Transportation

PAT McCRORY
Governor

NICHOLAS J. TENNYSON
Secretary

November 21, 2016

U.S. Army Corps of Engineers
Asheville Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28805

ATTN: Ms. Loretta Beckwith
NCDOT Division 13 Coordinator

SUBJECT: **Application for Section 404 Individual Permit and Section 401 Individual Water Quality Certification** for the proposed I-26 Interchange improvements at NC 191 (Brevard Road), Buncombe County, Division 13; Federal Aid Project No. IMF-26-1(191)47; TIP Project No. I-5504.

Debit $570 from WBS Element No. 45552.1.1

Dear Ms. Beckwith:

The North Carolina Department of Transportation (NCDOT) proposes a modification of the I-26 / NC 191 (Brevard Road) interchange ramps, widening and elevating the NC 191 bridge and approaches through the interchange, reconstruction of the I-26 pavement, paving the median of I-26, and reconfiguration of local roadways. The length of the project along NC 191 is approximately 3,600 feet and stretches from the intersection of NC 191 with the Ingles / Asheville Outlets entrance to the intersection of NC 191 and Old Brevard Road. The length of the project along I-26 is approximately 6,680 feet within the NC 191 interchange area, extending west to tie to the I-26 bridge reconstruction over Pond Road / Hominy Creek that is currently under construction (B-5178).

Please see the enclosed ENG 4345 form, Division of Mitigation Services (DMS) mitigation acceptance letters, agency review minutes (4B/4C), a No Archaeological Survey Required form, Historic Architecture and Landscapes Assessment of Effects form, list of property owners, State Stormwater Management Plan (SMP), permit drawings, and design plans for the above referenced project.

PROJECT SCHEDULE

The Let date for the I-5504 Design Build Project was February 16, 2016. Preliminary work in the median of I-26 is anticipated to begin in October 2016 in preparation of traffic realignment. Full construction is anticipated to begin by March 2017 and be completed by November 30, 2018.

PURPOSE AND NEED

The primary purpose of STIP Project I-5504 is to reduce projected traffic congestion at the I-26 / NC 191 interchange. Another benefit will be to improve interchange efficiency and maintain safe conditions. Some current turning movements on both I-26 exit ramps would operate at Level of Service F, the worst quality of traffic service, in 2040 during the AM and PM peak hours. Future year vehicle queues are projected to occur on the exit ramps possibly extending near the I-26 mainline, thus creating an unsafe condition.

NEPA DOCUMENT STATUS

A Categorical Exclusion (CE) was approved for the project in October 2015 and has been provided to all appropriate agencies. The CE is also available on the NCDOT website at https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx, under *Quick Links* > *Environmental Documents*. A 4B/4C Inter-Agency meeting was held on June 8, 2016. The meeting minutes were distributed on June 15, 2016. An additional meeting was held with the North Carolina Division of Water Resources (NCDWR) on July 15, 2016, and the minutes were revised to include these comments and distributed on July 18, 2016.

INDEPENDENT UTILITY

The subject project is in compliance with 23 CFR Part 771.111(f) which lists the Federal Highway Administration (FHWA) characteristics of independent utility of a project:

(1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope,
(2) The project is usable and a reasonable expenditure, even if no additional transportation improvements are made in the area,
(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

Project I-5504 can function as a stand-alone project that can be built without adding through lanes on I-26. The project will be usable and functional without additional transportation improvements since it is designed to reduce and possibly avoid traffic congestion problems on NC 191 in the vicinity of the I-26 interchange. Therefore, the I-5504 project would be a reasonable expenditure in keeping with 23 CFR Section (23) 771.111 (f)(2).

RESOURCE STATUS

Wetland and stream determinations within the I-5504 project study area were conducted using the field delineation methodologies outlined in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987) and the subsequent *Regional Supplement to the Corps of Engineers Delineation Manual: Eastern Mountains and Piedmont Region* (U.S. Army Corps of Engineers [USACE] Version 2.0 [April 2012]). The N.C. Wetland Assessment Method (NCWAM) User Manual, Version 4.1 (October 2010) was also used to classify wetlands within the project

study area. Stream identification and classification followed the *Methodology for Identification of Intermittent and Perennial Streams and Their Origins, Version 4.11,* [September 2010].

The jurisdictional wetlands and streams were field verified by Lori Beckwith (USACE Regulatory Specialist) on May 7 and 8, 2014. An Approved Jurisdictional Determination (AJD) was issued on May 15, 2015 (Action ID SAW-2014-02016). Revised JD information was submitted to the USACE on February 12, 2016, to supplement the AJD.

The project area lies within the Mountain physiographic region of North Carolina. Jurisdictional features within the project footprint are located in the French Broad River Basin (United States Geological Survey [USGS] Hydrologic Unit 06010105) in Buncombe County. Jurisdictional streams that will be impacted by this project include six unnamed tributaries (UTs) to Hominy Creek (NCDWR Classification C; NCDWR Index No. 6-76), and Long Valley Branch and two UTs to Long Valley Branch (NCDWR Classification C; NCDWR Index No. 6-75) as shown in Table 1.

There are no designated High Quality Waters (HQW), Outstanding Resource Waters (ORW), Water Supply I (WS-I), Water Supply II (WS-II), or Trout Waters (Tr) occurring within 1.0 mile of the project area. No Anadromous Fish Spawning Areas or potential habitat areas are located near or within the project study area. Within 1.0 mile of the construction footprint no streams are listed as a 303(d) water in the 2014 Final North Carolina 303(d) List of Impaired Waters of North Carolina for turbidity or sedimentation.

IMPACTS TO WATERS OF THE UNITED STATES

Surface Waters

Total jurisdictional stream impacts for I-5504 include 1,888 linear feet of permanent stream impacts, which includes 1,189 linear feet of fill and piping, 613 linear feet of stream realignment, and 86 linear feet of permanent bank stabilization, as well as 87 linear feet of temporary stream impacts. Utility relocation will not result in any temporary or permanent impacts. The jurisdictional stream impacts are summarized in Table 1 below.

Table 1. Surface Water Impacts

Site	Stream Name[1]	I/P[1]	Impact Type	Permanent Impact (linear feet)	Temporary Impacts (acres/feet)	Impacts Requiring USACE Mitigation (linear feet)[2]	USACE Mitigation Ratio[3]	Impacts Requiring 1:1 NCDWR Mitigation (linear feet)[4]
1a	UT to Long Valley Branch (SJ)	P	Permanent Fill	38	< 0.01/28	38	1:1	-
			Stream Realignment	20	-	20	1:1	-
1b	Long Valley Branch (SA)	P	Permanent Fill	17	< 0.01/13	17	1:1	-
			Bank Stabilization	23	-	-	-	-
1d	UT to Long Valley Branch (SI)	I	Bank Stabilization	31	-	-	-	-
2a	UT to Hominy Creek (SB)	P	Permanent Fill	31	< 0.01/10	31	2:1	-
			Stream Realignment	48	-	48	1:1	-
2b	UT to Hominy Creek (SC)	I	Permanent Fill	169	-	169	1:1	-
2b	UT to Hominy Creek (SE)	I	Permanent Fill	103	-	103	1:1	-
2c	UT to Hominy Creek (SD)	P	Permanent Fill	742	< 0.01/5	742	2:1	742
			Bank Stabilization	32	-	-	-	32
			Stream Realignment	33	-	33	1:1	33
2c	UT to Hominy Creek (SF)	I	Permanent Fill	71	-	71	1:1	-
3a	UT to Hominy Creek (SM)	P	Stream Realignment	33	< 0.01/10	33	1:1	-
3a	UT to Hominy Creek (SD)	P	Permanent Fill	18	< 0.01/13	18	2:1	18
			Stream Realignment	256	-	256	1:1	256
3b	UT to Hominy Creek (SD)	P	Stream Realignment	223	< 0.01/8	223	1:1	223
Totals[5]				1,888	0.01 / 87	-	791 @ 2:1 1,011 @ 1:1	1,304

[1]Stream names are from the CE document approved October 15, 2015 and I/P (Intermittent/Perennial calls) and mitigation ratios are from the I-5504 AJD.
[2]Per USACE, bank stabilization impacts do not require compensatory mitigation as the impacts do not require fill in the stream bed; therefore, under Section 404 of the Clean Water Act, do not constitute Loss of Waters of the U.S.
[3]Per I-5504 JD Site Visit.
[4]Per NCDWR, permanent stream impacts (including bank stabilization impacts) require compensatory mitigation when total permanent stream impacts equal or exceed 150 linear feet per perennial stream feature.
[5]See Table 3 for Mitigation breakdown.

Wetlands

There will be a total of 0.02 acres of permanent wetland impacts associated with this project due to fill. There will be no impacts to wetlands resulting from utilities or hand clearing. These impacts are summarized in Table 2 below.

Table 2. Wetland Impacts

Site	Wetland Name[1]	Wetland Size (ac)	Wetland Type	Impact Type	Permanent Impacts (ac)	Impacts Requiring USACE Mitigation[2] (ac)
1b	WA	<0.01	Riparian	Fill	<0.01	<0.01
2a	WB	0.01	Riparian	Fill	0.01	0.01
2b	WC	<0.01	Riparian	Fill	<0.01	<0.01
2c	WG	<0.01	Riparian	Fill	<0.01	<0.01
Total Impacts					**0.02[3]**	**0.02[3]**

[1]Wetland names are from the CE document approved October 15, 2015.
[2]Mitigation ratio for all applicable wetland sites is 2:1.
[3]Rounded total is based on the sum of the actual impacts.

Ponds

There will be a total of 0.03 acres of open water (pond) impacts associated with this project at Permit sites 1b and 1c as shown on the permit drawings. These ponds are identified in the PJD as jurisdictional ponds due to their direct connections with Long Valley Branch or its UT.

Permit Impact Sites

The I-5504 project involves three impact sites described below and presented in the attached plans. Each site has been broken down into the sub-impact areas (a,b,c, etc) for clarity.

Site 1

This site includes extensions of existing pipes under I-26 carrying Long Valley Branch and a tributary to the headwaters of Westerly Lake on the Biltmore Estate property.

Site 1a – UT to Long Valley Branch

The existing structure under I-26 is a 48" Corrugated Metal Pipe (CMP) that is 310 feet in length and conveys an unnamed tributary to Long Valley Branch (Stream SJ) to Westerly Lake. The proposed improvements to this structure include slip lining and a pipe extension with collar. At the inlet, the 48" CMP culvert will be extended by 38 feet. A stream realignment is proposed at this inlet extension to align the stream with the proposed pipe to prevent future erosion at the inlet. Impacts proposed for the above improvements total 38 linear feet of permanent stream fill (pipe extension), 20 linear feet of stream realignment, and 28 feet temporary stream impacts for construction access and erosion control.

Site 1b – Long Valley Branch

The existing 66" CMP is 260 feet in length and conveys the headwaters of Long Valley Branch (Stream SA) from its origin at a non-404-jurisdictional constructed stormwater pond just beyond the proposed right of way (ROW). The proposed changes to this structure include a culvert extension with collar and slip lining. Bank stabilization will be replaced along the channel, as the existing channel is currently stabilized with rip rap. Impacts for

these proposed improvements total 17 linear feet of permanent stream fill (pipe extension), 23 linear feet of bank stabilization and 13 linear feet of temporary stream impact for construction access and erosion control.

An existing 14'x14' Reinforced Concrete Box Culvert (RCBC) inlet will be extended to meet the new fill slope. This culvert was historically intended as vehicular access under I-26 and does not regularly carry jurisdictional waters. A new 11.5' x 11' RCBC will be constructed within the existing 14' x 14' RCBC to address structural degradation. The new RCBC will be graded to drain so it does not hold water, which the existing RCBC does. The fill and grading for drainage will result in the total take of <0.01 acre of open surface waters and <0.01 acre of wetlands.

Site 1c – Long Valley Branch

There are two existing CMPs at this location (the outlet of those previously noted at sites 1a and 1b) that will be extended due to I-26 widening and fill slope construction. One headwall will be constructed encompassing both pipe outlets. In addition to the culvert extensions, a rip-rapped energy dissipator basin will be constructed in an existing scour hole to reduce flow velocity and erosive force prior to entering Westerly Lake. These improvements will result in impacts totaling 0.03 of open surface waters.

Site 1d – UT to Long Valley Branch

A 15" CMP is being plugged and filled, and a new 15" Reinforced Concrete Pipe (RCP) / Corrugated Steel Pipe (CSP) is being installed at this site to assist in proper roadway stormwater drainage. The new pipe will outlet adjacent to a UT to Long Valley Branch (Westerly Lake), and 31 linear feet of bank stabilization will be provided to prevent future erosion.

The stream (Stream SI) paralleling the Biltmore Estate fence at sites 1c and 1d will not be impacted by construction (except for the 31 linear feet of bank stabilization above). Per agency meeting discussion, the stream in this area will be spanned using mats or other similar device above the ordinary high water mark/top of bank for construction equipment access.

Site 2

This site includes construction of new ramps in quadrant D of the I-26/NC 191 interchange and fill/piping of a perennial UT to Hominy Creek and several small intermittent UTs.

Site 2a – UT to Hominy Creek

An existing 42" CMP that is conveying a UT to Hominy Creek (Stream SB) will be slip lined and extended by 70 feet with a 42" RCP to accommodate new fill slopes. A stream realignment is proposed at this inlet extension to align the stream with the proposed pipe and prevent future erosion at the inlet. This improvement will result in 79 linear feet of

permanent stream impact (31 feet of pipe/fill and 48 feet of stream realignment) and 10 linear feet of temporary stream impact for construction access and erosion control. There will also be wetland impacts totaling 0.01 acre to accommodate the new fill slopes and drainage associated with the roadway design.

Site 2b – UT to Hominy Creek

Two RCPs (48" and 54") will be installed to convey flow from two intermittent UTs to Hominy Creek (Streams SC and SE) that start at the outlet of two stormwater pipes (18" and 48" RCPs) at the Toyota dealership. This will allow construction of the proposed exit loop from I-26. These permanent stream impacts will total 272 linear feet (169 lf to Stream SC and 103 lf to Stream SE). Resulting wetland impacts at this site from fill and grading of a small riparian wetland (Wetland WC) adjacent to the northernmost UT will total <0.01 acre.

Site 2c – UT to Hominy Creek

The existing UT to Hominy Creek (Stream SD) will be conveyed through a new 60" RCP to allow for the construction of the new I-26 / NC 191 loop and ramp. This construction will result in 807 linear feet of permanent stream impact (including 742 linear feet of permanent fill/pipe, 33 linear feet of stream stabilization (rip rap in channel), and 32 linear feet of bank stabilization), and 5 linear feet of temporary stream impact for construction access and erosion control. In addition, 71 feet of intermittent Stream SF and <0.01 acre of wetland fill to Wetland WG will result from fill and grading near ramp D.

Site 3

This site is for an extension of an existing 72" CMP and for installation of a supplemental 60" pipe by bore and jack methods. Stream realignment and stabilization are planned at the inlet and outlet of these pipes in order to prevent future migration of the channel toward off-site constraints including a sewer line and private access road. In addition, a rip-rapped energy dissipator basin will be constructed in the existing scour hole at the 72" CMP outlet to reduce flow velocity and erosive force.

Site 3a – UT to Hominy Creek

A new 60" Steel Plate Pipe (SPP) will be placed adjacent to the existing 72" CMP, which will be slip lined and extended with a 72" RCP. The 60" SPP will act as a conveyance of high flows for the UT to Hominy Creek (Stream SD), while the 72" CMP/RCP will continue to carry the base stream flow. The channel flowing into these structures will be slightly realigned due to required fill slope location and lined with rip rap for stabilization.

A small tributary (Stream SM) that passes under a sewer line and confluences with Stream SD within the stream realignment area will be stabilized from the outfall of the existing 24" CMP under the off-site sewer access road to Stream SD. These changes will result in 307 linear feet of permanent stream impacts (18 feet of pipe/fill, 256 feet of stream realignment,

and 33 feet of tributary stream stabilization to Stream SM) and 23 linear feet of temporary stream impacts (10 linear feet to Stream SM and 23 linear feet to Stream SD) to allow for construction access and erosion control.

Site 3b – UT to Hominy Creek

One headwall will be constructed to encompass both outlets of the pipes referenced at Site 3a. Stream realignment and installation of a rip rap energy dissipator pad will provide velocity control in Stream SD before it enters Hominy Creek. These improvements will result in 223 linear feet of permanent stream impacts and 8 linear feet of associated temporary stream impacts. The rip rap at the outlet of the supplemental 60" pipe will be raised to approximately bankfull elevation. The dissipator will be adjusted in the field, in consultation with the USACE and NCDWR, to ensure proper function.

MITIGATION OPTIONS

The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the waters of the United States. CEQ has defined mitigation of wetland and surface water impacts to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20).

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning phase and minimization measures were incorporated as part of the project design. Minimization includes the examination of appropriate and practicable steps to reduce adverse impacts.

Avoidance and Minimization

Avoidance and minimization has been employed in the project area to the maximum extent practicable. Listed below are some of the measures implemented on the project:

- NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be enforced;
- NCDOT's BMPs for Construction and Maintenance Activities will be utilized;
- NCDOT will implement installation, inspection, and maintenance of erosion and sediment control measures;
- Ditches too steep to qualify as swales will be lined with rip rap to minimize flow velocity and turbidity;
- Rip rap pads at drainage system outlets will dissipate flow and reduce velocities and erosive potential;
- Rip rap stabilization has been sized appropriately based on flow velocity to ensure long term stability of banks;

- New roadway drainage is being directed, where practical, to uplands and ditches/swales rather than direct discharge to surface waters;
- At the inlets and outlets of culverts carrying jurisdictional streams, stream realignment is proposed to avoid sharp bends in the streams and prevent future instability;
- Unstable eroded stream banks will be stabilized with rip rap armoring where necessary;
- Low flow conditions at culverts have been accommodated with the appropriate sizing, grade controls, and burial;
- Existing drainage patterns have been maintained to the maximum extent practicable.

In addition to the above practices, specific measures have been utilized to maintain water quality:

- Sites 1, 2, and 3: Side slopes have been steepened to 1.75:1 adjacent to all jurisdictional impact areas to minimize impacts to surface waters;
- Steepened slopes will be reinforced to minimize the potential for future erosion of fill slopes. Theses reinforced fill slopes will be revegetated using NCDOT approved vegetation.
- Sites 1a, 1c, and 3b: Existing concrete channels currently discharging directly to surface waters will be removed and replaced with a rip rap ditches to aid in velocity and turbidity reduction;
- Site 1c: sheet piling or similar exclusion methods will control turbidity during construction and prevent encroachment onto the Biltmore Estate;
- Sites 1c and 1d: The UT at the outlet of the 14'x14' RCBC (Stream SI) will be avoided except for placement of mats or other devices over the stream (above ordinary high water mark) for construction equipment access;
- Site 3b: A rock vein or sill will be constructed at the edge of the dissipator pad to maintain water in the existing 72" pipe that will convey stream base flow. The dissipator pad will be field adjusted, in consultation with USACE and NCDWR, to ensure proper function.
- Site 3b: Rip rap stabilization will be extended to 1 foot above the 50 year water surface elevation of the steep slope adjacent to the private access road.

Stormwater Management Plan

- Two (2) vegetated swales will be constructed at the following locations: 43+50 to 46+00 and 56+00 to 56+50. The function of these swales is to reduce water velocity, promote infiltration, and provide treatment for discharge before runoff enters streams;
- Two (2) rip rap energy dissipator basins will be constructed at the following locations: 26+90 RT and 79+40 LT. The function of these rip rap dissipators is to stabilize the stream outlets and reduce stream velocity and turbidity.

Compensatory Mitigation

Compensatory requirements for I-5504 are summarized below in Table 3. This project will permanently impact 1,888 linear feet of cool water streams. Of the 1,888 linear feet, 86 linear feet are associated with stream bank stabilization that does not require mitigation by the USACE. This

results in 1,802 linear feet of permanent stream impacts requiring USACE mitigation. Of the 1,802 linear feet of permanent impact requiring mitigation, 791 linear feet requires mitigation at a 2:1 ratio, while permanent impacts to lower quality streams (1,011 linear feet) or due to stream realignment (613 linear feet) require mitigation at a 1:1 ratio for the USACE.

As the total USACE mitigation requirement exceeds the total NCDWR requirement (Table 1), NCDOT has requested that NCDMS provide compensatory mitigation for 1,802 linear feet of stream impact (791 linear feet at a 2:1 ratio and 1,011 linear feet at a 1:1 ratio). NCDMS will also provide mitigation for 0.04 acre (2:1 ratio) of permanent riparian, non-isolated wetland impacts resulting for roadway fill and excavation.

Table 3. Compensatory Mitigation Summary

	USACE Stream Impacts (linear feet)	Riparian Wetland Impacts (acre)
Impacts Requiring Mitigation	1,802	0.02
Required NCDMS Mitigation	791 @ 2:1	2:1
	1,011 @ 1:1	

FEDERALLY PROTECTED SPECIES

Plants and animals with federal classifications of Endangered (E) or Threatened (T) are afforded protection under provisions of Section 7 and Section 9 of the Endangered Species Act (ESA) of 1973, as amended. As of July 24, 2015, the U.S. Fish and Wildlife Service (USFWS) lists eleven (11) species as threatened and / or endangered, of which one (1) species is listed as threatened by similarity of appearance in Buncombe County, NC.

Table 4. Federally Protected Species for Buncombe County, NC

Scientific Name	Common Name	Federal Status[1]	Habitat Present	Biological Conclusion
Clemmys muhlenbergii	Bog Turtle	T(S/A)	No	Not Required
Glaucomys sabrinus coloratus	Carolina northern flying squirrel	E	No	No Effect
Myotis grisescens	Gray bat	E	Yes	MANLAA[2]
Myotis septentrionalis	Northern long-eared bat	T	Yes	**
Erimonax monachus	Spotfin chub*	T	No	No Effect
Alasmidonta raveneliana	Appalachian elktoe*	E	No	No Effect
Microhexura montivaga	Spruce-fir moss spider	E	No	No Effect
Epioblasma florentina walker	Tan riffleshell*	E	No	No Effect
Geum radiatum	Spreading avens	E	No	No Effect
Spiraea virginiana	Virginia spiraea*	T	No	No Effect
Gymnoderma lineare	Rock gnome lichen	E	No	No Effect

[1]E – Endangered. T – Threatened. T(S/A) – Threatened due to similarity of appearance.
[2]MANLAA – May Affect, Not Likely to Adversely Affect
* Historic record (the species was last observed in the county more than 50 years ago)
**May Affect – NLEB is exempt due to consistency with the 4(d) rule.

Summary of Species with Habitat

Northern long-eared bat

In a memo, dated May 4, 2016, the NCDOT Biological Surveys Group states that according to the North Carolina Natural Heritage Program (NHP) Biotics Database, most recently updated May 2015, the nearest Northern long-eared bat (NLEB) hibernacula record is 19 miles east (EO ID 32137) and no known NLEB roost trees occur within 150 feet of the project area. In addition, this project is located entirely outside of the red highlighted areas (12-digit HUC) that the USFWS Asheville Office has determined to be representative of an area that may require consultation.

NCDOT has determined that the proposed action does not require separate consultation on the grounds that the proposed action is consistent with the final Section 4(d) rule.

Gray bat

A Section 7 concurrence request was submitted to the USFWS on November 15 2016.

CULTURAL RESOURCES

In order to comply with Section 106 of the National Historic Preservation Act (1966, as amended), FHWA and NCDOT must evaluate the project's impact upon any extant architectural and archaeological resources, and determine if additional measures will be necessary to mitigate any adverse effects of the project upon any significant properties and sites.

Based on North Carolina Department of Cultural Resources' State Historic Preservation Office's (NC-HPO) statewide survey of historic buildings, districts, and landscapes, there is one historic property within the project study area. The Biltmore Estate is listed on the NRHP as a National Historic Landmark and contains 138 contributing resources; comprised of 56 buildings, 31 sites, and 51 structures. An effects assessment among FHWA, NCDOT, and NC-HPO was held in July 2014 to review Options C, F, and G2. As a result of the consultation, Option G2 was determined to have "No Adverse Effect" on the Biltmore Estate and a *de minimis* finding was made with regard to Section 4(f). Options C and F both were given an "Adverse Effect" call due to their inclusion of proposed highway off-ramps within the boundary of the Biltmore Estate.

This project was reviewed by NCDOT under the terms of the 2007 Programmatic Agreement for minor transportation projects resulting in a No Archaeological Survey Required determination on April 30, 2014.

FEMA COMPLIANCE

There are no streams within the project limits requiring FEMA coordination.

INDIRECT CUMULATIVE IMPACT ANALYSIS

The NCDOT Human Environment Section completed an Indirect and Cumulative Effects (ICE) Screening Report for I-5504 in September, 2014. Overall, the screening matrix results conclude than an Indirect Scenario Assessment is possible. However, given that the project involves modification to an existing interchange, and given current growth trends in the area, this project is not expected to result in induced growth or a change in land use that would not otherwise occur. The project will not notably alter traffic capacity or travel patterns, reduce travel time, affect access to properties in the area, or open areas for development or redevelopment. In addition, there are no notable environmental features identified within the Future Land Use Study Area (FLUSA) which would necessitate more stringent environmental coordination in excess of standard procedures.

Overall, the project is not expected to have a long-term impact on water quality in the project area. Direct natural environment impacts by this project have been addressed by avoidance, minimization, or mitigation, consistent with review by the natural resource agencies during the Merger and permitting process. All other developments will be required to follow appropriate local, state, and federal guidelines and permitting regulations. Past development activities within the FLUSA have been consistent with local land use regulations and any development or redevelopment projects within the FLUSA would be subject to all current land use regulations.

WILD AND SCENIC RIVER SYSTEM

The project will not impact any designated Wild and Scenic Rivers or any rivers included in the list of study rivers (Public Law 90-542, as amended) or North Carolina Natural and Scenic Rivers.

ESSENTIAL FISH HABITAT

The project will not impact any essential fish habitat afforded protection under the Magnuson-Stevens Act of 1996 (16 U.S.C 1801 *et seq.*).

REGULATORY APPROVALS

Application is hereby made for a Department of the Army Section 404 Individual Permit as required for the above-described activities.

We are also herby requesting a Section 401 Water Quality Certification from the NCDWR. In compliance with Section 143-215.3D(e) of the NCAC, we will provide $570.00 to act as payment for processing the Section 401 permit.

A copy of this permit application and its distribution list will be posted on the NCDOT website at https://xfer.services.ncdot.gov/pdea/PermApps/. Thank you for your time and assistance with this project. Please contact William Barrett either at wabarrett@ncdot.gov or at (919) 707-6103 if you have any questions or need additional information.

Sincerely,

for Philip S. Harris III, P.E., C.P.M.
Natural Environment Section Head

Cc:
NCDOT Permit Application Standard Distribution List

U.S. ARMY CORPS OF ENGINEERS

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0710-0003
EXPIRES: 31 AUGUST 2012

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Middle - Last -	First - Middle - Last -
Company - North Carolina Department of Transportation - PDEA	Company -
E-mail Address -	E-mail Address -
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address- 1548 Mail Service Center	Address-
City - Raleigh State - NC Zip - 2769 Country - US	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business c. Fax	a. Residence b. Business c. Fax
919-707-6100 919-212-5785	

STATEMENT OF AUTHORIZATION

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ _____
SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

I-5504

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
See Resource Status section in attached cover letter.	Address
15. LOCATION OF PROJECT Latitude: ◦N 35.5340 Longitude: ◦W -82.6025	City - State- Zip-

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section - Township - Range -

17. DIRECTIONS TO THE SITE

Please see attached vicinity map and cover letter.

18. Nature of Activity (Description of project, include all features)

The I-5504 project involves the modification of the I-26 / NC 191 (Brevard Road) interchange ramps, widening and elevating the NC 191 bridge and approaches through the interchange, reconstruction of the I-26 pavement, paving the median of I-26, and reconfiguration of local roadways. The length of the project along NC 191 is approximately 3,600 feet and stretches from the intersection of NC 191 with the Ingles / Asheville Outlets entrance to the intersection of NC 191 and Old Brevard Road. The length of the project along I-26 is approximately 6,680 feet within the NC 191 interchange area, extending west to tie to the I-26 bridge reconstruction over Pond Road / Hominy Creek that is currently under construction (B-5178).

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The primary purpose of this project is to reduce projected traffic congestion at the I-26 / NC 191 interchange. It will also improve interchange efficiency and maintain safe conditions.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Proposed impacts are required as a result of widening the highway and its shoulders and lengthening/replacing existing hydraulic structures within the project corridor, and construction of new on/off ramps.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
See attached cover letter.		

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres See attached cover letter.

or

Linear Feet See attached cover letter.

23. Description of Avoidance, Minimization, and Compensation (see instructions)

See attached cover letter.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- See attached Property Owners List.

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE
for PHILIP. S. HARRIS, P.E.	11-21-2016		

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Mitigation Services
ENVIRONMENTAL QUALITY

PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

October 20, 2016

Mr. Philip S. Harris, III, P.E., CPM
Project Development and Environmental Analysis Unit
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Harris:

Subject: Mitigation Acceptance Letter:

I-5504, I-26 at the NC 191 Interchange, Buncombe County

The purpose of this letter is to notify you that the Division of Mitigation Services (DMS) will provide the compensatory stream and riparian wetland mitigation for the subject project. Based on the information supplied by you on October 19, 2016, the impacts are located in CU 06010105 of the French Broad River basin in the Southern Mountains (SM) Eco-Region, and are as follows:

French Broad 06010105 SM	Stream			Wetlands			Buffer (Sq. Ft.)	
	Cold	Cool	Warm	Riparian	Non-Riparian	Coastal Marsh	Zone 1	Zone 2
Impacts (feet/acres)	0	1,802.0	0	0.04	0	0	0	0

*Some of the stream and/or wetland impacts may be proposed to be mitigated at a 1:1 mitigation ratio. See permit application for details.

The impacts and associated mitigation needs were under projected by the NCDOT in the 2016 impact data. DMS will commit to implement sufficient compensatory stream and riparian wetland mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies using the delivery timeline listed in Section F.3.c.iii of the In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from DMS.

If you have any questions or need additional information, please contact Beth Harmon at 919-707-8420.

Sincerely,

James B. Stanfill
Credit Management Supervisor

cc: Ms. Lori Beckwith, USACE – Asheville Regulatory Field Office
Ms. Amy Chapman, NCDWR
File: I-5504

.

Meeting Notes / Memorandum

Meeting Date: June 8, 2016 8:00 am – 9:30 am (& July 6, 2016 NCDWR Meeting)

Subject: Meeting Notes for 4B/4C Meeting
TIP Project I-5504 (I-26 / NC-191 Interchange Modifications and I-26 Widening)

Location: NCDOT Hydraulics Conference Room, Century Center

Attendees:

Present from Agencies:
Marella Buncick, USFWS
Marla Chambers, NCWRC
Andrew Henderson, USFWS

Via Conference Call:
Lori Beckwith, USACE

Present from Design-Build Team:
Richard Bollinger, RS&H
Will Weathersbee, RS&H
Jason Talley, RS&H
Phil May, Carolina Ecosystems
Rob Crowther, Carolina Ecosystems
Kenny Haynes, Blythe Dev. Co.

Via Conference Call:
Richard Kirkman, Blythe Dev. Co.

Present from NCDOT:
Vincent Rivers, Hydraulics
Malcolm Watson, Design-Build
Tim McFadden, Design-Build
Mark Staley, REU
Bill Barrett, NES
Carla Dagnino, NES

Via Conference Call:
Cole Hood, Division 13

Vincent Rivers introduced the project and turned it over to Richard Bollinger of RS&H to lead the discussion.

The project was introduced including general location and purpose. This is an interchange improvement project that includes ramp and loop improvements in quadrants B and D and roadway widening along I-26 and NC 191.

Three impact sites are associated with the project:

- Site 1 which drains to Westerly Lake and Long Valley Branch
- Sites 2 and 3 which drain to Hominy Creek

The waters are all Class C, and drain to the French Broad River, which is Class B. No trout, HQW, WSW, or 303d listed streams are present.

Marella Buncick asked if Hominy Creek was on the 303d list. Phil May stated that a section of it was on the 2012 list but is not on the 2014 or Draft 2016 list.

Impact sites were then individually reviewed for comment.

Site 1:

Richard Bollinger reviewed the existing conditions of Site 1 and the proposed pipe and box culverts to be lengthened to accommodate the required lane widening on I-26 required for the interchange improvements.

Site 1A:

Minimization efforts throughout the project, including this location, include steepened side slopes to 1.5:1.

- Will the "s" curve in the existing channel be addressed?
    - The channel will be relocated to tie directly into the pipe inlet.
- Does the open stream channel start at the pipe being retained just upstream?
    - The channel either begins there or there might be a small headwater upstream of the pump station property.
- Lori Beckwith stated that this is not a high quality stream.

Site 1B:

The stream channel in this location is the outlet of a man made retention pond behind the Asheville Outlets. This is the origin of Long Valley Branch. The entire remaining channel between the pond outlet pipe and the cross-pipe under I-26 is riprapped. A small ponded area and wetland, formed mostly from roadside runoff, will be impacted by the fill slopes and drainage.

- What is the purpose of the 14x14 RCBC at this location?
    - There are several of these along I-26 apparently for access to the Biltmore Estate. This particular culvert is not in use and does not serve as a drainage structure. The culvert will be extended and remain open.
- Concern was expressed about the configuration of ditches at Site 1B. Will the banks of the stream be armored?
    - The existing stream currently has riprap, and will receive additional bank stabilization where the ditches tie in.

Site 1C:

Due to the extension of the two cross pipes, their headwalls will be combined and the existing scour hole at the outlet will be riprapped at the upper end of Westerly Lake.

- Is there a live stream at this location?

    - This is a pond impact. The area is a backwater of Westerly Lake and is constantly scoured out. The existing fence slows down debris and wetlands are present on the Biltmore side of the fence.

Site 1D:

There is temporary impact called out in this area to allow for access and construction of the headwall and RCBC. Bank stabilization will be provided at the outlet of a 15" CMP that will be replaced.

- If mats or other structures are laid over the stream, it would not be considered an impact if it is above the Ordinary High Water Mark.
    - Temporary impacts are shown as a worst case scenario and may be reduced or removed. This site will be further evaluated by the team and revised as necessary for the permit application.

Site 2:

This site is due primarily to the relocation of Ramp D and Loop D. These are the largest impact on the project.

Site 2A:

The existing structure will be extended and a slight channel relocation will be required to tie in.

- No comments were received.

Site 2B:

This area will be under Loop D fill. The two smaller streams are intermittent channels formed at the outlet of stormwater pipes from the Toyota dealership.

- No comments were received

Site 2C:

This is the continuation of the main stream channel through the interchange. The banks and stream bed at the outlet of the proposed 72" RCP will be riprapped to reduce velocity in the channel and protect the banks from erosion. Immediately downstream, additional bank stabilization will be added on the left bank where the proposed lateral base ditch ties into the stream.

- How steep is the base ditch along the right side of the ramp?
    - The ditch is steep at the roadway pipe outlet, but flattens out in the proximity of the stream channel. The ditch is lined with riprap due to the steepness.

Site 3:

This is the continuation of the stream that passes under the interchange, parallels I-26, and then crosses back under I-26 at this location. The existing 72" CMP will be retained to carry daily flow, and will be supplemented with a new cross-pipe to assist carrying higher flow stormwater events. The grade of the stream after the existing concrete slab bridge downstream of the project area is steep – dropping approximately 25-30 feet to Hominy Creek. The channel from the existing bridge to its confluence with Hominy Creek is heavily armored with bedrock, riprap, concrete, etc.

Site 3A:

The stream at the inlet will be relocated and riprapped to tie into the existing pipe. The channel in this area varies in width from 4 to 10 feet with vertical to 1:1 slopes. The proposed channel will be riprapped to prevent encroachment into the roadway fill or sewer line, and channel side slopes will be 1.5:1.

- What is the HW/D for the existing pipe?
    - The existing pipe HW/D is well over 2, and the addition of the supplemental pipe will drop the HW/D to less than 2. No flooding is currently occurring upstream of the pipe.
- Could the median drainage be dropped into the existing or proposed cross-pipes?
    - The fill over the cross-pipes in this area is approximately 30 feet deep. It would be costly and difficult to do that. The channel coming from the north is relatively steep so will be riprapped.
- Is the condition of the existing 72" pipe known?
    - Blythe Development Company has performed camera work. This information is being provided to NCDOT for review. Any deficient pipes will be addressed. All cross-pipes throughout the project will be slip lined.
- What size riprap will be used on the project? Biltmore has expressed concerns related to riprap size and stormwater in the past.
    - Riprap size will be evaluated at each location and reviewed with NCDOT.
- Is there sufficient room to construct the relocated channel here?
    - Access is tight between the proposed roadway fill slopes and the existing ROW/sewer line. The proposed channel relocation has been evaluated and does fit within this area with 1.5:1 side slopes.

Site 3B:

The stream at the outlet will be riprapped along with the banks, which have some scour at the outlet of the pipe. Channel relocation details will be provided from the outlet of the cross-pipes to the end of the currently shown channel relocation.

- Is the existing rock in the channel natural and is any blasting needed for construction?

    - Primarily gravel and cobble is present in the channel, and no blasting is anticipated. The bedrock is exposed downstream of the existing concrete slab crossing outside the project area.
- How will the ditch be connected at the end of the relocated channel? It seems that the ditch angle of confluence with the relocated channel would be a concern.
    - There will be a drop from the proposed ditch into the relocated channel. Daily flow and small storm events will flow well below the elevation that the ditch ties in to the channel. This entire area has steep slopes, and during large events the water coming down the ditch will easily confluence with the stream flow and move downstream. Riprap will be placed in the relocated channel to an elevation at least one foot above the 50 year water surface elevation.
- How will the ditch south of the outlet tie into the stream?
    - The ditch transitions from a cut to fill ditch. The fill ditch, which is currently not shown, will be shown and lined with riprap. The proposed ditch will tie into the stream channel in roughly the same location as existing. A concrete ditch is being removed upslope and replaced with the riprapped ditch.

General Questions:

Permit Impacts

- What is the total permanent impact to streams on the project?
    - Current design results in approximately 1370 feet of permanent impact (pipe and fill). There is approximately 600 feet of bank stabilization and stream relocation with 500 feet of that associated with Site 3. These numbers are preliminary and subject to revision.
- Lori Beckwith requested that the impacts be broken out by type in the permit application.
    - The Team has been working with Bill Barrett on this and will have all the impacts broken out by type.
- Will this be an Individual Permit application?
    - Yes.

Median Shoulder Reconstruction:

The DB Team would like to do minimal shoulder reconstruction in the median of I-26 this fall, prior to the permit approvals but after the submission of the application. This would allow traffic to be moved immediately once winter weather is passed and the permit issued. The work would be contained within the median and not impact jurisdictional areas. Four feet of existing paved shoulder would be removed and replaced with 6 feet of paved shoulder. The guardrail would be reset for traffic control. No additional median work and no impacts to drainage structures would occur.

NCDOT can send a letter documenting the work and lack of jurisdictional impacts.

- Lori Beckwith stated if there are no impacts to Waters of the US then no permit is required. This should be reviewed by SHPO and NCDWR to make sure there are no issues when the permit is under review. The fact that work has been done cannot be used to justify the project. Historic and threatened/endangered species issues should be cleared first.
    - The Team will coordinate with NCDOT, SHPO, and NCDWR to ensure that they approve prior to work beginning, and a letter sent through NCDOT.
- Marella Buncick stated that this is similar to a maintenance project. Rain events could contribute to sedimentation in streams from the minimal disturbed area. There are no threatened/endangered species issues on this project.
    - Adequate erosion control measures would be implemented for this phase of work.

With no further comments the meeting was adjourned.

Additional Meeting with NCDWR (Kevin Barnett) on July 6, 2016

A web conference call was held with Kevin Barnett, (NCDWR), Stephen Morgan (NCDOT Hydraulics), Bill Barrett (NCDOT NES), Richard Bollinger (RS&H), Will Weathersbee (RS&H) and Phil May (Carolina Ecosystems) to review the impact maps presented in the June 8, 2016 agency meeting that Mr. Barnett was unable to attend. The project was reviewed by Mr. Bollinger and Mr. May in a similar manner as the June 8, 2016 meeting described above. The following comments are being added to compile all agency comments into one document:

- Kevin Barnett stated that he has received and reviewed the meeting minutes from the June 8, 2016 agency meeting and he is good with those minutes and has no concerns.
- Kevin Barnett asked to ensure that the proposed 1.5:1 slopes at site 1C and 1D would be stable, and is not concerned if it requires riprap vs vegetation for the reinforced sections as long as the slopes do not promote erosion and sedimentation of downstream waters.
- Kevin Barnett asked if any grade control structures would be placed in the UT to Hominy Creek below Site 3 to ensure stream stability. Phil May answered that no grade control should be necessary; this section of stream drops quickly below the concrete slab “bridge” at the edge of the project limits down to Hominy Creek. The substrate of the channel includes bedrock, boulders, cobble, and large rubble such as rock and concrete, and therefore is very stable.
- Kevin Barnett said he agreed with the layout and concept of Site 1 and Site 2 and he had no concerns with either site.
- At Site 3A Stephen Morgan recommended extending the temporary surface water impacts and temporary drainage easement to encompass the small tributary that crosses under the sewer line up to the outlet of the existing pipe in order for dewatering of the construction area as the primary stream is relocated.
- Kevin Barnett discussed the outfall location of Site 3B, particularly the use of a rock vane or other grade control such as a rock sill just beyond the “plunge pool” at the outlet of the 72 inch

pipe. This could be used to maintain water in the existing pipe that will hold daily flow, while also allowing for a velocity reducing dissipation pad at the outlet. Kevin Barnett suggested including a standard detail for a cross vane or sill in the plans, with a note that the on-site engineer will adapt the design in the field to ensure proper function. This will allow some flexibility in constructing the sill/cross vein to meet field conditions without requiring a permit modification. DWR is willing to meet on site during construction to assist in the determination of the final construction of this structure.

