



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

August 14, 2018

U. S. Army Corps of Engineers
Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

ATTN: Mr. Eric Alsmeyer
NCDOT Division 5 Coordinator

SUBJECT: **Request for Modification of the Section 404 Individual Permit, Section 401 Water Quality Certification, Isolated Waters State General Permit, and Neuse River Riparian Buffer Certification** for the proposed East End Connector from NC 147 (Durham Freeway/Buck Dean Expressway) to north of NC 98 (Holloway Street) in Durham, Durham County, North Carolina, Division 5. Federal Aid Project No. NHF-76-1(2), TIP No. U-0071.

Debit \$570.00 from WBS Element No. 34745.1.1

REFERENCE: 1) USACE Individual Permit, Action ID No. SAW-2011-00796, dated March 24, 2014.
2) USACE Individual Permit Modifications, Action ID No. SAW-2011-00796, dated May 7, 2015; December 7, 2015; May 17, 2016; and December 21, 2017.
3) NCDWR Section 401 Water Quality Certification, Neuse River Buffer Authorization, and Isolated Wetlands Permit, NCDWR Project No. 20131282, Certification No. 3980, dated January 28, 2014.
4) Modifications to the NCDWR Section 401 Water Quality Certification, Neuse River Buffer Authorization, and Isolated Wetlands Permit, NCDWR Project Nos. 20131282 ver. 2 (dated April 15, 2015); 20131282 ver. 3 (dated October 26, 2015); 20131282 ver. 4 (dated May 5, 2016); and 2013182 ver.5 (dated November 15, 2017).

Dear Sir:

The purpose of this letter is to request a modification to the United States Army Corps of Engineers (USACE) Section 404 Individual Permit and North Carolina Division of Water Resources (NCDWR) Section 401 Water Quality Certification, Isolated Waters State General Permit, and Neuse River Riparian Buffer Certification for the above-referenced project.

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1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

In addition to this cover letter, please find enclosed Wetland Permit Drawing Sheet Number 4 and Wetland Permit Impact Summary Sheet; Buffer Permit Drawing Sheet No 4 and the Buffer Impacts Summary Sheet, a NCDWR Stream Form, and a NCSAM Field Assessment.

IMPACTS TO WATERS OF THE UNITED STATES

Surface Waters

All revisions occur within the Neuse River Basin (HUC 03020201). Stream impacts occur at new Site SR1. Stream SZZ at Site SR1 is a highly degraded channel located on the front side of the Fellowship Baptist Church on Muldee Street (near Station 6+28 to 10+78 Lt -SR-1-). Recent evaluations of this stream by a NCDOT Biologist on November 22, 2017 determined that this stream is classified as a perennial stream across the entire church property. The channel was classified as a non-jurisdictional stream feature that was not subject to the buffer rule in a previous 2012 determination.

A recent plan revision changed the installation of a sanitary sewer line and drainage system in the area of SZZ. The City of Durham indicated that the new drainage structures (2 @ 24 inch reinforced concrete pipes) that discharge into the jurisdictional feature could not be placed above the sewer line and would have to be installed below the sewer line. The recent installation of the 2 @ 24 inch reinforced concrete pipes revealed that the inverts of the structures are significantly below the adjacent elevation of the perennial stream. Invert elevations of the pipe structures were evaluated and could not be changed. The only practical option was to regrade the stream channel in a slightly lower elevation and place the feature in a Class I rip rap lined channel (see Details CS1 and CP1) from 6+28 to 10+78 Lt -SR1- on Permit Sheet 4.

This work is proposed along the upper part of the stream channel in front of the Fellowship Baptist Church and results in permanent impacts for the stream and buffers. Please see Tables 1 and 2 for the impacts.

Table 1. Revised Surface Water Impacts within the Neuse River Basin (HUC 03020201)

Permit Site No.	Stream Name	Stream ID ¹	Intermittent/ Perennial	Impact Type	Impacts (lin. ft.)	Impacts Requiring USACE mitigation (lin. ft.)	Impacts Requiring 1:1 DWR mitigation (lin. ft.)
SR1	UT to Goose Creek	SZZ	Perennial	Perm. Fill	450	0	0
Total Permanent Impacts					450	0	0

Table 2. Revised Riparian Buffer Impacts within the Neuse River Basin (HUC 03020201)

Impact Type	Zone 1 Impacts (sq. ft.)	Zone 2 Impacts (sq. ft.)
Allowable Parallel Impacts	13,860	9,158
TOTAL IMPACTS	13,860	9,158

Compensatory Mitigation

Compensatory mitigation requirements for permanent stream and riparian buffer impacts associated with U-0071 within the Neuse River Basin (HUC 03020201) are not proposed for this modification. The USACE has indicated mitigation for the stream loss is not required due to the highly degraded stream. The NCDWR has indicated that stream mitigation and buffer mitigation is not required due to the lack of negative impact on water quality and use of the protection of existing structures category in the Neuse Buffer Rule.

