STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

November 21, 2019

MEMORANDUM TO: Mr. Joey Hopkins, P.E.
Division 5 Engineer

FROM: Rodger Rochelle, P.E.
NCTA Chief Engineer

SUBJECT: Triangle Expressway Southeast Extension (Complete 540) from NC 55 Bypass in Apex to US 64/264 (I-87) in Knightdale, Wake and Johnston Counties; Federal Aid No. STP-0540(19), STP-0540(20), and STP-0540(21); WBS Nos. 37673.1.TA2, 35516.1.TA2, and 35517.1.TA1; STIP Project Nos. R-2721, R-2828, and R-2829

Attached are the US Army Corps of Engineers Section 404 Individual Permit, NC Division of Water Resources (NCDWR) 401 Water Quality Certification, Neuse Buffer Authorization and Isolated Wetlands Permit. Subject to any requisite permit modifications, all environmental permits have been received for the construction of the final design sections of this project.

A copy of this permit package is posted on the NCDOT website at:
https://xfer.services.ncdot.gov/pdea/PermIssued

cc: w/o attachment (see website for attachments)
Mr. Ron Davenport, P.E. Contracts Management
Mr. Clarence Coleman, P.E., FHWA
Mrs. Heather Montague, Division 5
Mr. Boyd Tharrington, P.E., Division 5
Mr.Corey McLamb, P.E., Division 4
Mr. Dennis Jernigan, P.E., NCTA
Dr. Majed Al-Ghandour, P.E., Programming and TIP
Mr. Todd Lapham, Utilities Unit
Mr. Stephen Morgan, P.E., Hydraulics Unit
Mr. Brian Hanks, P.E., Structures Management Unit
Mr. Mark Staley, Roadside Environmental
Mr. Lamar Sylvester, P.E., State Roadway Construction Engineer
Mr. Derrick Weaver, P.E., Environmental Policy Unit
Ms. Beth Harmon, NCDMS

Mailing Address:
NC DEPARTMENT OF TRANSPORTATION
TURNPIKE AUTHORITY
1578 MAIL SERVICE CENTER
RALEIGH, NC 27699-1578

Telephone: (919) 707-2700
Customer Service: 1-877-368-4968
Website: www.ncdot.gov

Location:
1 SOUTH WILMINGTON STREET
RALEIGH, NC 27699-1578

PROJECT COMMITMENTS

Complete 540 – Triangle Expressway Southeast Extension
Wake and Johnston Counties, North Carolina

STIP Project Nos. R-2721, R-2828, and R-2829
State Project Nos. 6.401078, 6.401079, and 6.401080
Federal Aid Project Nos. STP-0540(19), STP-0540(20), and STP-0540(21)
WBS Nos. 37673.1.TA2, 35516.1.TA2, and 35517.1.TA1

COMMITMENTS FROM PROJECT DEVELOPMENT AND DESIGN

Item	Responsible Party	Resource	Project Commitment	Project Stage / Status	Applicable STIP Project
1	Environmental Analysis Unit, NCTA	Historic Architectural Resources	NCDOT will coordinate with the NC State Historic Preservation Office and the property owner(s) relative to potential retaining wall design to eliminate the need for permanent easement or right-of-way from the Panther Branch School.	Completed	R-2828
2	Environmental Analysis Unit, NCTA	Archaeological Resources	NCDOT will conduct an archaeological survey of the Preferred Alternative and will coordinate the results with the NC State Historic Preservation Office and the NC Office of State Archaeology.	Completed	R-2721, R-2828, and R-2829
3	Environmental Analysis Unit, NCTA	Archaeological Resources	NCDOT will establish a Memorandum of Agreement with the NC State Historic Preservation Office in order to take into account the project's effect on archaeological resources.	Completed	R-2828
4	Environmental Analysis Unit, NCTA	Archaeological Resources	NCDOT will coordinate with the NC Office of State Archaeology relative to data recovery of materials in the one site determined eligible for the National Register of Historic Places based on the information contained at the site.	Final Design and Construction	R-2828
5	NCTA	Community Resources & Section 4(f)	NCDOT will coordinate with the Town of Cary relative to a potential Section 4(f) de minimis use finding for the Middle Creek School Park.	Completed	R-2721
6	NCTA	Community Resources & Section 4(f)	NCDOT will coordinate with the City of Raleigh relative to a potential Section 4(f) de minimis use finding for the Neuse River Trail.	Completed	R-2829
7	Division 5, NCTA	Recreation Facility	During construction, NCDOT will accommodate trail users along the Neuse River Trail through the project construction zone.	Final Design and Construction	R-2829
8	Environmental Analysis Unit, NCTA	Noise	NCDOT will prepare Design Noise Reports for the Selected Alternative during final design. All feasible and reasonable noise abatement measures will be constructed.	Final Design and Construction	R-2721, R-2828, and R-2829

Item	Responsible Party	Resource	Project Commitment	Project Stage / Status	Applicable STIP Project
9	Hydraulics Unit, NCTA	Stormwater Management	NCDOT will utilize Design Standards in Sensitive Watersheds in the Swift Creek and ~~*in the Lower*~~ Middle Creek watersheds.	Final Design and Construction	R-2721, R-2828, and R-2829
10	Environmental Analysis Unit, NCTA	Migratory Birds	NCDOT will comply with requirements set forth in the Migratory Bird Treaty Act (MBTA) of 1918. *On December 22, 2017, after further analysis of the text, history, and purpose of the MBTA, the US Department of Interior issued Opinion M-37050. Opinion M-37050 permanently withdraws and replaces Opinion M-37041. Opinion 37050 concludes that the MBTA applies to only affirmative actions that have as their purpose to reduce migratory birds by taking or killing of migratory birds, their eggs, or their nest.*	Final Design and Construction	R-2721, R-2828, and R-2829
11	Hydraulics Unit, NCTA	Major Drainage Structures	NCDOT will perform a more detailed hydrologic and hydraulic analysis for each major drainage crossing for the Selected Alternative.	Final Design	R-2721, R-2828, and R-2829
12	Utilities Unit, NCTA	Utilities	NCDOT will coordinate with the appropriate utility owners during design of the Selected Alternative for all utility conflicts, including means to avoid or minimize impacts to utilities.	Final Design	R-2721, R-2828, and R-2829
13	Environmental Analysis Unit, NCTA	Indirect Effects & Cumulative Impacts	NCDOT will prepare a quantitative assessment for indirect and cumulative effects and impacts for the Selected Alternative.	Completed	R-2721, R-2828, and R-2829
14	Environmental Analysis Unit, NCTA	Protected Species	NCDOT will carry out all activities for which it has been assigned responsibility in the Biological Assessment of Potential Impacts to Federally Listed Species (December 2017) and the USFWS Biological Opinion (April 2018) and as amended.	Final Design and Construction	R-2721, R-2828, and R-2829
15	Environmental Analysis Unit, NCTA	Protected Species	NCDOT will carry out all activities for which it has been assigned responsibility in the Biological Assessment for Atlantic Sturgeon Critical Habitat (December 2017) and the NMFS concurrence letter (May 2018).	Final Design and Construction	R-2829
16	Environmental Analysis Unit, Division 5, NCTA	Protected Species	FHWA and NCDOT will update the 2017 Biological Assessment and coordinate with USFWS in accordance with ESA Section 7 for the Neuse River Waterdog, Carolina Madtom, Atlantic Pigtoe, and Atlantic Pigtoe Critical Habitats.	Completed	R-2721, R-2828, and R-2829
17	Environmental Analysis Unit, Division 5, NCTA	Protected Species	NCDOT will carry out all activities for which it has been assigned responsibility in the Revised Biological Assessment of Potential Impacts to Federally Listed Species (July 2019) and the USFWS Revised Biological/Conference Opinion (October 2019).	Final Design and Construction	R-2721, R-2828, and R-2829

COMMITMENTS FROM PERMITTING

Item	Responsible Party	Commitment Source	Project Commitment	Project Stage / Status	Applicable STIP Project
18	Division 5, NCTA	Recreation Facility	During construction, NCDOT will accommodate trail users along the Woodcreek Trail through the project construction zone.	Final Design and Construction	R-2721A
19	Division 5, NCTA	404 Permit Condition 2	NCDOT will protect the Atlantic Sturgeon by not blocking greater than 50% of the Neuse River below the ordinary high-water mark with temporary causeways or work bridges. All causeways and work bridges will be removed at the end of the project.	Construction	R-2829
20	Environmental Analysis Unit, Division 5, NCTA	404 Permit Condition 3	NCDOT will comply with the attached USFWS Biological Opinion-Revised (USFWS BO), dated October 15, 2019.	Final Design and Construction	R-2721, R-2828, and R-2829
21	Division 5, NCTA	404 Permit Condition 3 (Attachment: USFWS Biological Opinion (BO) Section 2.4)	NCDOT will invite representatives of the USFWS NCWRC, and other agency personnel to preconstruction meetings prior to incurring impacts in jurisdictional features, as well as to preconstruction meetings associated with installation of structures within 0.25 mile of the Swift Creek crossing.	Construction	R-2828
22	Division 5, NCTA	404 Permit Condition 3 (Attachment: USFWS BO Section 2.4)	NCDOT will not allow any part of the bridging structure for Swift Creek to be within 10 feet of the top of bank on either side of the channel. No permanent structures or temporary structures will be placed in Swift Creek. All permanent and temporary structures will be installed and designed to maintain stability of the stream banks of Swift Creek.	Final Design and Construction	R-2828
23	Roadside Environmental Unit, Division 5, NCTA	404 Permit Condition 3 (Attachment: USFWS BO Section 2.4)	NCDOT will require construction of two permanent hazardous spill basins (HSBs) at the crossing of Swift Creek. Road runoff from approximately 1.3 miles of road facility will be directed to the HSBs prior to discharge into Swift Creek or Swift Creek tributaries. The HSBs will be designed to contain a spill from a typical tanker truck. NCDOT will implement their standard protocols for upkeep and use of these HSBs.	Final Design and Construction	R-2828

Item	Responsible Party	Commitment Source	Project Commitment	Project Stage / Status	Applicable STIP Project
24	Environmental Analysis Unit, Division 5, NCTA	404 Permit Condition 3 (Attachment: USFWS BO Sections: 2.4, 8.2 & 8.3)	NCDOT will conduct a preconstruction survey (just prior to construction) at the Swift Creek crossing and remove mussels from a defined salvage area and relocate them to appropriate habitat within Swift Creek outside of the salvage area (relocation site) or if deemed appropriate, after coordination with the USFWS and NCWRC, Dwarf Wedgemussel and Yellow Lance individuals may be taken into captivity to use as brood stock for propagation efforts. The preconstruction survey will be incorporated into a Mussel Relocation Plan, which will identify the salvage area and relocation site, and be developed in coordination with USFWS/NCWRC.	Construction	R-2828
25	Environmental Analysis Unit, Division 5, NCTA	404 Permit Condition 3 (Attachment: USFWS BO Sections: 2.4, 8.2 & 8.3)	NCDOT will provide funding to Wake County and NCWRC, after receiving the Section 404 Permit, to be utilized for the retrofit and upgrade of the existing research facility in the A.E. Finley Center, at the Historic Yates Mill County Park for the purpose of research and propagation of aquatic species.	Final Design	R-2721, R-2828, and R-2829
26	Division 5, NCTA	404 Permit Condition 3 (Attachment: USFWS BO Section 8.4)	NCDOT will monitor the Action area for evidence of sediment loss. The USFWS will be contacted if project related sedimentation is occurring beyond 400 meters from the Action area.	Construction	R-2828
27	Environmental Analysis Unit, Division 5, NCTA	404 Permit Condition 17	NCDOT will implement the Memorandum of Agreement (MOA) between the USACE and SHPO dated March 11, 2018 and adhere to the specific Stipulations provided in the MOA attachment.	Final Design and Construction	R-2721, R-2828, and R-2829
28	Roadside Environmental Unit, Division 5, NCTA	404 Permit Condition 23	NCDOT will segregate topsoil (6-12") in wetland areas where pipelines will be installed via trenching. The topsoil will be used to backfill the trench.	Construction	R-2828
29	Environmental Analysis Unit, Division 5, NCTA	404 Permit Condition 27	NCDOT will only complete construction activities on TIP R-2721A and B under the Section 404 Permit dated October 24, 2019. No work will commence for TIPs R-2828 and R-2829 without further USACE coordination.	Final Design and Construction	R-2721, R-2828, and R-2829
30	Division 5, NCTA	National Marine Fisheries Service Consultation (Page 3)	NCDOT will stop in-water construction activities if a sturgeon is spotted within 50 feet of operations. (See Attached NMFS Consultation)	Construction	R-2829
31	Division 5, NCTA	National Marine Fisheries Service Consultation (Page 3)	NCDOT will observe an in-water work moratorium of February 15-October 31. This includes installation/removal of causeways and temporary bridges. This will cover the WRC moratorium of February 15-September 30.	Construction	R-2829

Item	Responsible Party	Commitment Source	Project Commitment	Project Stage / Status	Applicable STIP Project
32	Division 5, NCTA	National Marine Fisheries Service Consultation (Page 4)	NCDOT will not blast within 50 feet of the Neuse River.	Construction	R-2829
33	Division 5, NCTA	National Marine Fisheries Service Consultation (Page 4)	NCDOT will adhere to shoreline stabilization Project Design Criteria (PDCs) when installing new bridges and piers.	Construction	R-2829
34	Division 5, NCTA	National Marine Fisheries Service Consultation (Attachment 1)	NCDOT will follow the PDCs outlined in Attachment 1 of the NMFS Consultation	Construction	R-2829

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

October 24, 2019

Regulatory Division

Action ID: SAW-2009-02240

North Carolina Department of Transportation (NCDOT)
Environmental Analysis Unit
Attn: Philip S. Harris, PhD
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Dr. Harris:

Enclosed is a Department of the Army permit for the placement of fill material as follows: 65.63 acres of permanent wetland impact, 0.60 acre of temporary wetland impact, 58,346 linear feet of permanent impact to tributaries, 946 linear feet of temporary impact to tributaries, and 29.53 acres of permanent impact to open water ponds; for the construction of TIPs R-2721, R-2828, and R-2829; Complete I-540; in Wake and Johnston Counties, North Carolina. The Corps is issuing this permit in response to the written request of September 12, 2018, and the ensuing administrative record.

Any deviation in the authorized work will likely require modification of this permit. If a change in the authorized work is necessary, you should promptly submit revised plans to the Corps showing the proposed changes. You may not undertake the proposed changes until the Corps notifies you that your permit has been modified.

Carefully read your permit. The general and special conditions are important. Your failure to comply with these conditions could result in a violation of Federal law. Certain significant conditions require that:

a. You must complete construction before December 31, 2024.

b. You must notify this office in advance as to when you intend to commence and complete work.

c. You must allow representatives from this office to make periodic visits to your worksite as deemed necessary to assure compliance with permit plans and conditions.

You should address all questions regarding this authorization to Mr. Eric Alsmeyer, Raleigh Regulatory Field Office, at telephone (919) 554-4884, extension 23.

FOR THE DISTRICT ENGINEER:

Scott McLendon
Chief, Regulatory Division

Enclosures:
Special Conditions
DWR Water Quality Certification
Section 106 Final MOA
MRT Cape Fear Form
MRT Neuse Form

Copy Furnished (w/enclosures):

Chief, Source Data Unit
NOAA/National Ocean Service
Attn: Sharon Tear N/CS261
1315 East-West Hwy., Rm 7316
Silver Spring, Maryland 20910-3282

Copies Furnished (w/special conditions):

Ms. Amanetta Somerville
USEPA – Region 4
61 Forsyth Street, S.W.
Mail Code: 9T25
Atlanta, Georgia 30303-8960

Mr. Pete Benjamin
U.S. Fish and Wildlife Service
Fish and Wildlife Enhancement
Post Office Box 33726
Raleigh, North Carolina 27636-3726

Dr. Ken Riley
Habitat Conservation Division –
Atlantic Branch/NOAA Fisheries Service
101 Pivers Island Road
Beaufort, North Carolina 28516

DEPARTMENT OF THE ARMY PERMIT

Permittee **North Carolina Department of Transportation**

Permit No. **AID SAW-2009-02240**

Issuing Office **CESAW-RG**

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: **TIPs R-2721, R-2828, and R-2829; Complete I-540; impacting 66.23 acres of 404 wetlands, 59,292 linear feet of tributaries, and 29.53 acres of 404 open water ponds.**

Project Location: **New alignment corridor for the Complete 540 project, from existing NC 540 at the NC 55 Bypass near Holly Springs, to existing I-540 at Poole Road, near Knightdale, ,Wake and Johnston Counties, NC; Latitude and Longitude (near center of project at NC 50): 35.624 N, -78.607 W.**

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **December 31, 2024.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit,

Special Conditions:

SEE ATTACHED SPECIAL CONDITIONS

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

*U.S. GOVERNMENT PRINTING OFFICE: 1986 – 717-425

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit, Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

_____ 10/24/19

(PERMITTEE) **NCDOT** *(DATE)*

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

_____ 24 OCT 2019

(DISTRICT COMMANDER) **ROBERT J. CLARK, COLONEL** FOR *(DATE)*

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____

(TRANSFEREE) *(DATE)*

*U.S. GOVERNMENT PRINTING OFFICE: 1986 - 717-425

SPECIAL CONDITIONS

Action ID SAW-2009-02240; Complete 540; TIPS R-2721, R-2828, and R-2829

1. **Work Limits:** All work authorized by this permit shall be performed in strict compliance with the attached permit plans submitted on September 12, 2018, and revised on February 8, 2019, which are a part of this permit. The Permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Any modification to the attached permit plans must be approved by the U.S. Army Corps of Engineers (Corps) prior to any active construction in waters or wetlands.

2. **Unauthorized Dredge and/or Fill:** Except as authorized by this permit or any U.S. Army Corps of Engineers approved modification to this permit, no excavation, fill, or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, within waters or wetlands, or shall any activities take place that cause the degradation of waters or wetlands. There shall be no excavation from, waste disposal into, or degradation of, jurisdictional wetlands or waters associated with this permit without appropriate modification of this permit, including appropriate compensatory mitigation. This prohibition applies to all borrow and waste activities connected with this project. In addition, except as specified in the plans attached to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, in such a manner as to impair normal flows and circulation patterns within, into, or out of waters or wetlands or to reduce the reach of waters or wetlands.

3. **Permit Distribution:** The Permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project, and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit. A copy of this permit, including all conditions and drawings shall be available at the project site during construction and maintenance of this project.

4. **Preconstruction Meeting:** The Permittee shall conduct an onsite preconstruction meeting between its representatives, the contractor's representatives and the appropriate U.S. Army Corps of Engineers Project Manager prior to undertaking any work within jurisdictional waters and wetlands to ensure that there is a mutual understanding of all terms and conditions contained within the Department of the Army permit. The Permittee shall schedule the preconstruction meeting for a time frame when the Corps, and NCDWR Project Managers can attend. The Permittee shall invite the Corps, and NCDWR Project Managers a minimum of thirty (30) days in advance of the scheduled meeting in order to provide those individuals with ample opportunity to schedule and participate in the required meeting. The thirty (30) day requirement can be waived with the concurrence of the Corps.

5. **Notification of Construction Commencement and Completion:** The Permittee shall notify the U.S. Army Corps of Engineers in writing prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

6. **Reporting Address:** All reports, documentation, and correspondence required by the conditions of this permit shall be submitted to the following: U.S. Army Corps of Engineers, Wilmington District Raleigh Regulatory Field Office, Attn: Eric Alsmeyer, 3331 Heritage Trade Drive, Suite 105, Wake Forest, NC 27587, or eric.c.alsmeyer@usace.army.mil. The Permittee shall reference the following permit number, SAW-2009-02240, on all submittals.

7. **Permit Revocation:** The Permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the work will, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the water or wetland to its pre-project condition.

8. **Reporting Violations:** Violation of these permit conditions or violation of Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act shall be reported to the Corps in writing and by telephone at: 919.554.4884, extension 23, within 24 hours of the Permittee's discovery of the violation.

9. **Endangered Species**

1) **The Permittee shall implement all necessary measures to ensure the authorized activity does not kill, injure, capture, harass, or otherwise harm any federally-listed thr**eatened or endangered species, except as authorized by the October 2019 USFWS BO. While accomplishing the authorized work, if the Permittee discovers or observes an injured or dead threatened or endangered species, the U.S. Army Corps of Engineers, Wilmington District Raleigh Field Office, telephone 919.554.4884, extension 23, email to eric.c.alsmeyer@usace.army.mil will be immediately notified to initiate the required Federal coordination.

2) Atlantic Sturgeon: In order to protect the federally-listed Atlantic sturgeon, no temporary causeways or work bridges will block more than 50% of the Neuse River below its ordinary high water mark, and will be removed at the end of the project's construction.

3) DWM Biological Opinion: This Department of the Army permit does not authorize you to take an endangered species, in particular the Dwarf wedgemussel, *Alasmidonta heterodon.* In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with "incidental take" provisions with which you

must comply). The attached U.S. Fish and Wildlife Service Biological Opinion (BO) contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your permit. The U.S. Fish and Wildlife Service is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA.

4) NLEB Programmatic Biological Opinion: This Department of the Army permit does not authorize you to take a threatened or endangered species, in particular, the Northern Long-eared Bat (NLEB) (Myotis septentrionalis). In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., a Biological Opinion (BO) under the ESA, Section 7, with 'incidental take' provisions with which you must comply). The U.S. Fish and Wildlife Service's (USFWS's) Programmatic BO titled 'Northern Long-eared Bat (NLEB) Programmatic Biological Opinion for North Carolina Department of Transportation (NCDOT) Activities in Eastern North Carolina (Divisions 1-8),' dated March 25, 2015, and adopted on May 4, 2015, contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with 'incidental take' that are specified in the BO. Your authorization under this USACE permit is conditioned upon your compliance with all the mandatory terms and conditions (incorporated by reference into this permit) associated with incidental take of the BO. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and would also constitute non-compliance with your USACE permit. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.

10. Maintain Flows and Circulation Patterns of Waters: Except as specified in the plans attached to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, in such a manner as to impair normal flows and circulation patterns within waters or wetlands or to reduce the reach of waters and/or wetlands.

11. Sediment and Erosion Control:

1) During the clearing phase of the project, heavy equipment shall not be operated in surface waters or stream channels. Temporary stream crossings will be used to access the opposite sides of stream channels. All temporary diversion channels and stream crossings will be constructed of non-erodible materials. Grubbing of riparian vegetation will not occur until immediately before construction begins on a given segment of stream channel.

2) No fill or excavation impacts for the purposes of sedimentation and erosion control shall occur within jurisdictional waters, including wetlands, unless the impacts are included on the plan drawings and specifically authorized by this permit. This includes, but is not limited to, sediment control fences and other barriers intended to catch sediment losses.

3) The Permittee shall remove all sediment and erosion control measures placed in waters and/or wetlands, and shall restore natural grades on those areas, prior to project completion.

4) The Permittee shall use appropriate sediment and erosion control practices which equal or exceed those outlined in the most recent version of the "North Carolina Sediment and Erosion Control Planning and Design Manual" to ensure compliance with the appropriate turbidity water quality standard. Erosion and sediment control practices shall be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to ensure compliance with the appropriate turbidity water quality standards. This shall include, but is not limited to, the immediate installation of silt fencing or similar appropriate devices around all areas subject to soil disturbance or the movement of earthen fill, and the immediate stabilization of all disturbed areas. Additionally, the project shall remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A Article 4). Adequate sedimentation and erosion control measures shall be implemented prior to any ground disturbing activities to minimize impacts to downstream aquatic resources. These measures shall be inspected and maintained regularly, especially following rainfall events. All fill material shall be adequately stabilized at the earliest practicable date to prevent sediment from entering into adjacent waters or wetlands.

12. **Clean Fill:** The Permittee shall use only clean fill material for this project. The fill material shall be free of items such as trash, construction debris, metal and plastic products, and concrete block with exposed metal reinforcement bars. Soils used for fill shall not be contaminated with any toxic substance in concentrations governed by Section 307 of the Clean Water Act. Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source.

13. **Water Contamination:** All mechanized equipment shall be regularly inspected and maintained to prevent contamination of waters and wetlands from fuels, lubricants, hydraulic fluids, or other toxic materials. In the event of a spill of petroleum products or any other hazardous waste, the Permittee shall immediately report it to the N.C. Division of Water Quality at (919) 733-3300 or (800) 858-0368 and provisions of the North Carolina Oil Pollution and Hazardous Substances Control Act shall be followed.

ANADROMOUS FISH / AQUATIC LIFE

14. **Aquatic Life Movement:** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area. All discharges of dredged or fill

material within waters of the United States shall be designed and constructed to maintain low flows to sustain the movement of aquatic species.

15. Prohibitions on Concrete: The Permittee shall take measures necessary to prevent live or fresh concrete, including bags of uncured concrete, from coming into contact with any water in or entering into waters of the United States. Water inside coffer dams or casings that has been in contact with concrete shall only be returned to waters of the United States when it no longer poses a threat to aquatic organisms (concrete is set and cured).

COMPENSATORY MITIGATION

16. In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit.

CULTURAL RESOURCES

17. Historic Properties (MOA): The Permittee shall fully implement the Memorandum of Agreement between the Permittee, the North Carolina State Historic Preservation Officer and the U.S. Army Corps of Engineers, Wilmington District, dated last signed 3/11/2018, which is incorporated herein by reference.

CULVERTS

18. Unless otherwise requested in the application and depicted on the approved permit plans, culverts greater than 48 inches in diameter shall be buried at least one foot below the bed of the stream. Culverts 48 inches in diameter and less shall be buried or placed on the stream bed as practicable and appropriate to maintain aquatic passage, and every effort shall be made to maintain existing channel slope. The bottom of the culvert shall be placed at a depth below the natural stream bottom to provide for passage during drought or low flow conditions. Culverts shall be designed and constructed in a manner that minimizes destabilization and head cutting.

19. Measures shall be included in the culvert construction/installation that will promote the safe passage of fish and other aquatic organisms. The dimension, pattern, and profile of the stream above and below a culvert or pipe shall not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed opening shall be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. Spring flow should be determined from gauge data, if available. In the absence of such data, bankfull flow can be used as a comparable level.

20. The Permittee shall implement all reasonable and practicable measures to ensure that equipment, structures, fill pads, work, and operations associated with this project do not adversely affect upstream and/or downstream reaches. Adverse effects include, but are not limited to, channel instability, flooding, and/or stream bank erosion. The Permittee shall routinely monitor for these effects, cease all work when detected, take initial corrective measures to correct actively eroding areas, and notify this office immediately. Permanent corrective measures may require additional authorization by the U.S. Army Corps of Engineers.

21. Culverts placed within wetlands must be installed in a manner that does not restrict the flows and circulation patterns of waters of the United States. Culverts placed across wetland fills purely for the purposes of equalizing surface water shall not be buried, but the culverts must be of adequate size and/or number to ensure unrestricted transmission of water.

PONDS

22. Sediment Sluicing: The release of sediments from ponds (sluicing) is not authorized by this permit. The Permittee shall take all measures necessary to control any bottom sediments that may be sluiced during the drainage of pond(s) on the project site.

UTILITY LINES

23. Temporary Impacts Restoration Measures: Within thirty (30) days of the date of completing the authorized work, the Permittee shall remove all temporary fills in waters of the United States and restore the affected areas to pre-construction contours and elevations. The affected areas shall be re-vegetated with native, non-invasive vegetation as necessary to minimize erosion and ensure site stability. In wetland areas where pipeline installation via trenching is authorized, wetland topsoil shall be segregated from the underlying subsoil, and the top 6 to 12 inches of the trench shall be backfilled with topsoil from the trench.

24. Cleared wetland areas shall be re-vegetated with a wetland seed mix or a mix of native woody species. Fescue grass or any invasive species such as *Lespedeza* spp., shall not be used within the wetland areas.

25. Prior to construction within any jurisdictional areas, the Permittee shall correctly install silt fencing (with or without safety fencing) parallel with the utility line corridor, on both sides of the jurisdictional crossing. This barrier is to serve both as an erosion control measure and a visual identifier of the limits of construction within any jurisdictional area. The Permittee shall maintain the fencing, at minimum, until the wetlands have re-vegetated and stabilized.

26. Hydraulic Fracturing (Fracking): When directional boring or horizontal directional drilling (HDD) under waters of the United States, including wetlands, the Permittee shall

closely monitor the project for hydraulic fracturing or "fracking" and material from the drilling operation leaching to the surface and into jurisdictional areas. Any discharge from fracking or leaching into waters of the United States, including wetlands, shall be reported to U.S. Army Corps of Engineers, Wilmington District Raleigh Field Office, telephone 919.554.4884, extension 23, email to eric.c.alsmeyer@usace.army.mil within 48 hours. Restoration and/or mitigation may be required as a result of any unintended discharges.

NCDOT STANDARD PERMIT CONDITIONS

27. Phased Permit and Mitigation: This permit only authorizes work on Sections A and B of TIP R-2721. Construction on Sections of TIP, R-2828 and R-2829 shall not commence until all the following occur:
(a) final design has been completed for those sections and submitted to the U.S. Army Corps of Engineers (Corps); (b) the Permittee has minimized impacts to waters and wetlands to the maximum extent practicable and the Corps concurs with this assessment through standard Merger 4B and 4C meetings; (c) any modification to the plans have been approved by the Corps in writing; and (d) a final compensatory mitigation plan for the relevant TIP project has been submitted by the Permittee and approved by the Corps.

28. Temporary Fills: Within thirty (30) days of the date of completing the authorized work, the Permittee shall remove all temporary fills in waters of the United States and restore the affected areas to pre-construction contours and elevations. The affected areas shall be re-vegetated with native, non-invasive vegetation as necessary to minimize erosion and ensure site stability.

29. Borrow and Waste: To ensure that all borrow and waste activities occur on high ground and do not result in the degradation of adjacent waters and wetlands, except as authorized by this permit, the Permittee shall require its contractors and/or agents to identify all areas to be used as borrow and/or waste sites associated with this project. The Permittee shall provide the U.S. Army Corps of Engineers with appropriate maps indicating the locations of proposed borrow and/or waste sites as soon as such information is available. The Permittee shall submit to the Corps site-specific information needed to ensure that borrow and/or waste sites comply with all applicable Federal requirements, to include compliance with the Endangered Species Act and the National Historic Preservation Act, such as surveys or correspondence with agencies (e.g., the USFWS, the NC-HPO, etc.). The required information shall also include the location of all aquatic features, if any, out to a distance of 400 feet beyond the nearest boundary of the site. The Permittee shall not approve any borrow and/or waste sites before receiving written confirmation from the Corps that the proposed site meets all Federal requirements, whether or not waters of the U.S., including wetlands, are located in the proposed borrow and/or waste site. All delineations of aquatic sites on borrow and/or waste sites shall be verified by the U.S. Army Corps of Engineers and shown on the approved reclamation plans. The Permittee shall ensure that all borrow and/or waste sites comply with Special Condition 2 of this permit. Additionally, the Permittee

shall produce and maintain documentation of all borrow and waste sites associated with this project. This documentation will include data regarding soils, vegetation, hydrology, any delineation(s) of aquatic sites, and any jurisdictional determinations made by the Corps to clearly demonstrate compliance with Special Condition 2. All information will be available to the U.S. Army Corps of Engineers upon request. The Permittee shall require its contractors to complete and execute reclamation plans for each borrow and/or waste site and provide written documentation that the reclamation plans have been implemented and all work is completed. This documentation will be provided to the U.S. Army Corps of Engineers within 30 days of the completion of the reclamation work.