- The median shoulder work that is anticipated to occur, after NCDOT approval, in September 2016 prior to permits being issued was discussed. NCDWR does not object to this activity as it does not require a permit and will occur outside jurisdictional areas. A letter is being prepared for NCDOT review and will be sent to the agencies documenting this plan.

If any recipient of the meeting notes would like to add comments or feels a comment is erroneous or needs to be expanded, please feel free to contact Stephen Morgan at (919) 707-6739 or by email at smorgan@ncdot.gov.

Copies to:

Meeting Attendees

I-5504 Agency Meeting
NCDOT Hydraulics Conference Room
June 8, 2016

Sign In

	NAME/ ORGANIZATION	PHONE NUMBER	EMAIL ADDRESS
1	Richard Bollinger	919-480-4066	richard.bollinger@rsandh.com
2	NCDOT-REU Mark Staley	919-707-2948 ~~NCDOT-REU~~	mstaley@ncdot.gov
3	Vincent Rivers	919-707-6748	vvrivers@ncdot.gov
4	Rob Crowther Carolina Ecosystems	919-359-1102	rob.crowther@carolinaeco.com
5	Phil May Carolina Ecosystems	919-606-1065	phil.may@carolinaeco.com
6	BILL BARRETT NCDOT - NES	919-707-6103	wabarrett@ncdot.gov
7	Kenny Haynes Blythe Development Co.	704-516-9651	khaynes@blythedevelopment.com
8	JASON TALLEY RS&H	919-926-4106	~~jontalley~~ Jason.talley@rsandh.com
9	Andrew Henderson US Fish+Wildlife Service	828-216-4969	andrew_henderson@fws.gov
10	Malcolm Watson NCDOT Design-Build	919-707-6614	mcwatson@ncdot.gov

RS&H

I-5504 Agency Meeting
NCDOT Hydraulics Conference Room
June 8, 2016

Sign In

	NAME/ ORGANIZATION	PHONE NUMBER	EMAIL ADDRESS
11	Tim McFadden NCDOT-DB	919-707-6615	tmcfadden@ncdot.gov
12	Will Weathersbee RS+H	704 904 4715	will.weathersbee@rsandh.com
13	Marelle Bunick	828-258-3939 x237	marelle_bunick@fws.gov
14	Marla Chambers	704-982-9181	marla.chambers@ncwildlife.org
On Phone 15	~~Laurie Backwith~~ Lori Backwith		USACE
On Phone 16	Cole Hood		chood@ncdot.gov NCDOT Division Office Consultant
17	Carla Dagnino	919 ~~610~~ 707 6110 ~~7110~~	cdagnino@ncdot.gov
On Phone 18	Richard Kirkman		rKirkman@blythedevelopment.com
19			
20			

RS&H

Project Tracking No.:

14-04-0001

NO ARCHAEOLOGICAL SURVEY REQUIRED FORM

This form only pertains to ARCHAEOLOGICAL RESOURCES for this project. It is not valid for Historic Architecture and Landscapes. You must consult separately with the Historic Architecture and Landscapes Group.

PROJECT INFORMATION

Project No:	**I-5504**	*County:*	**Buncombe**
WBS No:	**45552.1.1**	*Document:*	**CE**
F.A. No:	**IMF-026-1(191)47**	*Funding:*	☐ State ☒ Federal

Federal Permit Required? ☒ Yes ☐ No *Permit Type:* **Not known as of yet**

Project Description:
The project is for the interchange modification at I-26 and NC 191 (Brevard Road) in Buncombe County (Figure 1). The archaeological Area of Potential Effects (APE) for the project runs for approximately one mile (1.6 km) along I-26 and approximately 0.6 mile (0.97 km) along NC 191. From the center of the Bridge on NC 191 over I-26, the APE corridor extends for a half-mile (0.80 km) north and half-mile south along I-26 and 0.3 mile (0.48 km) northeast and 0.3 mile southwest on NC 191. The width of the corridor varies to include the current on/off ramps and newly proposed ramps and side road improvements.

SUMMARY OF CULTURAL RESOURCES REVIEW

Brief description of review activities, results of review, and conclusions:

The I-26 and NC 191 interchange modification project is located in the southwestern portion of Asheville in Buncombe County, North Carolina. The project area is plotted in the southwestern corner of the Asheville USGS 7.5' topographic quadrangle (Figure 2).

A map review and site file search was conducted at the Office of State Archaeology (OSA) on April 17, 2014. No previously recorded archaeological sites have been identified within the APE, but 10 sites (31BN122, 31BN746–31BN752, 31BN835, and 31BN898) are reported within a mile. According to the North Carolina State Historic Preservation Office online data base (HPOWEB 2014), the National Register-listed Biltmore Estate (BN 1835) falls within the eastern archaeological APE boundary (see Figure 1). Input from the Federal Highway Administration is recommended regarding the potential need for consultation with the Advisory Council on Historic Preservation (ACHP) concerning impacts to the property. All other properties found within the APE are covered by Programmatic Agreement. Topographic maps, USDA soil survey maps, aerial photographs (NC One Map), and historic maps (North Carolina maps website) were utilized to gage environmental and cultural variables that may have contributed to prehistoric or historic settlement within the project limits and to assess the level of ground disturbance.

The currently proposed project will impact mostly disturbed areas affected by past road construction and urban development. The landform is a broad ridge, which drains north and south into tributaries of the French Broad River (Figure 3). Two unnamed tributaries are crossed by I-26, one to the north and the other in the south. The stream channels at each crossing within the APE have been previously modified during the construction of I-26. Development within and adjacent to the project limits consist of a shopping mall, a car dealership, large stores, hotels, paved parking lots, major and minor roads, and residential housing. Households are located along Pine Lane on the northeastern edge of the APE. Minor

ground disturbance is most likely present on the Biltmore Estate to the east and in the wooded areas adjacent to I-26.

According to the USDA soil survey map, the Udorthents-Urban land complex (UhE) encompasses the property along I-26, while Urban land (Ux) makes up most of the property on NC 191 (Figure 4). These soil types either consist of cut/fill areas where the soil and underlying material have been removed or the land is covered with impervious material. It is very unlikely for any significant or intact archaeological sites to be present on these soils due to ground disturbance. To the northeast along the residential properties, the soil types include the Evard-Cowee-Urban land complex (ExD), the Clifton-Urban land complex (CuC), and Tate loam (TaC). Although these areas are well-drained, characteristics of these soil types such as urban development and slope of 15 percent or more are deterrents for significant cultural resources. The Tate loam has the most potential of yielding any cultural material, but this series is located in a narrow drainageway with no substantial landforms that could contain a significant archaeological site. Lastly, the Biltmore Estate includes Clifton sandy loam (CsB, CsC, and CsD). This series is well-drained with a slope of 2 to 30 percent. The fairly level areas have the potential of yielding archaeological sites, but the APE covers only a minimal extent of the property.

A review of the site files show that most of the APE has been previously investigated (see Figure 3 and 4). The northern portion of I-26 was covered during the Archaeological Survey and Evaluation for the I-26 Asheville Connector in 2005–2006 (TIP I-2513 Section C). A series of shovel test were excavated along the west side of I-26, which yielded negative results. No subsurface testing to the east was carried out due to a lack of level and dry landforms. This included the narrow drainageway on Tate loam within the currently defined APE. A second archaeological investigation covered the northwestern section of NC 191. This was the Archaeological Survey and Evaluation of Proposed Improvements to NC 191 conducted in 2005 (TIP U-3601). Shovel tests were excavated on both sides of the road including Biltmore Estate. Although nearby sites 31BN746–31BN752 were recorded during this project on the Biltmore property, none are situated within or adjacent to the APE for the interchange. A limited area to the west and southwest along the Biltmore property was not tested. However, this area appears to consist of an embankment of fill used in elevating I-26 and a drainageway to remove water away from the roads. It is not anticipated that any significant archaeological sites would be in this area that could contribute relevant information towards the Biltmore Estate due to previous disturbances from road construction.

Lastly, a historic map review was conducted, which provided no important information concerning the history of the region. Maps examined include the 1901 USGS topographic map for Asheville, the 1903 soil map for the Asheville vicinity, the 1920 Buncombe County soil map, and various State Highway maps for Buncombe County from 1930 to 1968.

Brief Explanation of why the available information provides a reliable basis for reasonably predicting that there are no unidentified historic properties in the APE:

The defined archaeological APE for the proposed interchange modification at I-26 and NC 191 in Buncombe County is unlikely to yield any intact and significant archaeological deposits. This is due to urban development which has contributed to sever ground disturbance and previous archaeological investigations within the APE that have produced negative results. The extent of the APE onto uninvestigated properties is minimal and fall mostly on disturbed soils. For those areas outside of the Biltmore Estate, no additional archaeological work is recommended, as long as impacts to the subsurface occur within the defined APE. If work should affect subsurface areas beyond the defined APE, further archaeological consultation will be necessary. While no archaeological investigations are recommended for this project as currently proposed, portions of the APE are within the Biltmore Estate, a designated National Historic Landmark (NHL). It is recommended that the PDEA project manager for I-5504 seek input from the Federal Highway Administration regarding the potential need for consultation with the Advisory Council on Historic Preservation. If it is determined that this undertaking may affect this NHL,

the Federal Highway Administration is required to take the action as set forth in 36 CFR Sections 800.6 and 800.10.

SUPPORT DOCUMENTATION

See attached: ☒ Map(s) ☐ Previous Survey Info ☒ Photos ☐ Correspondence
☐ Photocopy of County Survey Notes Other: **Images from historic maps**

FINDING BY NCDOT ARCHAEOLOGIST

NO ARCHAEOLOGY SURVEY REQUIRED

4/30/14

C. Damon Jones Date
NCDOT ARCHAEOLOGIST II

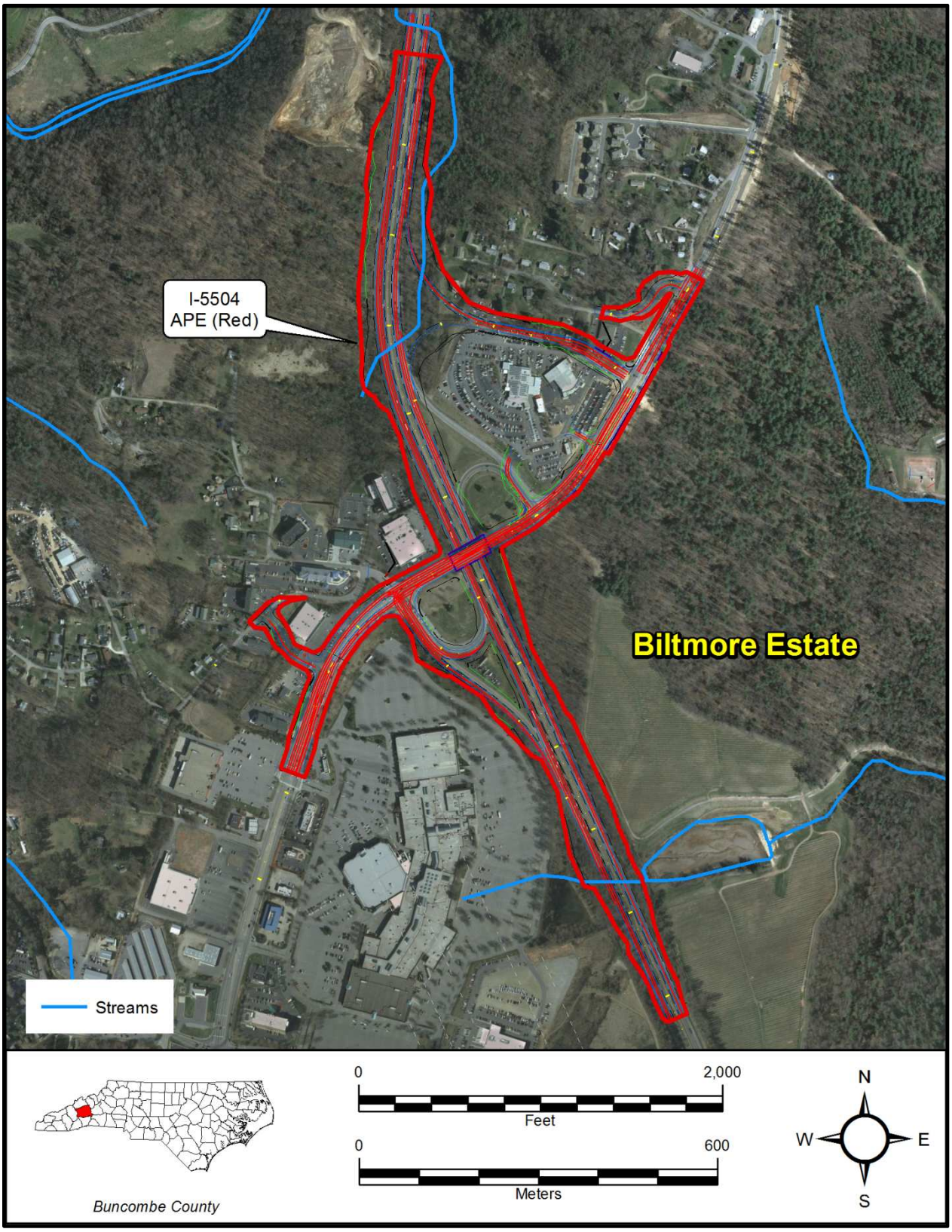


Figure 1. Aerial Photography of Design Plans and the APE.

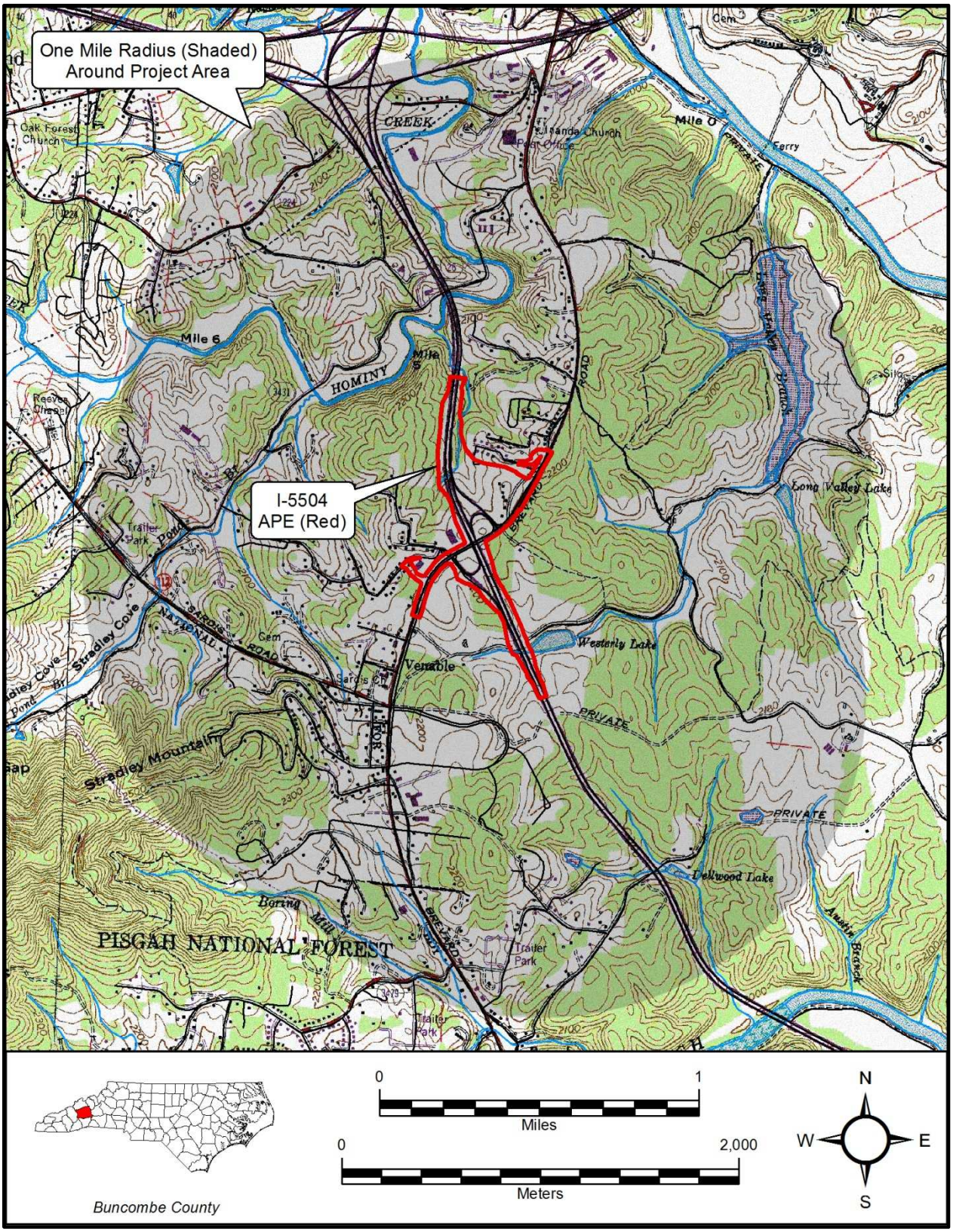


Figure 2. Topographic Setting of the Project Area, Asheville (1961, photorevised 1991), NC, USGS 7.5′ Topographic Quadrangle.

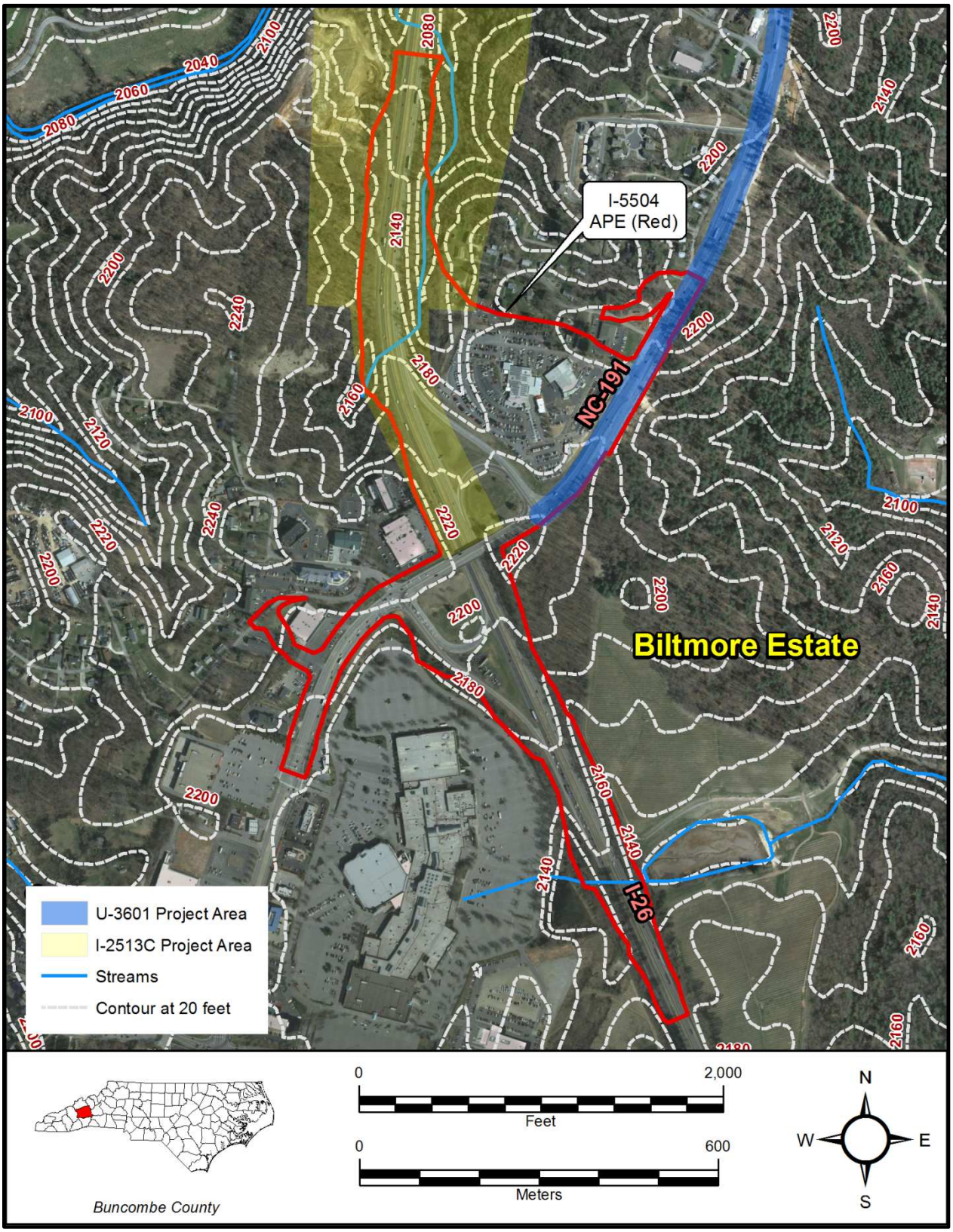


Figure 3. Aerial photograph of the APE showing development, landforms, and previous archaeological investigations within and near the project area.

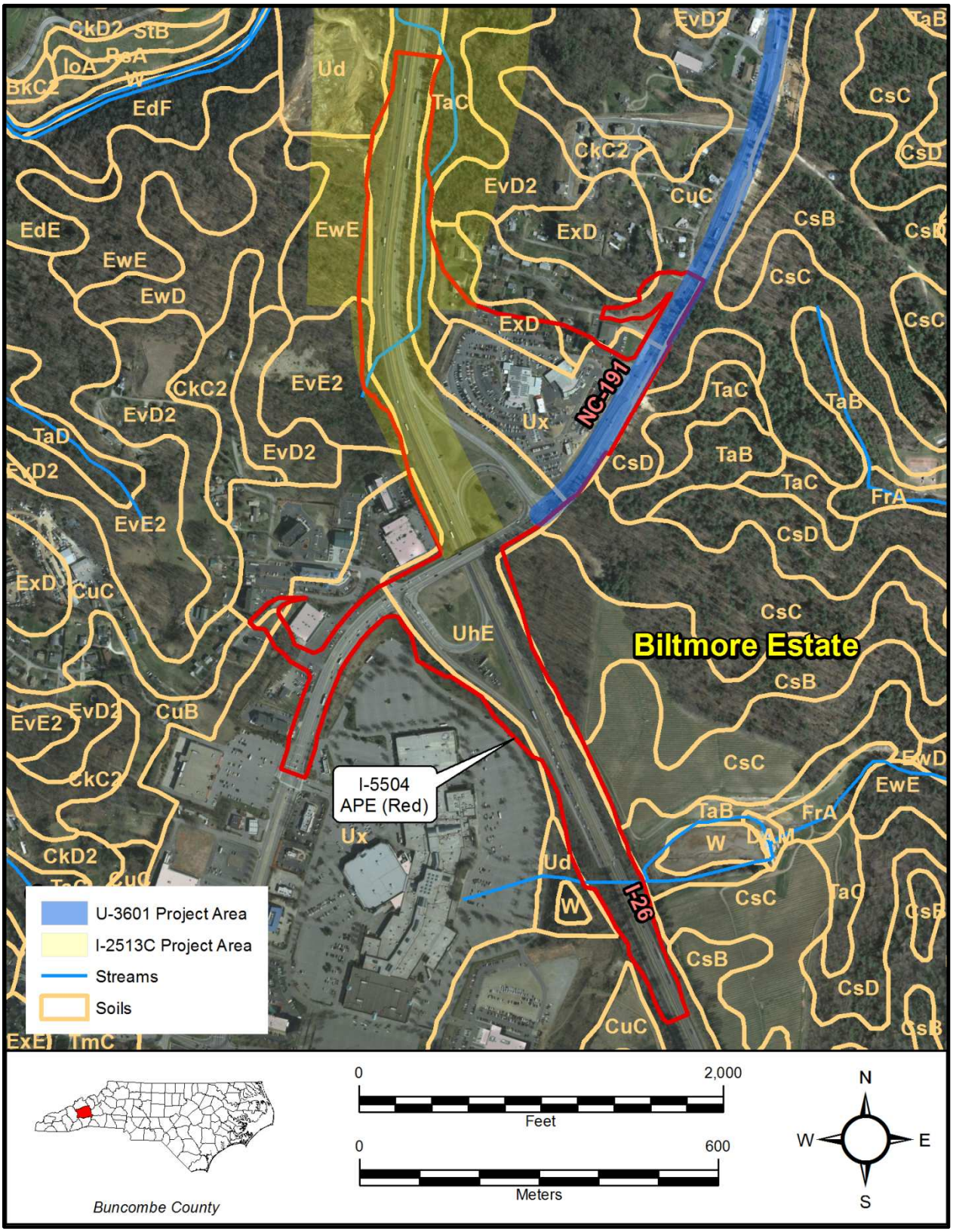


Figure 4. Aerial photograph of the APE showing soils, development, and previous archaeological investigations within and near the project area.

HISTORIC ARCHICTECTURE AND LANDSCAPES ASSESSMENT OF EFFECTS FORM

This form only pertains to Historic Architecture and Landscapes for this project. It is not valid for Archaeological Resources. You must consult separately with the Archaeology Group.

PROJECT INFORMATION

Project No:	I-5504	***County***:	Buncombe
WBS No.:	45552.1.1	***Document Type:***	CE
Fed. Aid No:	IMF-0261(191)47	***Funding***:	☐ State ☒ Federal
Federal Permit(s):	☒ Yes ☐ No	***Permit Type(s)***:	USACE
Project Description: Interchange modification at Interstate I-26/NC 191 (Brevard Rd) in Asheville			

SUMMARY OF HISTORIC ARCHICTECTURE AND LANDSCAPES REVIEW

Description of review activities, results, and conclusions*:*

Review of HPO maps conducted on 5/1/2014 which identified one property, Biltmore Estate (BN 0004, NHL) within the APE. No survey recommended since the area was extensively surveyed for the U-3601 project in 2000. Project engineer notified of presence of NHL and requirement for effects assessment and possible ACHP and Department of Interior involvement.

ASSESSMENT OF EFFECTS

Property Name:	Biltmore Estate	***Status***:	NR, NHL
Survey Site No.:	BN 0004	***PIN:***	963647977000000

Effects

☐ No Effect ☒ No Adverse Effect ☒ Adverse Effect

Explanation of Effects Determination:
Three alternatives considered for Interchange Modification:

1. Option C: new off ramp constructed within boundary of Biltmore Estate = Adverse Effect
2. Option F: diverging diamond, new off ramp constructed within boundary of Biltmore Estate, more ROW needed than for Option C = Adverse Effect
3. Option G2: only requires temporary construction easements within boundary for ditch and shoulder work along I-26 = No Adverse Effect and ***de mimimis***

List of Environmental Commitments:

****FHWA Intends to use the SHPO's concurrence as a basis for a "de minimis" finding for the following properties, pursuant to Section 4(f): Biltmore Estate**

SUPPORT DOCUMENTATION

☐ Map(s) ☐ Previous Survey Info. ☐ Photos ☐ Correspondence ☒ Design Plans

FINDING BY NCDOT AND STATE HISTORIC PRESERVATION OFFICE

Historic Architecture and Landscapes – ASSESSMENT OF EFFECTS

NCDOT Architectural Historian Date

State Historic Preservation Office Representative Date

FHWA Representative, for the Division Administrator Date

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.05; Released April 2016)

General Project Information

WBS Element:	45552.1.1	**TIP Number:**	I-5504	**Project Type:** Roadway Widening	**Date:** 11/2/2016
NCDOT Contact:	K. Zak Hamidi, PE	**Contractor / Designer:**	Jason Talley, PE		
Address:	1595 Mail Service Center Raleigh, NC 27699-1595	**Address:**	8601 Six Forks Road Suite 260 Raleigh, NC 27615		
Phone:	(919) 707-6629	**Phone:**	(919) 926-4106		
Email:	khamidi@ncdot.gov	**Email:**	jason.talley@rsandh.com		
City/Town:	Asheville, NC	**County(ies):**	Buncombe		
River Basin(s):	French Broad	**CAMA County?**	No		
Wetlands within Project Limits?	Yes				

Project Description

Project Length (lin. miles or feet):	1.21	**Surrounding Land Use:**	Commercial, single-unit residential, undeveloped forest, light agricultural

	Proposed Project	**Existing Site**
Project Built-Upon Area (ac.)	62.0 ac.	31.2 ac.
Typical Cross Section Description:	I-26 - per side, 2 to 4 12' travel lanes with 14' FDPS. 26' paved center median NC-119 - per side, 2 to 3 11' travel lanes with 5' bike lane and 2 ft. curb and gutter. 5' sidewalk with 4.5' grassy buffer. 22' to 46' raised monolithic median.	I-26 - per side, 2 12' travel lanes with 12' FDPS. 110' to 120' total roadway width with a grassy median. NC-119 - per side, 2 12' travel lanes with 12' turn lanes and variable 2.5' curb and gutter. North of I-26 has a 2.5'-14' variable raised monolith median and intermittent 5' sidewalk. South of I-26 has a 5-28' rasied monolith median and an intermittent 6'-8' sidewalk.
Annual Avg Daily Traffic (veh/hr/day):	Design/Future: 118,300 Year: 2040	Existing: 95,900 Year: 2016

General Project Narrative: (Description of Minimization of Water Quality Impacts)

The purpose of I-5504 is to reduce projected traffic congestion at the existing NC-191/I-26 interchange through reconfiguration of the interchange, including the widening and pavement reconstruction of I-26. The proposed improvement includes retrofitting the existing ramp configuration to increase the distance from existing 850 feet to 1900 feet along NC 191 (Brevard Road) separating the signalized ramp intersections.

The median of 1-26 will be paved and median barrier installed as part of STIP Project 1-5504 so that traffic can be maintained during construction. The limits of median paving extend in both directions on 1-26 to where ramp tapers will match existing pavement. The median paving on 1-26 will be extended westward to match with STIP Project B-5178; the replacement of 1-26 bridges over Hominy Creek and Pond Road. The connection will provide lane balance for safer travel on 1-26 without as many lane changes. The typical cross-section for 1-26 shows a paved median and new traffic lanes, some of which will be striped-out until the full I-26 corridor project is completed.

The proposed project includes widening the eastbound 1-26 ramp at its intersection with NC 191 (Brevard Road) and closing Rocky Ridge Road at NC 191 (Brevard Road). Access to residences and businesses on Rocky Ridge Road will be relocated to a new road to be built on the south side of the existing PETCO Animal Supplies store. The intesection of NC 191 with the westbound I-26 on-and off-ramp will be relocated to a new location that is approximately 1,150 feet northeast of the existing ramp intersection. The relocated westbound off-ramp will be elongated around the perimeter of the Jim Barkley Toyota dealership, increasing the deceleration distance and vehicle storage space considerably. The relocated on- and off-ramps will intersect NC 191 (Brevard Road) where Pine Lane now intersects. The Pine Lane intersection will be relocated several hundred feet to the northeast to intersect with a right-in I right-out only type of intersection.

There are no Outstanding Resource Waters, High Quality Waters, water supply watersheds, trout waters, anadromous fish waters, Essential Fish Habitats, Primary Nursery Areas or 303(d) turbidity or sedimentation-impaired streams within one mile of the project area. Aquatic habitats within the project study area consist of wetlands, perennial and intermittent streams, and ponds. The project will address increases in impervious surfaces in the individual project design through the use of BMP's.

Cumulative effects to these resources were determined to be Medium to Medium-Low due to the lack of comprehensive protection standards and ordinances, potential of urbanization and suburbanization, and presence of BMPs.

Waterbody Information

Surface Water Body (1):	UT to Long Valley Branch		**NCDWR Stream Index No.:**	6-75	
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C		
		Supplemental Classification:	None		
Other Stream Classification:	None				
Impairments:	None				
Aquatic T&E Species?	No	Comments:			
NRTR Stream ID:	SA			**Buffer Rules in Effect:**	N/A
Project Includes Bridge Spanning Water Body?	N/A	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)	
(If yes, provide justification in the General Project Narrative)					

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.05; Released April 2016)

WBS Element: 45552.1.1	TIP No.: I-5504	County(ies): Buncombe	Page 2 of 4

Additional Waterbody Information

Surface Water Body (2):	UT to Hominey Creek		**NCDWR Stream Index No.:**	6-76		
NCDWR Surface Water Classification for Water Body		**Primary Classification:**	Class C			
		Supplemental Classification:	None			
Other Stream Classification:	None					
Impairments:	None					
Aquatic T&E Species?	No	Comments:				
NRTR Stream ID:	SD			**Buffer Rules in Effect:**	N/A	
Project Includes Bridge Spanning Water Body?	N/A	**Deck Drains Discharge Over Buffer?**	N/A	**Dissipator Pads Provided in Buffer?**	N/A	
Deck Drains Discharge Over Water Body?	N/A	(If yes, provide justification in the General Project Narrative)		(If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative)		
(If yes, provide justification in the General Project Narrative)						

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.05; Released April 2016)

WBS Element: 45552.1.1 **TIP No.:** I-5504 **County(ies):** Buncombe

Swales

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Base Width (ft)	Front Slope (H:1)	Back Slope (H:1)	Drainage Area (ac)	Recommended Treatm't Length (ft)	Actual Length (ft)	Longitudinal Slope (%)	Q2 (cfs)	V2 (fps)	Q10 (cfs)	V10 (fps)	Rock Checks Used	BMP Associated w/ Buffer Rules?
6	Sta. 43+50 -L- to Sta. 46+00		2.0	6.0	6.0	0.6	62	250	1.10%	1.1	1.3	1.4	1.4	No	No
7	Sta. 56+00 -L- to Sta. 56+50		2.0	6.0	6.0	0.4	42	50	3.80%	1.3	1.7	1.7	2.3	No	No

Additional Comments

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 2.05; Released April 2016)

WBS Element: **TIP No.:** I-5504 **County(ies):** Buncombe

Preformed Scour Holes and Energy Dissipators

Sheet No.	Station & Coordinates (Road and Non Road Projects)	Surface Water Body	Energy Dissipator Type	Riprap Type	Drainage Area (ac)	Conveyance Structure	Pipe/Structure Dimensions (in)	Q10 (cfs)	V10 (fps)	BMP Associated w/ Buffer Rules?
5	Sta. 26+90 RT -L-	(1)UT to Long Valley Branch	Riprap Energy Dissipator Basin	Class II	145.0	Culvert	1-66", 1-60"	193.0		N/A
9	Sta. 79+40 LT -L-	(2)UT to Hominey	Riprap Energy Dissipator Basin	Class II	150.0	Culvert	1-72", 1-60"	199.0		N/A

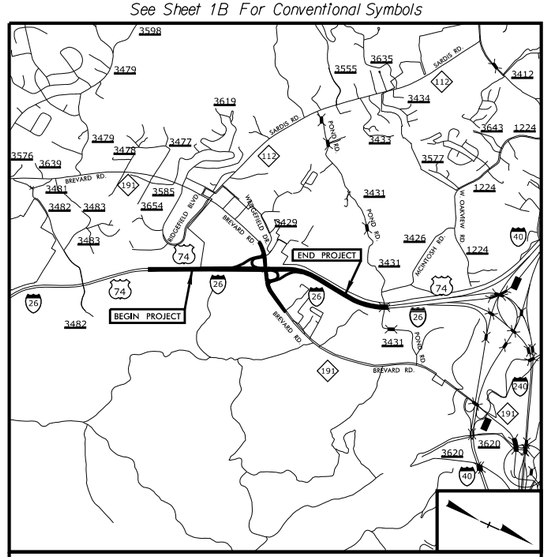
Additional Comments

* Refer to the NCDOT Best Management Practices Toolbox (2014), NCDOT Standards, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

TIP PROJECT: I-5504

CONTRACT: C203754

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols



VICINITY MAP N.T.S.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5504	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
45552.3.1	IMF-026-1(191)47	P.E.	

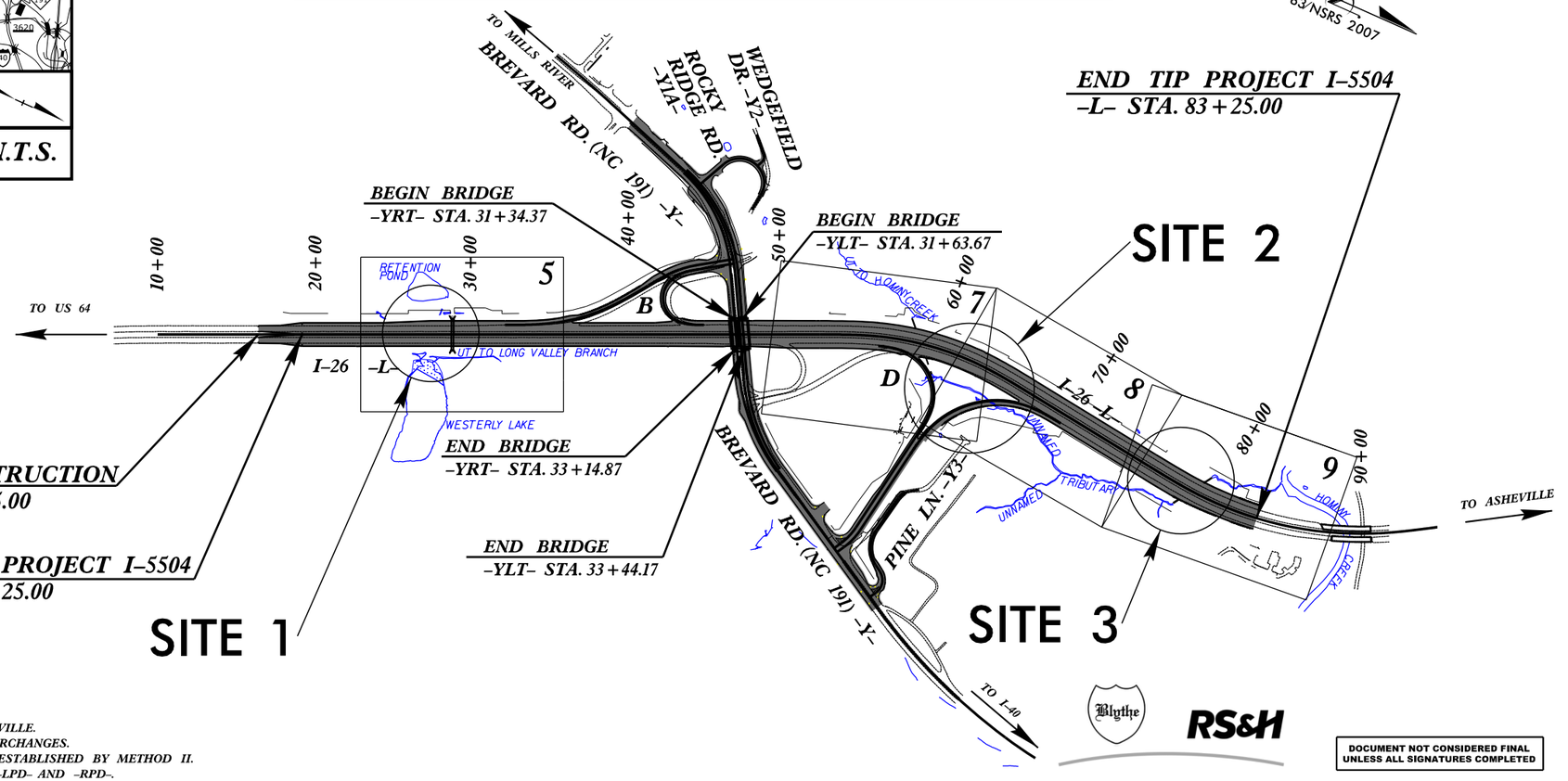
LOCATION: I-26/NC 191 (BREVARD ROAD) INTERCHANGE MODIFICATIONS AND I-26 WIDENING AND PAVEMENT RECONSTRUCTION

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, CULVERT, RETAINING WALLS, SOUND WALLS, SIGNALS, AND SIGNING

PERMIT DRAWING
SHEET 1 OF 26

WETLAND AND SURFACE WATER IMPACTS PERMIT

NAD 83/NSRS 2007



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF ASHEVILLE.
THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS TO INTERCHANGES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO LIMITS ESTABLISHED BY METHOD II.
DESIGN EXCEPTION REQUIRED FOR THE HORIZONTAL RADII OF -LPD- AND -RPD-.