A copy of this permit modification application and its distribution list will be posted on the NCDOT website at <https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx>, under Quick Links > Permit Applications. Thank you for your time and assistance with this project. Please contact Deanna Riffey at either driffey@ncdot.gov or (919) 707-6151 if you have any questions or need additional information.

Sincerely,



for Philip S. Harris III, P.E., C.P.M., Unit Head
Environmental Analysis Unit

cc:
NCDOT Permit Application Standard Distribution List

NC DWQ Stream Identification Form Version 4.11

Date: <small>(MM/DD/YYYY)</small> 11/22/2017	Project/Site: U-0071 SZZ	Latitude: 36.00058 <small>(XX.XXXXX)</small>
Evaluator: Mason, J. Barrett, B. _____	County: Durham	Longitude: -78.86267 <small>(-XX.XXXXX)</small>
Total Points: <i>Stream is at least intermittent if ≥ 19 or perennial if ≥ 30*</i> 43.00	Stream Determination: Perennial	Other <i>e.g. Quad Name:</i>

A. Geomorphology (Subtotal = <u>19.5</u>) Score		Absent	Weak	Moderate	Strong
1 ^a . Continuity of channel bed and bank	3	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
2. Sinuosity of channel along thalweg	2	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>
3. In-channel structure: ex. riffle-pool, step-pool, ripple-pool sequence	2	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>
4. Particle size of stream substrate	2	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>
5. Active/relict floodplain	3	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
6. Depositional bars or benches	3	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
7. Recent alluvial deposits	2	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>
8. Headcuts	1	0 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
9. Grade control	1	0 <input type="checkbox"/>	0.5 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>	1.5 <input type="checkbox"/>
10. Natural valley	0.5	0 <input type="checkbox"/>	0.5 <input checked="" type="checkbox"/>	1 <input type="checkbox"/>	1.5 <input type="checkbox"/>
11. Second or greater order channel	0	<input checked="" type="checkbox"/> No = 0		Yes = 3 <input type="checkbox"/>	

^a artificial ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = <u>11.0</u>)		Absent	Weak	Moderate	Strong
12. Presence of Baseflow	3	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
13. Iron oxidizing bacteria	2	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input checked="" type="checkbox"/>	3 <input type="checkbox"/>
14. Leaf litter	1.5	1.5 <input checked="" type="checkbox"/>	1 <input type="checkbox"/>	0.5 <input type="checkbox"/>	0 <input type="checkbox"/>
15. Sediment on plants or debris	1	0 <input type="checkbox"/>	0.5 <input type="checkbox"/>	1 <input checked="" type="checkbox"/>	1.5 <input type="checkbox"/>
16. Organic debris lines or piles	0.5	0 <input type="checkbox"/>	0.5 <input checked="" type="checkbox"/>	1 <input type="checkbox"/>	1.5 <input type="checkbox"/>
17. Soil-based evidence of high water table?	3	<input type="checkbox"/> No = 0		Yes = 3 <input checked="" type="checkbox"/>	

C. Biology (Subtotal = <u>12.50</u>)									
18. Fibrous roots in streambed	3	3	<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	1	<input type="checkbox"/>	0	<input type="checkbox"/>
19. Rooted upland plants in streambed	3	3	<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	1	<input type="checkbox"/>	0	<input type="checkbox"/>
20. Macroinbenthos (note diversity and abundance)	2	0	<input type="checkbox"/>	1	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	3	<input type="checkbox"/>
21. Aquatic Mollusks	1	0	<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>
22. Fish	0	0	<input checked="" type="checkbox"/>	0.5	<input type="checkbox"/>	1	<input type="checkbox"/>	1.5	<input type="checkbox"/>
23. Crayfish	0.5	0	<input type="checkbox"/>	0.5	<input checked="" type="checkbox"/>	1	<input type="checkbox"/>	1.5	<input type="checkbox"/>
24. Amphibians	0	0	<input checked="" type="checkbox"/>	0.5	<input type="checkbox"/>	1	<input type="checkbox"/>	1.5	<input type="checkbox"/>
25. Algae	1.5	0	<input type="checkbox"/>	0.5	<input type="checkbox"/>	1	<input type="checkbox"/>	1.5	<input checked="" type="checkbox"/>
26. Wetland plants in streambed	1.5	FACW = 0.75; OBL = 1.5 Other = 0							
*perennial streams may also be identified using other methods. See p. 35 of manual.			<input type="checkbox"/>		<input checked="" type="checkbox"/>		<input type="checkbox"/>		

Notes:
Reviewed feature along the entire frontage of the Baptist Church property. Snails, caddisflies, crayfish, damselflies, dragonfly, stoneflies, and aquatic worms ID'ed. Typha in streambed.