U.S. ARMY CORPS OF ENGINEERS
Wilmington District
Compensatory Mitigation Responsibility Transfer Form

Permittee: NCDOT **Action ID:** SAW-2009-02240
Project Name: TIPs R-2721, R-2828, and R-2829; Complete I-540-CapeFear04 **County:** Wake

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Division of Mitigation Services (NCDMS), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements (credits) shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the bank ledger and provide a copy of the signed form and the updated bank ledger to the Permittee, the USACE Project Manager, and the Wilmington District Mitigation Office (see contact information on page 2). The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements

Permitted Impacts Requiring Mitigation*: **8-digit HUC and Basin:** 03030004, Cape Fear River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
102				0.01		

*If more than one mitigation sponsor will be used for the permit, only include impacts to be mitigated by this sponsor.

Compensatory Mitigation Requirements: **8-digit HUC and Basin:** 03030004, Cape Fear River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
204				0.02		

Mitigation Site Debited: NCDMS
(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCDMS, list NCDMS. If the NCDMS acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCDMS), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name:_____

Name of Sponsor's Authorized Representative:_____

_____ _____
Signature of Sponsor's Authorized Representative **Date of Signature**

USACE Wilmington District
Compensatory Mitigation Responsibility Transfer Form, Page 2

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions:

This form is not valid unless signed below by the USACE Project Manager and by the Mitigation Sponsor on Page 1. ***Once signed, the Sponsor should provide copies of this form along with an updated bank ledger to: 1) the Permittee, 2) the USACE Project Manager at the address below, and 3) the Wilmington District Mitigation Office, Attn: Todd Tugwell, 3331 Heritage Trade Drive, Suite 105, Wake Forest, NC 27587 (email: todd.tugwell@usace.army.mil).*** Questions regarding this form or any of the permit conditions may be directed to the USACE Project Manager below.

USACE Project Manager: Eric Alsmeyer
USACE Field Office: Raleigh Regulatory Field Office
US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587
Email: **eric.c.alsmeyer@usace.army.mil**

Eric C. Alsmeyer 2019.10.18 10:48:21 -04'00'

USACE Project Manager Signature

October 18, 2019
Date of Signature

Current Wilmington District mitigation guidance, including information on mitigation ratios, functional assessments, and mitigation bank location and availability, and credit classifications (including stream temperature and wetland groupings) is available at http://ribits.usace.army.mil.

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at http://regulatory.usacesurvey.com/ to complete the survey online.

U.S. ARMY CORPS OF ENGINEERS
Wilmington District
Compensatory Mitigation Responsibility Transfer Form

Permittee: NCDOT **Action ID:** SAW-2009-02240
Project Name: TIP R-2721; Complete I-540_Neuse01 **County:** Wake

Instructions to Permittee: The Permittee must provide a copy of this form to the Mitigation Sponsor, either an approved Mitigation Bank or the North Carolina Division of Mitigation Services (NCDMS), who will then sign the form to verify the transfer of the mitigation responsibility. Once the Sponsor has signed this form, it is the Permittee's responsibility to ensure that to the U.S. Army Corps of Engineers (USACE) Project Manager identified on page two is in receipt of a signed copy of this form before conducting authorized impacts, unless otherwise specified below. If more than one mitigation Sponsor will be used to provide the mitigation associated with the permit, or if the impacts and/or the mitigation will occur in more than one 8-digit Hydrologic Unit Code (HUC), multiple forms will be attached to the permit, and the separate forms for each Sponsor and/or HUC must be provided to the appropriate mitigation Sponsors.

Instructions to Sponsor: The Sponsor must verify that the mitigation requirements (credits) shown below are available at the identified site. By signing below, the Sponsor is accepting full responsibility for the identified mitigation, regardless of whether or not they have received payment from the Permittee. Once the form is signed, the Sponsor must update the bank ledger and provide a copy of the signed form and the updated bank ledger to the Permittee, the USACE Project Manager, and the Wilmington District Mitigation Office (see contact information on page 2). The Sponsor must also comply with all reporting requirements established in their authorizing instrument.

Permitted Impacts and Compensatory Mitigation Requirements

Permitted Impacts Requiring Mitigation*: **8-digit HUC and Basin:** 03020201, Neuse River Basin

Stream Impacts (linear feet)			Wetland Impacts (acres)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
18,796				27.92		

*If more than one mitigation sponsor will be used for the permit, only include impacts to be mitigated by this sponsor.

Compensatory Mitigation Requirements: **8-digit HUC and Basin:** 03020101, Tar-Pamlico River Basin

Stream Mitigation (credits)			Wetland Mitigation (credits)			
Warm	Cool	Cold	Riparian Riverine	Riparian Non-Riverine	Non-Riparian	Coastal
37,592				55.84		

Mitigation Site Debited: NCDMS
(List the name of the bank to be debited. For umbrella banks, also list the specific site. For NCDMS, list NCDMS. If the NCDMS acceptance letter identifies a specific site, also list the specific site to be debited).

Section to be completed by the Mitigation Sponsor

Statement of Mitigation Liability Acceptance: I, the undersigned, verify that I am authorized to approve mitigation transactions for the Mitigation Sponsor shown below, and I certify that the Sponsor agrees to accept full responsibility for providing the mitigation identified in this document (see the table above), associated with the USACE Permittee and Action ID number shown. I also verify that released credits (and/or advance credits for NCDMS), as approved by the USACE, are currently available at the mitigation site identified above. Further, I understand that if the Sponsor fails to provide the required compensatory mitigation, the USACE Wilmington District Engineer may pursue measures against the Sponsor to ensure compliance associated with the mitigation requirements.

Mitigation Sponsor Name: _____

Name of Sponsor's Authorized Representative: _____

_____ _____
Signature of Sponsor's Authorized Representative **Date of Signature**

USACE Wilmington District
Compensatory Mitigation Responsibility Transfer Form, Page 2

Conditions for Transfer of Compensatory Mitigation Credit:

- Once this document has been signed by the Mitigation Sponsor and the USACE is in receipt of the signed form, the Permittee is no longer responsible for providing the mitigation identified in this form, though the Permittee remains responsible for any other mitigation requirements stated in the permit conditions.
- Construction within jurisdictional areas authorized by the permit identified on page one of this form can begin only after the USACE is in receipt of a copy of this document signed by the Sponsor, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein. For authorized impacts conducted by the North Carolina Department of Transportation (NCDOT), construction within jurisdictional areas may proceed upon permit issuance; however, a copy of this form signed by the Sponsor must be provided to the USACE within 30 days of permit issuance. NCDOT remains fully responsible for the mitigation until the USACE has received this form, confirming that the Sponsor has accepted responsibility for providing the mitigation requirements listed herein.
- Signed copies of this document must be retained by the Permittee, Mitigation Sponsor, and in the USACE administrative records for both the permit and the Bank/ILF Instrument. It is the Permittee's responsibility to ensure that the USACE Project Manager (address below) is provided with a signed copy of this form.
- If changes are proposed to the type, amount, or location of mitigation after this form has been signed and returned to the USACE, the Sponsor must obtain case-by-case approval from the USACE Project Manager and/or North Carolina Interagency Review Team (NCIRT). If approved, higher mitigation ratios may be applied, as per current District guidance and a new version of this form must be completed and included in the USACE administrative records for both the permit and the Bank/ILF Instrument.

Comments/Additional Conditions:

This form is not valid unless signed below by the USACE Project Manager and by the Mitigation Sponsor on Page 1. ***Once signed, the Sponsor should provide copies of this form along with an updated bank ledger to: 1) the Permittee, 2) the USACE Project Manager at the address below, and 3) the Wilmington District Mitigation Office, Attn: Todd Tugwell, 3331 Heritage Trade Drive, Suite 105, Wake Forest, NC 27587 (email: todd.tugwell@usace.army.mil)***. Questions regarding this form or any of the permit conditions may be directed to the USACE Project Manager below.

USACE Project Manager: Eric Alsmeyer
USACE Field Office: Raleigh Regulatory Field Office
US Army Corps of Engineers
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587
Email: **eric.c.alsmeyer@usace.army.mil**

Eric C. Alsmeyer 2019.11.08 08:55:46 -05'00'

USACE Project Manager Signature

October 18, 2019
Date of Signature

Current Wilmington District mitigation guidance, including information on mitigation ratios, functional assessments, and mitigation bank location and availability, and credit classifications (including stream temperature and wetland groupings) is available at http://ribits.usace.army.mil.

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete the Customer Satisfaction Survey located at our website at http://regulatory.usacesurvey.com/ to complete the survey online.

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director

NORTH CAROLINA
Environmental Quality

February 15, 2019

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

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act, NEUSE BUFFER RULES, and ISOLATED WETLANDS PERMIT Pursuant to IWGP100000 with ADDITIONAL CONDITIONS for Proposed construction of the Triangle Expressway Southeast Extension (NC 540) in Wake & Johnston Counties, Federal Aid Project No. STP-0540(19-21), State Project No. 37673.1.TA2, TIP Nos, R-2721, R-2828, & R-2829.
NCDWR Project No. 20181249 version 1.

Dear Mr. Harris:

Attached hereto is a copy of Certification No. 4179 issued to The North Carolina Department of Transportation (NCDOT) dated February 15, 2019.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Jim Gregson, Deputy Director
Division of Water Resources

Attachments

Electronic copy only distribution:
Eric Alsmeyer, US Army Corps of Engineers, Raleigh Field Office
Chris Murray, Division 5 Environmental Officer
Deanna Riffey, NC Department of Transportation
Gary Jordan, US Fish and Wildlife Service
Travis Wilson, NC Wildlife Resources Commission
Amanetta Somerville, EPA
Beth Harmon, Division of Mitigation Services
File Copy

401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act, NEUSE BUFFER RULES, and ISOLATED WETLANDS PERMIT Pursuant to IWGP100000 with ADDITIONAL CONDITIONS

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500 and 15A NCAC 2B.0233 and ISOLATED WETLANDS PERMIT Pursuant to IWGP100000. This certification version authorizes the NCDOT to impact 28.53 acres of jurisdictional wetlands, 2.45 acres of isolated wetlands 21809 linear feet of jurisdictional streams and 2476043 square feet of protected riparian buffers in Wake County. The project shall be constructed pursuant to the application dated received September 12, 2018 The authorized impacts are as described below:

R-2721A Stream Impacts in the Cape Fear River Basin

Site	Permanent Fill in Perennial Stream (linear ft)	Stabilization to Perennial Stream (linear ft)	Temporary Impact to Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring NCDWR Mitigation (linear ft)
1	33	10	13	56	0
41	56	0	10	66	0
51	13	0	0	13	0
Total	**102**	**10**	**23**	**135**	**0**

R-2721A Total Stream Impacts (Cape Fear): 135 linear feet
R-2721A Total Stream (Cape Fear) Requiring DWR Mitigation: 0 linear feet

R-2721A Stream Impacts in the Neuse River Basin

Site	Permanent Fill in Intermittent Stream (linear ft)	Stabilization to Intermittent Stream (linear ft)	Temporary Impact to Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Stabilization to Perennial Stream (linear ft)	Temporary Impact to Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring NCDWR Mitigation (linear ft)
6	463	0	10	0	0	0	473	0
7	372	0	16	0	0	0	388	0
8	0	0	0	2302	64	52	2418	2366
10	249	13	10	0	0	0	272	0
14	0	0	0	0	57	14	71	0
14A	0	0	0	231	0	15	246	0
15	0	0	0	33	0	0	33	0
18	273	81	21	0	0	0	375	0

18A	91	0	0	0	0	0	91	0
19	0	0	0	333	122	11	466	455
20	0	0	0	277	87	21	385	364
22	104	0	10	0	0	0	114	0
27	0	0	0	314	119	36	469	433
30	0	0	0	251	0	10	261	0
31	0	0	0	872	0	0	872	872
33	0	0	0	278	0	9	287	278
35 (AA)	0	0	0	719	35	57	811	754
35 (AB)	0	0	0	1035	44	20	1099	1079
36	0	0	0	977	92	10	1079	1069
38	358	18	10	0	0	0	386	0
39	303	18	9	0	0	0	330	0
40	0	0	10	0	0	0	10	0
44	0	0	0	58	123	30	211	0
45	0	0	0	211	102	41	354	313
49	0	0	0	28	83	0	111	0
50	128	0	6	0	0	0	134	0
Total	**2341**	**130**	**102**	**7919**	**928**	**326**	**11746**	**7983**

R-2721A Total Stream Impacts (Neuse): 11746 linear feet
R-2721A Total Stream (Neuse) Requiring DWR Mitigation: 7983 linear feet

R-2721B Stream Impacts in the Neuse River Basin

Site	Permanent Fill in Intermittent Stream (linear ft)	Stabilization to Intermittent Stream (linear ft)	Temporary Impact to Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Stabilization to Perennial Stream (linear ft)	Temporary Impact to Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring NCDWR Mitigation (linear ft)
1 (AJ)	0	0	0	405	77	50	532	482
1	0	0	0	18	0	10	28	0

(AK)								
2	0	0	0	398	0	11	409	398
3	0	0	0	327	84	46	457	411
4	128	0	10	0	0	0	138	0
5	0	0	0	537	0	32	569	537
6	953	0	30	0	0	0	983	0
8	105	0	0	0	0	0	105	0
9	640	38	22	0	0	0	700	0
11	0	0	0	404	20	60	484	424
12	157	0	46	0	0	0	203	0
14	0	0	0	402	0	28	430	402
15	142	0	0	0	0	0	142	0
16	333	46	13	0	0	0	392	0
17	0	0	0	181	368	46	595	549
18	0	0	0	256	15	0	271	0
20	0	0	0	1135	0	0	1135	1135
21	0	0	0	1158	204	34	1396	1362
22	692	55	13	0	0	0	760	0
23	9	0	11	0	0	0	20	0
24	14	0	17	0	0	0	31	0
25	142	0	6	0	0	0	148	0
Total	**3315**	**139**	**168**	**5221**	**768**	**317**	**9928**	**5700**

R-2721B Total Stream Impacts (Neuse): 9928 linear feet
R-2721B Total Stream (Neuse) Requiring DWR Mitigation: 5700 linear feet

R-2721A Wetland Impacts in the Cape Fear River Basin

Site	Permanent Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Total Wetland Impact (ac)
3	<0.01	<0.01	<0.01	0.01
Total	**<0.01**	**<0.01**	**<0.01**	**0.01**

R-2721A Total Wetland Impacts (Cape Fear): 0.01 acre
R-2721A Total Wetland (Cape Fear) Requiring DWR Mitigation: 0.01 acre

R-2721A Wetland Impacts in the Neuse River Basin

Site	Permanent Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Total Wetland Impact (ac)
1	0.38	0	0.07	0.45
2	0.09	0	0.02	0.11
3	0.01	0	0.02	0.03
5	0.05	0	0.02	0.07
6	1.53	0.06	0.02	1.61
9	0.27	<0.01	0	0.27
11	0.08	0.03	0	0.11
12	0.48	0	0.03	0.51
13	0.17	0	0.01	0.18
15	1.73	0.01	0.09	1.83
16	0	0.67	0	0.67
17	0.11	0	0.01	0.12
18	0.83	0.06	0.06	0.95
19	0.01	<0.01	0.04	0.05
20	0.11	<0.01	0.04	0.15
21	0	<0.01	<0.01	0.01
23	0	<0.01	<0.01	0.01
24	1.96	0.02	0.07	2.05
26	1.24	0	0.08	1.32
27	0	0	0.02	0.02
28	<0.01	0	<0.01	0.01
30	1.42	0	0.04	1.46
31	0.20	0	0	0.20
32	0.04	0	0	0.04
33	0.33	0.05	0.03	0.41
34	0.12	0.01	0.52	0.65

35	0.01	<0.01	<0.01	0.02
37	0.31	0.03	0.09	0.43
38	0.32	0.02	0.03	0.37
39	0.20	<0.01	0.03	0.23
40	0.26	<0.01	0.04	0.30
42	0.06	0	<0.01	0.06
43	0.19	0	0.07	0.26
46	0.07	0	0.03	0.10
47	0.06	0	0.03	0.09
48	0.08	0	0	0.08
Total	**12.72**	**0.98**	**1.52**	**15.23**

R-2721A Total Wetland Impacts (Neuse): 15.23 acres
R-2721A Total Wetland (Neuse) Requiring DWR Mitigation: 15.23 acres

R-2721B Wetland Impacts in the Neuse River Basin

Site	Permanent Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Temporary Impact (ac)	Total Wetland Impact (ac)
1	1.39	0.01	0.14	0.10	1.64
2	0.87	0	0.12	0.05	1.04
4	0.19	<0.01	0.07	0	0.27
5	1.12	0	0.18	0	1.30
6	0.54	<0.01	0.03	0	0.58
7	0.23	0	0.02	0.39	0.64
8	0.25	0	0.03	<0.01	0.29
9	0.06	<0.01	0.25	0	0.31
12	0.86	0.03	0.15	0	1.04
14	0.39	0.03	0.15	0.04	0.61
16	0.70	0.02	0.41	0	1.13
17	0.52	0	0.09	<0.01	0.61
18	0.18	0	0	0	0.18
20	0.62	2.34	0	0	2.96

21	0.41	0	0.09	0	0.50
22	0.14	<0.01	0	0	0.15
25	0.03	0	0	0	0.03
Total	**8.50**	**2.46**	**1.73**	**0.60**	**13.29**

R-2721B Total Wetland Impacts (Neuse): 13.29 acres
R-2721B Total Wetland (Neuse) Requiring DWR Mitigation: 12.69 acres

R-2721 A&B Isolated Wetland Impacts in the Neuse River Basin

Site	Permanent Fill (ac)	Excavation (ac)	Mechanized Clearing (ac)	Total Wetland Impact (ac)
A-4	0.02	0	0	0.02
B-13	0.24	0.03	0	0.25
B-19	0	2.15	0	2.15
B-26	0	0	0.01	0.01
Total	**0.26**	**2.18**	**0.01**	**2.45**

R-2721 Total Isolated Wetland Impacts: 2.45 acres
R-2721 Total Isolated Wetland Requiring DWR Mitigation: 1.95 acres

R-2721 A&B Open Water (Ponds) Impacts in the Neuse River Basin

Site	Total Fill in Open Waters (ac)
A-4	0.21
A-25	0.40
A-29	1.53
B-2	0.95
B-10	1.52
B-11	4.43
B-15	2.30
B-18	6.36
Total	**17.70**

R-2721A Neuse Riparian Buffer Impacts

Site	Zone 1 Impact (sq ft)	*minus* Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)		Zone 2 Impact (sq ft)	*minus* Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
1	0	0	0	N/A		1100	1100	0	N/A
2	29408	21740	7668	23004		18956	8886	10070	15105
3	24273	0	24273	72819		16141	0	16141	24211
4	132681	4296	128385	385155		69262	8310	60952	91428
5	10459	0	10459	31377		8389	0	8389	12583
6 Bridge	26603	0	26603	N/A		14543	0	14543	NA
6 Road	617	305	312	936		3309	3309	0	0
7 Bridge	2809	0	2809	N/A		748	0	748	N/A
7 Road	9867	1578	8289	24867		4783	2822	1961	2941
8	1831	0	1831	N/A		3121	0	3121	N/A
9	18345	15816	2529	7587		12510	5499	7011	10516
10	28484	2466	26018	78054		18802	1755	17047	25570
11	32299	4788	27511	82533		46835	1931	44904	67356
12	8561	1455	7106	21318		6046	1459	4587	6880
13	27842	1926	25916	77748		18095	3348	14747	22120
14	17040	11351	5689	17067		12724	6545	6179	9268
15	48780	6735	42045	126135		31001	1270	29731	44596
16	15703	11955	3748	11244		9430	3997	5433	8149
17	119892	3387	116505	349515		67192	2052	65140	97710
18	63401	3972	59429	178287		35703	6105	29598	44397
19	16825	8324	8501	25503		12033	736	11297	16945
20	22669	10895	11774	35322		14026	109	13917	20875
21	2521	1748	773	N/A		784	367	417	N/A
22	18564	210	18354	55062		10568	2581	7987	11980

23	19377	476	18901	56703	8151	594	7557	11335
24	9758	0	9758	29274	5594	0	5594	8391
25	5086	0	5086	N/A	2081	0	2081	N/A
26	1112	0	1112	3336	889	0	889	1333
Totals	**714807**	**113426**	**601381**	**1692846**	**452816**	**62775**	**390041**	**553689**

R-2721A Total Zone 1 Neuse Buffer Impacts: 714807 square feet
R-2721A Total Zone 2 Neuse Buffer Impacts: 452816 square feet
R-2721A Total Zone 1 Neuse Buffer Mitigation Required: 1692846 square feet
R-2721A Total Zone 2 Neuse Buffer Mitigation Required: 553689 square feet

R-2721B Neuse Riparian Buffer Impacts

Site	Zone 1 Impact (sq ft)	*minus* Wetlands in Zone 1 (sq ft)	= Zone 1 Buffers (not wetlands) (sq ft)	Zone 1 Buffer Mitigation Required (using 3:1 ratio)	Zone 2 Impact (sq ft)	*minus* Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Mitigation Required (using 1.5:1 ratio)
1	29078	0	29078	87234	15901	1979	13922	20883
2	53530	12154	41376	124128	30845	3801	27044	40566
3	27228	15366	11862	35586	13512	5784	7728	11592
4	4514	0	4514	N/A	4637	0	4637	N/A
5	12760	6369	6391	19173	9950	3782	6168	9252
6	32516	12737	19779	59337	18451	8907	9544	14316
7	60417	18916	41501	124503	37018	3794	33224	49836
8	4317	0	4317	N/A	3633	0	3633	N/A
9	43026	18242	24784	74352	16583	2248	14335	21502
10	81719	8611	73108	219324	58771	2996	55775	83662
11	12732	12073	659	1977	9284	6870	2414	3621
12	0	0	0	N/A	1033	0	1033	N/A
13	59742	8237	51505	154515	35256	2948	32308	48462
14	12570	12218	352	1056	3470	2154	1316	1974
15	26651	17309	9342	28026	19936	10179	9757	14635
16	50560	15737	34823	104469	26570	6092	20478	30717
17	99039	2771	96268	288804	61848	1828	60020	90030

18	67075	42113	24962	74886	44679	16265	28414	42621
19	90601	17540	73061	219183	44578	3825	40753	61129
20	45963	3402	42561	127683	25860	1745	24115	36172
21	2129	0	2129	N/A	2577	0	2577	N/A
22	2720	0	2720	N/A	2485	0	2485	N/A
A1	35	0	35	105	237	0	237	N/A
A2	1181	0	1181	3543	1203	0	1203	N/A
Totals	**820103**	**223795**	**596308**	**1747884**	**488317**	**85197**	**403120**	**580970**

R-2721B Total Zone 1 Neuse Buffer Impacts: 820103 square feet
R-2721B Total Zone 2 Neuse Buffer Impacts: 488317 square feet
R-2721B Total Zone 1 Neuse Buffer Mitigation Required: 1747884 square feet
R-2721B Total Zone 2 Neuse Buffer Mitigation Required: 580970 square feet

Approximate Preliminary R-2728 Impacts (*to be finalized in future certification version)*
Wetland: 19.3 acres
Stream: 20086 linear feet
Open Waters (Ponds): 5.99 acres
Isolated Wetland: 0.30 acre
Zone 1 Neuse Buffer: 1279298 square feet
Zone 2 Neuse Buffer: 752489 square feet

Approximate Preliminary R-2729 Impacts (*to be finalized in future certification version)*
Wetland: 18.4 acres
Stream: 17387 linear feet
Open Waters (Ponds): 7.57 acres
Zone 1 Neuse Buffer: 1350860 square feet
Zone 2 Neuse Buffer: 917248 square feet

The application provides adequate assurance that the discharge of fill material into the waters of the Cape Fear and Neuse River Basins in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application dated September 12, 2018. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). Additional buffer impacts may require compensatory mitigation as described in 15A NCAC 2B.0233. For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

Conditions of Certification:

1. This 401 Water Quality Certification and Neuse River Riparian Buffer Authorization is being issued with only the R-2721 phase having finalized design and impacts. When final design plans are completed for phases R-2828 and R-2829, a modification to the 401 Water Quality Certification and the Neuse Riparian Buffer Authorization shall be submitted with fees and final plans to the NC Division of Water Resources. Final designs shall reflect all appropriate further avoidance, minimization, and updated mitigation for impacts to wetlands, streams, and other surface waters, and buffers. **No** construction activities that impact any wetlands, streams, surface waters, or buffers located in phases R-2828 and R-2829 shall begin until after the permittee applies for, and receives, a written modification of the 401 Water Quality Certification and the Neuse Riparian Buffer Authorization from the NC Division of Water Resources.

2. Compensatory mitigation for impacts to 15.24 acres of wetlands in phase R-2721A, and 14.64 acres of wetlands in phase R-2721B are required. We understand that you have chosen to perform compensatory mitigation for impacts to wetlands through the North Carolina Division of Mitigation Services (DMS) (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. DMS has indicated in letters dated August 28, 2018, and updated February 12, 2019, that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with DMS's Mitigation Banking Instrument signed July 28, 2010.

3. Compensatory mitigation impact to streams is required. We understand that you have chosen to perform compensatory mitigation for impacts to 10362 linear feet of streams in phase R-2721A and 8536 linear feet of streams in phase R-2721B through the North Carolina Division of Mitigation Service (DMS) (formerly NCEEP), and that the DMS has agreed to implement the mitigation for the project. The DMS has indicated in letters dated August 28, 2018, and updated February 12, 2019, that they will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for the above-referenced project, in accordance with the DMS Mitigation Banking Instrument signed July 28, 2010.

4. Compensatory mitigation for impacts to protected Neuse riparian buffers are required. Compensatory mitigation requirements for phase R-2721A are 1692846 square feet of Zone 1 buffer and 553689 square feet of Zone 2 buffer. Compensatory mitigation requirements for phase R-2721B are 1747884 square feet of Zone 1 buffer and 580970 square feet of Zone 2 buffer. We understand that you have chosen to perform compensatory mitigation for impacts to protected buffers through use of the North Carolina Division of Mitigation Services (DMS) (formerly NCEEP). Mitigation for unavoidable impacts to Neuse Riparian Buffers shall be provided in the Neuse River Basin and done in accordance with 15A NCAC .02B .0295. The DMS has indicated in letters dated August 28, 2018, and updated February 12, 2019, that they will assume responsibility for satisfying the compensatory mitigation requirements for the above-referenced project, in accordance with DMS's Mitigation Banking Instrument signed June 14, 2016.

5. The post-construction removal of any temporary bridge structures must return the project site to its preconstruction contours and elevations. The impacted areas shall be revegetated with appropriate native species. [15A NCAC 02H .0506(b)(2)]

6. As a condition of this 401 Water Quality Certification, the bridge demolition and construction must be accomplished in strict compliance with the most recent version of NCDOT's Best Management Practices for Construction and Maintenance Activities. [15A NCAC 02H .0507(d)(2) and 15A NCAC 02H .0506(b)(5)]

7. Bridge deck drains shall not discharge directly into the stream. Stormwater shall be directed across the bridge and pre-treated through site-appropriate means (grassed swales, pre-formed scour holes, vegetated buffers, etc.) before entering the stream. To meet the requirements of NCDOT's NPDES permit NCS0000250 , please refer to the most recent version of the *North Carolina Department of Transportation Stormwater Best Management Practices Toolbox* manual for approved measures. [15A NCAC 02H .0507(d)(2) and 15A NCAC 02H .0506(b)(5)]

8. Bridge piles and bents shall be constructed using driven piles (hammer or vibratory) or drilled shaft construction methods. More specifically, jetting or other methods of pile driving are prohibited without prior written approval from the NCDWR first. [15A NCAC 02H.0506(b)(2)]

9. No drill slurry or water that has been in contact with uncured concrete shall be allowed to enter surface waters. This water shall be captured, treated, and disposed of properly. [15A NCAC 02H .0506(b)(3)]

10. A turbidity curtain will be installed in the stream if driving or drilling activities occur within the stream channel, on the stream bank, or within 5 feet of the top of bank, or during the removal of bents from an old bridge. This condition can be waived with prior approval from the NCDWR. [15A NCAC 02H .0506(b)(3)]

11. All bridge construction shall be performed from the existing bridge, temporary work bridges, temporary causeways, or floating or sunken barges. If work conditions require barges, they shall be floated into position and then sunk. The barges shall not be sunk and then dragged into position. Under no circumstances should barges be dragged along the bottom of the surface water. [15A NCAC 02H .0506(b)(3)]

12. Unless otherwise approved in this certification, placement of culverts and other structures in open waters and streams, shall be placed below the elevation of the streambed by one foot for all culverts with a diameter greater than 48 inches, and 20 percent of the culvert diameter for culverts having a diameter less than 48 inches, to allow low flow passage of water and aquatic life. Design and placement of culverts and other structures including temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands or streambeds or banks, adjacent to or upstream and down stream of the above structures. The applicant is required to provide evidence that the equilibrium is being maintained if requested in writing by the NCDWR. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NCDWR for guidance on how to proceed and to determine whether or not a permit modification will be required. [15A NCAC 02H.0506(b)(2)]

13. If multiple pipes or barrels are required, they shall be designed to mimic natural stream cross section as closely as possible including pipes or barrels at flood plain elevation and/or sills where appropriate. Widening the stream channel should be avoided. Stream channel widening at the inlet or outlet end of structures typically decreases water velocity causing sediment deposition that requires increased maintenance and disrupts aquatic life passage. [15A NCAC 02H.0506(b)(2)]

14. Riprap shall not be placed in the active thalweg channel or placed in the streambed in a manner that precludes aquatic life passage. Bioengineering boulders or structures should be properly designed, sized and installed. [15A NCAC 02H.0506(b)(2)]

15. For all streams being impacted due to site dewatering activities, the site shall be graded to its preconstruction contours and revegetated with appropriate native species. [15A NCAC 02H.0506(b)(2)]

16. The stream channels shall be excavated no deeper than the natural bed material of the stream, to the maximum extent practicable. Efforts must be made to minimize impacts to the stream banks, as well as to vegetation responsible for maintaining the stream bank stability. Any applicable riparian buffer impact for access to stream channel shall be temporary and be revegetated with native riparian species. [15A NCAC 02H.0506(b)(2)]

17. Pipes and culverts used exclusively to maintain equilibrium in wetlands, where aquatic life passage is not a concern, shall not be buried. These pipes shall be installed at natural ground elevation. [15A NCAC 02H.0506(b)]

18. A copy of the final construction drawings shall be furnished to the NCDWR Central Office prior to the pre-construction meeting. The permittee shall provide written verification that the final construction drawings comply with the permit drawings contained in the application received by NCDWR. Any deviations from the approved drawings are not authorized unless approved by the NC Division of Water Resources.

19. All portions of the proposed project draining to 303(d) listed watersheds that are impaired due to turbidity shall be designed, constructed, and operated with sediment and erosion control measures that meet Design Standards in Sensitive Watersheds (15A NCAC 4B .0124). However, due to the size of the project, NC DOT shall not be required to meet 15A NCAC 4B .0124(a) regarding the maximum amount of uncovered acres.

20. All portions of the proposed project draining to 303(d) listed watersheds that are impaired due to biological criteria exceedances shall not discharge stormwater directly to surface waters. Stormwater shall be treated using

appropriate best management practices (e.g., vegetated conveyances, constructed wetlands, detention ponds, etc.) prior to discharging to surface waters.