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2016 = 95,900
ADT 2040 = 118,300
DHV = 10 %
D = 55 %
T = 14 % *
V = 70 MPH
* (TTST = 10% + DUAL = 4%)
FUNC CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT I-5504	=	1.212 MILES
LENGTH STRUCTURE TIP PROJECT I-5504	=	0.000 MILES
TOTAL LENGTH TIP PROJECT I-5504	=	1.212 MILES

*NOTE: EASTBOUND LANES USED TO CALCULATE LENGTH OF PROJECT.

K. ZAK HAMIDI, PE
NCDOT CONTACT

Prepared In the Office of:
RS&H
ARCHITECTS-ENGINEERS-PLANNERS, INC.
8601 SIX FORKS ROAD, SUITE 260
RALEIGH, NC 27615

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: ***FEBRUARY 16, 2016***

LETTING DATE: ***FEBRUARY 16, 2016***

JASON TALLEY, PE
PROJECT ENGINEER

ALLISON DRAKE, PE
PROJECT DESIGN ENGINEER

HYDRAULIC DESIGN ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

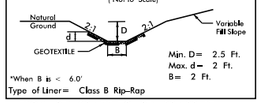
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2D-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 2 OF 26

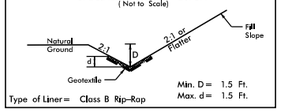
DETAIL A
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 2.5 Ft.
Max. d= 2 Ft.
B= 2 Ft.
*When B is < 6.0'
Type of Liner= Class B Rip-Rap

FROM STA. 20+75 TO STA. 23+00 RT –L–

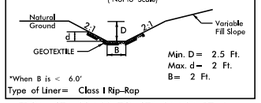
DETAIL B
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 22+40 TO STA. 24+30 LT –L–

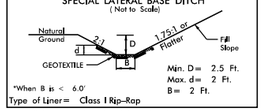
DETAIL C
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 2.5 Ft.
Max. d= 2 Ft.
B= 2 Ft.
*When B is < 6.0'
Type of Liner= Class I Rip-Rap

FROM STA. 23+00 TO STA. 24+25 RT –L–

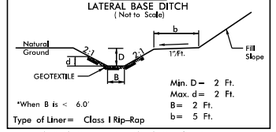
DETAIL D
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 2.5 Ft.
Max. d= 2 Ft.
B= 2 Ft.
*When B is < 6.0'
Type of Liner= Class I Rip-Rap

FROM STA. 24+25 TO STA. 25+75 RT –L–

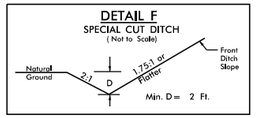
DETAIL E
LATERAL BASE DITCH
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
b= 5 Ft.
*When B is < 6.0'
Type of Liner= Class I Rip-Rap

FROM STA. 25+75 TO STA. 26+70 RT –L–
FROM STA. 58+00 TO STA. 58+50 LT –L–

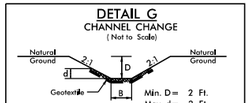
DETAIL F
SPECIAL CUT DITCH
(Not to Scale)



Min. D= 2 Ft.

FROM STA. 24+50 TO STA. 25+00 LT –L–
FROM STA. 25+00 TO STA. 26+50 LT –L–

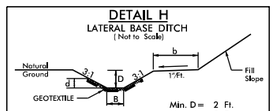
DETAIL G
CHANNEL CHANGE
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 6 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 24+27 TO STA. 24+45 LT –L–
FROM STA. 57+75 TO STA. 57+95 LT –L–

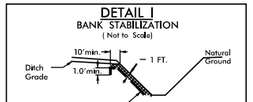
DETAIL H
LATERAL BASE DITCH
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
b= VAR 1.5–5 Ft.
*When B is < 6.0'
Type of Liner= Class B Rip-Rap

FROM STA. 26+50 TO STA. 28+10 LT –L–
FROM STA. 28+25 TO STA. 28+75 LT –L–
FROM STA. 29+00 TO STA. 30+00 LT –L–

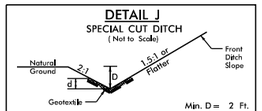
DETAIL I
BANK STABILIZATION
(Not to Scale)



Type of Liner= 2 TONS, Class B Rip-Rap
Geotextile= 5 SY

FROM STA. 30+48 TO STA. 30+53 RT –L–

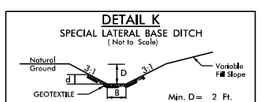
DETAIL J
SPECIAL CUT DITCH
(Not to Scale)



Min. D= 2 Ft.
Max d= 2 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 30+00 TO STA. 32+50 LT –L–
FROM STA. 58+50 TO STA. 61+50 LT –L–

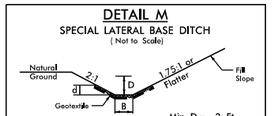
DETAIL K
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
*When B is < 6.0'
Type of Liner= Class B Rip-Rap

FROM STA. 32+50 TO STA. 36+00 LT –L–

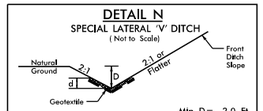
DETAIL M
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 38+50 TO STA. 39+50 RT –L–
FROM STA. 76+50 TO STA. 78+90 LT –L–

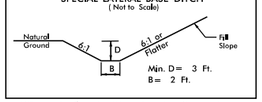
DETAIL N
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D= 2.0 Ft.
Type of Liner= B Rip-Rap

FROM STA. 39+50 TO STA. 40+50 RT –L–

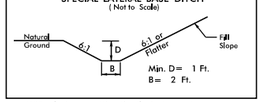
DETAIL O
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 3 Ft.
B= 2 Ft.

FROM STA. 16+00 TO STA. 20+00 RT –RPB–

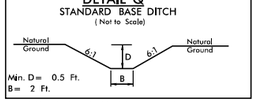
DETAIL P
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 1 Ft.
B= 2 Ft.

FROM STA. 39+00 TO STA. 42+50 LT –L–

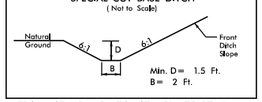
DETAIL Q
STANDARD BASE DITCH
(Not to Scale)



Min. D= 0.5 Ft.
B= 2 Ft.

FROM STA. 11+70 TO STA. 12+85 RT –LPB–

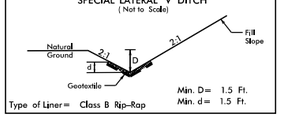
DETAIL R
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 1.5 Ft.
B= 2 Ft.

FROM STA. 50+50 TO STA. 52+75 RT –L–
FROM STA. 56+50 TO STA. 57+00 RT –L–

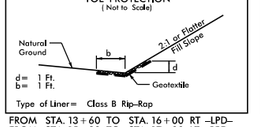
DETAIL S
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D= 1.5 Ft.
Min. d= 1.5 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 57+50 TO STA. 58+90 RT –L–

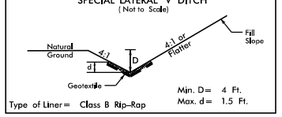
DETAIL T
TOE PROTECTION
(Not to Scale)



Type of Liner= Class B Rip-Rap

FROM STA. 13+60 TO STA. 16+00 RT –LPD–
FROM STA. 15+30 TO STA. 17+00 LT –RPD–

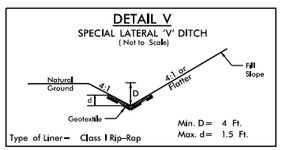
DETAIL U
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D= 4 Ft.
Max. d= 1.5 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 59+50 TO STA. 62+00 RT –L–

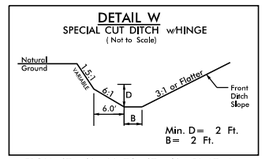
DETAIL V
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



Min. D= 4 Ft.
Max. d= 1.5 Ft.
Type of Liner= Class I Rip-Rap

FROM STA. 16+76 TO STA. 18+40 RT –RPD–

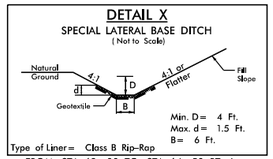
DETAIL W
SPECIAL CUT DITCH wHINGE
(Not to Scale)



Min. D= 2 Ft.
B= 2 Ft.

FROM STA. 62+00 TO STA. 62+50 LT –L–

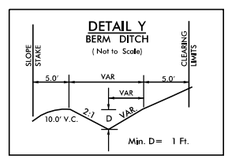
DETAIL X
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 4 Ft.
Max. d= 1.5 Ft.
B= 6 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 62+00 TO STA. 64+50 RT –L–

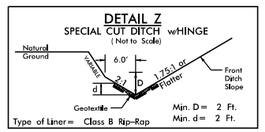
DETAIL Y
BERM DITCH
(Not to Scale)



Min. D= 1 Ft.

FROM STA. 64+00 TO STA. 73+25 LT –L–

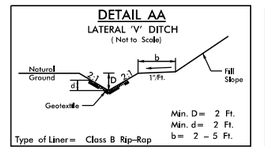
DETAIL Z
SPECIAL CUT DITCH wHINGE
(Not to Scale)



Min. D= 2 Ft.
Min. d= 2 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 13+30 TO STA. 14+80 LT –RPD–

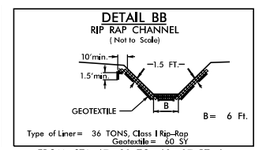
DETAIL AA
LATERAL 'V' DITCH
(Not to Scale)



Min. D= 2 Ft.
Min. d= 2 Ft.
b= 2 – 5 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 11+50 TO STA. 13+30 LT –RPD–

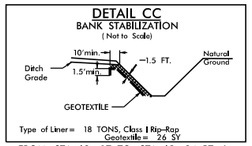
DETAIL BB
RIP RAP CHANNEL
(Not to Scale)



B= 6 Ft.
Type of Liner= 36 TONS, Class I Rip-Rap
Geotextile= 60 SY

FROM STA. 67+80 TO STA. 68+07 RT –L–

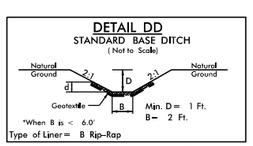
DETAIL CC
BANK STABILIZATION
(Not to Scale)



Type of Liner= 18 TONS, Class I Rip-Rap
Geotextile= 26 SY

FROM STA. 68+07 TO STA. 68+34 RT –L–

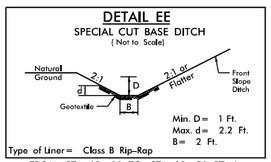
DETAIL DD
STANDARD BASE DITCH
(Not to Scale)



Min. D= 1 Ft.
B= 2 Ft.
*When B is < 6.0'
Type of Liner= B Rip-Rap

FROM STA. 68+30 TO STA. 69+00 RT –L–

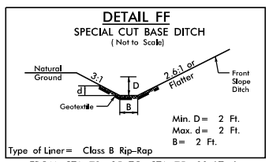
DETAIL EE
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 1 Ft.
Max. d= 2.2 Ft.
B= 2 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 69+00 TO STA. 69+50 RT –L–

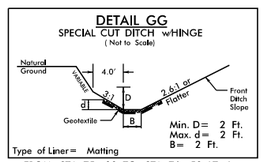
DETAIL FF
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 73+25 TO STA. 75+00 LT –L–

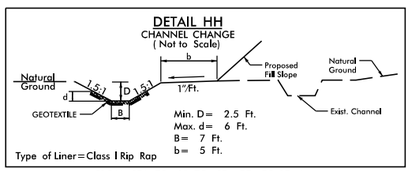
DETAIL GG
SPECIAL CUT DITCH wHINGE
(Not to Scale)



Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
Type of Liner= Matting

FROM STA. 75+00 TO STA. 76+50 LT –L–

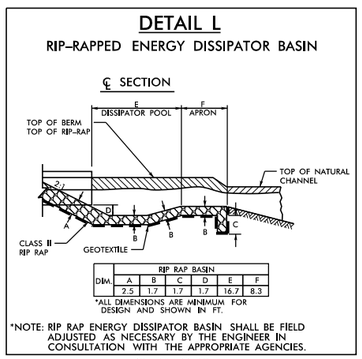
DETAIL HH
CHANNEL CHANGE
(Not to Scale)



Min. D= 2.5 Ft.
Max. d= 6 Ft.
B= 7 Ft.
b= 5 Ft.
Type of Liner=Class I Rip Rap

FROM STA. 75+60 TO STA. 77+75 RT –L–

DETAIL L
RIP–RAPPED ENERGY DISSIPATOR BASIN



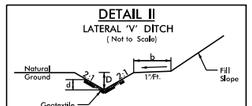
DIM.	RIP RAP BASIN					
	A	B	C	D	E	F
	2.5	1.7	1.7	1.7	16.7	8.3

*ALL DIMENSIONS ARE MINIMUM FOR DESIGN AND SHOWN IN FT.

*NOTE: RIP RAP ENERGY DISSIPATOR BASIN SHALL BE FIELD ADJUSTED AS NECESSARY BY THE ENGINEER IN CONSULTATION WITH THE APPROPRIATE AGENCIES.

STA. 26+92 RT –L–
STA. 49+59 LT –L–

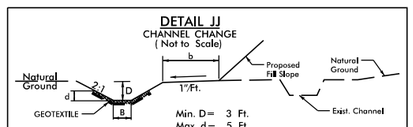
DETAIL II
LATERAL 'V' DITCH
(Not to Scale)



Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
b= 5 Ft.
Type of Liner= Class B Rip-Rap

FROM STA. 78+25 TO STA. 79+85 RT –L–

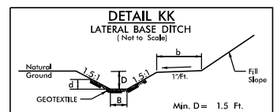
DETAIL JJ
CHANNEL CHANGE
(Not to Scale)



Min. D= 3 Ft.
Max. d= 5 Ft.
B= 10 Ft.
b= 5 Ft.
Type of Liner=Class I Rip Rap

FROM STA. 80+70 TO STA. 81+40 LT –L–

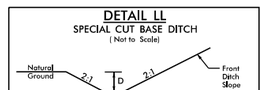
DETAIL KK
LATERAL BASE DITCH
(Not to Scale)



Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 2 Ft.
b= 2 Ft.
Type of Liner= Class I Rip-Rap

FROM STA. 81+60 TO STA. 82+15 LT –L–

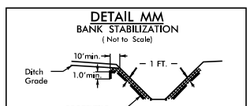
DETAIL LL
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 1 Ft.
B= 2 Ft.

FROM STA. 14+00 TO STA. 15+50 RT –Y1A–

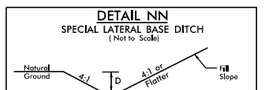
DETAIL MM
BANK STABILIZATION
(Not to Scale)



Type of Liner= 3 TONS, Class B Rip-Rap
Geotextile= 5 SY

FROM STA. 28+10 TO STA. 28+20 LT –L–

DETAIL NN
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D=4 Ft.
B=6 Ft.

FROM STA. 64+50 TO STA. 66+00 RT –L–

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

SITE 1A

SITE 1B

NOTE: EXISTING 14'x14' RCBC DOES NOT CARRY NORMAL STORMWATER DISCHARGE

SITE 1C

SITE 1D

MATCHLINE SHEET 4 –L– STA. 23+00.00

MATCHLINE SHEET 6 –L– STA. 36+00.00

25+00

30+00

35+00

BCL OF ASHEVILLE, LLC (ASHEVILLE KIA)

ASHEVILLE RETAIL ASSOCIATES, LLC

WEST RANGE, LLC (BILTMORE ESTATE)

RETENTION POND

WESTERLY LAKE

JURISDICTIONAL POND

VINEYARD

LONG VALLEY BRANCH

UT TO LONG VALLEY BRANCH

BANK STABILIZATION SEE DETAIL MM (BANKS ONLY)

LATERAL BASE DITCH SEE DETAIL H

18" SIDE DRAIN

SPECIAL CUT DITCH SEE DETAIL J

SPECIAL LATERAL BASE DITCH SEE DETAIL K

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

SPECIAL LATERAL V DITCH SEE DETAIL B

CHANNEL CHANGE SEE DETAIL G

SPECIAL CUT DITCH SEE DETAIL F

66" CULVERT EXTENSION

14'X14' RCBC EXTENSION

48" CULVERT EXTENSION

BANK STABILIZATION SEE DETAIL I

SPECIAL LATERAL BASE DITCH SEE DETAIL C

SPECIAL LATERAL BASE DITCH SEE DETAIL D

LATERAL BASE DITCH SEE DETAIL E

RIP-RAPPED ENERGY DISSIPATOR BASIN WITH CLASS II RIP RAP SEE DETAIL L

N 24° 01' 15.0" W

PERMIT DRAWING
SHEET 3 OF 26

SITE 1

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES FILL IN WETLAND

50' 0' 50'

FOR –LLT– PROFILE, SEE SHEET NO. 14

FOR –LRT– PROFILE, SEE SHEET NO. 14

FOR –RPB– PROFILE, SEE SHEET NO. 23

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

SITE 1A

SITE 1B

NOTE: EXISTING 14'x14' RCBC DOES NOT CARRY NORMAL STORMWATER DISCHARGE

SITE 1C

SITE 1D

MATCHLINE SHEET 4 –L– STA. 23+00.00

MATCHLINE SHEET 6 –L– STA. 36+00.00

25+00 30+00 35+00

BCL OF ASHEVILLE, LLC (ASHEVILLE KIA)

ASHEVILLE RETAIL ASSOCIATES, LLC

VINEYARD

WEST RANGE, LLC (BILTMORE ESTATE)

RETENTION POND

WESTERLY LAKE

JURISDICTIONAL POND

UT TO LONG VALLEY BRANCH

LONG VALLEY BRANCH

N 24°01'15.0"W

PERMIT DRAWING
SHEET 4 OF 26

SITE 1

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

DENOTES FILL IN WETLAND

50' 0' 50'

FOR –LLT– PROFILE, SEE SHEET NO. 14
FOR –LRT– PROFILE, SEE SHEET NO. 14
FOR –RPB– PROFILE, SEE SHEET NO. 23

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 5 OF 26

Blythe

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NAD 83/NSRS 2007

SITE 1A / 1B ENLARGEMENT

SITE 1A

SITE 1B

BCL OF ASHEVILLE, LLC (ASHEVILLE KIA)

RETENTION POND

25+00

30+00

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

SPECIAL LATERAL V DITCH SEE DETAIL B

CHANNEL CHANGE SEE DETAIL G

UT TO LONG VALLEY BRANCH

SPECIAL CUT DITCH SEE DETAIL F

RETAIN

TDE

HW

EXISTING R/W

48" CULVERT EXTENSION

CONC HW

COLLAR

ELBOW

15" CSP

LATERAL BASE DITCH SEE DETAIL H

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

TB 2GI

15" RCP-III

MTL

10' BST

I-26 EBL 36' BST

4' BST

42" SLIP LINE

48" CMP

2GI

RCP-III

JG & FILL

REMOVE DI

I-26 WBL 37' BST

48" WW & 2SBW

CONC HW & WW

66" CULVERT EXTENSION

BANK STABILIZATION SEE DETAIL MM (BANKS ONL

LATERAL BASE DITCH SEE DETAIL H

CB

OPEN THROAT CB

60" RCP

18" SIDE DRAIN

LONG VALLEY BRANCH

PAVED DITCH

14'X14' RCBC EXTENSION

CUL 2

CONC HW

60" SLIP LINE

66" CMP

60" CONC

I-26 EBL 37' BST

I-26 WBL 37' BST

ARREL CONC BOX CULVERT - TRAVEL THROUGH HWY

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

25' 0' 25'

FOR –LLT– PROFILE, SEE SHEET NO. 14

FOR –LRT– PROFILE, SEE SHEET NO. 14

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 6 OF 26

Blythe

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NAD 83/NSRS 2007

SITE 1A /1B ENLARGEMENT

BCL OF ASHEVILLE, LLC (ASHEVILLE KIA)

RETENTION POND

25+00

30+00

SITE 1A

SITE 1B

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

SPECIAL LATERAL V DITCH SEE DETAIL B

CHANNEL CHANGE SEE DETAIL G

UT TO LONG VALLEY BRANCH

SPECIAL CUT DITCH SEE DETAIL F

RETAIN

TDE

HW

EXISTING R/W

48" CULVERT EXTENSION

CONC HW

COLLAR

ELBOW

15" CSP

LATERAL BASE DITCH SEE DETAIL H

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

TB 2GI

15" RCP-III

MTL

10' BST

I-26 EBL 36' BST

4' BST

42" SLIP LINE

2GI

REMOVE DI

RCP-III

JG & FILL

48" CMP

I-26 WBL 37' BST

BANK STABILIZATION SEE DETAIL MM (BANKS ONL

LATERAL BASE DITCH SEE DETAIL H

RETAIN

CB

OPEN THROAT CB

18" SIDE DRAIN

LONG VALLEY BRANCH

48" WW & 2SBW

PAVED DITCH

66" CULVERT EXTENSION

CONC HW & WW

14'X14' RCBC EXTENSION

CULVERT

I-26 EBL 37' BST

66" CMP

60" SLIP LINE

60" CONC

ARREL CONC BOX CULVERT - TRAVEL DIRECTION

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

25' 0' 25'

FOR -LLT- PROFILE, SEE SHEET NO. 14

FOR -LRT- PROFILE, SEE SHEET NO. 14

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 7 OF 26

Blythe

RS&H

NAD 83/NSRS 2007

30+00

AR
TB 2GI
TB 2GI
15" RCP-III
TB 2GI
MTL
10' BST
ST
42" SLIP LINE
I-26 EBL 37' BST
66" CMP
60" SLIP LINE
4' BST
MTL
15" RCP-III
2GI
TB 2GI
REMOVE DI
60" CONC
MTL
REMOVE DI
MTL
DI
I-26 WBL 37' BST
4' BST
48" CMP
T
10' BST
MTL
15" RCP-III
TB 2GI
15" RCP-III
TB 2GI
MTL
TB 2GI
15" RCP-I
REMOVE
15" RCP-III
PLUG & FILL
15" CMP
160.00'
14'X14' SINGLE BARREL CONC BOX CULVERT - TRAVEL THRU
PLUG & FILL
15" RCP-III
15" CSP
315.00'
15" CMP
48" CULVERT EXTENSION AND COLLAR
CONC
COLLAR
CONC HW & WW
HW
66" CULVERT EXTENSION AND COLLAR
14'X14' RCBC EXTENSION
ELBOW
BANK STABILIZATION SEE DETAIL I
F
C
36" CMP
JS
RETAIN
JS
JS
JS
JS
OUT TO LONG VALLEY BRANCH
48" WW & 2SBW
WLB
EXISTING R/W
48" WW & 1SBW
RIP-RAPPED ENERGY DISSIPATOR BASIN WITH CLASS II RIP RAP SEE DETAIL L
8' SOIL
SP
IS
O
LATERAL BASE DITCH SEE DETAIL E
SPECIAL LATERAL BASE DITCH SEE DETAIL D
96" CMP
JS NONMT
JS NONMT
96" WW
CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY GEO
SITE 1C
WESTERLY LAKE
JURISDICTIONAL POND
SITE 1D
WEST RANGE, LLC
(BILTMORE ESTATE

S/S DENOTES IMPACTS IN SURFACE WATER
TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
P/P DENOTES IMPACTS IN SURFACE WATER (POND)

25' 0' 25'

FOR –LRT– PROFILE, SEE SHEET NO. 14

SITE 1C /1D
ENLARGEMENT

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 8 OF 26

Blythe

RS&H

NAD 83/NSRS 2007

30+00

TB 2GI

15" RCP-III

42" SLIP LINE

48" CMP

66" CMP

60" SLIP LINE

60" CONC

I-26 EBL 37' BST

I-26 WBL 37' BST

MTL

10' BST

4' BST

REMOVE DI

REMOVE 15" CMP PLUG & FILL

15" RCP-III

2GI

PLUG & FILL

15" CSP

135.00'

160.00'

14'X14' SINGLE BARREL CONC BOX CULVERT - TRAVEL THRU

14'X14' RCBC EXTENSION

ELBOW

48" CULVERT EXTENSION AND COLLAR

COLLAR CONC HW & WW

HW

66" CULVERT EXTENSION AND COLLAR

BANK STABILIZATION SEE DETAIL I

36" CMP

RETAIN

JS

48" WW & 2SBW

48" WW & 1SBW

RIP-RAPPED ENERGY DISSIPATOR BASIN WITH CLASS II RIP RAP SEE DETAIL L

LATERAL BASE DITCH SEE DETAIL E

SPECIAL LATERAL BASE DITCH SEE DETAIL D

JS NONMIT

96" CMP

96" WW

WESTERLY LAKE

JURISDICTIONAL POND

EXISTING R/W

8' SOIL

OT TO LONG VALLEY BRANCH

CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY GEO

WEST RANGE, LLC
(BILTMORE ESTATE

SITE 1C

SITE 1D

SITE 1C /1D
ENLARGEMENT

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

P/P DENOTES IMPACTS IN SURFACE WATER (POND)

25' 0' 25'

FOR –LRT– PROFILE, SEE SHEET NO. 14

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

SITE 2A

NAD 83/NSRS 2007

50+00

55+00

60+00

G. E. ENTERPRISES, INC.,
A NORTH CAROLINA CORPORATION

ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION
A/K/A ABCCM

SPRING IS APPROX

CHANNEL CHANGE SEE DETAIL G

LATERAL BASE DITCH SEE DETAIL E

42" CULVERT EXTENSION

COLLAR

SLIP-LINE 42" PIPE WITH 36" STEEL PIPE

SPECIAL CUT DITCH SEE DETAIL J

TB 2GI

REMOVE DI

15" RCP-III

18" RCP-III

60" CONC

2GI

N 24° 01' 15.0" W

SPECIAL CUT BASE DITCH SEE DETAIL R

FLOWER BED

PLUG & ABANDON

FILL & PLUG

JB w/MH

4OTCB

SPECIAL LATERAL V DITCH SEE DETAIL U

COLLAR 36" RCP-IV

UT TO HOMINY CREEK

SPECIAL LATERAL V DITCH SEE DETAIL V

TOE PROTECTION SEE DETAIL T

18" PIPE COLLAR

15+00 (-LPD-)

MATCHLINE SHEET 6 -L- STA. 49+00.00

MATCHLINE SHEET 8 -L- STA. 62+00.00

MATCH LINE SHEET 12 -LPD- STA. 16+00.00

REMOVE CONCRETE DITCH

REMOVE DI PLUG & ABANDON EXIST. 24" CMP

BARKLEY FAMILY LLC

SITE 2B

-L- STA. 56+00 TO 56+50 RT
Q10=1.7CFS
V10=2.3FPS

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

PAVEMENT REMOVAL

FOR -LLT- PROFILE, SEE SHEET NO. 16

FOR -LRT- PROFILE, SEE SHEET NO. 16

FOR -LPD- PROFILE, SEE SHEET NO. 25

50' 0' 50'

PERMIT DRAWING
SHEET 9 OF 26

SITE 2

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

SITE 2A

SITE 2B

SITE 2

PERMIT DRAWING
SHEET 10 OF 26

NAD 83/NSRS 2007

MATCHLINE SHEET 6 –L– STA. 49+00.00

MATCHLINE SHEET 8 –L– STA. 62+00.00

MATCH LINE SHEET 12 –LPD– STA. 16+00.00

15+00 (–LPD–)

50+00

55+00

60+00

G. E. ENTERPRISES, INC.,
A NORTH CAROLINA CORPORATION

ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION
A/K/A ABCCM

BARKLEY FAMILY LLC

CHANNEL CHANGE SEE DETAIL G

LATERAL BASE DITCH SEE DETAIL E

SPECIAL CUT DITCH SEE DETAIL J

42" CULVERT EXTENSION

COLLAR

SLIP-LINE 42" PIPE WITH 36" STEEL PIPE

SPECIAL CUT BASE DITCH SEE DETAIL R

SPECIAL LATERAL V DITCH SEE DETAIL U

SPECIAL LATERAL V DITCH SEE DETAIL V

TOE PROTECTION SEE DETAIL T

REMOVE CONCRETE DITCH

REMOVE DI
PLUG & ABANDON
EXIST. 24" CMP

–L– STA. 56+00 TO 56+50 RT
Q10=1.7CFS
V10=2.3FPS

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

PAVEMENT REMOVAL

FOR –LLT– PROFILE, SEE SHEET NO. 16

FOR –LRT– PROFILE, SEE SHEET NO. 16

FOR –LPD– PROFILE, SEE SHEET NO. 25

50' 0' 50'

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

APPROX

TS

TB

LT TO HOMINY CREEK

MINISTRY ASSOCIATION

ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION
A/K/A ABCCM

60+00

SITE 2A

CHANNEL CHANGE
SEE DETAIL G

LATERAL BASE DITCH
SEE DETAIL E

SPECIAL CUT DITCH
SEE DETAIL J

HW

TDE

E

C

A

SF

CONC HW

42" RCP-III

COLLAR

42" CULVERT
EXTENSION

SLIP-LINE 42" PIPE
WITH 36" STEEL PIPE

EXISTING R/W

48" WW & 2 SBW

2 SBW

160.00'

135.00'

MTL

11' BST

4' BST

38' BST

2GI

CONC

DI

REMOVE DI

BASE DITCH

18" RCP-III

PLUG & FILL

15" RCP-III

I-26 EBL

PERMIT DRAWING
SHEET 11 OF 26

SITE 2A
ENLARGEMENT

25' 0' 25'

PAVEMENT REMOVAL

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F/F DENOTES FILL IN WETLAND

FOR –LLT– PROFILE, SEE SHEET NO. 16

FOR –LRT– PROFILE, SEE SHEET NO. 16

FOR –LPD– PROFILE, SEE SHEET NO. 25

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

APPROX

MINISTRY ASSOCIATION

ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION
A/K/A ABCCM

60+00

SITE 2A

UT TO HOMINY CREEK

CHANNEL CHANGE
SEE DETAIL G

LATERAL BASE DITCH
SEE DETAIL E

SPECIAL CUT DITCH
SEE DETAIL J

42" CULVERT EXTENSION

42" RCP-III

COLLAR

SLIP-LINE 42" PIPE WITH 36" STEEL PIPE

TDE

EXISTING R/W

48" WW & 2 SBW

2 SBW

E

C

HW

TS

SF

CONC HW

MTL

11' BST

4' BST

38' BST

I-26 EBL

2GI

REMOVE DI

BASE DITCH

18" RCP-III

PLUG & FILL

15" RCP-III

135.00

PERMIT DRAWING
SHEET 12 OF 26

SITE 2A
ENLARGEMENT

25' 0' 25'

PAVEMENT REMOVAL

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F/F DENOTES FILL IN WETLAND

FOR –LLT– PROFILE, SEE SHEET NO. 16

FOR –LRT– PROFILE, SEE SHEET NO. 16

FOR –LPD– PROFILE, SEE SHEET NO. 25

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

REMOVE DI

SPECIAL CUT BASE DITCH SEE DETAIL R

18" RCP-III

PLUG & FILL

6" CMP

4' BST

MTL

CONC

I-26 WBL 51' BST

70' BST

10" CMP

REMOVE

DOT POLE

SOLAR PANEL

JB w/MH

18" RCP-III

RIPRAP

4OTCB

SPECIAL LATERAL V DITCH SEE DETAIL U

SITE 2B

SITE 2C

COLLAR

36" RCP-IV

BLIND JB

UT TO HOMINY CREEK

60" RCP-IV

54" RCP-IV

JB W/MH

48" RCP-III

4OTCB

24" HDPE

48" WW & 2 SBW

EXISTING R/W

10+00 (-LPD-)

15+00 (-LPD-)

RETAIN

48" RCP

18" HDPE

CB

JB

RIPRAP CB

TOE PROTECTION SEE DETAIL T

18" RCP-III

18" PIPE COLLAR

SPECIAL LATERAL V DITCH SEE DETAIL V

BARKLEY FAMILY LLC

18" CONC C&G

PA BST

72" CMP

CADD FEADER

15" CMP

-L- STA. 56+00 TO 56+50 RT
Q10=1.7CFS
V10=2.3FPS

PERMIT DRAWING
SHEET 13 OF 26

SITE 2B / 2C
ENLARGEMENT

25' 0' 25'

PAVEMENT REMOVAL

FOR -LLT- PROFILE, SEE SHEET NO. 16
FOR -LRT- PROFILE, SEE SHEET NO. 16
FOR -LPD- PROFILE, SEE SHEET NO. 25

S/S DENOTES IMPACTS IN SURFACE WATER
F/F DENOTES FILL IN WETLAND

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

REMOVE DI

SPECIAL CUT BASE DITCH SEE DETAIL R

18" RCP-III

PLUG & FILL

4" CMP

4' BST

MTL

CONC

I-26 WBL

51' BST

10' BST

DOT POLE

SOLAR PANEL

JB w/MH

18" RCP-III

RIPRAP

4OTCB

18" RCP-III

JB w/MH

18" RCP-III

SITE 2B

SITE 2C

REMOVE

SPECIAL LATERAL V DITCH SEE DETAIL U

COLLAR

36" RCP-IV

BLIND JB

UT TO HOMINY CREEK

60" RCP-IV

54" RCP-IV

JB W/MH

48" RCP-III

4OTCB

RIP RAP AREA

18" RCP-III

18" PIPE COLLAR

TOE PROTECTION SEE DETAIL T

REMOVE

SPECIAL LATERAL V DITCH SEE DETAIL V

10+00 (-LPD-)

15+00 (-LPD-)

24" HDPE

48" WW & 2 SBW

EXISTING R/W

RIPRAP

JB

18" HDPE

RETAIN

CB

48" RCP

RIPRAP CB

18" CONC C&G

PA BST

BARKLEY FAMILY LLC

72" CMP

CARD READER

18" RCP

15" CMP

JER

PERMIT DRAWING
SHEET 14 OF 26

SITE 2B / 2C
ENLARGEMENT

-L- STA. 56+00 TO 56+50 RT
Q10=1.7CFS
V10=2.3FPS

25' 0' 25'

PAVEMENT REMOVAL

FOR -LLT- PROFILE, SEE SHEET NO. 16
FOR -LRT- PROFILE, SEE SHEET NO. 16
FOR -LPD- PROFILE, SEE SHEET NO. 25

S/S DENOTES IMPACTS IN SURFACE WATER
F/F DENOTES FILL IN WETLAND

10/25/2016
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

SITE 2

NAD 83/NSRS 2007

65+00

70+00

ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION A/K/A ABCCM

QUARRY

MURMAX, LLC

QUARRY

SPECIAL CUT DITCH W/HINGE SEE DETAIL W

BERM DITCH SEE DETAIL Y

SPECIAL CUT BASE DITCH SEE DETAIL FF

MATCHLINE SHEET 7 –L– STA. 62+00.00

MATCHLINE SHEET 9 –L– STA. 75+00.00

N 7° 25' 13.0" E

SPECIAL LATERAL BASE DITCH SEE DETAIL NN

SPECIAL LATERAL BASE DITCH SEE DETAIL X

CLASS 'A' RIP RAP EST 3 TONS EST 10 SY GEO

CLASS 'B' RIP RAP EST 8 TONS EST 21 SY GEO

STANDARD BASE DITCH SEE DETAIL DD

LATERAL 'V' DITCH SEE DETAIL AA

SPECIAL CUT BASE DITCH SEE DETAIL EE

BANK STABILIZATION SEE DETAIL CC

RIP RAP CHANNEL SEE DETAIL BB

SPECIAL CUT DITCH w/HINGE SEE DETAIL Z

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

TOE PROTECTION SEE DETAIL T

JERRY B. RICH AND WIFE, PHYLLIS C. RICH

FLAURA FAYE MATHIS, ET AL

CAROL BRIGMAN CAMPBELL AND HUSBAND, CHARLES D. CAMPBELL

BRANDON KNOLLS, LLC

MATCH LINE SHEET 12 –RPD– STA. 17+50.00

15"-100' (–RPD–)

SITE 2C

PERMIT DRAWING
SHEET 15 OF 26

50' 0' 50'

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

FOR –LLT– PROFILE, SEE SHEET NO. 17
FOR –LRT– PROFILE, SEE SHEET NO. 17
FOR –RPD– PROFILE, SEE SHEET NO. 24

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

SITE 2

SITE 2C

MATCHLINE SHEET 7 –L– STA. 62+00.00

MATCHLINE SHEET 9 –L– STA. 75+00.00

MATCH LINE SHEET 12 –RPD– STA. 17+50.00

65+00

70+00

ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION A/K/A ABCCM

MURMAX, LLC

BRANDON KNOLLS, LLC

JERRY B. RICH AND WIFE, PHYLLIS J. RICH

FLAURA FAYE MATHIS, ET AL

CAROL BRIGMAN CAMPBELL AND HUSBAND, CHARLES D. CAMPBELL

QUARRY

SPECIAL CUT DITCH W/HINGE SEE DETAIL W

SPECIAL CUT BASE DITCH SEE DETAIL FF

BERM DITCH SEE DETAIL Y

SPECIAL LATERAL BASE DITCH SEE DETAIL NN

SPECIAL LATERAL BASE DITCH SEE DETAIL X

CLASS 'B' RIP RAP EST 3 TONS EST 10 SY GEO

CLASS 'B' RIP RAP EST 8 TONS EST 21 SY GEO

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

LATERAL 'V' DITCH SEE DETAIL AA

STANDARD BASE DITCH SEE DETAIL DD

SPECIAL CUT BASE DITCH SEE DETAIL EE

BANK STABILIZATION SEE DETAIL CC

SPECIAL CUT DITCH w/HINGE SEE DETAIL Z

RIP RAP CHANNEL SEE DETAIL BB

TOE PROTECTION SEE DETAIL T

24" CSP

30" CSP

24" RCP-III

30" RCP-III

15" RCP-III

60" RCP-III

60" CONC

ELBOW

BDO

PDE

TDE

2GI

2GI-A

TB 2GI

TB2GI-A

REMOVE DI

REMOVE

RETAIN

RIPRAP

PLUG & FILL

60" JB W/SLAB LID

48" MH

MOTCB

ISFD

ISBKD

WD DK

SEPTIC TANK

15'-00" (–RPD–)

20' GR

OUTDOOR ADVERTISING SIGN EASEMENT

48" WW & 2 SBW

EXISTING R/W

CONC HW

I-26 EBL

I-26 WBL

MTL

10' SOIL

4' BST

10' BST

12' BST

38' BST

39' BST

N 7° 25' 13.0" E

UT TO HOWNY CREEK

HOWNY CREEK

50' 0' 50'

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

FOR –LLT– PROFILE, SEE SHEET NO. 17

FOR –LRT– PROFILE, SEE SHEET NO. 17

FOR –RPD– PROFILE, SEE SHEET NO. 24

PERMIT DRAWING SHEET 16 OF 26

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

65+00

CONC HW

10' BST

I-26 EBL 38' BST

4' BST

MTL

60" CONC

2GI

DI

REMOVE DI

15" RCP-III

PLUG & FILL

24" RCP

18" RCP-III

8" CMP

RIPRAP

SPECIAL LATERAL BASE DITCH SEE DETAIL NN

CLASS 'B' RIP RAP EST 3 TONS EST 10 SY GEO

SPECIAL LATERAL BASE DITCH SEE DETAIL X

60" JB W/SLAB LID

UT TO HOMINY CREEK

60" RCP-IV

18" RCP-III

4OTCB

JS

S

F

48" WW & 2 SBW

EXISTING R/W

LATERAL 'V' DITCH SEE DETAIL AA

SITE 2C

20' SEWER EASEMENT

SS

E

TDE

PDE

SPECIAL CUT DITCH w/HINGE SEE DETAIL Z

15" RCP-III

MH

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

TOE PROTECTION SEE DETAIL T

15" HDPE

RETAIN

WD DK

ISFD

15+00 (-RPD-)

FLAURA FAYE MATHIS, ET AL

CAROL BRIGMAN CAMPBELL AND HUSBAND, CHARLES D. CAMPBELL

RICH AND WIFE, 'S E. RICH

60" RCP-III

HW

STANDARD BASE DITCH SEE DETAIL DD

BANK STABILIZATION SEE DETAIL CC

RIP RAP CHANNEL SEE DETAIL BB

TB

2GI-A

N 7° 25' 13.0" E

8" HDPE

REMOVE

TB 2GI

SITE 2C ENLARGEMENT

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F/F DENOTES FILL IN WETLAND

25' 0' 25'