Sketch:

NC SAM FIELD ASSESSMENT FORM
Accompanies User Manual Version 2.1

USACE AID #: SAW-2011-00796 NCDWR #: 20131282

INSTRUCTIONS: Attach a sketch of the assessment area and photographs. Attach a copy of the USGS 7.5-minute topographic quadrangle, and circle the location of the stream reach under evaluation. If multiple stream reaches will be evaluated on the same property, identify and number all reaches on the attached map, and include a separate form for each reach. See the NC SAM User Manual for detailed descriptions and explanations of requested information. Record in the "Notes/Sketch" section if any supplementary measurements were performed. See the NC SAM User Manual for examples of additional measurements that may be relevant.

NOTE EVIDENCE OF STRESSORS AFFECTING THE ASSESSMENT AREA (do not need to be within the assessment area).

PROJECT / SITE INFORMATION:

1. Project name (if any): U-0071 2. Date of evaluation: 11/22/2017
 3. Applicant/owner name: NCDOT 4. Assessor name/organization: Mason, Barrett
 5. County: Durham 6. Nearest named water body
 7. River Basin: Neuse on USGS 7.5-minute quad: Goose Creek
 8. Site coordinates (decimal degrees, at lower end of assessment reach): 36.00058, -78.86267

STREAM INFORMATION: (depth and width can be approximations)

9. Site number (show on attached map): Stream SZZ 10. Length of assessment reach evaluated (feet): 900
 11. Channel depth from bed (in riffle, if present) to top of bank (feet): 0.25-2 ☐ Unable to assess channel depth.
 12. Channel width at top of bank (feet): 6-12 13. Is assessment reach a swamp stream? ☒ Yes ☐ No
 14. Feature type: ☒ Perennial flow ☐ Intermittent flow ☐ Tidal Marsh Stream

STREAM RATING INFORMATION:

15. NC SAM Zone: ☐ Mountains (M) ☒ Piedmont (P) ☐ Inner Coastal Plain (I) ☐ Outer Coastal Plain (O)

16. Estimated geomorphic valley shape (skip for Tidal Marsh Stream):
☒ a (more sinuous stream, flatter valley slope) ☒ b (less sinuous stream, steeper valley slope)
 17. Watershed size: (skip for Tidal Marsh Stream) ☒ Size 1 (< 0.1 mi²) ☐ Size 2 (0.1 to < 0.5 mi²) ☐ Size 3 (0.5 to < 5 mi²) ☐ Size 4 (≥ 5 mi²)

ADDITIONAL INFORMATION:

18. Were regulatory considerations evaluated? ☒ Yes ☐ No If Yes, check all that apply to the assessment area.
☐ Section 10 water ☐ Classified Trout Waters ☐ Water Supply Watershed (☐ I ☐ II ☐ III ☒ IV ☐ V)
☐ Essential Fish Habitat ☐ Primary Nursery Area ☐ High Quality Waters/Outstanding Resource Waters
☐ Publicly owned property ☒ NCDWR riparian buffer rule in effect ☒ Nutrient Sensitive Waters
☐ Anadromous fish ☐ 303(d) List ☐ CAMA Area of Environmental Concern (AEC)
☐ Documented presence of a federal and/or state listed protected species within the assessment area.
 List species: _____
☐ Designated Critical Habitat (list species): _____

19. Are additional stream information/supplementary measurements included in "Notes/Sketch" section or attached? ☐ Yes ☒ No

1. Channel Water – assessment reach metric (skip for Size 1 streams and Tidal Marsh Streams)

- ☒ A Water throughout assessment reach.
☐ B No flow, water in pools only.
☐ C No water in assessment reach.

2. Evidence of Flow Restriction – assessment reach metric

- ☒ A At least 10% of assessment reach in-stream habitat or riffle-pool sequence is adversely affected by a flow restriction or fill to the point of obstructing flow or a channel choked with aquatic macrophytes or ponded water or impounded on flood or ebb within the assessment reach (examples: undersized or perched culverts, causeways that constrict the channel, tidal gates).
☒ B Not A

3. Feature Pattern – assessment reach metric

- ☒ A A majority of the assessment reach has altered pattern (examples: straightening, modification above or below culvert).
☐ B Not A.

4. Feature Longitudinal Profile – assessment reach metric

- ☒ A Majority of assessment reach has a substantially altered stream profile (examples: channel down-cutting, existing damming, over widening, active aggradation, dredging, and excavation where appropriate channel profile has not reformed from any of these disturbances).
☐ B Not A

5. Signs of Active Instability – assessment reach metric

Consider only current instability, not past events from which the stream has currently recovered. Examples of instability include active bank failure, active channel down-cutting (head-cut), active widening, and artificial hardening (such as concrete, gabion, rip-rap).

- ☒ A < 10% of channel unstable
☐ B 10 to 25% of channel unstable
☐ C > 25% of channel unstable

6. Streamside Area Interaction – streamside area metric

Consider for the Left Bank (LB) and the Right Bank (RB).

