this review (Sites 5, 6, 8, 9, 15, 20, 21, and 22). In addition, it was determined that several sites in proximity to the project termini are no longer within the project limits and are not addressed in this review (Sites 1, 2, 27, and 28).

Drainage structure recommendations for the remaining 16 sites are provided. Of the 16 crossings evaluated, seven are located on FEMA-studied streams. All of these crossings are within the French Broad River Basin and there is no requirement for riparian buffers. Site location maps and photographs of the stream crossings and existing structures are included in **Appendix B**.

3.2 DRAINAGE STRUCTURE RECOMMENDATIONS

Based on the hydrologic analysis, no change to the type of existing structures is warranted. It is recommended that all existing bridges be removed and replaced. Similarly, existing culverts are recommended to be retained and extended. Supplemental pipes are recommended in some locations. Specific drainage structure recommendations are shown in **Table 1**.

Although some streams and one wetland would be impacted by the culvert extensions, it is not recommended that any culverts be replaced with bridges. For an existing interstate project, it is generally not feasible or practicable to replace existing culverts with bridges, primarily due to cost and constructability issues. Replacing an existing culvert with a bridge would require several construction steps beyond what would be necessary to extend an existing culvert and/or provide a supplemental overflow pipe. The initial step involves construction of an on-site detour (likely outside the existing roadway footprint resulting in increased impacts) to maintain traffic. Once the on-site detour is complete, traffic would shift to the detour to allow for excavation of the existing roadbed and culvert. It is anticipated that temporary stream channels and a phased removal of the existing culvert would be necessary to maintain the flow in the existing stream. Upon the removal of the culvert, the new bridge would be constructed. Finally, traffic would be shifted to the completed bridge and the on-site detour removed. In most cases, the impacts associated with the on-site detour and the temporary stream channels would increase the impacts associated with a simple culvert extension or supplement.

Costs for recommended culvert extensions, supplemental pipes, and bridges are included in **Table 1**. For comparison, costs to replace existing culverts with bridges were estimated. This cost comparison highlights the substantial increase in cost to replace an existing culvert with a bridge.

Table 1. Recommended Major Drainage Structures

			STREAM INFORMATION							EXISTING STRUCTURE	6-LANE WIDENING			8-LANE WIDENING			HYBRID 6-/8-LANE WIDENING		
SITE NUMBER	STATION	ROUTE	STREAM NAME	NRTR MAP ID	NCDWR STREAM INDEX NUMBER	PERENNIAL / INTERMITTENT	STREAM LENGTH (ft)	STREAM CLASS	DRAINAGE AREA (sq mi) [acres]	Number, Size, Structure Type (Existing Length)	Recommended Structure (Additional Length)	Cost Estimate - Culvert Extension (Bridge)	Potential Stream (lf)/ Wetland (ac) Impact	Recommended Structure (Additional Length)	Cost Estimate - Culvert Extension (Bridge)	Potential Stream (lf)/ Wetland (ac) Impact	Recommended Structure (Additional Length)	Cost Estimate - Culvert Extension (Bridge)	Potential Stream (lf)/ Wetland (ac) Impact
3	-L- 79+09	I-26	UT to Dunn Creek	SV	6-55-8-1-1	P	725	C	0.28 178	1 @ 6' x 6' RCBC (240')	Retain and extend (18' [RT]/47' [LT])	$ 55,000 ($1,223,000)	145/0	Retain and extend (25' [RT]/27' [LT])	$ 44,000 ($1,458,000)	132/0	Retain and extend (18' [RT]/47' [LT])	$ 55,000 ($1,223,000)	145/0
4	-L- 90+32	I-26	Dunn Creek	ST	6-55-8-1-1	P	845	C	2.58 1,649	2 @ 8' x 8' RCBC (354')	Retain existing; add supplemental pipe	$248,000 ($1,151,000)	0/0	Retain and extend; add supplemental pipe (45' [RT]/18' [LT])	$382,000 (1,327,000)	143/0	Retain existing; add supplemental pipe	$248,000 ($1,151,000)	0/0
7	-L- 208+70	I-26	Devils Fork	SAJ	6-55-8-2	P	2849	C	6.80 4,351	3 @ 9' X 10' RCBC (220')	Retain and extend (42' [RT]/20' [LT])	$177,000 (1,295,000)	142/0	Retain and extend (42' [RT]/70' [LT])	$320,000 ($1,544,000)	192/0	Retain and extend (42' [RT]/20' [LT])	$177,000 (1,295,000)	142/0
10	-L- 248+18	I-26	UT to Devils Fork	SAR	6-55-8-2	P	812	C	0.29 185	1 @ 6' x 6' RCBC (382')	Retain existing	0	0/0	Retain and extend (0' [RT]/8' [LT])	$ 7,000 ($1,372,000)	48/0	Retain existing	0	0/0
11	-L- 334+69	I-26	Clear Creek	SBD	6-55-11-(5)	P	908	C	44.30 28,352	Dual 3 - Span RC Deck Bridges; L = 220.14'	Remove and replace; L (Min) = 230'	(3,227,000)	-	Remove and replace; L (Min) = 230'	(3,862,000)	-	Remove and replace; L (Min) = 230'	(3,227,000)	-
12	-L- 407+69	I-26	UT to Mud Creek	SBG	6-55	P	1,433	C	0.46 296	1 @ 7' x 7' RCBC (266')	Retain and extend (18' [RT]/0'[LT])	$ 18,000 ($2,086,000)	58/0	Retain and extend (26' [RT]/18' [LT])	$ 44,000 ($2,486,000)	124/0	Retain and extend (18' [RT]/0'[LT])	$ 18,000 ($2,086,000)	58/0
13	-L- 438+81	I-26	Featherstone Creek	SBP	6-55-12	P	643	C	4.09 2,616	3 @ 8' x 8' RCBC (160')	Retain existing	0	0/0	Retain and extend; add supplemental pipe (32' [RT]/52' [LT])	$351,000 ($943,000)	164/0	Retain existing	0	0/0
14	-L- 500+94	I-26	Byers Creek	SBU	6-55-13	P	1219	C	2.42 1,550	2 @ 8' x 8' RCBC (156')	Retain and extend; add supplemental pipe (21' [RT]/16' [LT])	$196,000 ($720,000)	117/0	Retain and extend; add supplemental pipe (33' [RT]/28' [LT])	$260,000 (4858,000)	141/0	Retain and extend; add supplemental pipe (21' [RT]/16' [LT])	$196,000 ($720,000)	117/0
16	-L- 669+02	I-26	Cane Creek	SCW	6-57-(9)	P	878	C	83.80 53,632	Dual 3 - Span RC Deck Bridges; L = 198.25'	Remove and replace; L (Min) = 210'	(2,947,000)	-	Remove and replace; L (Min) = 210'	3,526,000	-	Remove and replace; L (Min) = 210'	(3,526,000)	-
17	-L- 682+68	I-26	Kimsey Creek	SCY	6-57-22	P	960	C	2.49 1,594	3 @ 7' x 7' RCBC (236')	Retain and extend; add supplemental pipe (20' [RT]/30' [LT])	$287,000 ($1,511,000)	130/0	Retain and extend; add supplemental pipe (36' [RT]/48' [LT])	$396,000 ($1,801,000)	164/0	Retain and extend; add supplemental pipe (36' [RT]/48' [LT])	$396,000 ($1,801,000)	164/0
18	-Y12- 11+44	SR 1358	UT to French Broad River	-	6-(54.5)	-	-	B	0.14 88	1 @ 6' x 5' RCBC - 66" RCP w/ HW (540')	Retain existing	0	0/0	Retain and extend (0' [RT]/8' [LT])	$7,000	48/0	Retain and extend (0' [RT]/8' [LT])	$7,000	48/0
19	-L- 800+81	I-26	UT to French Broad River	SDC	6-(54.5)	P	961	B	0.36 228	1 @ 6' x 6' RCBC (220')	Retain and extend; add supplemental pipe (22' [RT]/27' [LT])	$233,000 ($1,583,000)	129/0	Retain and extend; add supplemental pipe (48' [RT]/27' [LT])	$262,000 ($1,886,000)	155/0	Retain and extend; add supplemental pipe (48' [RT]/27' [LT])	$262,000 ($1,886,000)	155/0
23	-L47001-897+06	I-26	Powell Creek	SDN	6-62	P	470	C	5.06 3,240	2 @ 10' x 10' RCBC (264')	Retain and extend (28' [RT]/0' [LT])	$ 68,000 ($1,655,000)	68/0	Retain and extend (80' [RT]/24' [LT])	$250,000 ($1,972,000)	184/0	Retain and extend (80' [RT]/24' [LT])	$250,000 ($1,972,000)	184/0
24	-L47001-931+91	I-26	Ducker Creek	SDT	6-63	P	377	C	0.99 632	1 @ 8' x 8' RCBC (552')	Retain existing	0	0/0	Retain existing	0	0/0	Retain existing	0	0/0
25	-L47002-1076+40	I-26	French Broad River		6-(54.5)			B	678.00 433,920	Dual 6 - Span RC Deck Bridges; L1 = 440.9' L2 = 453.4'	Remove and replace; L (Min) = 460'	($6,454,000)	-	Remove and replace; L (Min) = 460'	$7,724,000	-	Remove and replace; L (Min) = 460'	($7,724,000)	-
26	-L47002-1151+85	I-26	Long Valley Branch	SFN	6-75	P	44	C	0.25 158	1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC [vehicle underpass] (220')	Retain existing	0	0/0	Retain and extend (20' [RT]/40' [LT])	$118,000 ($2,315,000)	140/0.25	Retain and extend (20' [RT]/40' [LT])	$118,000 ($2,315,000)	140/0.25

NOTES: Minimum supplemental pipe size is 48".
Stream/wetland impacts are measured from the openings of the existing culverts to 40 feet beyond slope stakes.
For comparison, costs to replace existing culverts with bridges were estimated for sites where culvert extensions would be needed. Contour mapping was used to estimate the length of bridges at sites with existing culverts.
Cost estimates are based on unit costs and bid averages provided by NCDOT.

Unit costs
Culvert: single -$35/sf, double - $30/sf, triple - $25/sf
Bridges: $115/sf
48" Supplemental Pipe: $620/lf (bore and jack)
Stream mitigation is not included in the culvert extension costs. However, a 2:1 mitigation ratio would result in an increase in the culvert extension costs by $762/lf.

Site 18 is outside the NRTR boundary.
Wetlands are present only at Site 26.

4. MERGER PROJECT TEAM AGREEMENT SIGNATURE FORM

Merger Project Team Agreement

Concurrence Point 2A: Bridging Decisions and Alignment Review

Project Name/Description:
I-26, Widen from US 25 in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
TIP Project: I-4400/I-4700

Bridging Decisions: Based on the current preliminary hydraulics design for the existing major drainage structures for TIP Project I-4400/I-4700, the proposed culvert and bridging recommendations are presented in the following table:

SITE	PROPOSED HYDRAULIC STRUCTURE Number, Size, Structure Type, (Additional Length)		
	6-LANE WIDENING	**8-LANE WIDENING**	**HYBRID 6-/8-LANE WIDENING**
3	Retain and extend 1 @ 6' x 6' RCBC (18' [RT]/47' [LT])	Retain and extend 1 @ 6' x 6' RCBC (25' [RT]/27' [LT])	Retain and extend 1 @ 6' x 6' RCBC (18' [RT]/47' [LT])
4	Retain 2 @ 8' x 8' RCBC ; add supplemental pipe	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (45' [RT]/18' [LT])	Retain 2 @ 8' x 8' RCBC ; add supplemental pipe
7	Retain and extend 3 @ 9' X 10' RCBC (42' [RT]/20' [LT])	Retain and extend 3 @ 9' X 10' RCBC (42' [RT]/70' [LT])	Retain and extend 3 @ 9' X 10' RCBC (42' [RT]/20' [LT])
10	Retain 1 @ 6' x 6' RCBC	Retain and extend 1 @ 6' x 6' RCBC (0' [RT]/8' [LT])	Retain 1 @ 6' x 6' RCBC
11	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 230'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 230'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 230'
12	Retain and extend 1 @ 7' x 7' RCBC (18' [RT]/0'[LT])	Retain and extend 1 @ 7' x 7' RCBC (26' [RT]/18' [LT])	Retain and extend 1 @ 7' x 7' RCBC (18' [RT]/0'[LT])
13	Retain 3 @ 8' x 8' RCBC	Retain and extend 3 @ 8' x 8' RCBC; add supplemental pipe (32' [RT]/52' [LT])	Retain 3 @ 8' x 8' RCBC
14	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (21' [RT]/16' [LT])	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (33' [RT]/28' [LT])	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (21' [RT]/16' [LT])
16	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 210'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 210'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 210'
17	Retain and extend 3 @ 7' x 7' RCBC; add supplemental pipe (20' [RT]/30' [LT])	Retain and extend 3 @ 7' x 7' RCBC; add supplemental pipe (36' [RT]/48' [LT])	Retain and extend 3 @ 7' x 7' RCBC; add supplemental pipe (36' [RT]/48' [LT])
18	Retain 1 @ 6' x 5' RCBC - 66" RCP w/ HW	Retain and extend 1 @ 6' x 5' RCBC - 66" RCP w/ HW (0' [RT]/8' [LT])	Retain and extend 1 @ 6' x 5' RCBC - 66" RCP w/ HW (0' [RT]/8' [LT])
19	Retain and extend 1 @ 6' x 6' RCBC; add supplemental pipe (22' [RT]/27' [LT])	Retain and extend 1 @ 6' x 6' RCBC; add supplemental pipe (48' [RT]/27' [LT])	Retain and extend 1 @ 6' x 6' RCBC; add supplemental pipe (48' [RT]/27' [LT])

SITE	PROPOSED HYDRAULIC STRUCTURE Number, Size, Structure Type, (Additional Length)		
	6-LANE WIDENING	**8-LANE WIDENING**	**HYBRID 6-/8-LANE WIDENING**
23	Retain and extend 2 @ 10' x 10' RCBC (28' [RT]/0' [LT])	Retain and extend 2 @ 10' x 10' RCBC (80' [RT]/24' [LT])	Retain and extend 2 @ 10' x 10' RCBC (80' [RT]/24' [LT])
24	Retain 1 @ 8' x 8' RCBC	Retain 1 @ 8' x 8' RCBC	Retain 1 @ 8' x 8' RCBC
25	Remove and replace Dual 6 - Span RC Deck Bridges; L (Min) = 460'	Remove and replace Dual 6 - Span RC Deck Bridges; L (Min) = 460'	Remove and replace Dual 6 - Span RC Deck Bridges; L (Min) = 460'
26	Retain 1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC (vehicle underpass)	Retain and extend 1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC (vehicle underpass) (20' [RT]/40' [LT])	Retain and extend 1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC (vehicle underpass) (20' [RT]/40' [LT])

The Merger Team has concurred on this date of **February 11, 2015**, on the above proposed culvert and bridging recommendations for TIP Project I-4400/I-4700.

USACE_____ NCDOT_____

USEPA_____ USFWS_____

WRC_____ FHWA_____

DWR_____ SHPO_____

TVA_____ FBRMPO_____

EBCI_____

APPENDIX A

TYPICAL ROADWAY SECTIONS

PROJECT REFERENCE NO.	SHEET NO.
14400-4700	2-A

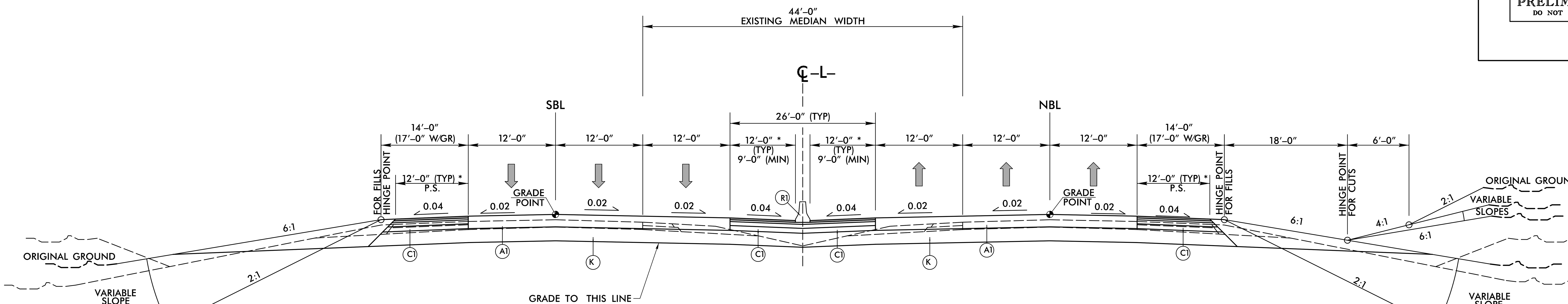
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION 1
RECONSTRUCTION
6 LANE SECTION
* DESIGN EXCEPTION REQUIRED

USE TYPICAL SECTION NO. 1 IN THE FOLLOWING LOCATIONS:

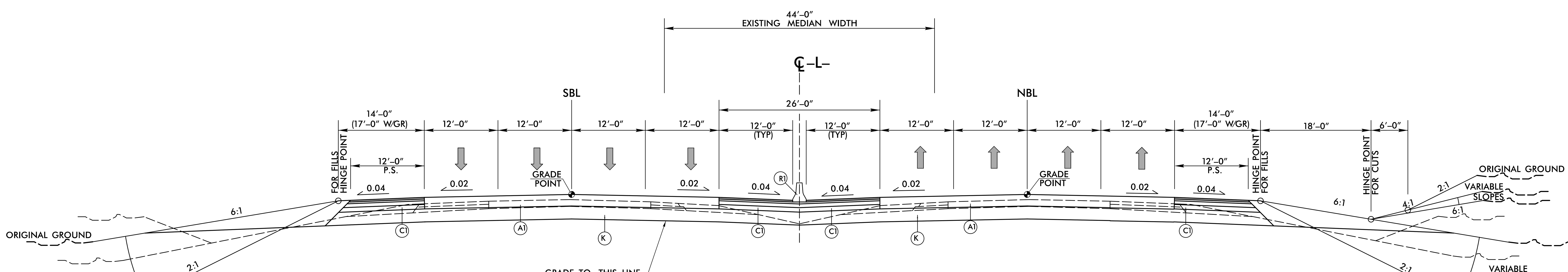
6 LANE ALTERNATIVE:
-L4400- STA 52+00.00 TO STA 791+00.00
-L47001- STA 909+00.00 TO STA 991+18.00
-L47002- STA 1049+91.12 TO STA 1152+82.01

HYBRID ALTERNATIVE:
-L4400- STA 14+00.00 TO STA 591+00

PAVEMENT SCHEDULE	
A1	PROP. PORTLAND CEMENT CONCRETE PAVEMENT
C1	PROP. ASPHALT CONCRETE PAVEMENT
K	PROP. SUBGRADE STABILIZATION
R1	DOUBLE FACED CONCRETE MEDIAN BARRIER
R2	2'-6" CONCRETE CURB AND GUTTER

TRANSITION FROM TYPICAL SECTION NO. 1 TO TYPICAL NO. 2 IN THE FOLLOWING LOCATIONS:

HYBRID ALTERNATIVE:
-L4400- STA 591+00 TO STA 594+00



TYPICAL SECTION 2
RECONSTRUCTION
8 LANE SECTION

USE TYPICAL SECTION NO. 2 IN THE FOLLOWING LOCATIONS:

8 LANE ALTERNATIVE:
-L4400- STA 43+00.00 TO STA 791+00.00
-L47001- STA 909+00.00 TO STA 991+18.00
-L47002- STA 1049+91.12 TO STA 1156+82.03

HYBRID ALTERNATIVE:
-L4400- STA 594+00.00 TO STA 791+00.00
-L47001- STA 909+00.00 TO STA 991+18.00
-L47002- STA 1049+91.12 TO STA 1221+00.00

REVISIONS

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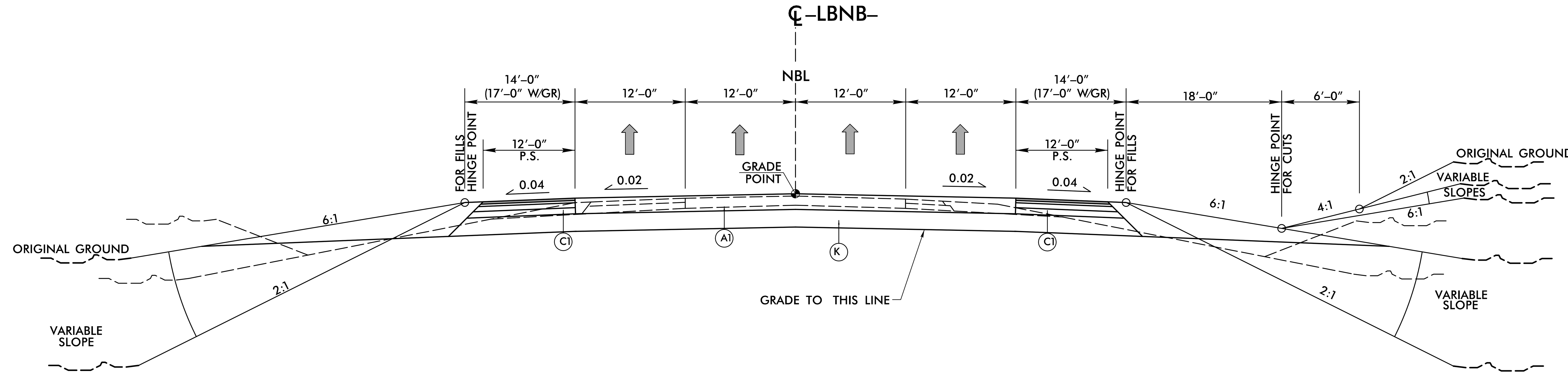
REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
14400-4700	2-B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

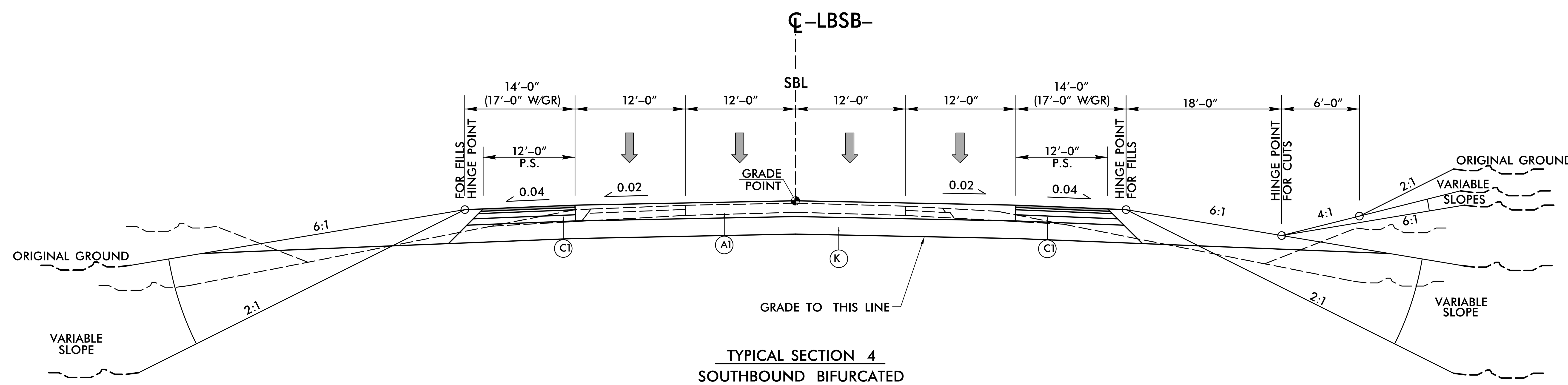


TYPICAL SECTION 3
NORTHBOUND BIFURCATED
8 LANE SECTION

USE TYPICAL SECTION NO. 3 IN THE FOLLOWING LOCATIONS:

8 LANE ALTERNATIVE:
-LBNB47001- STA 791+00.00 TO STA 908+92.32
-LBNB47002- STA 991+18.00 TO STA 1049+91.12

HYBRID ALTERNATIVE:
-LBNB47001- STA 791+00.00 TO STA 908+92.32
-LBNB47002- STA 991+18.00 TO STA 1049+30.93



TYPICAL SECTION 4
SOUTHBOUND BIFURCATED
8 LANE SECTION

USE TYPICAL SECTION NO. 4 IN THE FOLLOWING LOCATIONS:
8 LANE ALTERNATIVE:
-LBSB47001- STA 791+00.00 TO STA 908+90.26
-LBSB47002- STA 991+18.00 TO STA 1049+27.79

HYBRID ALTERNATIVE:
-LBSB47001- STA 791+00.00 TO STA 908+90.26
-LBSB47002- STA 991+18.00 TO STA 1049+91.12

PAVEMENT SCHEDULE	
A1	PROP. PORTLAND CEMENT CONCRETE PAVEMENT
C1	PROP. ASPHALT CONCRETE PAVEMENT
K	PROP. SUBGRADE STABILIZATION
R1	DOUBLE FACED CONCRETE MEDIAN BARRIER
R2	2'-6" CONCRETE CURB AND GUTTER

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PROJECT REFERENCE NO.	SHEET NO.
14400-4700	2-C

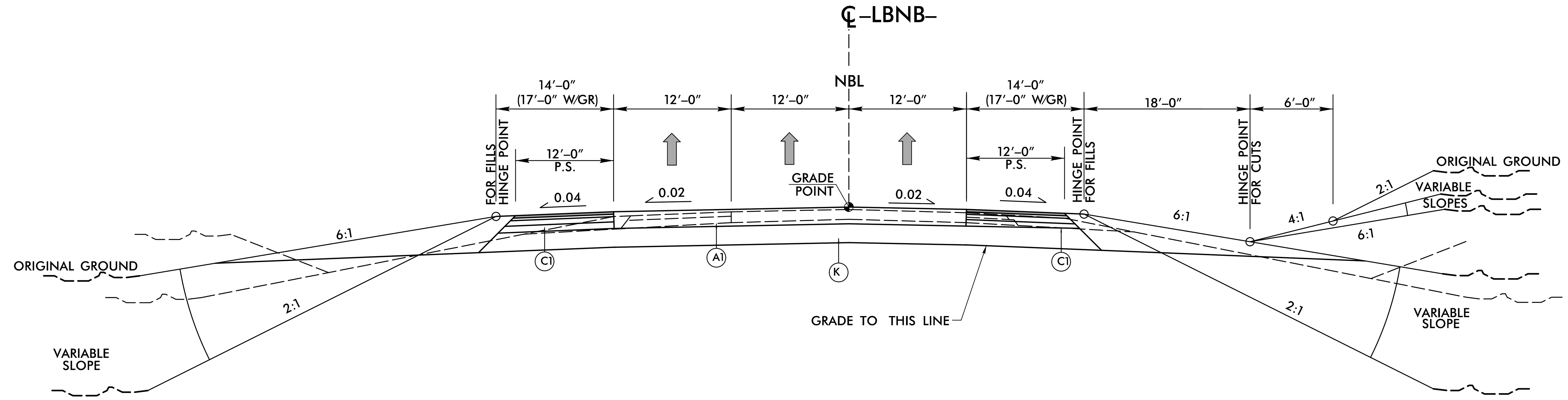
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

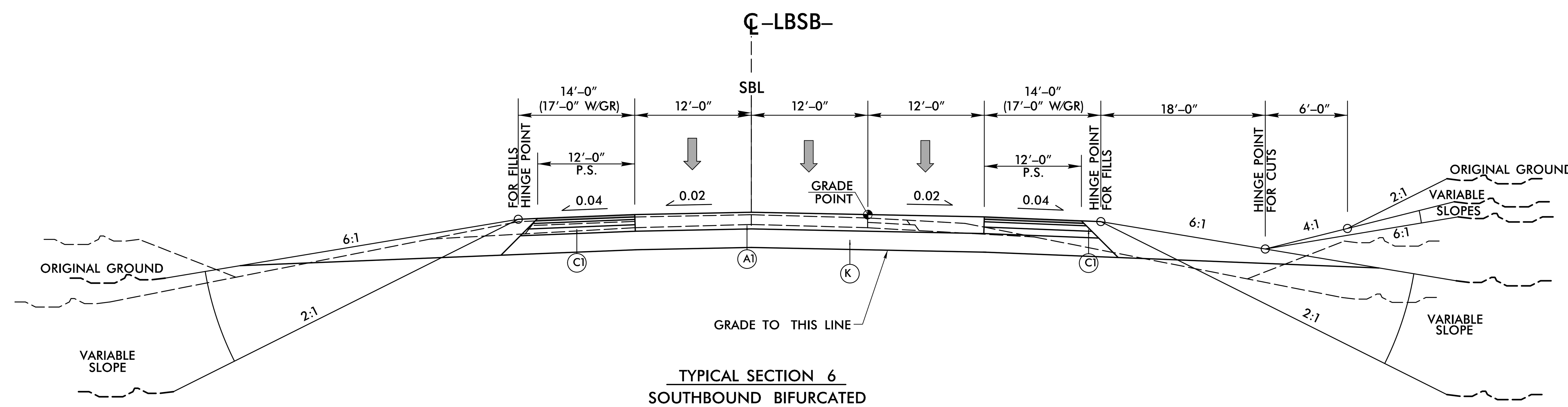
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION 5
NORTHBOUND BIFURCATED
6 LANE SECTION

USE TYPICAL SECTION NO. 5 IN THE FOLLOWING LOCATIONS:

6 LANE ALTERNATIVE:
-LBNB47001- STA 791+00.00 TO STA 908+92.32
-LBNB47002- STA 991+18.00 TO STA 1049+91.12



TYPICAL SECTION 6
SOUTHBOUND BIFURCATED
6 LANE SECTION

USE TYPICAL SECTION NO. 6 IN THE FOLLOWING LOCATIONS:

6 LANE ALTERNATIVE:
-LBSB47001- STA 791+00.00 TO STA 908+90.26
-LBSB47002- STA 991+18.00 TO STA 1049+27.79

REVISIONS

PAVEMENT SCHEDULE	
A1	PROP. PORTLAND CEMENT CONCRETE PAVEMENT
C1	PROP. ASPHALT CONCRETE PAVEMENT
K	PROP. SUBGRADE STABILIZATION
R1	DOUBLE FACED CONCRETE MEDIAN BARRIER
R2	2'-6" CONCRETE CURB AND GUTTER

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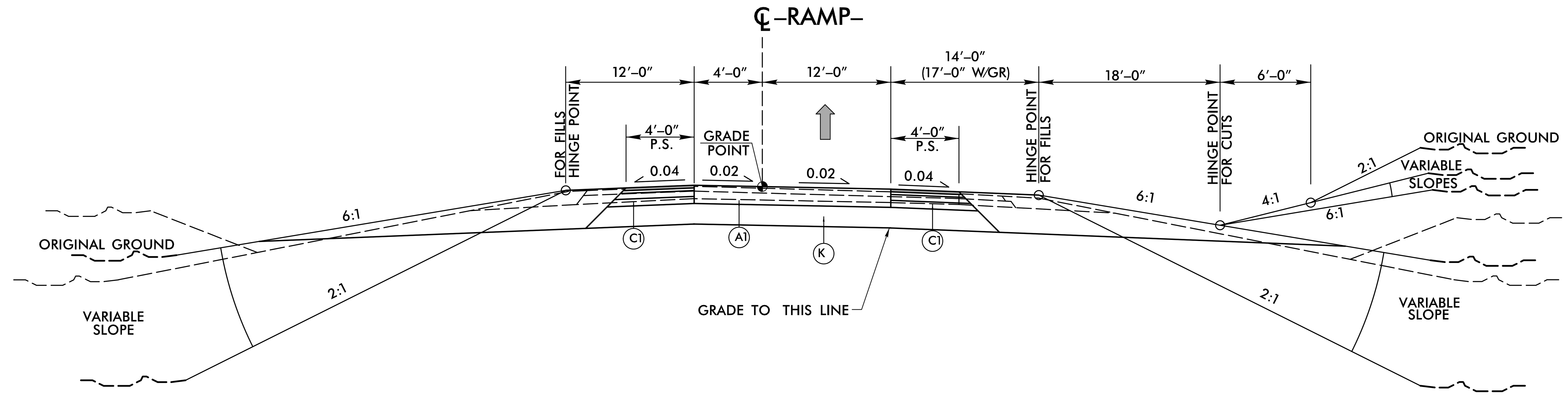
PROJECT REFERENCE NO.	SHEET NO.
14400-4700	2-D
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

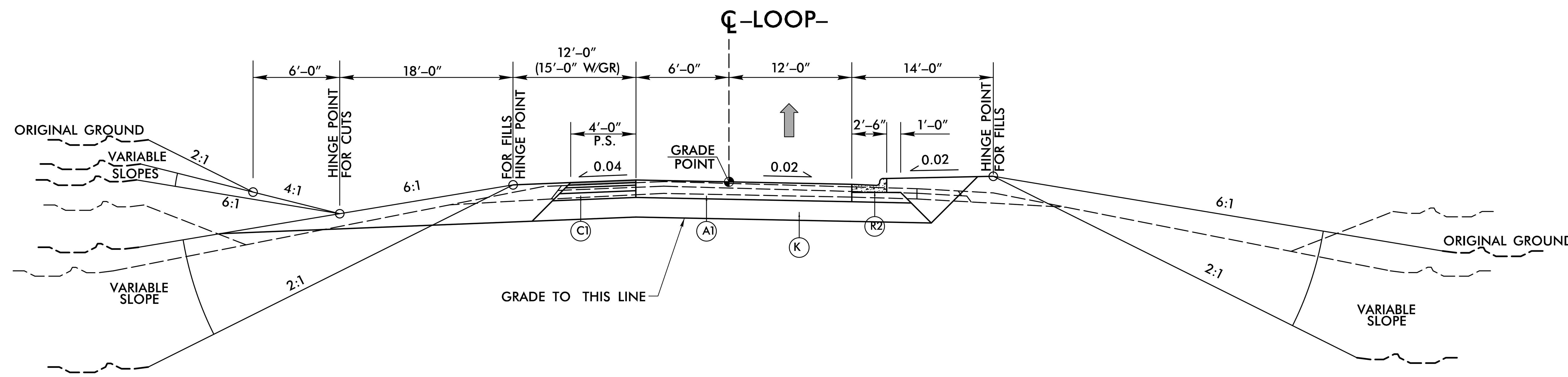
REVISIONS

8/17/99



TYPICAL SECTION 7
RAMPS

USE TYPICAL SECTION NO. 7 IN THE FOLLOWING LOCATIONS:
-Y1- RAMP A, B AND C (US 25)
-Y3- RAMP A, B, C AND D (UPWARD RD)
-Y6- RAMP A, B, C AND D (US 64)
-WS1- RAMP A, B, C AND D (WEIGH STATION)
-Y10- RAMP A, B, C AND D (US 25)
-REST1- RAMP A, B, C AND D (REST AREA)
-Y13- RAMP A, B, C AND D (NC 280)
-Y15- RAMP A, B, C AND D (NC 146)



TYPICAL SECTION 8
LOOPS

USE TYPICAL SECTION NO. 8 IN THE FOLLOWING LOCATIONS:
-Y1- LOOP D (US 25)
-Y3- LOOP A, B, C AND D (US 64)

PAVEMENT SCHEDULE	
A1	PROP. PORTLAND CEMENT CONCRETE PAVEMENT
C1	PROP. ASPHALT CONCRETE PAVEMENT
K	PROP. SUBGRADE STABILIZATION
R1	DOUBLE FACED CONCRETE MEDIAN BARRIER
R2	2'-6" CONCRETE CURB AND GUTTER

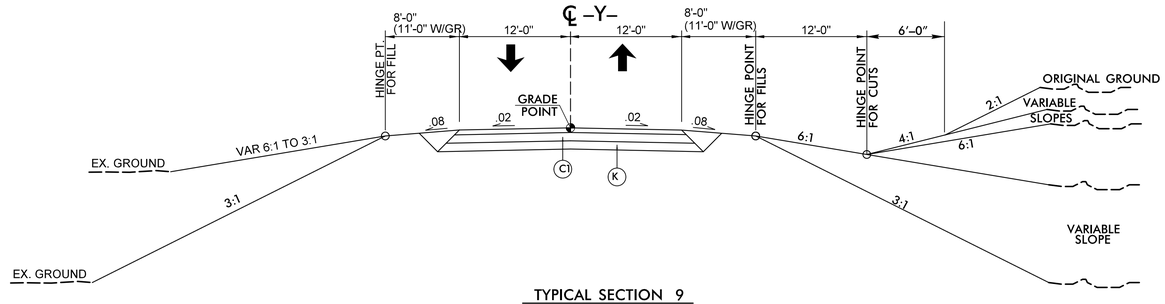
8/17/99

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
14400-4700	2-E
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

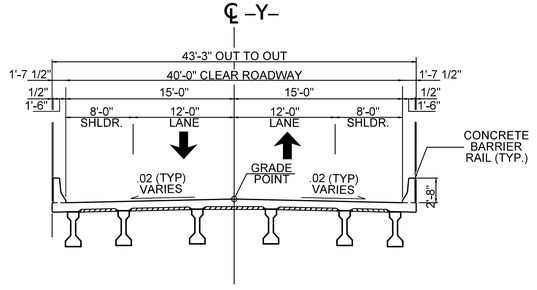
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION 9
2 LANE –Y– LINES

USE TYPICAL SECTION NO. 9 IN THE FOLLOWING LOCATIONS:

–Y2– SR1803 (CREST RD.)
–Y4– SR1793 (TRACEY GROVE RD.)
–Y5– SR1525 (DANA RD.)
–Y7– SR1503 (CLEAR CREEK RD.)
–Y8– SR1528 (BROOKSIDE CAMP RD.)
–Y9– SR1534 (NAPLES RD.)
–Y11– SR1345 (BUTLER BRIDGE RD.)
–Y12– SR3539 (FANNING BRIDGE RD.)



BRIDGE TYPICAL SECTION 1
RECONSTRUCTION
2 LANE SECTION

USE TYPICAL SECTION NO. 9 IN THE FOLLOWING LOCATIONS:

–Y2– SR1803 (CREST RD.) STA 18+50 TO STA 21+10
–Y4– SR1793 (TRACEY GROVE RD.) STA 21+30 TO STA 24+15
–Y5– SR1525 (DANA RD.) STA 34+80 TO STA 37+45
–Y7– SR1503 (CLEAR CREEK RD.) STA 19+05 TO STA 21+85
–Y8– SR1528 (BROOKSIDE CAMP RD.) STA 33+05 TO STA 35+70
–Y9– SR1534 (NAPLES RD.) STA 37+20 TO STA 40+05
–Y11– SR1345 (BUTLER BRIDGE RD.) STA 16+55 TO STA 19+00
–Y12– SR3539 (FANNING BRIDGE RD.) STA 21+75 TO STA 24+38

PAVEMENT SCHEDULE	
A1	PROP. PORTLAND CEMENT CONCRETE PAVEMENT
C1	PROP. ASPHALT CONCRETE PAVEMENT
K	PROP. SUBGRADE STABILIZATION
R1	DOUBLE FACED CONCRETE MEDIAN BARRIER
R2	2'-6" CONCRETE CURB AND GUTTER

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PROJECT REFERENCE NO.	SHEET NO.
I4400-4700	2-F
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

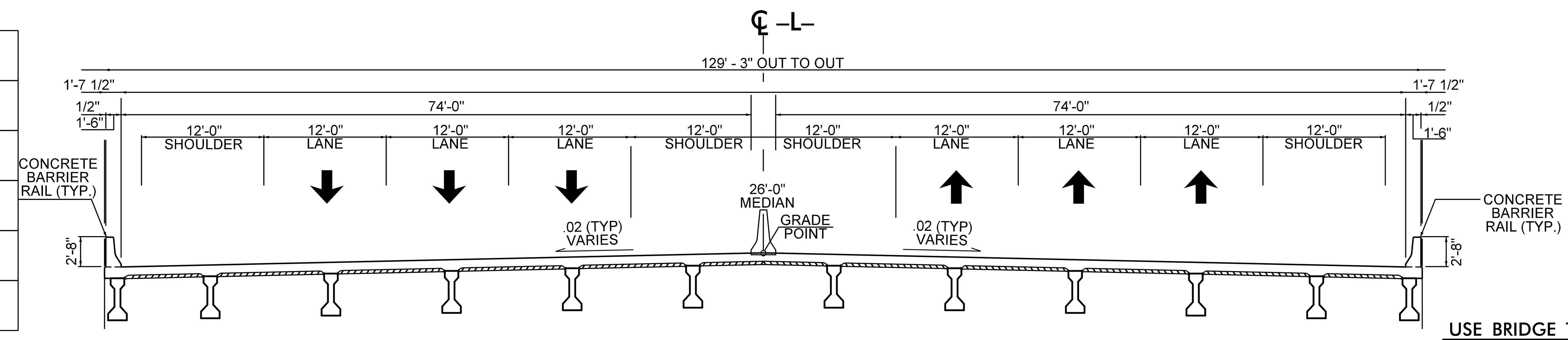
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

REVISIONS

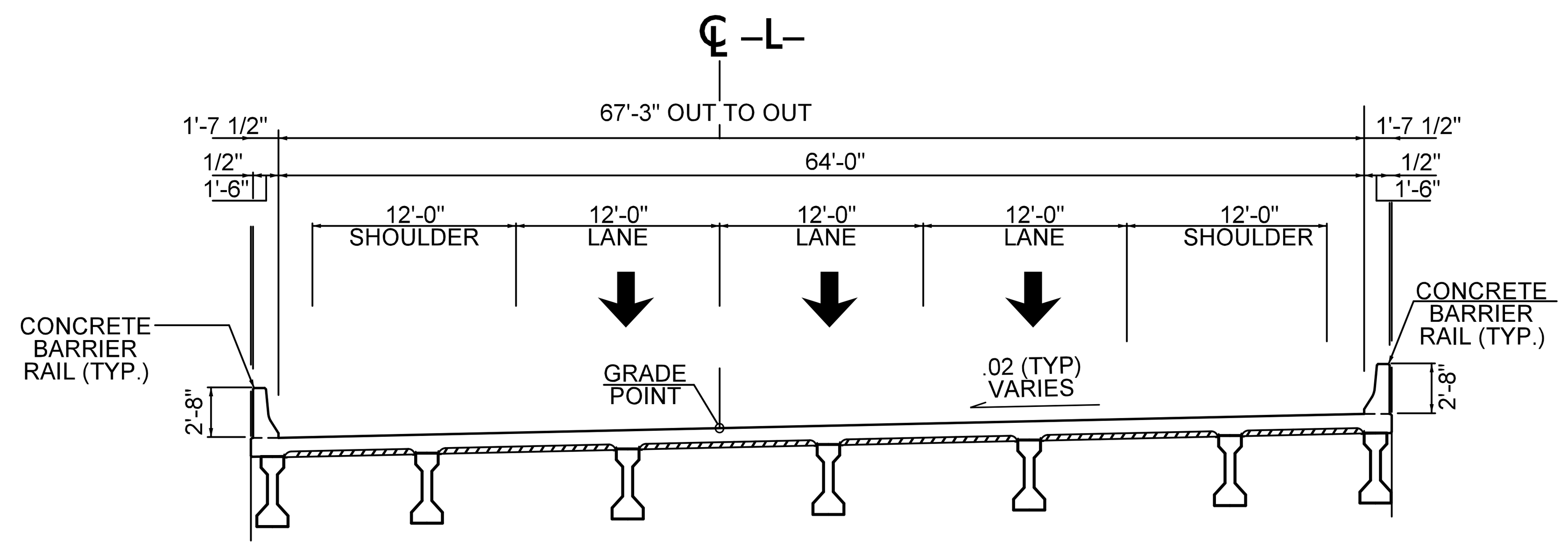
PAVEMENT SCHEDULE

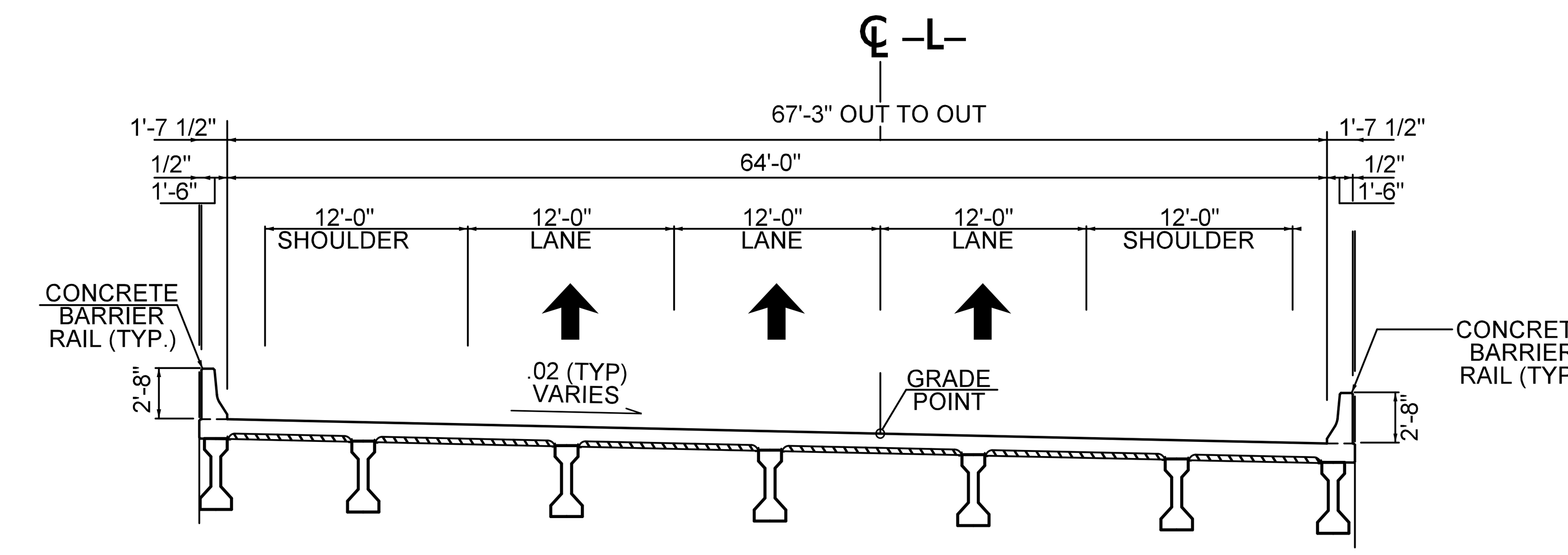
A1	PROP. PORTLAND CEMENT CONCRETE PAVEMENT
C1	PROP. ASPHALT CONCRETE PAVEMENT
K	PROP. SUBGRADE STABILIZATION
R1	DOUBLE FACED CONCRETE MEDIAN BARRIER
R2	2'-6" CONCRETE CURB AND GUTTER