FOR -LLT- PROFILE, SEE SHEET NO. 17

FOR -LRT- PROFILE, SEE SHEET NO. 17

FOR -RPD- PROFILE, SEE SHEET NO. 24

PERMIT DRAWING SHEET 17 OF 26

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

65+00

CONC HW

10' BST

4' BST

I-26 EBL 38' BST

I-26 WBL 39' BST

12' BST

MTL

CONC

60" CONC

2GI

DI

REMOVE DI

15" RCP-III

PLUG & FILL

24" RCP

18" RCP-III

TB 2GI

2GI-A

N 7° 25' 13.0" E

RETAIN

REMOVE

8" HDPE

RIPRAP

SPECIAL LATERAL BASE DITCH SEE DETAIL NN

SPECIAL LATERAL BASE DITCH SEE DETAIL X

CLASS 'B' RIP RAP EST 3 TONS EST 10 SY GEO

60" JB W/SLAB LID

UT TO HOMINY CREEK

60" RCP-IV

60" RCP-III

HW

STANDARD BASE DITCH SEE DETAIL DD

EXISTING R/W

LATERAL 'V' DITCH SEE DETAIL AA

48" WW & 2 SBW

SITE 2C

4OTCB

20' SEWER EASEMENT

PDE

TDE

SPECIAL CUT DITCH w/HINGE SEE DETAIL Z

RIP RAP CHANNEL SEE DETAIL BB

BANK STABILIZATION SEE DETAIL CC

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

MH

TOE PROTECTION SEE DETAIL T

15" HDPE

WD DK

ISFD

CAROL BRIGMAN CAMPBELL AND HUSBAND, CHARLES D. CAMPBELL

FLAURA FAYE MATHIS, ET AL

15+00 (-RPD-)

RICH AND WIFE, S. E. RICH

SITE 2C ENLARGEMENT

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

F/F DENOTES FILL IN WETLAND

25' 0' 25'

PERMIT DRAWING SHEET 18 OF 26

FOR -LLT- PROFILE, SEE SHEET NO. 17

FOR -LRT- PROFILE, SEE SHEET NO. 17

FOR -RPD- PROFILE, SEE SHEET NO. 24

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

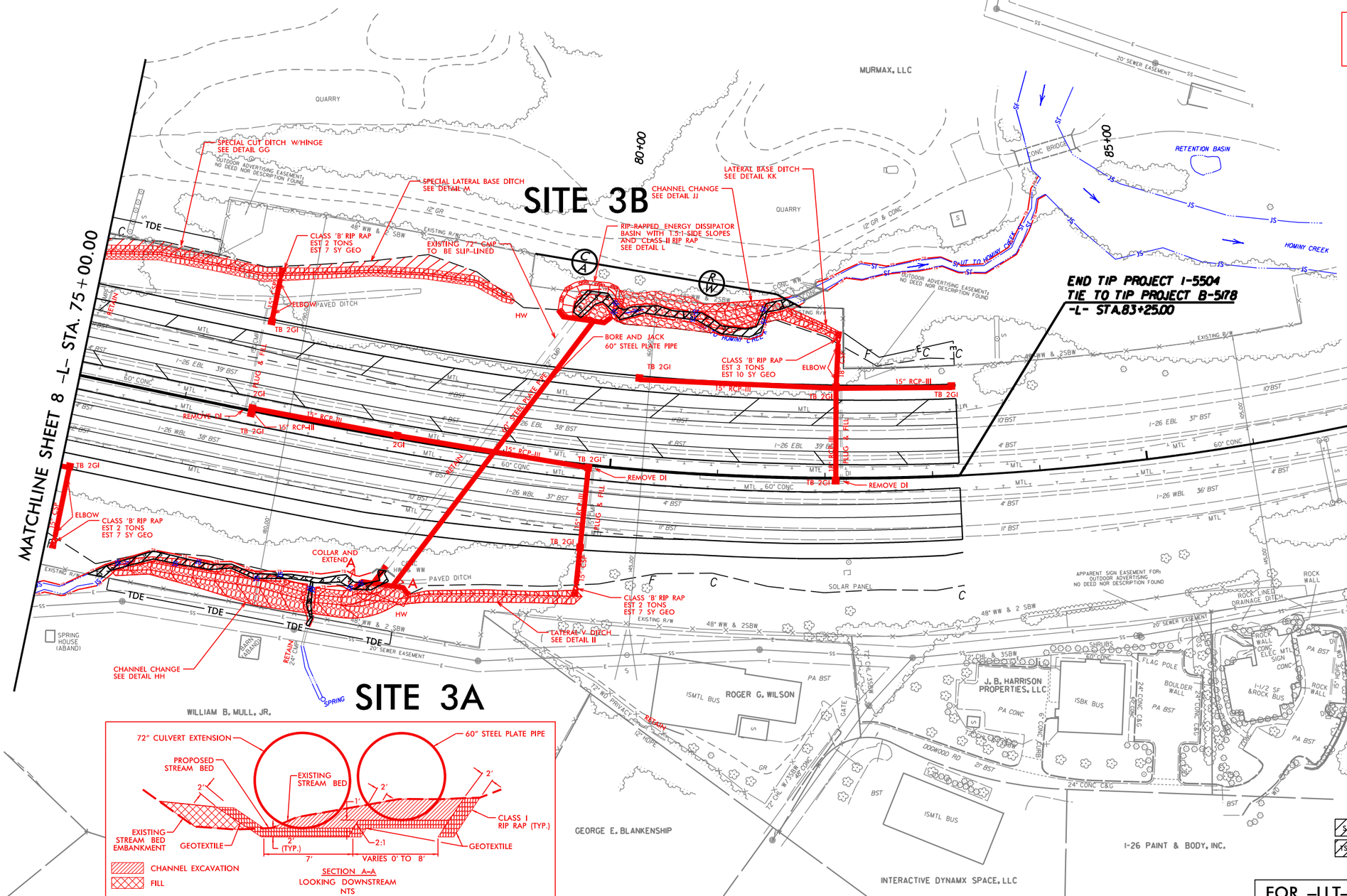
Blythe

RS&H

NAD 83/NSRS 2007

PERMIT DRAWING
SHEET 19 OF 26

SITE 3



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

FOR -LLT- PROFILE, SEE SHEET NO. 18

FOR -LRT- PROFILE, SEE SHEET NO. 18

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83/NSRS 2007

PERMIT DRAWING SHEET 20 OF 26

SITE 3

SITE 3B

SITE 3A

MATCHLINE SHEET 8 –L– STA. 75+00.00

80+00

85+00

MURMAX, LLC

QUARRY

SPECIAL CUT DITCH W/HINGE SEE DETAIL GG

SPECIAL LATERAL BASE DITCH SEE DETAIL M

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

EXISTING 72" CMP TO BE SLIP-LINED

CHANNEL CHANGE SEE DETAIL JJ

LATERAL BASE DITCH SEE DETAIL KK

RIP-RAPPED ENERGY DISSIPATOR BASIN WITH 1.5:1 SIDE SLOPES AND CLASS II RIP RAP SEE DETAIL L

BORE AND JACK 60" STEEL PLATE PIPE

CLASS 'B' RIP RAP EST 3 TONS EST 10 SY GEO

ELBOW

TB 2GI

15" RCP III

REMOVE DI

PLUG & FILL

RETAIN

ELBOW

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

COLLAR AND EXTEND

PAVED DITCH

CHANNEL CHANGE SEE DETAIL HH

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

LATERAL V DITCH SEE DETAIL II

SPRING HOUSE (ABAND)

BARN (REMOVE)

RETAIN 24" CMP

SPRING

WILLIAM B. MULL, JR.

ROGER G. WILSON

GEORGE E. BLANKENSHIP

INTERACTIVE DYNAMX SPACE, LLC

J. B. HARRISON PROPERTIES, LLC

I-26 PAINT & BODY, INC.

APB II, LLC

RETENTION BASIN

HOMINY CREEK

SHUT TO HOMINY CREEK

CONC. BRIDGE

20' SEWER EASEMENT

APPARENT SIGN EASEMENT FOR OUTDOOR ADVERTISING NO DEED NOR DESCRIPTION FOUND

DOGWOOD RD

ROCK LINED DRAINAGE DITCH

ROCK WALL

SHRUBS

FLAG POLE

BOULDER WALL

SOLAR PANEL

END TIP PROJECT I-5504
TIE TO TIP PROJECT B-5178
–L– STA 83+25.00

72" CULVERT EXTENSION

60" STEEL PLATE PIPE

PROPOSED STREAM BED

EXISTING STREAM BED

EXISTING STREAM BED EMBANKMENT

GEOTEXTILE

CLASS I RIP RAP (TYP.)

2:1

VARIES 0' TO 8'

CHANNEL EXCAVATION

FILL

SECTION A–A
LOOKING DOWNSTREAM
NTS

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 0' 50'

FOR –LLT– PROFILE, SEE SHEET NO. 18

FOR –LRT– PROFILE, SEE SHEET NO. 18

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PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

PERMIT DRAWING SHEET 21 OF 26

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 3A

PLUG 2GI

REMOVE DI

TB 2GI

15" RCP-III

60" STEEL PLATE PIPE

RETAIN

PLUG & FILL

15" CSP

ELBOW

CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY GEO

COLLAR AND EXTEND A

CONC HW & WW

PAVED DITCH

HW

TDE

48" WW & 2 SBW

20' SEWER EASEMENT

CHANNEL CHANGE
SEE DETAIL HH

LATERAL V DITCH
SEE DETAIL II

EXISTING R/W

SPRING HOUSE (ABAND)

BARN (ABAND)

24" CMP

SPRING

WILLIAM B. MULL, JR.

ROGER G. WII

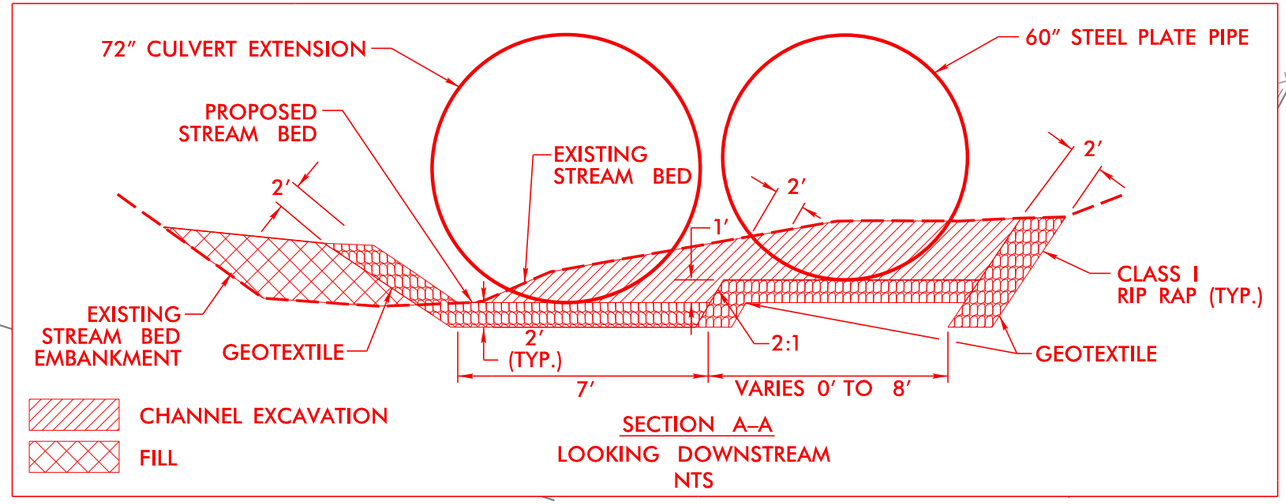
12" WD PRIVACY

12" HDPE

80+00

GEORGE E. BLANKENSHIP

SECTION A–A
LOOKING DOWNSTREAM
NTS



SITE 3A ENLARGEMENT

25' 0' 25'

FOR –LLT– PROFILE, SEE SHEET NO. 18

FOR –LRT– PROFILE, SEE SHEET NO. 18

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RICHARDSON, JACOB
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

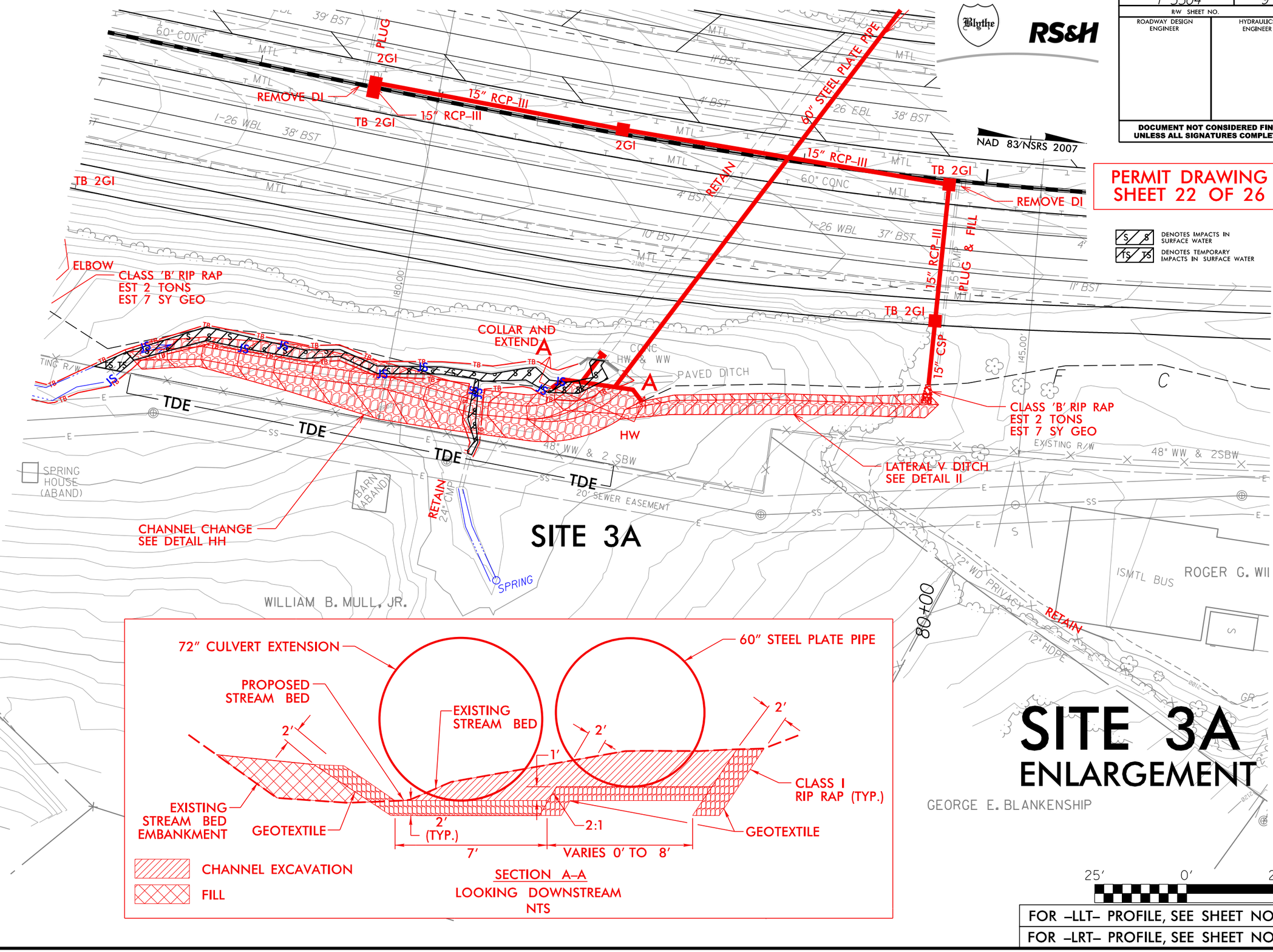
PERMIT DRAWING SHEET 22 OF 26

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 3A

SITE 3A ENLARGEMENT



SECTION A–A
LOOKING DOWNSTREAM
NTS

25' 0' 25'

FOR –LLT– PROFILE, SEE SHEET NO. 18

FOR –LRT– PROFILE, SEE SHEET NO. 18

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SITE 3B
ENLARGEMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe RS&H

NAD 83/NSRS 2007

PERMIT DRAWING SHEET 23 OF 26

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 3B

QUARRY

80+00

SPECIAL LATERAL BASE DITCH SEE DETAIL M

LATERAL BASE DITCH SEE DETAIL KK

CHANNEL CHANGE SEE DETAIL JJ

RIP-RAPPED ENERGY DISSIPATOR BASIN WITH 1.5:1 SIDE SLOPES AND CLASS II RIP RAP SEE DETAIL L

CLASS 'B' RIP RAP EST 2 TONS EST 7 SY GEO

EXISTING 72" CMP TO BE SLIP-LINED

BORE AND JACK 60" STEEL PLATE PIPE

CLASS 'B' RIP RAP EST 3 TONS EST 10 SY GEO

REMOVE DI

REMOV

FOR –LLT– PROFILE, SEE SHEET NO. 18

FOR –LRT– PROFILE, SEE SHEET NO. 18

SITE 3B
ENLARGEMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

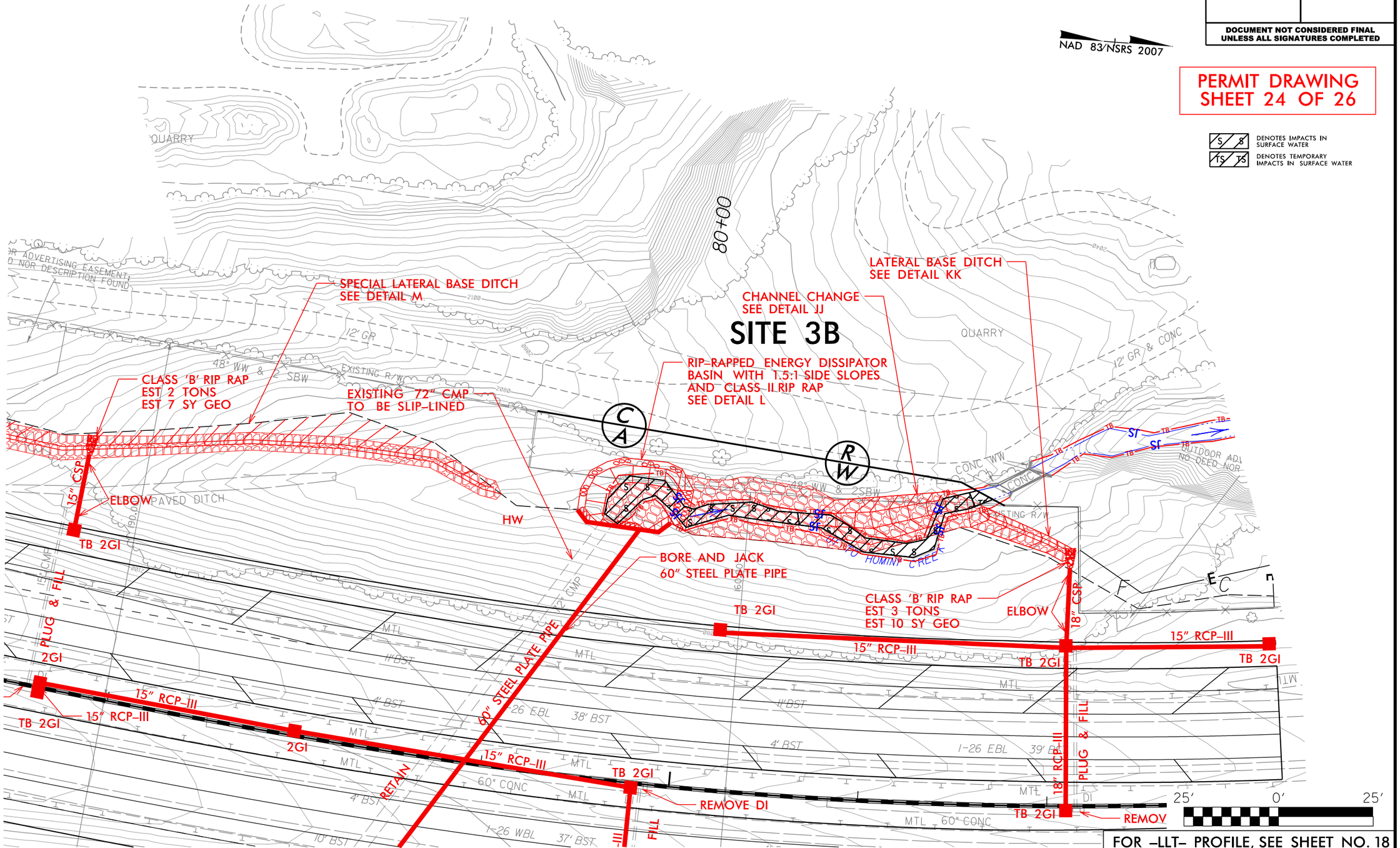
Blythe RS&H

NAD 83/NSRS 2007

PERMIT DRAWING SHEET 24 OF 26

S/S DENOTES IMPACTS IN SURFACE WATER

TS/TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER



FOR –LLT– PROFILE, SEE SHEET NO. 18

FOR –LRT– PROFILE, SEE SHEET NO. 18

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5/14/99

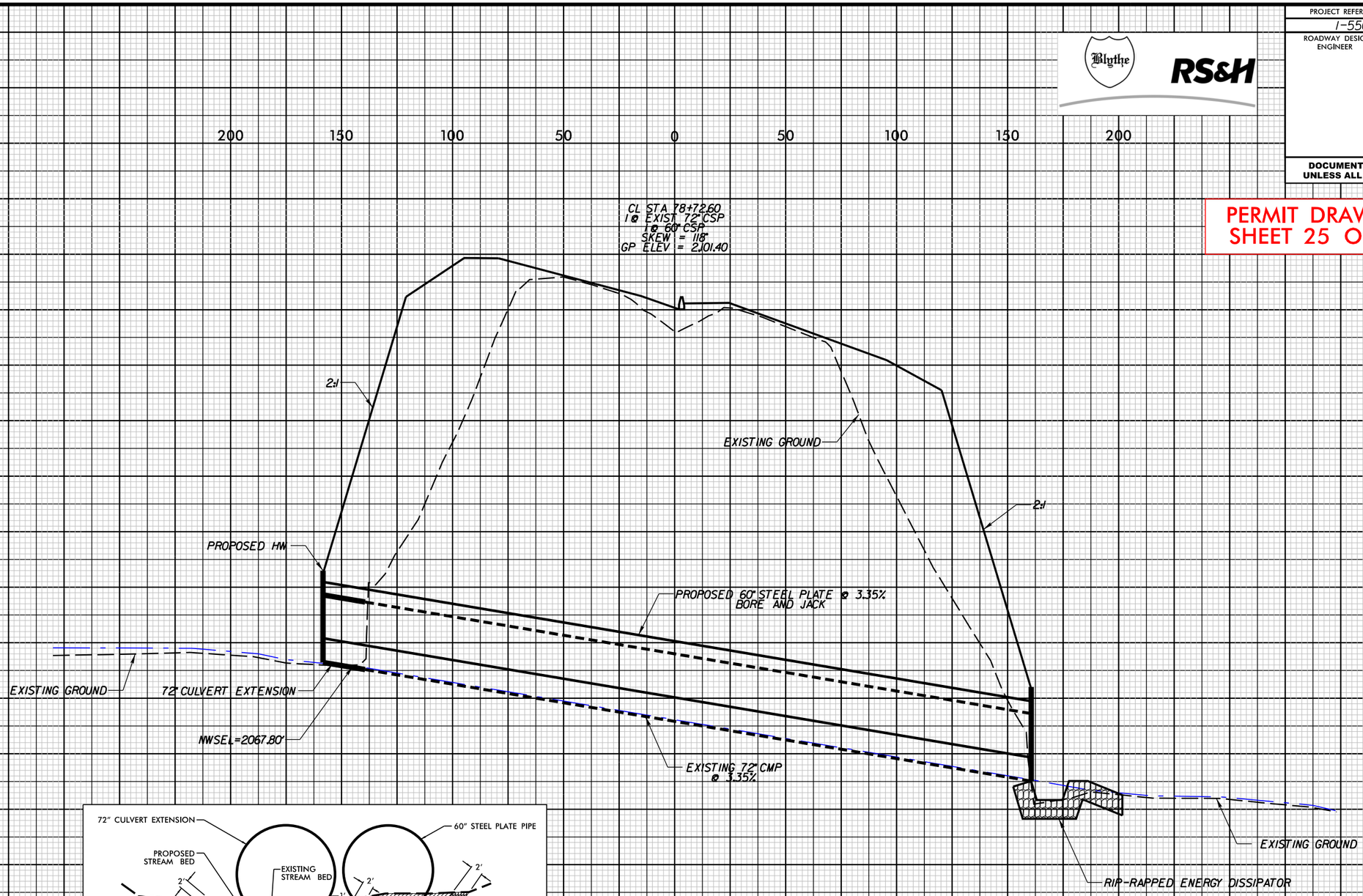
PROJECT REFERENCE NO.	SHEET NO.
I-5504	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

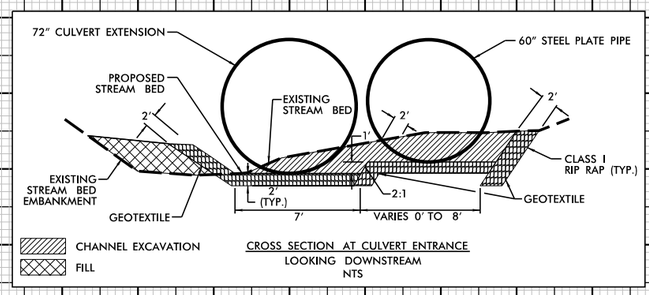
Blythe Engineering

RS&H

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 25 OF 26





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$$$$FILENAME$$$$

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1A	L 24+00 TO 24+30 (LT)	Stream Realignment						< 0.01	< 0.01	20	28	
1A	L 24+30 TO 24+62 (LT)	48" CMP Culvert Extension						< 0.01		38		
1B	L 28+02 TO 28+12 (LT)	66" CMP Culvert Extension						< 0.01		17		
1B	L 28+10 TO 28+20 (LT)	Bank stabilization						< 0.01	< 0.01	23	13	
1B	L 28+29 TO 29+62 (LT)	14' X 14' RCBC Extension	< 0.01					< 0.01				
1C	L 26+30 TO 27+19 (RT)	48", 66" CMP Culverts Ext.						0.03				
1D	L 30+35 TO 30+67 (RT)	Bank stabilization						< 0.01		31		
2A	L 57+72 TO 58+05 (LT)	Stream Realignment						< 0.01	< 0.01	48	10	
2A	L 58+05 TO 58+84 (LT)	42" CMP Culvert Extension	0.01					< 0.01		31		
2B	L 59+15 TO 60+65 (RT)	48",54",60" RCP/Fill						0.01		169		
2B	L 59+59 TO 60+59 (RT)	48",54",60" RCP/Fill	< 0.01					< 0.01		103		
2C	L 60+19 TO 68+91 (RT)	60" RCP/Fill	< 0.01					0.11		742		
2C	L 64+73 TO 65+35 (RT)	60"RCP/Fill						< 0.01		71		
2C	L 67+80 TO 68+07 (RT)	Rip Rap in Channel						< 0.01		33		
2C	L 68+07 TO 68+34 (RT)	Bank stabilization						< 0.01	< 0.01	32	5	
3A	L 75+45 TO 78+04 (RT)	Stream Realignment						0.03	< 0.01	256	13	
3A	L 78+04 TO 78+15 (RT)	72" CMP Culvert Extension						< 0.01		18		
3A	L 77+46 TO 77+48 (RT)	Rip Rap in Channel						< 0.01	< 0.01	33	10	
3B	L 79+50 TO 81+78 (LT)	Stream Realignment						0.04	< 0.01	223	8	
TOTALS*:			0.02					0.28	0.01	1888	87	

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
2 November 2016
Buncombe County
I-5504
45552.3.1

See Sheet 1A For Index of Sheets
See Sheet 1B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I–5504	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
45552.3.1	IMF–026–1(191)47	P.E.
45552.3.1	IMF–026–1(191)47	R/W, UTIL.

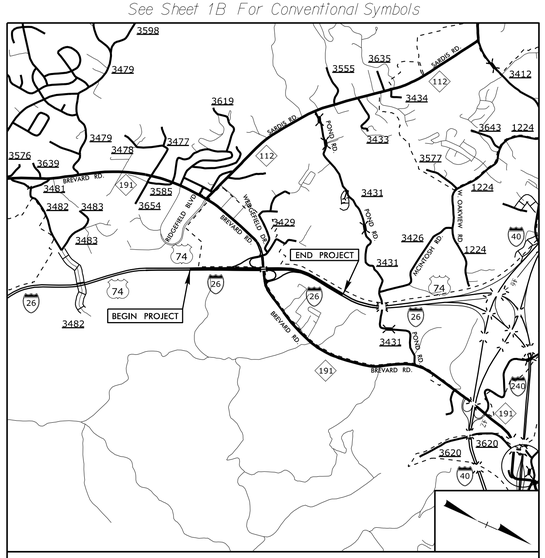
BUNCOMBE COUNTY

LOCATION: I–26/NC 191 (BREVARD ROAD) INTERCHANGE MODIFICATIONS AND I–26 WIDENING AND PAVEMENT RECONSTRUCTION

TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, CULVERT, RETAINING WALLS, SOUND WALLS, SIGNALS, AND SIGNING

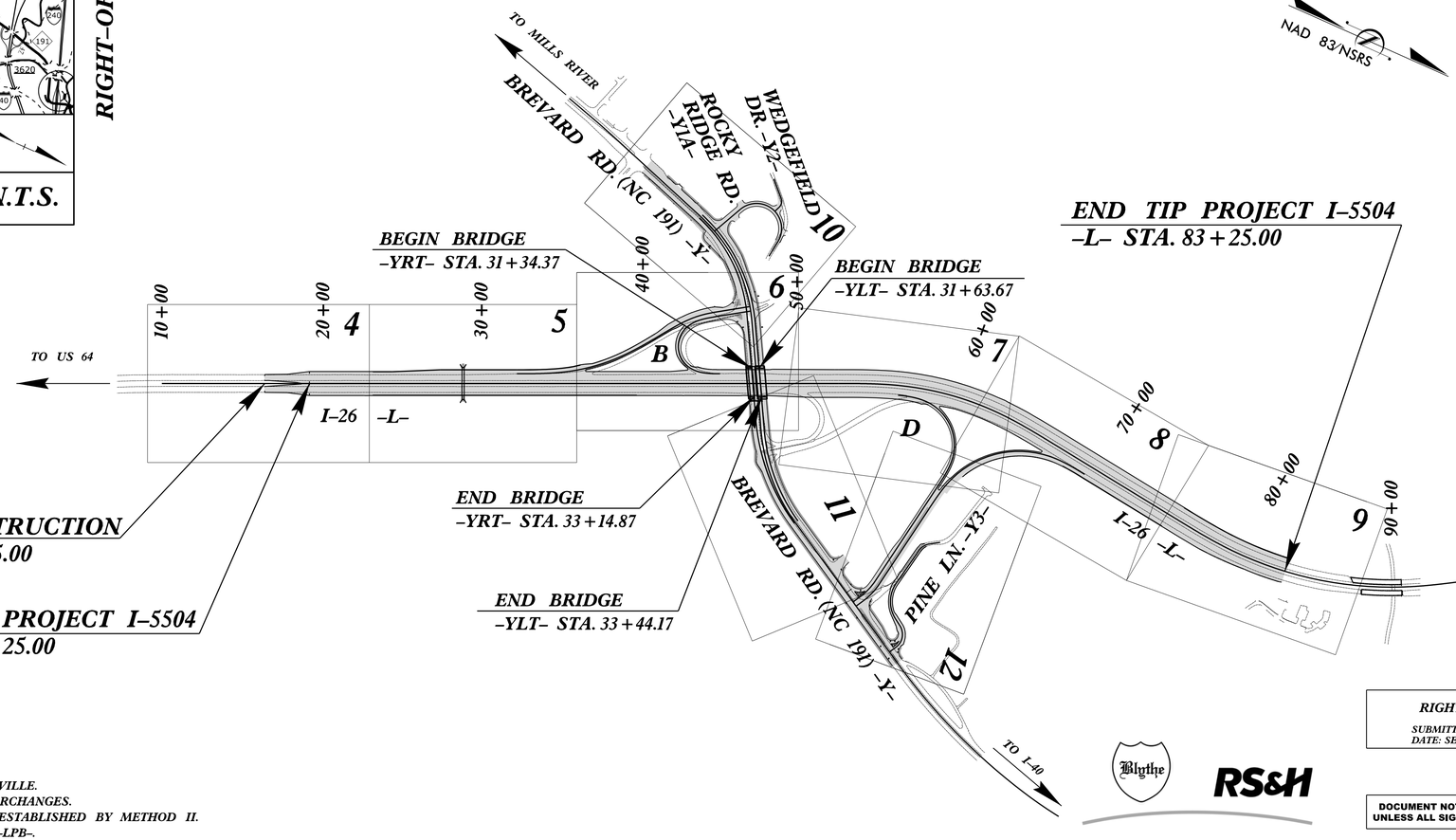
TIP PROJECT: I–5504

CONTRACT: C203754



VICINITY MAP ***N.T.S.***

RIGHT–OF–WAY



RIGHT–OF–WAY
SUBMITTAL NO. D–011R2
DATE: SEPTEMBER 19, 2016

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF ASHEVILLE.
THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS TO INTERCHANGES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO LIMITS ESTABLISHED BY METHOD II.
DESIGN EXCEPTION REQUIRED FOR THE HORIZONTAL RADII OF –LPB–.

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2016	=	95,900
ADT 2040	=	118,300
DHV	=	10 %
D	=	55 %
T	=	14 % *
V	=	70 MPH

* (TTST =10% + DUAL =4%)
FUNC CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT I–5504	=	1.212 MILES
LENGTH STRUCTURE TIP PROJECT I–5504	=	0.000 MILES
TOTAL LENGTH TIP PROJECT I–5504	=	1.212 MILES

*NOTE: EASTBOUND LANES USED TO CALCULATE LENGTH OF PROJECT.

K. ZAK HAMIDI, PE
NCDOT CONTACT– PROJECT ENGINEER DESIGN–BUILD UNIT

Prepared in the Office of:
RS&H
ARCHITECTS–ENGINEERS–PLANNERS, INC.
8601 SIX FORKS ROAD, SUITE 260
RALEIGH, NC 27615

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
FEBRUARY 16, 2016

LETTING DATE:
FEBRUARY 16, 2016

JASON TALLEY, PE
PROJECT ENGINEER

ALLISON DRAKE, PE
PROJECT DESIGN ENGINEER

HYDRAULIC DESIGN ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PROJECT REFERENCE NO.	SHEET NO.
I-5504	1B

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

Note: Not to Scale **S.U.E. = Subsurface Utility Engineering*

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Existing Historic Property Boundary — HPB
- Known Contamination Area: Soil
- Potential Contamination Area: Soil
- Known Contamination Area: Water
- Potential Contamination Area: Water
- Contaminated Site: Known or Potential

BUILDINGS AND OTHER CULTURE:

- Gas Pump Vent or U/G Tank Cap
- Sign — S
- Well — W
- Small Mine
- Foundation
- Area Outline
- Cemetery
- Building
- School
- Church
- Dam

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- Jurisdictional Stream — JS
- Buffer Zone 1 — BZ 1
- Buffer Zone 2 — BZ 2
- Flow Arrow
- Disappearing Stream
- Spring
- Wetland
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite R/W Marker — RW
- Proposed Control of Access Line with Concrete C/A Marker — CA
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Drainage / Utility Easement — DUE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Aerial Utility Easement — AUE
- Proposed Permanent Easement with Iron Pin and Cap Marker

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Curb Ramp
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

VEGETATION:

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

EXISTING STRUCTURES:

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H–Frame Pole
- U/G Power Line LOS B (S.U.E.*) — P
- U/G Power Line LOS C (S.U.E.*) — P
- U/G Power Line LOS D (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- U/G Telephone Cable LOS B (S.U.E.*) — T
- U/G Telephone Cable LOS C (S.U.E.*) — T
- U/G Telephone Cable LOS D (S.U.E.*) — T
- U/G Telephone Conduit LOS B (S.U.E.*) — TC
- U/G Telephone Conduit LOS C (S.U.E.*) — TC
- U/G Telephone Conduit LOS D (S.U.E.*) — TC
- U/G Fiber Optics Cable LOS B (S.U.E.*) — T FO
- U/G Fiber Optics Cable LOS C (S.U.E.*) — T FO
- U/G Fiber Optics Cable LOS D (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- U/G Water Line LOS B (S.U.E*) — W
- U/G Water Line LOS C (S.U.E*) — W
- U/G Water Line LOS D (S.U.E*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- U/G TV Cable LOS B (S.U.E.*) — TV
- U/G TV Cable LOS C (S.U.E.*) — TV
- U/G TV Cable LOS D (S.U.E.*) — TV
- U/G Fiber Optic Cable LOS B (S.U.E.*) — TV FO
- U/G Fiber Optic Cable LOS C (S.U.E.*) — TV FO
- U/G Fiber Optic Cable LOS D (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- U/G Gas Line LOS B (S.U.E.*) — G
- U/G Gas Line LOS C (S.U.E.*) — G
- U/G Gas Line LOS D (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- SS Forced Main Line LOS B (S.U.E.*) — FSS
- SS Forced Main Line LOS C (S.U.E.*) — FSS
- SS Forced Main Line LOS D (S.U.E.*) — FSS

MISCELLANEOUS:

- Utility Pole
- Utility Pole with Base
- Utility Located Object
- Utility Traffic Signal Box — S
- Utility Unknown U/G Line LOS B (S.U.E.*) — ?UTL
- U/G Tank; Water, Gas, Oil
- Underground Storage Tank, Approx. Loc. — UST
- A/G Tank; Water, Gas, Oil
- Geoenvironmental Boring
- U/G Test Hole LOS A (S.U.E.*)
- Abandoned According to Utility Records — AATUR
- End of Information — E.O.I.

PAVEMENT SCHEDULE

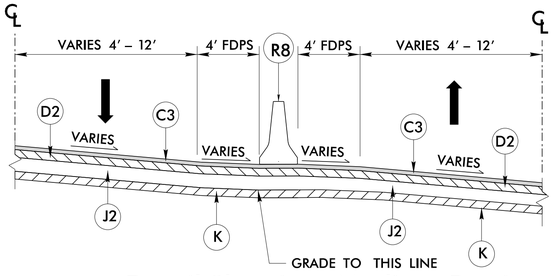
PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

A	10.5″ JOINTED CONCRETE PAVEMENT WITH DOWELS	E1	PROP. APPROX. 4″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	R3	CONCRETE BARRIER TYPE "T"
C1	PROP. APPROX. 1.25″ ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD.	E2	PROP. APPROX. 5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YD.	R4	SINGLE FACED CONCRETE BARRIER
C2	PROP. APPROX. 2.5″ ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	E3	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 4″ IN DEPTH OR GREATER THAN 5.5″ IN DEPTH.	R5	5″ MONOLITHIC CONCRETE ISLAND (KEYED IN)
C3	PROP. APPROX. 3″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	E4	PROP. APPROX. 9″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	R6	EXPRESSWAY GUTTER
C4	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1.5″ OR GREATER THAN 2″ IN DEPTH.	E5	PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 4″ IN DEPTH OR GREATER THAN 5.5″ IN DEPTH.	R7	SHOULDER BERM GUTTER
C5	PROP. APPROX. 3″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS.	J1	PROP. 6″ AGGREGATE BASE COURSE.	R8	32″ MEDIAN BARRIER WITH 14″ GLARE SCREEN
C6	PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5D, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YD. PER 1″ DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 1.5″ OR GREATER THAN 2″ IN DEPTH.	J2	PROP. 8″ AGGREGATE BASE COURSE.	S	4″ CONCRETE SIDEWALK
D1	PROP. APPROX. 2.5″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YD.	K	LIME TO A DEPTH OF 8″ AT A RATE OF 20 LBS. PER SQ. YD. OR CEMENT TO A DEPTH OF 7″ AT A RATE 55 LBS. PER SQ. YD.	T	EARTH MATERIAL
D2	PROP. APPROX. 4″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD.	P	PRIME COAT	U	EXISTING PAVEMENT
D3	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2.5″ IN DEPTH OR GREATER THAN 4″ IN DEPTH.	R1	1′-6″ CONCRETE CURB AND GUTTER	W	VARIABLE DEPTH ASPHALT PAVEMENT (SEE WEDGING DETAILS)
D4	PROP. APPROX. 3″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0D, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YD.	R2	2′-6″ CONCRETE CURB AND GUTTER	X	3.0″ PERMEABLE ASPHALT DRAINAGE COURSE (PADC)
D5	PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0D, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 2.5″ IN DEPTH OR GREATER THAN 4″ IN DEPTH.				

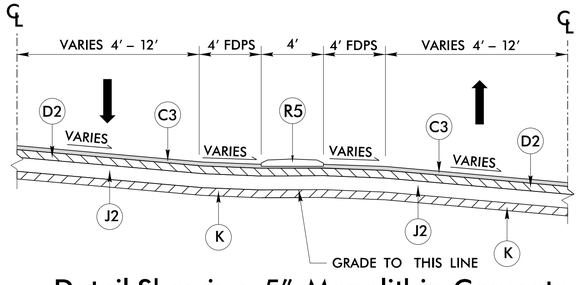
NOTE: PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE.