- | LB | RB | |
|---------------------------------------|---------------------------------------|---|
| <input type="checkbox"/> A | <input type="checkbox"/> A | Little or no evidence of conditions that adversely affect reference interaction |
| <input type="checkbox"/> B | <input type="checkbox"/> B | Moderate evidence of conditions (examples: berms, levees, down-cutting, aggradation, dredging) that adversely affect reference interaction (examples: limited streamside area access, disruption of flood flows through streamside area, leaky or intermittent bulkheads, causeways with floodplain constriction, minor ditching [including mosquito ditching]) |
| <input checked="" type="checkbox"/> C | <input checked="" type="checkbox"/> C | Extensive evidence of conditions that adversely affect reference interaction (little to no floodplain/intertidal zone access [examples: causeways with floodplain and channel constriction, bulkheads, retaining walls, fill, stream incision, disruption of flood flows through streamside area] <u>or</u> too much floodplain/intertidal zone access [examples: impoundments, intensive mosquito ditching]) <u>or</u> floodplain/intertidal zone unnaturally absent <u>or</u> assessment reach is a man-made feature on an interstream divide |

7. Water Quality Stressors – assessment reach/intertidal zone metric

Check all that apply.

- ☒ A Discolored water in stream or intertidal zone (milky white, blue, unnatural water discoloration, oil sheen, stream foam)
- ☒ B Excessive sedimentation (burying of stream features or intertidal zone)
- ☐ C Noticeable evidence of pollutant discharges entering the assessment reach and causing a water quality problem
- ☐ D Odor (not including natural sulfide odors)
- ☐ E Current published or collected data indicating degraded water quality in the assessment reach. Cite source in the "Notes/Sketch" section.
- ☐ F Livestock with access to stream or intertidal zone
- ☒ G Excessive algae in stream or intertidal zone
- ☐ H Degraded marsh vegetation in the intertidal zone (removal, burning, regular mowing, destruction, etc.)
- ☐ I Other: _____ (explain in "Notes/Sketch" section)
- ☐ J Little to no stressors

8. Recent Weather – watershed metric

For Size 1 or 2 streams, D1 drought or higher is considered a drought; for Size 3 or 4 streams, D2 drought or higher is considered a drought.

- ☒ A Drought conditions and no rainfall or rainfall not exceeding 1 inch within the last 48 hours
- ☐ B Drought conditions and rainfall exceeding 1 inch within the last 48 hours
- ☒ C No drought conditions

9. Large or Dangerous Stream – assessment reach metric

☐ Yes ☒ No Is stream is too large or dangerous to assess? If Yes, skip to Metric 13 (Streamside Area Ground Surface Condition).

10. Natural In-stream Habitat Types – assessment reach metric

10a. ☒ Yes ☐ No Degraded in-stream habitat over majority of the assessment reach (examples of stressors include excessive sedimentation, mining, excavation, in-stream hardening [for example, rip-rap], recent dredging, and snagging) (evaluate for size 4 Coastal Plain streams only, then skip to Metric 12)

10b. Check all that occur (occurs if > 5% coverage of assessment reach) (skip for Size 4 Coastal Plain streams)

- | | | |
|--|------------------------------------|---|
| <input type="checkbox"/> A Multiple aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) | Check for Tidal Marsh Streams only | <input type="checkbox"/> F 5% oysters or other natural hard bottoms |
| <input type="checkbox"/> B Multiple sticks and/or leaf packs and/or emergent vegetation | | <input type="checkbox"/> G Submerged aquatic vegetation |
| <input type="checkbox"/> C Multiple snags and logs (including lap trees) | | <input type="checkbox"/> H Low-tide refugia (pools) |
| <input checked="" type="checkbox"/> D 5% undercut banks and/or root mats and/or roots in banks extend to the normal wetted perimeter | | <input type="checkbox"/> I Sand bottom |
| <input type="checkbox"/> E Little or no habitat | | <input type="checkbox"/> J 5% vertical bank along the marsh |
| | | <input type="checkbox"/> K Little or no habitat |

*****REMAINING QUESTIONS ARE NOT APPLICABLE FOR TIDAL MARSH STREAMS*****

11. Bedform and Substrate – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

11a. ☐ Yes ☒ No Is assessment reach in a natural sand-bed stream? (skip for Coastal Plain streams)

11b. Bedform evaluated. Check the appropriate box(es).

- ☒ A Riffle-run section (evaluate 11c)
- ☐ B Pool-glide section (evaluate 11d)
- ☐ C Natural bedform absent (skip to Metric 12, Aquatic Life)

11c. In riffles sections, check all that occur below the normal wetted perimeter of the assessment reach – whether or not submerged.

Check at least one box in each row (skip for Size 4 Coastal Plain Streams and Tidal Marsh Streams). Not Present (NP) = absent, Rare (R) = present but ≤ 10%, Common (C) = > 10-40%, Abundant (A) = > 40-70%, Predominant (P) = > 70%. Cumulative percentages should not exceed 100% for each assessment reach.

NP	R	C	A	P	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bedrock/saprolite
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Boulder (256 – 4096 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cobble (64 – 256 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gravel (2 – 64 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sand (.062 – 2 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Silt/clay (< 0.062 mm)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Detritus
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Artificial (rip-rap, concrete, etc.)