21. Channel relocations shall be completed and stabilized, and approved by NCDWR staff, prior to diverting water into the new channel. Stream banks shall be matted with coir-fiber matting. Vegetation used for bank stabilization shall be limited to native riparian vegetation, and should include establishment of a vegetated buffer on both sides of the relocated channel to the maximum extent practical. Also, rip-rap may be allowed if it is necessary to maintain the physical integrity of the stream, but the applicant must provide written justification and any calculations used to determine the extent of rip-rap coverage requested Once the stream has been turned into the new channel, it may be necessary to relocate stranded fish to the new channel to prevent fish kills. [15A NCAC 02H .0506(b)(3)]

22. All stormwater runoff shall be directed as sheetflow through stream buffers at non-erosive velocities, unless otherwise approved by this certification. [15A NCAC 2B.0233]

21. All riparian buffers impacted by the placement of temporary fill or clearing activities shall be restored to the preconstruction contours and revegetated. Maintained buffers shall be permanently revegetated with non-woody species by the end of the growing season following completion of construction. For the purpose of this condition, maintained buffer areas are defined as areas within the transportation corridor that will be subject to regular NCDOT maintenance activities including mowing. The area with non-maintained buffers shall be permanently revegetated with native woody species before the next growing season following completion of construction. Insert buffer rule citation. [15A NCAC 2B.0233]

22. Pursuant to 15A NCAC 2B.0233(6), sediment and erosion control devices shall not be placed in Zone 1 of any Neuse Buffer without prior approval by the NCDWR. At this time, the NCDWR has approved no sediment and erosion control devices in Zone 1, outside of the approved project impacts, anywhere on this project. Moreover, sediment and erosion control devices shall be allowed in Zone 2 of the buffers provided that Zone 1 is not compromised and that discharge is released as diffuse flow.

23. All clearing of vegetation for purpose of relocating overhead power lines within jurisdictional wetlands shall be performed without the use of mechanized equipment. [15A NCAC 02H.0506(b)(3)]

24. The permittee will need to adhere to any and all appropriate in-water work moratoria (including the use of pile driving or vibration techniques) prescribed by the NC Wildlife Resources Commission, the US Fish & Wildlife Service, and/or the NC Division of Marine Fisheries. [15A NCAC 2H.0506(b)(2) and 15A NCAC 4B.0125]

25. Prior to, and during the construction of project, the permittee shall coordinate with the North Carolina Wildlife Resources Commission and the US Fish & Wildlife Service to ensure that the construction will not result in negative impacts to threatened and endangered mussels. Should either of those agencies require changes to the proposed design or construction activities, a modification to this 401 Water Quality Certification may be required. Any changes to the design authorized by this certification will require approval from the NC Division of Water Resources. [15A NCAC 2H.0506(b)(2) and 15A NCAC 4B.0125]

26. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills. [15A NCAC 02B.0200]

27. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers. [15A NCAC 02H.0506(b)(2)]

28. The dimension, pattern and profile of the stream above and below the crossing shall not be modified. Disturbed floodplains and streams shall be restored to natural geomorphic conditions. [15A NCAC 02H.0506(b)(2)]

29. The use of rip-rap above the Normal High Water Mark shall be minimized. Any rip-rap placed for stream stabilization shall be placed in stream channels in such a manner that it does not impede aquatic life passage. [15A NCAC 02H.0506(b)(2)]

30. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval. [15A NCAC 02H .0507 (c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

31. All work in or adjacent to stream waters shall be conducted in a dry work area. Approved BMP measures from the most current version of NCDOT Construction and Maintenance Activities manual such as sandbags, rock berms, cofferdams and other diversion structures shall be used to prevent excavation in flowing water. [15A NCAC 02H.0506(b)(3) and (c)(3)]

32. Heavy equipment shall be operated from the banks rather than in the stream channel in order to minimize sedimentation and reduce the introduction of other pollutants into the stream. [15A NCAC 02H.0506(b)(3)]

33. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials. [15A NCAC 02H.0506(b)(3)]

34. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification. [15A NCAC 02H.0506(b)(3)]

35. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited. [15A NCAC 02H.0506(b)(3)]

36. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If the NCDWR determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification. [15A NCAC 02B.0200]

37. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification. [15A NCAC 02H.0506(b)(2)]

38. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

39. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization, including all non-commercial borrow and waste sites associated with the project, shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification. [15A NCAC 02H.0501 and .0502]

40. The issuance of this certification does not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.

41. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery. [15A NCAC 02B.0506(b)(2)]

42. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0502(f)]

43. Native riparian vegetation (i.e., trees and shrubs native to your geographic region) must be reestablished in the riparian areas within the construction limits of the project by the end of the growing season following completion of construction. [15A NCAC 02B.0233(10)] & [15A NCAC 02B.0506(b)(2)]

44. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities. [15A NCAC 02H.0506(b)(3) and (c)(3)]

45. Erosion and sediment control practices must be in full compliance with all specifications governing the proper design, installation and operation and maintenance of such Best Management Practices in order to protect surface waters standards [15A NCAC 02H.0506(b)(3) and (c)(3)]:

a. The erosion and sediment control measures for the project must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Sediment and Erosion Control Planning and Design Manual.*

b. The design, installation, operation, and maintenance of the sediment and erosion control measures must be such that they equal, or exceed, the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual.* The devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) projects, including contractor-owned or leased borrow pits associated with the project.

c. For borrow pit sites, the erosion and sediment control measures must be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.*

d. The reclamation measures and implementation must comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act.

46. Sediment and erosion control measures shall not be placed in wetlands or surface waters, or within 5 feet of the top of bank, without prior approval from DWR. [15A NCAC 02H.0506(b)(3) and (c)(3)]

47. When applicable, all construction activities shall be performed and maintained in full compliance with G.S. Chapter 113A Article 4 (Sediment and Pollution Control Act of 1973). Regardless of applicability of the Sediment and Pollution Control Act, all projects shall incorporate appropriate Best Management Practices for the control of sediment and erosion so that no violations of state water quality standards, statutes, or rules occur. [15A NCAC 02H .0506{b)(3) and (c)(3) and 15A NCAC 02B .0200]

48. Design, installation, operation, and maintenance of all sediment and erosion control measures shall be equal to or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual,* or for linear transportation projects, the *NCDOT Sediment and Erosion Control Manual.*
All devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) sites, including contractor-owned or leased borrow pits associated with the project. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.
For borrow pit sites, the erosion and sediment control measures shall be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.* Reclamation measures and implementation shall comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971. [15A NCAC 02H.0506(b)(3) and (c)(3); GC 4135]

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit.

If you wish to contest any statement in the attached Certification you must file a petition for an administrative hearing. You may obtain the petition form from the office of Administrative hearings. You must file the petition with the office of Administrative Hearings within sixty (60) days of receipt of this notice. A petition is considered filed when it is received in the office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00am and 5:00pm, except for official state holidays. The original and one (1) copy of the petition must be filed with the Office of Administrative Hearings.

The petition may be faxed-provided the original and one copy of the document is received by the Office of Administrative Hearings within five (5) business days following the faxed transmission.
The mailing address for the Office of Administrative Hearings is:

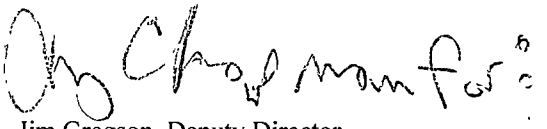
Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Telephone: (919) 431-3000, Facsimile: (919) 431-3100

A copy of the petition must also be served on DEQ as follows:

Mr. Bill F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center

This the 15th day of February 2019

DIVISION OF WATER RESOURCES



Jim Gregson, Deputy Director

WQC No. 4179

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Director

NORTH CAROLINA
Environmental Quality

NCDWR Project No.: _____ **County:** _____

Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion
Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the 401 Transportation Permitting Unit, North Carolina Division of Water Resources, 1617 Mail Service Center, Raleigh, NC, 27699-1617. This form may be returned to NCDWR by the applicant, the applicant's authorized agent, **or** the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date:_____

Engineer's Certification

_____ Partial _____ Final

I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____
Date _____

Biological/Conference Opinion - Revised

Complete 540, Triangle Expressway Southeast Extension in Wake and Johnston Counties, North Carolina (STIP Numbers R-2721, R-2828, R-2829)

FWS Log #: 42420-2010-F-0383-R001

Prepared by:

U.S. Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

[NAME, TITLE]

10/15/19
Date

TABLE OF CONTENTS

CONSULTATION HISTORY ..... **iii**
BIOLOGICAL OPINION **1**
1. INTRODUCTION **1**
2. PROPOSED ACTION **2**
2.1. Action Area *2*
2.2. Construction of Roadway and Stream Crossings *4*
2.3. Operation of Roadway Facility *4*
2.4. Conservation Measures *5*
2.5. Interrelated and Interdependent Actions *7*
3. CONCURRENCE **8**
4. DWARF WEDGEMUSSEL **9**
4.1. Status of Dwarf Wedgemussel *9*
4.2. Environmental Baseline for Dwarf Wedgemussel *12*
4.3. Effects of the Action on Dwarf Wedgemussel *13*
4.4. Cumulative Effects on Dwarf Wedgemussel *16*
4.5. Conclusion for Dwarf Wedgemussel *17*
5. YELLOW LANCE **18**
5.1. Status of Yellow Lance *18*
5.2. Environmental Baseline for Yellow Lance *20*
5.3. Effects of the Action on Yellow Lance *21*
5.4. Cumulative Effects on Yellow Lance *22*
5.5. Conclusion for Yellow Lance *22*
6. ATLANTIC PIGTOE **22**
6.1. Status of Atlantic Pigtoe *22*
6.2. Environmental Baseline for Atlantic Pigtoe *24*
6.3. Effects of the Action on Atlantic Pigtoe *25*
6.4. Cumulative Effects on Atlantic Pigtoe *25*
6.5. Conclusion for Atlantic Pigtoe *25*
7. PROPOSED ATLANTIC PIGTOE CRITICAL HABITAT **26**
7.1. Status of Proposed Atlantic Pigtoe Critical Habitat *26*
7.2. Environmental Baseline for Proposed Atlantic Pigtoe Critical Habitat *27*
7.3. Effects of the Action on Proposed Atlantic Pigtoe Critical Habitat *28*
7.4. Cumulative Effects on Proposed Atlantic Pigtoe Critical Habitat *29*
7.5. Conclusion for Proposed Atlantic Pigtoe Critical Habitat *29*
8. INCIDENTAL TAKE STATEMENT **30**
8.1. Amount or Extent of Take *31*
8.2. Reasonable and Prudent Measures *32*
8.3. Terms and Conditions *32*
8.4. Monitoring and Reporting Requirements *33*
9. CONSERVATION RECOMMENDATIONS **33**
10. REINITIATION NOTICE **34**
11. LITERATURE CITED **35**

CONSULTATION/CONFERENCE HISTORY

This section lists key events and correspondence during the course of this consultation/ conference. A complete administrative record of this consultation/conference is on file in the U.S. Fish and Wildlife Service's (Service) Raleigh Field Office.

2009-12-08 to **2017-07-12** – Service staff attended multiple agency coordination meetings with North Carolina Department of Transportation (NCDOT) and Federal Highway Administration (FHWA).

2010-02-03 – The Service submitted a letter to NCDOT expressing concerns about potential adverse effects to Dwarf Wedgemussel (DWM).

2011-02-17 – The Service submitted a letter to NCDOT detailing specific concerns about effects to DWM and requesting NCDOT to fund additional studies of the species and its habitat within the Swift Creek Watershed.

2011-03-14 – The Service met with NCDOT, FHWA, and North Carolina Wildlife Resources Commission to discuss DWM issues.

2011-03-16 – NCDOT agreed to conduct additional studies of DWM within Swift Creek Watershed.

2012-01-25 – The Service submitted a letter to NCDOT commenting on alternatives being studied and reiterated concerns for adverse effects to DWM.

2012-06-11 – The Service met with consultants to discuss additional DWM studies.

2015-02-03 – The Service met with FHWA and NCDOT to discuss DWM issues and strategy to improve viability of the species in Swift Creek Watershed via captive propagation.

2015-11-25 – The Service submitted a letter to NCDOT commenting on the Federal Draft Environmental Impact Statement and reiterated concerns about adverse effects on federally listed mussels and the need for captive propagation as part of strategy to maintain viability of species.

2016-05-16 – The Service met with NCDOT to discuss Endangered Species Act Section 7 consultation and captive propagation facility as a conservation measure.

2016-05-17 – DWM Viability Study for Swift Creek Watershed final report completed and reviewed by Service.

2016-08-02 – NCDOT and FHWA agree to fund mussel captive propagation facility as conservation measure.

2017-01-19 – The Service met with NCDOT to discuss captive propagation facility as conservation measure.

2017-05-10 – The Service met with NCDOT and FHWA to discuss development of Biological Assessment (BA).

2017-07-12 – North Carolina State University provides budget proposal to operate mussel propagation facility.

2017-09-13 – The Service provided comments to NCDOT and FHWA on draft BA.

2017-09-28 – The Service met with NCDOT and other stakeholders to discuss mussel propagation facility.

2017-10-04 – The Service met with NCDOT and FHWA to discuss comments on the draft BA.

2017-12-06 – The Service received the final BA and a letter from the FHWA requesting initiation of formal Section 7 consultation for DWM and formal Section 7 conference for the Yellow Lance (YL).

2017-12-21 – The Service provided a letter to the FHWA stating that all information required for initiation of formal consultation and formal conference was either included with their 2017-12-06 letter or was otherwise available.

2018-01-18 – The Service provided the FHWA and NCDOT with a draft Biological/Conference Opinion (BO/CO).

2018-04-03 – The YL was listed as a federally threatened species.

2018-04-10 – The Service provided the FHWA and NCDOT with a final BO.

2018-05-23 – Sound Rivers, Inc.; Center for Biological Diversity; and Clean Air Carolina filed a federal lawsuit against the Service challenging the BO.

2018-10-11 – The Service published a proposed rule to list the Atlantic Pigtoe (AP) as threatened with critical habitat.

2019-02-06 – The Service met with NCDOT, FHWA, and project consultants to discuss revising the BA and reinitiating Section 7 consultation/conference to address additional species.

2019-04-10 – The Service provided comments to NCDOT and FHWA on a draft revised BA.

2019-05-13 – The Service provided comments to NCDOT and FHWA on a draft revised BA.

2019-07-16 – The Service received a revised final BA and letter from the FHWA requesting reinitiation of formal Section 7 consultation for DWM and YL and initiation of formal Section 7 conference for AP and its proposed critical habitat.

2019-08-22 – NCDOT reached a settlement with the plaintiffs in the lawsuit against the Service.

2019-09-11 – The FHWA provided an addendum to the BA regarding the legal settlement.

2019-09-16 – The Service provided FHWA and NCDOT a draft revised BO/CO.

BIOLOGICAL/CONFERENCE OPINION

1. INTRODUCTION

A Biological Opinion (BO) is the document that states the opinion of the U.S. Fish and Wildlife Service (Service) under the Endangered Species Act of 1973, as amended (ESA), as to whether a federal action is likely to:

- jeopardize the continued existence of species listed as endangered or threatened; or
- result in the destruction or adverse modification of designated critical habitat.

A Conference Opinion (CO) is equivalent to a BO, but addresses species that are not yet listed under the ESA and/or proposed critical habitats not yet designated. Therefore, the ESA prohibitions against jeopardizing species, destroying critical habitat, and taking animals do not yet apply. The Service may adopt a CO as a BO if and when the evaluated species/critical habitat are listed/designated and while the action agency's discretion and involvement in the action continue.

The federal action addressed in this BO/CO is the Federal Highway Administration (FHWA) proposed Complete 540, Triangle Expressway Southeast Extension in Wake and Johnston Counties, North Carolina (the Action). The BO considers the effects of the Action on Dwarf Wedgemussel and Yellow Lance. The CO considers the effects of the Action on Atlantic Pigtoe and proposed critical habitat for Atlantic Pigtoe.

The FHWA determined that the Action is not likely to adversely affect Neuse River Waterdog (proposed threatened), Neuse River Waterdog proposed critical habitat, Michaux's Sumac, and Cape Fear Shiner. The Service concurs with these determinations, for reasons we explain in Section 3 of the BO/CO.

A BO/CO evaluates the effects of a federal action along with those resulting from interrelated and interdependent actions, and from non-federal actions unrelated to the proposed Action (cumulative effects), relative to the status of listed/proposed species and the status of designated/proposed critical habitat. A Service opinion that concludes a proposed federal action is *not* likely to jeopardize species and is *not* likely to destroy or adversely modify critical habitat fulfills the federal agency's responsibilities under §7(a)(2) of the ESA.

"*Jeopardize the continued existence*" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02). "*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 CFR §402.02).

This BO/CO uses hierarchical numeric section headings. Primary (level-1) sections are labeled sequentially with a single digit (e.g., 2. PROPOSED ACTION). Secondary (level-2) sections

within each primary section are labeled with two digits (e.g., 2.1. Action Area), and so on for level-3 sections. The basis of our opinion for each listed/proposed species and proposed critical habitat is wholly contained in separate level-1 sections that address the status, environmental baseline, effects of the Action, cumulative effects, and conclusion.

2. PROPOSED ACTION

The North Carolina Department of Transportation (NCDOT), in cooperation with the FHWA, proposes improvements to NC 540 in Wake and Johnston Counties, North Carolina. The Complete 540 project is proposed to be a controlled-access toll road extending the existing Triangle Expressway from NC 55 Bypass in Apex to the US 64/US 264 Bypass (I-495) in Knightdale and is approximately 27 miles long. The proposed Action will improve mobility, reduce forecast traffic congestion on the existing roadway network, and improve system linkage within the study area. The Action is comprised of three projects in the NCDOT 2018-2027 State Transportation Improvement Program (STIP R-2721, R-2828, and R-2829) combined together for analysis. The Action will likely be constructed in phases with initial construction tentatively scheduled to begin in fiscal year 2020. The Action will be evaluated here in three components: 1) construction of roadway and stream crossings, 2) operation of roadway facility, and 3) conservation measures.

2.1. Action Area

For purposes of consultation/conference under ESA §7, the action area is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action" (50 CFR §402.02). The "Action Area" described in the July 2019 Revised Biological Assessment (BA) consists of the Future Land Use Study Area (FLUSA) as defined in the Qualitative Indirect and Cumulative Effects Report (H.W. Lochner 2014). The FLUSA covers portions of Wake, Johnston, and Harnett Counties (See Figures 1 and 2 in BA). The FLUSA was initially chosen by FHWA as the Action Area because of the Action's potential to induce land development in the area. However, the FLUSA was developed using National Environmental Policy Act (NEPA) guidelines and not ESA guidelines. ESA guidelines address actions and effects that are "reasonably certain to occur". The NEPA reports used an integrated land use allocation tool and was broad and not focused solely on actions that are reasonably certain to occur (Michael Baker Engineering 2017a,b,c,d) as a result of the proposed action.

Michael Baker Engineering (2017a,b,c,d) completed a Quantitative Indirect and Cumulative Effects (ICE) Report for the Action using a methodology to forecast land use changes between the base year of 2010 and design year 2040. The report determined that development will occur throughout the FLUSA with or without the Action occurring. Michael Baker Engineering (2017d) concluded that the "projected differences in land use between the 2040 No-Build and 2040 Build scenarios are relatively small". The ICE report does not quantitatively address specific responses of federally listed mussels to the expected increased development in either the 2040 No-Build or 2040 Build. Given the high-level of analysis and uncertainty in projecting into the future, it is difficult to ascertain the ecological significance of the relatively small differences in land use between the 2040 No-Build and 2040 Build scenarios. Therefore, the small contribution of potential effects from future induced development attributed to the Action will be

indistinguishable from the numerous effects of development occurring independent of the Action. Thus any potential effects caused by the Action within the FLUSA cannot be meaningfully measured, detected, or evaluated. Furthermore, the three metrics (changes in impervious surface, total suspended solids, and copper) used in the ICE studies as surrogates for threats to mussel species do not readily translate into actual measurable effects in the context of evaluating small changes attributable to the Action among the large changes expected without the Action.

Recently revised Service regulations (84 FR 44976-45018; August 27, 2019) define "effects of the action" as "all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur **but for** the proposed action and it is **reasonably certain to occur**." Although the ICE report identifies small quantitative differences (between No-Build and Build) in land use and in the metrics used as surrogates for threats to listed mussel species, as previously stated, these differences are likely indistinguishable as **consequences** to the species in light of the large scale changes that will occur independent of the Action. Given this, it is uncertain whether the "but for" test can be satisfied. Additionally, the revised regulations identify remoteness in time and lengthy causal chains involving many steps as considerations in the "but for" test. The ICE report projects out to the year 2040, and approvals for future developments would involve many steps over several years – thus adding to the argument that the "but for" test cannot definitively be met.

The revised regulations apply the "reasonably certain to occur" test not only to effects, but also to activities caused by the proposed action (but not part of the proposed action). The regulations state that the "reasonably certain to occur" test must be based on "clear and substantial information", and they identify "existing plans" and "remaining economic, administrative, and legal requirements necessary" as factors to consider when applying the test. The ICE report does not list specific future development projects or plans, and we are not aware of any specific plans for development that will be caused by the Action. Therefore, the Service cannot define any specific activities or effects from induced development that are "reasonably certain to occur". Furthermore, any such future developments would be subject to many economic, administrative, and legal requirements that further reduce the chance that they are "reasonably certain to occur", or that such developments would result in effects to the evaluated species..

Therefore, since future induced development caused by the proposed action and the potential effects thereof are not reasonably certain to occur, and given the overly expansive extent of the FLUSA and its NEPA-derived ICE studies, the Service has reduced the Action Area to an area where more definable and measurable effects are reasonably certain to occur. This reduced Action Area will include the following:

- Footprint of the road facility and right-of-way (1,240 acres)
- 0.42 mile section of Swift Creek at the new road crossing (0.13 mile within right-of-way + 0.25 mile downstream of right-of-way + 0.04 mile downstream of confluence of a tributary to Swift Creek)
    - 0.25 mile is generally presumed to be the downstream extent of detectable sedimentation effects of bridge crossings on Piedmont streams when appropriate sediment and erosion control best management practices (BMPs) are utilized. NCDOT utilizes state-of-the-art BMPs which prevent sedimentation from

affecting aquatic resources more than 0.25 mile downstream of bridge crossings (David Harris, NCDOT Roadside Environmental Engineer, personal email communication on August 23, 2019). Lotic habitats impacted by sediment are easily recognized and characterized by a fine layer of clay, silt, and sand (Henley et al. 2000). There is no evidence or history of NCDOT projects indicating that effects of sedimentation exceed 0.25 mile in the presence of effective BMPs. For more information on NCDOT BMPs, see Section 2.4.
    - 0.04 mile is included due to a tributary of Swift Creek being crossed 0.21 mile upstream of its confluence with Swift Creek
- Proposed mussel propagation facility located at Historic Yates Mill County Park

No portion of Middle Creek is included in this reduced Action Area because the proposed road crosses the stream several miles upstream of any known occurrences of listed/proposed mussel species. Past and recent surveys have failed to find the species in the vicinity of the crossing. No effects to listed/proposed mussels are expected within Middle Creek.

2.2. Construction of Roadway and Stream Crossings

An approximately 27 mile long controlled-access toll road is proposed to be constructed on new location to extend the existing NC 540 (Triangle Expressway) from its current terminus at NC 55 Bypass in Apex to US 64/US 264 (I-495) in Knightdale. The new road will consist of six lanes, with three 12-foot lanes in each direction of travel, separated by a 70-foot median. The new facility will occupy approximately 1,240 acres within the proposed right-of-way. Interchanges are proposed at the following locations: NC 55 Bypass, Holly Springs Road, Bells Lake Road, US 401, Old Stage Road, NC 50, I-40, White Oak Road, US 70 Business, Rock Quarry Road, Auburn Knightdale Road, Poole Road, and US 64/US 264 Bypass (I-87). The Neuse River, Swift Creek, some tributaries to Swift Creek, and other major streams will be crossed utilizing bridges. Smaller streams will be crossed using culverts. The dual bridges over Swift Creek will be 825 feet long and will completely span the channel (i.e. no bents in the water) and much of the floodplain. The Action will likely be implemented in phases over several years, depending upon availability of funding. Construction is tentatively scheduled to begin in fiscal year 2020. The estimated construction duration for each STIP is approximately:

- R-2721 – 3.0 years
- R-2828 – 3.5 years
- R-2829 – 2.5 years

2.3. Operation of Roadway Facility

Operation of the new roadway facility includes daily vehicular use and routine maintenance activities. Routine maintenance includes, but is not limited to, the following common practices: mowing, tree trimming, bridge painting, minor bridge repair, culvert cleaning/repair, ditch cleaning/reshaping, detention/retention basin cleaning, guardrail replacement, pavement rehabilitation/resurfacing, and right-of-way fence repair.

2.4. Conservation Measures

The following measures will be implemented by NCDOT to minimize and partially offset potential adverse effects to Dwarf Wedgemussel (DWM), Yellow Lance (YL), Atlantic Pigtoe (AP), and proposed AP critical habitat.

Erosion Control Measures

NCDOT will require Design Standards in Sensitive Watersheds [15A NCAC 04B .0124 (b) – (e)], which are erosion and sediment control measures that exceed the standard best management practices (BMPs) (e.g. measures are designed to provide protection from runoff of 25-year storm event). The areas within the Swift Creek Watershed and Middle Creek Watershed will be identified as "Environmentally Sensitive Areas" on the Sedimentation and Erosion Control Plans. By definition, the Environmentally Sensitive Areas will be identified as a 50-foot buffer zone on both sides of the stream measured from top of streambank. Within the identified 50-foot Environmentally Sensitive Areas, the following shall apply:

1. The contractor may perform clearing operations, but not grubbing operations until immediately prior to beginning grading operations.
2. Once grading operations begin in identified Environmentally Sensitive Areas, work shall progress in a continuous manner until complete.
3. Erosion control devices shall be installed immediately following the clearing operation.
4. Seeding and mulching shall be performed on the areas disturbed by construction immediately following final grade establishment.
5. Seeding and mulching shall be done in stages on cut and fill slopes that are greater than 20 feet in height measured along the slope, or greater than 2 acres in area, whichever is less.

All other NCDOT BMPs will be implemented as appropriate (NCDOT 2003, NCDOT 2014, NCDOT 2015). All sedimentation and erosion control measures will be appropriately maintained following NCDOT standards, to ensure proper function of the measures. NCDOT has partnered with North Carolina State University and others to develop and test their current BMPs. For a comprehensive list of research conducted on NCDOT BMP effectiveness, see https://ci.lib.ncsu.edu/profiles/sscram and Appendix B of NCDOT 2014.

Bridge Deck Drainage

The design for all bridges within the Swift Creek Watershed and Middle Creek Watershed will eliminate deck drains into the water bodies they cross. Deck drainage is routed back to the land, thus allowing for some filtering of runoff prior to entering the stream.

Agency Coordination

NCDOT will invite representatives from the Service, North Carolina Wildlife Resources Commission (NCWRC), and other agency personnel to preconstruction meetings for the Action, as well as to preconstruction meetings associated with installation of structures within 0.25 mile of the Swift Creek crossing to ensure compliance with special project commitments.

Stream Crossing Review

During the development of the alternatives for the Action, an interagency field review was held to review stream crossings and determine if the minimum required structure type should be altered to minimize environmental effects. Within Swift Creek Watershed, the crossings of three tributaries to Swift Creek were identified as particularly high-value that warranted larger structures to minimize direct effects. Two proposed culverts were changed to bridges and one proposed bridge was lengthened (to span more of the stream banks and floodplain rather than fill them), resulting in the following net reduction of impacts: 3153 linear feet of stream, 7.56 acres of stream buffers, and 18.57 acres of wetlands (see Table 15 and Figure 12 in revised BA).

Bridging of Swift Creek

The bridges that cross Swift Creek will not have any part of the structure in the stream channel or within 10 feet of the top of either bank. Also, no permanent structures or temporary structures required to build the bridge will be placed within Swift Creek. All permanent and temporary structures will be designed and installed such that they should not result in bank instability or cause significant sediment runoff into Swift Creek.

Hazardous Spill Basins (HSBs)

NCDOT will require construction of two permanent HSBs at the crossing of Swift Creek. Road runoff from approximately 1.3 miles of road facility will be directed to a HSB before being discharged to Swift Creek or tributaries. The HSBs will be designed to contain a spill from a typical tanker truck that may have otherwise flowed directly into these water bodies. NCDOT will implement their standard protocols for upkeep and use of these HSBs.

Preconstruction Survey and Potential Mussel Relocation

NCDOT will conduct a preconstruction survey (just prior to construction) at the Swift Creek crossing and remove mussels from a defined area (salvage area) and relocate them to appropriate habitat within Swift Creek outside of the salvage area (relocation site), or if deemed appropriate after coordination with the Service and NCWRC, federally listed/proposed mussels may be taken into captivity to use as brood stock for propagation efforts. The preconstruction survey will be incorporated into a Mussel Relocation Plan, which will identify the salvage area and relocation site, and be developed in coordination with the Service and NCWRC.

DWM Viability Study

NCDOT, in cooperation with the Service, commissioned the DWM Viability Study (Three Oaks 2016) to update the baseline conditions for the DWM. The results obtained were used in the development of this BO/CO and are discussed below. The specific purpose of the DWM Viability Study was threefold:

1. Characterize existing conditions of the Swift Creek Watershed
2. Summarize conservation measures that have been implemented to protect DWM in the Swift Creek Watershed
3. Assess historical trends and future viability of the DWM population and habitat conditions

The study concluded that suitable habitat still exists in Swift Creek and the DWM population there exhibits signs of viability but is vulnerable.

Propagation Facility

An ongoing commitment by several entities in developing the Yates Mill Aquatic Conservation Center (YMACC) has been underway concurrent to the development of the Action. Since 1997, state and federal agencies in North Carolina have worked with local universities and others to develop Atlantic Slope freshwater mussel captive propagation techniques, steadily growing the expertise but lacking full production capacity. Hence, the Service, NCDOT, and the FHWA have been in coordination regarding the logistics of developing a mussel propagation facility in the Raleigh, North Carolina area as a conservation measure to expand current capabilities, apply local expertise, and help offset potential effects to DWM, YL, and AP resulting from the Action.

NCDOT will provide funding to be utilized for the retrofit and upgrade of the existing research facility in the A.E. Finley Center, at the Historic Yates Mill County Park, owned by Wake County and leased and operated by North Carolina State University (NCSU), for the purpose of research and propagation of DWM, YL, AP, and other aquatic species. The retrofitted/upgraded facility will then become the YMACC. The goal of the YMACC is to promote the long-term survival of rare aquatic species in streams throughout eastern North Carolina by producing individuals for population augmentation and/or reintroduction. Wake County will be provided with approximately $2 million in funding for the construction of the retrofit and upgrade to the existing facility in the A.E. Finley Center. Wake County and NCSU will oversee and manage the construction of the new YMACC. In addition, approximately $6 million in funding will be provided to NCWRC's Non-Game Aquatic Species Program. These funds will be used for NCSU's detailed proposal to provide a facility manager and an assistant at the YMACC to oversee the propagation, research, restoration, outreach, and other expenses estimated to operate and maintain the facility for approximately ten years.

NCDOT is not responsible for the construction, management, or success of the facility or its propagation goals. NCDOT has committed to provide funding which is based on the design and construction needs for the facility (through Wake County) and the operations leading to the ability to do mussel restorations (via the Non-Game Aquatic Species Program). This program is intended to benefit federally threatened, endangered, and at-risk aquatic species, and may fund projects such as NCSU's proposal for operation of the YMACC, restocking efforts, surveys, monitoring, land acquisition, or habitat enhancement work by NCSU, NCWRC, and other conservation partners. Initial funding agreements (for approximately $5 million) are in place for the construction and for up to five years of operating and maintaining the facility. The funding agreement for operating and maintaining the facility will be amended for an additional approximately $3 million.

Litigation Settlement

Although most details are yet to be developed, a settlement reached by NCDOT and plaintiffs that ends a federal lawsuit against the Service contains several land acquisition, stream protection, and other mitigation measures as well as research projects which may benefit the DWM and other listed mussels.

2.5. Interrelated and Interdependent Actions

A BO/CO evaluates the effects of a proposed federal action. For purposes of consultation/

conference under ESA §7, the effects of a federal action on listed/proposed species or critical habitat include the direct and indirect effects of the action, plus the effects of interrelated or interdependent actions. "Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR §402.02).