BRIDGE TYPICAL SECTION 2
RECONSTRUCTION
6 LANE SECTION

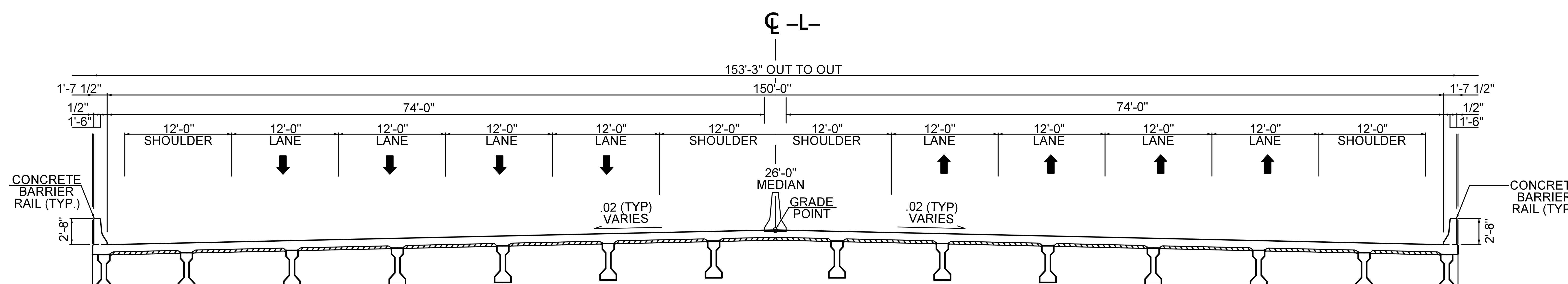
USE BRIDGE TYPICAL SECTION NO. 1 IN THE FOLLOWING LOCATIONS:
-L4400- STA 333+00 TO STA 336+00
-L4400- STA 571+00 TO STA 574+00
-L4400- STA 667+50 TO STA 670+50
-L47001- STA 962+50 TO STA 964+50
-L47002- STA 1073+00 TO STA 1078+75





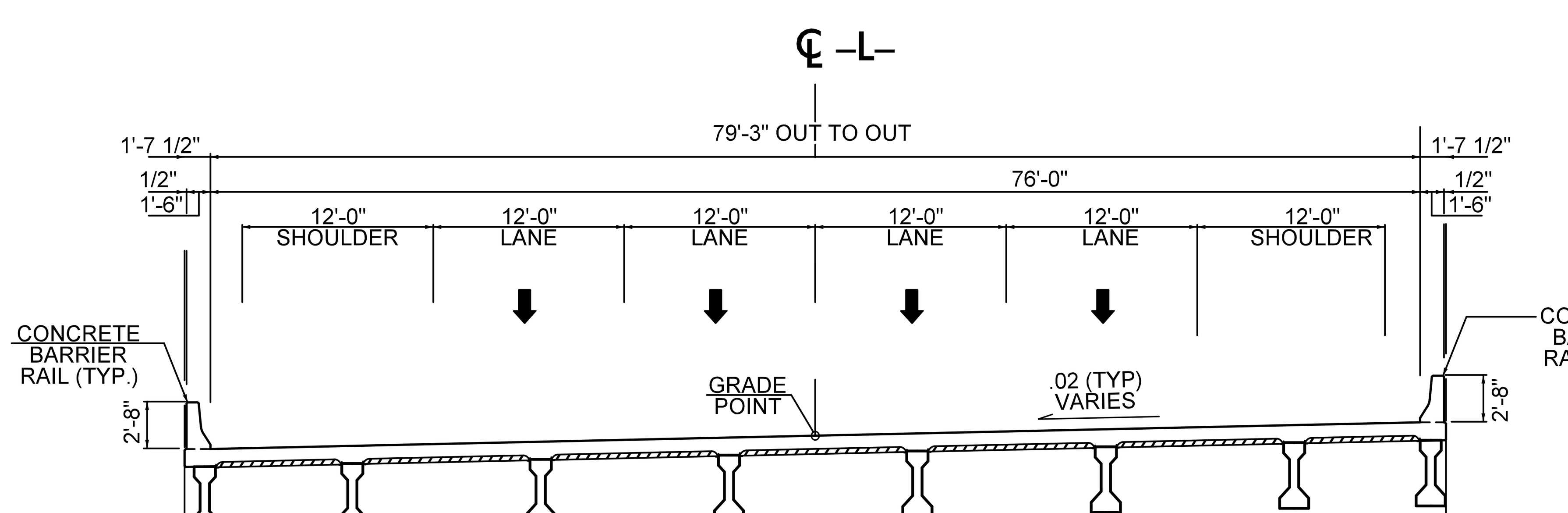
BRIDGE TYPICAL SECTION 3
RECONSTRUCTION
6 LANE SECTION (BIFURCATED)

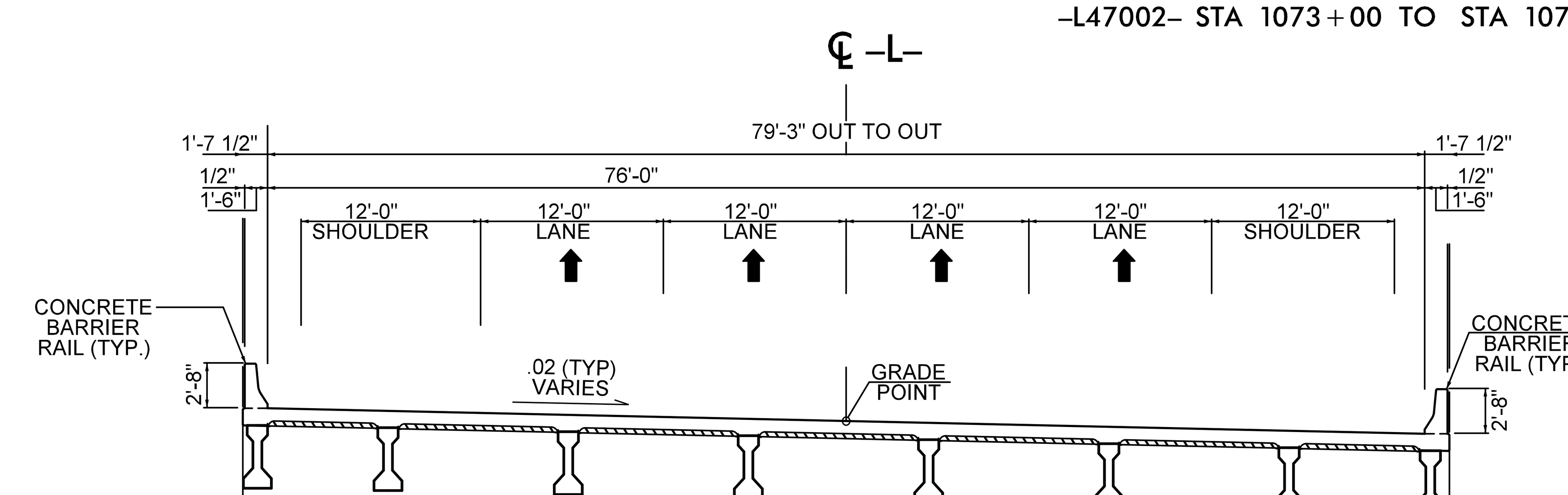
USE BRIDGE TYPICAL SECTION NO. 2 IN THE FOLLOWING LOCATIONS:
-LBNB47001- STA 825+00+00 TO STA 827+00
-LBSB47001- STA 824+00+00 TO STA 826+00



TYPICAL SECTION 4
RECONSTRUCTION
8 LANE SECTION

USE BRIDGE TYPICAL SECTION NO. 1 IN THE FOLLOWING LOCATIONS:
-L4400- STA 333+00 TO STA 336+00
-L4400- STA 571+00 TO STA 574+00
-L4400- STA 667+50 TO STA 670+50
-L47001- STA 962+50 TO STA 964+50
-L47002- STA 1073+00 TO STA 1078+75





BRIDGE TYPICAL SECTION 5
RECONSTRUCTION
8 LANE SECTION (BIFURCATED)

USE BRIDGE TYPICAL SECTION NO. 2 IN THE FOLLOWING LOCATIONS:
-LBNB47001- STA 825+00+00 TO STA 827+00
-LBSB47001- STA 824+00+00 TO STA 826+00

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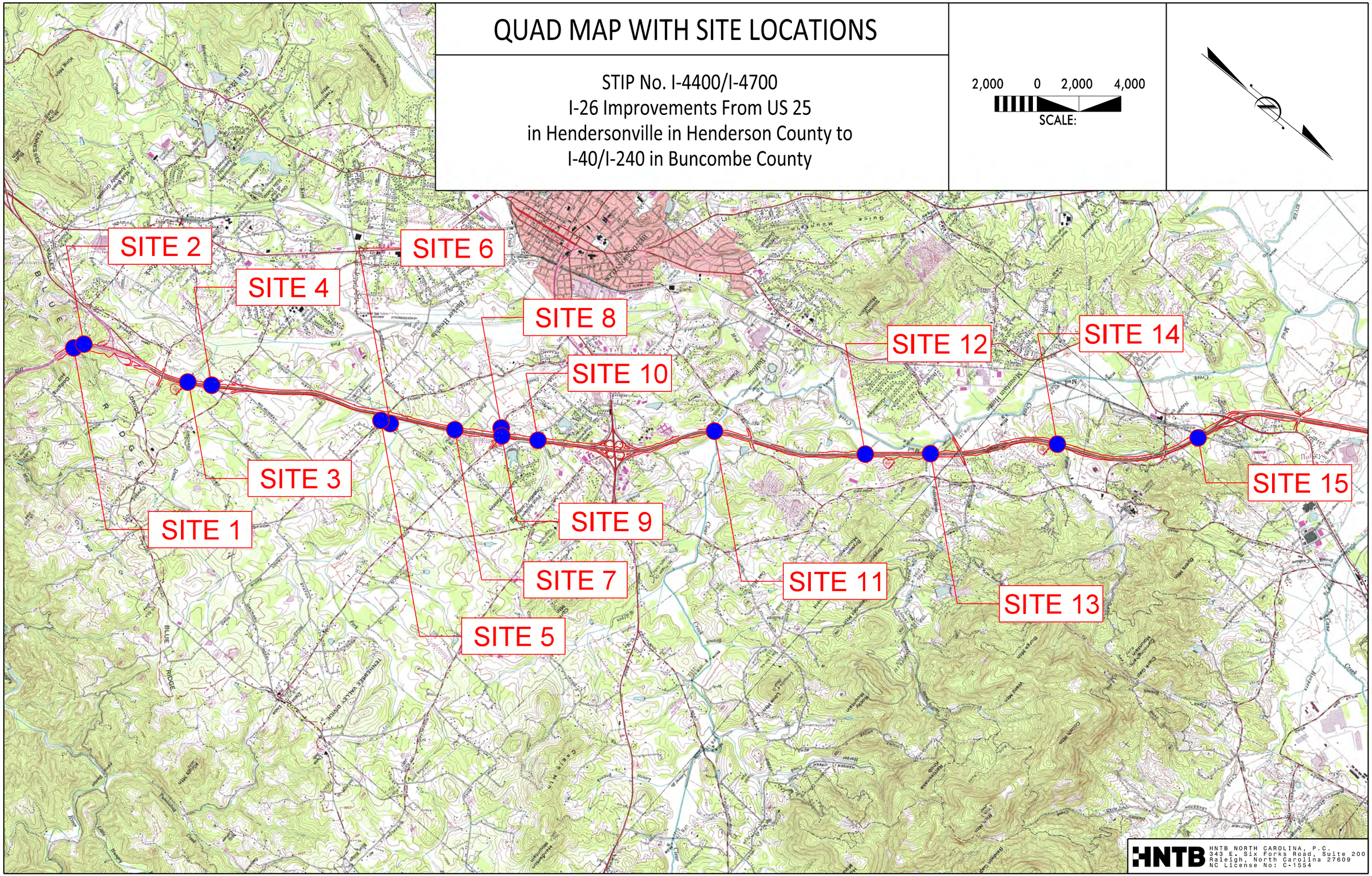
APPENDIX B

SITE MAPS AND PHOTOGRAPHS

QUAD MAP WITH SITE LOCATIONS

STIP No. I-4400/I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County

2,000 0 2,000 4,000
SCALE:

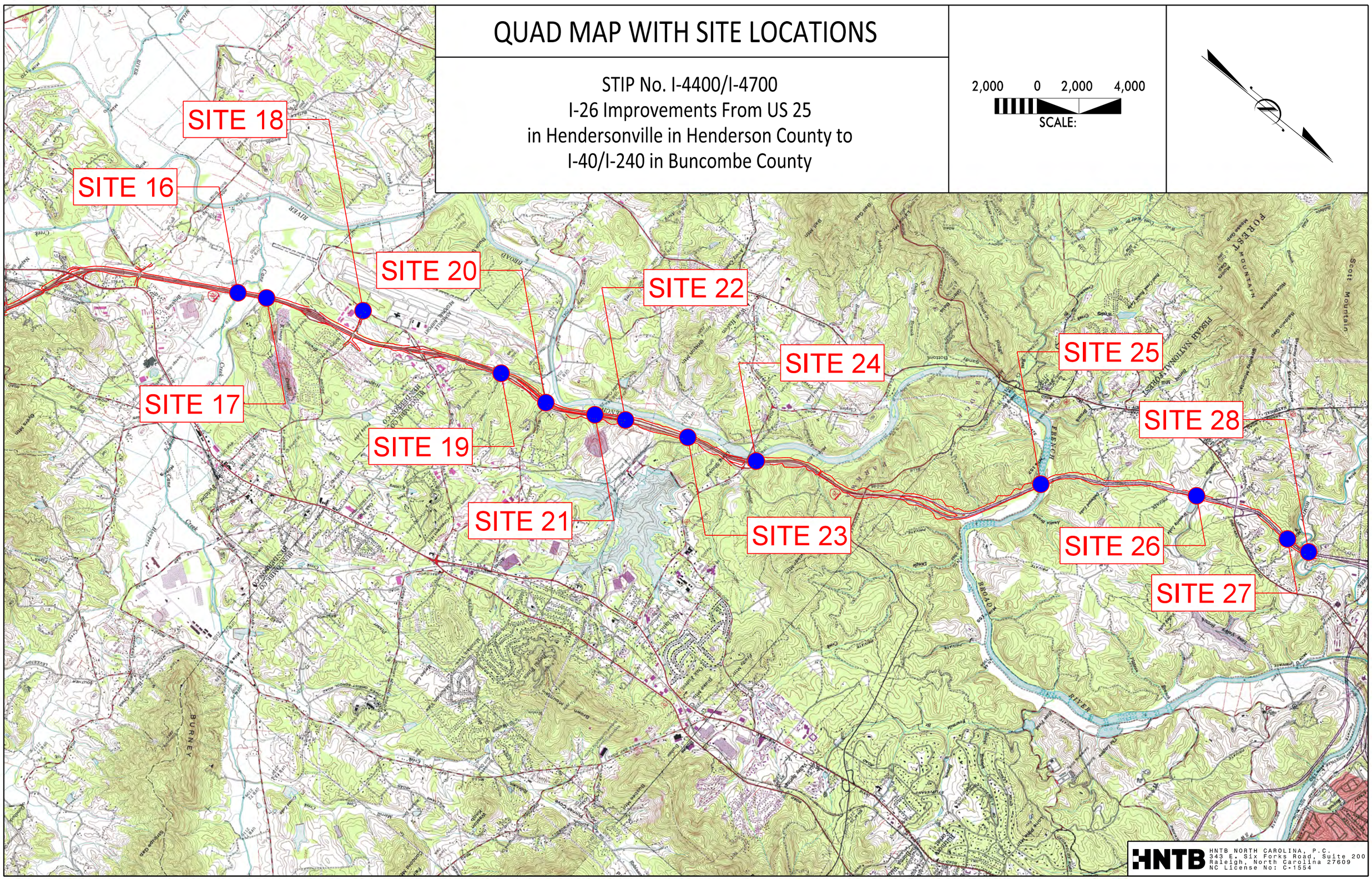


HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554

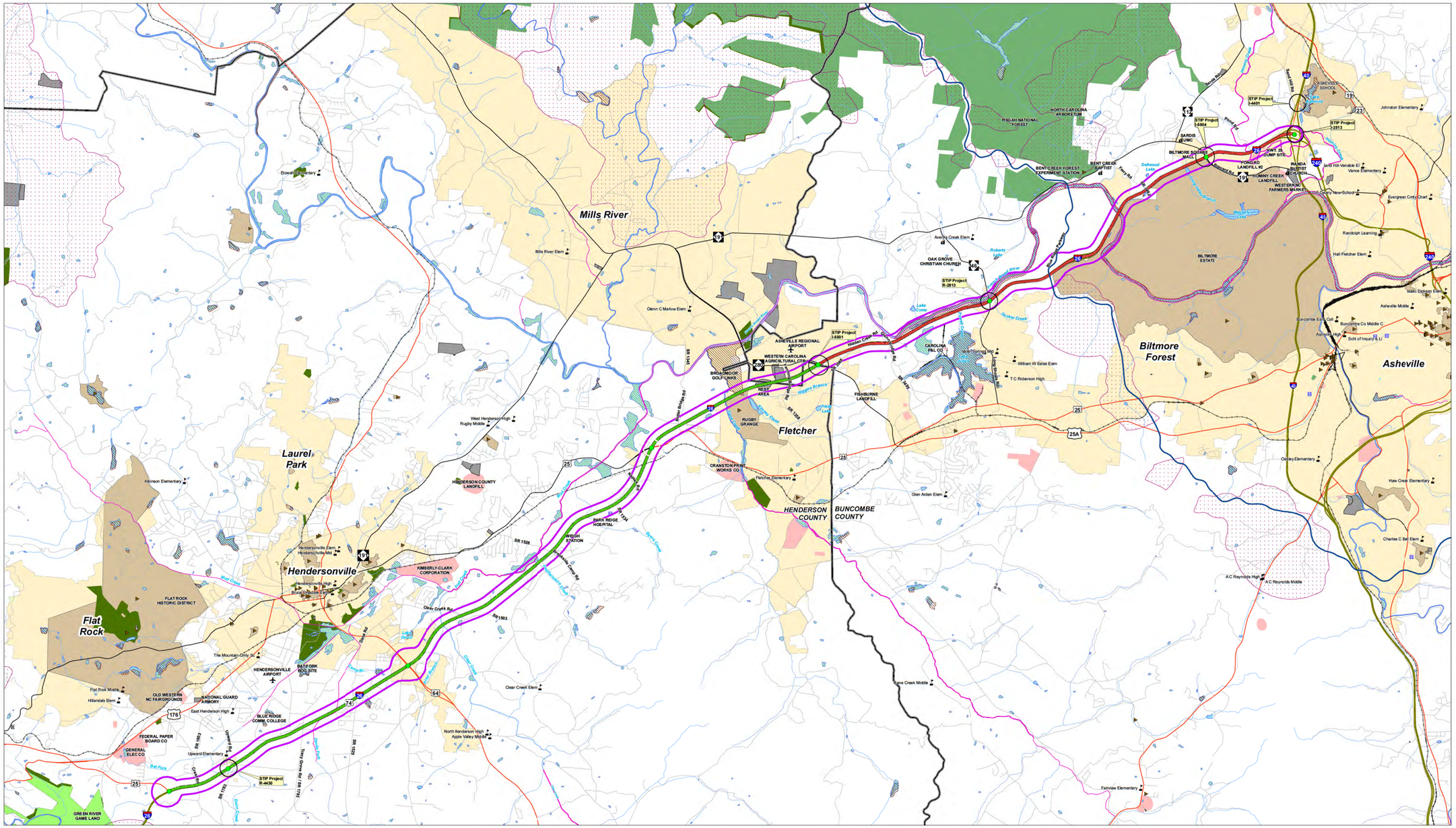
QUAD MAP WITH SITE LOCATIONS

STIP No. I-4400/I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County

2,000 0 2,000 4,000
SCALE:



HNTB
HNTB NORTH CAROLINA, P.C.
343 E. Six Forks Road, Suite 200
Raleigh, North Carolina 27609
NC License No: C-1554



Environmental Constraints

Legend

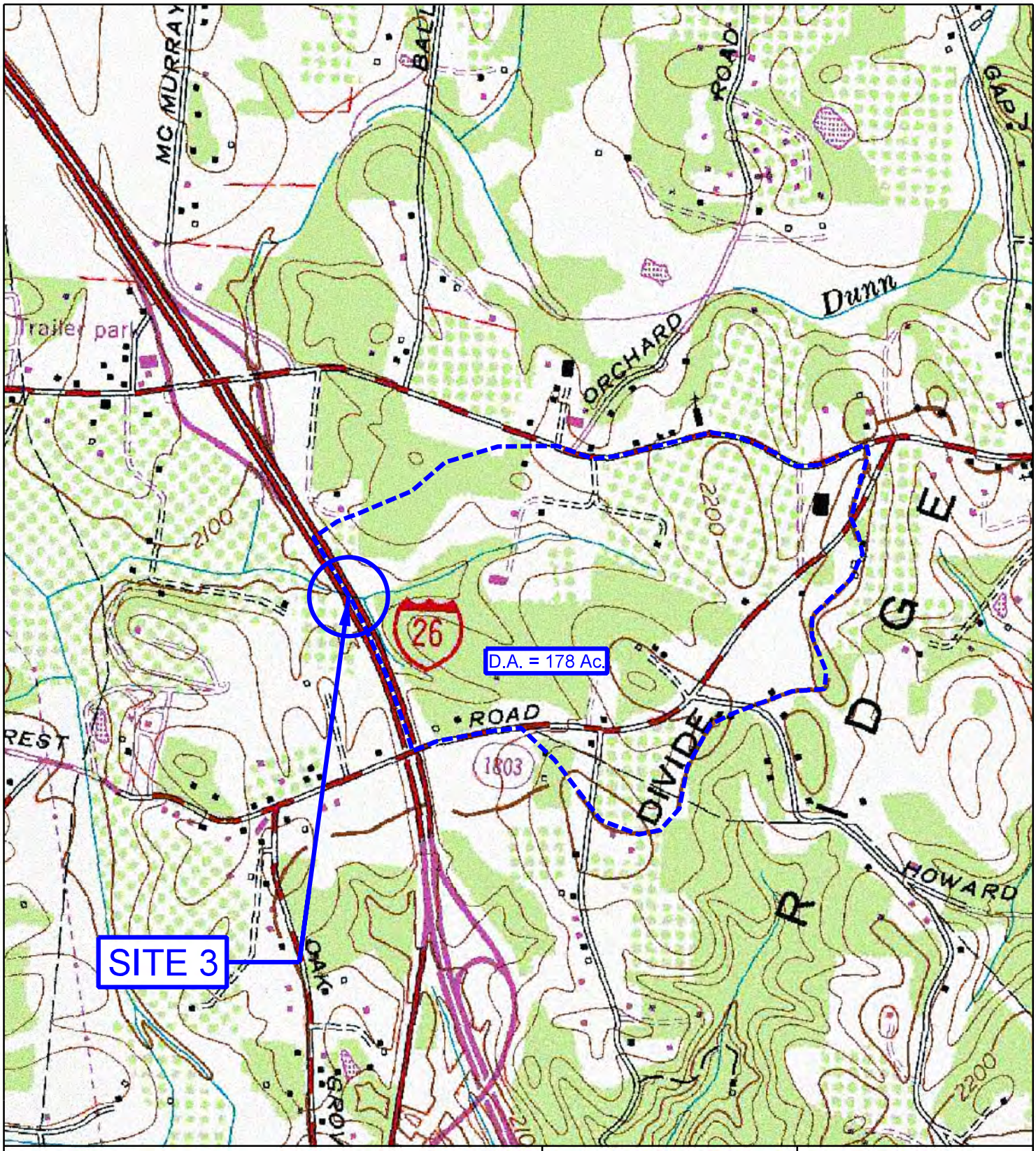
🟩	STIP Project I-4400
🟥	STIP Project I-4700
☐	Study Corridor
●	Interchange
☐	Other STIP Projects
—	Interstate
—	US Route
—	State Route
—	Secondary Road
—	Blue Ridge Parkway
—	Railroads
—	Streams & Creeks
🟦	Water Bodies
▨	Designated Trout Waters
▨	Wetlands
◀	National Register Structure
🟫	National Register Boundaries
—	303(d) Impaired Water Body
🟥	Hazardous Substance Disposal Site
▨	High Quality Outstanding Resource Water Zone
⬛	State-Owned Complexes
🟩	Pisgah National Forest
🟩	Henderson Co. Parks
🟩	Green River Game Lands
🟨	Municipal Boundaries
☐	County Boundary
	Schools
	Churches
H	Hospital
✈	Airport