11d. ☐ Yes ☒ No Are pools filled with sediment? (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12. Aquatic Life – assessment reach metric (skip for Size 4 Coastal Plain streams and Tidal Marsh Streams)

12a. ☒ Yes ☐ No Was an in-stream aquatic life assessment performed as described in the User Manual?

If No, select one of the following reasons and skip to Metric 13. ☐ No Water ☐ Other: _____

12b. ☒ Yes ☐ No Are aquatic organisms present in the assessment reach (look in riffles, pools, then snags)? If Yes, check all that apply. If No, skip to Metric 13.

1 >1 Numbers over columns refer to "individuals" for size 1 and 2 streams and "taxa" for size 3 and 4 streams.

- | | | |
|-------------------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Adult frogs |
| <input type="checkbox"/> | <input type="checkbox"/> | Aquatic reptiles |
| <input type="checkbox"/> | <input type="checkbox"/> | Aquatic macrophytes and aquatic mosses (include liverworts, lichens, and algal mats) |
| <input type="checkbox"/> | <input type="checkbox"/> | Beetles (including water pennies) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Caddisfly larvae (Trichoptera [T]) |
| <input type="checkbox"/> | <input type="checkbox"/> | Asian clam (<i>Corbicula</i>) |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Crustacean (isopod/amphipod/crayfish/shrimp) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Damselfly and dragonfly larvae |
| <input type="checkbox"/> | <input type="checkbox"/> | Dipterans (true flies) |
| <input type="checkbox"/> | <input type="checkbox"/> | Mayfly larvae (Ephemeroptera [E]) |
| <input type="checkbox"/> | <input type="checkbox"/> | Megaloptera (dobsonfly, fishfly, dobsonfly larvae) |
| <input type="checkbox"/> | <input type="checkbox"/> | Midges/mosquito larvae |
| <input type="checkbox"/> | <input type="checkbox"/> | Mosquito fish (<i>Gambusia</i>) or mud minnows (<i>Umbra pygmaea</i>) |
| <input type="checkbox"/> | <input type="checkbox"/> | Mussels/Clams (not <i>Corbicula</i>) |
| <input type="checkbox"/> | <input type="checkbox"/> | Other fish |
| <input type="checkbox"/> | <input type="checkbox"/> | Salamanders/tadpoles |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Snails |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Stonefly larvae (Plecoptera [P]) |
| <input type="checkbox"/> | <input type="checkbox"/> | Tipulid larvae |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | Worms/leeches |

13. Streamside Area Ground Surface Condition – streamside area metric (skip for Tidal Marsh Streams and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB). Consider storage capacity with regard to both overbank flow and upland runoff.

LB RB

- | | | |
|------------------------------------|------------------------------------|---|
| <input checked="" type="radio"/> A | <input type="radio"/> A | Little or no alteration to water storage capacity over a majority of the streamside area |
| <input type="radio"/> B | <input checked="" type="radio"/> B | Moderate alteration to water storage capacity over a majority of the streamside area |
| <input checked="" type="radio"/> C | <input type="radio"/> C | Severe alteration to water storage capacity over a majority of the streamside area (examples include: ditches, fill, soil, compaction, livestock disturbance, buildings, man-made levees, drainage pipes) |

14. Streamside Area Water Storage – streamside area metric (skip for Size 1 streams, Tidal Marsh Streams, and B valley types)

Consider for the Left Bank (LB) and the Right Bank (RB) of the streamside area.

LB RB

- | | | |
|------------------------------------|------------------------------------|--|
| <input checked="" type="radio"/> A | <input type="radio"/> A | Majority of streamside area with depressions able to pond water \geq 6 inches deep |
| <input type="radio"/> B | <input checked="" type="radio"/> B | Majority of streamside area with depressions able to pond water 3 to 6 inches deep |
| <input checked="" type="radio"/> C | <input type="radio"/> C | Majority of streamside area with depressions able to pond water < 3 inches deep |

15. Wetland Presence – streamside area metric (skip for Tidal Marsh Streams)

Consider for the Left Bank (LB) and the Right Bank (RB). Do not consider wetlands outside of the streamside area or within the normal wetted perimeter of assessment reach.

LB RB

- | | | |
|------------------------------------|------------------------------------|--|
| <input type="radio"/> Y | <input type="radio"/> Y | Are wetlands present in the streamside area? |
| <input checked="" type="radio"/> N | <input checked="" type="radio"/> N | |

16. Baseflow Contributors – assessment reach metric (skip for size 4 streams and Tidal Marsh Streams)

Check all contributors within the assessment reach or within view of and draining to the assessment reach.

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> A | Streams and/or springs (jurisdictional discharges) |
| <input type="checkbox"/> B | Ponds (include wet detention basins; do not include sediment basins or dry detention basins) |
| <input type="checkbox"/> C | Obstruction that passes some flow during low-flow periods within assessment area (beaver dam, bottom-release dam) |
| <input checked="" type="checkbox"/> D | Evidence of bank seepage or sweating (iron oxidizing bacteria in water indicates seepage) |
| <input checked="" type="checkbox"/> E | Stream bed or bank soil reduced (dig through deposited sediment if present) |
| <input type="checkbox"/> F | None of the above |

17. Baseflow Detractors – assessment area metric (skip for Tidal Marsh Streams)

Check all that apply.