Although there are currently no designs for borrow pits, haul roads, or staging areas, the Action will invariably require such. These common construction features are generally left to the contractor to determine the need and location. NCDOT will strongly discourage the contractor from choosing borrow/waste site locations, staging areas, equipment storage areas, and refueling areas within 0.25 mile of Swift Creek by putting such language in the project commitments. However, if the contractor opts to pursue borrow or waste sites in these locations, the NCDOT Division Environmental Officer will coordinate with the Service during the approval process of any borrow or waste sites. It is the Service's experience that such sites are generally located so as to avoid additional adverse effects to listed/proposed species. The contractor must follow provisions in the Standard Specifications for Roads and Structures (January 2018) for borrow excavation (Section 230) and disposal of waste and debris (Section 802).

At this time there are no identified utilities within 0.25 mile of Swift Creek which must be relocated due to the Action. However, after additional detailed design, it is possible that limited utility relocation may be necessary.

3. CONCURRENCE

The FHWA determined that the Action is not likely to adversely affect Neuse River Waterdog (proposed threatened), Neuse River Waterdog proposed critical habitat, Michaux's Sumac, and Cape Fear Shiner. The Service concurs with these determinations for the following reasons.

Although the Neuse River Waterdog is known to occur in Swift Creek and Middle Creek, the species is not known to occur in the vicinity of the new road crossings. The closest known occurrences in Swift Creek and Middle Creek are 5.24 stream miles downstream and 13.58 stream miles downstream, respectively. Surveys conducted in February 2019 did not reveal any Neuse River Waterdogs within the Action Area (Three Oaks 2019). Suitable habitat for the species does not occur near the crossing of Middle Creek.

Proposed critical habitat for Neuse River Waterdog in Swift Creek and Middle Creek occurs approximately 3.1 miles and 13.5 miles downstream of the Action Area. Given the distance from proposed critical habitat, adverse effects are not anticipated.

There are only two known occurrences of Michaux's Sumac within the FLUSA utilized in the BA, but there are no known occurrences in the Service's reduced Action Area. Surveys for Michaux's Sumac were performed within the footprint of the proposed road in 2013 and 2017. No specimens were observed.

The Cape Fear Shiner only occurs within the Cape Fear River Basin. Given that the alignment of the Action occurs within the Neuse River Basin only, there will be no construction related or operational effects to the Cape Fear Shiner.

This concurrence concludes consultation/conference for the listed/proposed species named in this section, and these are not further addressed in this BO/CO. The circumstances described in the Reinitiation Notice of this BO that require reinitiating consultation for the Action, except for exceeding the amount or extent of incidental take, also apply to these species.

4. DWARF WEDGEMUSSEL

4.1. Status of Dwarf Wedgemussel

This section summarizes the best available data about the biology and current condition of the Dwarf Wedgemussel (DWM, *Alasmidonta heterodon*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list DWM as endangered on March 14, 1990 (55 FR 9447- 9451).

4.1.1. Description of DWM

The DWM is a small bivalve, rarely exceeding 45 mm in length. Clean young shells are usually greenish-brown with green rays. As it ages, the shell color becomes obscured by diatoms or mineral deposits and appears black or brown. The shell is thin but does thicken somewhat with age, especially toward the anterior end. The anterior end is rounded while the posterior end is angular forming a point near the posterio-ventral margin (USFWS 2017b).

4.1.2. Life History of DWM

The DWM occurs in small creeks to deep rivers in stable habitat with substrates ranging from mixed sand, pebble and gravel, to clay and silty sand. In the southern portion of its range, it is often found buried under logs or root mats in shallow water (USFWS 1993); whereas in the northern portion of its range, it may be found in firm substrates of mixed sand, gravel or cobble, or embedded in clay banks in water depths of a few inches to greater than 20 feet (Fichtel and Smith 1995, Gabriel 1995 and 1996, Nedeau and Werle 2003, Nedeau 2004a and 2004b, Nedeau 2006).

The DWM's reproductive cycle is typical of other freshwater mussels, requiring a host fish on which its larvae (glochidia) parasitize and metamorphose into juvenile mussels. The following species have been confirmed as host fish for the DWM: Tessellated Darter (*Etheostoma olmstedi*), Johnny Darter (*E. nigrum*), Fantail Darter (*E. flabellare*), Chainback Darter (*Percina nevisense*), Roanoke Darter (*P. roanoka*), Mottled Sculpin (*Cottus bairdi*), Slimy Sculpin (*C. cognatus*), Atlantic Salmon (*Salmo salar*), Pirate Perch (*Aphredoderus sayanus*), Redbreast Sunfish (*Lepomis auritus*), Green Sunfish (*L. cyanellus*), Bluegill (*L. macrochirus*), Bluehead Chub (*Nocomis leptocephalus*), Highfin Shiner (*Notropis altipinnis*), Swallowtail Shiner (*Notropis procne*), White Shiner (*Luxilus albeolus*), and Pinewoods Shiner (*Lythrurus matutinus*) (Michaelson and Neves 1995, White 2007, Levine *et al*. 2011). The DWM is not a long-lived

species as compared to other freshwater mussels; life expectancy is estimated at 10 to 12 years (Michaelson and Neves 1995).

4.1.3. Numbers, Reproduction, and Distribution of DWM

The DWM is found in Atlantic Coast drainage streams and rivers of various sizes and moderate current. It currently ranges from New Hampshire to North Carolina. Historically, the DWM range extended north to New Brunswick, Canada. North Carolina's Neuse River Basin tributaries have apparently always represented the southern end of the range of the species. The DWM has been documented in 16 major drainages (Table 4.1.3), comprising approximately 70 sites. However, at least 45 of these sites are based on less than five individuals or solely on relic shells (USFWS 2007, USFWS 2013).

Viable populations (i.e. containing a sufficient number of reproducing adults to maintain genetic variability and in which annual recruitment is adequate to sustain a stable population, USFWS 1993) in the northeastern United States include the Ashuelot River in New Hampshire and the Flat Brook in New Jersey. The Connecticut River in New Hampshire and Vermont, the Farmington River in Connecticut, Paulins Kill in New Jersey, and the Neversink River in New York may harbor viable populations, but more survey work is needed (USFWS 2013). Because of the qualitative survey methods used to assess the populations, it is not possible to estimate the number of individuals in these populations at this time. However, recent surveys indicate that DWM numbers may be declining at some locations in the Connecticut River and Ashuelot River (Biodrawversity LLC 2013, Biodrawversity LLC et al. 2014).

Although remaining populations from New Jersey south to North Carolina are much smaller, the Upper Tar River and Upper Fishing Creek in North Carolina are thought to harbor viable populations. Other populations in North Carolina, Virginia, and Maryland appear to be declining as evidenced by low densities, lack of reproduction, or inability to relocate any DWM in follow-up surveys (USFWS 2013). The DWM population in Swift Creek appears potentially viable (Three Oaks 2016) but with a high risk of local extirpation due to low population abundance and lack of dispersal (Smith et al. 2015).

Table 4.1.3 DWM major drainages.

State	Major Drainage*	County
NH	Upper Connecticut River	Coos, Grafton, Sullivan, Cheshire
VT	Upper Connecticut River	Essex, Orange, Windsor, Windham
MA	Middle Connecticut River	Hampshire, Hampden
CT	Lower Connecticut River	Hartford
NY	Housatonic River	Dutchess
NY	Middle Delaware	Orange, Sullivan, Delaware
NJ	Middle Delaware	Warren, Sussex
PA	Upper Delaware River	Wayne
MD	Choptank River	Queen Anne's, Caroline
MD	Lower Potomac River	St. Mary's, Charles
MD	Upper Chesapeake Bay	Queen Anne's

VA	Middle Potomac River	Stafford
VA	York River	Louisa, Spotsylvania
VA	Chowan River	Sussex, Nottoway, Lunenburg
NC	Upper Tar River	Granville, Vance, Franklin, Nash
NC	Upper Fishing Creek	Warren, Franklin, Nash, Halifax
NC	Upper Contentnea Creek	Wilson, Nash, Johnston
NC	Upper Neuse River (including Swift Creek)	Johnston, Wake, Orange

* The 16 major drainages identified in Table 4.1.3 do not necessarily correspond to the original drainages identified in the Recovery Plan (USFWS 1993), although there is considerable overlap.

4.1.4. Conservation Needs of and Threats to DWM

Human activity has significantly degraded DWM habitat causing a general decline in populations and a reduction in distribution of the species. Some factors responsible for the decline of the DWM include: 1) impoundment of river systems, 2) pollution, 3) alteration of riverbanks, 4) siltation, and 5) extreme weather events (e.g. floods and drought) (USFWS 1993, USFWS 2013).

Damming and channelization of rivers throughout the DWM's range have resulted in the elimination or alteration of much mussel habitat (Watters 2001). Domestic and industrial pollution was the primary cause for mussel extirpation at many historical sites. Mussels are known to be sensitive to a variety of heavy metals, inorganic salts, and ammonia (Wang et al. 2017). Mussel die-offs have been attributed to chemical spills, agricultural waste run-off, and low dissolved oxygen levels.

Because freshwater mussels are relatively sedentary and cannot move quickly or for long distances, they cannot easily escape when silt is deposited over their habitat. Siltation has been documented to be extremely detrimental to mussel populations by degrading substrate and water quality, increasing exposure to other pollutants, and by direct smothering of mussels (Ellis 1936, Marking and Bills 1980). In Massachusetts, a bridge construction project decimated a population of DWM by accelerated sedimentation and erosion (Smith 1981).

Extreme weather events like flooding and drought have had an impact on DWM. Surveys in 2006 indicated that the DWM population in the Neversink River (formerly one of the most robust populations of DWM) was adversely affected by flood events, and it remains to be seen if this population can rebound. Drought also appears to have adverse effects on DWM populations. This is evident in the upper Tar River watershed in North Carolina, where severe population declines followed a substantial drought in 2007 (USFWS 2013).

Most DWM populations are small and geographically isolated from each other. This isolation restricts exchange of genetic material among populations and reduces genetic variability within populations (USFWS 1993). Recent studies investigating the range-wide phylogeographic structure of DWM indicate that the low degree (or absence) of gene flow between and within drainages suggests that individual host fish do not move between drainages, nor do they exhibit effective movement (resulting in gene flow) within drainages (USFWS 2013).

4.2. Environmental Baseline for DWM

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the DWM, its habitat, and ecosystem within the Action Area. The environmental baseline is a "snapshot" of the species' condition in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

4.2.1. Action Area Numbers, Reproduction, and Distribution of DWM

The DWM was first discovered in Swift Creek in 1991. During DWM monitoring surveys required for the nearby Dempsey Benton Water Treatment Plant, a single DWM was observed within the Action Area in 2007 (The Catena Group 2008). Additionally, three individuals (one in 1996 and two in 1998) were found less than a mile downstream of the Action Area. No DWM were observed during surveys conducted on February 7, 2019 and March 25, 2019. Three Oaks (2019) estimates that 0-17 adult DWM occur within the Action Area, with the most likely number being 0-2 individuals. However, due to the low detection rate of DWM and the inherent nature of sampling methods, it is not possible to know the exact number of DWM within the Action Area.

4.2.2. Action Area Conservation Needs of and Threats to DWM

In order to reclassify the DWM to threatened status, the DWM Recovery Plan (USFWS 1993) requires a viable population be present in Swift Creek. Smith et al. (2015) concluded that the top three factors limiting the persistence of DWM in Swift Creek are:

1. Unsuitable physical habitat
2. Allee effect (high risk of demographic extirpation due to low population abundance and lack of dispersal)
3. Low water quality because of contaminants

Unsuitable physical habitat within the Action Area can arise from several sources including alterations in stream flow, channel instability, loss of riparian buffers, and degradation from all-terrain vehicle use within the channel (Three Oaks 2016). The Swift Creek Watershed has experienced rapid urbanization in recent years with an associated increase in impervious surface. The correlation of increasing urbanization within a watershed and decreasing water quality is well documented (Garie and McIntosh 1986, Crawford and Lenat 1989, Kemp and Spotila 1997, Paul and Meyer 2001). An increase in impervious surface leads to higher stormwater peak discharges which, in turn, lead to channel instability and scouring of the channel and banks. As erosion rates increase, sedimentation of DWM habitat increases. Increased impervious surface also leads to decreases in infiltration and base flow (groundwater flow), thus lowering water levels within streams. Periods of drought also contribute to lower water levels within Swift Creek. Stream gauge data on Swift Creek indicates that the stream has experienced periodic episodes of low flow throughout the period of record (Three Oaks 2016).

The DWM Viability Study (Three Oaks 2016) concluded that the mussel fauna of the Swift Creek Watershed is subject to multiple stressors which may threaten future viability. While further analysis of population and habitat trends would allow for a more definitive conclusion,

the results of this study point to a population that is vulnerable to extirpation. Changes in the watershed have happened in a relatively short period of time, and the overall mussel fauna appears to have declined in conjunction with these changes. However, through the Neuse 01 Regional Watershed Plan, the Swift Creek Watershed is being targeted for conservation/ mitigation efforts (NCDEQ 2016).

While it is apparent that habitat has been degraded in the Action Area, relatively stable areas with heterogeneous substrate still exist within Swift Creek. In general, the Swift Creek Watershed is a dynamic stream system where hydrogeomorphic changes have occurred. The channel dimensions and substrate composition in any given area have been adjusting to this change and will continue to do so until a dynamic equilibrium has been reached. As long as areas of suitable habitat continue to be present within the stream, and there are sufficient dispersal mechanisms to facilitate recruitment, the DWM has a realistic chance of persisting in the stream. (Three Oaks 2016).

The North Carolina DWM Work Group concluded that population augmentation through captive propagation is an essential component of management strategies to ensure DWM persistence in North Carolina (Smith et al. 2015). This is especially true with the population in Swift Creek where the Allee effect (high risk of demographic extirpation due to low population abundance and lack of dispersal) is one of the major limiting factors of population viability. Though a cooperative program between the NCWRC and NCSU is actively propagating some imperiled mussel species, the current capacity is insufficient to meet the needs. There is an ongoing commitment in developing a Swift Creek DWM population augmentation plan and acquiring the capacity or funds needed to implement this plan (Three Oaks 2016).

In summary, there is still some high-quality stream habitat present within or near the Action Area, yet there are also some water quality concerns. Despite an urbanizing watershed, the DWM still persists within Swift Creek at a low population level. There appears to have been a possible levelling off in the decline of DWM, and the population appears to have some level of recent recruitment. When considering this information, and with active management, it can be concluded that the DWM will likely persist into the future within the Swift Creek Watershed. Captive propagation and population augmentation, along with increased habitat protection, is vital to this future persistence.

4.3. Effects of the Action on DWM

This section analyzes the direct and indirect effects of the Action on the DWM, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur. Our analyses are organized according to the description of the Action in section 2 of this BO/CO.

4.3.1. Effects of Construction of Roadway and Stream Crossings on DWM

Swift Creek will be completely spanned by bridges with no permanent or temporary in-stream fill-related impacts. Some small tributaries to Swift Creek will also be crossed either by bridge or

culvert; however, all but one are too far upstream to produce detectable effects to DWM within Swift Creek. DWM are not known to occur within any of the small tributaries in the vicinity of the Action Area, and habitat within the tributaries is generally absent. Since the dual bridges over Swift Creek will not involve any permanent or temporary fill in the channel, there is no anticipated DWM habitat loss or disturbance associated with fill for this crossing.

The greatest construction related concern is prolonged erosion/sedimentation from the construction area in close proximity to Swift Creek. A major storm event could erode soil from within the disturbed area and wash it into the stream, causing harm to DWM by interfering with respiration, feeding, or spawning and otherwise degrading habitat for DWM and their host fish. However, to avoid or minimize the potential siltation effects, NCDOT has developed stringent erosion and sediment control measures (see Section 2.4) which greatly minimize sediment entering the stream. Assuming the proper installation and maintenance of these erosion control measures and full implementation of all conservation measures, the probability of effects from sedimentation leading to mortality is low. Except in the most extreme and rare circumstances, it is the Service's experience that the modern erosion control methods employed by NCDOT are effective at minimizing sediment entering a stream. Also, contractor compliance with sediment and erosion control measures in the Piedmont is high (NCDOT 2019), and NCDOT has measures in place to preclude grossly negligent contractors from future contracts (Benjamin Dewit, NCDOT Roadside Environmental Field Operations Engineer, personal email communication on August 26, 2019). However, given the small size and cryptic nature of DWM, any effects would be difficult to detect and measure. Although as many as 17 individuals potentially could be present, Three Oaks (2019) estimates that up to two individuals are likely present in the Action Area. Thus we estimate that up to two DWM may be harmed.

4.3.2. Effects of Operation of Roadway Facility on DWM

With the exception of Swift Creek, none of the other stream crossings occur within occupied DWM habitat. The presence of new roadway surface at or near Swift Creek could expose the DWM population to increased roadway runoff. The most common contaminants in highway runoff are heavy metals, inorganic salts, hydrocarbons, and suspended solids that accumulate on the road surface as a result of regular highway operation and maintenance activities (FHWA 2016). Mussels are known to be among the most sensitive forms of aquatic life to toxicity from some heavy metals and inorganic salts (Wang et al. 2017). However, NCDOT has committed to eliminating deck drainage directly into any waterbody within the Action Area and to maintain the local discharge to pre-construction conditions. These actions will reduce the potential for adverse effects to DWM (URS Corporation 2012).

Over time there is the potential for a traffic accident involving toxic chemicals to occur. Toxic chemical spills can be devastating to mussels (USFWS 2017a). It is not possible to accurately predict when or where toxic spills may occur. However, NCDOT has committed to constructing two hazardous spill basins adjacent to the Swift Creek crossing (see Section 2.4) to minimize the potential for adverse effects to DWM. In addition, in the event of a toxic spill that adversely affected the DWM population, NCDOT's funding for the captive propagation facility would help provide the potential for restocking of the population after clean up occurred.

4.3.3. Effects of Conservation Measures on DWM

While most of the conservation measures described in Section 2.4 are designed to minimize adverse effects to DWM, the captive propagation facility is a substantial and proactive measure that would not only partially offset adverse effects to the DWM within the Action Area, but would be a significant tool in furthering the recovery of the species.

Propagation Facility

Captive propagation of freshwater mussels is becoming an increasingly useful tool in the management and restoration of freshwater mussel populations, building upon recommendations to pursue augmentation and reintroduction as management strategies for these imperiled animals (National Native Mussel Conservation Committee 1998, Neves 2004). The Allee effect (high risk of demographic extirpation due to low population abundance and lack of dispersal) has been recognized as one of the major limiting factors of DWM population viability in the Swift Creek Watershed (Smith et al. 2015). If the Allee effect is causing unsustainable recruitment for the DWM, the release of propagated individuals to augment the existing population may increase viability given the apparent leveling off in population declines for DWM and other mussel species (Three Oaks 2016). Propagated DWM would be placed into suitable habitat where conditions would allow the likelihood of success.

Numerous imperiled freshwater mussel species have been successfully propagated and released into the wild for various projects in the United States (Virginia Tech News 2010, Kentucky Department of Fish and Wildlife Resources 2013, USFWS 2015, Clinch-Powell Clean Rivers Initiative 2016, USFWS 2019a,b,c). Several freshwater mussel species have been propagated (Eads et al. 2007, Levine et al. 2011, Levine 2012) and successfully released in North Carolina (NCWRC 2015, Tar River Land Conservancy 2015, Fraley et al. 2017, Hoch et al. 2017). To date there have not been any DWM population augmentation or reintroduction efforts using captive propagation in North Carolina, but the species has successfully been propagated, and the methodology is currently being refined at NCSU (Beck and Neves 2001, Levine et al. 2011).

As stated in the DWM Viability Report (Three Oaks 2016), the DWM Workgroup for North Carolina concluded that propagation/augmentation was the highest priority management action for the Swift Creek population. Also, the long-term maintenance of captive held “ark” populations is a vital conservation strategy for critically imperiled mussels (Rachael Hoch, Conservation Aquaculture Coordinator for NCWRC, Marion, NC. Personal email communication on December 28, 2017). Thus, in addition to augmenting the Swift Creek Watershed DWM population, developing the propagation facility will allow for the establishment of an “ark” population of the DWM for the Neuse River Basin, and ultimately for other North Carolina streams in the species range, to maintain the genetic stock.

Although a mussel propagation facility currently exists in western North Carolina, there is no eastern North Carolina analogue. Due to limitations in capacity, and given the distance from DWM habitats, the mussel propagation facility in western North Carolina is unable to meet the needs for propagation of DWM and other eastern North Carolina mussels. Therefore, the beneficial effect of NCDOT’s commitment to fund the propagation facility fulfills an urgent need in the conservation and recovery of DWM in the Swift Creek Watershed and beyond.

Potential Mussel Relocation

NCDOT has committed to conduct a preconstruction survey (just prior to construction) at the Swift Creek crossing and remove mussels from a defined area (where they could potentially be affected by sedimentation). The removed mussels would then either be relocated to appropriate habitat within Swift Creek or taken into captivity to use as brood stock for propagation. The extent of this survey and potential relocation has yet to be determined, but will be limited to the reach of stream that is deemed most susceptible to the potential for sedimentation effects. Based on past survey history, the probability of encountering DWM within such a survey is low. However, if DWM are collected, the relocation or taking into captivity would qualify as harassment to the species.

Litigation Settlement

A settlement reached by NCDOT and plaintiffs that ends a federal lawsuit against the Service contains several land acquisition, stream protection, and other mitigation measures as well as research projects which may benefit the DWM and other listed mussels. However, these measures will not increase or reduce the Action's take of the species. Since the details of these measures have yet to be developed, they are not part of our analysis of the effects.

4.3.4. Effects of Interrelated and Interdependent Actions on DWM

At this time, the locations of potential borrow/waste sites, staging areas, equipment storage areas, and refueling areas have not been selected. Activities at these locations have the potential to adversely affect DWM through sedimentation/erosion and introduction of toxic compounds into streams within the Swift Creek Watershed. As discussed in Section 2.5, NCDOT will strongly discourage the contractor from choosing borrow/waste site locations, staging areas, equipment storage areas, and refueling areas within 0.25 mile of Swift Creek. However, if the contractor opts to pursue borrow or waste sites in these locations, the NCDOT Division Environmental Officer will coordinate with the Service during the approval process of any borrow or waste sites. In addition, NCDOT standard guidance for borrow/fill sites provide another layer of environmental protection for waterbodies. These sites will also be reviewed through interagency meetings. Staging areas are required to be identified by the contractor and reviewed by NCDOT, the Service, and other regulatory agencies. Therefore, adverse effects to DWM from the use of borrow/waste sites, staging areas, equipment storage areas, and refueling areas are extremely unlikely to occur (discountable).

4.4. Cumulative Effects on DWM

For purposes of consultation under ESA §7, cumulative effects are those caused by future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

Although the Quantitative Indirect and Cumulative Effects (ICE) Report (Michael Baker Engineering 2017a,b,c,d) developed for the much broader FLUSA addressed future development as a cumulative effect, the analysis was performed utilizing the NEPA definition for cumulative

impacts (40 CFR § 1508.7) and not the ESA definition for cumulative effects. Furthermore, the ICE Report does not list specific future development projects and does not differentiate between future projects with a federal nexus and those with no federal nexus. Presumably, most such development projects would have a federal nexus via a requirement for a Section 404 Clean Water Act permit. For reasons described in Section 2.1, the Service is not using the FLUSA as the Action Area, and thus our consideration of potential cumulative effects is narrowed to a smaller area where potential effects would be more definable and measurable and are reasonably certain to occur. Accordingly, we are not aware of any non-federal actions in the Action Area that may affect DWM. Therefore, there are no cumulative effects relevant to formulating our opinion for the Action.

4.5. Conclusion for DWM

In this section, we summarize and interpret the findings of the previous sections for the DWM (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

Viable and relatively larger populations of DWM occur in portions of the northeastern United States. Other populations from New Jersey south to North Carolina are smaller and appear to be declining. The DWM Recovery Plan (USFWS 1993) requires a viable population be present in Swift Creek in order for the species to be reclassified to threatened status.

Smith et al. (2015) concluded that the top three factors limiting the persistence of DWM in Swift Creek are 1) unsuitable physical habitat, 2) Allee effect (high risk of demographic extirpation due to low population abundance and lack of dispersal), and 3) low water quality from contaminants. The DWM Viability Study (Three Oaks 2016) concluded that there are several stressors to DWM in the Swift Creek Watershed, directly and indirectly related to urbanization of the watershed. While the DWM population has declined since urbanization began, the decline appears to have possibly leveled off, and there is evidence of recruitment of DWM within the past few years.

Three Oaks (2019) estimates that 0-17 DWM occur in Swift Creek within the Action Area, with the most likely number being 0-2 individuals. Swift Creek will be completely spanned by bridges with no permanent or temporary in-stream fill-related impacts. While there is potential for construction related erosion/siltation effects on DWM, NCDOT has developed stringent erosion and sediment control measures which greatly minimize sediment entering the stream. Assuming the proper installation and maintenance of these erosion control measures, the probability of effects from siltation leading to mortality is low. These potential effects are not expected to have a meaningful impact on DWM reproduction, numbers, or distribution within its overall range or

within the Action Area. Therefore, these direct effects will not reduce appreciably the likelihood of the survival and recovery of the DWM.

The DWM Viability Study (Three Oaks 2016) and the North Carolina DWM Work Group concluded that aggressive management, particularly through captive propagation and the ability to augment the existing population in the future, is considered to be the best practice to improve the viability of the DWM population in the Swift Creek Watershed. Therefore, the commitment of NCDOT to fund the propagation facility fulfills an urgent need in the conservation and recovery of DWM in the Action Area and beyond.

After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service's biological opinion that the Action is not likely to jeopardize the continued existence of the DWM.

5. YELLOW LANCE

5.1. Status of Yellow Lance

This section summarizes the best available data about the biology and current condition of Yellow Lance (YL, *Elliptio lanceolata*) throughout its range that are relevant to formulating an opinion about the Action. The Service published its decision to list YL as threatened on April 3, 2018 (83 FR 14189-14198). The Service also recently completed a Species Status Assessment Report for the YL (USFWS 2017c), and much of the information contained in that document is incorporated by reference into this BO/CO.

5.1.1. Description of YL

The YL is a bright yellow mussel with a shell more than twice as long as it is tall, usually not more than 86 mm (3.4 inches) in length. Its shell is composed of two hinged valves which are joined by a ligament. The outermost layer of the shell has a waxy appearance with brownish ridges known as "growth rests" that formed during an intermediate stage of growth when the ridge area was the edge of the shell. The lustrous inner layer is usually an iridescent blue color, and sometimes has white or salmon color on the shorter end of the shell from where the foot extends (the anterior). The longer end of the shell from where the siphons extend (the posterior) is distinctly rounded. YL has interlocking hinge "teeth" on the inside of the shell to help keep the two valves in proper alignment (USFWS 2019d)

5.1.2. Life History of YL

The YL is a sand-associated species often found buried deep in clean, coarse to medium sand, although it can sometimes be found in gravel substrates. The YL often are moved with shifting sand and eventually settle in sand at the downstream end of stable sand and gravel bars. This species depends on clean, moderate flowing water with high dissolved oxygen and is found in medium-sized rivers to smaller streams.

The life cycle of the YL, like most freshwater mussels, is complex, relying on host fish for successful reproduction. Their eggs develop into microscopic larvae (glochidia) within the gills of the female mussel. The female expels glochidia into the water where they must attach to gills or fins of a fish to continue developing. Each mussel species has specific host fish species that are needed by the glochidia to keep growing and transform into juveniles. After a few weeks, they drop off and settle on the river bottom where they grow into adults.

Like many freshwater mussels, the YL grows rapidly during the first few years of life and slows down with age. In the laboratory, the YL reaches sexual maturity around three years old. Once the YL reaches maturity, the females release stringy clumps of glochidia in mucous. The clumps are likely eaten by minnows so the glochidia can attach to the minnow's gills and fin scales. At least two species of minnow are confirmed to host YL development in a laboratory setting, the White Shiner (*Luxilus albeolus*) and Pinewoods Shiner (*Lythrurus matuntinus*). Biologists have developed ways to propagate YL under controlled laboratory conditions.

Like other freshwater mussels, YL are suspension feeders that eat algae and other tiny particles, such as leaf debris, that they filter out of the water. Juveniles likely pedal-feed in the sediment, whereas adults filter-feed from the water column. For more detailed information on the life history of YL, see USFWS (2017c).

5.1.3. Numbers, Reproduction, and Distribution of YL

The YL has a historical range from the Patuxent River Basin in Maryland to the Neuse River Basin in North Carolina. For the current range, the YL Species Status Assessment Report (USFWS 2017c) delineates populations by using the eight river basins that YL has historically occupied. This includes the Patuxent, Potomac, Rappahannock, York, James, Chowan, Tar, and Neuse River basins in Maryland, Virginia, and North Carolina. Because the river basin level is at a very coarse scale, populations were further delineated using management units (MUs). MUs were defined as one or more HUC10 watersheds that species experts identified as most appropriate for assessing population-level resiliency. Of eight historical populations, six are known to have had a YL occurrence in the last 12 years, though the majority of those occurrences were limited to a single location within the river basin.

Patuxent River Basin in Maryland – This population contains one MU, the Patuxent MU. Five YL were collected prior to 1965, one individual was collected in 2015, and one relic shell was collected in 2016. In 2018, 23 individuals were found over 6+ kilometers of the Hawlings River.

Potomac River Basin in Maryland/Virginia – This population contains one MU, the Potomac MU. One specimen has been documented from a pre-1970 survey.

Rappahannock River Basin in Virginia – This population contains one MU, the Rappahannock River Subbasin MU. Many surveys have documented the presence of YL in this MU, with an occasional observation of upwards of 50 individuals. The species was first seen in the late 1980s, and it has been observed most recently in 2011 in the Rappahannock River, although very few (3) individuals were seen during that survey.

York River Basin in Virginia – This population contains one MU, the York MU. Several surveys document the presence of YL in this MU – presumably first seen in 1973, and as recent as 2007 in the South Anna River, although only one individual was observed during that survey.

James River Basin in Virginia – This population contains one MU, the Johns Creek MU. YL was first seen in this MU in 1984, and last observed in 2004, where one effort observed 31 individuals. YL is assumed to still be present despite the lack of recent occurrences.

Chowan River Basin in Virginia – This population contains two MUs, the Nottoway River Subbasin MU and the Meherrin River MU. Several surveys in the Nottoway River Subbasin have noted the presence of YL (one with as many as 781 individuals, although the identity of some specimens is in question). The species has been seen as recently as 2011 in the Nottoway River, albeit in extremely low (5) numbers.

Tar River Basin in North Carolina – This population contains four MUs; the Upper/Middle Tar River MU, the Lower Tar River MU, the Sandy-Swift Creek MU, and the Fishing Creek Subbasin MU. Many survey efforts have documented the presence of YL over the years; the species was first seen in 1966 in the Tar River, and it has been documented as recently as 2017 in Shocco Creek (RK&K 2017). Surveys in the mainstem Tar in 1990 documented upwards of 100 live individuals; most other surveys have documented between 25 and 31 individuals, and the most seen in recent (2014) surveys has been 25 live individuals. Similarly, in the late 1980s and early 1990s, Swift Creek surveys documented hundreds (342 in one instance) of shells, and recent surveys in 2015 and 2016 documented 53 and 45 live individuals, respectively.

Neuse River Basin in North Carolina – This population contains one MU, the Middle Neuse Tributaries MU. The YL was first seen in 1991, and most recently one individual was seen in 2015. Most surveys report very low numbers observed (usually only one live individual or just shell material), although one effort in 1994 (Swift Creek) documented 18 live individuals. There have been recent (2014-2016) intensive surveys in the Swift Creek watershed, and only one YL has been observed.

For more detailed information regarding the current condition of YL populations across its range, see USFWS (2017c).

5.1.4. Conservation Needs of and Threats to YL

The conservation needs of and threats to YL are very similar to those of the DWM described in Section 4.1.4. However, for additional detailed information, see USFWS (2017c).