STIP Project I-4400/I-4700
I-26 Widening
Henderson and Buncombe Counties

May 2014

N

0 0.5 1 2
Miles



QUAD MAP - SITE 3

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

Looking at Upstream Face of 1 @ 6′ x 6′ RCBC under I-26

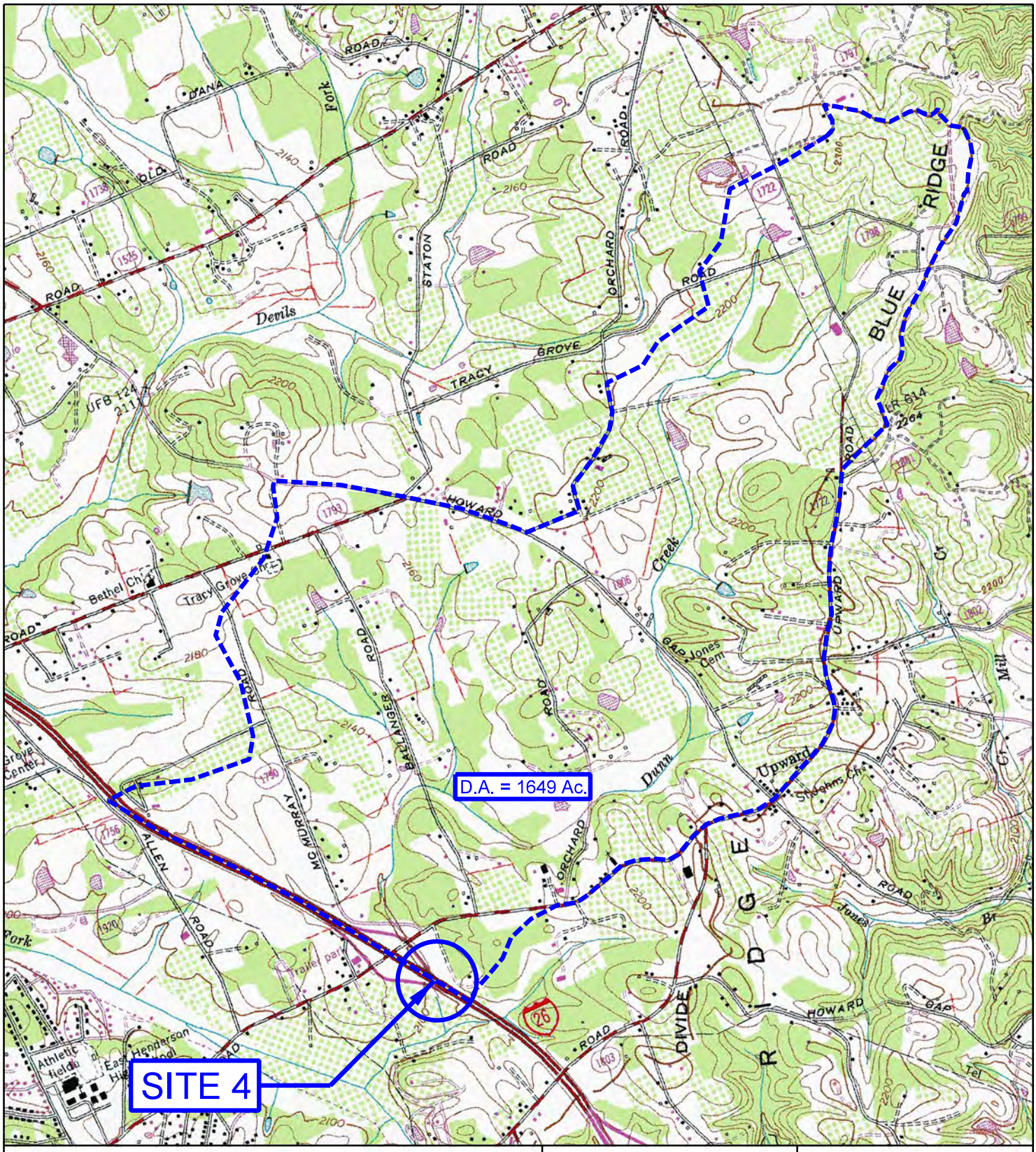
Looking Upstream from 1 @ 6′ x 6′ RCBC Inlet

Looking Inside of 1 @ 6' x 6' RCBC

Outlet of Drop Inlet Inside 1 @ 6' x 6' RCBC

Looking at Downstream Face of 1 @ 6' x 6' RCBC under I-26

Looking Downstream from 1 @ 6' x 6' RCBC Outlet



QUAD MAP - SITE 4

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

1,000 0 1,000 2,000
SCALE:

Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9588

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
HENDERSON COUNTY	370125	9588	J
HENDERSONVILLE, CITY OF	370128	9588	J

Site 4

MAP NUMBER
3700958800J

MAP REVISED
10/2/2008

Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9587

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
HENDERSON COUNTY	370125	9587	J
HENDERSONVILLE, CITY OF	370128	9587	J

Site 4

MAP NUMBER
3700958700J

MAP REVISED
10/2/2008

Looking at Upstream Face of 2 @ 8′ x 8′ RCBC under I-26

Looking at Upstream Left Ditch

Looking Upstream from 2 @ 8' x 8' RCBC Inlet

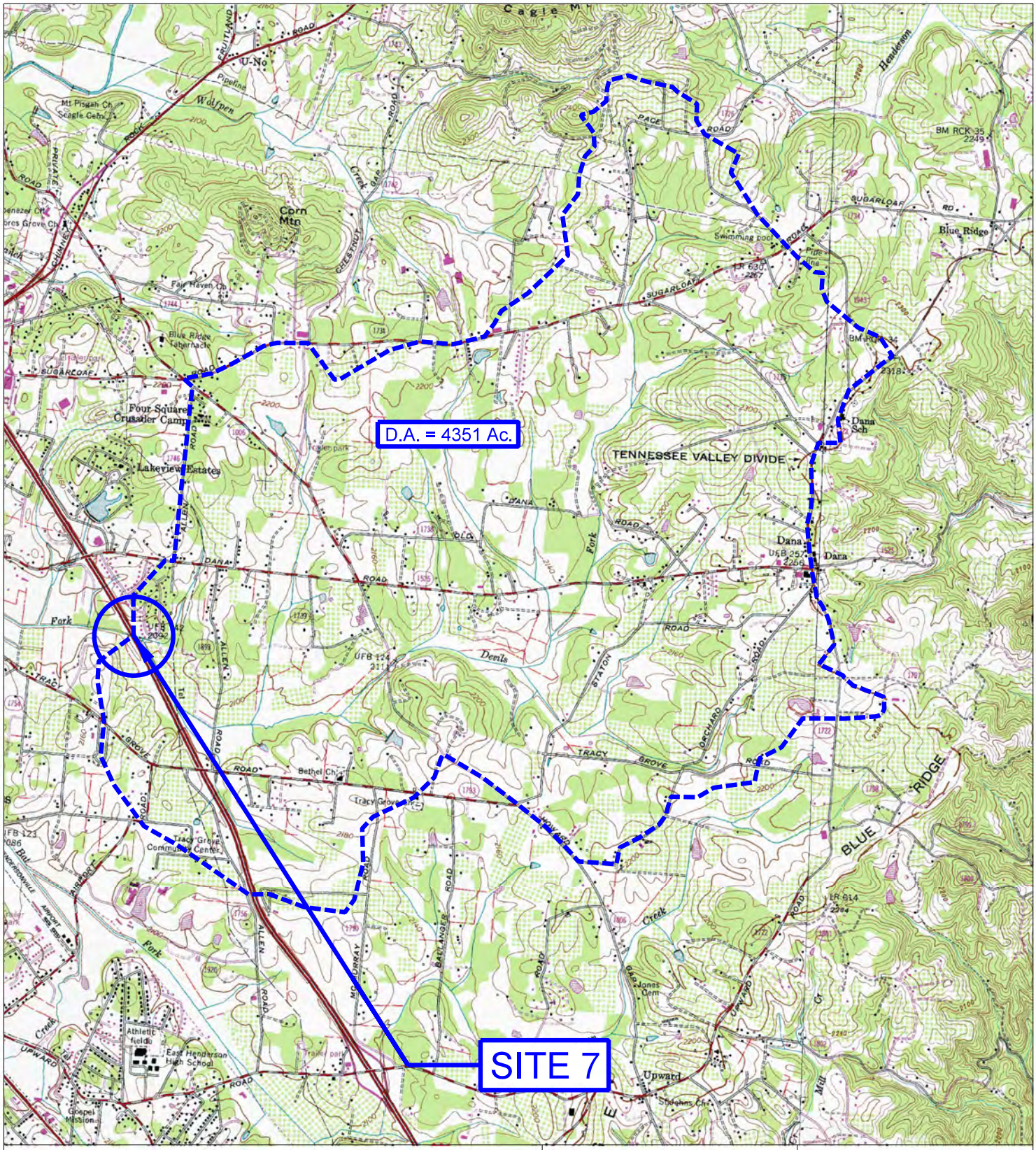
Looking Inside of Left Barrel

Looking Inside of Right Barrel

Crack in Right Barrel

Looking at Downstream Face of 2 @ 8' x 8' RCBC under I-26

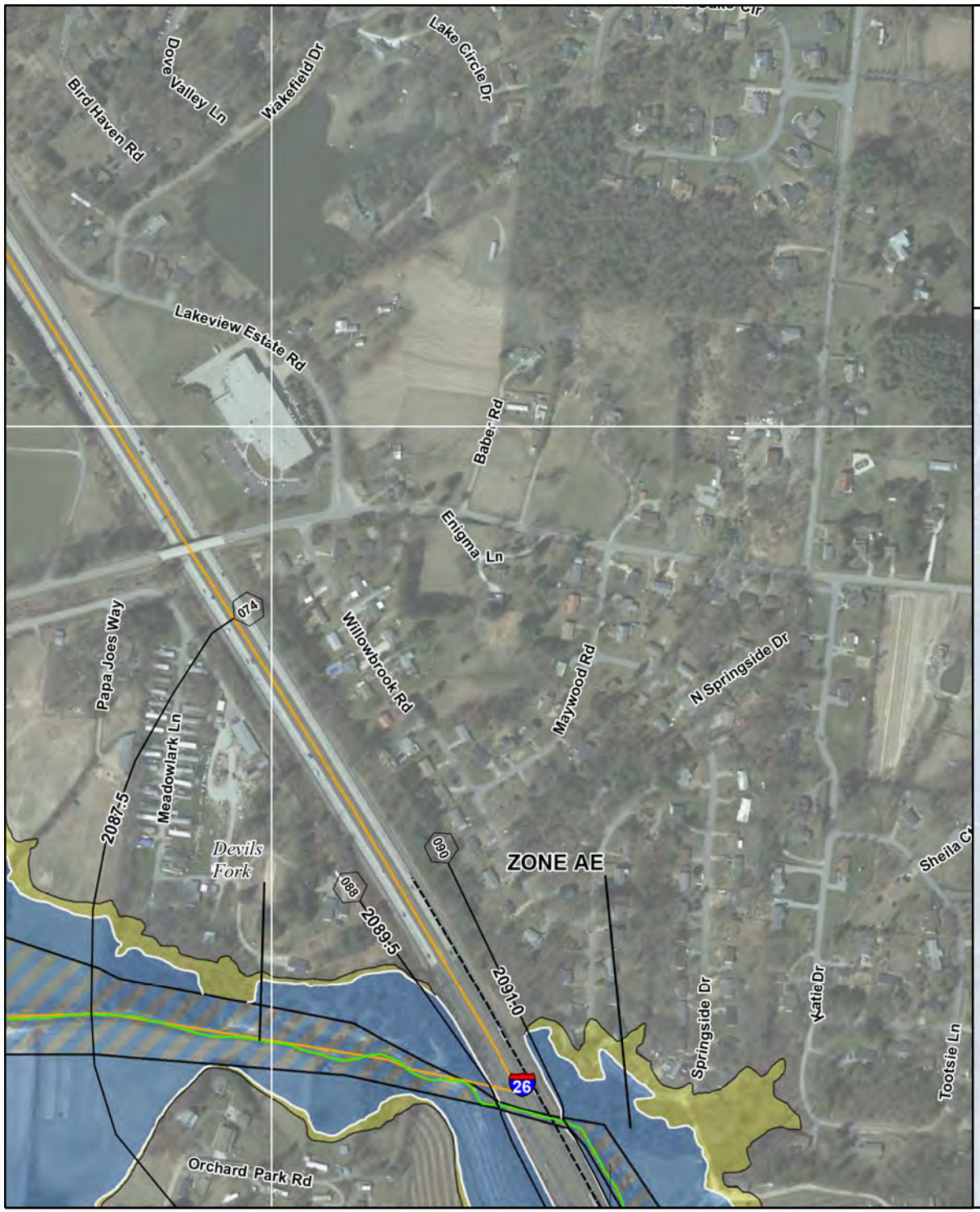
Looking Downstream from 2 @ 8' x 8' RCBC Outlet



QUAD MAP - SITE 7

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

1,500 0 1,500 3,000
SCALE:



Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9579

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
HENDERSON COUNTY	370125	9579	J
HENDERSONVILLE, CITY OF	370128	9579	J

Site 7

MAP NUMBER
3700957900J

MAP REVISED
10/2/2008

Looking at Upstream Face of 3 @ 9' x 10' RCBC under I-26

Looking Upstream from 3 @ 9' 10' RCBC Inlet

Looking Downstream in Left Barrel

Cracks in Left Barrel

Looking Downstream in Center Barrel

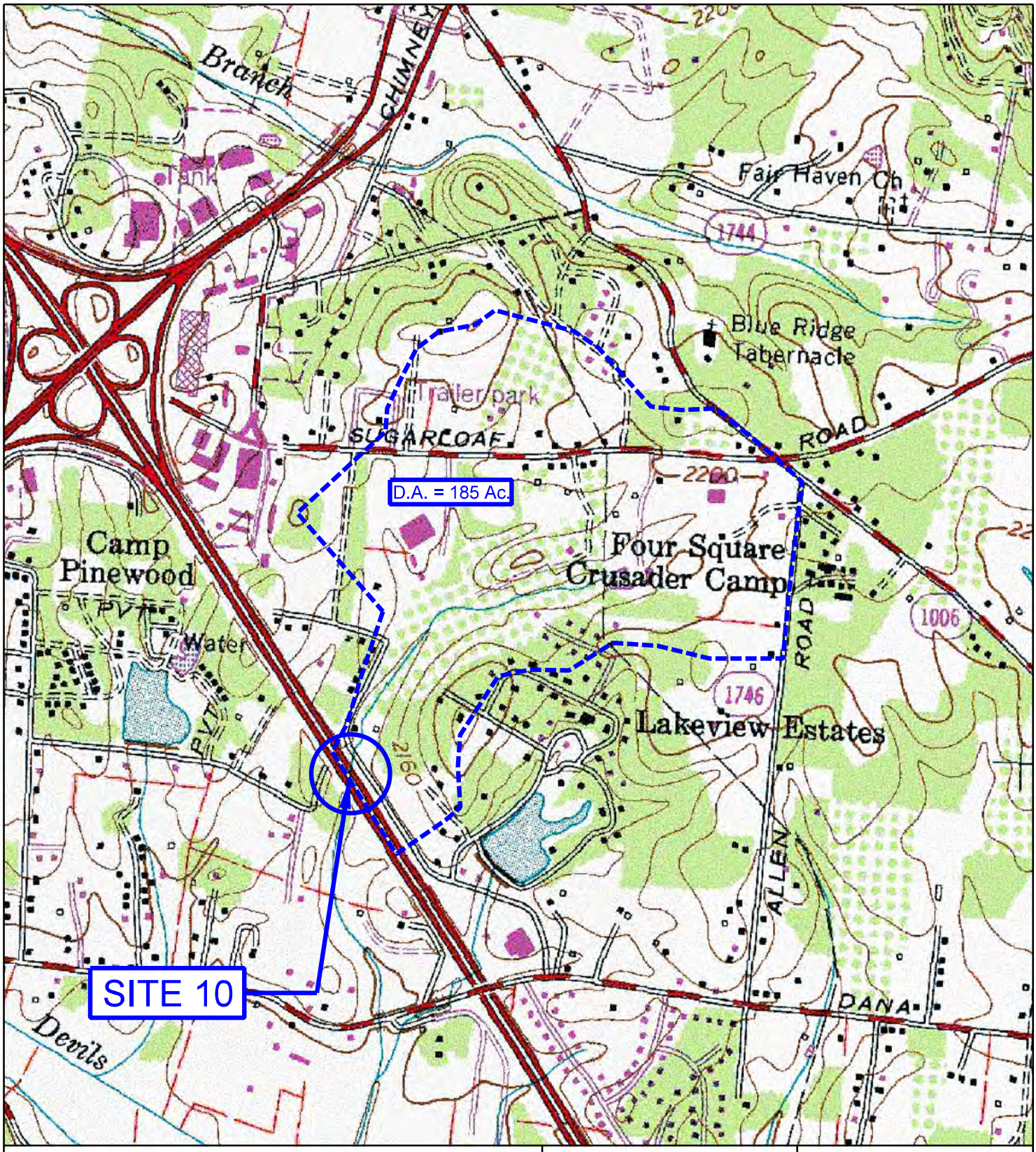
Looking Downstream in Right Barrel

Damage on Downstream Center Barrel

Looking at Upstream Face of 3 @ 9' x 10' RCBC under I-26

Looking Downstream from 3 @ 9' x 10' RCBC Outlet

Looking Downstream



QUAD MAP - SITE 10

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

N

Looking at Upstream Face of 1 @ 6' x 6' RCBC under I-26

Looking Upstream from 1 @ 6' x 6' RCBC Inlet

Looking Upstream Inside of the Barrel

Looking Downstream Inside of the Barrel

Cracks on Downstream Side and Top Slab of the Barrel

Pipe Outlet on Right Side of the Barrel

Looking at Downstream Face of 1 @ 6' x 6' RCBC under I-26

Looking at Downstream Face of 1 @ 6' x 6' RCBC under I-26

Looking at Downstream Right Ditch

Looking Downstream from 1 @ 6′ x 6′ RCBC Outlet

Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9670

FEMA

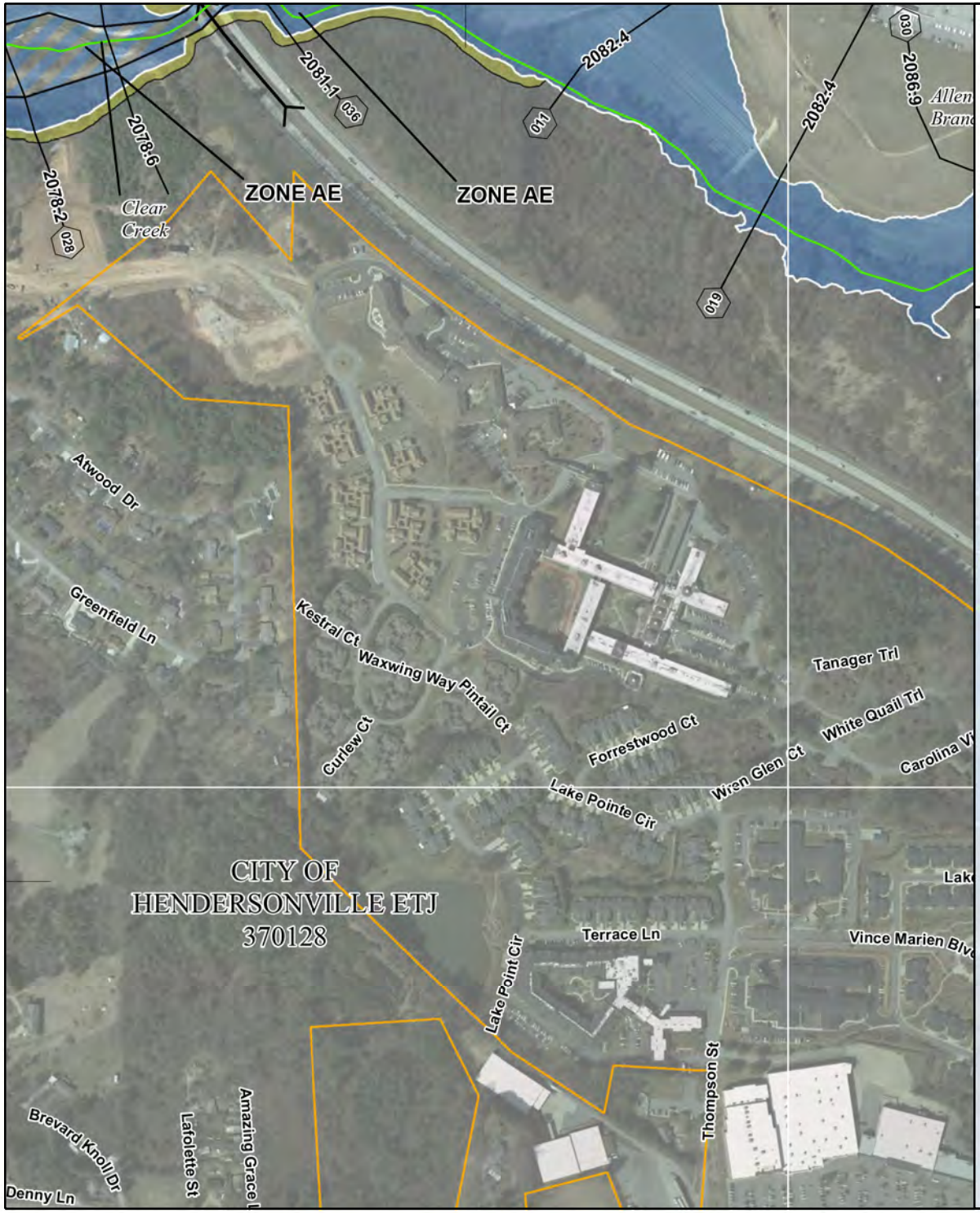
Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
HENDERSON COUNTY	370125	9670	J
HENDERSONVILLE, CITY OF	370128	9670	J