- | | |
|---------------------------------------|--|
| <input type="checkbox"/> A | Evidence of substantial water withdrawals from the assessment reach (includes areas excavated for pump installation) |
| <input type="checkbox"/> B | Obstruction not passing flow during low flow periods affecting the assessment reach (ex: watertight dam, sediment deposit) |
| <input checked="" type="checkbox"/> C | Urban stream (\geq 24% impervious surface for watershed) |
| <input checked="" type="checkbox"/> D | Evidence that the stream-side area has been modified resulting in accelerated drainage into the assessment reach |
| <input type="checkbox"/> E | Assessment reach relocated to valley edge |
| <input type="checkbox"/> F | None of the above |

18. Shading – assessment reach metric (skip for Tidal Marsh Streams)

Consider aspect. Consider "leaf-on" condition.

- | | |
|------------------------------------|--|
| <input type="radio"/> A | Stream shading is appropriate for stream category (may include gaps associated with natural processes) |
| <input checked="" type="radio"/> B | Degraded (example: scattered trees) |
| <input checked="" type="radio"/> C | Stream shading is gone or largely absent |

19. Buffer Width – streamside area metric (skip for Tidal Marsh Streams)

Consider “vegetated buffer” and “wooded buffer” separately for left bank (LB) and right bank (RB) starting at the top of bank out to the first break.

Vegetated		Wooded		
LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	≥ 100-feet wide <u>or</u> extends to the edge of the watershed
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	From 50 to < 100-feet wide
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	From 30 to < 50-feet wide
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	From 10 to < 30-feet wide
<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E	<input type="radio"/> E	< 10-feet wide <u>or</u> no trees

20. Buffer Structure – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Vegetated” Buffer Width).

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Mature forest
<input type="radio"/> B	<input type="radio"/> B	Non-mature woody vegetation <u>or</u> modified vegetation structure
<input type="radio"/> C	<input type="radio"/> C	Herbaceous vegetation with or without a strip of trees < 10 feet wide
<input type="radio"/> D	<input type="radio"/> D	Maintained shrubs
<input type="radio"/> E	<input type="radio"/> E	Little or no vegetation

21. Buffer Stressors – streamside area metric (skip for Tidal Marsh Streams)

Check all appropriate boxes for left bank (LB) and right bank (RB). Indicate if listed stressor abuts stream (Abuts), does not abut but is within 30 feet of stream (< 30 feet), or is between 30 to 50 feet of stream (30-50 feet).

If none of the following stressors occurs on either bank, check here and skip to Metric 22: ☐

Abuts		< 30 feet		30-50 feet		
LB	RB	LB	RB	LB	RB	
<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	<input type="radio"/> A	Row crops
<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	<input type="radio"/> B	Maintained turf
<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	<input type="radio"/> C	Pasture (no livestock)/commercial horticulture
<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	<input type="radio"/> D	Pasture (active livestock use)

22. Stem Density – streamside area metric (skip for Tidal Marsh Streams)

Consider for left bank (LB) and right bank (RB) for Metric 19 (“Wooded” Buffer Width).

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Medium to high stem density
<input type="radio"/> B	<input type="radio"/> B	Low stem density
<input type="radio"/> C	<input type="radio"/> C	No wooded riparian buffer <u>or</u> predominantly herbaceous species <u>or</u> bare ground

23. Continuity of Vegetated Buffer – streamside area metric (skip for Tidal Marsh Streams)

Consider whether vegetated buffer is continuous along stream (parallel). Breaks are areas lacking vegetation > 10-feet wide.

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	The total length of buffer breaks is < 25 percent.
<input type="radio"/> B	<input type="radio"/> B	The total length of buffer breaks is between 25 and 50 percent.
<input type="radio"/> C	<input type="radio"/> C	The total length of buffer breaks is > 50 percent.

24. Vegetative Composition – First 100 feet of streamside area metric (skip for Tidal Marsh Streams)

Evaluate the dominant vegetation within 100 feet of each bank or to the edge of the watershed (whichever comes first) as it contributes to assessment reach habitat.

LB	RB	
<input type="radio"/> A	<input type="radio"/> A	Vegetation is close to undisturbed in species present and their proportions. Lower strata composed of native species, with non-native invasive species absent or sparse.
<input type="radio"/> B	<input type="radio"/> B	Vegetation indicates disturbance in terms of species diversity or proportions, but is still largely composed of native species. This may include communities of weedy native species that develop after clear-cutting or clearing <u>or</u> communities with non-native invasive species present, but not dominant, over a large portion of the expected strata <u>or</u> communities missing understory but retaining canopy trees.
<input type="radio"/> C	<input type="radio"/> C	Vegetation is severely disturbed in terms of species diversity or proportions. Mature canopy is absent <u>or</u> communities with non-native invasive species dominant over a large portion of expected strata <u>or</u> communities composed of planted stands of non-characteristic species <u>or</u> communities inappropriately composed of a single species <u>or</u> no vegetation.