5.2. Environmental Baseline for YL

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the YL, its habitat, and ecosystem within the Action Area. The environmental baseline is a "snapshot" of the species' health in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

5.2.1. Action Area Numbers, Reproduction, and Distribution of YL

The YL was first discovered in Swift Creek in 1991. One individual was found in the Action Area in 1998. Additionally, four individuals (three in 1998 and one in 2011) were found less than a mile downstream of the Action Area. Surveys conducted on February 7, 2019 and March 25, 2019 failed to find the species. Also, habitat for the species in these most recent surveys was found to be less than optimal. Three Oaks (2019) estimates that 0-1 adult YL occur within the Action Area. Due to the inherent nature of sampling methods, it is not possible to know the exact number of YL within the Action Area.

5.2.2. Action Area Conservation Needs of and Threats to YL

The Action Area conservation needs of and threats to the YL are similar to those of the DWM described in Section 4.2.2.

5.3. Effects of the Action on YL

This section analyzes the direct and indirect effects of the Action on the YL, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur. Our analyses are organized according to the description of the Action in section 2 of this BO/CO.

5.3.1. Effects of Construction of Roadway and Stream Crossings on YL

The construction related effects of the Action on YL in Swift Creek are very similar to those of the DWM described in Section 4.3.1. Three Oaks (2019) estimates that up to one YL is likely present in the Action Area. Thus we estimate that up to one YL may be harmed.

5.3.2. Effects of Operation of Roadway Facility on YL

The effects of the operation of the roadway facility on YL are very similar to those of the DWM described in Section 4.3.2.

5.3.3. Effects of Conservation Measures on YL

The effects of the conservations measures on YL are very similar to those of the DWM described in Section 4.3.3.

5.3.4. Effects of Interrelated and Interdependent Actions on YL

The effects of interrelated and interdependent actions on YL are very similar to those of the DWM described in Section 4.3.4.

5.4. Cumulative Effects on YL

For purposes of consultation under ESA §7, cumulative effects are those caused by future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

The cumulative effects on YL are the same as those of the DWM described in Section 4.4.

5.5. Conclusion for YL

In this section, we summarize and interpret the findings of the previous sections for the YL (status, baseline, effects, and cumulative effects) relative to the purpose of a BO under §7(a)(2) of the ESA, which is to determine whether a federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

Of eight historical populations of YL occurring in Maryland, Virginia, and North Carolina, six are known to have had records in the last 12 years (USFWS 2017c). Although the catch per unit effort has declined since the 1990s, the YL is thought to still be present in the Swift Creek Watershed in very low numbers (Three Oaks 2016). Three Oaks (2019) estimates that 0-1 YL occur within the Action Area. The conclusion for YL is otherwise very similar to that of the DWM described in Section 4.5. After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service's biological opinion that the Action is not likely to jeopardize the continued existence of the YL.

6. ATLANTIC PIGTOE

6.1. Status of Atlantic Pigtoe

This section summarizes best available data about the biology and current condition of Atlantic Pigtoe (AP, *Fusconaia masoni*) throughout its range that are relevant to formulating an opinion about the Action. The Service published a proposed rule to list AP as threatened on October 11, 2018 (83 FR 51570-51609). The Service also recently completed a Species Status Assessment Report for the AP (USFWS 2017d), and much of the information contained in that document is incorporated by reference into this CO.

6.1.1. Description of AP

The AP is a freshwater mussel with a chunky, rhombus shaped shell, similar in appearance to a pig's hoof/toe. There is a distinct posterior ridge. The outer surface of the shell is yellow to dark

brown and parchment-like, while the inner layer is iridescent blue to salmon, white, or orange. Although larger specimens exist, the AP rarely exceeds two inches in length. Young individuals may have greenish rays across the entire shell surface. When collected fresh, the interior surface (nacre) in the shell tends to be salmon colored and sometimes iridescent. AP has interlocking hinge "teeth" on the inside of the shell to help keep the two valves in proper alignment (USFWS 2019e).

6.1.2. Life History of AP

The preferred habitat of the AP is coarse sand and gravel, and rarely in silt and detritus. Historically, the best populations existed in small creeks to larger rivers with excellent water quality, where flows were sufficient to maintain clean, silt-free substrates.

The life cycle of the AP, like most freshwater mussels, is complex, relying on host fish for successful reproduction. Male AP release their sperm into the water column where it is siphoned in by the females. Once fertilization has taken place in the gills of the female mussel, mature microscopic glochidia (larva) are released where they must attach themselves to the gills and/or fins of fish hosts to continue developing. AP are tachytictic (short term) breeders that usually release their larvae by July or August (USFWS 2019e).

AP have specific host fish that are needed by the glochidia to keep growing to ultimately transform into juveniles. After a few weeks of living as parasites, they drop off and settle on the stream bottom where they grow into adults. Host fish for the AP include the Rosefin Shiner (*Lythrurus ardens*), Creek Chub (*Semotilus atromaculatus*), Longnose Dace (*Rhynichthys cataractae*), White Shiner (*Luxilus albeolus*), Satinfin Shiner (*Cyprinella analostana*), Bluehead Chub (*Nocomis leptocephalus*), Rosyside Dace (*Clinostomus funduloides*), Pinewoods Shiner (*Lythrurus matutinus*), Swallowtail Shiner (*Notropis procne*), and Mountain Redbelly Dace (*Chrosomus oreas*). The time period for glochidia to develop varies between 30 to-60 days and depends on the host fish (USFWS 2019e).

Like all freshwater mussels, AP are known as suspension feeders because they eat algae, bacteria, and other microscopic matter they filter out of the water. Juveniles likely pedal-feed in the sediment, whereas adults filter-feed from the water column (USFWS 2019e).

6.1.3. Numbers, Reproduction, and Distribution of AP

The AP's historical range included all major river basins in the Atlantic coastal drainages from the James River Basin in Virginia south to the Altamaha River Basin in Georgia. The AP has been documented from multiple physiographic provinces, from the foothills of the Appalachian Mountains through the Piedmont and into the Coastal Plain, in streams ranging in size from < 1 meter wide up to some of the largest Atlantic Slope rivers within the species' range.

For the current range, the AP Species Status Assessment Report (USFWS 2017d) delineates populations using the 12 river basins that AP has historically occupied. This includes the James, Chowan, Roanoke, Tar, Neuse, Cape Fear, Pee Dee, Catawba, Edisto, Savannah, Ogeechee, and Altamaha River basins. Of 12 historical populations, seven populations within Virginia and

North Carolina have observations in the last 12 years, though the majority of occurrences were limited to a single location within the river basin. The AP is presumed extirpated from the southern portion of the range in South Carolina and Georgia. Most of the remaining populations are small and fragmented, only occupying a fraction of reaches that were historically occupied. This decrease in abundance and distribution has resulted in largely isolated contemporary populations.

Because the river basin level is at a very coarse scale, the seven extant populations were further delineated using management units (MUs). MUs were defined as one or more HUC10 watersheds that species experts identified as most appropriate for assessing population-level resiliency. For more detailed information regarding the status of each population and MU, see pages 13-26 and Table 3-2 of the AP Species Status Assessment Report (USFWS 2017d).

6.1.4. Conservation Needs of and Threats to AP

The conservation needs of and threats to AP are very similar to those of the DWM described in Section 4.1.4. However, for additional detailed information, see USFWS (2017d).

6.2. Environmental Baseline for AP

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the AP, its habitat, and ecosystem within the Action Area. The environmental baseline is a "snapshot" of the species' health in the Action Area at the time of the consultation, and does not include the effects of the Action under review.

6.2.1. Action Area Numbers, Reproduction, and Distribution of AP

The AP was first discovered in Swift Creek in 1991. Nine individuals were found between 2007 and 2010 in Swift Creek within the Action Area. Additionally, nine individuals (four in 1998, one in 2010 and four in 2011) were found less than 1.0 mile downstream of the Action Area, and one AP was found less than 1.0 mile upstream of the Action Area in 1998 (NCWRC Unpublished Aquatics Species Database). More recently, four individual AP were observed during surveys on February 7 and March 25, 2019. One of the individuals found on February 7, and then again on March 25, was originally found and tagged on August 8, 2010. Three Oaks (2019) estimates that 4-25 adult AP occur within the Action Area, with the most likely number being 4-12 individuals. Due to the inherent nature of sampling methods, it is not possible to know the exact number of AP within the Action Area.

6.2.2. Action Area Conservation Needs of and Threats to AP

The Action Area conservation needs of and threats to the AP are very similar to those of the DWM described in Section 4.2.2.

6.3. Effects of the Action on AP

This section analyzes the direct and indirect effects of the Action on the AP, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur. Our analyses are organized according to the description of the Action in Section 2 of this BO/CO.

6.3.1. Effects of Construction of Roadway and Stream Crossings on AP

The construction related effects of the Action on AP in Swift Creek are very similar to those of the DWM described in Section 4.3.1. Although as many as 25 individuals could be present, Three Oaks (2019) estimates that up to 12 individuals are likely present in the Action Area. Thus we estimate that up to 12 AP may be harmed.

6.3.2. Effects of Operation of Roadway Facility on AP

The effects of the operation of the roadway facility on AP are very similar to those of the DWM described in Section 4.3.2.

6.3.3. Effects of Conservation Measures on AP

The effects of the conservations measures on AP are very similar to those of the DWM described in Section 4.3.3.

6.3.4. Effects of Interrelated and Interdependent Actions on AP

The effects of interrelated and interdependent actions on AP are very similar to those of the DWM described in Section 4.3.4.

6.4. Cumulative Effects on AP

For purposes of consultation under ESA §7, cumulative effects are those caused by future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation under §7 of the ESA.

The cumulative effects on AP are the same as those of the DWM described in Section 4.4.

6.5. Conclusion for AP

In this section, we summarize and interpret the findings of the previous sections for the AP (status, baseline, effects, and cumulative effects) relative to the purpose of a CO under §7(a)(2) of the ESA, which is to determine whether a federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or
b) result in the destruction or adverse modification of designated critical habitat.

"Jeopardize the continued existence" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

Of 12 historical AP populations, seven populations within Virginia and North Carolina have observations in the last 12 years. AP are still observed in Swift Creek, with observations within the Action Area as recent as 2019. The conclusion for AP is otherwise very similar to that of the DWM described in Section 4.5. After reviewing the current status of the species, the environmental baseline for the Action Area, the effects of the Action and the cumulative effects, it is the Service's biological opinion that the Action is not likely to jeopardize the continued existence of the AP.

7. PROPOSED ATLANTIC PIGTOE CRITICAL HABITAT

7.1. Status of Atlantic Pigtoe Proposed Critical Habitat

This section summarizes best available data about the current condition of all proposed units of critical habitat for Atlantic Pigtoe (AP, *Fusconaia masoni*) that are relevant to formulating an opinion about the Action. The Service published its proposed rule to designate critical habitat for AP on October 11, 2018 (83 FR 51570-51609).

7.1.1. Description of AP Proposed Critical Habitat

Proposed critical habitat for AP is comprised of approximately 542 river miles in 16 units. All of the units are currently occupied by the species and contain all of the physical and biological features (PBFs) essential to the conservation of the species. See Table 3 of 83 FR 51570-51609 for more detailed information on individual units.

The proposed critical habitat provides the following PBFs essential to the conservation of the AP (83 FR 51570-51609).

1. Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (*i.e.,* channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffle-run-pool habitats that provide flow refuges consisting of silt-free gravel and coarse sand substrates).

2. Adequate flows, or a hydrologic flow regime (which includes the severity, frequency, duration, and seasonality of discharge over time), necessary to maintain benthic habitats where the species is found and to maintain connectivity of streams with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish hosts' habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

3. Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.

4. The presence and abundance of fish hosts necessary for recruitment of the AP.

7.1.2. Conservation Value of AP Proposed Critical Habitat

The current distribution of the AP is much reduced from its historical distribution. We anticipate that recovery will require continued protection of existing populations and habitat, as well as ensure there are adequate numbers of mussels in stable populations and that these populations occur over a wide geographic area. This strategy will help to ensure that catastrophic events, such as the effects of hurricanes (e.g. flooding that causes excessive sedimentation, nutrients, and debris to disrupt stream ecology), cannot simultaneously affect all known populations. Rangewide recovery considerations, such as maintaining existing genetic diversity and striving for representation of all major portions of the species' current range, were considered in formulating this proposed critical habitat. All of the units are currently occupied by the species and contain all of the PBFs essential to the conservation of the species (83 FR 51570-51609).

7.1.3. Conservation Needs for AP Proposed Critical Habitat

The features essential to the conservation of the AP may require special management considerations or protections to reduce the following threats: (1) urbanization of the landscape, including land conversion for urban and commercial use, infrastructure (roads, bridges, utilities), and urban water uses (water supply reservoirs, wastewater treatment, etc.); (2) nutrient pollution from agricultural activities that impact water quantity and quality; (3) significant alteration of water quality; (4) improper forest management or silviculture activities that remove large areas of forested wetlands and riparian systems; (5) culvert and pipe installation that creates barriers to movement; (6) impacts from invasive species; (7) changes and shifts in seasonal precipitation patterns as a result of climate change; and (8) other watershed and floodplain disturbances that release sediments or nutrients into the water. Management activities that could ameliorate these threats include: use of best management practices designed to reduce sedimentation, erosion, and bank side destruction; protection of riparian corridors and leaving sufficient canopy cover along banks; moderation of surface and ground water withdrawals to maintain natural flow regimes; increased use of stormwater management and reduction of stormwater flows into the systems; and reduction of other watershed and floodplain disturbances that release sediments, pollutants, or nutrients into the water (83 FR 51570-51609).

7.2. Environmental Baseline for AP Proposed Critical Habitat

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of proposed critical habitat for AP within the Action Area. The environmental baseline is a "snapshot" of the condition of the PBFs that are essential to the conservation of the species within proposed critical habitat of the Action Area at the time of the conference, and does not include the effects of the Action under review.

7.2.1. Action Area Conservation Value of AP Proposed Critical Habitat

Of the total 542 river miles of critical habitat proposed for the AP, 0.42 mile occurs within the Action Area (or about 0.08%). Proposed critical habitat within the Action Area falls within Unit 13. This unit contains all four PBFs essential to the conservation of the AP.

7.2.2. Action Area Conservation Needs for AP Proposed Critical Habitat

See page 51585 of 83 FR 51570-51609 for the conservation needs of Unit 13 of proposed critical habitat.

7.3. Effects of the Action on AP Proposed Critical Habitat

This section analyzes the direct and indirect effects of the Action on proposed critical habitat for AP, which includes the direct and indirect effects of interrelated and interdependent actions. Direct effects are caused by the Action and occur at the same time and place. Indirect effects are caused by the Action, but are later in time and reasonably certain to occur. Our analyses are organized according to the description of the Action in section 2 of this BO/CO.

7.3.1. Effects of Construction of Roadway and Stream Crossings on AP Proposed Critical Habitat

There is potential for erosion/sedimentation from the construction area in close proximity to Swift Creek. A major storm event could erode soil from within the disturbed area and wash it into the stream, potentially affecting PBF 1 (depositing silt on substrates), PBF 3 (degrading water and sediment quality), and PBF 4 (excluding fish hosts). However, to avoid or minimize such effects, NCDOT has developed stringent erosion and sediment control measures (see Section 2.4) which greatly minimize sediment entering the stream. Assuming the proper installation and maintenance of these erosion control measures and full implementation of all conservation measures, the probability of adverse effects to proposed critical habitat is low. Except in the most extreme and rare circumstances, it is the Service's experience that the modern erosion control methods employed by NCDOT are effective at minimizing sediment entering a stream. The effects of any residual sedimentation not intercepted by erosion control measures would likely be minor and temporary in nature.

7.3.2. Effects of Operation of Roadway Facility on AP Proposed Critical Habitat

The presence of new roadway surface at or near Swift Creek could expose proposed critical habitat to increased roadway runoff. The most common contaminants in highway runoff are heavy metals, inorganic salts, hydrocarbons, and suspended solids that accumulate on the road surface as a result of regular highway operation and maintenance activities (FHWA 2016). These contaminants could affect PBF 3 (degrading water and sediment quality) and PBF 4 (harming fish hosts). However, NCDOT has committed to eliminating deck drainage directly into any waterbody within the Action Area and to maintain the local discharge to pre-construction conditions. These actions will reduce the potential for adverse effects to proposed critical habitat.

Over time there is the potential for a traffic accident involving toxic chemicals to occur which could also similarly affect PBF 3 and PBF 4. It is not possible to accurately predict when or where toxic spills may occur. However, NCDOT has committed to constructing two hazardous spill basins adjacent to the Swift Creek crossing (see Section 2.4) to minimize the potential for adverse effects.

7.3.3. Effects of Conservation Measures on AP Proposed Critical Habitat

Most of the conservation measures described in Section 2.4 are designed to minimize adverse effects to proposed AP critical habitat.

7.3.4. Effects of Interrelated and Interdependent Actions on AP Proposed Critical Habitat

At this time, the locations of potential borrow/waste sites, staging areas, equipment storage areas, and refueling areas have not been selected. Activities at these locations have the potential to adversely affect proposed critical habitat by erosion/sedimentation and introduction of toxic compounds into Swift Creek. As discussed in Section 2.5, NCDOT will strongly discourage the contractor from choosing borrow/waste site locations, staging areas, equipment storage areas, and refueling areas within 0.25 mile of Swift Creek. However, if the contractor opts to pursue borrow or waste sites in these locations, the NCDOT Division Environmental Officer will coordinate with the Service during the approval process of any borrow or waste sites. In addition, NCDOT standard guidance for borrow/fill sites provide another layer of environmental protection for waterbodies. These sites will also be reviewed through interagency meetings. Staging areas are required to be identified by the contractor and reviewed by NCDOT, the Service, and other regulatory agencies. Therefore, adverse effects to proposed critical habitat from the use of borrow/waste sites, staging areas, equipment storage areas, and refueling areas are extremely unlikely to occur (discountable).

7.4. Cumulative Effects on AP Proposed Critical Habitat

For purposes of consultation/conference under ESA §7, cumulative effects are those caused by future state, tribal, local, or private actions that are reasonably certain to occur in the Action Area. Future federal actions that are unrelated to the proposed action are not considered, because they require separate consultation/conference under §7 of the ESA.

We are not aware of any non-federal actions in the Action Area that may affect proposed AP critical habitat. Therefore, cumulative effects are not relevant to formulating our opinion for the Action.

7.5. Conclusion for AP Proposed Critical Habitat

In this section, we summarize and interpret the findings of the previous sections for AP proposed critical habitat (status, baseline, effects, and cumulative effects) relative to the purpose of a CO under §7(a)(2) of the ESA, which is to determine whether a federal action is likely to:

a) jeopardize the continued existence of species listed as endangered or threatened; or

b) result in the destruction or adverse modification of designated critical habitat.

"*Destruction or adverse modification*" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat as a whole for the conservation of a listed species (50 CFR §402.02).

Of the total 542 river miles of proposed critical habitat for the AP, 0.42 mile (0.08%) occurs within the Action Area. Some adverse effects to proposed critical habitat may occur from the input of sediment into Swift Creek, thus potentially affecting PBF numbers 1, 3, and 4. However, implementation of conservation measures as part of the Action will greatly minimize these effects. All such effects are expected to minor and temporary, and thus will not appreciably diminish the value of the PBFs.

After reviewing the current status of the proposed critical habitat, the environmental baseline for the Action Area, the effects of the Action, and the cumulative effects, it is the Service's conference opinion that the Action is not likely to destroy or adversely modify proposed critical habitat for AP.

8. INCIDENTAL TAKE STATEMENT

ESA §9(a)(1) and regulations issued under §4(d) prohibit the take of endangered and threatened fish and wildlife species without special exemption. The term "take" in the ESA means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (ESA §3). In regulations at 50 CFR §17.3, the Service further defines:

- "harass" as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering;"
- "harm" as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering;" and
- "incidental take" as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity."

Under the terms of ESA §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited, provided that such taking is in compliance with the terms and conditions of an incidental take statement (ITS).

The Action considered in this BO/CO includes a conservation measure to potentially collect and then either relocate or take into captivity for propagation efforts listed/proposed mussels in the vicinity of the crossing of Swift Creek as described in Section 2.4. Through this statement, the Service authorizes this conservation measure as an exception to the prohibitions against trapping, capturing, or collecting listed species. This conservation measure is referenced in a Reasonable and Prudent Measure below, and we provide Terms and Conditions for its implementation.

For the exemption in ESA §7(o)(2) to apply to the Action considered in this BO/CO, the FHWA must undertake the non-discretionary measures described in this ITS, and these measures must

become binding conditions of any permit, contract, or grant issued for implementing the Action. The FHWA has a continuing duty to regulate the activity covered by this ITS. The protective coverage of §7(o)(2) may lapse if the FHWA fails to:

- assume and implement the terms and conditions; or
- require a permittee, contractor, or grantee to adhere to the terms and conditions of the ITS through enforceable terms that are added to the permit, contract, or grant document.

In order to monitor the impact of incidental take, the FHWA must report the progress of the Action and its impact on the species to the Service as specified in this ITS.

8.1. Amount or Extent of Take

This section specifies the amount or extent of take of listed wildlife species that the Action is reasonably certain to cause, which we estimated in the "Effects of the Action" section(s) of this BO/CO.

8.1.1. DWM

The Service anticipates that the Action is reasonably certain to cause incidental take of individual DWM consistent with the definition of harm resulting from the construction of the roadway and stream crossings (see Sections 4.3.1). However, we believe that incidental take for this species is difficult to determine. Incidental take that occurs due to sub-lethal levels of siltation or water quality degradation which temporarily disrupt movement, breeding, feeding, or sheltering of adult and juvenile DWM or larval glochidia are likely not detectable or measurable. Incidental take that occurs as harm resulting in injury or death from larger amounts of siltation or water quality degradation would also be difficult to determine. Actual habitat degradation may be detectable, but knowing whether a specific degradation actually affected the species would be difficult to determine. Spent shells may be collected, but attributing the cause of mortality would be very difficult. Since Three Oaks (2019) estimates that the most likely number of adult DWM occurring in the Action Area is 0-2 individuals, we estimate that up to two adult DWM will incur incidental take.

8.1.2. YL

The Service anticipates that the Action is reasonably certain to cause incidental take of individual YL consistent with the definition of harm resulting from the construction of the roadway and stream crossings (see Sections 5.3.1). However, we believe that incidental take for this species is difficult to determine. Incidental take that occurs due to sub-lethal levels of siltation or water quality degradation which temporarily disrupt movement, breeding, feeding, or sheltering of adult and juvenile YL or larval glochidia are likely not detectable or measurable. Incidental take that occurs as harm resulting in injury or death from larger amounts of siltation or water quality degradation would also be difficult to determine. Actual habitat degradation may be detectable, but knowing whether a specific degradation actually affected the species would be difficult to determine. Spent shells may be collected, but attributing the cause of mortality would be very difficult. Since Three Oaks (2019) estimates that the most likely number of adult YL occurring in the Action Area is 0-1 individuals, we estimate that up to one adult YL will incur incidental take.

8.1.3. AP

The Service anticipates that the Action is reasonably certain to cause incidental take of individual AP consistent with the definition of harm resulting from the construction of the roadway and stream crossings (see Sections 6.3.1). However, we believe that incidental take for this species is difficult to determine. Incidental take that occurs due to sub-lethal levels of siltation or water quality degradation which temporarily disrupt movement, breeding, feeding, or sheltering of adult and juvenile AP or larval glochidia are likely not detectable or measurable. Incidental take that occurs as harm resulting in injury or death from larger amounts of siltation or water quality degradation would also be difficult to determine. Actual habitat degradation may be detectable, but knowing whether a specific degradation actually affected the species would be difficult to determine. Spent shells may be collected, but attributing the cause of mortality would be very difficult. Since Three Oaks (2019) estimates that the most likely number of adult AP occurring in the Action Area is 4-12 individuals, we estimate that up to 12 adult AP will incur incidental take.

8.2. Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures (RPMs) are necessary or appropriate to minimize the impact of incidental take caused by the Action on DWM, YL, and AP.

RPM 1. Funding Propagation Facility. After receiving Section 404 Clean Water Permit for the Action, NCDOT will transfer necessary funding for the propagation facility described in Section 2.4 in accordance with the terms of the funding agreements among NCDOT, NCWRC, and Wake County.

RPM 2. Mussel Relocation. NCDOT will conduct a preconstruction mussel survey at the Swift Creek crossing (just prior to construction) and potentially relocate or take into captivity DWM, YL, and AP. This measure is part of the proposed Action described in Section 2.4.

8.3. Terms and Conditions

In order for the exemption from the take prohibitions of §9(a)(1) and of regulations issued under §4(d) of the ESA to apply to the Action, the FHWA must comply with the terms and conditions (T&Cs) of this statement, provided below, which carry out the RPMs described in the previous section. These T&Cs are mandatory. As necessary and appropriate to fulfill this responsibility, the FHWA must require any permittee, contractor, or grantee to implement these T&Cs through enforceable terms that are added to the permit, contract, or grant document.

T&C 1. Funding to Wake County (RPM 1). After receiving a Section 404 Clean Water Act permit for the Action from the US Army Corps of Engineers, NCDOT will begin reimbursing Wake County for the construction of the Yates Mill Aquatic Conservation Center (approximately $1,958,936) in accordance with the terms of the funding agreement between NCDOT and Wake County.

T&C 2. Funding to NCWRC (RPM 1). After receiving a Section 404 Clean Water Act permit for the Action from the US Army Corps of Engineers, NCDOT will transfer approximately $6,082,124 to the NCWRC Non-Game Aquatic Species Fund in accordance with the terms of the funding agreement between NCDOT and NCWRC (as to be amended). These funds will be used for North Carolina State University's detailed proposal to operate the facility, including a facility manager and assistant at the Yates Mill Aquatic Conservation Center to oversee the operation of the facility for propagation of DWM, YL, and other mussels.

T&C 3. Mussel Relocation and/or Captivity (RPM 2). Prior to conducting the preconstruction survey, NCDOT must coordinate with the Service regarding the extent of the survey and to determine whether DWM, YL, or AP will be relocated or taken into captivity for propagation purposes. If DWM, YL, or AP are to be relocated, a relocation plan must be submitted to and approved by the Service.

8.4. Monitoring and Reporting Requirements

In order to monitor the impacts of incidental take, the FHWA or NCDOT must report the progress of the Action and its impact on the species to the Service as specified in the incidental take statement (50 CFR §402.14(i)(3)). This section provides the specific instructions for such monitoring and reporting (M&R). As necessary and appropriate to fulfill this responsibility, the FHWA must require any permittee, contractor, or grantee to accomplish the monitoring and reporting through enforceable terms that are added to the permit, contract, or grant document. Such enforceable terms must include a requirement to immediately notify the FHWA and the Service if the amount or extent of incidental take specified in this ITS is exceeded during Action implementation.

M&R 1. Erosion Control Measures Failure. Our effects analysis is based on the premise that measurable sedimentation effects do not occur more than 400 meters downstream of bridge replacement projects in Piedmont streams. In the event that visible sediment loss from the Action is observed at the Swift Creek bridges, a review of turbidity levels will be made immediately upstream and downstream 400 meters (0.25 mile) to determine if sedimentation effects are occurring beyond the Action Area. If visual observation of turbidity levels downstream appear to be elevated beyond upstream observations, the project inspector will contact the Division Environmental Officer. If determined that project-related sedimentation is occurring beyond 400 meters, the amount or extent of incidental take specified in this ITS has been exceeded and the Service must be contacted immediately.

9. CONSERVATION RECOMMENDATIONS

§7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by conducting conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary activities that an action agency may undertake to avoid or minimize the adverse effects of a proposed action, implement recovery plans, or develop information that is useful for the conservation of listed species. The Service offers the

following recommendations that are relevant to the listed species addressed in this BO/CO and that we believe are consistent with the authorities of the FHWA.

1. Prioritize Section 404 Clean Water Act mitigation projects that will help conserve habitat for DWM, YL, and AP populations.
2. Provide funding for additional surveys for DWM, YL, and AP outside of the Action Area.
3. After the mussel propagation facility is functional, provide additional funding for DWM, YL, and AP augmentations throughout their range in North Carolina.

10. REINITIATION NOTICE

Formal consultation for the Action considered in this BO is concluded. Reinitiating consultation is required if the FHWA retains discretionary involvement or control over the Action (or is authorized by law) when:

a. the amount or extent of incidental take is exceeded;
b. new information reveals that the Action may affect listed species or designated critical habitat in a manner or to an extent not considered in this BO;
c. the Action is modified in a manner that causes effects to listed species or designated critical habitat not considered in this BO; or
d. a new species is listed or critical habitat designated that the Action may affect.

In instances where the amount or extent of incidental take is exceeded, the FHWA is required to immediately request a reinitiation of formal consultation.

Formal conference for the Action considered in this CO is concluded. The FHWA may submit a written request to the Service to confirm the CO as a BO issued through formal consultation if the FHWA retain discretionary involvement or control over the Action when species addressed in the CO are listed, or when proposed critical habitat addressed in the CO is designated. This request should advise the Service of any new information about the Action or its effects on such species or critical habitats that is relevant to adopting the CO as a BO, including the amount or extent of any taking of species that the Action has caused before the effective date of a listing decision.

The incidental take statement provided for non-listed species in a CO does not become effective until such species are listed and the CO is adopted as a BO. At that time, the Service will review the Action to determine whether modifying the opinion and incidental take statement to reflect new information is appropriate. If the Service finds no significant changes in the Action as proposed or in the information used during the conference, the Service will confirm the CO as a BO for the Action, which shall conclude formal consultation. Thereafter, the FHWA shall request to reinitiate formal consultation under the same four circumstances listed above.

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MEMORANDUM OF AGREEMENT
AMONG THE
FEDERAL HIGHWAY ADMINISTRATION,
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,
AND
NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER
FOR THE
COMPLETE 540 TRIANGLE EXPRESSWAY SOUTHEAST EXTENSION, WAKE & JOHNSTON COUNTIES, NORTH CAROLINA,
TIP NOS. R-2721, R-2828, R-2829, FEDERAL AID NOS. STP-0540(10), STP-0540(20), STP-054O-(21)

WHEREAS, the Federal Highway Administration (FHWA) has determined that the Complete 540 Triangle Expressway Southeast Extension (the Undertaking) will have an adverse effect upon archaeological site 31WA1997&1997** which has been determined eligible for the National Register of Historic Places (NRHP) under Criterion D; and

WHEREAS, the FHWA and the North Carolina Department of Transportation (NCDOT) have consulted with the North Carolina State Historic Preservation Officer (SHPO), pursuant to 36 CFR 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); and

WHEREAS, the FHWA has notified the Advisory Council on Historic Preservation (Council) of the adverse effect to archaeological site 31WA1997/1997** and it has declined to comment or participate in the consultation; and

WHEREAS, the Catawba Indian Nation has been invited to participate in the consultation and concur in this Memorandum of Agreement (MOA); and

WHEREAS, the consulting parties agree that the recovery of significant information from archaeological site 31WA1997/1997** may be done in accordance with the published guidance; and

WHEREAS, the consulting parties agree that it is in the public interest to expend funds for the recovery of significant information from archaeological site 31WA1997&1997** to mitigate the adverse effects of the project; and

WHEREAS, to the best of our knowledge and belief, no human remains, associated or unassociated funerary objects or sacred objects, or objects of cultural patrimony as defined in the Native American Graves Protection and Repatriation Act (25 U.S.C. 3001), are expected to be encountered in the archaeological work;

NOW, THEREFORE, the FHWA, NCDOT, and the SHPO agree that the Undertaking shall be implemented in accordance with the following stipulations in compliance with the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470).