Site 11

MAP NUMBER
3700967000J

MAP REVISED
10/2/2008



Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9579

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
HENDERSON COUNTY	370125	9579	J
HENDERSONVILLE, CITY OF	370128	9579	J

Site 11

MAP NUMBER
3700957900J

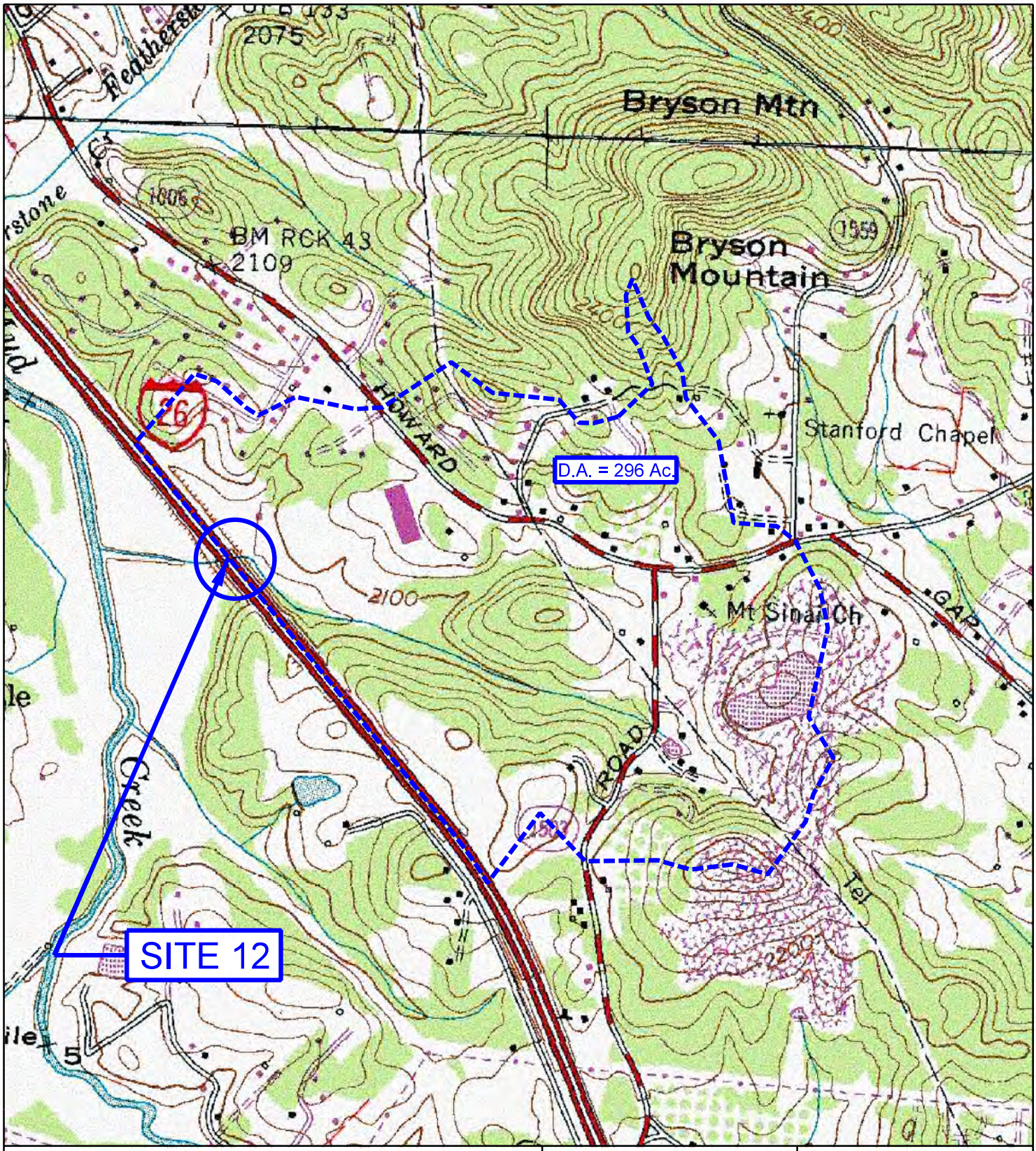
MAP REVISED
10/2/2008

Looking at Upstream Face

Looking at Downstream Face

Looking Downstream

Looking Upstream



QUAD MAP - SITE 12

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

Looking at Upstream Face of 1 @ 7′ x 7′ RCBC under I-26

Looking Upstream from 1 @ 7′ x 7′ RCBC Inlet

Looking at Upstream Channel coming from the right

Looking at Upstream Channel coming from the right

Looking at Upstream Channel coming from the left

Looking Downstream inside of the Barrel

Cracks on the Side of the Wall Inside of the Barrel

Cracks on the Top Slab Inside of the Barrel

Looking Downstream inside of the Barrel

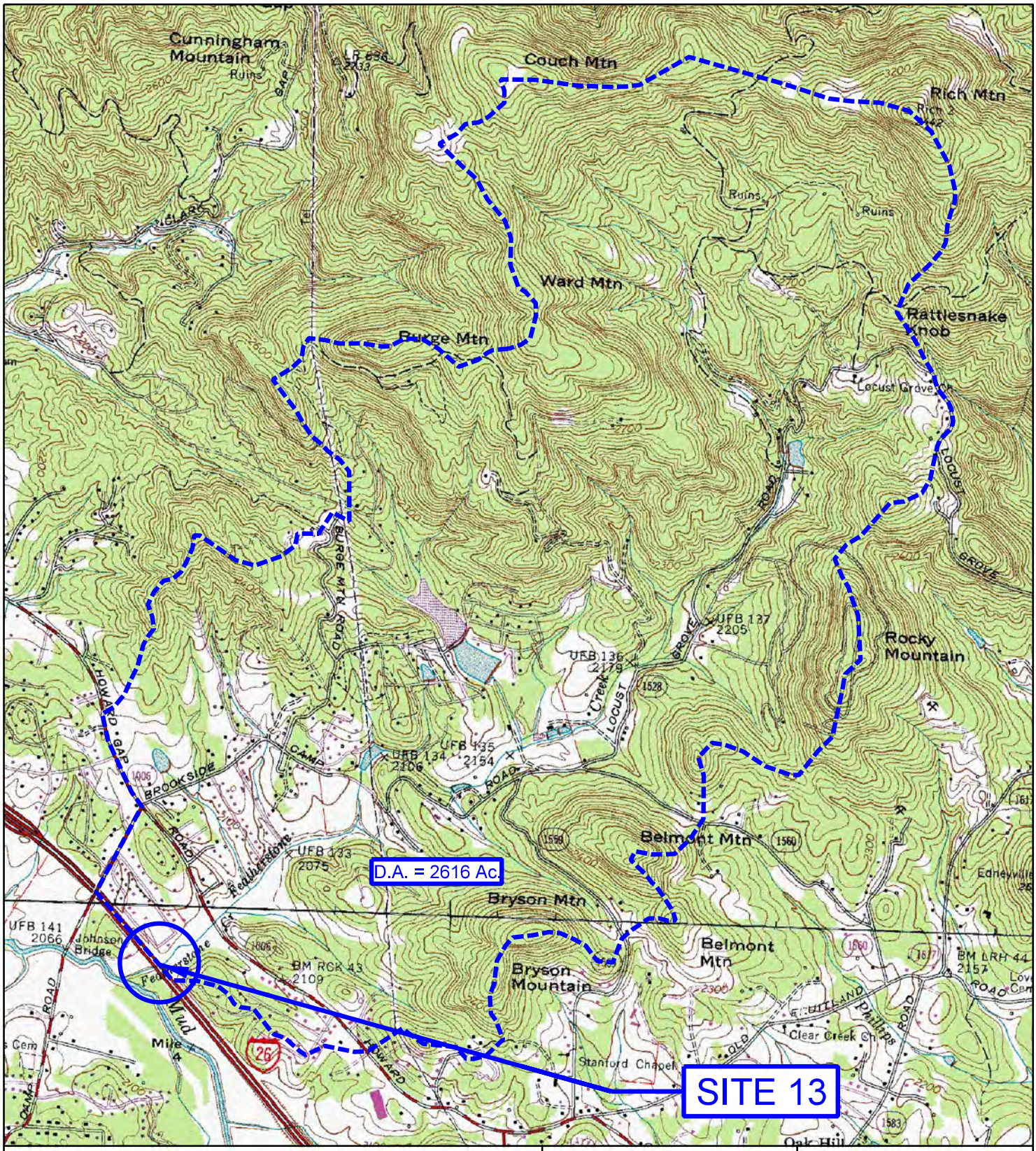
Looking at Downstream Face of 1 @ 7' x 7' RCBC under I-26

Looking Downstream from 1 @ 7′ x 7′ RCBC Outlet

Upstream Face of Downstream 54″ CMP with Rock Headwall

Downstream Face of Downstream 54" CMP with Rock Headwall

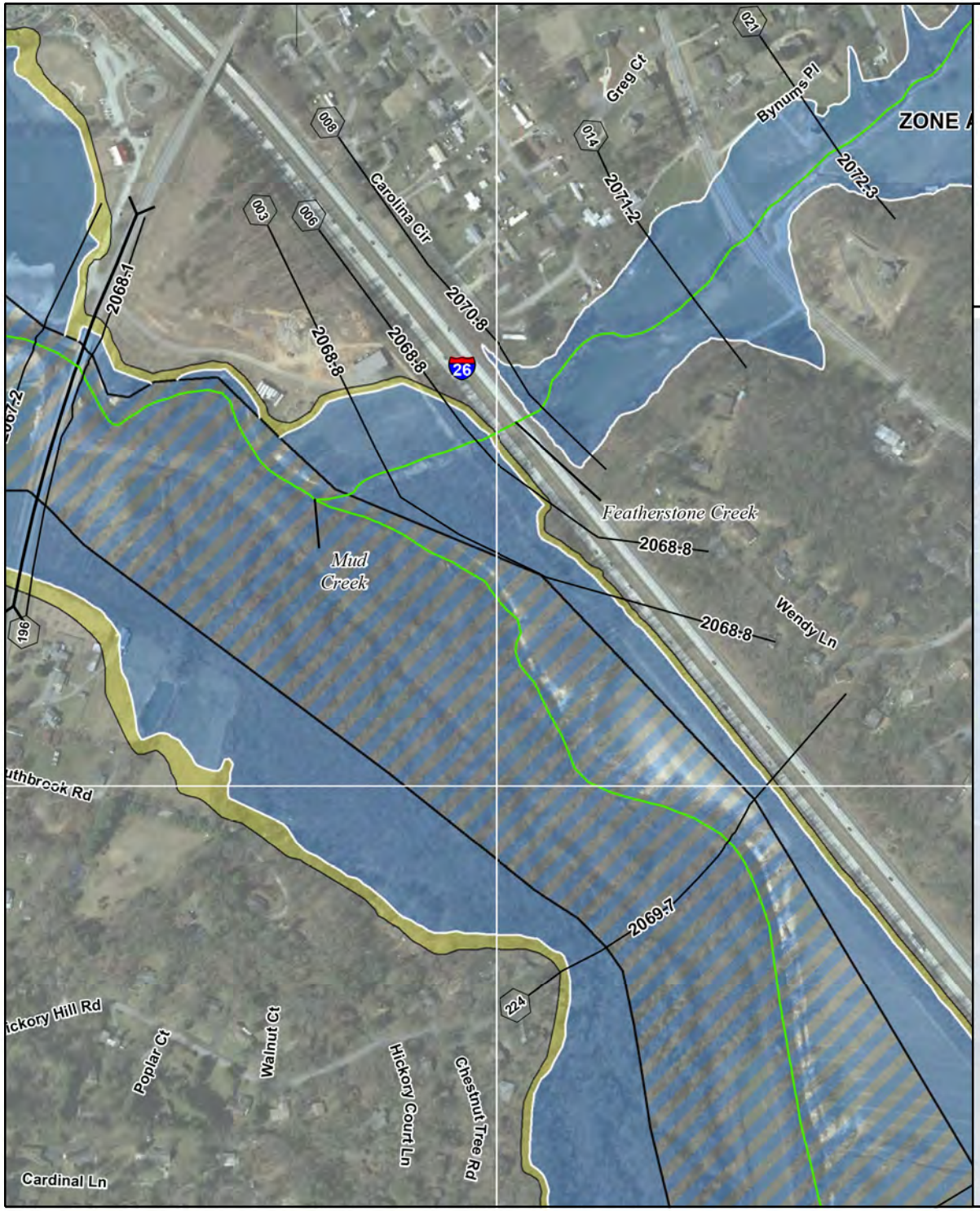
Downstream of 54" CMP with Rock Headwall



QUAD MAP - SITE 13

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

1,000 0 1,000 2,000
SCALE:



Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9660

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
HENDERSON COUNTY	370125	9660	J
HENDERSONVILLE, CITY OF	370128	9660	J

Site 13

MAP NUMBER
3700966000J

MAP REVISED
10/2/2008

Looking at Upstream Face of 3 @ 8′ x 8′ RCBC under I-26

Looking Upstream from 3 @ 8′ x 8′ RCBC Inlet

Looking Downstream in Left Barrel

Crack in the Top Slab of Left Barrel

Looking Upstream in Center Barrel

Looking Upstream in Right Barrel

Drop Inlet in Center Barrel

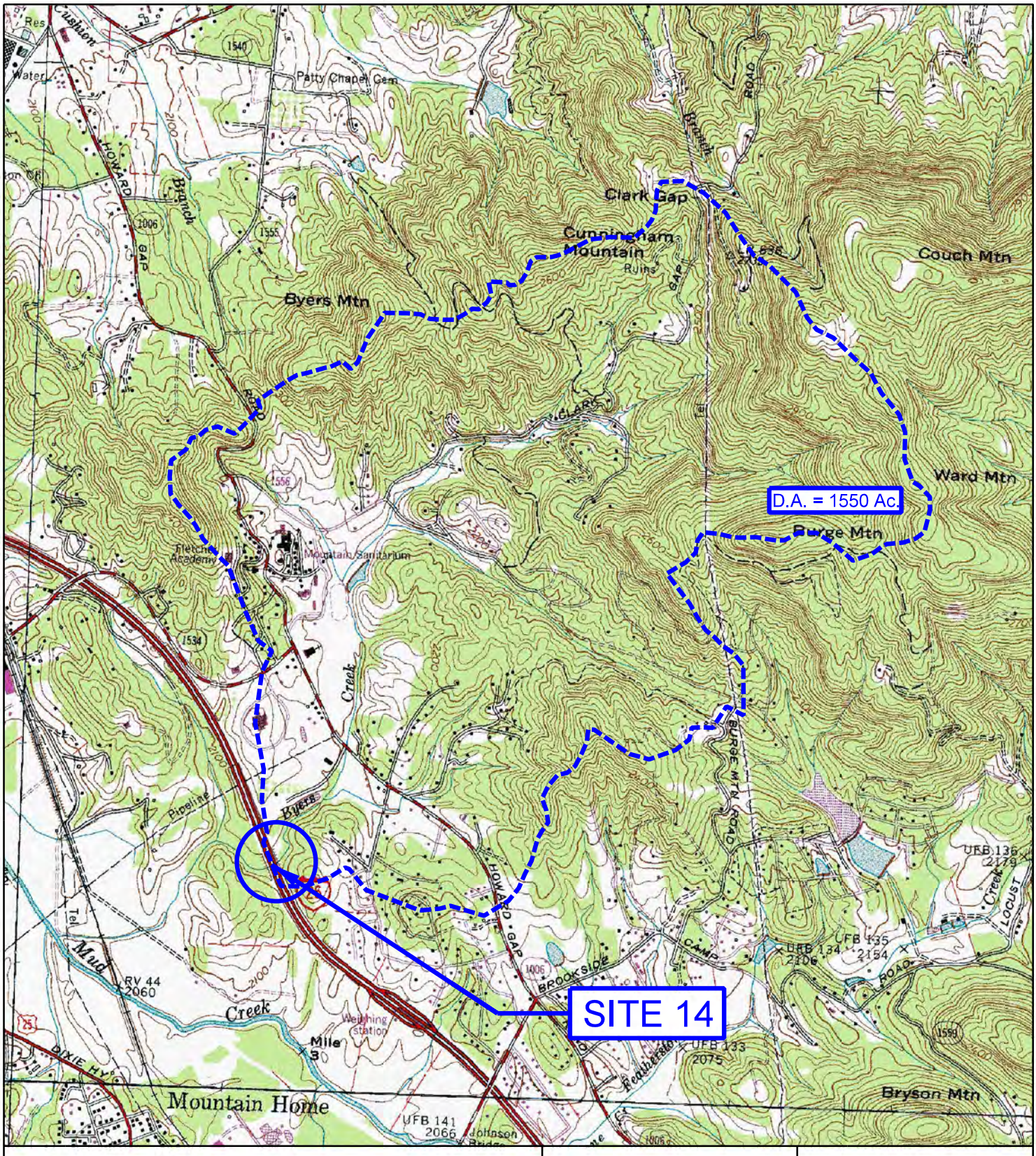
Looking at Downstream Face of 3 @ 8′ x 8′ RCBC under I-26

Looking Downstream from 3 @ 8'x 8' RCBC Outlet

Looking at Upstream Face of 78" CMP

Looking at Downstream Face of 78" CMP

Erosion on top of 78" CMP



QUAD MAP - SITE 14

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

1,000 0 1,000 2,000
SCALE:

Looking at Upstream Face of 2 @ 8′ x 8′ RCBC under I-26

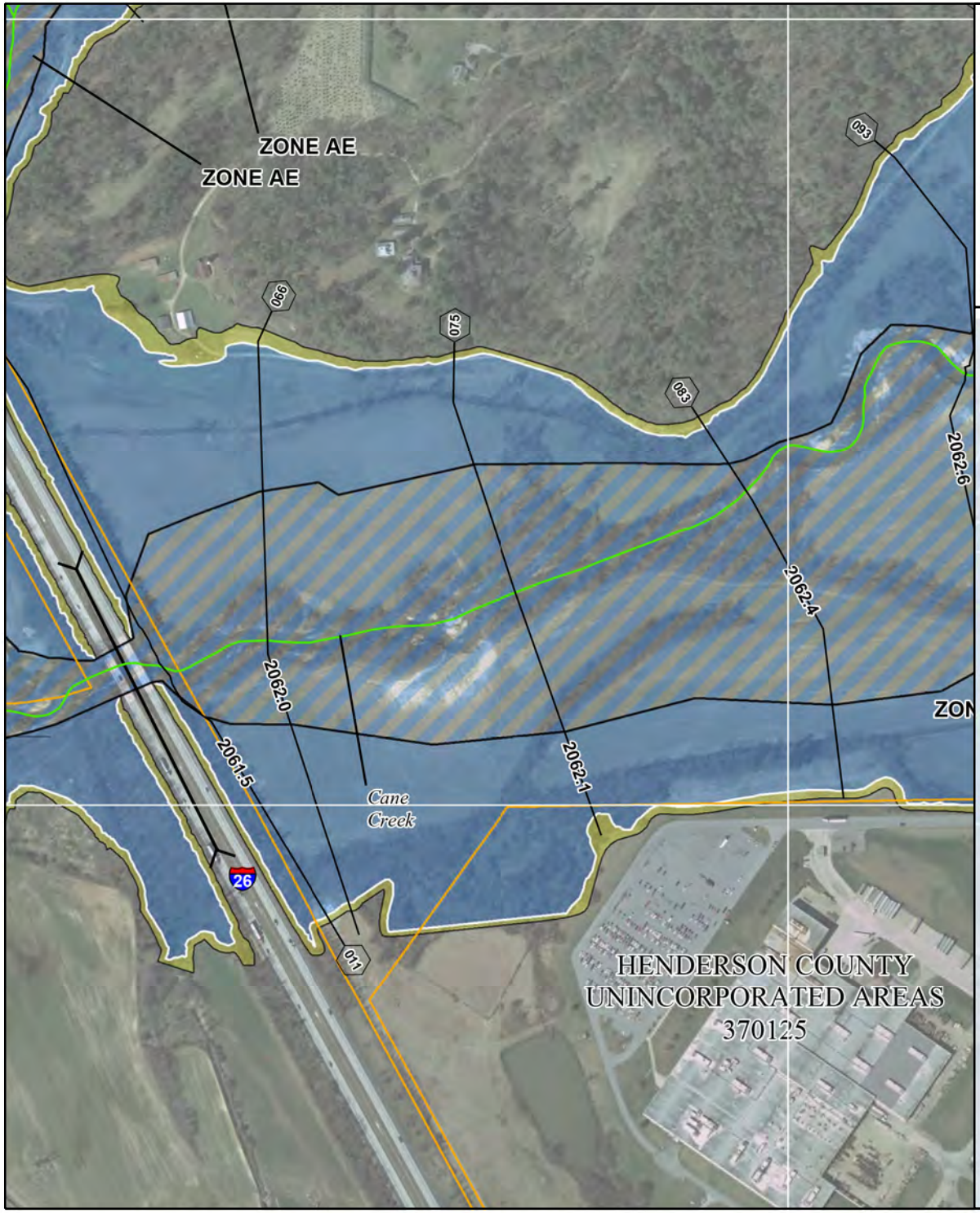
Looking Upstream from 2 @ 8′ x 8′ RCBC

Looking Downstream in Left Barrel

Looking Downstream in Right Barrel

Looking at Downstream Face of 2 @ 8' x 8' RCBC under I-26

Looking Downstream from 2 @ 8' x 8' RCBC



Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9652

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
FLETCHER, TOWN OF	370568	9652	J
HENDERSON COUNTY	370125	9652	J