PAVEMENT SCHEDULE			
A	10.5″ CONCRETE	E5	VAR. DEPTH B25.0C
C1	1.25″ SF9.5A	J2	8″ ABC
C3	3″ S9.5B	K	STABILIZED SUBGRADE
C4	VAR. DEPTH S9.5B	R5	CONCRETE ISLAND
C5	3″ S9.5D	R6	EXPRESSWAY GUTTER
C6	VAR. DEPTH S9.5D	R7	SHOULDER BERM GUTTER
D2	4″ I19.0B	R8	MEDIAN BARRIER WITH GLARE SCREEN
D3	VAR. DEPTH I19.0B	T	EARTH MATERIAL
D4	3″ I19.0D	U	EXIST. PAVEMENT
D5	VAR. DEPTH I19.0D	X	3″ PADC
E3	VAR. DEPTH B25.0B		



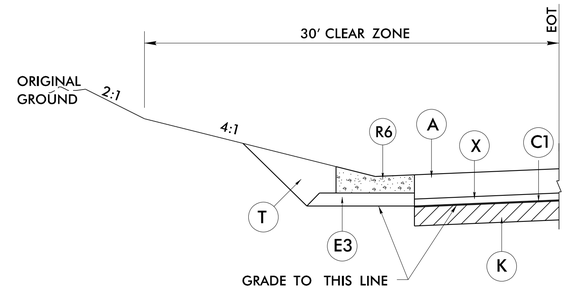
Detail Showing Median Barrier With Glare Screen Between Ramps and Loops

SEE PLANS FOR LOCATIONS



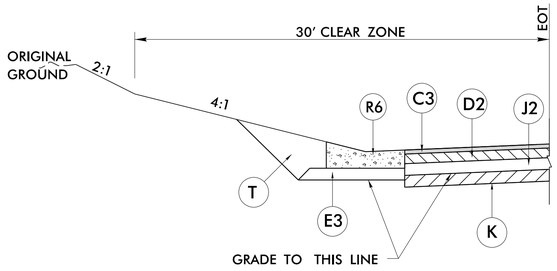
Detail Showing 5″ Monolithic Concrete Island Between Ramps and Loops

SEE PLANS FOR LOCATIONS



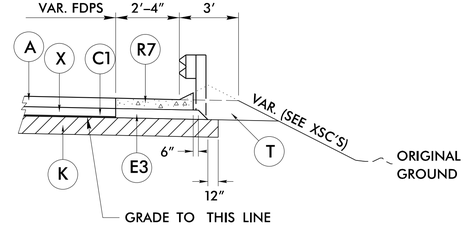
Detail Showing Paved Shoulder in Relation to Expressway Gutter – Mainline

SEE PLANS FOR LOCATIONS
USE WITH –L– TYPICAL SECTION



Detail Showing Paved Shoulder in Relation to Expressway Gutter – RPD

SEE PLANS FOR LOCATIONS
USE WITH –RPD– TYPICAL SECTION



Detail Showing Paved Shoulder in Relation to Shoulder Berm Gutter – Mainline

SEE PLANS FOR LOCATIONS
USE WITH –L– TYPICAL SECTION

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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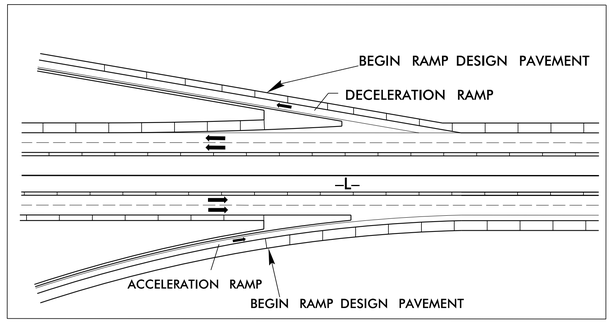
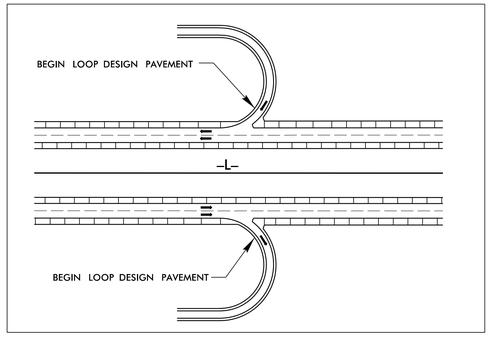
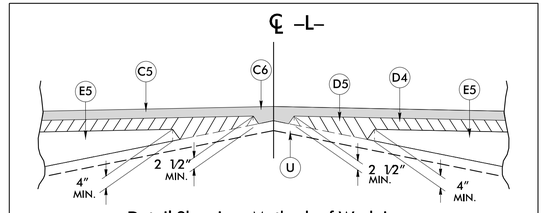


DETAIL SHOWING LIMITS OF PAVEMENT DESIGN

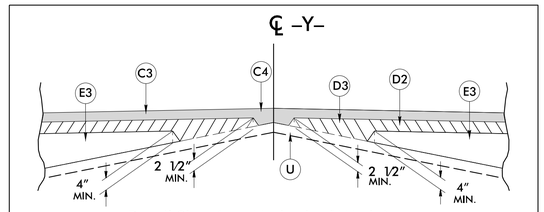


DETAIL SHOWING LIMITS OF PAVEMENT DESIGN



Detail Showing Method of Wedging

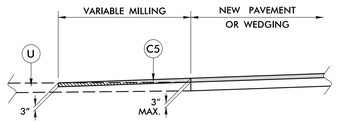
SEE PLANS FOR ALL WEDGING LOCATIONS



Detail Showing Method of Wedging

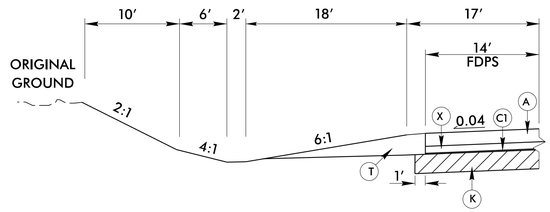
SEE PLANS FOR ALL WEDGING LOCATIONS

PAVEMENT SCHEDULE			
A	10.5″ CONCRETE	K	STABILIZED SUBGRADE
C1	1.25″ SF9.5A	R3	CONC. BARRIER "T"
C5	3″ S9.5D	T	EARTH MATERIAL
C6	VAR. DEPTH S9.5D	U	EXIST. PAVEMENT
D4	3″ I19.0D	W	WEDGING
E4	9″ B25.0C	X	3″ PADC



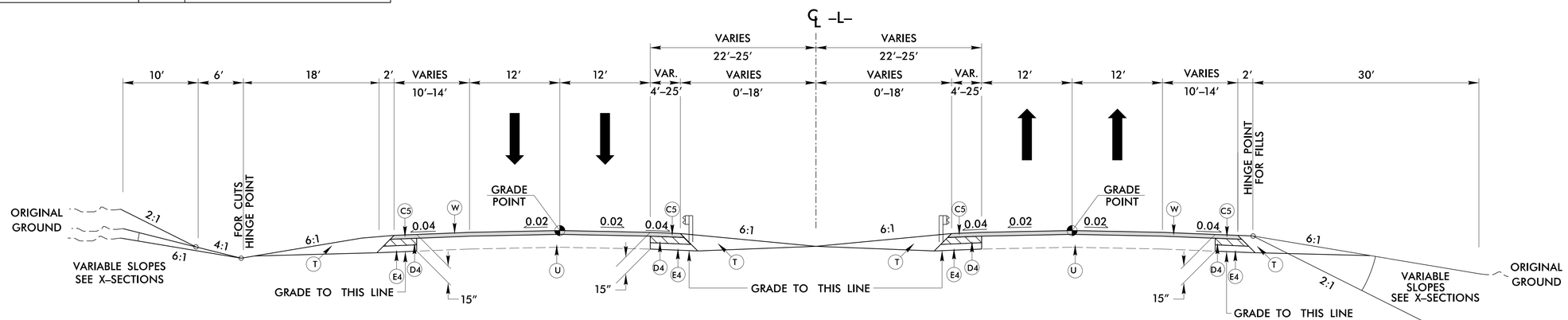
Detail Showing Milling At Pavement Tie–Ins

–L– STA. 16+45.00 TO STA. 16+70.00



Detail Showing Stormwater Management Ditches

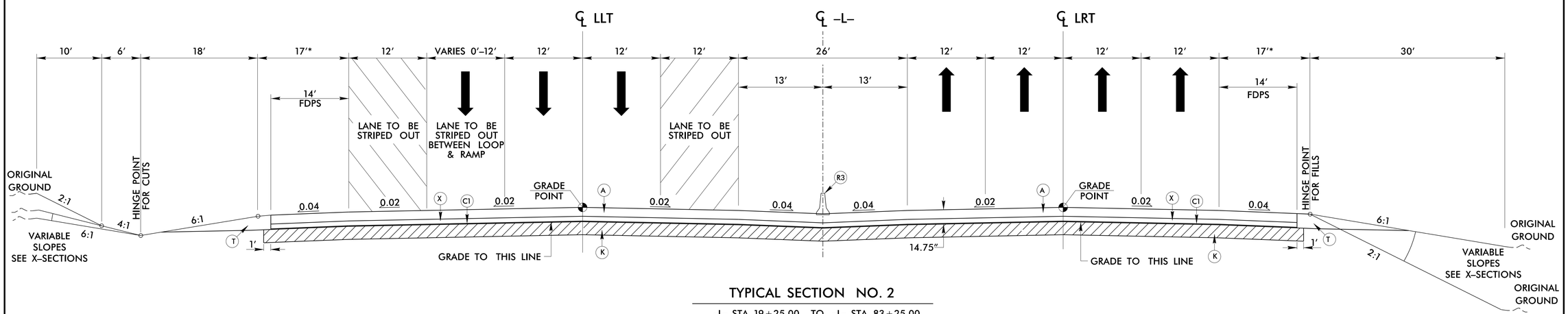
–L– STA. 36+00.00 TO STA. 37+00.00 LT.
–L– STA. 43+50.00 TO STA. 46+00.00 LT.
–L– STA. 62+50.00 TO STA. 65+30.00 LT.
–L– STA. 56+00.00 TO STA. 56+50.00 RT.



TYPICAL SECTION NO. 1

–L– STA. 16+45.00 TO –L– STA. 19+25.00

*NOTE: RUMBLE STRIPS TO BE APPLIED TO INSIDE MEDIAN AND OUTSIDE SHOULDERS IN ACCORDANCE WITH STANDARD DRAWING 665.01 AND 720.01



TYPICAL SECTION NO. 2

–L– STA. 19+25.00 TO –L– STA. 83+25.00

*NOTE: SEE SHEET 2B–1 FOR TYPICAL SECTION UNDER BRIDGE, RUMBLE STRIPS TO BE APPLIED TO INSIDE MEDIAN AND OUTSIDE SHOULDERS IN ACCORDANCE WITH STANDARD DRAWING 665.01 AND 720.01

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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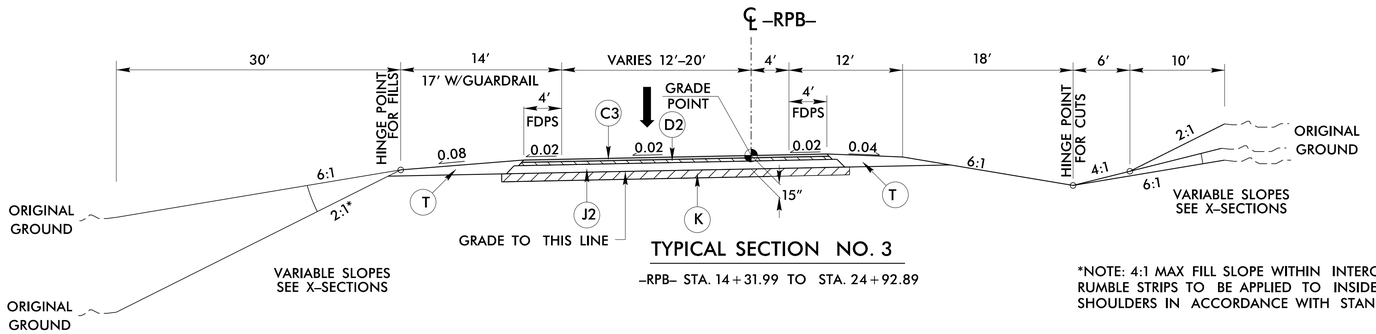
PAVEMENT SCHEDULE	
C3	3″ S9.5B
D2	4″ I19.0B
J1	6″ ABC
J2	8″ ABC
K	STABILIZED SUBGRADE
R2	2′-6″ C & G
R4	SINGLE FACED BARRIER
T	EARTH MATERIAL

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

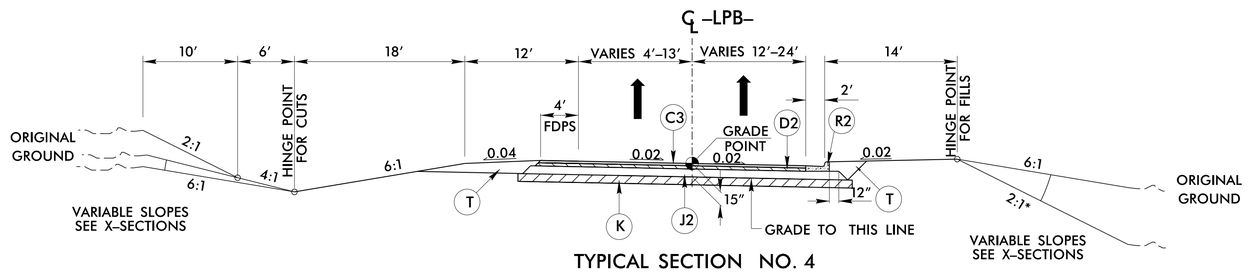
RS&H



TYPICAL SECTION NO. 3

–RPB– STA. 14+31.99 TO STA. 24+92.89

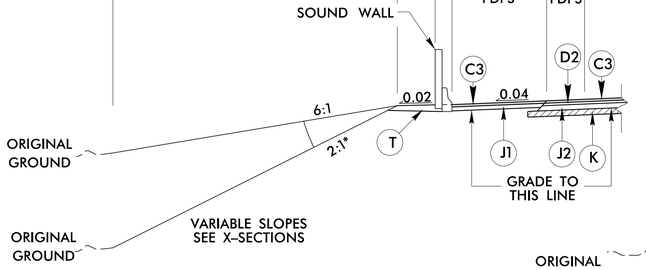
*NOTE: 4:1 MAX FILL SLOPE WITHIN INTERCHANGE, RUMBLE STRIPS TO BE APPLIED TO INSIDE MEDIAN AND OUTSIDE SHOULDERS IN ACCORDANCE WITH STANDARD DRAWING 665.01



TYPICAL SECTION NO. 4

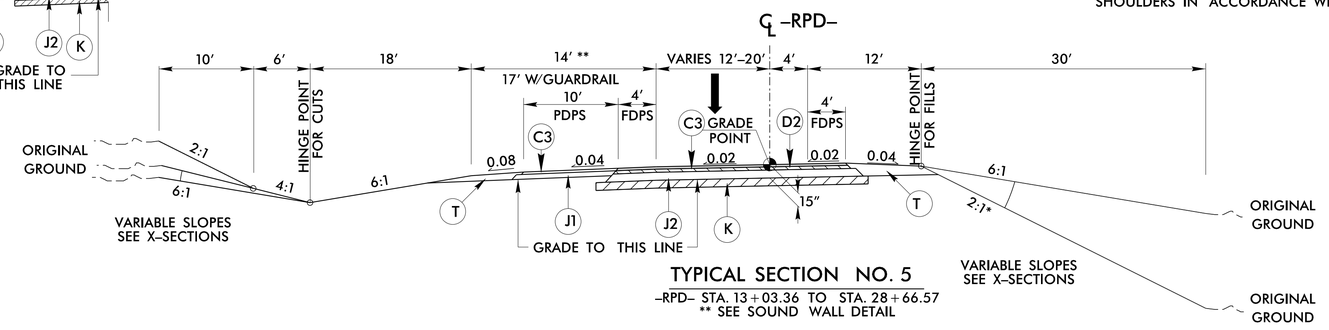
–LPB– STA. 12+04.97 TO STA. 18+55.04

*NOTE: 4:1 MAX FILL SLOPE WITHIN INTERCHANGE, RUMBLE STRIPS TO BE APPLIED TO INSIDE MEDIAN AND OUTSIDE SHOULDERS IN ACCORDANCE WITH STANDARD DRAWING 665.01



Detail Showing Paved Shoulder In Relation to Sound Wall

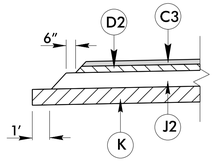
–RPD– STA. 11+52.25 TO STA. 20+00.00



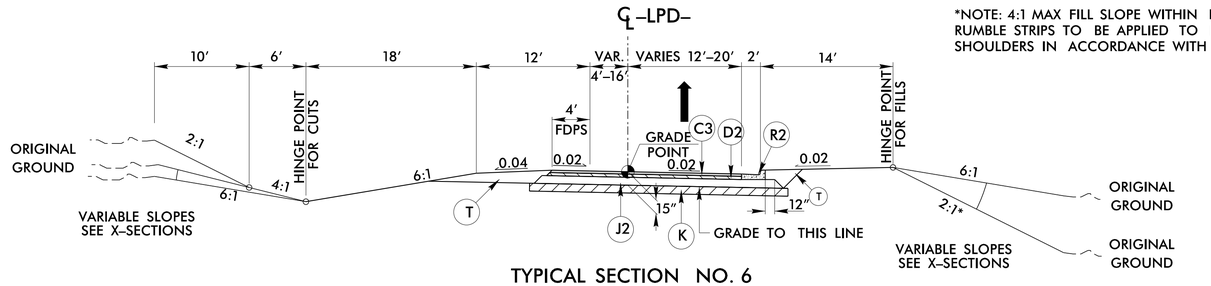
TYPICAL SECTION NO. 5

–RPD– STA. 13+03.36 TO STA. 28+66.57
** SEE SOUND WALL DETAIL

*NOTE: 4:1 MAX FILL SLOPE WITHIN INTERCHANGE, RUMBLE STRIPS TO BE APPLIED TO INSIDE MEDIAN AND OUTSIDE SHOULDERS IN ACCORDANCE WITH STANDARD DRAWING 665.01



Detail Showing Pavement For Ramps and Loops



TYPICAL SECTION NO. 6

–LPD– STA. 12+71.56 TO STA. 26+65.19

*NOTE: 4:1 MAX FILL SLOPE WITHIN INTERCHANGE, RUMBLE STRIPS TO BE APPLIED TO INSIDE MEDIAN AND OUTSIDE SHOULDERS IN ACCORDANCE WITH STANDARD DRAWING 665.01

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$$$$USERNAME$$$$

PAVEMENT SCHEDULE	
C3	3″ S9.5B
D2	4″ I19.0B
E2	5″ B25.0B
R1	1′-6″ C & G
R2	2′-6″ C & G
R5	CONCRETE ISLAND
S	4″ SIDEWALK
T	EARTH MATERIAL
U	EXIST. PAVEMENT
W	WEDGING

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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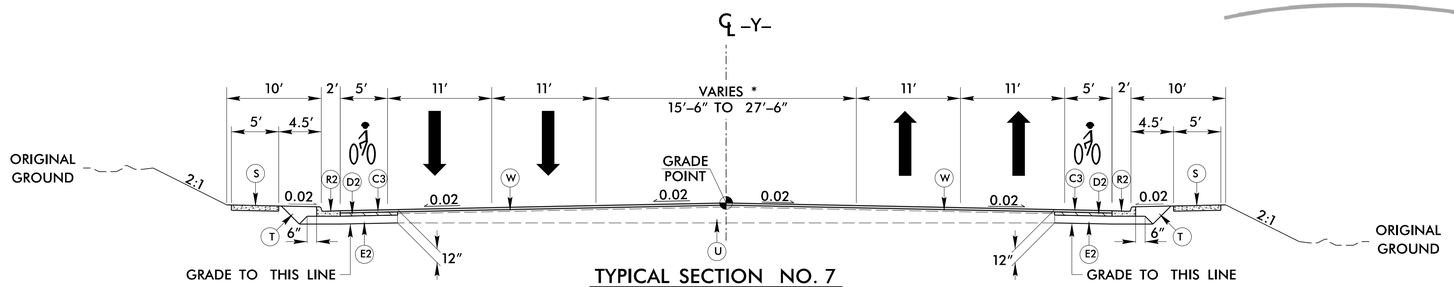
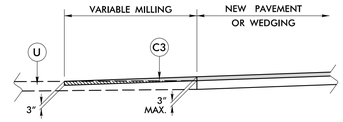


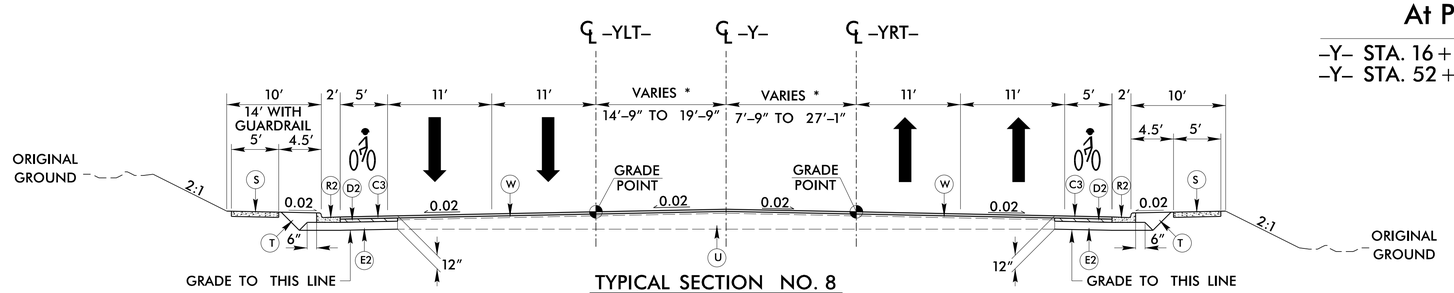
TYPICAL SECTION NO. 7

–Y– STA. 16+60.00 TO STA. 21+08.12 LT. AND RT.
–Y– STA. 41+66.19 TO STA. 52+50.00 LT. AND RT.
* SEE LEFT TURN DETAILS ON SHEET 2A–6



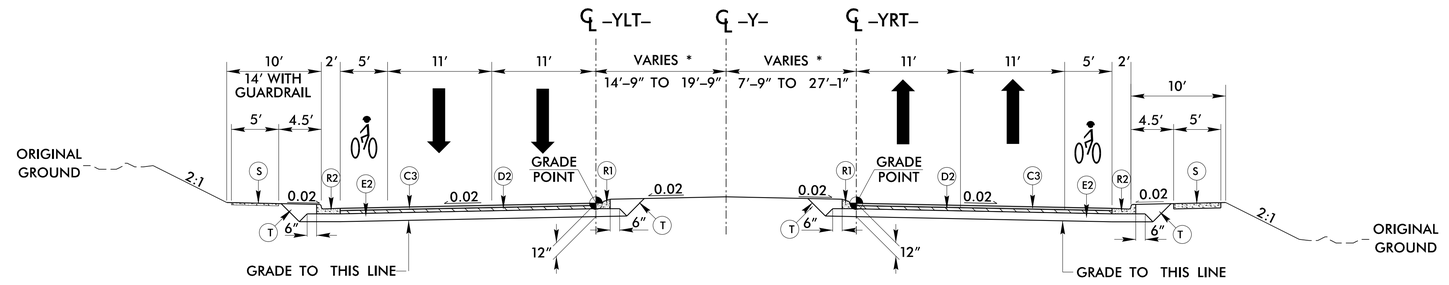
Detail Showing Milling At Pavement Tie–Ins

–Y– STA. 16+30.00 TO STA. 16+60.00
–Y– STA. 52+25.00 TO STA. 52+50.00



TYPICAL SECTION NO. 8

–Y– STA. 21+08.12 TO STA. 26+50.00 LT.
–Y– STA. 21+08.12 TO STA. 21+96.95 RT.
–Y– STA. 38+50.00 LT. TO STA 41+66.19 LT.
–Y– STA. 38+00.81 TO STA. 41+66.19 RT.
*SEE LEFT TURN DETAILS ON SHEET 2A–6



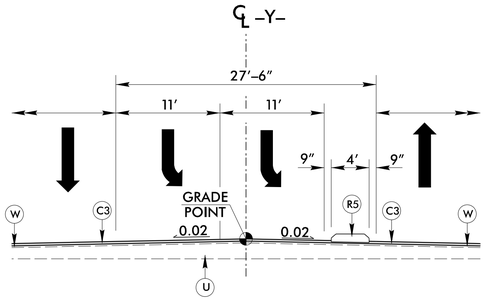
TYPICAL SECTION NO. 9

–Y– STA. 26+50.00 LT. TO –YLT– STA. 31+63.67 (BEGIN BRIDGE)
–Y– STA. 21+96.95 RT. TO –YRT– STA. 31+34.37 (BEGIN BRIDGE)
–YLT– STA. 33+44.17 (END BRIDGE) TO STA. 38+50.00 LT.
–YRT– STA. 33+14.87 (END BRIDGE) TO STA. 38+00.81 RT.
* SEE LEFT TURN DETAILS ON SHEET 2A–6

PAVEMENT SCHEDULE	
C3	3″ S9.5B
D2	4″ I19.0B
E2	5″ B25.0B
R1	1′-6″ C & G
R5	CONCRETE ISLAND
T	EARTH MATERIAL
U	EXIST. PAVEMENT
W	WEDGING

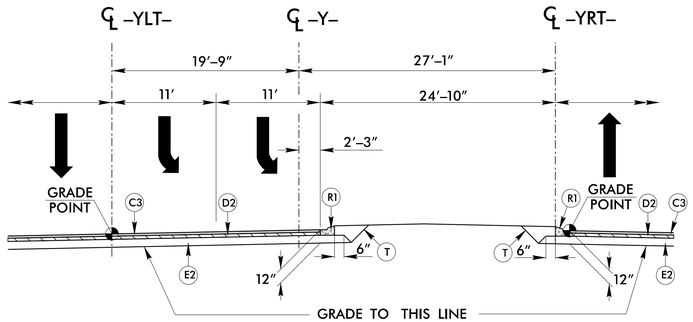
PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



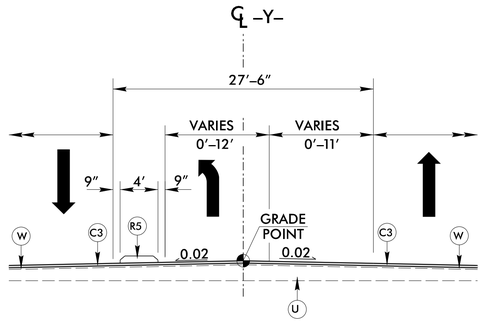
LEFT TURN DETAIL A

–Y– STA. 16+30.00 TO STA. 18+60.00



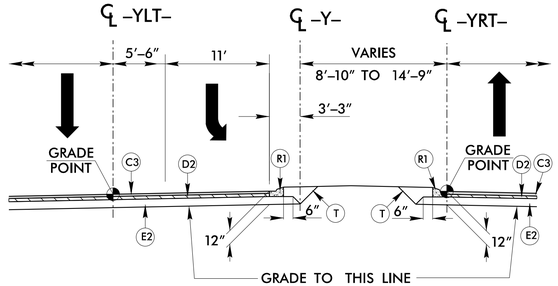
LEFT TURN DETAIL D

–Y– STA. 28+27.87 TO STA. 33+87.76



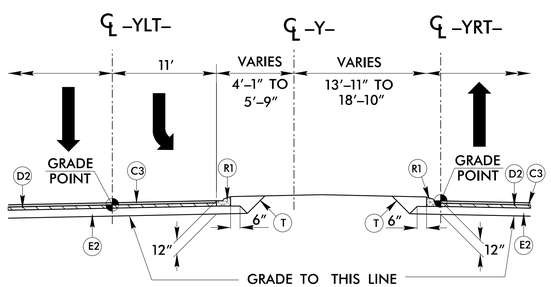
LEFT TURN DETAIL B

–Y– STA. 20+60.00 TO STA. 21+80.03



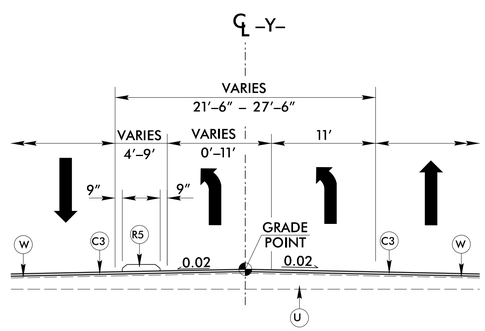
LEFT TURN DETAIL E

–Y– STA. 37+73.19 TO STA. 40+13.56



LEFT TURN DETAIL C

–Y– STA. 23+07.31 TO STA. 25+72.92

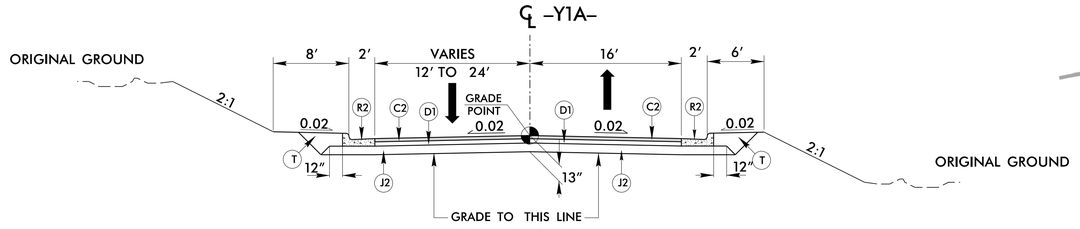


LEFT TURN DETAIL F

–Y– STA. 41+66.19 TO STA. 47+50.00

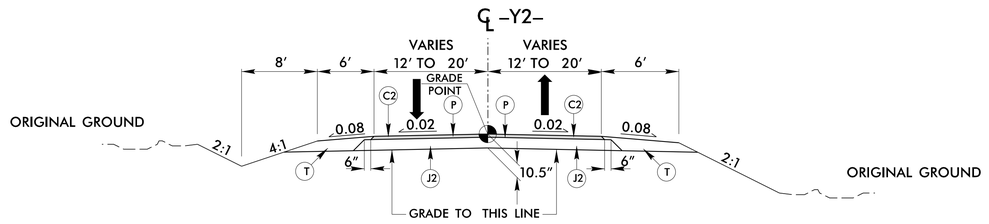
–Y– STA. 50+00.00 TO STA. 51+04.12

PAVEMENT SCHEDULE	
C2	2.5″ SF9.5A
D1	2.5″ I19.0B
E2	4″ B25.0B
J2	8″ ABC
P	PRIME COAT
T	EARTH MATERIAL
U	EXIST. PAVEMENT



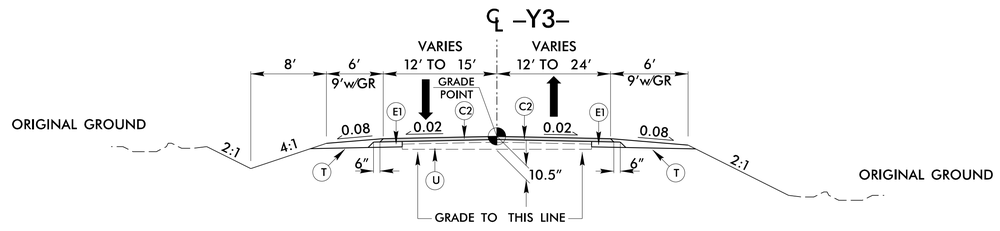
TYPICAL SECTION NO. 10

–Y1A– STA. 10+41.90 TO STA. 17+20.00



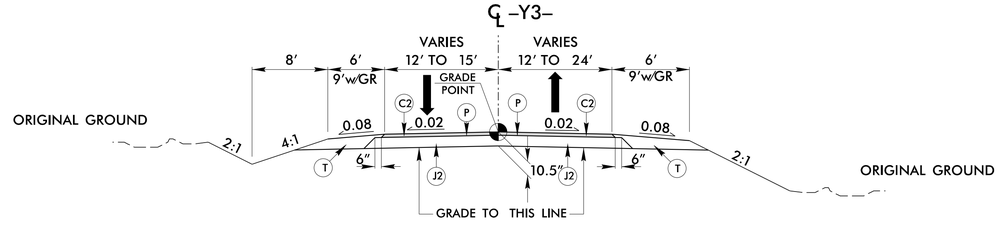
TYPICAL SECTION NO. 11

–Y2– STA. 10+12.00 TO STA. 12+27.00



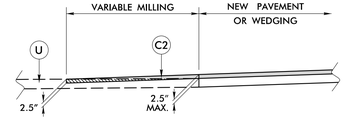
TYPICAL SECTION NO. 12

–Y3– STA. 10+93.00 TO STA. 12+75.00



TYPICAL SECTION NO. 13

–Y3– STA. 12+75.00 TO STA. 18+49.89



Detail Showing Milling At Payment Tie–Ins

–Y3– STA. 10+93.00 TO STA. 11+18.00

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2A-7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STRUCTURE TYPICAL SECTIONS

–YPGLRT– STRUCTURE

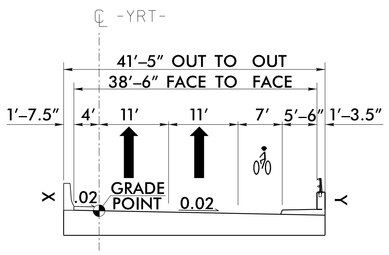
–YPGLRT– (NC 191 / BREVARD RD. NB) OVER –L– (I–26)

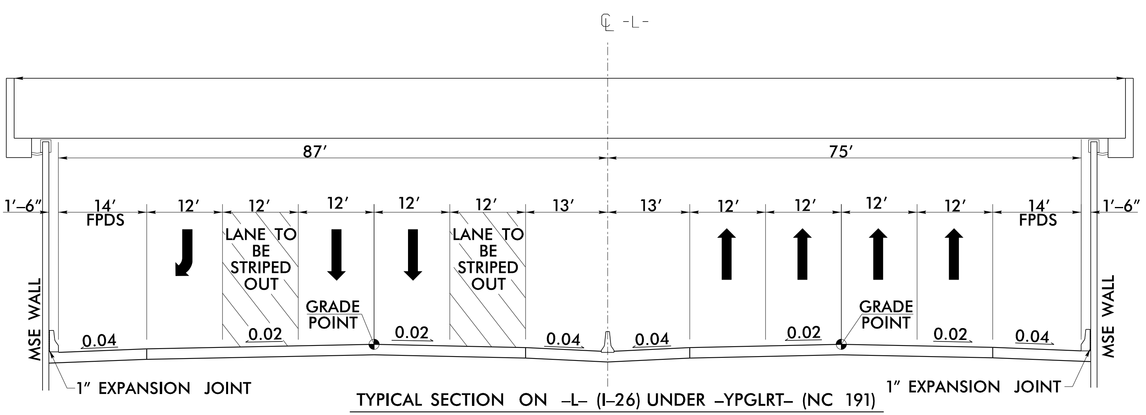
DESIGN DATA	–L–	–Y–
2016 ADT	95,900	29,400
2040 ADT	118,300	34,100
DHV (%)	10	10
D (%)	55	55
DUAL (%)	4	4
TTST (%)	10	2
V (MPH)	70	50
FUNC CLASS	INTERSTATE	MINOR ARTERIAL

MINIMUM VERTICAL CLEARANCE = 17′–0″

⋊ INSIDE BRIDGE BARRIER RAIL IN ACCORDANCE WITH STD. DRAWING CBR1

⋋ OUTSIDE BRIDGE BARRIER RAIL IN ACCORDANCE WITH STD. DRAWINGS BMR2, BMR3, AND BMR4





TYPICAL SECTION ON –L– (I–26) UNDER –YPGLRT– (NC 191)

–Y– STRUCTURE

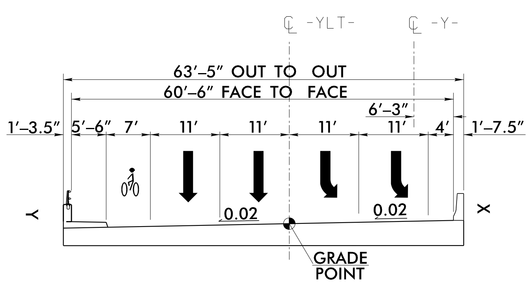
–Y– (NC 191 / BREVARD RD. SB) OVER –L– (I–26)

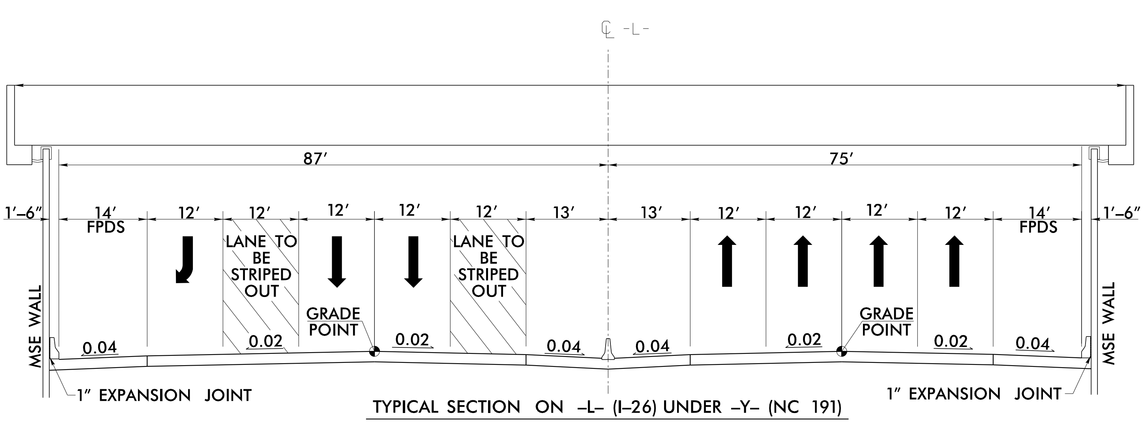
DESIGN DATA	–L–	–Y–
2016 ADT	95,900	29,400
2040 ADT	118,300	34,100
DHV (%)	10	10
D (%)	55	55
DUAL (%)	4	4
TTST (%)	10	2
V (MPH)	70	50
FUNC CLASS	INTERSTATE	MINOR ARTERIAL

MINIMUM VERTICAL CLEARANCE = 17′–0″

⋊ INSIDE BRIDGE BARRIER RAIL IN ACCORDANCE WITH STD. DRAWING CBR1

⋋ OUTSIDE BRIDGE BARRIER RAIL IN ACCORDANCE WITH STD. DRAWINGS BMR2, BMR3, AND BMR4





TYPICAL SECTION ON –L– (I–26) UNDER –Y– (NC 191)

RS&H

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

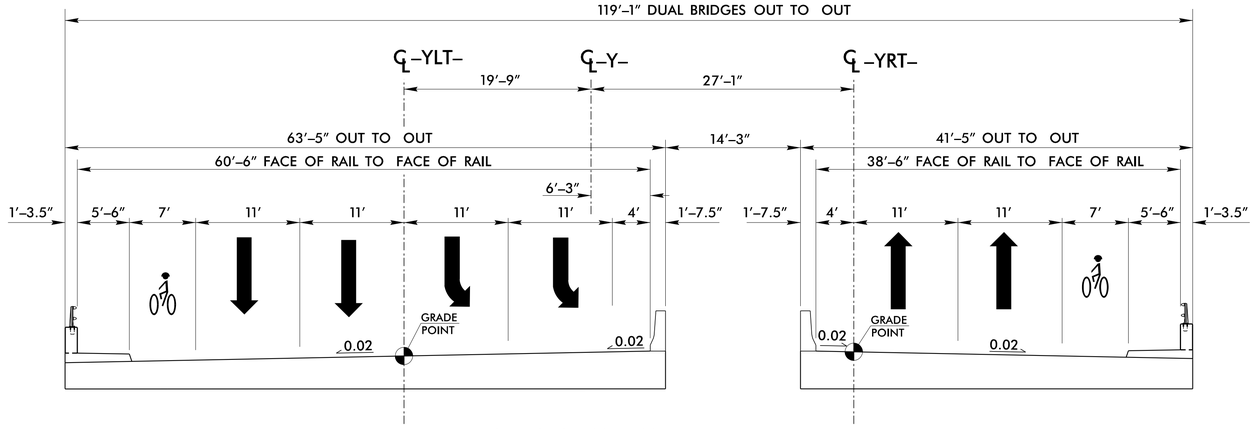
PROJECT REFERENCE NO. I-5504

SHEET NO. 2B-1

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RELATIONSHIP BETWEEN –Y–, –YLT– & –YRT–



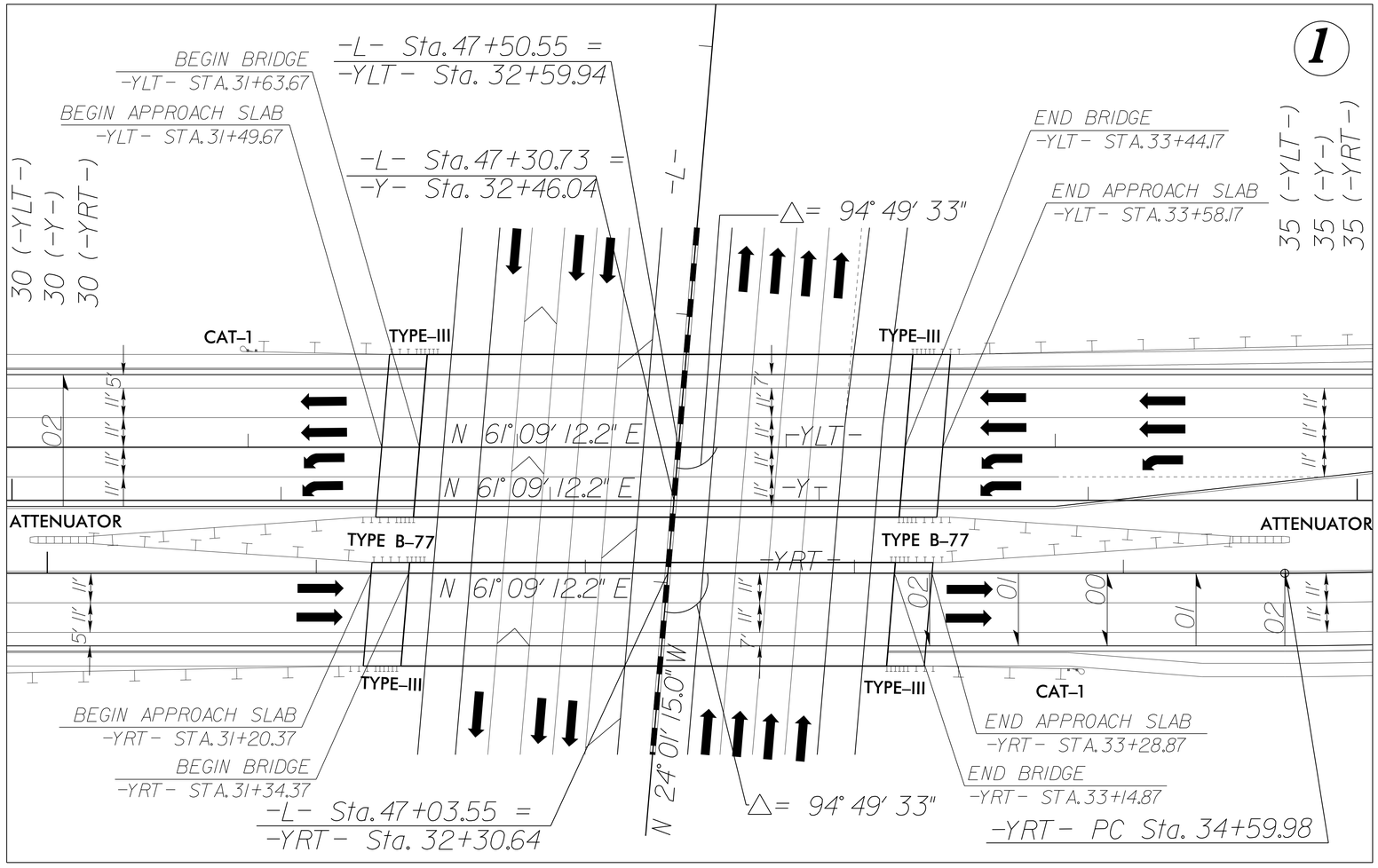
TYPICAL SECTION ON –Y–

–YLT– STA. 31+63.67 (BEGIN BRIDGE) TO STA. 33+44.17 (END BRIDGE) LT.
–YRT– STA. 31+34.37 (BEGIN BRIDGE) TO STA. 33+14.87 (END BRIDGE) RT.