I. Stipulations

1. The NCDOT will develop a Data Recovery Plan (DRP) for archaeological site 31WA1997/1997** which will be affected by the subject project, in consultation with the SHPO and the Catawba Nation.
2. The NCDOT will ensure that the DRP will be implemented after Right-of-Way is acquired and prior to construction activities within the site location as shown in the DRP.
3. Upon completion of the Data Recovery efforts, the NCDOT will prepare and forward a Management Summary to the SHPO and the Catawba Nation detailing the results of the Data Recovery field investigations. The Management Summary will contain sufficient information to demonstrate that the field investigation portion of the DRP has been implemented.
4. Upon receipt of the Management Summary, the SHPO and the Catawba Nation will respond within ten (10) days to the recommendations contained within the document.
5. Upon acceptance of the recommendations contained in the Management Summary, the SHPO and the Catawba Nation will issue the NCDOT documentation that the Data Recovery field investigations have been completed.
6. The analysis and report preparation, detailing archaeological work conducted at site 31WA1997/1997**, will be completed by the NCDOT, or their consultants, within eighteen (18) months after completion of the fieldwork.

II. Unanticipated Discovery

In accordance with 36 CFR 800.11(a), if NCDOT identifies additional cultural resource(s) during construction and determine them to be eligible for the NRHP, all work will be halted within the limits of the NRHP-eligible resource(s) and the FHWA and SHPO contacted. If after consultation with the Signatory Parties additional mitigation is determined necessary, the NCDOT, in consultation with the Signatory Parties, will develop and implement appropriate protection/mitigation measures for the resource(s). Inadvertent or accidental discovery of human remains will be handled in accordance with North Carolina General Statutes 65 and 70.

III. Dispute Resolution

Should any Signatory object within (30) days to any plans or documentation provided for review pursuant to this Agreement, the FHWA shall consult with the objecting party(ies) to resolve the objection. If the FHWA or objecting party(ies) determines that the objection cannot be resolved, the FHWA will forward all documentation relevant to the dispute to the Advisory Council on Historic Preservation (Council). Within thirty (30) days after receipt of all pertinent documentation, the Council will either:

A. Provide the FHWA with recommendations, which the FHWA will take into account in reaching a final decision regarding the dispute, or
B. Notify the FHWA that it will comment pursuant to 36 CFR Section 800.7(c) and proceed to comment. Any Council comment provided in response to such a request will be taken into account by the FHWA, in accordance with 36 CFR Section 800.7 (c) (4) with reference to the subject of the dispute.

Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; the FHWA's responsibility to carry out all of the actions under this agreement that are not the subject of the dispute will remain unchanged.

IV. Amendments

If any Signatory to this MOA believes that its terms cannot be carried out, or that an amendment to the terms must be made, that party(ies) shall immediately consult with the other party(ies) to develop amendments in accordance with 36 CFR 800.6(c)(7). If an amendment cannot be agreed upon, the dispute resolution process set forth in Section III will be followed.

V. Termination

Any Signatory to this MOA may terminate the agreement by providing notice to the other party(ies), provided that the party(ies) will consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination. Termination of this MOA will require compliance with 36 CFR 800. This MOA may be terminated by the execution of a subsequent MOA that explicitly terminates or supersedes its terms.

VI. Duration

Unless terminated as detailed above, this MOA will be in effect until FHWA, in consultation with the other Signatories, determines that all of its terms have satisfactorily been fulfilled or if NCDOT is unable or decides not to construct the Undertaking.

Execution of this Memorandum of Agreement by the FHWA, the NCDOT, and the North Carolina SHPO, its subsequent filing with the Council and implementation of its terms evidence that FHWA, has afforded the Council an opportunity to comment on the Undertaking, and that the FHWA, has taken into account the effects of the Undertaking on the aforementioned archaeological sites.

AGREED:

By: _____ Date: 2/23/18
Federal Highway Administration

By: _____ Date: 2/7/18
North Carolina Department of Transportation

By: _____ Date: 2/21/2018
North Carolina State Historic Preservations Officer

CONCUR:

By: _____ Date: 3/11/18
Catawba Indian Nation THPO OFFICER

MEMORANDUM OF AGREEMENT
AMONG THE
FEDERAL HIGHWAY ADMINISTRATION,
THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION,
AND
NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICER
FOR THE
COMPLETE 540 TRIANGLE EXPRESSWAY SOUTHEAST EXTENSION, WAKE & JOHNSTON COUNTIES, NORTH CAROLINA,
TIP NOS. R-2721, R-2828, R-2829, FEDERAL AID NOS. STP-0540(10), STP-0540(20), STP-054O-(21)

Execution of this Memorandum of Agreement by the FHWA, the NCDOT, and the North Carolina SHPO, its subsequent filing with the Council and implementation of its terms evidence that FHWA, has afforded the Council an opportunity to comment on the Undertaking, and that the FHWA, has taken into account the effects of the Undertaking upon archaeological site 31WA1997/1997.

FILED:

By: _____ Date: _____
Advisory Council on Historic Preservation

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

AUG 13 2018

F/SER31:SBC
SER-2018-19113

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

Dear Mr. Harris:

The following is a supplemental analysis to the May 21, 2018 section 7 consultation completed for North Carolina Department of Transportation's (NCDOT) project to build and complete the route 540 project, which will be a controlled access toll road extending the existing Triangle Expressway from NC 55 Bypass in Apex to the US 64/264 (I-495/Future I-87) in Knightdale, a distance of approximately 27 miles. The project includes the construction of two bridges (one northbound and one southbound) over the Neuse River in conjunction with a six-lane expressway. The description of the proposed action and physical and biological features of Designated Atlantic Sturgeon Critical Habitat (PBF), as well as the analysis of effects on Atlantic sturgeon and its critical habitat contained in the May 21, 2018 informal consultation, are hereby incorporated by reference.[1]

The May 21, 2018 consultation analyzed the effects of the project's construction activities on Atlantic sturgeon and Designated Atlantic Sturgeon Critical Habitat; however, it did not analyze the effects associated with induced land development, specifically the possibility of increased pollutants from runoff and toxic spills, nor did it address the effects of operation of the roadway upon completion of construction. The Biological Assessment (BA) completed for this project referenced the Baker Engineering (2017) Quantitative Indirect and Cumulative Effects (ICE) Report of the Complete 540 Project, forecasting land use changes between the base year of 2011 and design year of 2040. The ICE report indicates that changes in land development from the No-Build option to the Build option are higher land use densities, more commercial and industrial development, and a greater mix of uses in the areas surrounding the interchanges. The BA also discusses development restrictions that are in place within the Action Area, such as Neuse Buffer Rules and designated Environmentally Sensitive Areas (ESAs), that would lessen some of the potential for project induced development.

[1] This project is approximately 35 miles upstream from where the Atlantic Coast Pipeline (ACP) will cross the Neuse River. The ACP was the subject of a prior separate informal section 7 consultation with NMFS, which concluded that all effects to Atlantic sturgeon and Atlantic sturgeon critical habitat were either insignificant or discountable. Given the distance between the two projects, the lack of any significant downstream effects from this project, and the fact that this project is upstream, beyond the reach of any direct and indirect effects associated with the ACP, the ACP is not within the action area for this project.

The BA discusses how a predictive watershed model was utilized and was run twice with model run 1 as the upper limit and model run 2 as the lower limit. The parameters modeled were impervious surface, annual streamflow, annual runoff, annual total suspended solids, annual nitrogen, annual total phosphorus and annual copper. These parameters are also applicable to Atlantic Sturgeon, as sedimentation, and exposure to heavy metals, including copper were identified as threats to the species (Atlantic Sturgeon Recovery Team 2007).

Increased pollutants associated with induced land development and operation of the roadway may affect Atlantic sturgeon and critical habitat found in the Nuese River. Of the PBFs, only the water quality (PBF 4) supporting important life functions, such as growth and reproduction, of various life stages of Atlantic sturgeon may be affected by increased runoff and toxic spills associated with future development in the action area. The proposed action lacks any potential routes of effects to PBF 3, other than potential additional related in water construction, which would require additional federal permitting and section 7 consultation. As noted in the May 18, 2018 letter, the project is located in freshwater and no hard substrate was found at the proposed bridge crossing; thus, we believe PBF 1 and PBF 2 will not occur in the action area.

Runoff from the road way and bridges will be limited as NCDOT has committed to eliminating deck drainage directly into any waterbody within the Action Area, as well as a commitment to match the post-discharge to the pre-construction conditions. Modeling of land use changes indicates that the increase in runoff from all land use changes will cause a less than 1% increase in the streamflow and the operation effects of the 540 project would represent an immeasurable percentage of this 1%. Based on the modeling information, NCDOT's commitment, and the development restrictions, we believe runoff associated with operation and/or use of the roadway from the 540 project and induced land development will have insignificant effects to Atlantic sturgeon and Atlantic sturgeon designated critical habitat.

The elimination of drainage decks will significantly reduce the chances of any toxic spill entering the waterways. Therefore, we believe a toxic spill entering the waterways and adversely affecting Atlantic sturgeon and Atlantic sturgeon designated critical habitat is extremely unlikely to occur and, thus, discountable.

Conclusion

Because all potential project effects to listed species and critical habitat were found to be discountable, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species and critical habitat under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in the prior informal consultation letter incorporated by reference above. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Shelby Creager, Consultation Biologist, at (727) 209-5951, or by email at shelby.creager@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

File: 1514-22.L.1

UNITED STATES DEPARTMENT OF COMMERCE
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Philip S. Harris III, P.E., CPM, Unit Head
North Carolina Department of Transportation
Environment Analysis Unit
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

MAY 2 1 2018

Dear Mr. Harris:

This letter responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) for the following action.

Permit Number(s)	Applicant(s)	SER Number	Project Type(s)
STIP Nos. R-2721, R-2828, R-2829	North Carolina Department of Transportation	SER-2018-19113	Expressway Extension

Consultation History
We received your letter requesting consultation on January 30, 2018, and we requested additional information (RAI) from NCDOT on March 1, 2018. We received NCDOT's response to our RAI on March 14, 2018 and initiated consultation that same day. We also received a completed ESA Section 7 checklist on May 4, 2018.

Project Location

Address	Latitude/Longitude	Water body
Neuse River, Wake and Johnston Counties, North Carolina	35.725632°N, 78.506774°W (North American Datum 1983), bridge point at Neuse River crossing	Neuse River



Image of project location at Neuse River crossing (©2018 Google)

Existing Site Conditions

The proposed project crosses at the Neuse River (approximately RKM 338) and is approximately 185 miles (mi) from Pamlico Sound. The width at the deeper thalweg areas are narrow (approximately 25 feet (ft)), and the width at the proposed crossing is approximately 80 ft. Water depth in most of the crossing location is six inches (in) or less, and ranges in the action area from 0 to 3 ft. The action area is located in freshwater (above the saltwater wedge). The substrate in the Johnston County and eastern Wake County section of the Neuse River is dominated by shifting sand and soft clay banks, with sporadic pockets of gravel, cobble, and boulder and bedrock. Other than a minor small gravel component in limited areas, there was no concentration of any hard substrate found at the proposed crossing location. The substrate at which the bridge will cross is mainly muddy clay and coarse/fine sand. The project location is located in Atlantic sturgeon critical habitat Carolina Unit 3.

Project Description

The North Carolina Department of Transportation (NCDOT) and the Federal Highway Administration (FHWA) propose to build the Complete 540 project, which will be a controlled access toll road extending the existing Triangle Expressway from NC 55 Bypass in Apex to the US 64/264 (I-495/Future I-87) in Knightdale, a distance of approximately 27 miles.

The project includes the construction of two bridges (one northbound and one southbound) over the Neuse River in conjunction with a six-lane expressway. Installation will include individual

temporary cofferdams in the stream for drilled shaft/column construction. Temporary work causeways and temporary work bridges will be placed between the two highway bridges for construction. The highway bridges will be concrete decks supported by concrete beams. The concrete decks are anticipated to be approximately 40,640 square feet (ft^2) (635 ft long and 64 ft wide) for the southbound bridge and 36,830 ft^2 (635 ft long and 58 ft wide) for the northbound bridge. The bottom of the bridge beams would be approximately 35 ft above mean daily flow of the non-tidally influenced Neuse River.

Sixty-in concrete drilled shafts/concrete columns will be used to support the two bridge piers for both of the new highway bridges. Four drilled shafts/columns will be constructed for each pier (for a total of 16 concrete piers (4 per 4 bents)) and will be aligned parallel to stream flow. Holes will be augured and lined with steel liners. The steel liners will be removed as the concrete is placed in the holes. Material removed from the holes will be deposited in an approved off-site upland location. Each shaft will have an approximate permanent impact of 20 ft^2, and the 4 piers will permanently impact approximately 320 ft^2. It is estimated that permanent impacts will not exceed 500 ft^2.

Each pier and the erection of girders will take place from one or two temporary causeways and river banks via cranes. The causeways will be made from cleaned large grade rip rap. There will be a causeway on each side of the river and each will temporarily impact 8,000 ft^2 for a total of 16,000 ft^2. Temporary causeways will only be installed on one side of the river at a time, thereby leaving more than 50% of the river free flowing with no obstructions. It is estimated that approximately 10 prefabricated concrete cross pipes will also be installed under the causeway to maintain river flow. The exact size and number of cross pipes will be determined closer to the time of construction.

Geotechnical drilling may be performed at the project site and may require boring through the substrate. There would be 6 borings of 3-in diameter per bent, for a total of 24 borings. Borings will be performed by auguring a casing to the rock. Split spoon samples will pull material, after which the rock will be cored. Work will be performed from the river bank, a floating barge, or a temporary causeway.

Each pier is expected to take 1 week to install and an additional 4 weeks to erect the girders. Total in-water work time is expected to take 25 weeks to complete. In-water work will be done during daylight hours, however if daytime temperatures are too high, pouring of concrete may be done at night. While not anticipated, some shaft auguring may be done at night.

Pile Installation

Pile type(s)	Number of Piles	Installation Method	Confined Space or Open Water
Concrete	16	Auguring	Confined

Construction Conditions

The contractor will comply with NCDOT's Best Management Practices. The NCDOT has agreed to provide an additional measure of protection by requiring in-water construction activities to stop if a sturgeon is spotted within 50 ft of operations. No in-water work will occur from February 15 – October 31. Causeways and temporary work bridges will be

installed/removed outside the moratorium and construction will not block more than 50% of the stream. Any blasting, if necessary, associated with the project will not occur within 50 ft of the river. In addition, NCDOT has agreed to abide by the PDCs for temporary structures (Attachment 1) for the proposed actions associated with this project. Project specific PDCs that will be part of this project at the Neuse River crossing are listed below:

1) New Bridges
   - Shoreline stabilization for new bridges (approaches/causeway/embankment) will adhere to Shoreline Stabilization PDCs stated below.
2) New Piers
   - New piers will not be installed where swimming sturgeon are known to occur.
   - New piers within 0.5 mile of areas where sturgeon are known to occur, or where Atlantic sturgeon critical habitat is present, will adhere to the following:
     - Take-off/causeway fill for piers will not be placed below the OHWM or MHWL of the waterbody or impede or restrict normal flows.
     - Shoreline stabilization activities for new or replacement piers (approaches/causeway/embankment) will adhere to Shoreline Stabilization PDCs stated below.
3) Installation, Maintenance, and Removal of Shoreline Stabilization
   - Installation of new shoreline stabilization
     - Bank stabilization will not exceed 500 feet in length (for any type: e.g., seawalls, riprap, revetments
   - Riprap/Revetments
     - Shoreline stabilization materials will be free of debris and are limited to sand cement, concrete, and quarry stone. No slope paving, poured concrete, or reinforced concrete will be utilized.

Effects Determination(s) for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Fish			
Atlantic sturgeon (Carolina DPS)	E	NLAA	NLAA
E = endangered; NLAA = may affect, not likely to adversely affect			

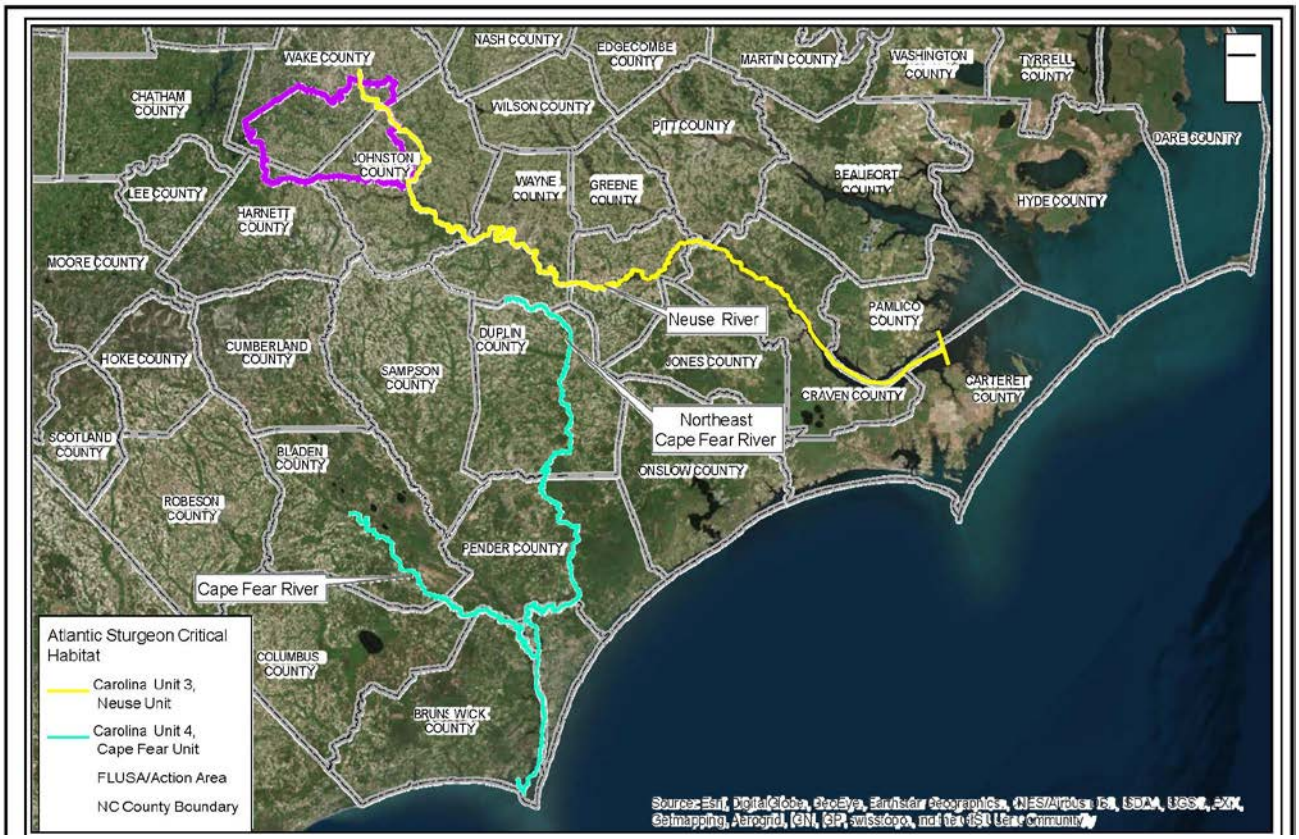


Image of the project location and Atlantic Sturgeon Critical Habitat in the Neuse River (Provided by NCDOT)

Critical Habitat

The project is located in Atlantic sturgeon critical habitat Carolina Unit 3 (Neuse Unit). The physical and biological features (PBFs) of the critical habitat are described in the table below. We believe the proposed action may affect the unobstructed water of appropriate depth and water quality PBFs.

Atlantic Sturgeon Critical Habitat PBFs and their Purpose/Function		
PBF		**Purpose/Function of PBF**
Hard Substrate (PBF 1)	Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 ppt range)	Necessary for settlement of fertilized eggs, refuge, growth, and development of early life stages
Salinity Gradient and Soft Substrate (PBF 2)	Aquatic habitat with a gradual downstream salinity gradient of 0.5 ppt up to as high as 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites	Necessary for juvenile foraging and physiological development
Unobstructed Water of	Water of appropriate depth and absent physical barriers to	Necessary to support: • Unimpeded movement of adults to and

Appropriate Depth (PBF 3)	passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites	from spawning sites • Seasonal and physiologically dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary • Staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (at least 1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river
Water Quality (PBF 4)	Water quality conditions, especially in the bottom meter of the water column, with the appropriate combination of temperature and oxygen values	Necessary to support: • Spawning • Annual and inter-annual adult, subadult, larval, and juvenile survival • Larval, juvenile, and subadult growth, development, and recruitment. Appropriate temperature and oxygen values will vary interdependently, and depending on salinity in a particular habitat. For example, 6.0 mg/L DO or greater likely supports juvenile rearing habitat, whereas DO less than 5.0 mg/L for longer than 30 days is less likely to support rearing when water temperature is greater than 25 °C. In temperatures greater than 26 °C, DO greater than 4.3 mg/L is needed to protect survival and growth. Temperatures of 13 to 26 °C likely support spawning habitat.

Analysis of Potential Routes of Effects to Species

Atlantic sturgeon may be affected by (1) the potential risk of injury from direct impact by construction machinery and associated in-water activities (e.g., crane and temporary work bridge/causeway operations), (2) the risk of exposure to turbidity from in-water construction activities, and (3) the effects of temporarily avoiding the project site due to construction activities. We believe these effects are discountable due to the complete moratorium on in-water work from February 15 – October 31. Because of the moratoria, Atlantic sturgeon (adult, larval, and small juvenile sturgeon) will not be exposed to the risk of injury because they are extremely unlikely to be in the action area.

The permanent installation of 16 concrete shafts (60-in) will result in the loss of approximately 320 ft^2 of unvegetated river bottom (i.e., fine/course sand and clay) where sturgeon might forage for invertebrate prey. In addition, up to 16,000 ft^2 of river bottom will be temporarily displaced

by the rip rap installed for the temporary work causeways. We believe the effects on sturgeon caused by the loss of river bottom due to this project will be insignificant. Because sturgeon are opportunistic feeders and forage over large areas, they would be able to locate prey beyond the immediate area of the piles and temporary causeways. The temporary causeways and work bridges will be removed once the new bridge is built. Invertebrates, which are prey for Atlantic sturgeon, will quickly recolonize this river bottom upon removal of these substructures.

Analysis of Potential Routes of Effect to Critical Habitat

Since the project is located in freshwater and no hard substrate was found at the proposed bridge crossing, we believe PBF 1 and PBF 2 will not occur in the action area.

Unobstructed water of appropriate depth (PBF 3) that supports staging, resting, holding, or movement of various life stages of Atlantic sturgeon may be affected by the installation of piles and temporary work structures. We believe the obstructions created by the installation of piles will have an insignificant effect on PBF 3 because the temporary causeways/work bridges and permanent bridge piles will only affect small portions of the main channel. The temporary causeways and work bridges will not block more than 50% of the stream and will be removed at the end of the project's construction. While the placement of the causeways and work bridges will have a temporary effect on water depth (deeper upstream, shallower downstream), these effects will be minimized by placing pipes within the causeways, are localized, and will not affect the overall depth of the river in this area since sufficient passage will be maintained within a portion of the river at all times during construction. In addition, sedimentation effects are not anticipated to reach a level that would create a depth barrier, and the implementation of the construction moratorium will ensure there is no noise barrier to migrating individuals in the event they are present in the river.

Water quality (PBF 4) supporting important life functions, such as growth and reproduction, of various life stages of Atlantic sturgeon may be affected by temporary and highly localized turbidity and associated effects on suitable water temperature and oxygen values caused during installation of piles and temporary causeways/work bridges. However, we believe the effects to PBF 4 will be discountable. NCDOT has committed to Design Standards for Sensitive Watersheds along with specific Project Design Criteria (PDC's). All work will be completed outside of February 15 - October 31 to prevent adult, larval, and small juvenile sturgeon from being exposed to elevated turbidity levels during times of the year when they might be present in the project area.

Conclusion

Because all potential project effects to listed species and critical habitat were found to be discountable, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species and critical habitat under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in this

response. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Shelby Creager, Consultation Biologist, at (727) 209-5951, or by email at shelby.creager@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

File: 1514-22.L.1

ATTACHMENT 1

SER-2018-19113

Activity-specific PDCs for temporary platforms, access fills, and cofferdam activities:

A6.1 All [water dependent] activities will be limited to a total of 120 days or less ("temporary" is defined as 120 days or less), except temporary work platforms/work trestles. Temporary work platforms/work trestles are limited to 24 months or less.

A6.2 Temporary platforms/work trestles will be installed/constructed following the PDCs outlined in Section 5.2 ("Noise") below and Appendix A. (similar to the Pile driving stuff you said you would be able to follow)

A6.3 The combined temporary impacts from temporary platforms/access fills/cofferdams are limited to a total of 0.5 acres or less in waters of the U.S. (e.g., below OHWM or MHWL) for a single, complete project. Of the total 0.5 acres of temporary impacts, individual activity breakdowns are as follows:

A6.3.1 Temporary platforms are limited to those with substrate impacts (e.g., footprint of pilings equaling less than 500 ft^2 (0.011 acres).

A6.3.2 Temporary access fills are limited to 0.5 ac of clean fill (e.g., riprap free of debris) in waters of the U.S. (e.g., below OHWM or MHWL) at any given time.

A6.3.3 Individual temporary cofferdams are limited to:

A. 500 ft^2 (0.011 ac) or less in size and a maximum of 2 cofferdams (regardless of size) may be installed/in place at any given time; a maximum of 8 cofferdams (regardless of size) may be installed for a single, complete project.

or

B. 1000 ft^2 (0.023 ac) or less in size and a maximum of 1 cofferdam (regardless of size) may be installed/in place at any given time; a maximum of 4 cofferdams (regardless of size) may be installed for a single, complete project.

A6.4 Placement of geotextile barriers is required prior to placement of the platform/access fills to ensure that the fill will be removed completely at the end of construction.

A6.5 Temporary fill materials will be placed in a manner that will not be eroded by high water flows. Temporary fills will be removed in their entirety and the affected areas returned to pre-construction conditions/elevations.

A6.6 The navigability of the waterway will remain uninterrupted and freely open for species movement in/out of the area.

A6.6.1 Cofferdams and fills will be limited to no more than 50% of the width of a waterbody. In tidal areas (e.g., tidal creeks), the width of the water body should be considered/measured at mean low water (MLW).

A6.7 Projects will not appreciably impact surface water flow into or out of any waters of the U.S.

A6.8 Appropriate measures will be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of the construction sites.

A6.9 Temporary steel sheet pile cofferdams will be installed/removed by vibratory hammers only.

A6.10 For temporary inflatable cofferdams, the footprints of the walls will be included into the overall impacts area.

A6.11 All activities will avoid impacts to submerged aquatic vegetation (i.e., seagrasses), to the maximum extent practicable; activities will not impact more than 100 ft^2 of submerged aquatic vegetation.

A6.12 Activities are not authorized at the mouths of rivers where sturgeon are known to migrate for spawning purposes.

Critical Habitat-specific PDCs:

A6.13 Temporary platforms/work trestles in Atlantic sturgeon critical habitat, where the following PBF is present, are limited to 24 months or less and those with total substrate impacts (e.g., footprint of pilings) of 250 ft^2 (0.005 acres) or less, do not impede or obstruct sturgeon movement, and will be installed outside of the spawning/migration season.

Suitable hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand range [ppt]) for settlement of fertilized eggs and refuge, growth, and development of early life stages.

A6.14 Temporary access fills in Atlantic sturgeon critical habitat, where the following PBF is present, are limited to 0.25 acre of total temporary impacts or less, and will be installed and removed outside of the spawning/migration (moratoria) season(s):

Suitable hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand range [ppt]) for settlement of fertilized eggs and refuge, growth, and development of early life stages.

A6.15 Temporary cofferdams in Atlantic sturgeon critical habitat, where the following PBF is present, are limited to 2000 ft^2 (0.04 acres) of total temporary impacts or less (must adhere to

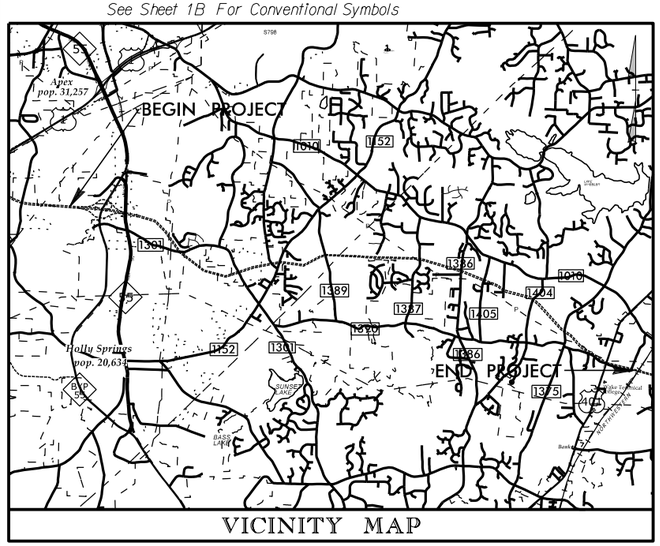
the same individual size restrictions as A6.3.3), and will be installed and removed outside of the spawning/migration (moratoria) season(s):

> Suitable hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand range [ppt]) for settlement of fertilized eggs and refuge, growth, and development of early life stages.

09/08/99

PERMIT DRAWING SHEET 1 OF 119

See Sheet 1B For Conventional Symbols



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

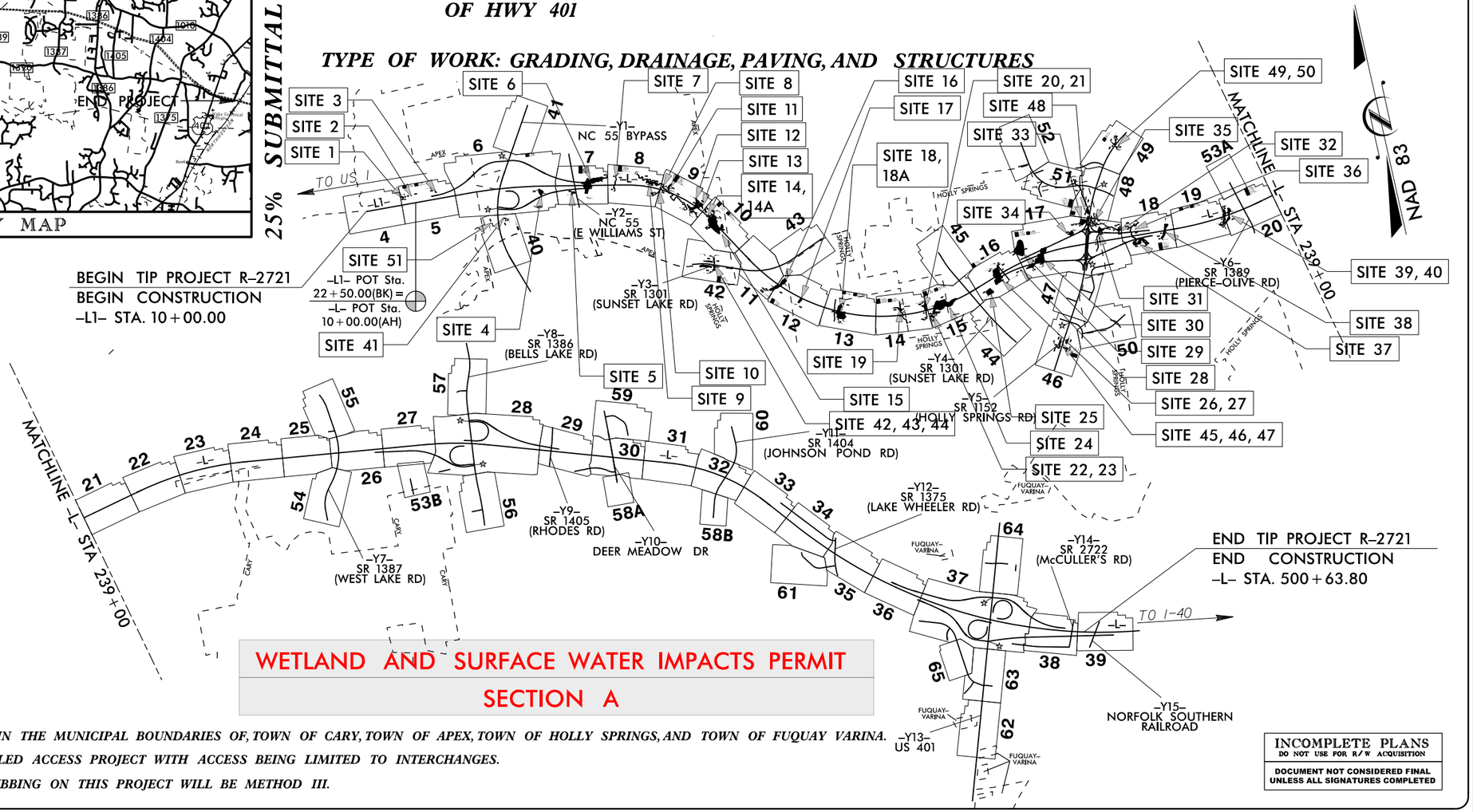
WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2721	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
6.401078	STP–540(19)	PE	

LOCATION: COMPLETE 540 – FROM WEST OF NC55 TO EAST OF HWY 401

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

25% SUBMITTAL



WETLAND AND SURFACE WATER IMPACTS PERMIT

SECTION A

THIS PROJECT WITHIN THE MUNICIPAL BOUNDARIES OF, TOWN OF CARY, TOWN OF APEX, TOWN OF HOLLY SPRINGS, AND TOWN OF FUQUAY VARINA.