25. Conductivity – assessment reach metric (skip for all Coastal Plain streams)

25a. ☐ Yes ☒ No Was a conductivity measurement recorded?

If No, select one of the following reasons.

☐ No Water

☐ Other: _____

25b. Check the box corresponding to the conductivity measurement (units of microsiemens per centimeter).

☐ A <46

☐ B 46 to < 67

☐ C 67 to < 79

☐ D 79 to < 230

☐ E ≥ 230

Notes/Sketch:

WETLAND PERMIT IMPACT SUMMARY

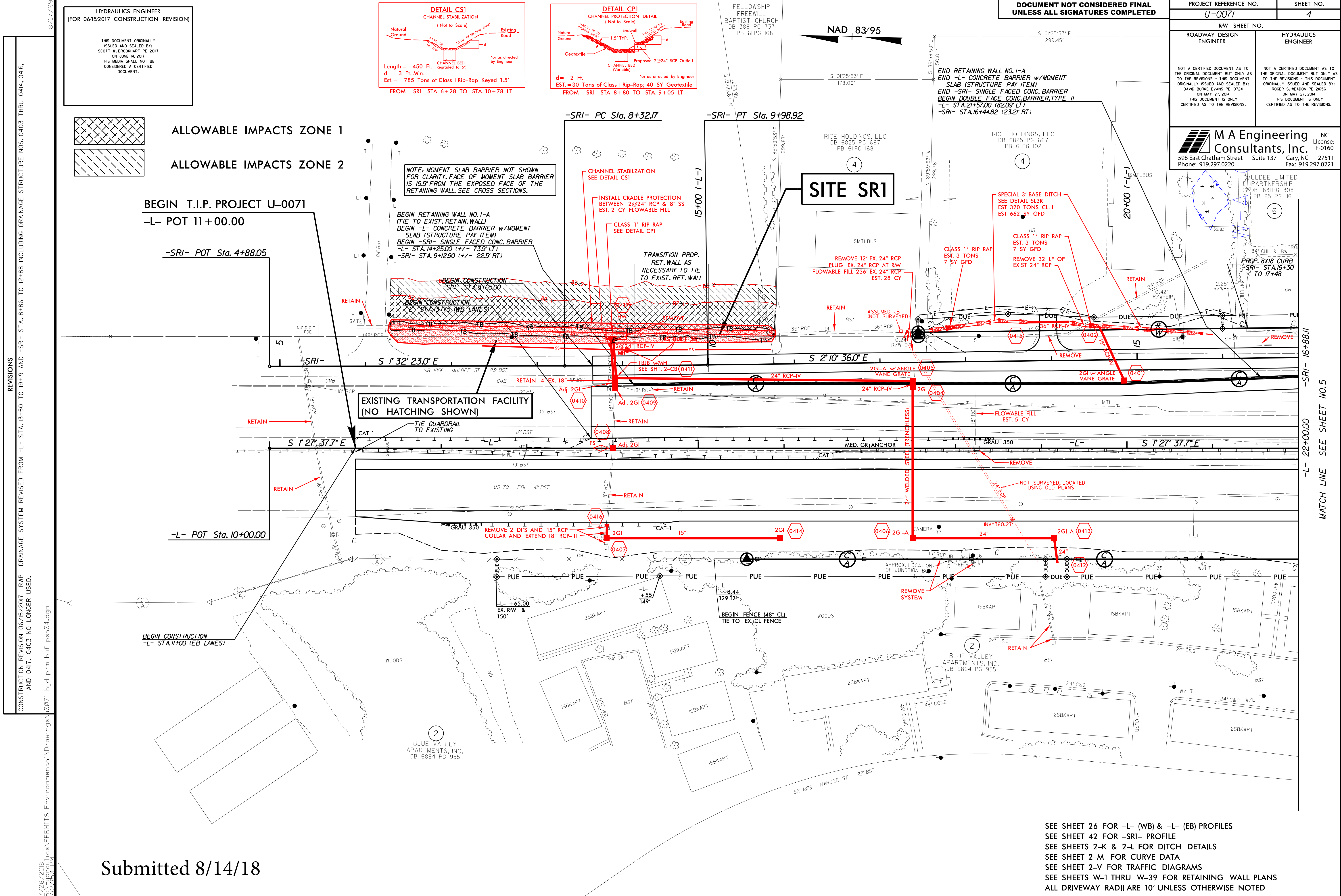
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS				
			Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
SR1	SR1 6+28 to 10+78 LT	Bank Stabilization; Rechannelization						0.05		450		
TOTALS:			0.00	0.00		0.00		0.05	0.00	450	0	