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL SHOWING PAVEMENT–BRIDGE RELATIONSHIP FOR –Y– (NC 191 /BRAVARD RD.) OVER –L– (I–26)

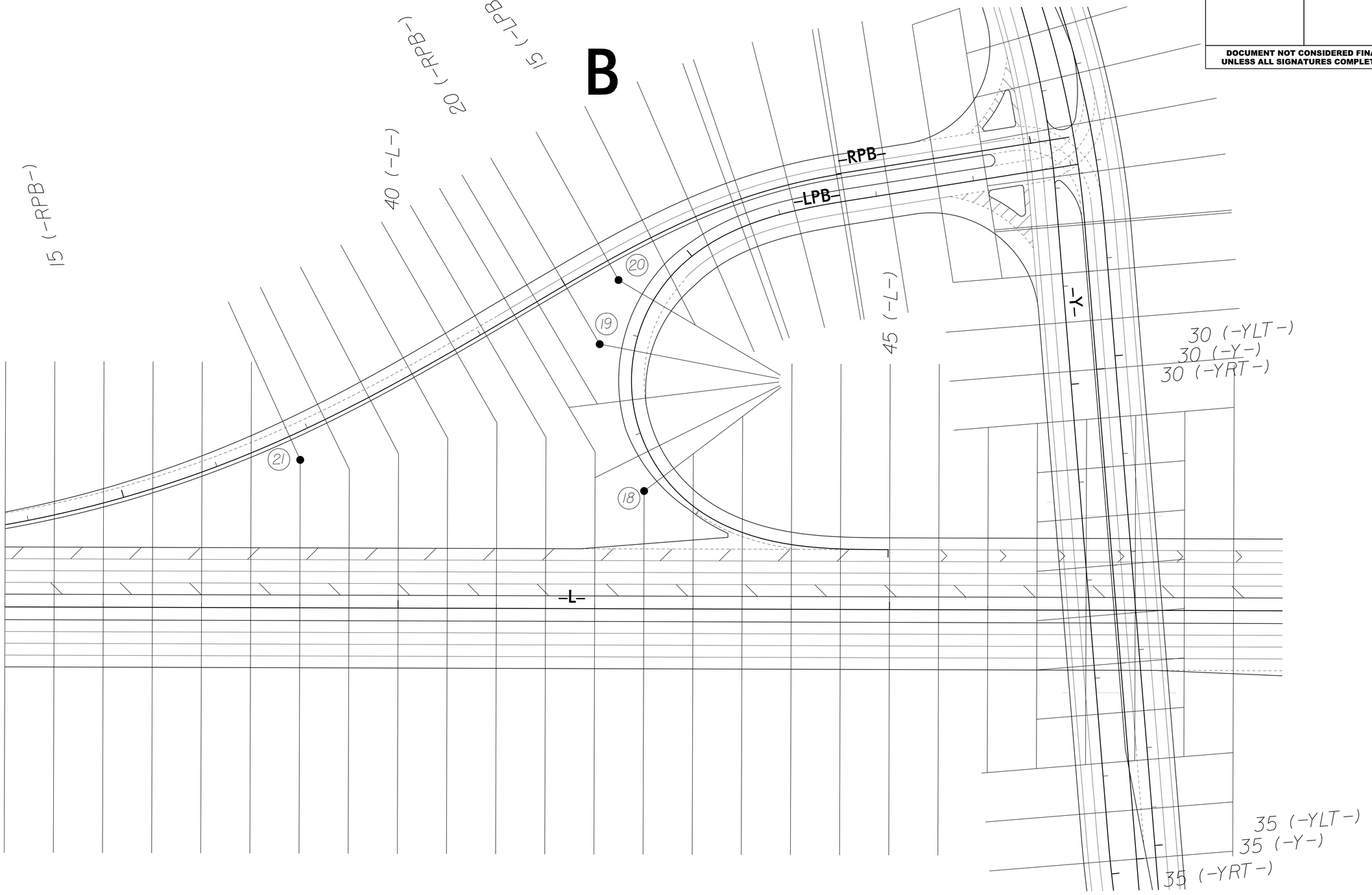


FOR STRUCTURE PLAN VIEW, SEE SHEETS NO. 6
FOR STRUCTURE TYPICAL SECTION, SEE SHEETS NO. 2A

SHEAR POINT DIAGRAM

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



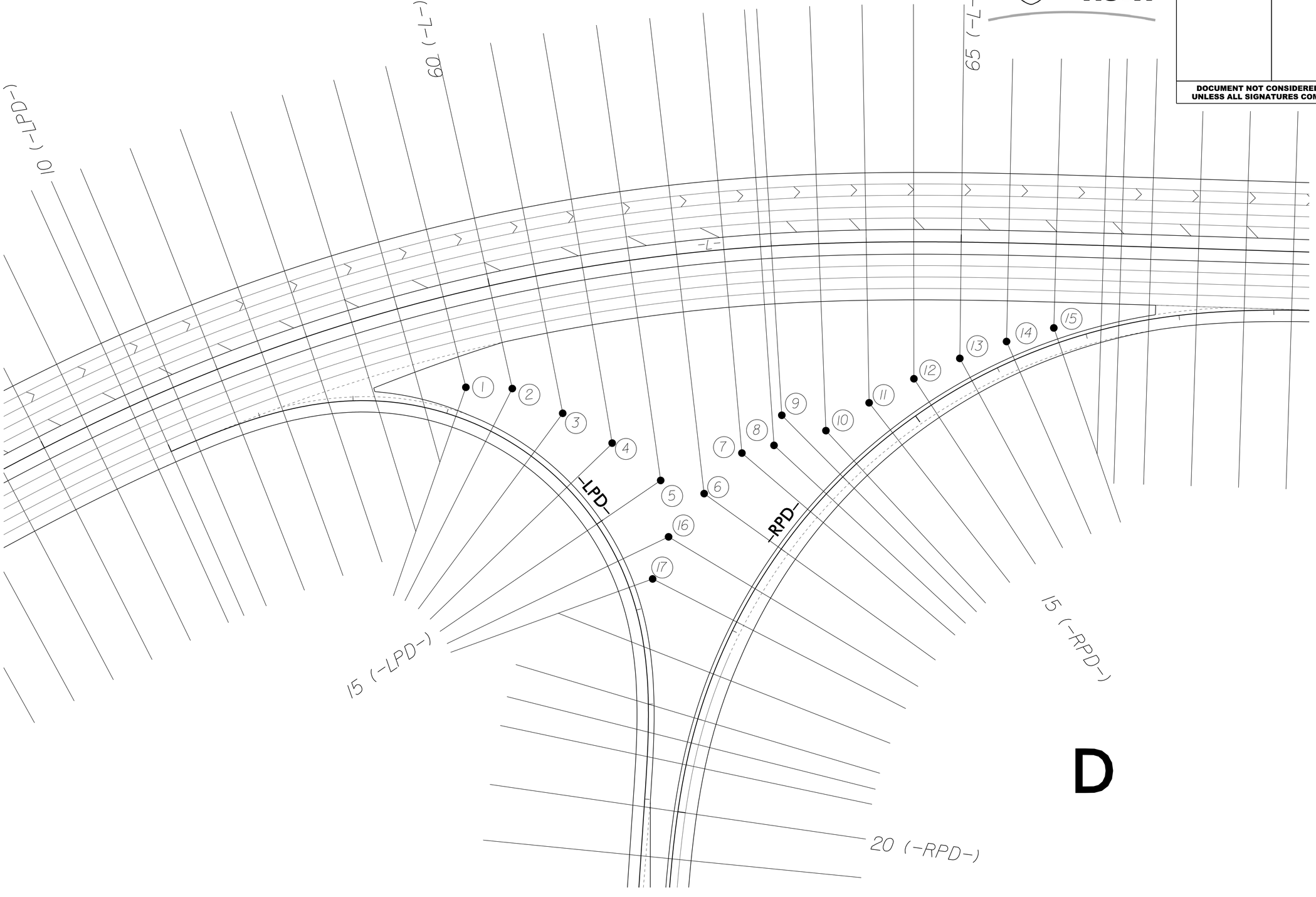
SHEAR POINT DIAGRAM

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H



PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe RS&H

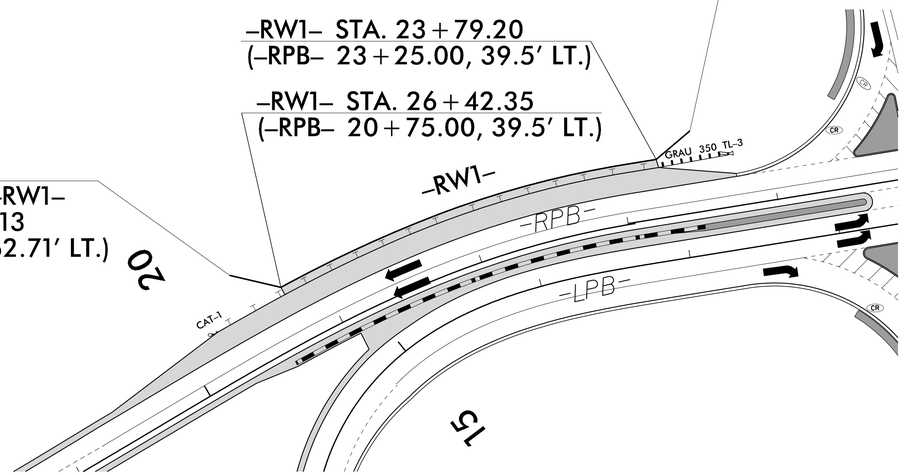
NAD 83/NSRS 20

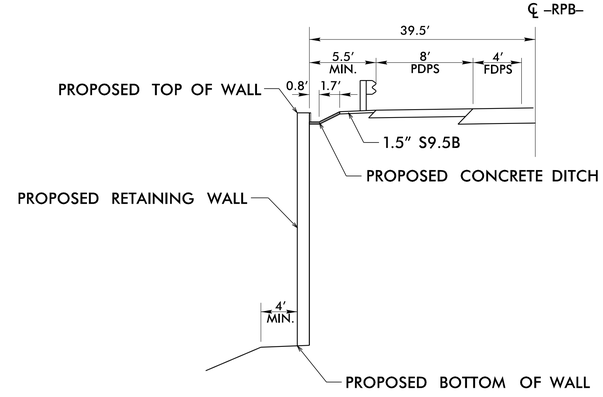
BEGIN PERMANENT RETAINING WALL –RW1–
–RW1– STA. 23+50.00
(–RPB– 23+50.00, 54.58' LT.)

–RW1– STA. 23+79.20
(–RPB– 23+25.00, 39.5' LT.)

–RW1– STA. 26+42.35
(–RPB– 20+75.00, 39.5' LT.)

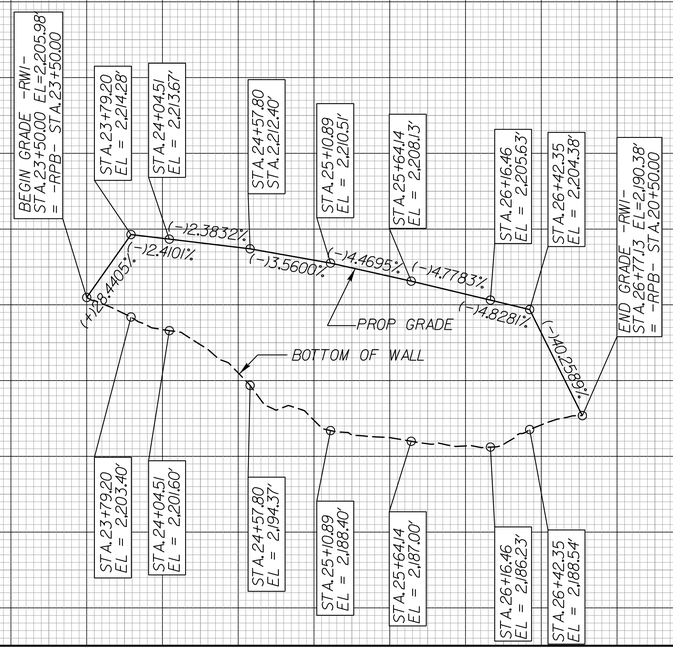
END PERMANENT RETAINING WALL –RW1–
–RW1– STA. 26+77.13
(–RPB– 20+50.00, 62.71' LT.)





SECTION THROUGH RETAINING WALL
–RW1– STA. 23+50.00 TO STA. 26+77.13

PRELIMINARY RETAINING WALL ENVELOPE



–RW1–
LT. OF –RPB–
WALL LENGTH = 327.13'
AVG. WALL HEIGHT = 13.82'
WALL FACE AREA = 5,247.90 SF

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

21-SEP-2016 13:48
I:\5504\ROADWAY\RW\RW_RPB.dgn
$$$$USERNAME=$$$$

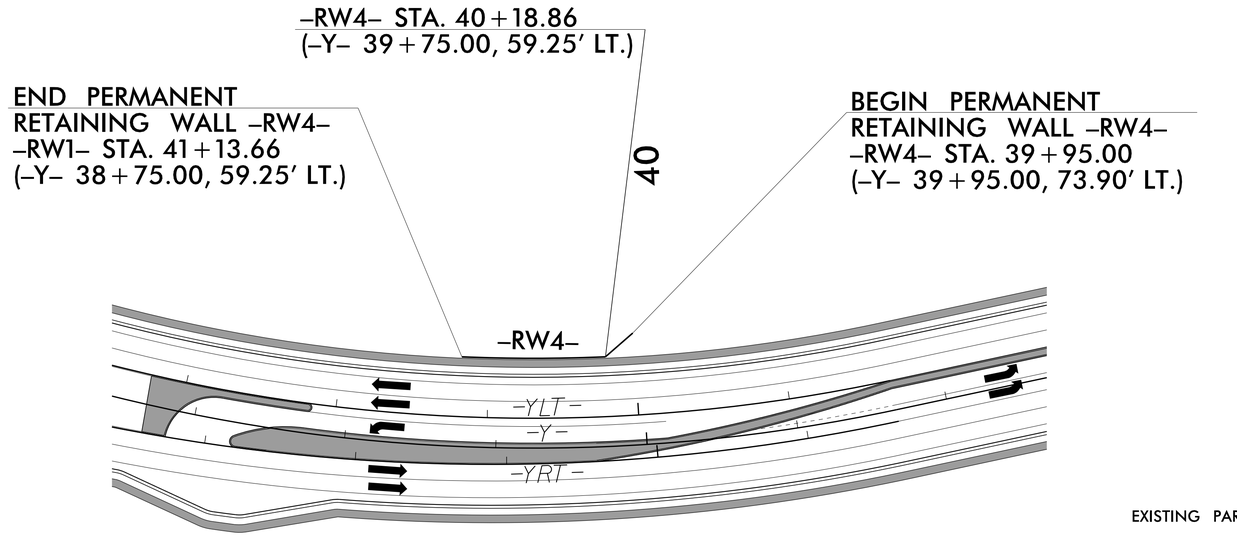
PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

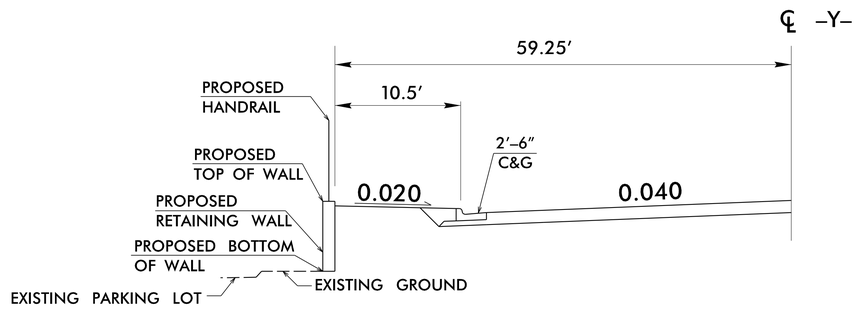
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

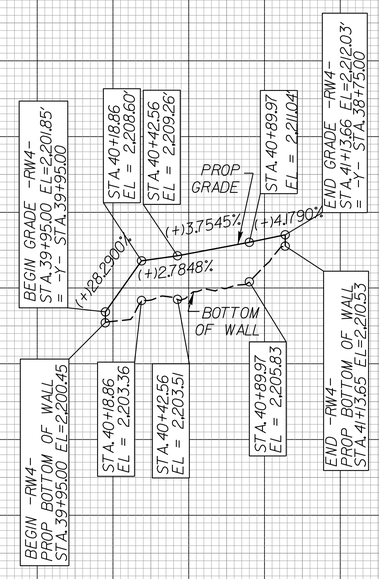
NAD 83/NSRS 2007





SECTION THROUGH RETAINING WALL
–RW4– STA. 39+95.00 TO STA. 41+13.66

PRELIMINARY RETAINING WALL ENVELOPE



–RW4–
LT. OF –Y–
WALL LENGTH = 118.66'
AVG. WALL HEIGHT = 3.82'
WALL FACE AREA = 2,781.21 SF

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

2,250 2,240 2,230 2,220 2,210 2,200 2,190 2,180 2,170 2,160

39 40 41 42

12-SEP-2016 17:09
I:\5504_R\DGN\RW-Sheet.dgn
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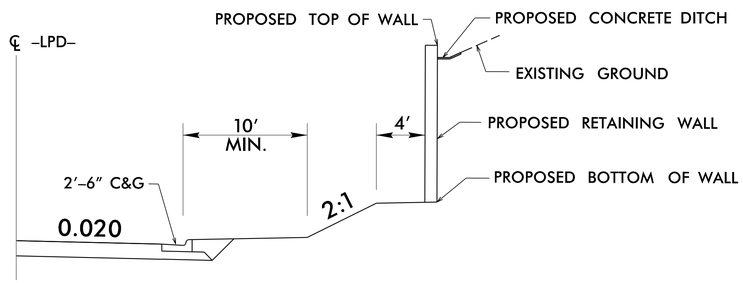
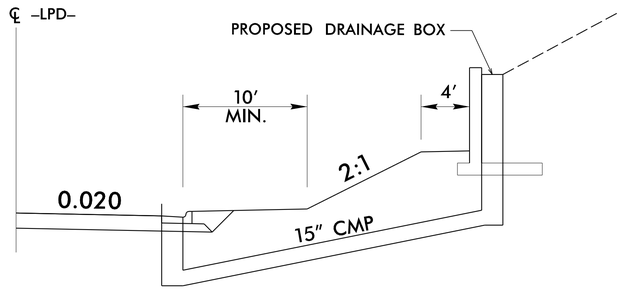
PROJECT REFERENCE NO.	SHEET NO.
I-5504	2B-12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



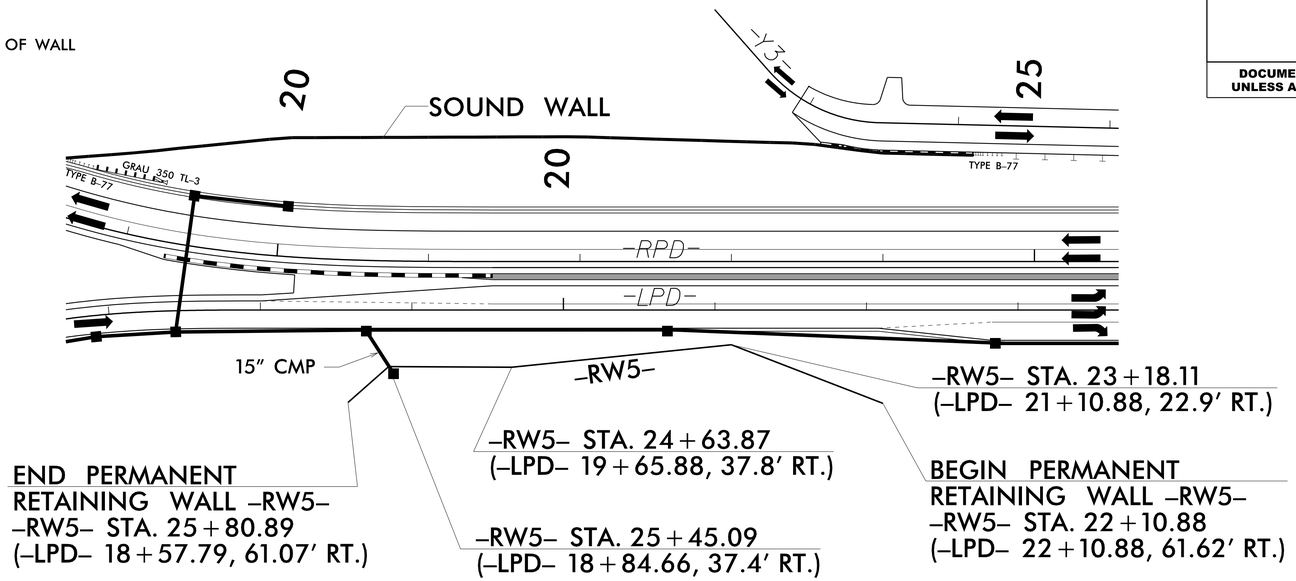
SECTION THROUGH RETAINING WALL

–RW5– STA. 22+10.88 TO STA. 25+80.89



SECTION THROUGH LOW POINT

–RW5– STA. 25+45.09



END PERMANENT RETAINING WALL –RW5–
–RW5– STA. 25+80.89
(–LPD– 18+57.79, 61.07′ RT.)

–RW5– STA. 24+63.87
(–LPD– 19+65.88, 37.8′ RT.)

–RW5– STA. 25+45.09
(–LPD– 18+84.66, 37.4′ RT.)

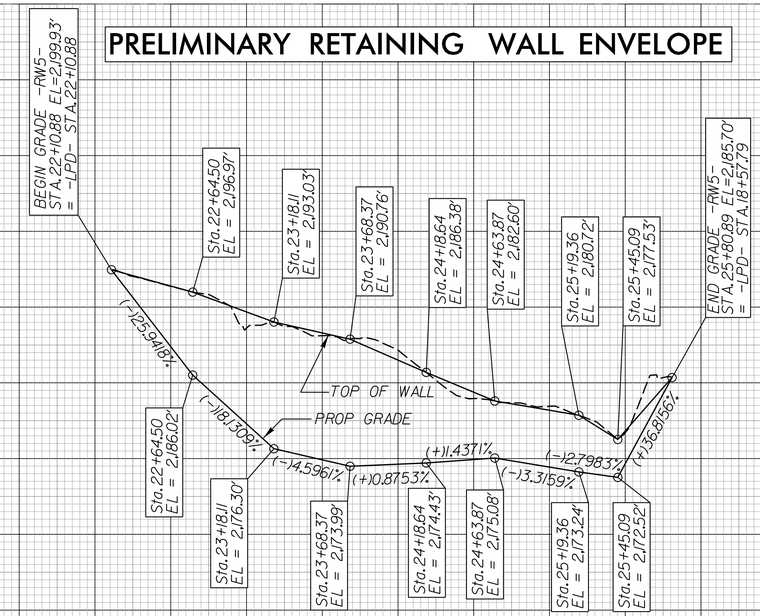
–RW5– STA. 23+18.11
(–LPD– 21+10.88, 22.9′ RT.)

BEGIN PERMANENT RETAINING WALL –RW5–
–RW5– STA. 22+10.88
(–LPD– 22+10.88, 61.62′ RT.)

NAD 83/NSRS 2007

PRELIMINARY RETAINING WALL ENVELOPE

–RW5–
RT. OF –LPD–
WALL LENGTH = 370.01′
AVG. WALL HEIGHT = 10.92′
WALL FACE AREA = 3,744.94 SF

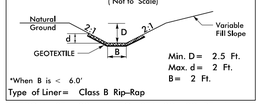


NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF WALL.

PROJECT REFERENCE NO.	SHEET NO.
I-5504	2D-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL A
SPECIAL LATERAL BASE DITCH
(Not to Scale)

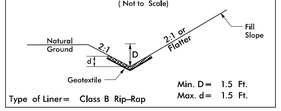


Min. D= 2.5 Ft.
Max. d= 2 Ft.
B= 2 Ft.

*When B is < 6.0'
Type of Liner= Class B Rip–Rap

FROM STA. 20+75 TO STA. 23+00 RT –L–

DETAIL B
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

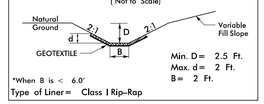


Min. D= 1.5 Ft.
Max. d= 1.5 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 22+40 TO STA. 24+30 LT –L–

DETAIL C
SPECIAL LATERAL BASE DITCH
(Not to Scale)

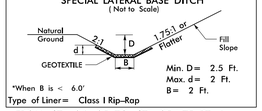


Min. D= 2.5 Ft.
Max. d= 2 Ft.
B= 2 Ft.

*When B is < 6.0'
Type of Liner= Class I Rip–Rap

FROM STA. 23+00 TO STA. 24+25 RT –L–

DETAIL D
SPECIAL LATERAL BASE DITCH
(Not to Scale)

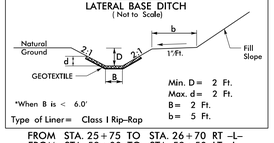


Min. D= 2.5 Ft.
Max. d= 2 Ft.
B= 2 Ft.

*When B is < 6.0'
Type of Liner= Class I Rip–Rap

FROM STA. 24+25 TO STA. 25+75 RT –L–

DETAIL E
LATERAL BASE DITCH
(Not to Scale)

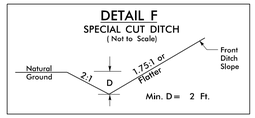


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
b= 5 Ft.

*When B is < 6.0'
Type of Liner= Class I Rip–Rap

FROM STA. 25+75 TO STA. 26+70 RT –L–
FROM STA. 58+00 TO STA. 58+50 LT –L–

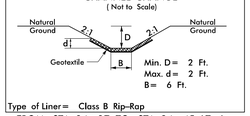
DETAIL F
SPECIAL CUT DITCH
(Not to Scale)



Min. D= 2 Ft.

FROM STA. 24+50 TO STA. 25+00 LT –L–
FROM STA. 25+00 TO STA. 26+50 LT –L–

DETAIL G
CHANNEL CHANGE
(Not to Scale)

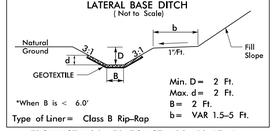


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 6 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 24+27 TO STA. 24+45 LT –L–
FROM STA. 57+75 TO STA. 57+95 LT –L–

DETAIL H
LATERAL BASE DITCH
(Not to Scale)

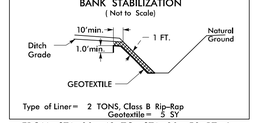


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.
b= VAR 1.5–5 Ft.

*When B is < 6.0'
Type of Liner= Class B Rip–Rap

FROM STA. 26+50 TO STA. 28+10 LT –L–
FROM STA. 28+25 TO STA. 28+75 LT –L–
FROM STA. 29+00 TO STA. 30+00 LT –L–

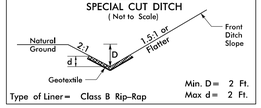
DETAIL I
BANK STABILIZATION
(Not to Scale)



Type of Liner= 2 TONS, Class B Rip–Rap
Geotextile= 5 SY

FROM STA. 30+48 TO STA. 30+53 RT –L–

DETAIL J
SPECIAL CUT DITCH
(Not to Scale)

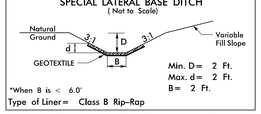


Min. D= 2 Ft.
Max d= 2 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 30+00 TO STA. 32+50 LT –L–
FROM STA. 58+50 TO STA. 61+50 LT –L–

DETAIL K
SPECIAL LATERAL BASE DITCH
(Not to Scale)

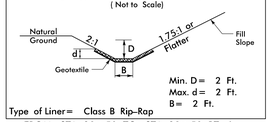


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.

*When B is < 6.0'
Type of Liner= Class B Rip–Rap

FROM STA. 32+50 TO STA. 36+00 LT –L–

DETAIL M
SPECIAL LATERAL BASE DITCH
(Not to Scale)

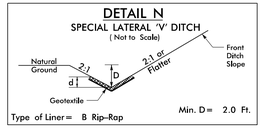


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 38+50 TO STA. 39+50 RT –L–
FROM STA. 76+50 TO STA. 78+90 LT –L–

DETAIL N
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

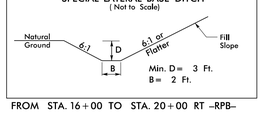


Min. D= 2.0 Ft.

Type of Liner= B Rip–Rap

FROM STA. 39+50 TO STA. 40+50 RT –L–

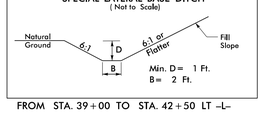
DETAIL O
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 3 Ft.
B= 2 Ft.

FROM STA. 16+00 TO STA. 20+00 RT –RPB–

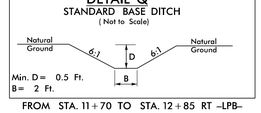
DETAIL P
SPECIAL LATERAL BASE DITCH
(Not to Scale)



Min. D= 1 Ft.
B= 2 Ft.

FROM STA. 39+00 TO STA. 42+50 LT –L–

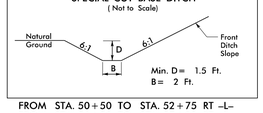
DETAIL Q
STANDARD BASE DITCH
(Not to Scale)



Min. D= 0.5 Ft.
B= 2 Ft.

FROM STA. 11+70 TO STA. 12+85 RT –LPB–

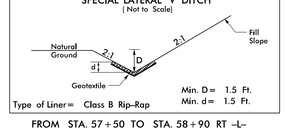
DETAIL R
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 1.5 Ft.
B= 2 Ft.

FROM STA. 50+50 TO STA. 52+75 RT –L–
FROM STA. 56+50 TO STA. 57+00 RT –L–

DETAIL S
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

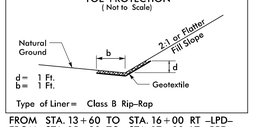


Min. D= 1.5 Ft.
Min. d= 1.5 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 57+50 TO STA. 58+90 RT –L–

DETAIL T
TOE PROTECTION
(Not to Scale)

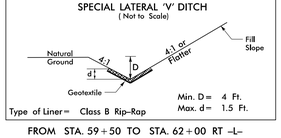


d= 1 Ft.
b= 1 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 13+60 TO STA. 16+00 RT –LPD–
FROM STA. 15+30 TO STA. 17+00 LT –RPD–

DETAIL U
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

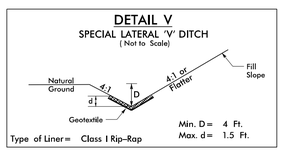


Min. D= 4 Ft.
Max. d= 1.5 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 59+50 TO STA. 62+00 RT –L–

DETAIL V
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

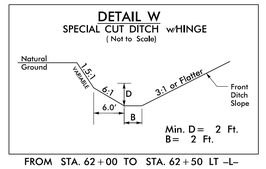


Min. D= 4 Ft.
Max. d= 1.5 Ft.

Type of Liner= Class I Rip–Rap

FROM STA. 16+76 TO STA. 18+40 RT –RPD–

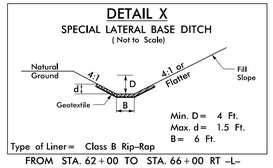
DETAIL W
SPECIAL CUT DITCH wHINGE
(Not to Scale)



Min. D= 2 Ft.
B= 2 Ft.

FROM STA. 62+00 TO STA. 62+50 LT –L–

DETAIL X
SPECIAL LATERAL BASE DITCH
(Not to Scale)

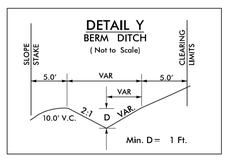


Min. D= 4 Ft.
Max. d= 1.5 Ft.
B= 6 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 62+00 TO STA. 66+00 RT –L–

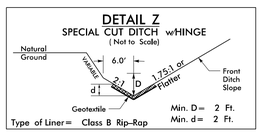
DETAIL Y
BERM DITCH
(Not to Scale)



Min. D= 1 Ft.

FROM STA. 64+00 TO STA. 73+25 LT –L–

DETAIL Z
SPECIAL CUT DITCH wHINGE
(Not to Scale)

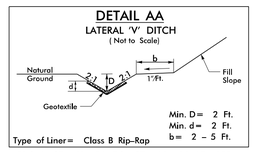


Min. D= 2 Ft.
Min. d= 2 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 13+30 TO STA. 14+80 LT –RPD–

DETAIL AA
LATERAL 'V' DITCH
(Not to Scale)

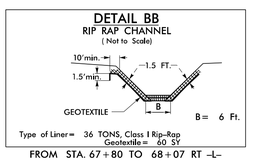


Min. D= 2 Ft.
Min. d= 2 Ft.
b= 2 – 5 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 11+50 TO STA. 13+30 LT –RPD–

DETAIL BB
RIP RAP CHANNEL
(Not to Scale)

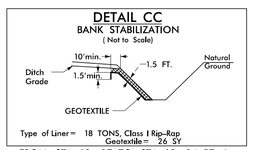


B= 6 Ft.

Type of Liner= 36 TONS, Class I Rip–Rap
Geotextile= 60 SY

FROM STA. 67+80 TO 68+07 RT –L–

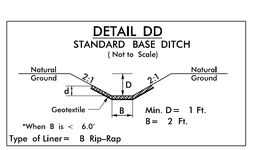
DETAIL CC
BANK STABILIZATION
(Not to Scale)



Type of Liner= 18 TONS, Class I Rip–Rap
Geotextile= 26 SY

FROM STA. 68+07 TO STA. 68+34 RT –L–

DETAIL DD
STANDARD BASE DITCH
(Not to Scale)

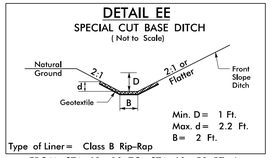


Min. D= 1 Ft.
B= 2 Ft.

*When B is < 6.0'
Type of Liner= B Rip–Rap

FROM STA. 68+30 TO STA. 69+00 RT –L–

DETAIL EE
SPECIAL CUT BASE DITCH
(Not to Scale)

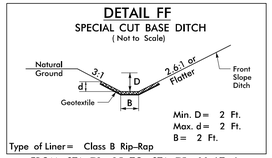


Min. D= 1 Ft.
Max. d= 2.2 Ft.
B= 2 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 69+00 TO STA. 69+50 RT –L–

DETAIL FF
SPECIAL CUT BASE DITCH
(Not to Scale)

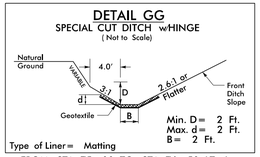


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 73+25 TO STA. 75+00 LT –L–

DETAIL GG
SPECIAL CUT DITCH wHINGE
(Not to Scale)

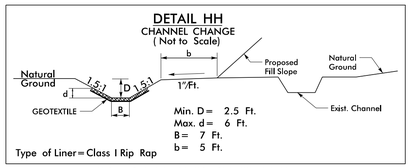


Min. D= 2 Ft.
Max. d= 2 Ft.
B= 2 Ft.

Type of Liner= Matting

FROM STA. 75+00 TO STA. 76+50 LT –L–

DETAIL HH
CHANNEL CHANGE
(Not to Scale)

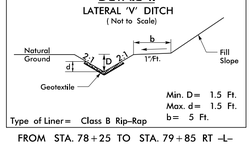


Min. D= 2.5 Ft.
Max. d= 6 Ft.
B= 7 Ft.
b= 5 Ft.

Type of Liner= Class I Rip Rap

FROM STA. 75+60 TO STA. 77+75 RT –L–

DETAIL II
LATERAL 'V' DITCH
(Not to Scale)

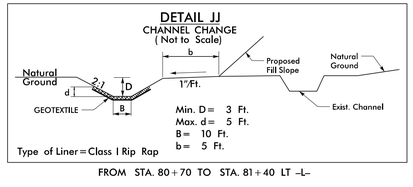


Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
b= 5 Ft.

Type of Liner= Class B Rip–Rap

FROM STA. 78+25 TO STA. 79+85 RT –L–

DETAIL JJ
CHANNEL CHANGE
(Not to Scale)

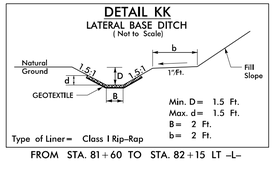


Min. D= 3 Ft.
Max. d= 5 Ft.
B= 10 Ft.
b= 5 Ft.

Type of Liner= Class I Rip Rap

FROM STA. 80+70 TO STA. 81+40 LT –L–

DETAIL KK
LATERAL BASE DITCH
(Not to Scale)

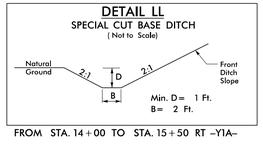


Min. D= 1.5 Ft.
Max. d= 1.5 Ft.
B= 2 Ft.
b= 2 Ft.

Type of Liner= Class I Rip–Rap

FROM STA. 81+60 TO STA. 82+15 LT –L–

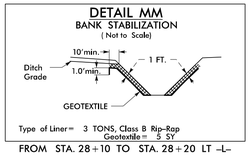
DETAIL LL
SPECIAL CUT BASE DITCH
(Not to Scale)



Min. D= 1 Ft.
B= 2 Ft.