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

CLEARING AND GRUBBING ON THIS PROJECT WILL BE METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CONTRACT:

TIP PROJECT: R–2721

GRAPHIC SCALES

PLANS: 50′ 25′ 0 50′ 100′

PROFILE (HORIZONTAL): 50′ 25′ 0 50′ 100′

PROFILE (VERTICAL): 10′ 5′ 0 10′ 20′

DESIGN DATA

ADT 2018 = 28,200
ADT 2040 = 66,400
K = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST = 7% DUAL 4%

FUNC CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R–2721	*=9.529 Miles*
LENGTH STRUCTURES	*=0.178 Miles*
TOTAL LENGTH TIP PROJECT R–2721	*=9.351 Miles*

Prepared In the Office of:

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909 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-0243
NC FIRM LICENSE NO.: C-0990

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
February 18, 2020

LETTING DATE:
February 18, 2020

Brian K. Eason, PE
PROJECT ENGINEER

Christina L. Yokeley, EI
PROJECT DESIGN ENGINEER

NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

6/12/2018
R2721_Hyd_prm_wet_psh_01.dgn
jharvey

8/17/99

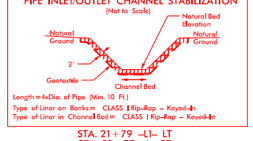
PERMIT DRAWING SHEET 2 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R–2721	2A–1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

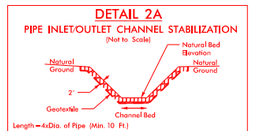
DETAIL 1A
PIPE INLET/OUTLET CHANNEL STABILIZATION
(Not to Scale)



Length = 4xDia. of Pipe (Min. 10 Ft.)
Type of Liner on Banks = CLASS I Rip–Rap – Keyed–In
Type of Liner in Channel Bed = CLASS I Rip–Rap – Keyed–In

STA. 21+79 –L1– LT
STA. 52+77 –L– RT
STA. 59+98 –L– LT
STA. 70+27 –L– RT
STA. 209+82 –L– RT
STA. 211+03 –L– LT
STA. 24+55 –Y5RPB– LT
STA. 19+96 –Y5RPC– RT

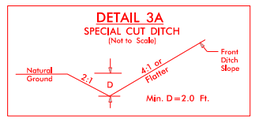
DETAIL 2A
PIPE INLET/OUTLET CHANNEL STABILIZATION
(Not to Scale)



Length = 4xDia. of Pipe (Min. 10 Ft.)
Type of Liner on Banks = CLASS II Rip–Rap – Keyed–In
Type of Liner in Channel Bed = CLASS I Rip–Rap – Keyed–In

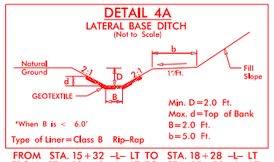
STA. 29+15 –Y1– LT

DETAIL 3A
SPECIAL CUT DITCH
(Not to Scale)



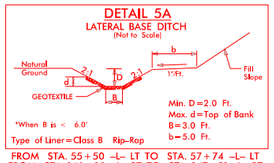
FROM STA. 185+00 –L– RT TO STA. 186+00 –L– RT
FROM STA. 232+00 –L– RT TO STA. 234+50 –L– RT
FROM STA. 68+36 –Y5– RT TO STA. 69+50 –Y5– RT
FROM STA. 70+34 –Y5– LT TO STA. 71+00 –Y5– LT
FROM STA. 18+49 –Y5A– RT TO STA. 25+00 –Y5A– RT
FROM STA. 26+61 –Y5A– RT TO STA. 28+00 –Y5A– RT
FROM STA. 14+75 –Y5F– LT TO STA. 17+00 –Y5F– LT
FROM STA. 18+00 –Y5F– RT TO STA. 19+30 –Y5F– RT
FROM STA. 18+50 –Y5F– LT TO STA. 19+21 –Y5F– LT
FROM STA. 21+00 –Y3DETR– LT TO STA. 22+00 –Y3DETR– LT

DETAIL 4A
LATERAL BASE DITCH
(Not to Scale)



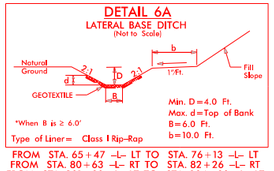
FROM STA. 15+32 –L– LT TO STA. 18+28 –L– LT
FROM STA. 50+42 –L– LT TO STA. 55+50 –L– LT
FROM STA. 77+00 –L– RT TO STA. 79+03 –L– RT
FROM STA. 148+32 –L– RT TO STA. 154+01 –L– RT
FROM STA. 204+38 –L– RT TO STA. 205+59 –L– RT
FROM STA. 210+00 –L– LT TO STA. 211+02 –L– LT
FROM STA. 211+70 –L– LT TO STA. 213+00 –L– LT
FROM STA. 50+50 –Y5– RT TO STA. 55+95 –Y5– RT
FROM STA. 66+61 –Y5– LT TO STA. 68+41 –Y5– LT
FROM STA. 68+60 –Y5– LT TO STA. 70+50 –Y5– LT
FROM STA. 18+93 –Y5NB– LT TO STA. 24+08 –Y5RPB– RT
FROM STA. 11+80 –Y5A– RT TO STA. 15+11 –Y5A– RT

DETAIL 5A
LATERAL BASE DITCH
(Not to Scale)



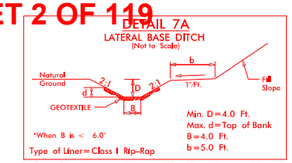
FROM STA. 55+50 –L– LT TO STA. 57+74 –L– LT
FROM STA. 146+00 –L– RT TO STA. 147+31 –L– RT

DETAIL 6A
LATERAL BASE DITCH
(Not to Scale)



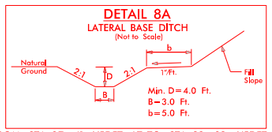
FROM STA. 65+47 –L– LT TO STA. 76+13 –L– LT
FROM STA. 80+63 –L– RT TO STA. 82+26 –L– RT
FROM STA. 201+90 –L– LT TO STA. 204+00 –L– LT

DETAIL 7A
LATERAL BASE DITCH
(Not to Scale)



FROM STA. 47+75 –Y5– LT TO STA. 52+79 –Y5– LT

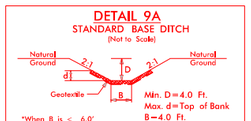
DETAIL 8A
LATERAL BASE DITCH
(Not to Scale)



FROM STA. 27+41 –Y5DET– LT TO STA. 32+82 –Y5DET– LT

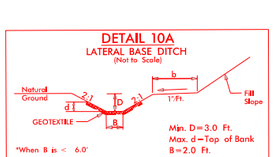
DETAIL HAS BEEN REMOVED

DETAIL 9A
STANDARD BASE DITCH
(Not to Scale)



FROM STA. 52+62 –Y5– LT TO STA. 54+98 –Y5– LT
FROM STA. 68+56 –Y5– LT TO STA. 69+50 –Y5– LT

DETAIL 10A
LATERAL BASE DITCH
(Not to Scale)



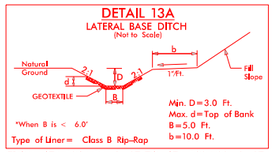
FROM STA. 141+50 –L– RT TO STA. 142+36 –L– RT
FROM STA. 170+68 –L– LT TO STA. 173+70 –L– LT

DETAIL 12A
SPECIAL CUT DITCH
(Not to Scale)



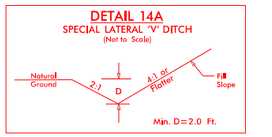
FROM STA. 87+50 –L– LT TO STA. 91+50 –L– LT
FROM 103+50 –L– RT TO STA. 106+50 –L– RT

DETAIL 13A
LATERAL BASE DITCH
(Not to Scale)



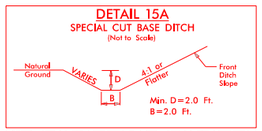
FROM STA. 196+50 –L– LT TO STA. 199+92 –L– LT

DETAIL 14A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



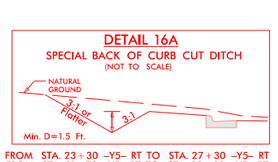
FROM STA. 13+51 –Y1LPB– LT TO STA. 15+00 –Y1LPB– LT
FROM STA. 18+88 –Y1RPC– LT TO STA. 19+85 –Y1RPC– LT
FROM STA. 19+50 –Y6– RT TO STA. 21+50 –Y6– RT
FROM STA. 18+50 –Y6– RT TO STA. 19+50 –Y6– RT

DETAIL 15A
SPECIAL CUT DITCH
(Not to Scale)



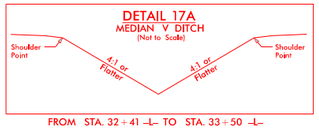
FROM STA. 225+50 –L– LT TO STA. 227+50 –L– LT
FROM STA. 227+50 –L– LT TO STA. 228+00 –L– LT

DETAIL 16A
SPECIAL BACK OF CURB CUT DITCH
(NOT TO SCALE)



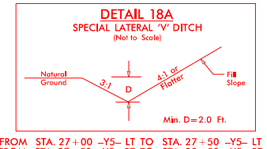
FROM STA. 23+30 –Y5– RT TO STA. 27+30 –Y5– RT
FROM STA. 31+70 –Y5– RT TO STA. 33+80 –Y5– RT
FROM STA. 11+00 –Y5I– LT TO STA. 13+51 –Y5I– LT
FROM STA. 14+00 –Y5I– LT TO STA. 10+66 –Y5J– LT
FROM STA. 10+66 –Y5J– LT TO STA. 15+50 –Y5I– LT

DETAIL 17A
MEDIAN 'V' DITCH
(Not to Scale)



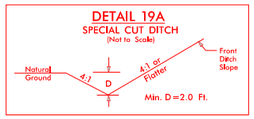
FROM STA. 32+41 –L– TO STA. 33+50 –L–

DETAIL 18A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



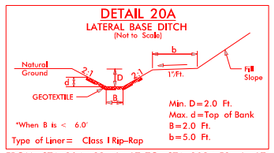
FROM STA. 27+00 –Y5– LT TO STA. 27+50 –Y5– LT
FROM STA. 27+50 –Y5– RT TO STA. 28+50 –Y5– RT
FROM STA. 10+80 –Y5C– LT TO STA. 11+89 –Y5C– LT
FROM STA. 11+00 –Y5C– RT TO STA. 27+50 –Y5– LT

DETAIL 19A
SPECIAL CUT DITCH
(Not to Scale)



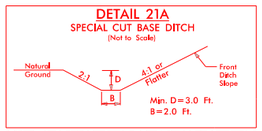
FROM STA. 228+50 –L– LT TO STA. 230+50 –L– LT
FROM STA. 232+00 –L– RT TO STA. 234+50 –L– RT
FROM STA. 12+50 –Y6– LT TO STA. 13+75 –Y6– LT

DETAIL 20A
LATERAL BASE DITCH
(Not to Scale)



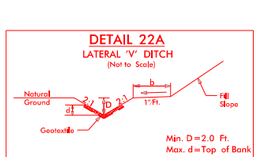
FROM STA. 204+32 –L– LT TO STA. 208+52 –L– LT
FROM STA. 204+38 –L– RT TO STA. 205+59 –L– RT
FROM STA. 209+73 –L– RT TO STA. 210+50 –L– RT
FROM STA. 15+84 –Y3– RT TO STA. 16+43 –Y3– RT
FROM STA. 24+00 –Y5RPB– LT TO STA. 24+54 –Y5RPB– LT
FROM STA. 23+86 –Y5RPD– RT TO STA. 25+12 –Y5RPD– RT

DETAIL 21A
SPECIAL CUT DITCH
(Not to Scale)



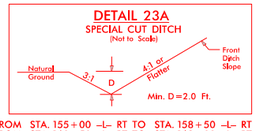
FROM STA. 154+00 –L– LT TO STA. 155+50 –L– LT
FROM STA. 155+50 –L– LT TO STA. 158+10 –L– LT
FROM STA. 160+50 –L– RT TO STA. 163+00 –L– RT

DETAIL 22A
LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 28+05 –Y1– RT TO STA. 30+17 –Y1– RT
FROM STA. 68+40 –Y5– RT TO STA. 69+83 –Y5– RT
FROM STA. 69+05 –Y5– LT TO STA. 70+34 –Y5– LT

DETAIL 23A
SPECIAL CUT DITCH
(Not to Scale)



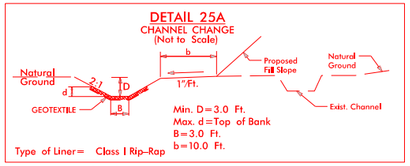
FROM STA. 155+00 –L– RT TO STA. 158+50 –L– RT
FROM STA. 160+50 –L– RT TO STA. 163+00 –L– RT
FROM STA. 14+00 –Y5G– RT TO STA. 14+33 –Y5G– RT
FROM STA. 14+00 –Y5G– LT TO STA. 14+44 –Y5G– LT

DETAIL 24A
SPECIAL CUT DITCH
(Not to Scale)



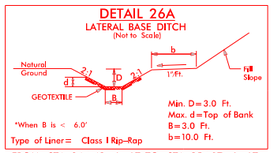
FROM STA. 192+00 –L– LT TO STA. 194+00 –L– LT
FROM STA. 194+00 –L– LT TO STA. 196+50 –L– LT
FROM STA. 41+00 –Y1– RT TO STA. 42+50 –Y1– RT
FROM STA. 34+26 –Y4– LT TO STA. 36+50 –Y4– LT

DETAIL 25A
CHANNEL CHANGE
(Not to Scale)



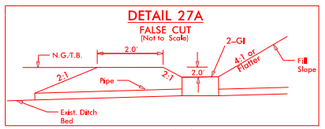
FROM STA. 83+25 –L– LT TO STA. 85+39 –L– LT

DETAIL 26A
LATERAL BASE DITCH
(Not to Scale)



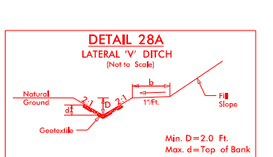
FROM STA. 84+48 –L– LT TO STA. 85+17 –L– LT

DETAIL 27A
FALSE CUT
(Not to Scale)



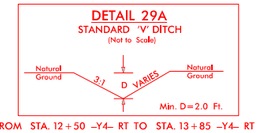
FROM STA. 226+02 –L– LT TO STA. 226+70 –L– LT
FROM STA. 227+28 –L– LT TO STA. 228+18 –L– LT
FROM STA. 41+25 –Y1– RT TO STA. 41+77 –Y1– RT
FROM STA. 24+50 –Y1RPB– RT TO STA. 26+50 –Y1RPB– RT
FROM STA. 27+00 –Y1RPB– RT TO STA. 28+50 –Y1RPB– RT

DETAIL 28A
LATERAL 'V' DITCH
(Not to Scale)



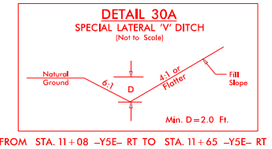
FROM STA. 115+87 –L– RT TO STA. 116+50 –L– RT

DETAIL 29A
STANDARD 'V' DITCH
(Not to Scale)



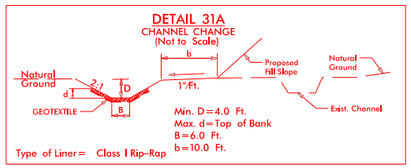
FROM STA. 12+50 –Y4– RT TO STA. 13+85 –Y4– RT

DETAIL 30A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



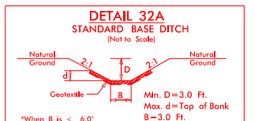
FROM STA. 11+08 –Y5E– RT TO STA. 11+65 –Y5E– RT

DETAIL 31A
CHANNEL CHANGE
(Not to Scale)



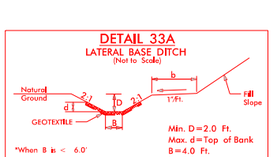
FROM STA. 65+47 –L– LT TO STA. 76+13 –L– LT
FROM STA. 80+75 –L– RT TO STA. 81+89 –L– RT

DETAIL 32A
STANDARD BASE DITCH
(Not to Scale)



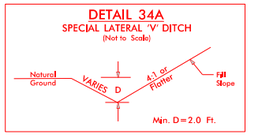
FROM STA. 83+25 –L– LT TO STA. 84+48 –L– LT
FROM STA. 85+17 –L– LT TO STA. 85+39 –L– LT

DETAIL 33A
LATERAL BASE DITCH
(Not to Scale)



FROM STA. 16+26 –Y5– RT TO STA. 17+00 –Y5– RT

DETAIL 34A
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 24+00 –Y1RPB– RT TO STA. 29+50 –Y1RPB– RT

DETAIL HAS BEEN REMOVED

7/9/2018
R2721dtl_prm_wet_psh_02A1_Detail.dgn
bgravel

8/17/99

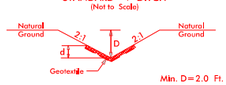
PERMIT DRAWING SHEET 3 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	2A-2
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DETAIL 36A
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= Class B Rip-Rap

FROM STA. 40+83 -L- LT TO STA. 43+50 -L- LT

DETAIL 41A
STANDARD BASE DITCH
(Not to Scale)



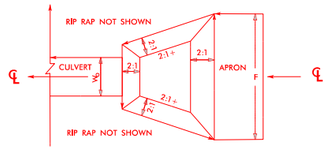
Type of Liner= Class II Rip-Rap

FROM STA. 10+11 -Y5RANB- RT TO STA. 13+06 -Y5RANB- RT

DETAIL 47A
RIP-RAPPED ENERGY DISSIPATOR BASIN

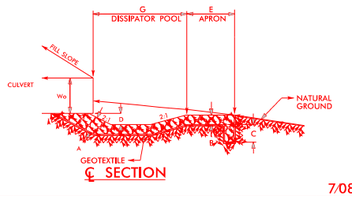
DIM. (ft)	RIP RAP BASIN #		
	1		
A	3.5		
B	2.3		
C	1.5		
D	1.1		
E	5.6		
F	13.6		
G	11.1		

ALL DIMENSIONS APPROXIMATE



PLAN

BASIN #	LOCATION (AT OUTLET)
1	15+17-Y5I-RT

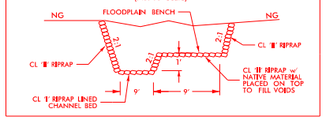


℄ SECTION

7/08

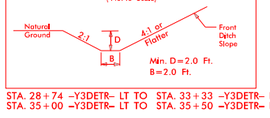
STA. 15+17 -Y5I- RT

DETAIL 56A
INLET & OUTLET CHANNEL STABILIZATION
(Not To Scale)



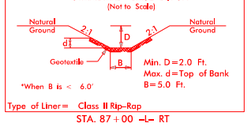
STA. 16+14 -Y5-

DETAIL 61A
SPECIAL CUT BASE DITCH
(Not to Scale)



FROM STA. 28+74 -Y3DETR- LT TO STA. 33+33 -Y3DETR- LT
FROM STA. 35+00 -Y3DETR- LT TO STA. 35+50 -Y3DETR- LT

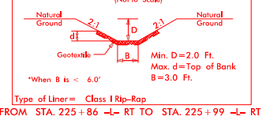
DETAIL 37A
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class II Rip-Rap

STA. 87+00 -L- RT

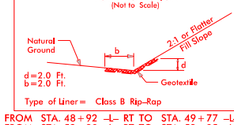
DETAIL 42A
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 225+86 -L- RT TO STA. 225+99 -L- RT

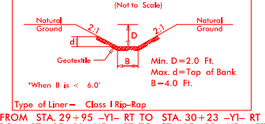
DETAIL 38A
TOE PROTECTION
(Not to Scale)



Type of Liner= Class B Rip-Rap

FROM STA. 48+92 -L- RT TO STA. 49+77 -L- RT
FROM STA. 52+30 -L- RT TO STA. 52+95 -L- RT
FROM STA. 58+10 -L- RT TO STA. 60+50 -L- RT
FROM STA. 68+00 -L- RT TO STA. 71+00 -L- RT
FROM STA. 79+95 -L- LT TO STA. 81+01 -L- LT
FROM STA. 81+24 -L- LT TO STA. 81+79 -L- LT
FROM STA. 75+65 -L- RT TO STA. 77+00 -L- RT
FROM STA. 85+66 -L- LT TO STA. 87+50 -L- LT
FROM STA. 86+62 -L- RT TO STA. 89+50 -L- RT
FROM STA. 115+53 -L- RT TO STA. 115+82 -L- RT
FROM STA. 124+67 -L- LT TO STA. 128+00 -L- LT
FROM STA. 126+06 -L- RT TO STA. 127+39 -L- RT
FROM STA. 139+80 -L- RT TO STA. 141+48 -L- RT
FROM STA. 141+19 -L- RT TO STA. 142+50 -L- RT
FROM STA. 145+24 -L- LT TO STA. 147+66 -L- LT
FROM STA. 150+00 -L- LT TO STA. 152+96 -L- LT
FROM STA. 166+00 -L- RT TO STA. 167+85 -L- RT
FROM STA. 166+60 -L- LT TO STA. 168+59 -L- LT
FROM STA. 211+06 -L- LT TO STA. 211+72 -L- LT
FROM STA. 225+14 -L- RT TO STA. 226+47 -L- RT
FROM STA. 226+16 -L- LT TO STA. 226+59 -L- LT
FROM STA. 227+39 -L- LT TO STA. 227+93 -L- LT
FROM STA. 12+00 -Y3- RT TO STA. 15+28 -Y3- RT
FROM STA. 13+66 -Y3- LT TO STA. 15+09 -Y3- LT
FROM STA. 16+33 -Y5- LT TO STA. 17+94 -Y5- LT
FROM STA. 17+26 -Y5- RT TO STA. 19+30 -Y5- RT
FROM STA. 18+00 -Y5F- RT TO STA. 19+30 -Y5F- RT
FROM STA. 11+70 -Y5RPBSB- LT TO STA. 12+45 -Y5RPBSB- LT
FROM STA. 18+40 -Y5RPC- RT TO STA. 20+18 -Y5RPC- RT
FROM STA. 13+18 -Y5RPD- LT TO STA. 15+20 -Y5RPD- LT

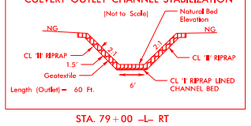
DETAIL 43A
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 29+95 -Y1- RT TO STA. 30+23 -Y1- RT
FROM STA. 15+10 -Y5A- RT TO STA. 15+29 -Y5A- RT

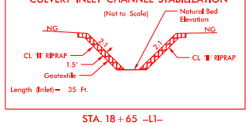
DETAIL 48A
CULVERT OUTLET CHANNEL STABILIZATION
(Not to Scale)



Length (Outlet)= 60 Ft.

STA. 79+00 -L- RT

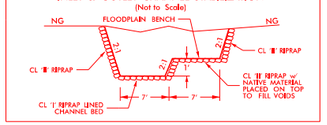
DETAIL 52A
CULVERT INLET CHANNEL STABILIZATION
(Not to Scale)



Length (Inlet)= 35 Ft.

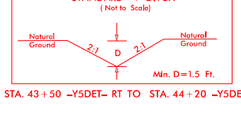
STA. 18+65 -L1-

DETAIL 57A
INLET & OUTLET CHANNEL STABILIZATION
(Not to Scale)



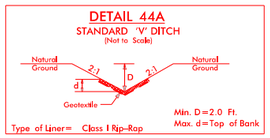
STA. 68+38 -Y5-

DETAIL 62A
STANDARD 'V' DITCH
(Not to Scale)



FROM STA. 43+50 -Y5DET- RT TO STA. 44+20 -Y5DET- RT

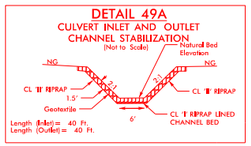
DETAIL 44A
STANDARD 'V' DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 227+46 -L- LT TO STA. 227+50 -L- LT

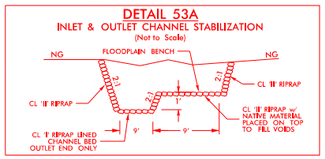
DETAIL 49A
CULVERT INLET AND OUTLET CHANNEL STABILIZATION
(Not to Scale)



Length (Inlet)= 40 Ft.
Length (Outlet)= 40 Ft.

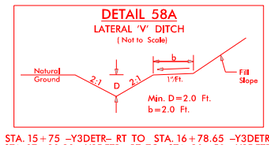
STA. 125+86 -L-

DETAIL 53A
INLET & OUTLET CHANNEL STABILIZATION
(Not to Scale)



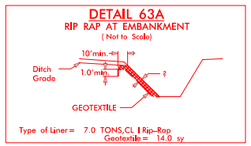
STA. 169+00 -L-

DETAIL 58A
LATERAL 'V' DITCH
(Not to Scale)



FROM STA. 15+75 -Y3DETR- RT TO STA. 16+78.65 -Y3DETR- RT
FROM STA. 17+39.39 -Y3DETR- RT TO STA. 20+50 -Y3DETR- RT
FROM STA. 17+50 -Y6DET- RT TO STA. 18+03 -Y6DET- RT
FROM STA. 18+03 -Y6DET- RT TO STA. 18+50 -Y6DET- RT

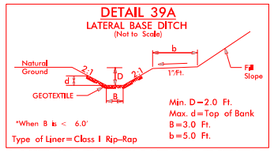
DETAIL 63A
RIP RAP AT EMBANKMENT
(Not to Scale)



Type of Liner= 7.0 TONS,CL I Rip-Rap
Geotextile= 14.0 sy

FROM STA. 15+73 -Y3DETR- RT TO STA. 15+86 -Y3DETR- RT

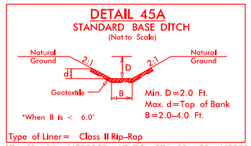
DETAIL 39A
LATERAL BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

FROM STA. 55+50 -L- LT TO STA. 57+74 -L- LT

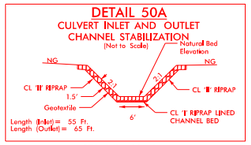
DETAIL 45A
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class II Rip-Rap

FROM STA. 11+20 -Y5RPBSB- LT TO STA. 12+52 -Y5RPBSB- LT

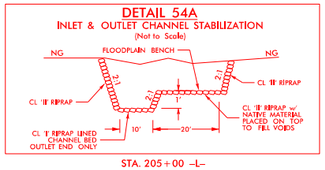
DETAIL 50A
CULVERT INLET AND OUTLET CHANNEL STABILIZATION
(Not to Scale)



Length (Inlet)= 55 Ft.
Length (Outlet)= 65 Ft.

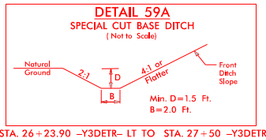
STA. 141+68 -L-

DETAIL 54A
INLET & OUTLET CHANNEL STABILIZATION
(Not to Scale)



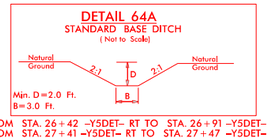
STA. 205+00 -L-

DETAIL 59A
SPECIAL CUT BASE DITCH
(Not to Scale)



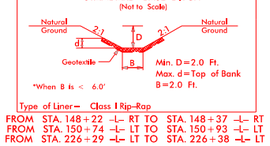
FROM STA. 26+23.90 -Y3DETR- LT TO STA. 27+50 -Y3DETR- LT

DETAIL 64A
STANDARD BASE DITCH
(Not to Scale)



FROM STA. 26+42 -Y5DET- RT TO STA. 26+91 -Y5DET- RT
FROM STA. 27+41 -Y5DET- RT TO STA. 27+47 -Y5DET- RT

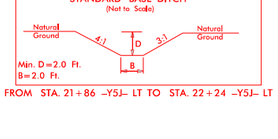
DETAIL 40A
STANDARD BASE DITCH
(Not to Scale)



Type of Liner= Class I Rip-Rap

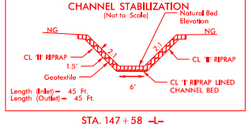
FROM STA. 148+22 -L- RT TO STA. 148+37 -L- RT
FROM STA. 150+74 -L- LT TO STA. 150+93 -L- LT
FROM STA. 226+29 -L- LT TO STA. 226+38 -L- LT

DETAIL 46A
STANDARD BASE DITCH
(Not to Scale)



FROM STA. 21+86 -Y5J- LT TO STA. 22+24 -Y5J- LT

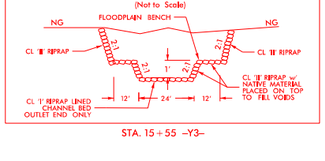
DETAIL 51A
CULVERT INLET AND OUTLET CHANNEL STABILIZATION
(Not to Scale)



Length (Inlet)= 45 Ft.
Length (Outlet)= 45 Ft.