Site 16

MAP NUMBER
3700965200J

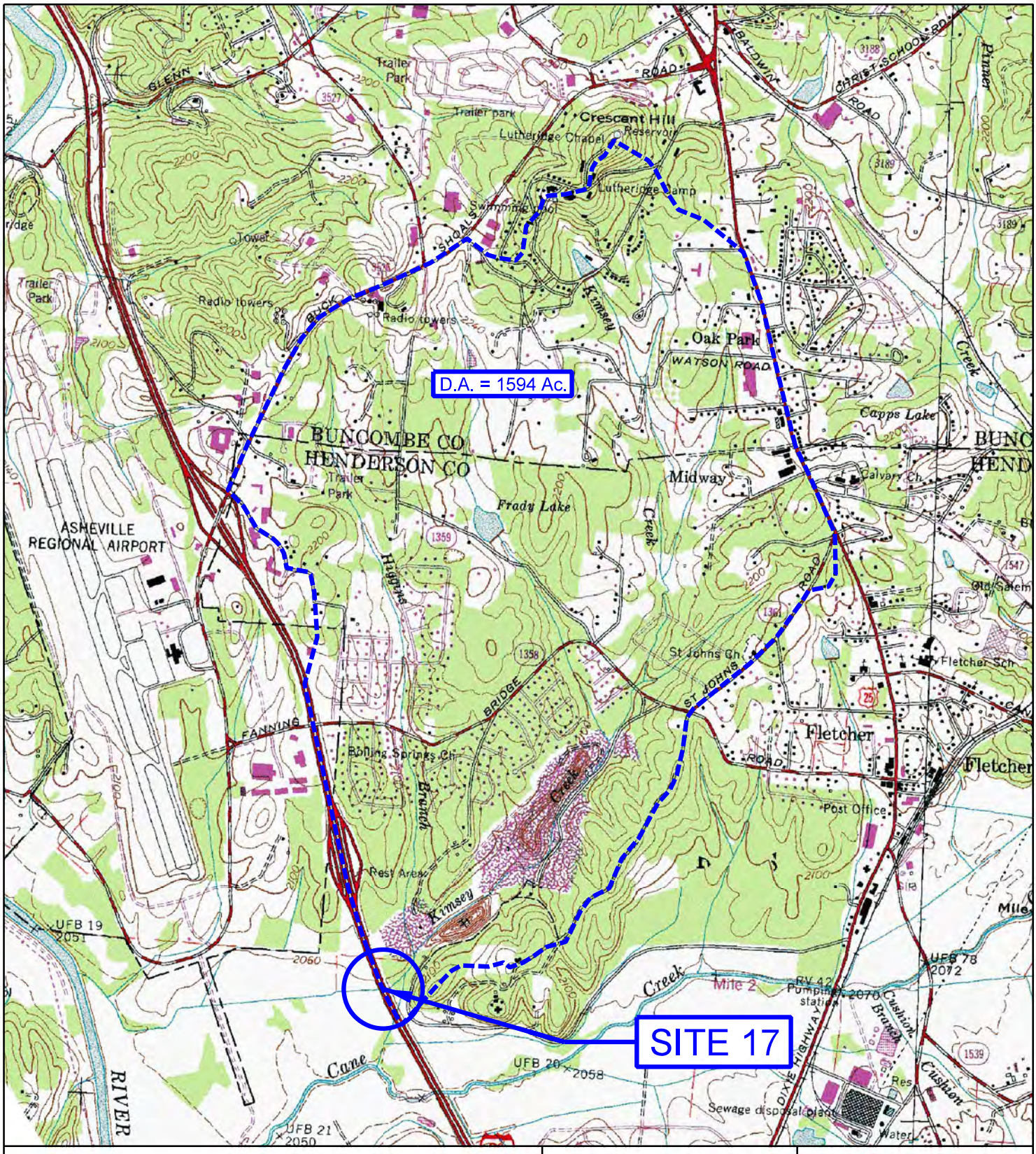
MAP REVISED
10/2/2008

Looking at Upstream Face

Looking Upstream

Looking at Downstream Face

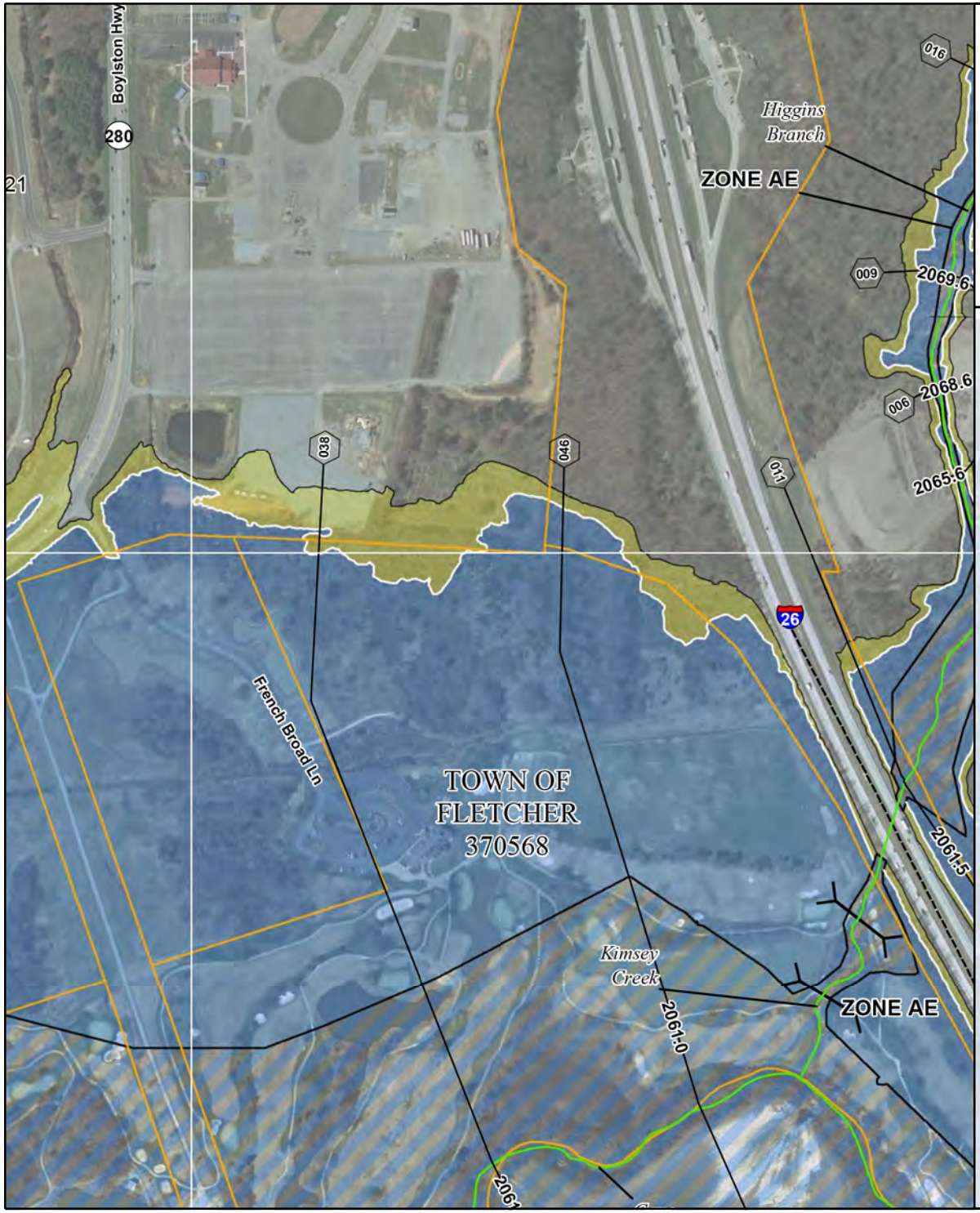
Looking Downstream



QUAD MAP - SITE 17

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

1,000 0 1,000 2,000
SCALE:



Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 1,000 Feet

0 75 150 300 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

NORTH CAROLINA

PANEL 9642

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
ASHEVILLE, CITY OF	370032	9642	K
FLETCHER, TOWN OF	370568	9642	K
HENDERSON COUNTY	370125	9642	K
MILLS RIVER, TOWN OF	370025	9642	K

Site 17

MAP NUMBER
3700964200K

MAP REVISED
01/06/10

Looking at Upstream Face of 3 @ 7' x 7' RCBC under I-26

Looking Upstream of 3 @ 7' x 7' RCBC

Looking Downstream in Left Barrel

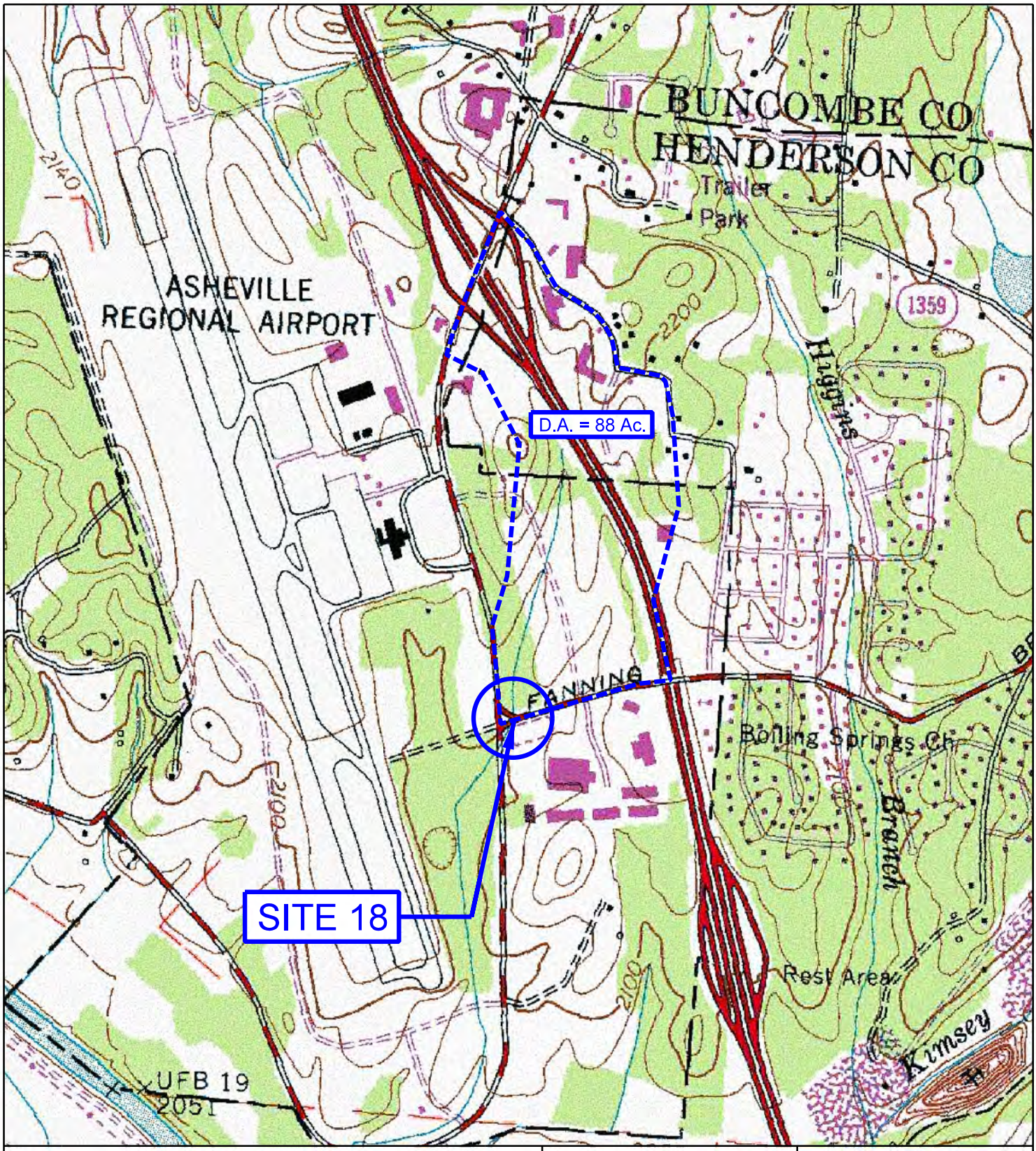
Looking Downstream in Center Barrel

Looking Upstream in Right Barrel

Looking at Downstream Face of 3 @ 7′ x 7′ RCBC

Looking at Downstream Face of 3 @ 7′ x 7′ RCBC under I-26

Looking Downstream of 3 @ 7′ x 7′ RCBC



QUAD MAP - SITE 18

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

Looking at Upstream Face of 1 @ 6' x 5' RCBC under Airport Rd.

Looking Upstream from 1 @ 6' x 5' RCBC Inlet

Pipe located Upstream of 1 @ 6' x 5' RCBC

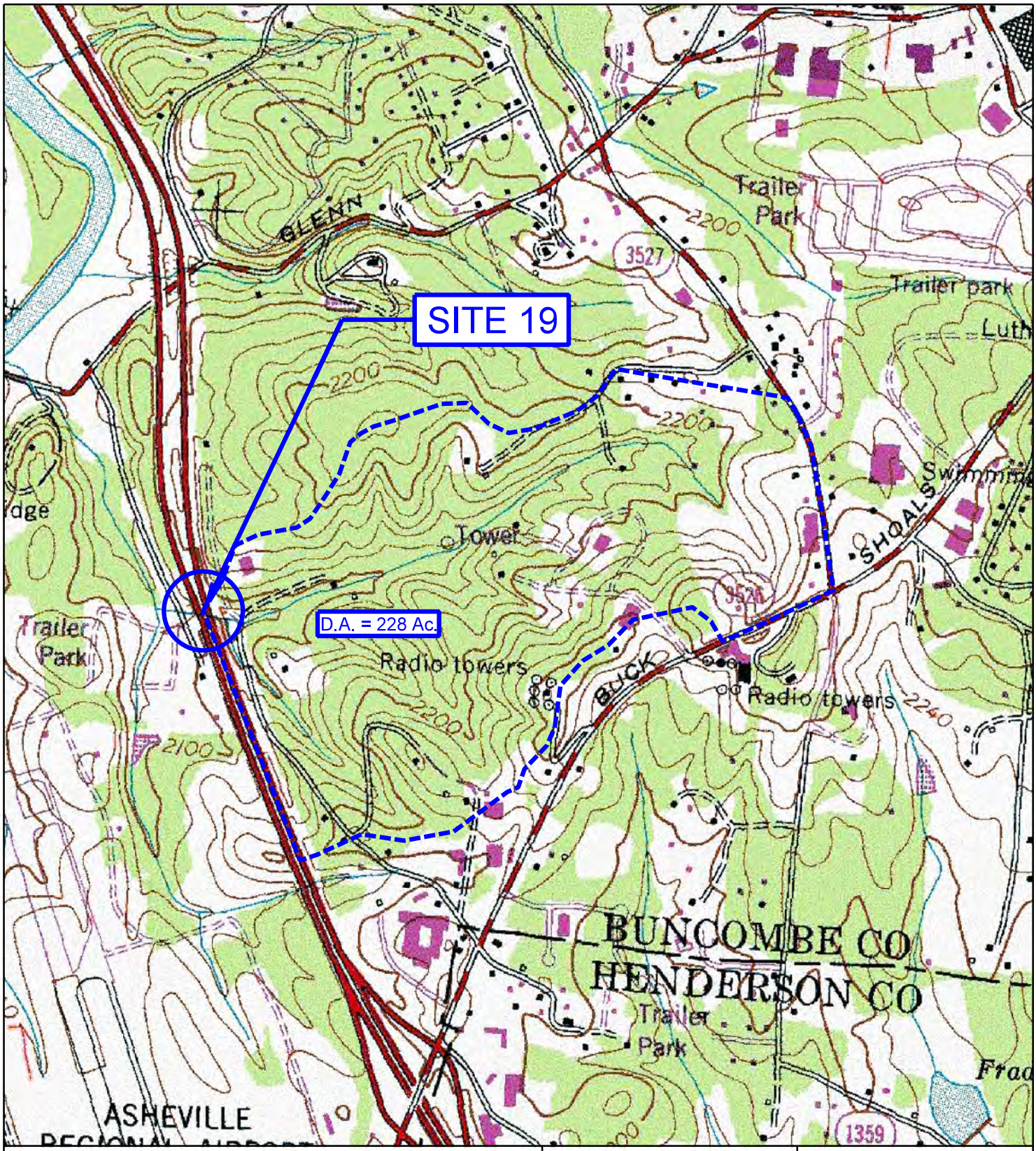
Looking Downstream Inside 1 @ 6' x 5' RCBC

Looking Downstream Inside of 66" RCP

Looking at Downstream Face of 66" RCP with Headwall under Airport Rd.

Looking Downstream from 66" RCP

Looking Downstream 66" RCP



QUAD MAP - SITE 19

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

N

Looking at Upstream Face of 1 @ 6' x 6' RCBC under I-26

Looking Upstream from 1 @ 6' x 6' RCBC Inlet

Looking Downstream Inside of 1 @ 6' x 6' RCBC

Looking Upstream of 1 @ 6' x 6' RCBC

Looking at Downstream Face of 1 @ 6' x 6' RCBC under I-26

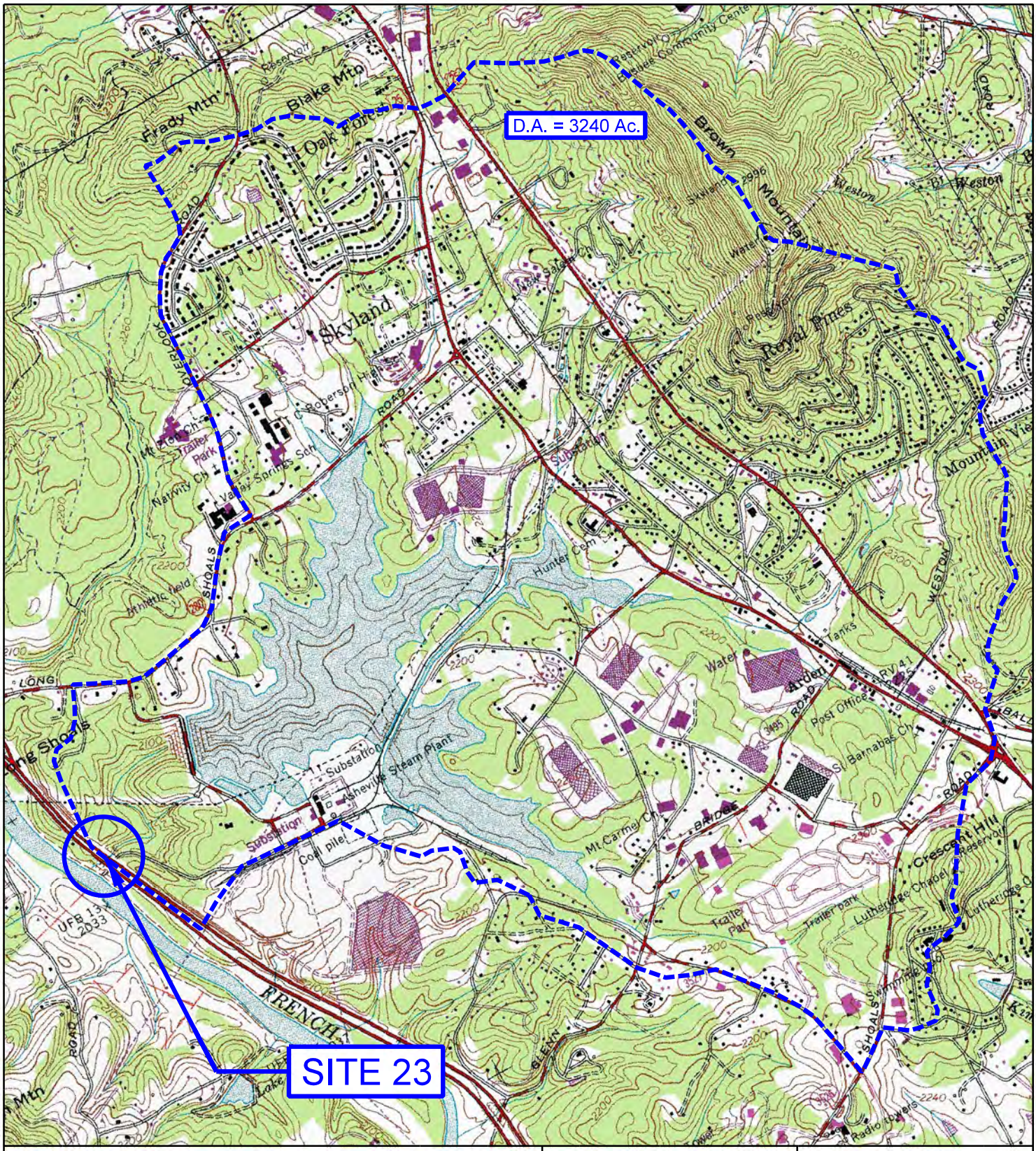
Looking at Downstream Face of 1 @ 6' x 6' RCBC under I-26