NOTES:
Wetland impact sheet only for permanant surface water impacts along SR1 on Parcel 1
Channel to be regraded to maintain postive drainage from 36" RCP outlet at SR1 10+78 (34.5' LT)
to 48" RCP under driveway on Parcel 1 at SR1 6+28 (45.5'. LT)

Submitted 8/14/18

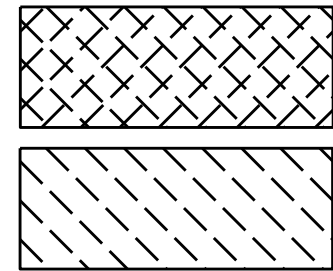
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
WBS - 34745.1.1 (U-0071)



HYDRAULICS ENGINEER
(FOR 06/15/2017 CONSTRUCTION REVISION)

THIS DOCUMENT ORIGINALLY
ISSUED AND SEALED BY:
SCOTT W. BROOKHART PE 2007
ON JUNE 14, 2017
THIS MEDIA SHALL NOT BE
CONSIDERED A CERTIFIED
DOCUMENT.



ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

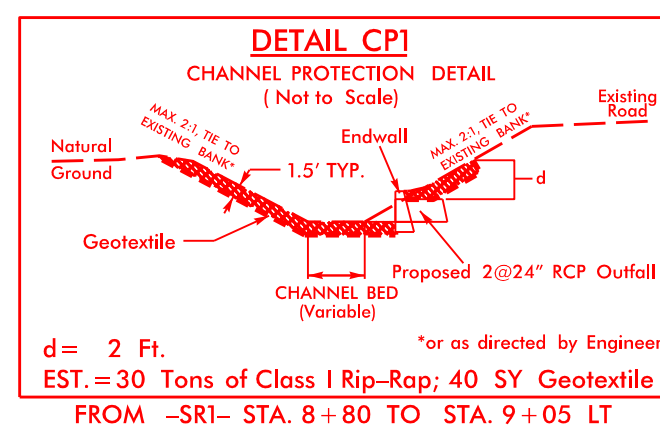
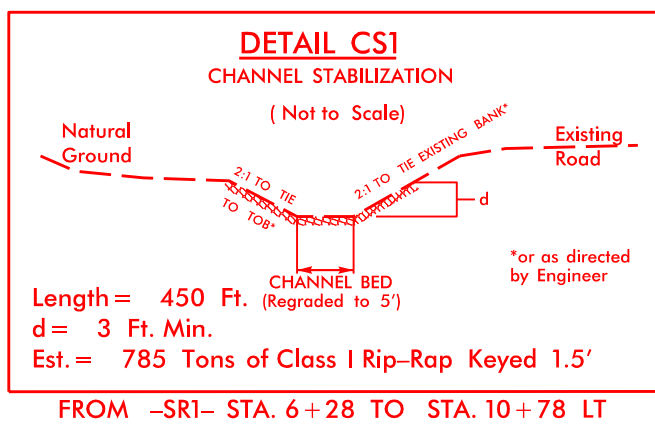
BEGIN T.I.P. PROJECT U-0071

-L- POT 11+00.00

-SRI- POT Sta. 4+88.05

-L- POT Sta. 10+00.00

EXISTING TRANSPORTATION FACILITY
(NO HATCHING SHOWN)



SITE SR1

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.		SHEET NO.
U-0071		4
RW SHEET NO.		HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER		NOT A CERTIFIED DOCUMENT AS TO THE ORIGINAL DOCUMENT BUT ONLY AS TO THE REVISIONS - THIS DOCUMENT ORIGINALLY ISSUED AND SEALED BY: DAVID BURKE EVANS PE 18724 ON MAY 27, 2014 THIS DOCUMENT IS ONLY CERTIFIED AS TO THE REVISIONS.
M A Engineering Consultants, Inc.		NC License: F-0160 598 East Chatham Street Suite 137 Cary, NC 27511 Phone: 919.297.0220 Fax: 919.297.0221

SEE SHEET 26 FOR -L- (WB) & -L- (EB) PROFILES
SEE SHEET 42 FOR -SRI- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEETS W-1 THRU W-39 FOR RETAINING WALL PLANS
ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED

Submitted 8/14/18

BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	TYPE			ALLOWABLE			MITIGABLE			ZONE 1 (ft²)	ZONE 2 (ft²)
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft²)	ZONE 2 (ft²)	TOTAL (ft²)	ZONE 1 (ft²)	ZONE 2 (ft²)	TOTAL (ft²)		
SR1	Bank Stabilization; Rechannelization	SR1 6+28 to 10+78 LT			X	13860	9158	23018					
TOTAL:						13860	9158	23018					

NOTES:
 Buffer impact sheet only for parallel impacts along SR1 on Parcel 1
 Channel to be regraded to maintain positive drainage from 36" RCP outlet at SR1 10+78 (34.5' LT)
 to 48" RCP under driveway on Parcel 1 at SR1 6+28 (45.5' LT)

Submitted 8/14/18

N.C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS

DURHAM COUNTY
 PROJECT: 34745.2.8 (U-0071)

7/26/2018
 SHEET 1 OF 1