FROM STA. 14+00 TO STA. 15+50 RT –Y1A–

DETAIL MM
BANK STABILIZATION
(Not to Scale)



Type of Liner= 3 TONS, Class B Rip–Rap
Geotextile= 5 SY

FROM STA. 28+10 TO STA. 28+20 LT –L–

PROJ. REFERENCE NO.	SHEET NO.
I-5504	3P-1

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PARCEL INDEX SHEET

PARCEL No.	SHEET No.	PROPERTY OWNER NAME
1	4	RIDGEFIELD BUSINESS CENTER PROPERTY OWNERS ASSOC., INC.
2	5, 6, 10	TSLF BILTMORE, LLC (BILTMORE SQUARE MALL)
3	6, 7	G. E. ENTERPRISES, INC.
4	7	GLOBAL COUNTRY OF WORLD PEACE, INC.
5	7, 8	CAROL BRIGMAN CAMPBELL
6	7, 11, 12	BARKLEY FAMILY LLC
7	8	JERRY B. RICH
8	8	FLAURA FAYE MATHIS, ET AL
9	8	CAROL BRIGMAN CAMPBELL
10	8	BRANDON KNOLLS, LLC
11	8, 9	MURMAX, LLC
12	9	WILLIAM B. MULL, JR.
13	10	THE KOON FAMILY LIMITED PARTNERSHIP I
14	10	LOBOS PROPERTIES, LLC
15	10	WEDGEFIELD ENTERPRISES, LLC
16	10	LAB MOTELS, INC.
17	11	BILTMORE DAIRY FARMS
18	12	BUNCOMBE COUNTY FARM BUREAU
19	12	NANCY NAVE
20	12	CHRISTINA GRACE CLARK
21	12	RAY EDWARD LEWIS
22	12	JOHN TRIANTOS
23	12	BILL S. PHILLIPS, JR.
24	12	RBR AFFILIATES, LLC
25	12	TRI-WESTERN INVESTMENTS, INC.
26	12	LAURA K. WILLIAMS
27	5	BCL OF ASHEVILLE, LLC (ASHEVILLE KIA)
28	10	INGLES MARKETS, INC.
29	10	WAFFLE HOUSE. INC.
30	10	OM GANESH, LLC
31	12	JAMES F. PADGETT, III

PARCEL No.	SHEET No.	PROPERTY OWNER NAME

PROJECT REFERENCE NO.	SHEET NO.
I-5504	4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DEANE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe RS&H

NAD 83/NSRS 2007

RIDGEFIELD INVESTMENTS, LLC ET AL
DB 2395 PG 592

RIDGEFIELD INVESTMENTS, LLC
DB 2407 PG 312

RIDGEFIELD BUSINESS CENTER
PROPERTY OWNERS ASSOC., INC.
DB 1773 PG 575

15+00

20+00

-L- POT Sta.10+00.00

BEGIN CONSTRUCTION
BEGIN ASPHALT RESURFACING
-L- STA.16+45.00

BEGIN TIP PROJECT I-5504
END ASPHALT RESURFACING
BEGIN CONCRETE PAVEMENT
RECONSTRUCTION
-L- STA.19+25.00

MATCHLINE SHEET 5 -L- STA. 23+00.00

BM #1
-BL- STA 4+96.50
87.90' RT
ELEV.=2161.42

BM #2
-BL- STA. 15+81.16
104.87' LT
ELEV.=2147.29

-L- +05.00
150.00' LT
142.68' LT
BEGIN REMOVE AND REPLACE FENCE

-L- +92.00 135.00' LT
END REMOVE AND REPLACE FENCE

REMOVE CONCRETE DITCH 150.00' LT

SPECIAL LATERAL V DITCH SEE DETAIL B

300' LANE DROP

DOUBLE FACED TYPE 'T' BARRIER

TYPE B-77

100' TAPER

REMOVE CONCRETE DITCH

CLASS 'B' RIP RAP
EST 8 TONS
EST 21 SY GEO

SPECIAL LATERAL BASE DITCH
SEE DETAIL A

GRAU 350 TL-3

WEST RANGE, LLC
(BILTMORE ESTATE)
DB 2163 PG 847

(BILTMORE ESTATE)
DB 2163 PG 847

VINEYARD

NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

FOR -LLT- PROFILE, SEE SHEET NO. 13

FOR -LRT- PROFILE, SEE SHEET NO. 13

29-SEP-2016 10:37
I-5504_R2016_01_04.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
I-5504	5
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DANE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM J. WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

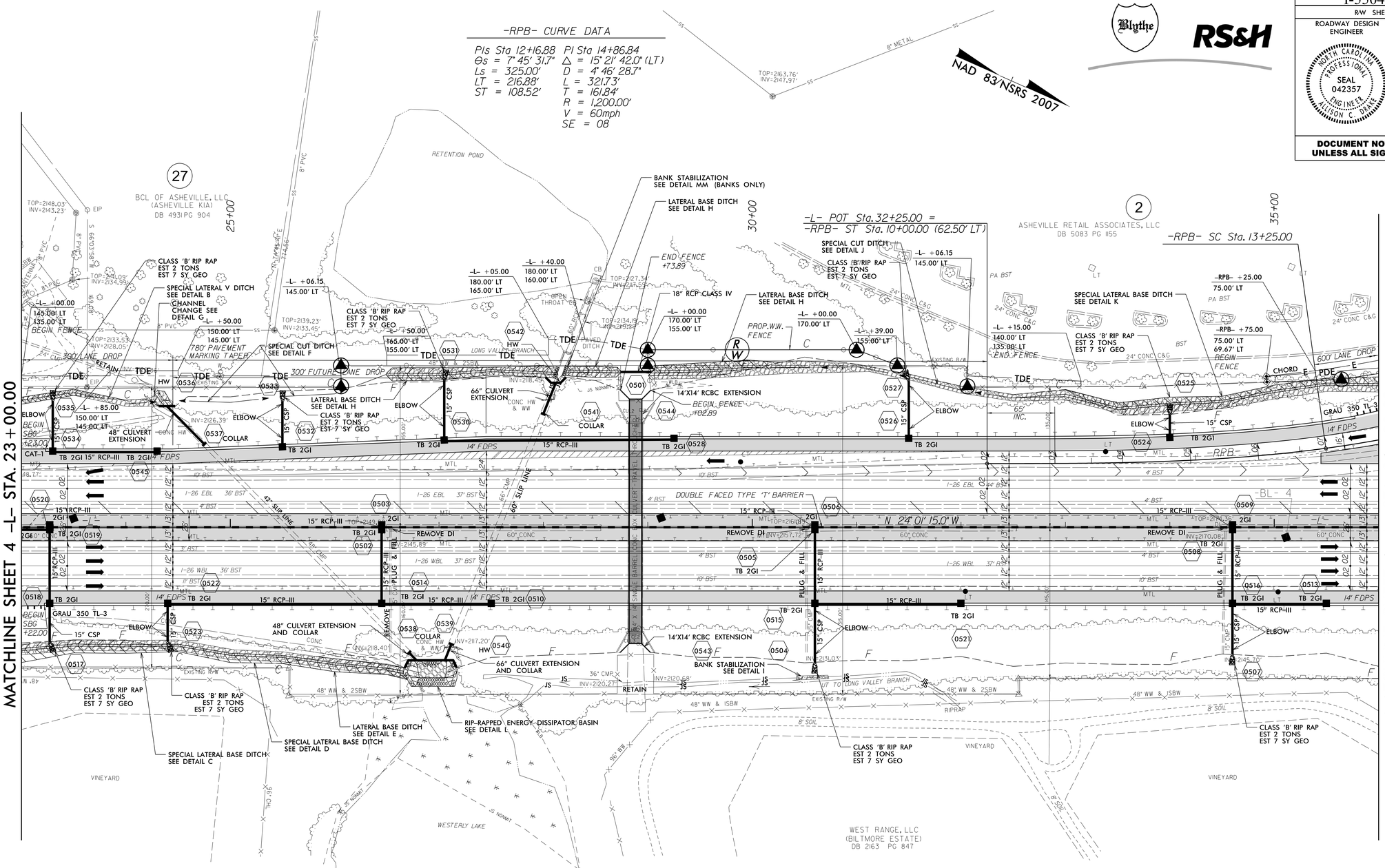
Blythe

RS&H

NAD 83/NSRS 2007

-RPB- CURVE DATA

PIs Sta 12+16.88 PI Sta 14+86.84
Θs = 7° 45' 31.7" Δ = 15° 21' 42.0" (LT)
Ls = 325.00' D = 4° 46' 28.7"
LT = 216.88' L = 321.73'
ST = 108.52' T = 161.84'
R = 1,200.00'
V = 60mph
SE = 08



NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

FOR -LLT- PROFILE, SEE SHEET NO. 14
FOR -LRT- PROFILE, SEE SHEET NO. 14
FOR -RPB- PROFILE, SEE SHEET NO. 23

PROJECT REFERENCE NO.	SHEET NO.
I-5504	6
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
SEAL 042357 ALLISON C. DRAKE	SEAL 036188 WILL J. WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RS&H

-RPB- CURVE DATA

PI Sta 14+86.84
△ = 15° 21′ 42.0″ (LT)
D = 4° 46′ 28.7″
L = 321.73′
T = 161.84′
R = 1,200.00′
V = 60mph
SE = 08

PIs Sta 17+53.58
Θs = 7° 38′ 22.0″
Ls = 320.00′
LT = 213.53′
ST = 106.85′

PIs Sta 21+16.34
Θs = 10° 41′ 42.8″
Ls = 224.00′
LT = 149.61′
ST = 74.92′

PI Sta 22+47.93
△ = 10° 53′ 24.8″ (RT)
D = 9° 32′ 57.5″
L = 114.04′
T = 57.19′
R = 600.00′
V = 46mph
SE = 08

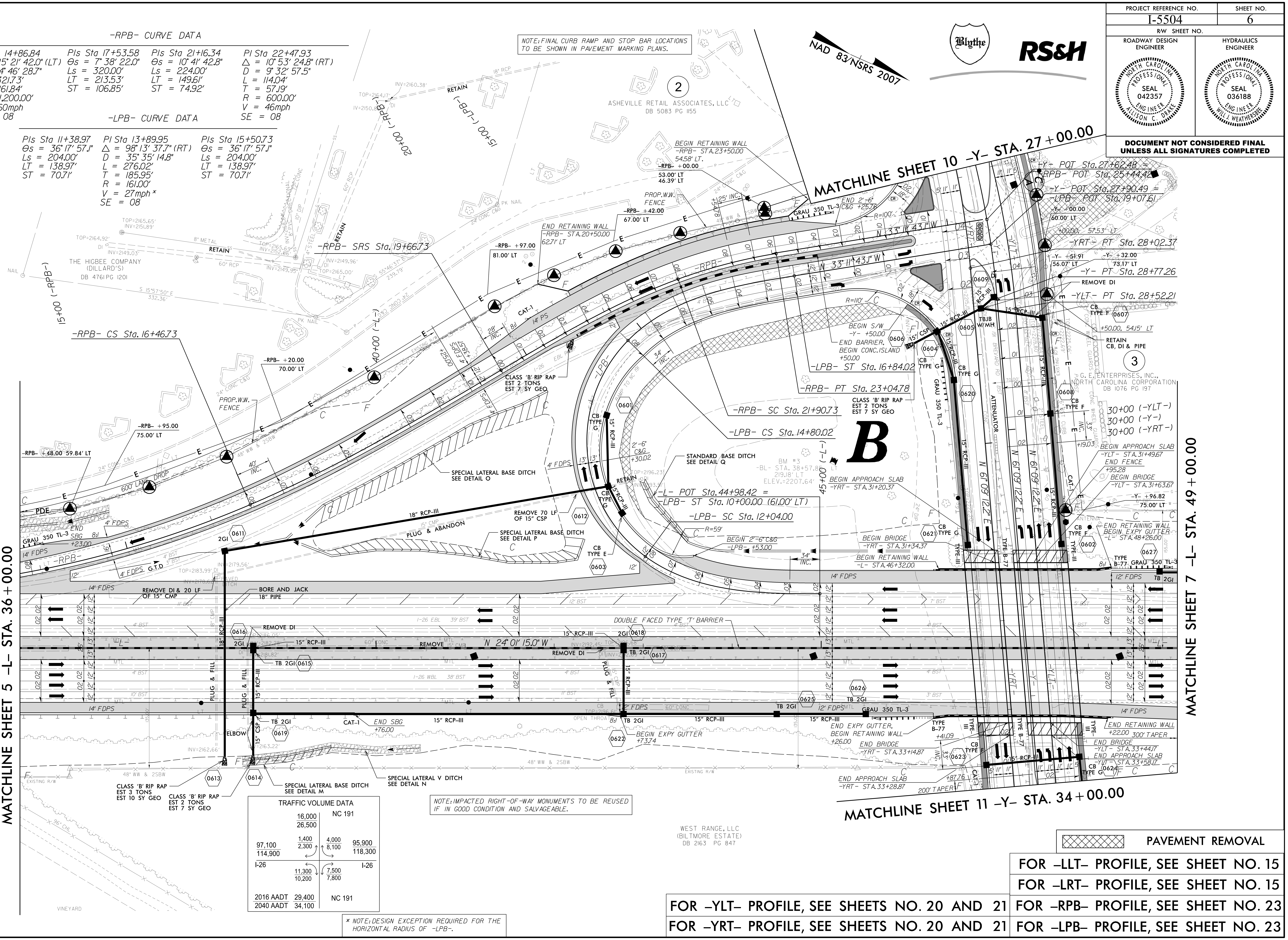
-LPB- CURVE DATA

PIs Sta 11+38.97
Θs = 36° 17′ 57.1″
Ls = 204.00′
LT = 138.97′
ST = 70.71′

PI Sta 13+89.95
△ = 98° 13′ 37.7″ (RT)
D = 35° 35′ 14.8″
L = 276.02′
T = 185.95′
R = 161.00′
V = 27mph *
SE = 08

PIs Sta 15+50.73
Θs = 36° 17′ 57.1″
Ls = 204.00′
LT = 138.97′
ST = 70.71′

NOTE: FINAL CURB RAMP AND STOP BAR LOCATIONS TO BE SHOWN IN PAVEMENT MARKING PLANS.



* NOTE: DESIGN EXCEPTION REQUIRED FOR THE HORIZONTAL RADIUS OF -LPB-.

▨	PAVEMENT REMOVAL

FOR -LLT- PROFILE, SEE SHEET NO. 15
FOR -LRT- PROFILE, SEE SHEET NO. 15
FOR -YLT- PROFILE, SEE SHEETS NO. 20 AND 21
FOR -YRT- PROFILE, SEE SHEETS NO. 20 AND 21
FOR -RPB- PROFILE, SEE SHEET NO. 23
FOR -LPB- PROFILE, SEE SHEET NO. 23

29-SEP-2016 19:45
I5504_Rdy_psh_6.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
I-5504	7
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DANE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILL J. WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83/NSRS 2007

Blythe

RS&H

-L- CURVE DATA

PIs Sta 54+94.05
Θs = 5° 42' 00.0"
Ls = 380.00'
LT = 253.46'
ST = 126.79'

PI Sta 59+58.05
Δ = 20° 02' 28.0" (RT)
D = 3° 00' 00.0"
L = 668.04'
T = 337.47'
R = 1,909.86'
V = 71 mph
SE = 08

-LPD- CURVE DATA

PIs Sta 11+27.82
Θs = 3° 06' 34.3"
Θs = 19° 37' 59.2"
Ls = 204.00'
LT = 127.82'
ST = 78.62'

PI Sta 14+34.64
Δ = 75° 23' 38.1" (RT)
D = 19° 11' 52.2"
L = 392.72'
T = 230.64'
R = 298.45'
V = 34 mph
SE = 08

3 G. E. ENTERPRISES, INC., A NORTH CAROLINA CORPORATION DB 1076 PG 197

4 ASHEVILLE BUNCOMBE CHRISTIAN MINISTRY ASSOCIATION A/K/A ABCCM DB 5351 PG 1497; DB 5351 PG 1507

5 CAROL BRIGMAN CAMPBELL DB 3473 PG 862

6 BARKLEY FAMILY LLC DB 4876 PG 0837

MATCHLINE SHEET 6 -L- STA. 49+00.00

MATCHLINE SHEET 8 -L- STA. 62+00.00

MATCH LINE SHEET 12 -LPD- STA. 16+00.00

-L- SC Sta. 56+20.58

-L- TS Sta. 52+40.58

-L- POT Sta. 56+20.58 = -LPD- ST Sta. 10+00.00 (62.50' RT)

-LPD- SC Sta. 12+04.00

-LPD- CS Sta. 15+96.72

D

NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

PAVEMENT REMOVAL

FOR -LLT- PROFILE, SEE SHEET NO. 16

FOR -LRT- PROFILE, SEE SHEET NO. 16

FOR -LPD- PROFILE, SEE SHEET NO. 25

29-SEP-2016 19:19
I:\5504_RDWY_01_PLAN.dgn
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	8
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DEANE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

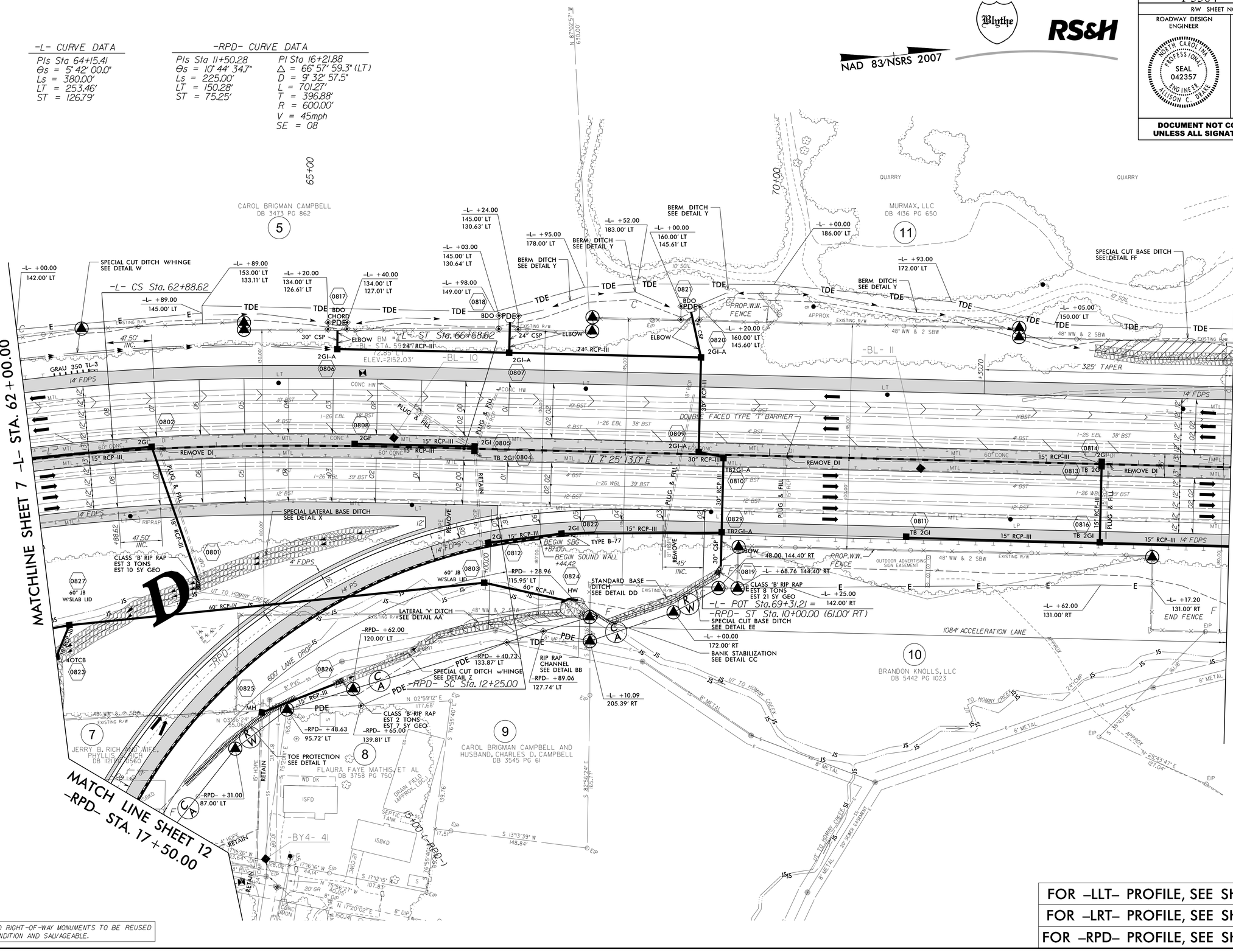
Blythe

RS&H

NAD 83/NSRS 2007

-L- CURVE DATA
PIs Sta 64+15.41
Θs = 5° 42' 00.0"
Ls = 380.00'
LT = 253.46'
ST = 126.79'

-RPD- CURVE DATA	
PIs Sta 11+50.28	PI Sta 16+21.88
Θs = 10° 44' 34.7"	Δ = 66° 57' 59.3" (LT)
Ls = 225.00'	D = 9° 32' 57.5"
LT = 150.28'	L = 701.27'
ST = 75.25'	T = 396.88'
	R = 600.00'
	V = 45mph
	SE = 08



FOR –LLT– PROFILE, SEE SHEET NO. 17
FOR –LRT– PROFILE, SEE SHEET NO. 17
FOR –RPD– PROFILE, SEE SHEET NO. 24

PROJECT REFERENCE NO.	SHEET NO.
I-5504	9
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DRAKE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM J. WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

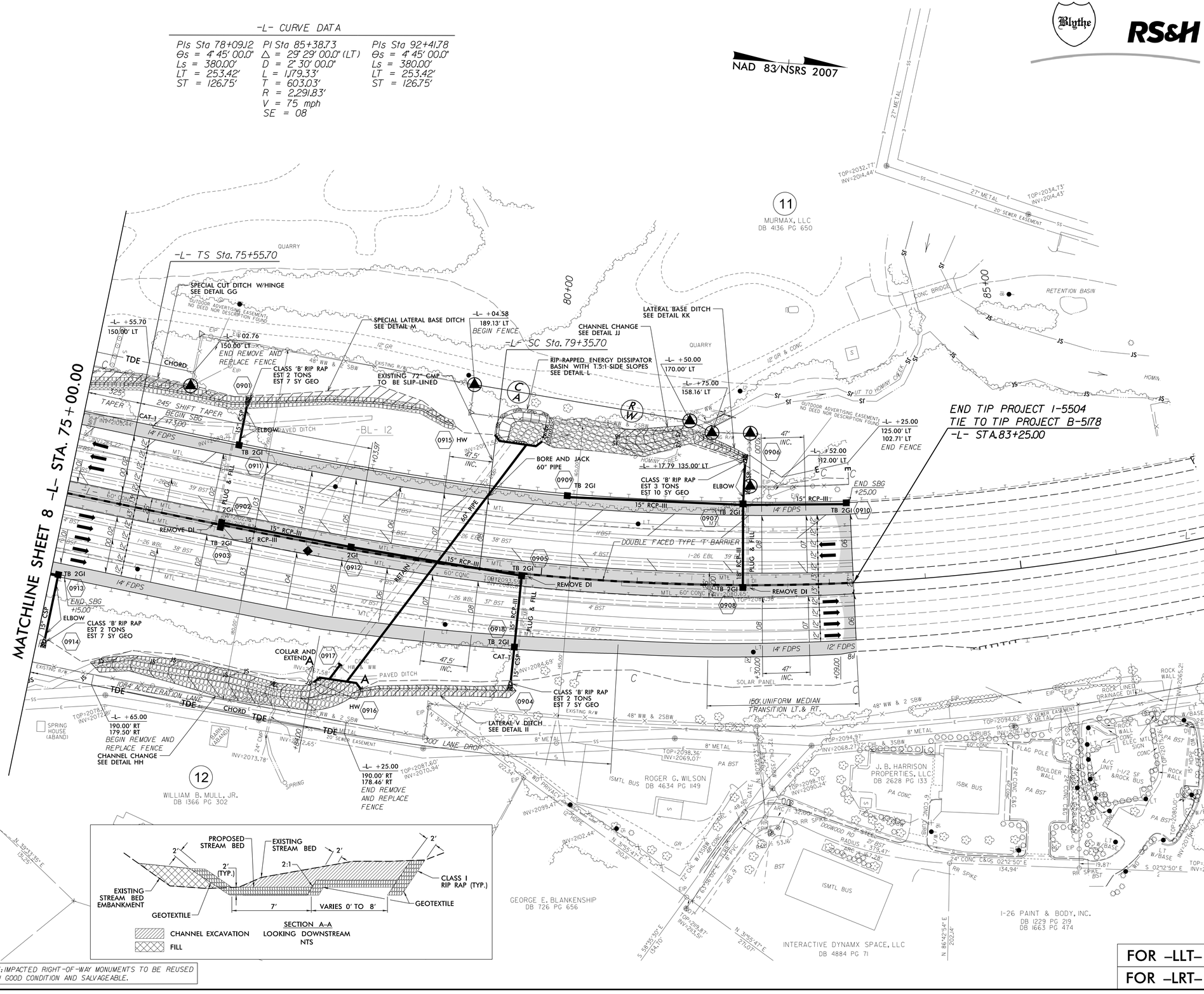
Blythe

RS&H

-L- CURVE DATA

PIs Sta 78+09.12	PI Sta 85+38.73	PIs Sta 92+41.78
Θs = 4° 45' 00.0"	Δ = 29° 29' 00.0" (LT)	Θs = 4° 45' 00.0"
Ls = 380.00'	D = 2° 30' 00.0"	Ls = 380.00'
LT = 253.42'	L = 1,179.33'	LT = 253.42'
ST = 126.75'	T = 603.03'	ST = 126.75'
	R = 2,291.83'	
	V = 75 mph	
	SE = 08	

NAD 83/NSRS 2007



NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

FOR -LLT- PROFILE, SEE SHEET NO. 18

FOR -LRT- PROFILE, SEE SHEET NO. 18

PROJECT REFERENCE NO.	SHEET NO.
I-5504	10
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DRAKE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

REVISIONS

ROW REV.: REVISED TCE TO ROW ON PARCEL 14 AND 15. ADDED TCE TO PARCEL 13. JMT 10/27/2016

25-OCT-2016 20:59
I:\5504_ROADWAY\Design\Sheets\5504_PLAN_SHEET_10.dgn
$$$$USERNAME$$$$

-Y- CURVE DATA

PI Sta 24+98.34
△ = 42° 37' 59.9" (RT)
D = 5° 43' 46.5"
L = 744.09'
T = 390.22'
R = 1,000.00'
V = 51 mph
SE = 04

-YRT- CURVE DATA

PI Sta 24+72.20
△ = 42° 37' 59.9" (RT)
D = 6° 08' 27.2"
L = 694.25'
T = 364.08'
R = 933.02'
V = 50 mph
SE = 04

-YLT- CURVE DATA

PI Sta 25+11.48
△ = 42° 37' 59.9" (RT)
D = 5° 32' 34.6"
L = 769.14'
T = 403.36'
R = 1,033.67'
V = 52 mph
SE = 04

-YIA- CURVE DATA

PI Sta 21+82.46
△ = 161° 37' 47.3" (RT)
D = 36° 29' 38.9"
L = 442.89'
T = 970.95'
R = 157.00'
V = 25 mph
SE = 04

-Y2- CURVE DATA

PI Sta 10+69.89
△ = 66° 57' 32.9" (LT)
D = 114° 35' 29.6"
L = 58.43'
T = 33.07'
R = 50.00'
STOP CONDITION

15+00 (-Y-)

20+00 (-Y-)

25+00 (-YLT-)
25+00 (+YLT-)
25+00 (-YRT-)

MATCHLINE SHEET 6 -Y- STA. 27+00.00

TRAFFIC VOLUME DATA

	ROCKY RIDGE RD	
2,900 / 3,600		
27,500 / 33,300	1,000 / 1,400	1,900 / 2,200 — 29,400 / 34,100
NC 191		NC 191

2016 AADT
2040 AADT

PAVEMENT REMOVAL

FOR -Y- PROFILE, SEE SHEET NO. 19
FOR -YRT- PROFILE, SEE SHEET NO. 20
FOR -YLT- PROFILE, SEE SHEET NO. 20
FOR -Y1A- PROFILE, SEE SHEET NO. 26
FOR -Y2- PROFILE, SEE SHEET NO. 26

NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

NOTE: FINAL CURB RAMP AND STOP BAR LOCATIONS TO BE SHOWN IN PAVEMENT MARKING PLANS.

PROJECT REFERENCE NO.	SHEET NO.
I-5504	11
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DANE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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RS&H

NAD 83/NSRS 2007

MATCHLINE SHEET 6 –Y– STA. 34+00.00

MATCHLINE SHEET 12 –Y– STA. 47+00.00

–Y– PC Sta. 35+42.28

–YLT– PC Sta. 35+54.52

35+00 (–YLT–)
35+00 (–Y–)
35+00 (–YRT–)

CLASS 'B' RIP RAP
EST 2 TONS
EST 7 SY GEO
1101

REMOVE DI

GRAU 350 B-3

15" RCP-III

8" STEEL

12" RCP

REMOVE PIPE DI AND JB

CB TYPE G 1102

DI 1103

N 6° 00' 12.5" E

ATTENUATOR

REMOVE DI

SR 1911 BREVARD RD

200' TAPER

–YRT– PC Sta. 34+59.98

–Y– +33.16

58' TAPER

58' TAPER

–Y– +96.17

PLUG & ABANDON

BARKLEY FAMILY, LLC
DB 4876 PG 837

6

END RETAINING WALL
–Y– STA. 38+75.00,
59.25' LT

BEGIN RETAINING WALL
–Y– STA. 39+95.00,
73.90' LT

–Y– +47.00
74.60' LT
BEGIN FENCE
1104

CB TYPE G 1106

–Y– +45.00
79.00' LT
68.40' LT

–Y– +57.49
68.45' LT

–YLT– PT Sta. 41+67.67

142' TAPER

REMOVE CB

PUE

CB TYPE G 1108

–Y– +57.53
74.00' LT

DI 1109

PLUG & FILL

DI 1105

DI 1107

30" CONC C&G

24" DIP

24" CONC EXPWY GUTTER

48" WW & LSBW

EXISTING R/W

33' INC.

200' TAPER

–Y– +96.19

–Y– PT Sta. 41+66.19

–YRT– PT Sta. 41+60.85

WEST RANGE, LLC
(BILTMORE ESTATE)
DB 2163 PG 847

WEST RANGE, LLC
(BILTMORE ESTATE)
DB 2163 PG 847

PA BST

18" CONC C&G

24" CMP RETAIN

END C&G
–Y– +03.84

END S/W
–Y– +00.14

–Y– +40.00
72.80' LT
00.00' LT
BEGIN C/A BREAK

–Y– +00.00
135.00' LT

–Y– +93.43
86.00' LT

–Y– +50.00
71.42' LT
00.00' LT
END C/A BREAK

BEGIN FENCE
BEGIN C&G
–Y– +62.67
1118

–Y– +77.00
130.00' LT

–Y– +50.00
80.00' LT

–Y– +85.00
71.20' LT

CB TYPE E 1117

CB TYPE E 1122

BEGIN S/W
–Y– +78.39

8'x5' CONC BUS PAD

15" RCP-III

55'

R=50'

RADIUS = 327.48'
ARC = 108.39'

N 35°09'07" E

–Y– +55.00
81.62' LT

CB TYPE G 1116

BILTMORE FARMS INC.
DB 2212 PG 9036

17

END FENCE
–Y– +14.57

RETAIN

REMOVE DI

REMOVE CB

CB TYPE G 1115

DI 1114

JB W/MH 1119

CB TYPE E 1121

DI 1120

REMOVE CB

ADJUST CB 1113

ADJUST CB 1111

ADJUST CB 1112

N 29° 55' 59.3" E

PLUG & FILL

36" CMP RETAIN

INV= 2145.00'
TOP= 2149.71'

APPROX

–Y– CURVE DATA

PI Sta 38+62.19
△ = 31° 13' 12.9" (LT)
D = 5° 00' 14.4"
L = 623.91'
T = 319.91'
R = 1,145.00'
V = 54 mph
SE = 04

–YRT– CURVE DATA

PI Sta 38+19.35
△ = 31° 13' 12.9" (LT)
D = 4° 27' 16.2"
L = 700.87'
T = 359.37'
R = 1,286.25'
V = 57 mph
SE = 04

–YLT– CURVE DATA

PI Sta 38+68.91
△ = 31° 13' 12.9" (LT)
D = 5° 05' 30.6"
L = 613.14'
T = 314.39'
R = 1,125.25'
V = 54 mph
SE = 04

PAVEMENT REMOVAL

FOR –Y– PROFILE, SEE SHEET NO. 22

FOR –YRT– PROFILE, SEE SHEET NO. 21

FOR –YLT– PROFILE, SEE SHEET NO. 21

NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

NOTE: FINAL CURB RAMP AND STOP BAR LOCATIONS TO BE SHOWN IN PAVEMENT MARKING PLANS.

29-SEP-2016 20:00
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PROJECT REFERENCE NO.	SHEET NO.
I-5504	12
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 042357 ENGINEER ALLISON C. DAKE

HYDRAULICS ENGINEER

NORTH CAROLINA PROFESSIONAL SEAL 036188 ENGINEER WILLIAM WEATHERSBEE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Blythe

RS&H

NAD 83/NSRS 2007

-Y3- CURVE DATA

PI Sta 11+09.13	PI Sta 15+32.79	PI Sta 17+79.68
△ = 47° 11' 44.3" (LT)	△ = 67° 41' 49.3" (LT)	△ = 86° 53' 27.1" (RT)
D = 57° 17' 44.8"	D = 28° 38' 52.4"	D = 57° 17' 44.8"
L = 82.37'	L = 236.31'	L = 151.65'
T = 43.68'	T = 134.13'	T = 94.72'
R = 100.00'	R = 200.00'	R = 100.00'
V = 22mph	V = 28mph	V = 22mph
SE = 06	SE = 06	SE = 06

-RPD- CURVE DATA

PIs Sta 19+98.49	PI Sta 27+83.05
Θs = 10° 18' 47.7"	△ = 20° 32' 07.9" (RT)
Ls = 216.00'	D = 13° 48' 22.4"
LT = 144.25'	L = 148.74'
ST = 72.22'	T = 75.18'
	R = 415.00'
	V = 39mph
	SE = 08

-LPD- CURVE DATA

PIs Sta 16+65.49	PI Sta 25+88.12
Θs = 19° 34' 54.4"	△ = 20° 32' 07.9" (RT)
Ls = 204.00'	D = 14° 46' 01.0"
LT = 136.84'	L = 139.06'
ST = 68.77'	T = 70.29'
	R = 388.00'
	V = 37mph
	SE = 08

MATCH LINE SHEET 8 -RPD- STA. 17+50.00

MATCH LINE SHEET 7 -LPD- STA. 16+00.00

MATCHLINE SHEET 11 -Y- STA. 47+00.00

-RPD- CS Sta. 19+26.27

-RPD- CT Sta. 21+42.27

-RPD- ST Sta. 18+00.72

-Y3- POT Sta. 10+00.00

-Y3- PC Sta. 10+65.44

BEGIN CONSTRUCTION -Y3- POC Sta. 10+93.00

-Y3- PT Sta. 11+47.82

-Y3- PC Sta. 16+84.97

-Y3- PT Sta. 16+34.97

-Y3- PC Sta. 13+98.66

-Y- PC Sta. 52+69.80

END CONSTRUCTION -Y- POT Sta. 52+50.00 LT.

-RPD- PC Sta. 27+07.87

-RPD- PT Sta. 28+56.61

-LPD- PC Sta. 25+47.84

-LPD- PT Sta. 26+56.90

-Y- POT Sta. 51+67.44 = -Y3- POT Sta. 18+86.62

-RPD- POT Sta. 48+11.81 = -RPD- POT Sta. 29+11.84

-Y- POT Sta. 47+79.81 = -LPD- POT Sta. 27+11.23

S 80° 36' 08.6" E

S 79° 15' 41.3" E

S 32° 04' 00.0" E

N 33° 02' 26.4" E

LARRY OWENBY DB 2488 PG 879

JOSEF A. WARREN DB 3655 PG 776

CHARLES L. MEADOWS DB 963 PG 678

JOSEPH D. ELKINS DB 4929 PG 208

FAYE ROBERTS DB 4925 PG 121

EFFIE E. BLANKENSHIP DB 1116 PG 32

SHARPE DAVID WALL, III DB 4950 PG 930

EDWARD LEE McGLAMERY, ET AL DB 4934 PG 829

LAURA K. WILLIAMS DB 4570 PG 157

JOHN TRIANTOS DB 1119 PG 397

RAY C. LEWIS DB 1678 PG 186 DB 1555 PG 186

CHRISTINA GRACE CLARK DB 0026 PG 0268

PATSY S. CABLE DB 1356 PG 77

RBR AFFILIATES, LLC DB 3553 PG 499

BARKLEY FAMILY, LLC DB 4876 PG 837

BOBBIE SUE NAVE DB 3100 PG 776

COMBE COUNTY BOARD OF COMMISSIONERS DB 1725 PG 106

WEST RANGE, LLC (BILTMORE ESTATE) DB 2163 PG 847

DUKE ENERGY AB697 40KS

NOTE: IMPACTED RIGHT-OF-WAY MONUMENTS TO BE REUSED IF IN GOOD CONDITION AND SALVAGEABLE.

NOTE: FINAL CURB RAMP AND STOP BAR LOCATIONS TO BE SHOWN IN PAVEMENT MARKING PLANS.