Looking at Upstream Face of 1 @ 6' x 6' RCBC under Hidden Creek Rd

Looking at Downstream Face of 1 @ 6' x 6' RCBC under Hidden Creek Rd

Looking Downstream from Hidden Creek Rd

Home Downstream of Hidden Creek Rd



QUAD MAP - SITE 23

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

Looking at Upstream Face of 2 @ 10' x 10' RCBC under I-26

Looking Upstream from 2 @ 10' x 10' RCBC Inlet

Looking Downstream in Left Box

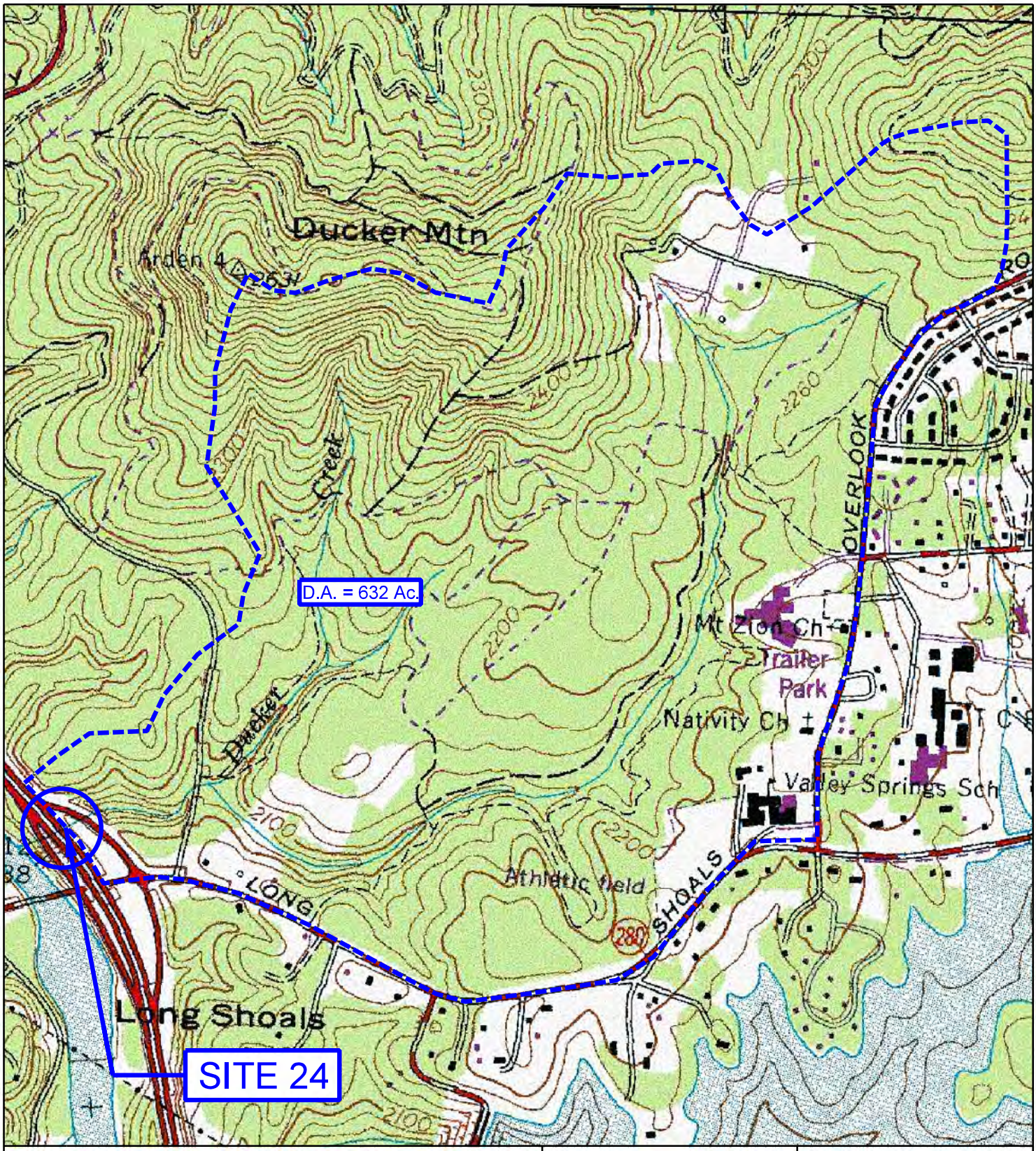
Looking Upstream in Left Box

Looking Downstream in Right Box

Looking Upstream in Right Box

Looking at Downstream Face of 2 @ 10' x 10' RCBC under I-26

Looking Downstream from 2 @ 10' x 10' RCBC Outlet



QUAD MAP - SITE 24

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

Looking at Upstream Face of 1 @ 8′ x 8′ RCBC under I-26

Looking Upstream from 1 @ 8′ x 8′ RCBC Inlet

Looking Downstream

Looking Upstream

Pipe Outlet in the Middle of the Box

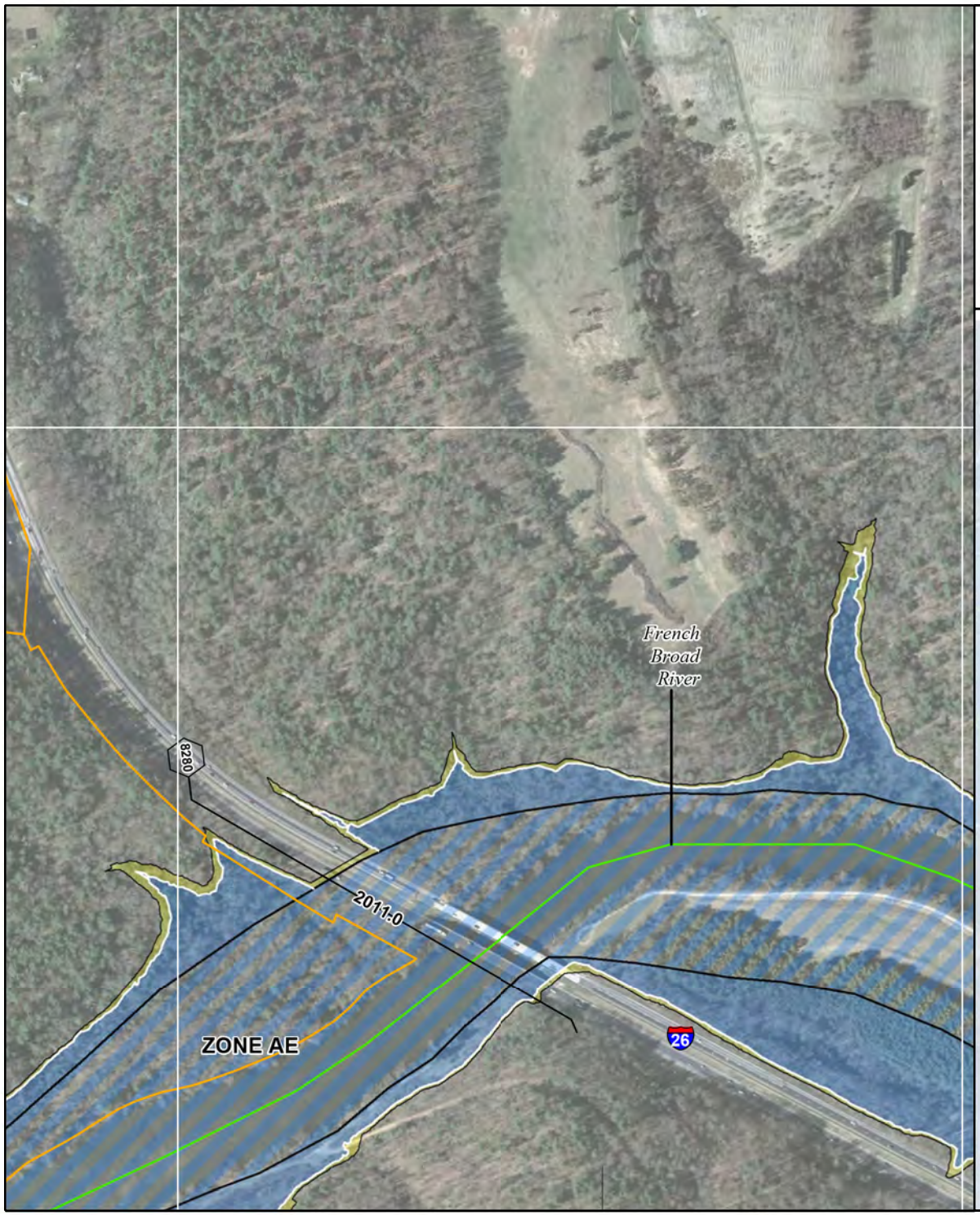
Crack in the Top Slab

Cracks in the Box

Right Headwall Separation on the Downstream Side

Looking at Downstream Face of 1 @ 8' x 8' RCBC under I-26

Looking Downstream from 1 @ 8' x 8' RCBC Outlet



Map Projection:
North Carolina State Plane Projection Feet (Zone 3200)
Datum: NAD 1983 (Horizontal), NAVD 1988 (Vertical)

1 inch = 500 feet 1:6,000

0 250 500 750 1,500 Feet

0 100 200 400 Meters

FEMA

National Flood Insurance Program

NORTH CAROLINA FLOODPLAIN MAPPING PROGRAM
NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

BUNCOMBE COUNTY, NC
and Incorporated Areas

PANEL 9636

FEMA

Panel Contains:

COMMUNITY	CID	PANEL	SUFFIX
ASHEVILLE, CITY OF	370032	9636	J
BUNCOMBE COUNTY	370031	9636	J

Site 25

MAP NUMBER
3700963600J

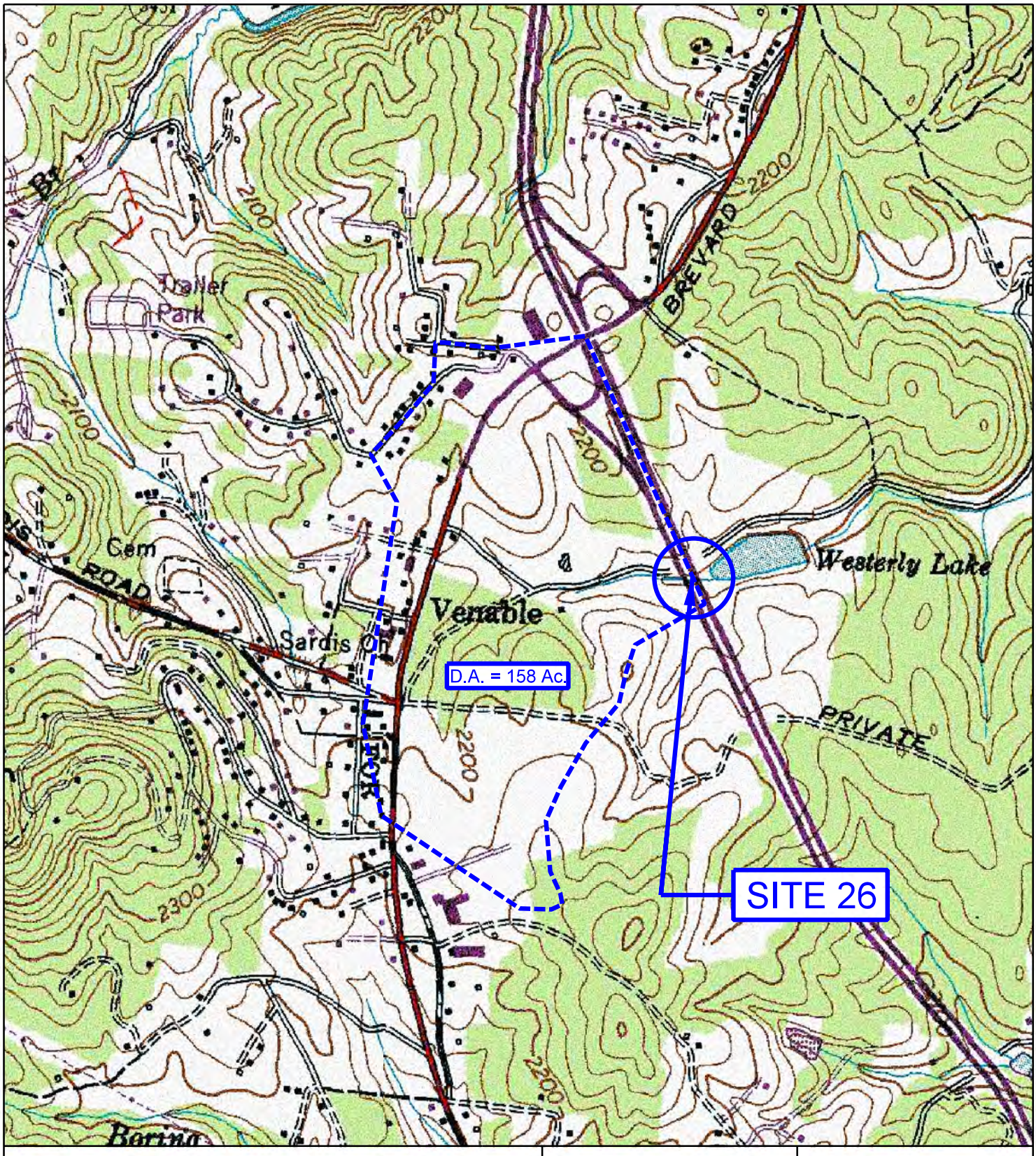
EFFECTIVE DATE
1/6/2010

Looking Upstream

Looking Upstream

Looking at Downstream Face

Looking Downstream



QUAD MAP - SITE 26

T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
STIP Project I-4400/I-4700

500 0 500 1,000
SCALE:

N

Looking at Upstream Face of 66" SPP with Headwall under I-26

Upstream Stormwater Pond

Looking Downstream Inside of 66" SPP

Looking at Downstream Face of 66" SPP with Headwall under I-26

Looking Downstream of 66" SPP

Upstream Side of Vehicular Underpass

Downstream Side of Vehicular Underpass

Looking Downstream from Vehicular Underpass

HNTB

Final Meeting Summary

Project: STIP Project I-4400/I-4700 (I-26 Widening)

Subject: Merger Process Concurrence Point 2A

Meeting Date, Time: 2/11/15, 3:15 PM

Meeting Location: NCDOT Century Center, Building B, Hydraulics Conference Room

Present:

Name	Organization	Email Address
Mitch Batuzich	FHWA, NC	Michael.batuzich@dot.gov
Lori Beckwith	USACE	loretta.a.beckwith@usace.army.mil
Steve Kichefski	USACE	Steven.l.kichefski@usace.army.mil
Cynthia Van Der Wiele	USEPA	vanderwiele.cynthia@epa.gov
Marella Buncick	USFWS	marella_buncick@fws.gov
Marla Chambers	NCWRC	marla.chambers@ncwildlife.org
Paul Black*	French Broad River MPO	paul@landofsky.org
Ricky Tipton	NCDOT, Division 13	rtipton@ncdot.gov
Bill Zerman	NCDOT, Hydraulics	bzerman@ncdot.gov
Jennifer Harris	NCDOT, PDEA	Jhharris1@ncdot.gov
Undrea Major	NCDOT, PDEA	ujmajor@ncdot.gov
Zahid Baloch	NCDOT, PDEA	zbaloch@ncdot.gov
Bill Barrett	NCDOT, PDEA, NES	wabarrett@ncdot.gov
Carla Dagnino	NCDOT, PDEA, NES	cdagnino@ncdot.gov
Kevin Moore	NCDOT, Roadway	kmoore@ncdot.gov
Steve Kendall	NCDOT, Roadway	sdkendall@ncdot.gov
Wael Arafat	NCDOT, Structures	warafat@ncdot.gov
Pam Cook	NCDOT, TPB	prcook@ncdot.gov
Brendan Merithew	NCDOT, TPB	bwmerithew@ncdot.gov
Mark Staley	NCDOT, REU	mstaley@ncdot.gov
Kiersten Bass	HNTB	kbass@hntb.com
Jamie Byrd	HNTB	jabyrd@hntb.com
Eric Seckinger*	HNTB	eseckinger@hntb.com
Jonathan Williamson*	HNTB	jewilliamson@hntb.com

*Participated via telephone

Summary: A meeting was held on February 11, 2015, to discuss and reach concurrence on Merger Process Concurrence Point 2A (Bridging Decisions and Alignment Review) for STIP Project I-4400/I-4700 (I-26 Widening). NCDOT distributed, on December 23, 2014, an informational packet to the participating agencies and team members for their review prior to the meeting. Dre Major began the meeting with a brief summary of the purpose of the meeting, and introductions were made by each member of the group present or participating via telephone. Kiersten Bass then provided a PowerPoint presentation (attached). She covered the purpose of the meeting, the project's location and background, including previous agency concurrences obtained for CP1 and CP2 in June 2013. The presentation was turned over to Jamie Byrd, who presented data relevant to CP2A (existing drainage crossings and drainage structure recommendations).

The following summarizes the general topics discussed:

1. For roadway construction on new location, three-cell box culverts are not typically used. For purposes of widening of an existing facility, and specifically for this project, all multi-barrel box culverts should have their

flows restricted to the number of cells that most closely matches the natural stream conditions in order to maintain normal stream flow widths and depths.
- Sills should be used in multi-cell box culverts to route the base flow into the appropriate number of cells.
- When sills are used, floodplain benches should be constructed to route flows into the active normal flow cell(s).

2. Existing box culvert conditions.
   - The Hydraulic Tech Memo contains a visual assessment of the existing conditions.
   - The conditions of structures greater than 20 feet in width have Inspection Reports with detailed condition assessments.
3. Perched stream conditions should be corrected at all locations as part of the project.
4. Mitigation costs should be included in the cost comparison for a more accurate comparison of total costs.
   - Table 1, Recommended Major Drainage Structures, included in the meeting material notes "*Stream mitigation is not included in the culvert extension costs. However, a 2:1 mitigation ratio would result in an increase in the culvert extension cost by $762/lf.*" After the jurisdictional site visit with the Agencies, the Preliminary Jurisdictional Determination (PJD) was updated to reflect the final stream calls and mitigation ratios that will be required at permitting. This is included in the PJD dated July 22, 2014 and has been used to update Table 1 of the CP2A meeting packet (attached).

The following summarizes the site-specific discussions:

Site 3 – Why are the potential stream impacts less for the 8-lane alternative as compared to the 6-lane and Hybrid alternatives?
- At this location, the 8-lane Alternative typical section used proposed guardrail with a fill slope of 2:1 and the 6-lane Alternative used no guardrail with a fill slope of 4:1. This difference made the footprint larger for the 6-lane Alternative than the 8-lane Alternative. HNTB will revise the typical section to eliminate the guardrail for the 6-lane Alternative and will correct Table 1 to reflect the change in potential stream impacts.

Site 4 – Marella identified this crossing as a candidate for a bridge since a supplemental pipe was recommended for all alternatives.
- HNTB advised that Dunn Creek is a FEMA regulated stream and would need to meet FEMA backwater criteria.
- HNTB added that with a drainage area of 2.58sq. mi., this crossing would generally not be considered for a bridge crossing.

Site 7 – Marella and Marla identified this crossing as a candidate for a bridge since it is a 3-cell box culvert with some internal cracks and over widening of the channel at the inlet.
- HNTB advised that Devils Fork is a FEMA regulated stream and would need to meet FEMA backwater criteria.
- HNTB added that with a drainage area of 6.8sq. mi., this crossing may be considered for a bridge crossing for new location design, but does not recommend a bridge for an existing facility.
- For preliminary design of the Preferred Alternative, HNTB will review the Inspection Report for the crossing.

Site 13 – Marella and Marla felt that this crossing was a candidate for a bridge since it is a 3-cell box culvert.

- Marella also expressed concern about a direct stormwater discharge through the culvert top slab.
- HNTB advised that Featherstone Creek is a FEMA regulated stream and would need to meet FEMA backwater criteria.
- HNTB added that with a drainage area of 4.1sq. mi., this crossing would generally not be considered for a bridge crossing.

Site 17 – In accordance with previous comments for 3-cell box culverts, any improvements at this site should include sills and flood plain benches.

Site 23 – After discussing this crossing with respect to its location to Lake Julian and the French Broad River, the group agreed that this site did not warrant special consideration.

The Merger Team agreed with the recommendations identified in the table included in the Merger Project Team Agreement Signature Form, except it was requested that for the 8-lane Alternative, bridges be evaluated for Sites 4 and 7. As such, the signature form was revised to include **Evaluate bridges at Sites 4 and 7 for the 8-lane Alternative.*

Action Items:

- PDEA, NES will provide the PJD mitigation ratios for estimating the mitigation cost associated with proposed culvert extensions. [*completed*]
- HNTB will update Table 1, Recommended Major Drainage Structures, to include stream mitigation costs for the proposed culvert extensions. [*completed*]
- HNTB will eliminate the guardrail and associated slope for the 6-lane Alternative and update Table 1 to reflect the change in potential stream impacts. [*completed*]

Attachments:

- Updated Table 1 from CP2A packet, signed Concurrence Point Number 2A form, meeting agenda and presentation.

4. MERGER PROJECT TEAM AGREEMENT SIGNATURE FORM

Merger Project Team Agreement

Concurrence Point 2A: Bridging Decisions and Alignment Review

Project Name/Description:
I-26, Widen from US 25 in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
TIP Project: I-4400/I-4700

Bridging Decisions: Based on the current preliminary hydraulics design for the existing major drainage structures for TIP Project I-4400/I-4700, the proposed culvert and bridging recommendations are presented in the following table:

SITE	PROPOSED HYDRAULIC STRUCTURE Number, Size, Structure Type, (Additional Length)		
	6-LANE WIDENING	8-LANE WIDENING	HYBRID 6-/8-LANE WIDENING
3	Retain and extend 1 @ 6' x 6' RCBC (18' [RT]/47' [LT])	Retain and extend 1 @ 6' x 6' RCBC (25' [RT]/27' [LT])	Retain and extend 1 @ 6' x 6' RCBC (18' [RT]/47' [LT])
4*	Retain 2 @ 8' x 8' RCBC ; add supplemental pipe	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (45' [RT]/18' [LT])	Retain 2 @ 8' x 8' RCBC ; add supplemental pipe
7*	Retain and extend 3 @ 9' X 10' RCBC (42' [RT]/20' [LT])	Retain and extend 3 @ 9' X 10' RCBC (42' [RT]/70' [LT])	Retain and extend 3 @ 9' X 10' RCBC (42' [RT]/20' [LT])
10	Retain 1 @ 6' x 6' RCBC	Retain and extend 1 @ 6' x 6' RCBC (0' [RT]/8' [LT])	Retain 1 @ 6' x 6' RCBC
11	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 230'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 230'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 230'
12	Retain and extend 1 @ 7' x 7' RCBC (18' [RT]/0'[LT])	Retain and extend 1 @ 7' x 7' RCBC (26' [RT]/18' [LT])	Retain and extend 1 @ 7' x 7' RCBC (18' [RT]/0'[LT])
13	Retain 3 @ 8' x 8' RCBC	Retain and extend 3 @ 8' x 8' RCBC; add supplemental pipe (32' [RT]/52' [LT])	Retain 3 @ 8' x 8' RCBC
14	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (21' [RT]/16' [LT])	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (33' [RT]/28' [LT])	Retain and extend 2 @ 8' x 8' RCBC; add supplemental pipe (21' [RT]/16' [LT])
16	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 210'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 210'	Remove and replace Dual 3 - Span RC Deck Bridges; L (Min) = 210'
17	Retain and extend 3 @ 7' x 7' RCBC; add supplemental pipe (20' [RT]/30' [LT])	Retain and extend 3 @ 7' x 7' RCBC; add supplemental pipe (36' [RT]/48' [LT])	Retain and extend 3 @ 7' x 7' RCBC; add supplemental pipe (36' [RT]/48' [LT])
18	Retain 1 @ 6' x 5' RCBC - 66" RCP w/ HW	Retain and extend 1 @ 6' x 5' RCBC - 66" RCP w/ HW (0' [RT]/8' [LT])	Retain and extend 1 @ 6' x 5' RCBC - 66" RCP w/ HW (0' [RT]/8' [LT])
19	Retain and extend 1 @ 6' x 6' RCBC; add supplemental pipe (22' [RT]/27' [LT])	Retain and extend 1 @ 6' x 6' RCBC; add supplemental pipe (48' [RT]/27' [LT])	Retain and extend 1 @ 6' x 6' RCBC; add supplemental pipe (48' [RT]/27' [LT])

SITE	PROPOSED HYDRAULIC STRUCTURE Number, Size, Structure Type, (Additional Length)		
	6-LANE WIDENING	8-LANE WIDENING	HYBRID 6-/8-LANE WIDENING
23	Retain and extend 2 @ 10' x 10' RCBC (28' [RT]/0' [LT])	Retain and extend 2 @ 10' x 10' RCBC (80' [RT]/24' [LT])	Retain and extend 2 @ 10' x 10' RCBC (80' [RT]/24' [LT])
24	Retain 1 @ 8' x 8' RCBC	Retain 1 @ 8' x 8' RCBC	Retain 1 @ 8' x 8' RCBC
25	Remove and replace Dual 6 - Span RC Deck Bridges; L (Min) = 460'	Remove and replace Dual 6 - Span RC Deck Bridges; L (Min) = 460'	Remove and replace Dual 6 - Span RC Deck Bridges; L (Min) = 460'
26	Retain 1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC (vehicle underpass)	Retain and extend 1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC (vehicle underpass) (20' [RT]/40' [LT])	Retain and extend 1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC (vehicle underpass) (20' [RT]/40' [LT])

*Evaluate bridges at Sites 4 and 7 for the 8-Lane Alternative.

The Merger Team has concurred on this date of February 11, 2015, on the above proposed culvert and bridging recommendations for TIP Project I-4400/I-4700.

USACE _____ NCDOT _____

USEPA _____ FWS _____

WRC _____ FHWA _____

DWR _____ SHPO _____

TVA _____ FBRMPO _____

EBCI _____

			STREAM INFORMATION								EXISTING STRUCTURE	6-LANE WIDENING			8-LANE WIDENING			HYBRID 6-/8-LANE WIDENING		
SITE NUMBER	STATION	ROUTE	STREAM NAME	NRTR MAP ID	NCDWR STREAM INDEX NUMBER	MITIGATION RATIO	PERENNIAL / INTERMITTENT	STREAM LENGTH (ft)	STREAM CLASS	DRAINAGE AREA (sq mi) [acres]	Number, Size, Structure Type (Existing Length)	Recommended Structure (Additional Length)	Cost Estimate - Culvert Extension (Bridge)	Potential Stream (lf)/ Wetland (ac) Impact	Recommended Structure (Additional Length)	Cost Estimate - Culvert Extension (Bridge)	Potential Stream (lf)/ Wetland (ac) Impact	Recommended Structure (Additional Length)	Cost Estimate - Culvert Extension (Bridge)	Potential Stream (lf)/ Wetland (ac) Impact
3	-L- 79+09	I-26	UT to Dunn Creek	SV	6-55-8-1-1	2:1	P	725	C	0.28 178	1 @ 6' x 6' RCBC (240')	Retain and extend (18' [RT]/0' [LT])	$100,000 ($1,573,000)	58/0	Retain and extend (25' [RT]/27' [LT])	$145,000 ($1,808,000)	132/0	Retain and extend (18' [RT]/0' [LT])	$100,000 ($1,573,000)	58/0
4	-L- 90+32	I-26	Dunn Creek	ST	6-55-8-1-1	2:1	P	845	C	2.58 1,649	2 @ 8' x 8' RCBC (354')	Retain existing; add supplemental pipe	$248,000 ($1,501,000)	0/0	Retain and extend; add supplemental pipe (45' [RT]/18' [LT])	$491,000 ($1,677,000)	143/0	Retain existing; add supplemental pipe	$248,000 ($1,501,000)	0/0
7	-L- 208+70	I-26	Devils Fork	SAJ	6-55-8-2	2:1	P	2849	C	6.80 4,351	3 @ 9' X 10' RCBC (220')	Retain and extend (42' [RT]/20' [LT])	$285,000 ($1,645,000)	142/0	Retain and extend (42' [RT]/70' [LT])	$466,000 ($1,894,000)	192/0	Retain and extend (42' [RT]/20' [LT])	$285,000 ($1,645,000)	142/0
10	-L- 248+18	I-26	UT to Devils Fork	SAR	6-55-8-2	EAST 2:1 WEST 1:1	P	812	C	0.29 185	1 @ 6' x 6' RCBC (382')	Retain existing	0	0/0	Retain and extend (0' [RT]/8' [LT])	$25,000 ($1,722,000)	48/0	Retain existing	0	0/0
11	-L- 334+69	I-26	Clear Creek	SBD	6-55-11-(5)	2:1	P	908	C	44.30 28,352	Dual 3 - Span RC Deck Bridges; L = 220.14'	Remove and replace; L (Min) = 230'	($3,577,000)	-	Remove and replace; L (Min) = 230'	($4,212,000)	-	Remove and replace; L (Min) = 230'	($3,577,000)	-
12	-L- 407+69	I-26	UT to Mud Creek	SBG	6-55	1:1	P	1,433	C	0.46 296	1 @ 7' x 7' RCBC (266')	Retain and extend (18' [RT]/0'[LT])	$40,000 ($2,436,000)	58/0	Retain and extend (26' [RT]/18' [LT])	$91,000 ($2,836,000)	124/0	Retain and extend (18' [RT]/0'[LT])	$40,000 ($2,436,000)	58/0
13	-L- 438+81	I-26	Featherstone Creek	SBP	6-55-12	2:1	P	643	C	4.09 2,616	3 @ 8' x 8' RCBC (160')	Retain existing	0	0/0	Retain and extend; add supplemental pipe (32' [RT]/52' [LT])	$476,000 ($1,293,000)	164/0	Retain existing	0	0/0
14	-L- 500+94	I-26	Byers Creek	SBU	6-55-13	2:1	P	1219	C	2.42 1,550	2 @ 8' x 8' RCBC (156')	Retain and extend; add supplemental pipe (21' [RT]/16' [LT])	$285,000 ($1,070,000)	117/0	Retain and extend; add supplemental pipe (33' [RT]/28' [LT])	$367,000 ($1,208,000)	141/0	Retain and extend; add supplemental pipe (21' [RT]/16' [LT])	$285,000 ($1,070,000)	117/0
16	-L- 669+02	I-26	Cane Creek	SCW	6-57-(9)	2:1	P	878	C	83.80 53,632	Dual 3 - Span RC Deck Bridges; L = 198.25'	Remove and replace; L (Min) = 210'	($3,297,000)	-	Remove and replace; L (Min) = 210'	($3,876,000)	-	Remove and replace; L (Min) = 210'	($3,876,000)	-
17	-L- 682+68	I-26	Kimsey Creek	SCY	6-57-22	2:1	P	960	C	2.49 1,594	3 @ 7' x 7' RCBC (236')	Retain and extend; add supplemental pipe (20' [RT]/30' [LT])	$386,000 ($1,861,000)	130/0	Retain and extend; add supplemental pipe (36' [RT]/48' [LT])	$521,000 ($2,151,000)	164/0	Retain and extend; add supplemental pipe (36' [RT]/48' [LT])	$521,000 ($2,151,000)	164/0
18	-Y12- 11+44	SR 1358	UT to French Broad River	-	6-(54.5)	-	-	-	B	0.14 88	1 @ 6' x 5' RCBC - 66" RCP w/ HW (540')	Retain existing	0	0/0	Retain and extend (0' [RT]/8' [LT])	$43,000	48/0	Retain and extend (0' [RT]/8' [LT])	$43,000	48/0
19	-L- 800+81	I-26	UT to French Broad River	SDC	6-(54.5)	2:1	P	961	B	0.36 228	1 @ 6' x 6' RCBC (220')	Retain and extend; add supplemental pipe (22' [RT]/27' [LT])	$331,000 ($1,933,000)	129/0	Retain and extend; add supplemental pipe (48' [RT]/27' [LT])	$380,000 ($2,236,000)	155/0	Retain and extend; add supplemental pipe (48' [RT]/27' [LT])	$380,000 ($2,236,000)	155/0
23	-L47001- 897+06	I-26	Powell Creek	SDN	6-62	2:1	P	470	C	5.06 3,240	2 @ 10' x 10' RCBC (264')	Retain and extend (28' [RT]/0' [LT])	$119,000 ($2,005,000)	68/0	Retain and extend (80' [RT]/24' [LT])	$390,000 ($2,322,000)	184/0	Retain and extend (80' [RT]/24' [LT])	$390,000 ($2,322,000)	184/0
24	-L47001- 931+91	I-26	Ducker Creek	SDT	6-63	2:1	P	377	C	0.99 632	1 @ 8' x 8' RCBC (552')	Retain existing	0	0/0	Retain existing	0	0/0	Retain existing	0	0/0
25	-L47002- 1076+40	I-26	French Broad River		6-(54.5)	-	-	-	B	678.00 433,920	Dual 6 - Span RC Deck Bridges; L1 = 440.9' L2 = 453.4'	Remove and replace; L (Min) = 460'	($6,804,000)	-	Remove and replace; L (Min) = 460'	($8,074,000)	-	Remove and replace; L (Min) = 460'	($8,074,000)	-
26	-L47002- 1151+85	I-26	Long Valley Branch	SFN	6-75	1:1	P	44	C	0.25 158	1 @ 66" SPP w/ HW; 1 @ 14' x 14' RCBC [vehicle underpass] (220')	Retain existing	0	0/0	Retain and extend (20' [RT]/40' [LT])	$171,000 ($2,665,000)	140/0.25	Retain and extend (20' [RT]/40' [LT])	$171,000 ($2,665,000)	140/0.25

NOTES: Minimum supplemental pipe size is 48".

Stream/wetland impacts are measured from the openings of the existing culverts to 40 feet beyond slope stakes.

For comparison, costs to replace existing culverts with bridges were estimated for sites where culvert extensions would be needed. Contour mapping was used to estimate the length of bridges at sites with existing culverts.

Cost estimates are based on unit costs and bid averages provided by NCDOT.

Unit costs

Culvert: single -$35/sf, double - $30/sf, triple - $25/sf

Bridges: $115/sf

48" Supplemental Pipe: $620/lf (bore and jack)

Stream mitigation cost is included in the culvert extension estimate and was calculated using mitigation ratio information from Table 1 in the Preliminary Jurisdictional Determination report (July 2014); with the basis that a 2:1 mitigation ratio would result in an increase in the culvert extension cost by $762/lf and a 1:1 mitigation ratio would result in an increase in the culvert extension cost by $381/lf.

On-site detour cost was included in the replace existing culverts with bridges estimate and was calculated using the basis of 3,100sy of temporary pavement per traffic shift during construction of each of the new dual bridges. Barrier and earthwork costs were also included to arrive at a total estimate of $350,000 per culvert to bridge replacement.

Site 18 is outside the NRTR boundary.

Wetlands are present only at Site 26.

UPDATED March 4, 2015

CONCURRENCE POINT 2A
NEPA/404 MERGER TEAM MEETING

STIP Project I-4400/I-4700

Improve I-26 from US 25 to I-40

(Buncombe and Henderson Counties)

February 11, 2015

MEETING AGENDA

I. Introduction

- Purpose of Today's Meeting
- Project Location
- Project Schedule

Meeting Material Tabs

1. Recommended Major Drainage Structures Table

   Merger Project Team Signature Form
2. Site Maps and Photographs

II. Merger Team Concurrences to Date

- CP1 – Project Purpose and Need
- CP2 – Alternatives to be Studied in Detail

III. Merger Concurrence Point 2A

- Existing Drainage Crossings
- Drainage Structure Recommendations
- Discussion
- Concurrence on Hydraulic Recommendations with Signatures

Bridging Decisions
&
Alignment Review for I-26

From US 25 in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County

STIP Project I-4400/I-4700

SECTION 404 / NEPA
INTERAGENCY MEETING FOR
MERGER CONCURRENCE POINT 2A

February 11, 2015

Meeting Agenda

I. Introduction
- Purpose of Today's Meeting
- Project Location
- Project Schedule

II. Merger Team Concurrences To Date
- CP1 – Project Purpose and Need
- CP2 – Preliminary Alternatives to be Studied in Detail

III. Merger Concurrence Point 2A
- Existing Drainage Crossings
- Drainage Structure Recommendations
- Discussion

2

I. Introduction

Purpose of Today's Meeting

The purpose of today's meeting is to review major hydraulic structures for the build alternatives carried forward in Concurrence Point 2.

Formal concurrence on the bridge locations will be requested at the conclusion of this meeting.

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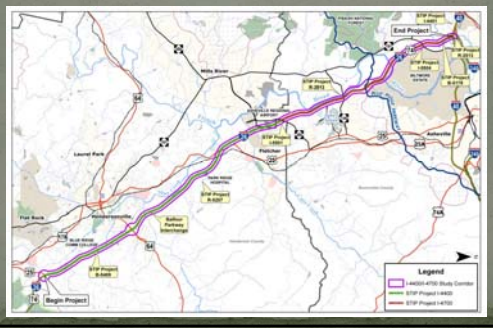
I. Introduction

The project proposes to improve the approximate 22.2-mile segment of the I-26 corridor from US 25 in Henderson County, north to I-40 in Buncombe County.



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I. Introduction

Project Reinitiation

- Growing need for improvements to I-26 corridor recognized. Project included in NCDOT 2013-2023 STIP and subsequently in the Draft 2015-2025 STIP.
- Project formally reinitiated in the Fall of 2012. Reinitiation packets distributed to agencies on April 19, 2013.

Merger Screening

- Merger Screening Meeting held in September 2012.
- Consensus at meeting was project should follow Merger process but could be removed in the future, if deemed appropriate.

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I. Introduction

Project Schedule

Project Technical Reports	2013–2015
Draft Environmental Impact Statement	Late 2015
Public Hearing	2016
Final Environmental Impact Statement	Late 2016
Record of Decision	2017
Begin Right-of-Way Acquisition	2018
Begin Construction	2020

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II. Concurrences to Date

Concurrence Point 1 – Project Purpose and Need

- The stated needs to be addressed by the project include:
  - *Improve existing and projected roadway capacity deficiencies.*
  - *Improve insufficient pavement structure and deteriorating existing road surface conditions.*
- The stated purpose of the project is to:
  - *Reduce congestion, with a goal of achieving an overall LOS D in the design year (2040), and improve the pavement structure.*

The Merger Team concurred on June 20, 2013

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II. Concurrences to Date

Concurrence Point 2 – Preliminary Alternatives to be Studied

Three build alternatives were presented. Each alternative would be asymmetrical and developed to best fit the current roadway location and surrounding environmental constraints and land uses:

- 6-Lane Widening
- 8-Lane Widening
- Traffic Report Recommendations Widening

  Widen I-26 as a hybrid of 6- or 8-lane segments as recommended by the traffic report.

The Merger Team concurred on June 20, 2013

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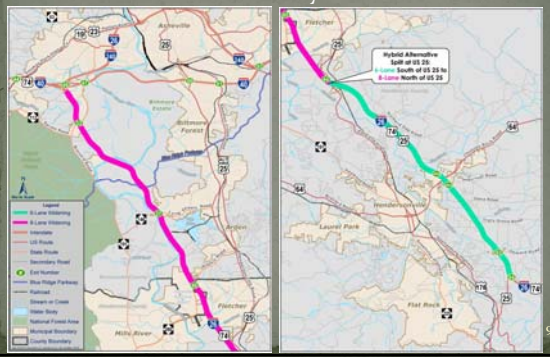
II. Concurrences to Date

Concurrence Point 2 – Preliminary Alternatives to be Studied



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MERGER CONCURRENCE POINT 2A

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III. Merger Concurrence Point 2A

Existing Drainage Crossings

Field investigations and preliminary hydraulic studies were conducted for 28 stream existing crossings in the project corridor.

- Four bridges
- Fifteen major culvert crossings
- Nine 66-inch pipes

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III. Merger Concurrence Point 2A

Drainage Structure Recommendations

Based on hydraulic analysis, no change to the type of existing structures is warranted. The hydraulic analysis recommends:

- Three existing bridges be removed and replaced:

  11, 16, and 25

- Thirteen existing culverts be retained and extended, and supplemented in some locations:

  3, 4, 7, 10, 12, 13, 14, 17, 18, 19, 23, 24, and 26

Due to cost and constructability issues associated with an existing interstate, it is <u>not</u> recommended that any culverts be replaced with bridges.

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Site Locations

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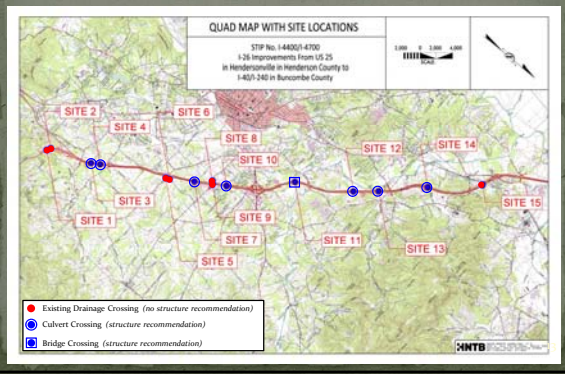


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STIP No. I-4400/I-4700
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in Hendersonville in Henderson County to
I-40/I-240 in Buncombe County
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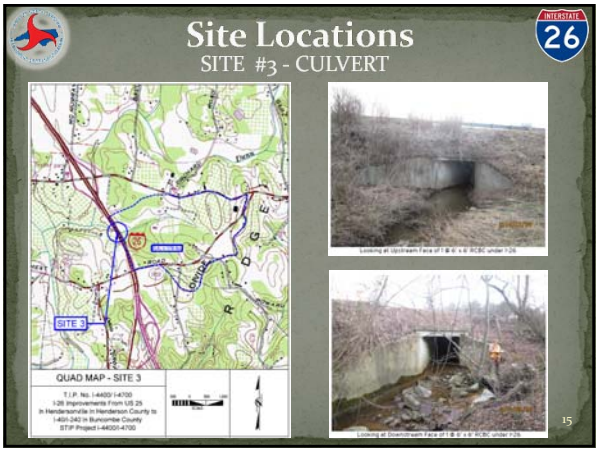
SITE 17
SITE 18
SITE 19
SITE 20
SITE 21
SITE 22
SITE 23
SITE 24
SITE 25
SITE 26
SITE 27
SITE 28
Existing Drainage Crossing (no structure recommendation)
Culvert Crossing (structure recommendation)
Bridge Crossing (structure recommendation)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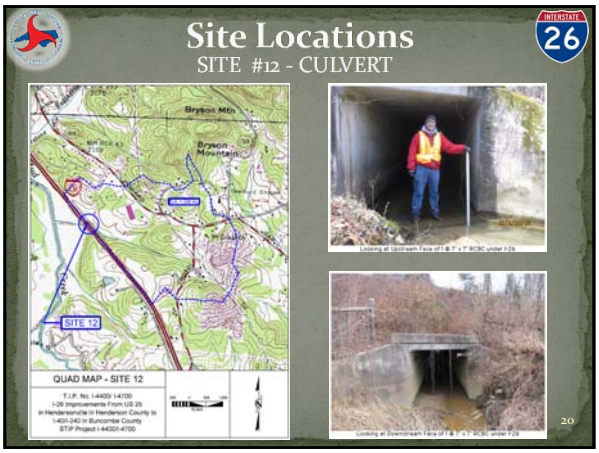
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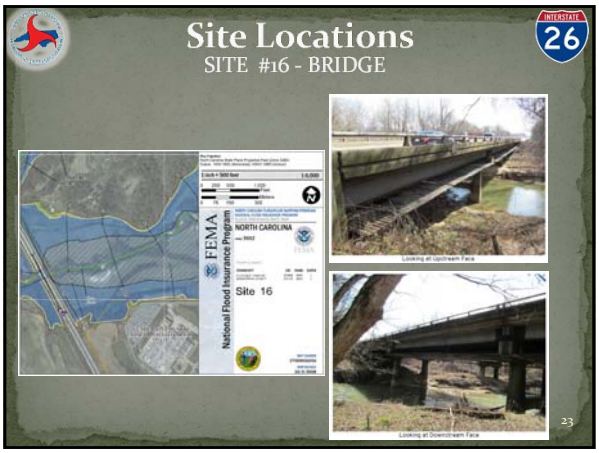
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SITE #16 - BRIDGE
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NORTH CAROLINA
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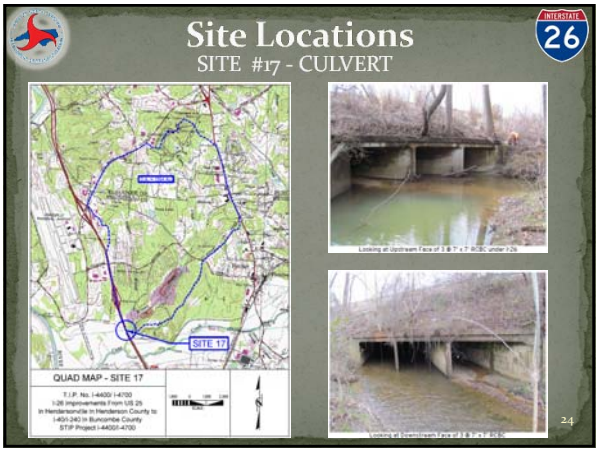
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SITE 17
QUAD MAP - SITE 17
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SITE #18 - CULVERT
INTERSTATE 26
BUNCOMBE CO
HENDERSON CO
ASHEVILLE REGIONAL AIRPORT
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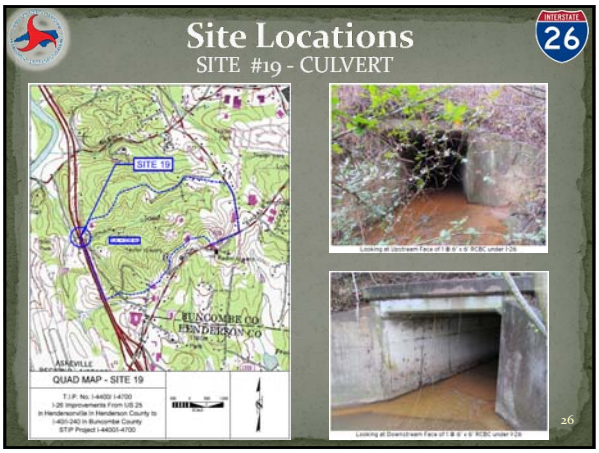
Site Locations
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INTERSTATE 26
SITE 19
BUNCOMBE CO
HENDERSON CO
ASHEVILLE
QUAD MAP - SITE 19
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I-26 Improvements From US 25
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STIP Project I-4400/I-4700
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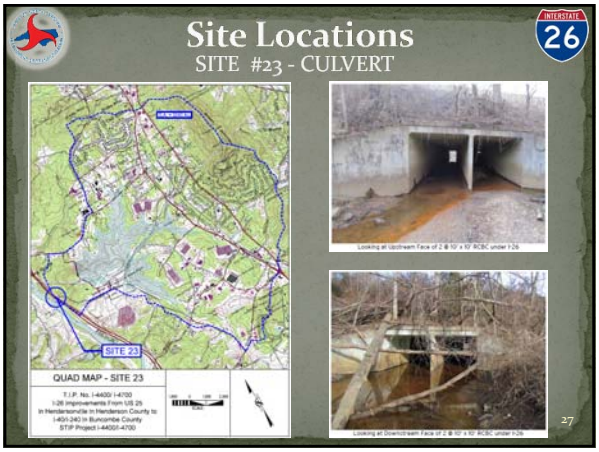
Site Locations
SITE #23 - CULVERT
INTERSTATE 26
SITE 23
QUAD MAP - SITE 23
T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
In Hendersonville In Henderson County to
I-40/I-240 In Buncombe County
STIP Project I-4400/I-4700
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Site Locations
SITE #24 - CULVERT
INTERSTATE 26
Ducker Mtn
SITE 24
QUAD MAP - SITE 24
T.I.P. No. I-4400/ I-4700
I-26 Improvements From US 25
In Hendersonville In Henderson County to
I-40/I-240 In Buncombe County
STIP Project I-4400/I-4700
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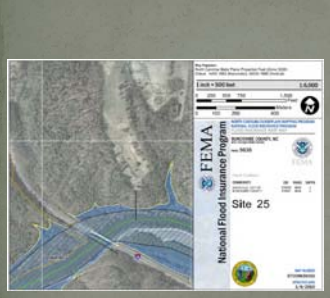
Site Locations
SITE #25 - BRIDGE



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Site Locations
SITE #26 - CULVERT

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III. Merger Concurrence Point 2A

Drainage Structure Recommendations

Based on hydraulic analysis, no change to the type of existing structures is warranted. The hydraulic analysis recommends:

- Three existing bridges be removed and replaced:

  11, 16, and 25

- Thirteen existing culverts be retained and extended, and supplemented in some locations:

  3, 4, 7, 10, 12, 13, 14, 17, 18, 19, 23, 24, and 26

Due to cost and constructability issues associated with an existing interstate, it is not recommended that any culverts be replaced with bridges.

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