PAVEMENT REMOVAL

FOR -RPD- PROFILE, SEE SHEET NO. 24

FOR -LPD- PROFILE, SEE SHEET NO. 25

FOR -Y3- PROFILE, SEE SHEET NO. 26

FOR -Y- PROFILE, SEE SHEET NO. 22

03-OCT-2016 09:48
I-5504 TRANSPORTATION MANAGEMENT PLAN.dgn
$$$$USERNAME$$$$

RIGHT DITCH ----------
LEFT DITCH ----·---·----
MEDIAN DITCH – – – – – –

PROJECT REFERENCE NO.	SHEET NO.
I-5504	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LLT–

BEGIN RESURFACING
–LLT– STA. 16+45.00
ELEV = 2,153.88

BEGIN PAVEMENT
RECONSTRUCTION
STA. 19+25.00
ELEV = 2,152.03'

EXISTING GROUND

PROPOSED GRADE

2,150.05

(–)0.6598%

(–)9.7000%

BEGIN SPECIAL
LATERAL 'V' DITCH LT.
PI = 22+40.00
EI = 2,142.82

SEE SHEET NO. 4 FOR –L– ALIGNMENT

–LRT–

BEGIN RESURFACING
–LRT– STA. 16+45.00
ELEV = 2,153.91

BEGIN PAVEMENT
RECONSTRUCTION
STA. 19+25.00
ELEV = 2,152.21'

EXISTING GROUND

PROPOSED GRADE

2,150.42

(–)0.6054%

BEGIN SPECIAL LATERAL
BASE DITCH RT.
PI = 20+75.00
EI = 2,145.15

(–) 8.6000%

(–) 2.8000%

(–) 1.0000%

(–) 1.2000%

PI =21+00.00
EI = 2,143.00

PI =21+50.00
EI = 2,141.60

PI =22+50.00
EI = 2,140.60

SEE SHEET NO. 4 FOR –L– ALIGNMENT

RIGHT DITCH ----------	PROJECT REFERENCE NO.	SHEET NO.
LEFT DITCH -----------	I-	14
MEDIAN DITCH ———————	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LLT–

PIPE HYDRAULIC DATA
EXISTING 48" CMP

DRAINAGE AREA	=	49 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	75 CFS
DESIGN HW ELEVATION	=	2130.99 FT
100 YEAR DISCHARGE	=	91 CFS
100 YEAR HW ELEVATION	=	2131.25 FT
OVERTOPPING FREQUENCY	=	100 YRS
OVERTOPPING DISCHARGE	=	80 CFS
OVERTOPPING ELEVATION	=	2131.18 FT

PIPE HYDRAULIC DATA
EXISTING 66" CMP

DRAINAGE AREA	=	145 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	286 CFS
DESIGN HW ELEVATION	=	2128.89 FT
100 YEAR DISCHARGE	=	309 CFS
100 YEAR HW ELEVATION	=	2130.09 FT
OVERTOPPING FREQUENCY	=	500 YRS
OVERTOPPING DISCHARGE	=	600 CFS
OVERTOPPING ELEVATION	=	2150.04 FT

PI = 25+20.00
EL = 2,148.31'
VC = 710'
K = 186
DS = 71 MPH

EXISTING GROUND
PROPOSED GRADE

2,150.05
(–)10.6598%
(+)3.1545%
PI =23+00.00
EI = 2,137.00
(–) 11.0200%
(–) 2.3333%
(–) 4.7600%
PI =23+50.00
EI = 2,131.49
PI =24+00.00
EI = 2,129.11
END SPECIAL LATERAL 'V' DITCH LT.
PI = 24+30.00
EI = 2,128.41
(+) 4.8200%
(–) 2.3600%
EXIST. 48" CMP
STA 25+16.98
ELEV = 2123.90'
BEGIN SPECIAL CUT DITCH LT.
PI = 24+50.00
EI = 2,127.94
END SPECIAL CUT DITCH LT.
BEGIN SPECIAL CUT DITCH LT.
PI = 25+00.00
EI = 2,130.35
(–) 5.3800%
PI =25+50.00
EI = 2,129.17
(–) 4.9400%
PI =26+00.00
EI = 2,126.48
END SPECIAL CUT DITCH LT.
BEGIN LATERAL BASE DITCH LT.
PI = 26+50.00
EI = 2,124.01
PI =27+00.00
EI = 2,122.36
(–) 3.3000%
(–) 1.3800%
(–) 0.9400%
BEGIN LATERAL BASE DITCH LT.
PI = 28+25.00
EI = 2,122.00
PI =27+50.00
EI = 2,121.67
(–) 1.0000%
EXIST. 66" CMP
STA 27+71.31
ELEV = 2118.00'
PI =28+00.00
EI = 2,121.20
END LATERAL BASE DITCH LT.
PI = 28+10.00
EI = 2,121.10
(+) 0.3200%
(+) 2.4800%
END LATERAL BASE DITCH LT.
PI = 28+75.00
EI = 2,122.70
EXIST. 14"X14"
STA 28+88.23
ELEV = 2122.83'
PI =28+50.00
EI = 2,122.08
(+) 2.6000%
(+) 4.5200%
PI =30+50.00
EI = 2,128.80
(+) 4.4000%
PI =29+50.00
EI = 2,124.34
BEGIN LATERAL BASE DITCH LT.
PI = 29+00.00
EI = 2,123.04
(+) 7.6200%
(+) 13.5800%
END LATERAL BASE DITCH LT.
BEGIN SPECIAL CUT DITCH LT.
PI = 30+00.00
EI = 2,126.60
(+) 16.1200%
PI =31+00.00
EI = 2,132.61
(+) 13.2800%
PI =31+50.00
EI = 2,139.40
END SPECIAL LATERAL BASE DITCH LT.
BEGIN LATERAL BASE DITCH LT.
PI = 32+50.00
EI = 2,154.10
(+) 8.7800%
PI =32+00.00
EI = 2,147.46
(+) 8.2200%
PI =33+00.00
EI = 2,158.49
(+) 1.1400%
PI =33+50.00
EI = 2,162.60
PI =34+50.00
EI = 2,163.74
(+) 3.9000%
(+) 7.6200%
PI =35+00.00
EI = 2,165.69
PI =35+50.00
EI = 2,169.50
(+)3.1545%

SEE SHEET NO. 5 FOR –L– ALIGNMENT

–LRT–

PI = 25+20.00
EL = 2,148.61'
VC = 710'
K = 191
DS = 72 MPH

PROPOSED GRADE
EXISTING GROUND

2,150.42
(–)10.6054%
(+)3.1068%
PI =23+00.00
EI = 2,140.00
(–) 11.8000%
(–) 4.5600%
PI =23+50.00
EI = 2,139.41
PI =24+00.00
EI = 2,137.13
(–) 6.4200%
(–) 9.6000%
PI =24+50.00
EI = 2,133.92
PI =25+00.00
EI = 2,129.12
(–) 7.0800%
(–) 9.5200%
PI =25+50.00
EI = 2,125.58
END SPECIAL LATERAL BASE DITCH RT.
BEGIN LATERAL BASE DITCH RT.
PI = 25+75.00
EL = 2,123.20
EXIST. 48" CMP
STA 25+89.64
ELEV = 2120.81'
(–) 4.7600%
PI =26+00.00
EI = 2,120.82
PI =26+50.00
EI = 2,118.44
(–) 4.7500%
END LATERAL BASE DITCH RT.
PI = 26+70.00
EL = 2,117.49
EXIST. 66" CMP
STA 27+41.71
ELEV = 2117.61'
EXIST. 14"X14"
STA 28+88.07
ELEV = 2122.69'
(+)3.1068%
2,182.17

SEE SHEET NO. 5 FOR –L– ALIGNMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	15
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

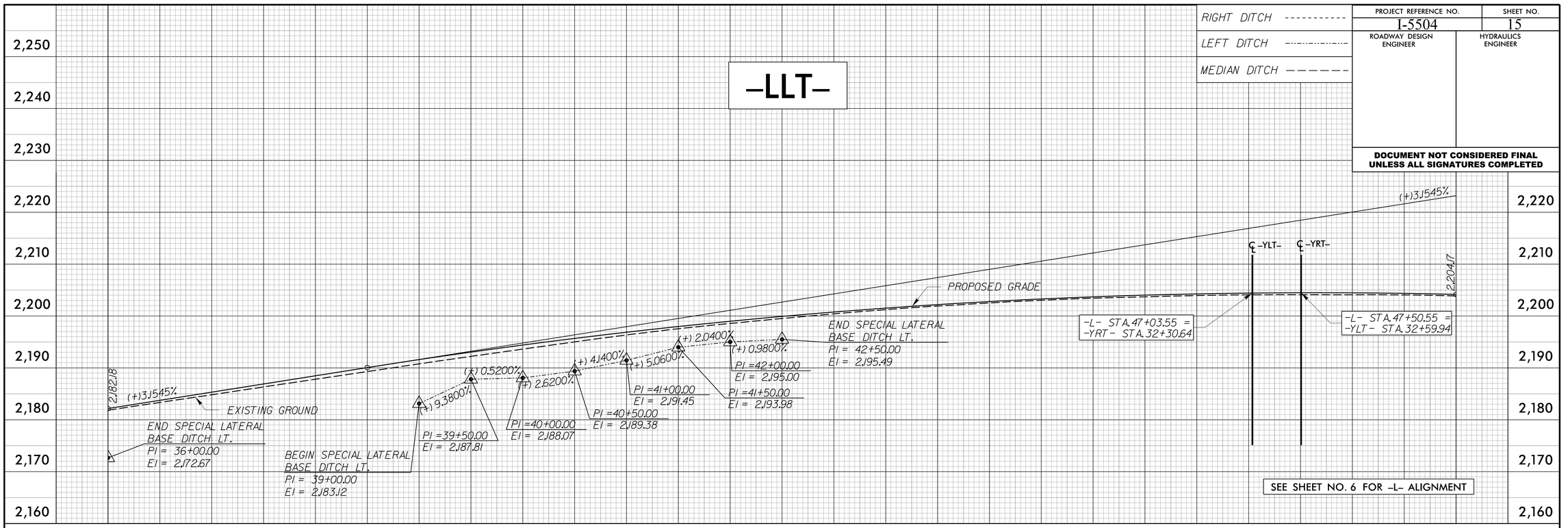
RIGHT DITCH ----------

LEFT DITCH ----------

MEDIAN DITCH ----------

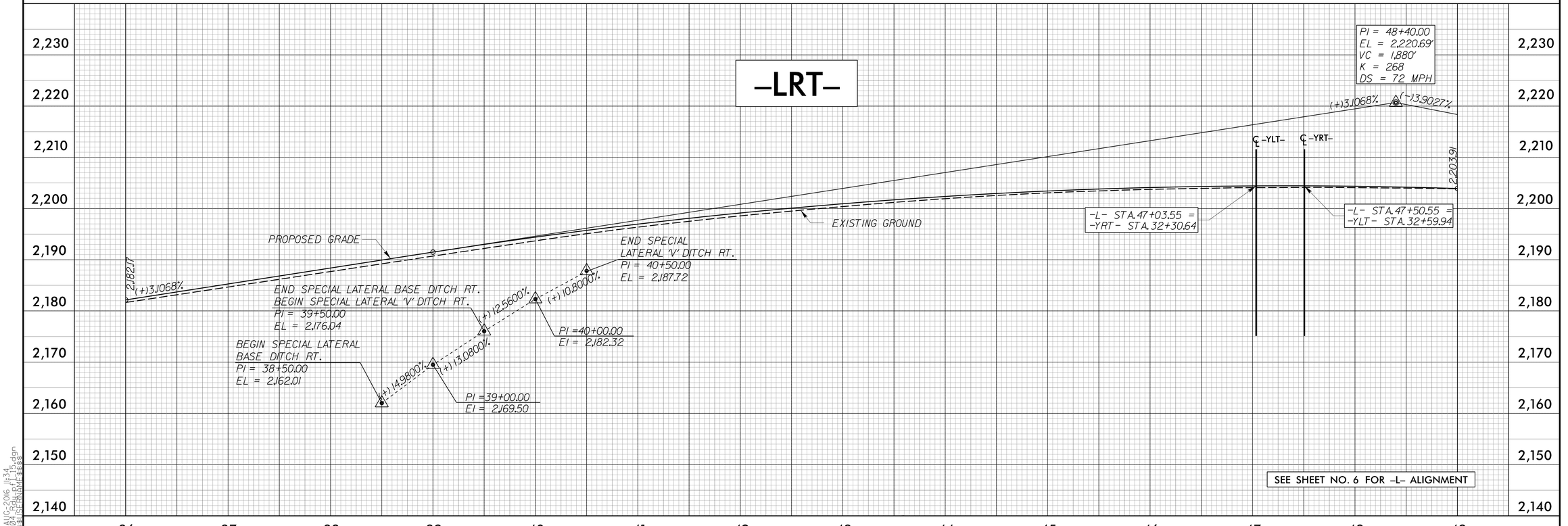
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LLT–



SEE SHEET NO. 6 FOR –L– ALIGNMENT

–LRT–



SEE SHEET NO. 6 FOR –L– ALIGNMENT

29-AUG-2016 11:34
I5504_GRD_LLT_LRT_15.dgn
$$$$USERNAME$$$$

RIGHT DITCH ----------
LEFT DITCH ----·----·----
MEDIAN DITCH – – – – – –

PROJECT REFERENCE NO.	SHEET NO.
I-5504	16
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LLT–

(−)14.1585%

2,220.417

PROPOSED GRADE

EXISTING GROUND

PI = 49+10.00
EL = 2,223.50'
VC = 2,120
K = 290
DS = 73 MPH

PIPE HYDRAULIC DATA
EXISTING 42" CMP

DRAINAGE AREA	=	27 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	80 CFS
DESIGN HW ELEVATION	=	2145.98 FT
100 YEAR DISCHARGE	=	92 CFS
100 YEAR HW ELEVATION	=	2146.50 FT
OVERTOPPING FREQUENCY	=	500 YRS
OVERTOPPING DISCHARGE	=	258 CFS
OVERTOPPING ELEVATION	=	2172.00 FT

END LATERAL BASE DITCH LT.
BEGIN SPECIAL CUT DITCH LT.
PI = 58+50.00
EI = 2,141.98

BEGIN LATERAL BASE DITCH LT.
PI = 58+00.00
EI = 2,140.53

PI =59+00.00
EI = 2,143.36

(+) 2.9000% (+) 2.7600% (+) 16.6400% (+) 13.4800% (+) 1.4000% (+) 1.3200% (+) 7.4200%

EXIST. 42" CMP
STA 58+69.12
ELEV = 2,153.85'

PI =59+50.00
EI = 2,151.68

PI =60+00.00
EI = 2,158.42

PI =60+50.00
EI = 2,159.12

PI =61+00.00
EI = 2,159.78

END SPECIAL CUT DITCH LT.
PI = 61+50.00
EI = 2,163.49

(−)14.1585%

2,169.85

SEE SHEET NO. 7 FOR –L– ALIGNMENT

–LRT–

(−)13.9027%

2,203.91

BEGIN SPECIAL CUT BASE DITCH RT.
PI = 50+50.00
EL = 2,197.98

(−) 1.7400%

PI =52+00.00
EI = 2,195.37

(−) 1.7496%

PI =52+40.58
EI = 2,194.66

(−) 1.6985%

(−) 0.2400%

PI =52+50.00
EI = 2,194.50

END SPECIAL CUT BASE DITCH RT.
PI = 52+75.00
EL = 2,194.44

BEGIN SPECIAL CUT BASE DITCH RT.
PI = 56+50.00
EI = 2,181.73

(−) 14.0400%

END SPECIAL CUT BASE DITCH RT.
PI = 57+00.00
EL = 2,174.71

BEGIN SPECIAL LATERAL 'V' DITCH RT.
PI = 57+50.00
EL = 2,170.99

(−) 5.9800%

(−) 22.0000%

PI =58+00.00
EI = 2,163.00

PI =58+50.00
EI = 2,152.00

(−) 29.0000%

END SPECIAL LATERAL 'V' DITCH RT.
PI = 58+90.00
EL = 2,140.40

EXIST. 42" CMP
STA 58+67.69
ELEV = 2,129.47'

PIPE HYDRAULIC DATA
EXISTING 42" CMP

DRAINAGE AREA	=	27 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	80 CFS
DESIGN HW ELEVATION	=	2145.98 FT
100 YEAR DISCHARGE	=	92 CFS
100 YEAR HW ELEVATION	=	2146.50 FT
OVERTOPPING FREQUENCY	=	500 YRS
OVERTOPPING DISCHARGE	=	258 CFS
OVERTOPPING ELEVATION	=	2172.00 FT

PROPOSED GRADE

EXISTING GROUND

(−) 1.1580%

PI =60+00.00
EI = 2,164.05

(−) 14.1800%

(−) 16.3600%

PI =60+50.00
EI = 2,156.96

PI =61+00.00
EI = 2,148.78

(−) 12.9600%

(−) 23.1600%

PI =61+50.00
EI = 2,142.30

(−)13.9027%

2,167.61

SEE SHEET NO. 7 FOR –L– ALIGNMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	17
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

RIGHT DITCH ----------

LEFT DITCH ----------

MEDIAN DITCH ---------

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LLT–

2,169.85

END SPECIAL CUT DITCH WITH HINGE LT.
PI = 62+50.00
EI = 2,167.82

(–) 4.1600%

(–)4.1585%

BEGIN SPECIAL CUT DITCH WITH HINGE LT.
PI = 62+00.00
EI = 2,169.90

PROPOSED GRADE

EXISTING GROUND

END SPECIAL CUT BASE DITCH LT.
BEGIN SPECIAL CUT DITCH WITH HINGE LT.
PI = 75+00.00
EI = 2,110.17

BEGIN SPECIAL CUT BASE DITCH LT.
PI = 73+25.00
EI = 2,120.00

(–) 8.3600%

(–) 3.6800%

(–) 2.6400%

(–)14.1585%

2,115.80

PI =73+50.00
EI = 2,115.41

PI =74+00.00
EI = 2,113.57

(–) 4.1600%

PI =74+50.00
EI = 2,112.25

SEE SHEET NO. 8 FOR –L– ALIGNMENT

–LRT–

2,167.61

(–)13.9027%

EXISTING GROUND

PI =62+50.00
EI = 2,134.25

PI =63+00.00
EI = 2,137.85

PI =64+00.00
EI = 2,143.07

(+) 2.3400%

(+) 0.7400%

(+) 7.0600%

(+) 5.6189%

(+) 12.5689%

(+) 4.3600%

(+) 5.0600%

(+) 3.9400%

(+) 6.0800%

PI =63+50.00
EI = 2,140.03

PI =64+50.00
EI = 2,145.60

PI =65+00.00
EI = 2,147.57

PI =65+50.00
EI = 2,148.74

END SPECIAL LATERAL BASE DITCH RT.
PI = 66+00.00
EL = 2,149.11

PROPOSED GRADE

PI =62+88.62
EI = 2,136.42

END SPECIAL LATERAL 'V' DITCH RT.
BEGIN SPECIAL LATERAL BASE DITCH RT.
PI = 62+00.00
EL = 2,130.72

END SPECIAL CUT BASE DITCH RT.
PI = 69+50.00
EL = 2,119.00

(–)13.9027%

2,116.88

BEGIN STANDARD BASE DITCH RT.
PI = 68+30.00
EL = 2,098.93

(+) 32.0000%

(+) 0.3500%

(+) 8.0000%

END STANDARD BASE DITCH RT.
BEGIN SPECIAL CUT BASE DITCH RT.
PI = 69+00.00
EL = 2,103.00

PI =68+50.00
EI = 2,099.00

SEE SHEET NO. 8 FOR –L– ALIGNMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	18
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

RIGHT DITCH ----------

LEFT DITCH ----·----·----

MEDIAN DITCH – – – – – –

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LLT–

2,115.80

(–)4.1585%

(–)13.2600%

(–)13.5000%

(–)12.4000%

(–)16.1000%

(–)16.3600%

(–)11.2200%

(–)6.2600%

(–)9.0500%

(–)4.1585%

(–)13.8870%

PROPOSED GRADE

EXISTING GROUND

PI =76+00.00
EI = 2,096.79

PI =75+50.00
EI = 2,103.54

PI =77+00.00
EI = 2,082.54

END SPECIAL CUT DITCH WITH HINGE LT.
BEGIN SPECIAL LATERAL BASE DITCH LT.
PI = 76+50.00
EI = 2,090.59

PI =77+50.00
EI = 2,074.36

PI =78+00.00
EI = 2,068.75

PI =78+50.00
EI = 2,065.62

EXIST 72" CMP
STA 78+52.48
ELEV = 2,064.26'

PROP 60" RCP
STA 78+70.43
ELEV = 2,066.32'

END SPECIAL LATERAL BASE DITCH LT.
PI = 78+90.00
EI = 2,062.00

BEGIN CHANNEL CHANGE LT.
PI = 80+70.00
EI = 2,053.23

PI =81+00.00
EI = 2,054.68

BEGIN LATERAL BASE DITCH LT.
PI = 81+60.00
EI = 2,064.00

(–)1.8333%

(–)2.5500%

END CHANNEL CHANGE LT.
PI = 81+40.00
EI = 2,053.66

(–)4.2000%

(–)28.8000%

PI =82+00.00
EI = 2,058.32

END LATERAL BASE DITCH LT.
PI = 82+15.00
EI = 2,054.00

PI = 82+10.00
EL = 2,086.27'
VC = 210
K = 77.3
DS > 80 MPH

END GRADE –LLT–
STA. 83+25.00
ELEV = 2,081.80'
GRADE POINT SHIFT
FROM 37' RT. TO 11.5' RT.
TO TIE TO B-5178

PIPE HYDRAULIC DATA
EXISTING 72" CMP/PROPOSED 60" RCP

DRAINAGE AREA	= 150 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 368 CFS
DESIGN HW ELEVATION	= 2074.80 FT
100 YEAR DISCHARGE	= 428 CFS
100 YEAR HW ELEVATION	= 2075.73 FT
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING DISCHARGE	= 1030 CFS
OVERTOPPING ELEVATION	= 2095.00 FT

SEE SHEET NO. 9 FOR –L– ALIGNMENT

–LRT–

2,116.88

(–)3.9027%

EXISTING GROUND

PROPOSED GRADE

END GRADE –LRT–
STA. 83+25.00
ELEV = 2,084.68'
GRADE POINT SHIFT
FROM 37' RT. TO 11.5' RT.
TO TIE TO B-5178

(–)3.9027%

PI =76+00.00
EI = 2,071.00

PI =76+50.00
EI = 2,070.29

END CHANNEL CHANGE RT.
PI = 77+75.00
EL = 2,068.50

PI =77+00.00
EI = 2,069.57

PI =77+50.00
EI = 2,068.86

BEGIN CHANNEL CHANGE RT.
PI = 75+60.00
EL = 2,071.96

(–)2.4000%

(–)1.4200%

(–)1.4400%

(–)1.4200%

(–)1.4400%

PI =78+50.00
EI = 2,074.65

PI =79+00.00
EI = 2,077.29

(+)3.0000%

(+)5.2800%

(+)11.4800%

(+)15.0286%

EXIST 72" CMP
STA 78+93.06
ELEV = 2,061.43'

PROP 60" RCP
STA 79+11.65
ELEV = 2,063.46'

BEGIN LATERAL 'V' DITCH RT.
PI = 78+25.00
EL = 2,071.40

END LATERAL 'V' DITCH RT.
PI = 79+85.00
EL = 2,088.29

PI =79+50.00
EI = 2,083.03

PIPE HYDRAULIC DATA
EXISTING 72" CMP/PROPOSED 60" RCP

DRAINAGE AREA	= 150 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 368 CFS
DESIGN HW ELEVATION	= 2074.80 FT
100 YEAR DISCHARGE	= 428 CFS
100 YEAR HW ELEVATION	= 2075.73 FT
OVERTOPPING FREQUENCY	= 500 YRS
OVERTOPPING DISCHARGE	= 1030 CFS
OVERTOPPING ELEVATION	= 2095.00 FT

SEE SHEET NO. 9 FOR –L– ALIGNMENT

29-AUG-2016 08:37
I:\5504\Roadway\Design\Profiles\I5504_PROFILES.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
I-5504	19
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–Y–

END GRADE
–Y– STA. 21+08.12
ELEV = 2202.72'
BEGIN GRADE
GRADE POINT SHIFT (14.75' LT)
–YLT– STA. 21+08.12
ELEV = 2203.11'
BEGIN GRADE
GRADE POINT SHIFT (12.75' RT)
–YRT– STA. 21+08.12
ELEV = 2202.38'

BEGIN GRADE –Y–
STA. 16+60.00
ELEV = 2,184.40'

(+)4.0882%

PROPOSED GRADE

(+)4.0882%

EXISTING GROUND

SEE SHEET NO. 10 FOR –Y– ALIGNMENT
SEE SHEET NO. 20, 21 FOR –YLT– & –YRT– PROFILES

2,250
2,240
2,230
2,220
2,210
2,200
2,190
2,180
2,170
2,160

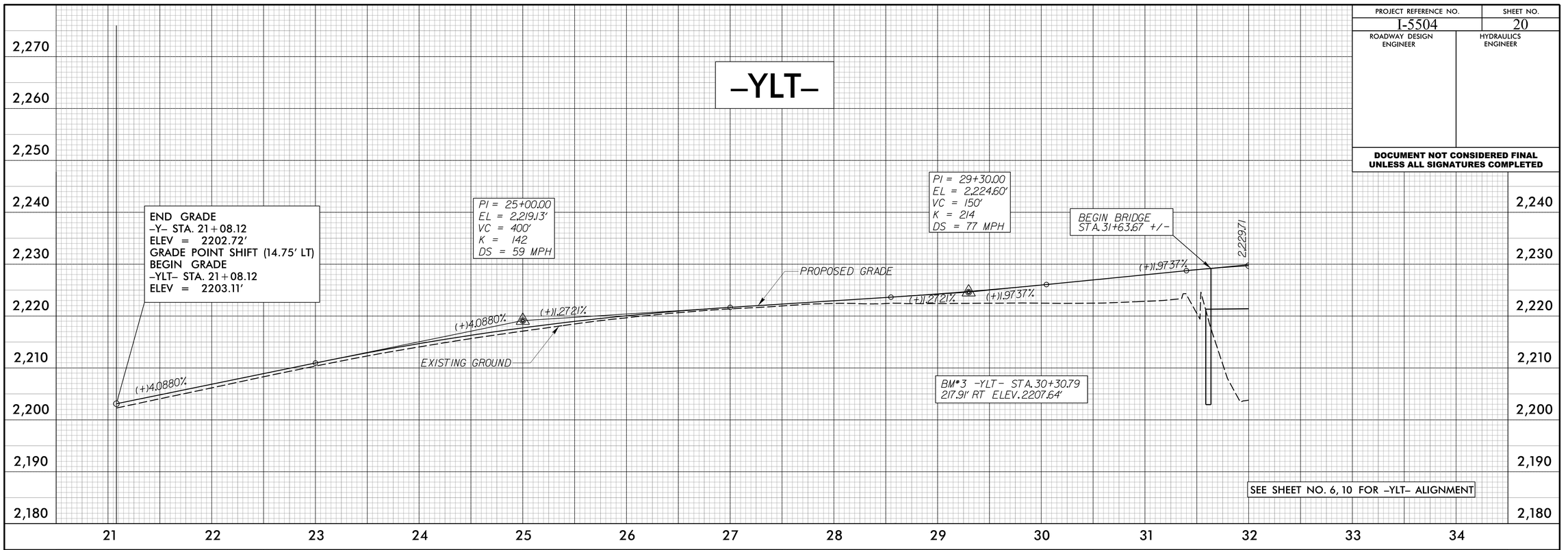
15 16 17 18 19 20 21 22

28-JUL-2016 08:38
I:\5504\Roadway\Design\Profiles\5504_pf_y.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
I-5504	20
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

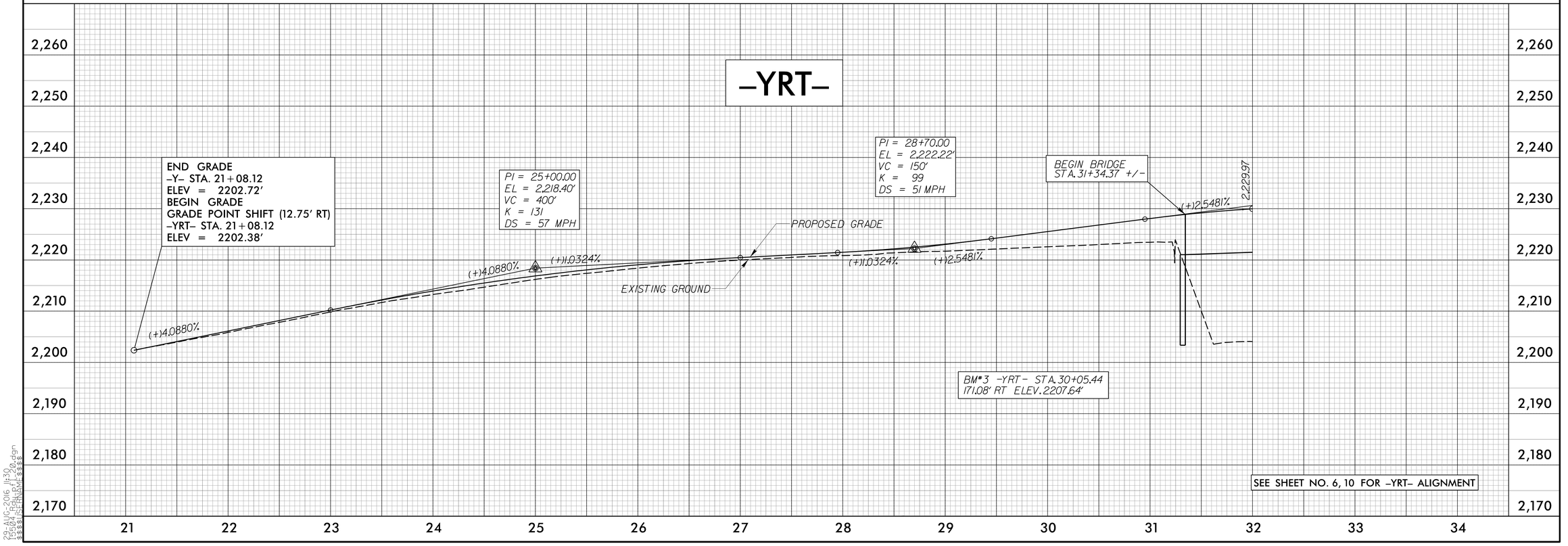
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–YLT–



SEE SHEET NO. 6, 10 FOR –YLT– ALIGNMENT

–YRT–

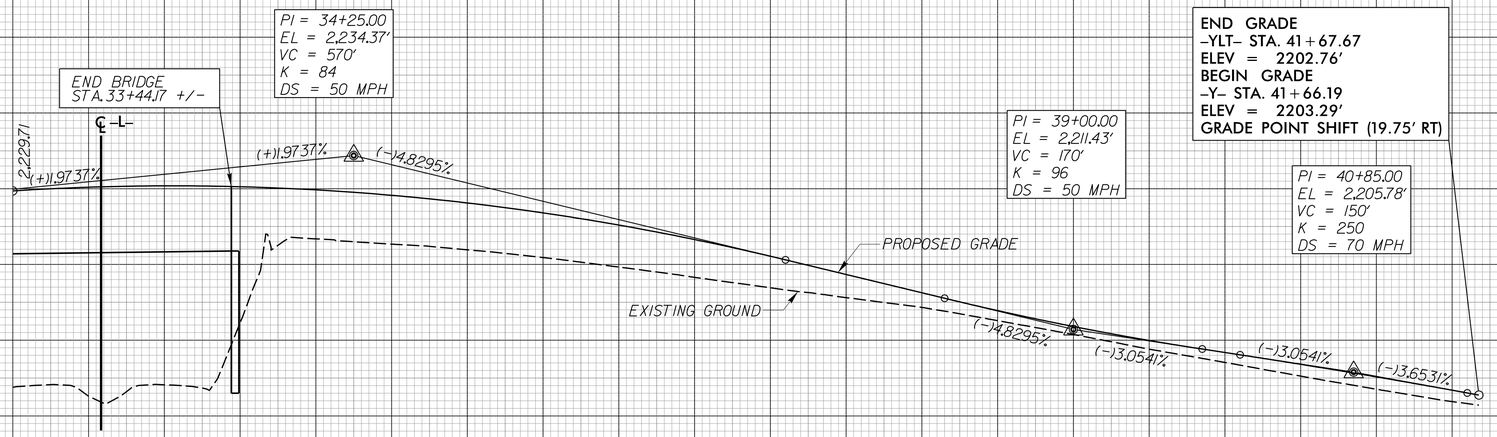


SEE SHEET NO. 6, 10 FOR –YRT– ALIGNMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	21
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

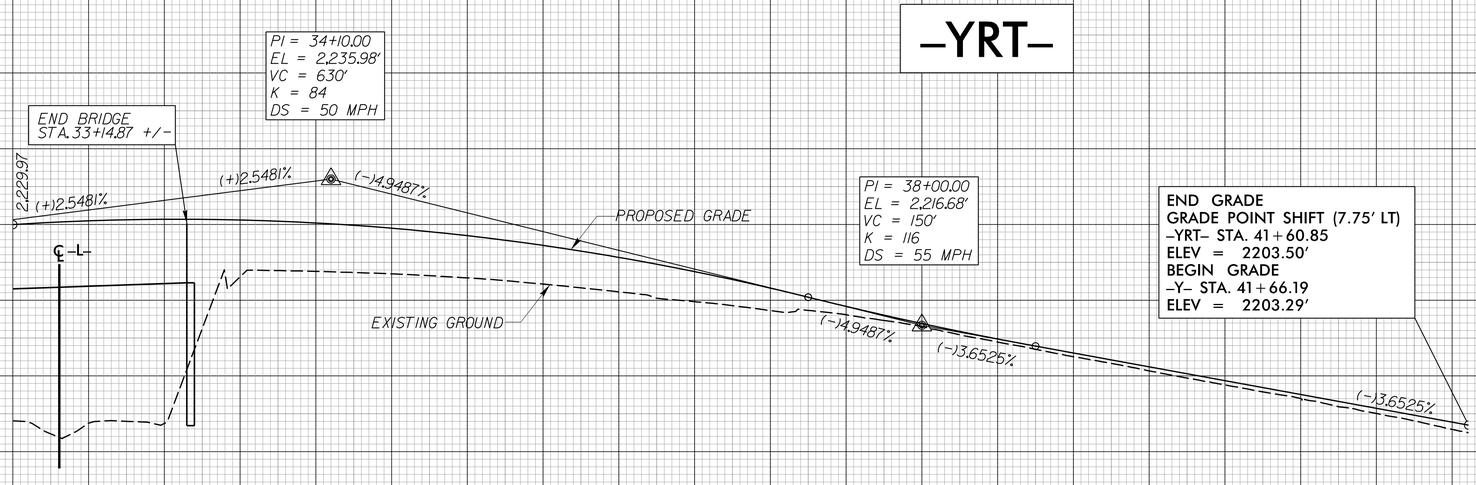
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–YLT–



SEE SHEET NO. 19, 22 FOR –Y– PROFILE
SEE SHEET NO. 6, 11, FOR –YLT– & –YRT– ALIGNMENT

–YRT–



SEE SHEET NO. 19, 22 FOR –Y– PROFILE
SEE SHEET NO. 6, 11, FOR –YLT– & –YRT– ALIGNMENT

PROJECT REFERENCE NO.	SHEET NO.
I-5504	22
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–Y–

END GRADE
GRADE POINT SHIFT (19.75' RT)
–YLT– STA. 41+67.67
ELEV = 2202.76'
END GRADE
GRADE POINT SHIFT (7.75' LT)
–YRT– STA. 41+60.85
ELEV = 2203.50'
BEGIN GRADE
–Y– STA. 41+66.19
ELEV = 2203.29'

PI = 44+65.00
EL = 2,192.38'
VC = 590'
K = 97
DS = 50 MPH

PI = 51+00.00
EL = 2,207.94'
VC = 200'
K = 540
DS > 80 MPH

END GRADE –Y–
STA. 52+50.00
ELEV = 2,211.06'

(–)3.6511%
(–)3.6511%
(+)2.4504%
PROPOSED GRADE
EXISTING GROUND
(+)2.4504%
(+)2.0800%

2,250
2,240
2,230
2,220
2,210
2,200
2,190
2,180
2,170
2,160

41 42 43 44 45 46 47 48 49 50 51 52 53 54

SEE SHEET NO. 11, 12 FOR –Y– ALIGNMENT
SEE SHEET NO. 20, 21 FOR –YLT– & –YRT– PROFILES

RIGHT DITCH ----------	PROJECT REFERENCE NO.	SHEET NO.
LEFT DITCH ----·----·----	I-5504	23
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–RPB–

BEGIN GRADE –RPB–
STA. 10+00.00
ELEV = 2,169.87'

PI = 12+28.00
EL = 2,177.07'
VC = 260'
K = 298
DS = 74 MPH

PI = 15+60.00
EL = 2,184.66'
VC = 360'
K = 241
DS > 80 MPH

(+)3.1579%
(+)2.2861%
PROPOSED GRADE
(+)3.7797%
(+) 2.7807%
(+) 0.3756%
(+) 9.0007%
(+) 4.8600%
(+) 3.5800%
(+) 3.6286%
(+) 1.4000%
(+) 0.4863%
(+) 2.7352%
EXISTING GROUND
2,212.63

BEGIN SPECIAL LATERAL BASE DITCH RT.
PI = 16+00.00
EL = 2,182.20

PI =16+37.40
EI = 2,183.24

PI =16+80.00
EI = 2,183.40

PI =17+20.00
EI = 2,187.00

PI =17+70.00
EI = 2,189.43

PI =18+70.00
EI = 2,193.01

PI =19+05.00
EI = 2,194.28

PI =19+66.73
EI = 2,194.90

PI =19+40.00
EI = 2,194.77

END SPECIAL LATERAL BASE DITCH RT.
PI = 20+00.00
EL = 2,195.81

SEE SHEET NO. 5, 6 FOR –RPB– ALIGNMENT

–RPB–

END GRADE –RPB–
STA. 24+92.89
ELEV = 2,219.92'

PROPOSED GRADE
(+)3.7797%
2,212.63
EXISTING GROUND

SEE SHEET NO. 5, 6 FOR –RPB– ALIGNMENT

–LPB–

BEGIN GRADE –LPB–
STA. 10+00.00
ELEV = 2,202.78'

PI = 10+88.00
EL = 2,201.90'
VC = 90'
K = 44
DS = 40 MPH

PI = 12+85.00
EL = 2,195.86'
VC = 280'
K = 38
DS = 30 MPH

END GRADE –LPB–
STA. 18+55.04
ELEV = 2,220.40'

PI = 18+08.00
EL = 2,218.84'
VC = 90'
K = 84
DS = 50 MPH

(–)1.0000%
(–)3.0660%
(–)3.0660%
(+)4.3939%
EXISTING GROUND
PROPOSED GRADE
(+)4.3939%
(+)3.3163%

SEE SHEET NO. 6 FOR –LPB– ALIGNMENT

–RPD–

PROJECT REFERENCE NO.	SHEET NO.
I-5504	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

RIGHT DITCH ----------

LEFT DITCH ----------.--.--

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BEGIN GRADE –RPD–
STA. 10+00.00
ELEV = 2,138.60'

PI = 11+54.00
EL = 2,144.55'
VC = 190'
K = 234
DS = 69 MPH

(+)3.8636%

(+)3.0510%

PI = 15+46.00
EL = 2,156.51'
VC = 190'
K = 171
DS = 63 MPH

(+)11.9406%

PROPOSED GRADE

(+)15.0000%

2172.31

END SPECIAL LATERAL 'V' DITCH RT.
PI = 18+40.00
EL = 2,158.09

(+)12.5000%

PI =18+24.00
EI = 2,156.09

(+)12.3211%

(+)23.6875%

PI =17+71.00
EI = 2,149.66

BEGIN SPECIAL LATERAL 'V' DITCH RT.
PI = 16+76.00
EL = 2,132.41

(+)12.5106%

PI =17+23.00
EI = 2,138.29

END SPECIAL CUT DITCH W/ HINGE LT.
PI = 14+80.00
EI = 2,118.30

EXISTING GROUND

(+) 9.7000%

PI =14+30.00
EI = 2,113.45

PI =12+82.00
EI = 2,106.80

(+) 0.8333%

(+) 6.2500%

BEGIN LATERAL 'V' DITCH LT.
PI = 11+50.00
EI = 2,101.50

(+) 4.4690%

(+) 1.3168%

PI =12+63.00
EI = 2,106.55

END LATERAL 'V' DITCH LT.
BEGIN SPECIAL CUT DITCH W/ HINGE LT.
PI = 13+30.00
EI = 2,107.20

SEE SHEET NO. 8, 12 FOR –RPD– ALIGNMENT

–RPD–

PI = 26+72.00
EL = 2,195.31'
VC = 160'
K = 61
DS = 45 MPH

EXISTING GROUND

PROPOSED GRADE

(+)5.0000%

(+)2.3950%

END GRADE –RPD–
STA. 28+66.57
ELEV = 2,199.97

2172.31

(+)5.0000%

SEE SHEET NO. 8, 12 FOR –RPD– ALIGNMENT

RIGHT DITCH ----------	PROJECT REFERENCE NO.	SHEET NO.
LEFT DITCH ----·----·----	I-5504	25
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–LPD–

BEGIN GRADE –LPD–
STA. 10+00.00
ELEV = 2,187.83'

PI = 11+00.00
EL = 2,184.38'
VC = 200'
K = 133
DS = 58 MPH

(–)3.4500%

(–)4.9593%

PI = 16+90.00
EL = 2,155.12'
VC = 800'
K = 81
DS = 46 MPH

EXISTING GROUND

PROPOSED GRADE

(–)4.9593%

(+)4.9578%

2,175.45

(+)4.9578%

SEE SHEET NO. 7, 12 FOR –LPD– ALIGNMENT

–LPD–

PI = 25+20.00
EL = 2,196.27'
VC = 110'
K = 37
DS = 38 MPH

END GRADE –LPD–
STA. 26+65.19
ELEV = 2,199.17

EXISTING GROUND

PROPOSED GRADE

2,175.45

(+)4.9578%

(+)4.9578%

(+)1.9974%

SEE SHEET NO. 7, 12 FOR –LPD– ALIGNMENT

RIGHT DITCH ----------

LEFT DITCH -·-·-·-·-·-

PROJECT REFERENCE NO.	SHEET NO.
I-5504	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

–Y1A–

BEGIN GRADE –Y1A–
STA. 10+41.90
ELEV = 2,209.42'

PI = 11+02.00
EL = 2,211.82'
VC = 120'
K = 69
DS = 47 MPH

PI = 12+37.00
EL = 2,214.85'
VC = 150'
K = 85
DS = 47 MPH

PI = 16+24.00
EL = 2,230.33'
VC = 190'
K = 55
DS = 43 MPH

(+)3.9933% (+)2.2444% (+)2.2444% (+)4.0000% (+)4.0000% (+)0.5208%

EXISTING GROUND

PROPOSED GRADE

END GRADE –Y1A–
STA. 17+20.00
ELEV = 2,230.83

BEGIN SPECIAL CUT
BASE DITCH RT.
PI = 14+00.00
EL = 2,214.74

(+) 2.3200% (+) 2.3800% (+) 2.3400%

PI =14+50.00
EI = 2,215.90

PI =15+00.00
EI = 2,217.09

END SPECIAL CUT
BASE DITCH RT.
PI = 15+50.00
EL = 2,218.26

SEE SHEET NO. 10 FOR –Y1A– ALIGNMENT

–Y2–

PI = 10+60.00
EL = 2,225.80'
VC = 90'
K = 50
DS = 35 MPH

PI = 11+60.00
EL = 2,231.62'
VC = 100'
K = 30
DS = 35 MPH

EXISTING GROUND

(+)12.5075% (+)5.8200% (+)4.0000%

PROPOSED GRADE

BEGIN GRADE –Y2–
STA. 10+12.00
ELEV = 2,223.88

END GRADE –Y2–
STA. 12+27.00
ELEV = 2,233.30

SEE SHEET NO. 10 FOR –Y2– ALIGNMENT

–Y3–

PI = 11+35.00
EL = 2,197.08'
VC = 80'
K = 27
DS = 35 MPH

PI = 13+20.00
EL = 2,201.82'
VC = 100'
K = 73
DS = 48 MPH

PI = 14+50.00
EL = 2,203.37'
VC = 150'
K = 56
DS = 44 MPH

PI = 16+60.00
EL = 2,200.25'
VC = 190'
K = 29
DS = 26 MPH

PI = 18+05.00
EL = 2,207.70'
VC = 80'
K = 26
DS = 34 MPH

(+)5.5000% (+)2.5622% (+)2.5622% (+)1.1923% (+)1.1923% (−)1.4857% (−)1.4857% (+)5.1379% (+)5.1379% (+)2.0049%

PROPOSED GRADE

EXISTING GROUND

BEGIN GRADE –Y3–
STA. 10+93.00
ELEV = 2,194.77

END GRADE –Y3–
STA. 18+49.89
ELEV = 2,208.60

SEE SHEET NO. 12 FOR –Y3– ALIGNMENT