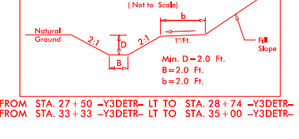
STA. 147+58 -L-

DETAIL 55A
INLET & OUTLET CHANNEL STABILIZATION
(Not to Scale)



STA. 15+55 -Y3-

DETAIL 60A
LATERAL BASE DITCH
(Not to Scale)



FROM STA. 27+50 -Y3DETR- LT TO STA. 28+74 -Y3DETR- LT
FROM STA. 33+33 -Y3DETR- LT TO STA. 35+00 -Y3DETR- LT

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jmeyer

51499

PERMIT DRAWING SHEET 4 OF 119

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	2B-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

Sta. =15+76 -Y3DETR- RT
Q(10) = 6.0 CFS
V(10) = 2.38 FPS
d(10) = 1.12 Ft.
s = 1.03%
n = 0.040
Liner = Grass

Sta. =21+00 -Y3DETR- LT
Q(10) = 6.0 CFS
V(10) = 4.18 FPS
d(10) = 0.76 Ft.
s = 5.12%
n = 0.040
Liner = Grass

-Y3DETR- PRC Sta. 12+58.95
WETLAND WS

-Y3DETR- PRC Sta. 10+05.05

WETLAND WR
-Y3DETR- PT Sta. 17+05.64

SITE 1

SITE 2

MATCHLINE SHEET 2B-2
-Y3DET- STA 22+00.00

MATCHLINE SHEET 2B-1
-Y3- STA 21+75.00

BEGIN CONSTRUCTION
-Y3DETR- STA. 10+05.05

SEE SHEET 121 FOR -Y3DET- PROFILE
SEE SHEETS 11, 42, & 43 FOR -Y3- PLAN VIEW
SEE SHEETS 101 & 102 FOR -Y3- PROFILE

PERMIT DRAWING SHEET 5 OF 119

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LOCHNER
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RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	2B-1
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

Sta. =15+76 -Y3DETR- RT
Q(10) = 6.0 CFS
V(10) = 2.38 FPS
d(10) = 1.12 Ft.
s = 1.03%
n = 0.040
Liner = Grass

Sta. =21+00 -Y3DETR- LT
Q(10) = 6.0 CFS
V(10) = 4.18 FPS
d(10) = 0.76 Ft.
s = 5.12%
n = 0.040
Liner = Grass

-Y3DETR- PRC Sta. 12+58.95
WETLAND WS
WETLAND WR
-Y3DETR- PT Sta. 17+05.64
SITE 1
SITE 2
-Y3DETR- BEGIN POT Sta. 10+00.00
-Y3DETR- EOT Sta. 10+05.05
-Y3DETR- EOT Sta. 20+00.00

MATCHLINE SHEET 2B-2
-Y3DET- STA 22+00.00

MATCHLINE SHEET 2B-2
-Y3- STA 21+75.00

BEGIN CONSTRUCTION
-Y3DETR- STA. 10+05.05

SEE SHEET 12I FOR -Y3DET- PROFILE
SEE SHEETS 11, 42, & 43 FOR -Y3- PLAN VIEW
SEE SHEETS 101 & 102 FOR -Y3- PROFILE

7/2/2018
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lhargrav

51499

PERMIT DRAWING SHEET 6 OF 119

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	2B-6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

PAVEMENT REMOVAL
PAVED SHOULDER

WETLAND WAK

SITE 3

-Y5DET- PC Sta. 29+35.26

-Y5DET- PT Sta. 22+17.21

MATCHLINE SHEET 2B-5 -Y5DET- STA. 19+00.00

MATCHLINE SHEET 2B-5 -Y5- STA. 40+50.00

MATCHLINE SHEET 2B-7 -Y5DET- STA. 33+00.00

MATCHLINE SHEET 2B-7 -Y5- STA. 54+00.00

SEE SHEET 122 & 123 FOR -Y5DET- PROFILE
SEE SHEET 104 FOR -Y5- PROFILE
SEE SHEET 17 & 48 FOR -Y5- PLAN VIEW

7/9/2018
R2721_hyd_prm_wet_psh_0286.dgn
jharvey

51499

PERMIT DRAWING SHEET 7 OF 119

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	2B-6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

PAVEMENT REMOVAL
PAVED SHOULDER

WETLAND WAK

SITE 3

-Y5DET- PC Sta. 29+35.26

-Y5DET- PT Sta. 22+17.21

-Y5DET- N 21° 55' 16.3" E

MATCHLINE SHEET 2B-5 -Y5DET- STA. 19+00.00

MATCHLINE SHEET 2B-5 -Y5- STA. 40+50.00

MATCHLINE SHEET 2B-7 -Y5DET- STA. 33+00.00

MATCHLINE SHEET 2B-7 -Y5- STA. 54+00.00

SEE SHEET 122 & 123 FOR -Y5DET- PROFILE
SEE SHEET 104 FOR -Y5- PROFILE
SEE SHEET 17 & 48 FOR -Y5- PLAN VIEW

7/2/2018
R2721_hyd_prm_wet_psh_0286a.dgn
lburgay

51499

PERMIT DRAWING SHEET 8 OF 119

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PAVEMENT REMOVAL
PAVED SHOULDER

409
GREENWAY WASTE SOLUTIONS OF APEX LLC

STREAM SSF
WETLAND WVZ
SITE 1
SITE 2
SITE 3
-L- POT Sta. 14+02.00= -YIRPD- ST Sta. 10+00.00 87.00' LT
-LI- POT Sta. 22+50.00(BK)= -L- POT Sta. 10+00.00(AH)
-YIRPD- SG Sta. 12+25.00
MATCHLINE SHEET 4 -LI- STA 19+00.00
MATCHLINE SHEET 6 -L- STA 16+00.00
MATCHLINE SHEET 6 -L- STA 20+00.00
-YIRPD- STA 15+00
20+00
15+00
-LI-
-L-
S 87° 37' 44.2" E
S 87° 37' 44.2" E
INLET CHANNEL SEE DETAIL 51A
EXTEND EXIST 1@10'X9' RCBC
CL I RIPRAP LENGTH=11 FT SEE DETAIL 1A
15" W/ 2 ELBOWS
JB wMH
REMOVE
15" RCP
24" CSP W/ELBOW
COLLAR
REMOVE 6 FT EXIST 15" RCP
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
CL B RIPRAP
CL I RIPRAP
RETAIN
PDE
EXISTING R/W PER STATE PROJECT REF# R-2635A
I-540 WBL WESTERN WAKE FREEWAY 74' CONC
I-540 EBL WESTERN WAKE FREEWAY 60' CONC
12' CONC
24' CONC
36' BST
MTL
RIPRAP
R/W MON
U/C
48" WW
30" C&G
2GI
LP 701
LP 702
LP 703
LP 704
LP 705
LP 706

SEE SHEET 66 FOR -L- PROFILE
SEE SHEET 66 FOR -LI- PROFILE
SEE SHEET 88 FOR -YIRPD- PROFILE

7/2/2018
R2721_Hyd_prm_wet_psh_05.dgn
lhorney

51499

PERMIT DRAWING SHEET 9 OF 119

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PAVEMENT REMOVAL
PAVED SHOULDER

409
GREENWAY WASTE SOLUTIONS OF APEX LLC

STREAM SSF

WETLAND WVZ

SITE 1

SITE 2
-L- POT Sta. 22+50.00(BK)=
-L- POT Sta. 10+00.00(AH)

SITE 3
-L- POT Sta. 14+02.00=
-YIRPD- ST Sta. 10+00.00
87.00' LT

-YIRPD- SC Sta. 12+25.00

MATCHLINE SHEET 4
-LI- STA 19+00.00

MATCHLINE SHEET 6
-YIRPD- STA 16+00.00

MATCHLINE SHEET 6
-L- STA 20+00.00

GREENWAY WASTE SOLUTIONS OF APEX LLC

SEE SHEET 66 FOR -L- PROFILE
SEE SHEET 66 FOR -LI- PROFILE
SEE SHEET 88 FOR -YIRPD- PROFILE

7/2/2018
R2721_hyd_prm_wet_pah_05a.dgn
jhoney

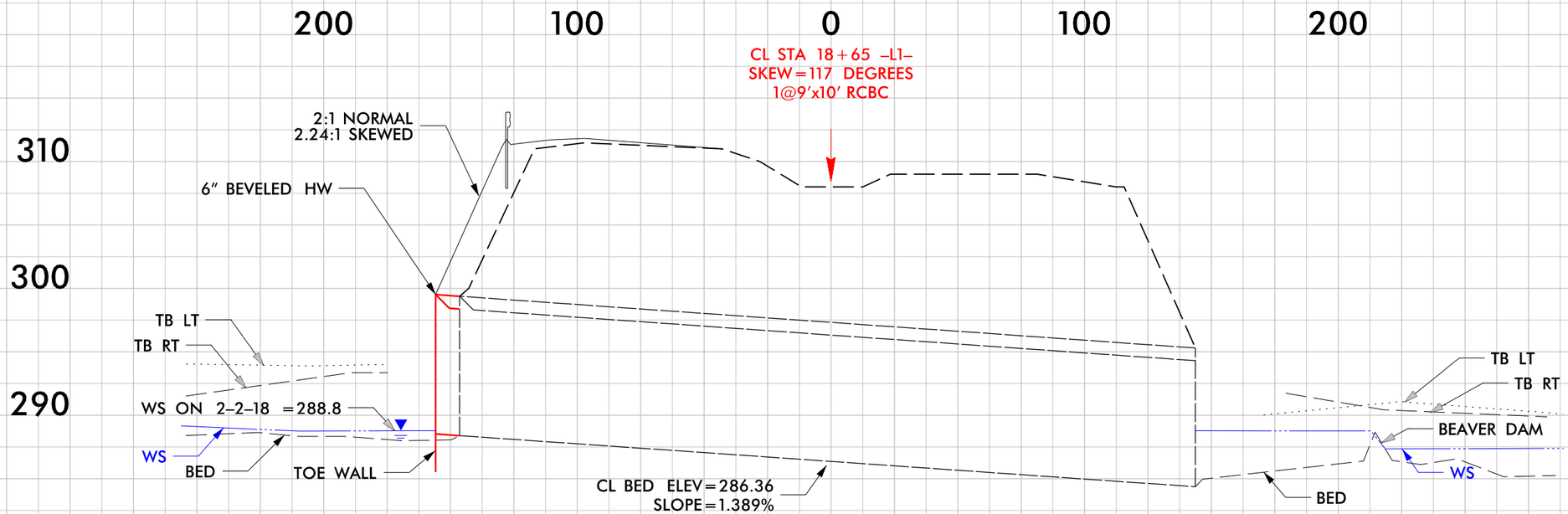
5/14/99

PERMIT DRAWING SHEET 10 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	5B
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/9/2018
R2721_hyd_prm_wet_psh_05b_sec.dgn
[redacted]

PERMIT DRAWING SHEET 11 OF 119

REVISIONS

NC 55 BYPASS
35,100
60,800
600
6,900
4,500
10,300
COMPLETE 540
17,500
49,300
26,800
66,400
WESTERN WAKE FREEWAY
14,900
31,300
3,300
10,800
46,600
105,700
NC 55 BYPASS
2018 ADT
2040 ADT

LOCHNER
H. W. LOCHNER, INC.
7344 FALLS POINTE, SUITE 202
RALEIGH, NC 27615
NC License Number P-0293
SUNGATE DESIGN GROUP, P.A.

PROJECT REFERENCE NO.	SHEET NO.
R-2721	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER (POND)

MATCHLINE SHEET 41
-Y1- STA 17+00.00

-Y1- POT Sta.44+89.8=
-YIRPC- POT Sta. 31+05.56
Δ = 68°09'18.2"
-YIRPD- PT Sta. 29+14.73
-YIRPD- SC Sta. 24+97.93
-YIRPD- SS Sta. 22+17.93
-YIRPD- CS Sta. 19+92.93
-Y1- POT Sta.44+76.5=
-YIRPD- POT Sta. 31+70.24
Δ = 68°09'18.2"
-L1 POC Sta. 31+10.55=
-Y1+ POT Sta. 31+56.06
Δ = 68°07'02.6"
-L- PC Sta. 22+53.85
-L- POC Sta. 32+50.57=
-YILPB- ST Sta. 10+00.00
75.00' RT
-YILPB- SC Sta. 12+00.00
-YILPB- ST Sta. 19+22.71
-YILPB- CS Sta. 17+22.71
-YILPB- POT Sta. 31+56.06
Δ = 9°17.2"
-Y1- POC Sta. 32+40.86=
-YIRPC- POT Sta. 31+56.06
Δ = 32°44'23.9"
-YIRPB- PT Sta. 31+55.55
-YIRPB- SC Sta. 29+12.72
-YIRPC- PT Sta. 30+33.56
N 80°08'25.0" W
-YIRPC- SC Sta. 27+99.33
-YIRPC- TS Sta. 24+99.33
-YIRPC- ST Sta. 22+99.33
-YIRPC- CS Sta. 20+94.33
-YIRPB- CS Sta. 23+37.72
-YIRPB- SRS Sta. 26+10.72
-YIRPB- SC Sta. 29+12.72
-YIRPB- ST Sta. 20+28.03
N 82°24'52.4" E
S 80°37'44.2" E
S 80°08'25.0" E
R=580.00'
R=1,000.00'
R=1,200.00'
R=1,400.00'
R=1,600.00'
R=1,800.00'
R=2,000.00'
R=2,200.00'
R=2,400.00'
R=2,600.00'
R=2,800.00'
R=3,000.00'
R=3,200.00'
R=3,400.00'
R=3,600.00'
R=3,800.00'
R=4,000.00'
R=4,200.00'
R=4,400.00'
R=4,600.00'
R=4,800.00'
R=5,000.00'
R=5,200.00'
R=5,400.00'
R=5,600.00'
R=5,800.00'
R=6,000.00'
R=6,200.00'
R=6,400.00'
R=6,600.00'
R=6,800.00'
R=7,000.00'
R=7,200.00'
R=7,400.00'
R=7,600.00'
R=7,800.00'
R=8,000.00'
R=8,200.00'
R=8,400.00'
R=8,600.00'
R=8,800.00'

PERMIT DRAWING SHEET 12 OF 119

REVISIONS

NC 55 BYPASS
35,100 / 60,900
600 / 6,900 | 4,500 / 10,300 | COMPLETE 540 17,500 / 49,300
26,800 / 66,400 | 3,300 / 10,800
WESTERN WAKE FREEWAY
14,900 / 31,300
46,600 / 105,700
NC 55 BYPASS
2018 ADT / 2040 ADT

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER (POND)

MATCHLINE SHEET 41 -Y1- STA 17+00.00
MATCHLINE SHEET 5 -L- STA 20+00.00
MATCHLINE SHEET 40 -Y1- STA 31+00.00
MATCHLINE SHEET 7 -L- STA 45+00.00
-YIRPD- STA 16+00.00
-YIRPC- STA 17+00.00
-YIRPB- STA 14+00.00

-YIRPD- POT Sta.44+80.18
-YIRPC- POT Sta. 31+05.56
Δ = 68°09'18.62"
-YIRPD- PT Sta. 23+19.23
-YIRPD- SC Sta. 22+97.92
-YIRPD- CS Sta. 22+17.51
-YIRPD- CS Sta. 19+92.93
-YIRPC- PC Sta. 30+97.39
-YIRPC- TS Sta. 24+59.33
-YIRPC- ST Sta. 22+95.33
-YIRPC- CS Sta. 20+94.33
-YIRPD- PT Sta. 44+76.29
-YIRPC- POT Sta. 31+10.29
Δ = 68°09'18.62"
N 80°08'45.04"W
S 80°08'45.04"E
-L- PC Sta. 22+53.25
-L- POC Sta. 31+10.55
-Y1- POT Sta. 37+56.06
Δ = 68°08'10.69"
-L- POC Sta. 32+40.07
-YILPB- ST Sta. 17+10.80
75.00 RT
-YILPB- SC Sta. 12+00.00
-YILPB- ST Sta. 19+22.71
-YILPB- CS Sta. 21+12.96
-L- POC Sta. 10+24.00
-YILPB- POT Sta. 37+45.00
Δ = 32°44'42.59"
-YILPB- POT Sta. 37+45.00
Δ = 47°10'11.24"
-YIRPB- PT Sta. 31+85.55
-YIRPB- SC Sta. 28+29.72
-YIRPB- CS Sta. 26+10.72
-YIRPB- ST Sta. 23+89.33
-YIRPB- CS Sta. 21+37.72
-YIRPB- ST Sta. 20+29.33
-L- PC Sta. 22+53.25
-L- PT Sta. 23+19.23
-L- PC Sta. 30+97.39
-L- PT Sta. 31+85.55

SEE PSH 06B

WETLAND WE
SITE 4
WE Sta. 42+35.62
POND PA
SITE 4
NO WETLAND IMPACT

HOPE COMMUNITY CHURCH OF NC, INC
NC TURNPIKE AUTHORITY
VICTOR B. JAMMAL & TERESA B. MORENO CO
GEORGE WILLIAMS & JULIA PULLEN HUGHES
JOHN E. & JACQUELINE Z. BROWN

SEE SHEET 2B-25 FOR BRIDGE SKETCH
SEE SHEET 07 FOR -L- PROFILE
SEE SHEET 08 FOR -YIRPD- PROFILE
SEE SHEET 86 FOR -YIRPB- PROFILE
SEE SHEET 87 FOR -YIRPC- PROFILE
SEE SHEET 88 FOR -YILPB- PROFILE

PROPOSED SIGNAL
PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50 25 0 50 100
PLANS

LOCHNER
H. W. LOCHNER, INC.
7344 FALLS POINTE, SUITE 202
RALEIGH, NC 27615
NC License Number P-0293
SUNGATE DESIGN GROUP, P.A.

PROJECT REFERENCE NO.	SHEET NO.
R-2721	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LOCATION:
TIP NO.: R-2721 COUNTY: WAKE
DESIGNED BY:
CHECKED BY: DATE:

8/17/99

PERMIT DRAWING SHEET 13 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	6B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

25' 12.5' 0 25' 50'
SCALE: 1"=50'

WETLAND WE

SITE 4

F F DENOTES FILL IN WETLAND

P P DENOTES IMPACTS IN SURFACE WATER (POND)

POND PA

40+00

42+35.62

20+00

25+00

FS 2GI 15" RCP-III

15" RCP-III FS 2GI

48" WW

GR

12'

CONC

LT 1

LT 2

12

ISFD ABAND

SINGLE FACE BARRIER

15" RCP-IV

18" RCP-IV

TB 2GI

FALSE CUT SEE DETAIL 27A

SPEC LAT V-DITCH SEE DETAIL 34A

18" 2GI 18" RCP-III

18" RCP III

24" RCP-III

TB 2GI

-YIRPB- SC Sta. 20+28.32

-YIRPB- CS Sta. 23+37.72

R/W MON

R W 1

GEORGE WILLIAMS & JULIA PULLEN HUGHES

CHC

VICTOR B.
TERESA B.

8" PVC

72" WD

10' SOIL

HENRY

7/8/2018
R2721_hyd_prm_wet_psh_06b_ViewIn.dgn
harvell

6/23/16

PERMIT DRAWING SHEET 14 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-317

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

430 420 410 400 390 380

WETLAND

FILL IN WETLAND *(WE)*

IMPACTS IN SURFACE WATER POND

6.693:1 0.020 0.020 4.29:1 4.6:1

412.96 406.22 395.97

41+50.00

WETLAND WETLAND

FILL IN WETLAND *(WE)*

IMPACTS IN SURFACE WATER POND

6.208:1 0.020 0.020 4.33:1

411.95 399.75

41+00.00

5.738:1 0.020 0.020 5.21:1

410.86 399.61

40+50.00

SITE 4

-L- RT

7/8/2018
R2721_Hyd-prm_wet_psh_06c_xpl.dgn
jharvey

PERMIT DRAWING SHEET 15 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″ = 100′

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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MATCHLINE SHEET 6
-L- STA 45+00.00

MATCHLINE SHEET 8
-L- STA 58+00.00

-YIRPC- STA 17+00.00

-YIRPB- STA 14+00.00

3 NC TURNPIKE AUTHORITY

5 PAULINE PENNINGTON

-Y2= POC Sta.16+50.78=
-YIRPC- POC Sta.13+75.76
Δ 107°05' 36.70"

N 2°09' 37" E

20+00

PUE

12 MCI ENTERPRISES, LLC

13 WORD OF TRUTH CHURCH OF GOD

16 MCI ENTERPRISES, LLC

MCI ENTERPRISES, LLC

STREAM SF

LAT 3' BASE DITCH w/CL RIPRAP SEE DETAIL 29A

CL 15" RCP CONC RISER RIP RAP

TS

-L- POT Sta.53+33.40
-YIRPC- ST Sta.10+00.00
75.00' LT

-Y2- PT Sta.16+71.59

-YIRPC- SC Sta.12+05.00

BEGIN FENCE
+73.33 -YIRPC-
19.42' RT

15" W/ 2 ELBOWS END FENCE +39.36 -YIRPC- 19.42' RT

15" RCP-III

15" RCP-IV

7 MAINER T & UVA R. HOLLAND

6

7GI

2GI

TB 2GI

15+00

SITE 6

-YIRPC-

-Y2- PC Sta.15+95.96

MCF

55+00

-L- POT Sta.49+75.34=
-Y2- POT Sta.15+56.34
Δ = 79°27'37.04"

HARVEY L. MONTAGUE

60+00

60+51

SITE 5

-Y2- PC Sta.14+68.28=
-YIRPB- POC Sta.14+10.51
Δ 96° 35' 10.57" LT

R/W MON

EXISTING R/W PER STATE PROJECT REF # R-2635A

2 MAINER T & UVA R. HOLLAND

WETLAND WF

TOE PROTECTION SEE DETAIL 38A

-YIRPB- OS Sta.18+28.32

LORENE DOBBS

BRENDA W. BIALOCK
TERESA W. KEOPPEN

ACCESS EASEMENT PER DB 2000 PG 1820

RETAIN

PEGGY S. CANNADY

ISBLKD

-Y2- PC Sta.11+18.81
N 1° 24' 41.7" W

8 IGNACIO RODRIGUEZ IBARRA

RUINS

N 1° 17' 37.0" E

-Y2- PT Sta.13+54.88

TOE PROTECTION SEE DETAIL 38A

CL RIPRAP LENGTH=16 FT SEE DETAIL 1A

-YIRPB- SC Sta.12+00.00

-L- POT Sta.54+01.62
-YIRPB- ST Sta.10+00.00
75.00' RT

9 WETLAND WG
DARRIN F. MCCLAIN (PER GIS)
HEIR OF HENRY E. MCCLAIN

11

10

THOROUGHFARE BUFFER BM 2000 PG 1820

DAVID A. AND BETHANY NO

EDWARD C. AND PATRICIA D KILEY

JAMES B. BAILEY

REBECCA SUSAN CATCHINGS

DAVID C. AND TERENA R. ROBINSON

AT&T FIBER (INSTALLED BY SUNGATE SURVEY)

CASANA DR

14 NCDOT

15 BESSIE H. JONES

S 78° 10' 00.1" E 18" RCP-III

SEE SHEET 87 FOR -YIRPC- PROFILE
SEE SHEET 86 FOR -YIRPB- PROFILE
SEE SHEET 2B-25 FOR BRIDGE SKETCH
SEE SHEET 68 FOR -L- PROFILE

7B270IB
R-2721_Hyd_prm_wet_psh_07.dgn
lhorney

PERMIT DRAWING SHEET 16 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

END CONSTRUCTION
-Y2- STA. 19+75.00

MATCHLINE SHEET 6
-L- STA 45+00.00

MATCHLINE SHEET 8
-L- STA 58+00.00

-YIRPC- STA 17+00.00

-YIRPB- STA 14+00.00

NC TURNPIKE AUTHORITY

PAULINE PENNINGTON

MAINER T & UVA R. HOLLAND

MCI ENTERPRISES, LLC

WORD OF TRUTH CHURCH OF GOD

NCDOT

BESSIE H. JONES

HARVEY L. MONTAGUE

IGNACIO RODRIGUEZ IBARRA

LORENE DOBBS

PEGGY S. CANNADY

DARRIN F. MCCLAIN (PER GIS) HEIR OF HENRY E. MCCLAIN

EDWARD C. AND PATRICIA D. KILEY

DAVID C. AND TERENA S. ROBINSON

STREAM SF

WETLAND WF

WETLAND WG

SITE 5

SITE 6

-Y2- POC Sta.16+50.78=
-YIRPC- POC Sta.13+75.76
Δ 107°05' 36.70"

-Y2- PT Sta.16+71.59

-YIRPC- SC Sta.12+05.00

-L- POT Sta.53+33.40
-YIRPC- ST Sta.10+00.00
75.00' LT

-Y2- PC Sta.15+95.96

-L- POT Sta.49+75.34=
-Y2- POT Sta.15+56.34
Δ 79°27' 37.04"

-Y2- PT Sta.13+54.88

-YIRPB- SC Sta.12+00.00

-L- POT Sta.54+01.62
-YIRPB- ST Sta.10+00.00
75.00' RT

-Y2- PC Sta.11+18.81
N 1° 24' 41.7" W

BEGIN CONSTRUCTION
-Y2- STA. 13+72.00

N 1° 17' 37.0" E

S 78° 10' 00.1" E

-YIRPB- POC Sta.14+10.51
Δ 96° 35' 10.57"

-YIRPB- OS Sta.18+28.32

BEGIN FENCE
173.33 -YIRPC-
19.42' RT

END FENCE
139.36 -YIRPC-
19.42' RT

LAT 3' BASE DITCH w/CL I RIPRAP SEE DETAIL 19A

CL I RIPRAP LENGTH=16 FT SEE DETAIL 1A

TOE PROTECTION SEE DETAIL 38A

SINGLE FACE BARRIER

ACCESS EASEMENT PER DB 2000 PG 1820

THOROUGHFARE BUFFER DB 2000 PG 1820

AT&T FIBER INSTALLED BY SUNGATE SURVEY COMPLETION OF FIELD SURVEY

SEE SHEET 87 FOR -YIRPC- PROFILE
SEE SHEET 86 FOR -YIRPB- PROFILE
SEE SHEET 2B-25 FOR BRIDGE SKETCH
SEE SHEET 68 FOR -L- PROFILE

7822018
R2721_hyd_prm_wet_psh_07a.dgn
lhorney

5/28/99

PERMIT DRAWING SHEET 17 OF 119

LOCHNER
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2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

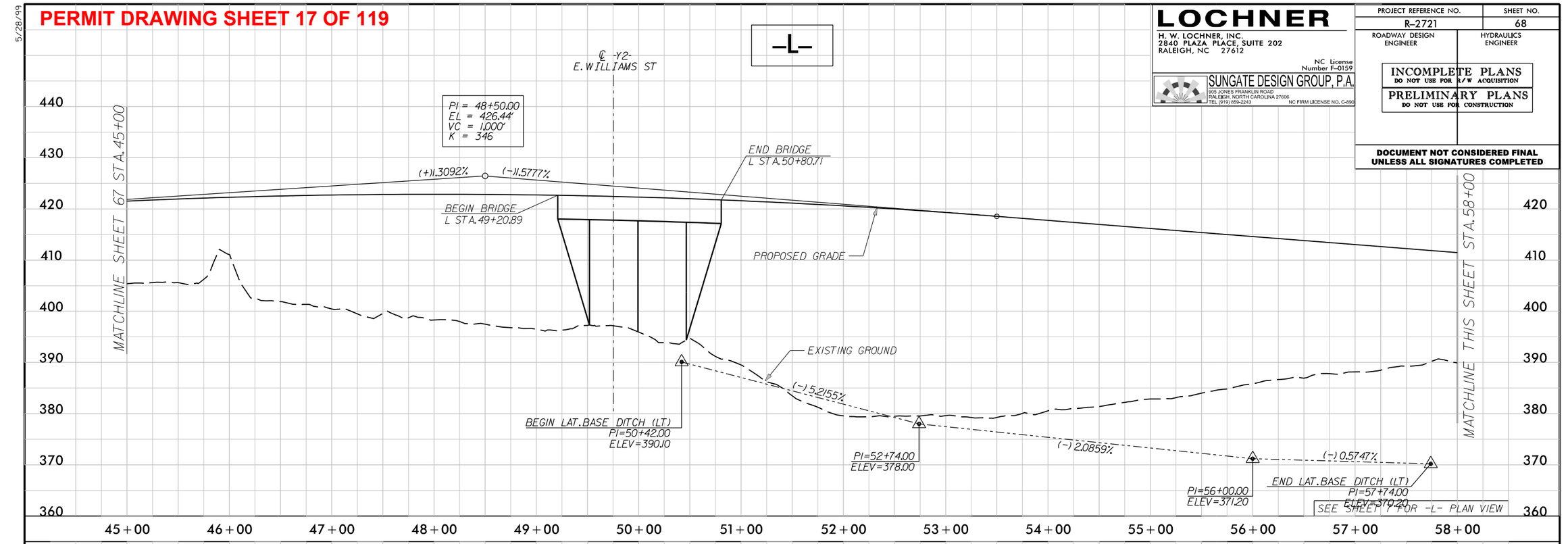
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

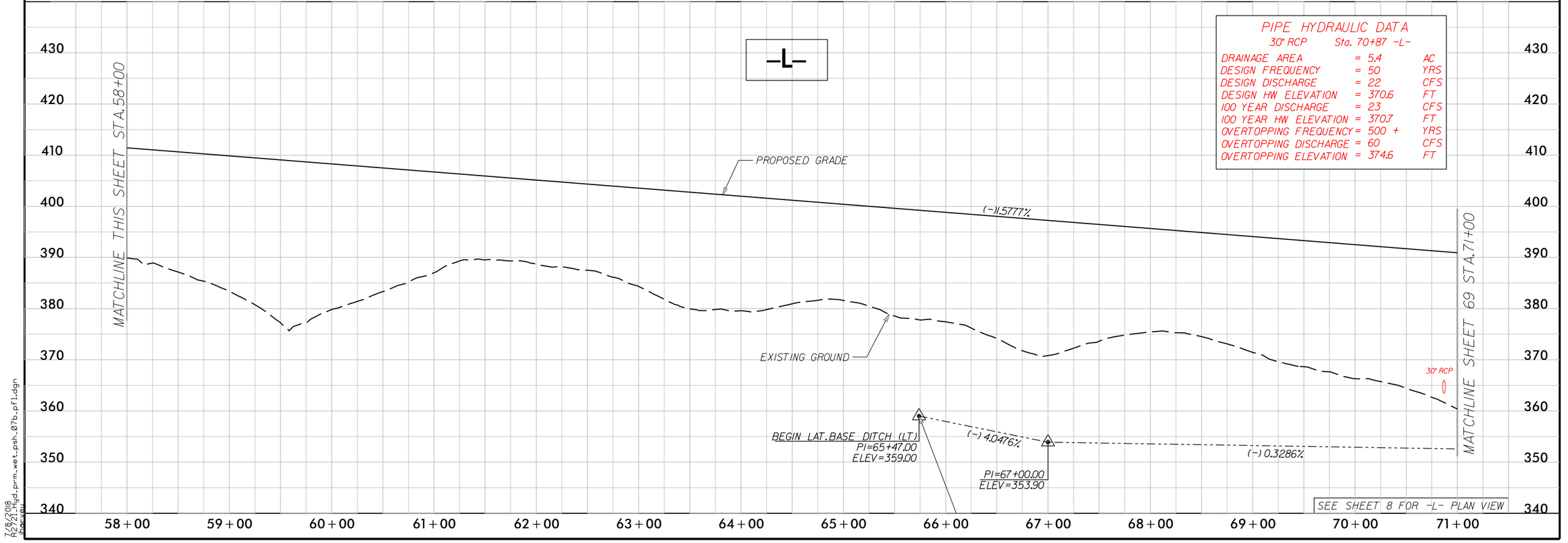
PROJECT REFERENCE NO.	SHEET NO.
R-2721	68
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





7/8/2018
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bpryan

6/23/16

PERMIT DRAWING SHEET 18 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-321

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

430 420 410 400 390

0.020

397.24

49 + 50.00

:1 8:1 0.020

419.01

2.01:1

396.50

49 + 00.00

1 8:1 0.012 0.020

419.21

WETLAND

FILL IN WETLAND (WF)

2.01:1

WETLAND

397.47

48 + 50.00

7.961:1 0.020 0.02

419.34

WETLAND

FILL IN WETLAND (WF)

2:1

WETLAND

SITE 5

398.30

48 + 00.00

-L- RT

7/9/2018
R2721_hyd_prm_wet_psh_07c_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 19 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-33

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

430 420 410 400 390 380 370

0.02 0.020 7.530:1 414.23

WETLAND

2:1

FILL IN WETLAND (WG)

WETLAND

FILL IN WETLAND (WG)

IMPACTS IN SURFACE WATER (SF)

12:1

380.56

54+00.00

0.02 0.020 7.008:1 415.02

WETLAND

2:1

FILL IN WETLAND (WG)

WETLAND

FILL IN WETLAND (WG)

IMPACTS IN SURFACE WATER (SF)

12:1

53+50.00

SITE 6

0.020 0.020 7.424:1 415.78

WETLAND

2:1

FILL IN WETLAND (WG)

12:1

53+00.00

-L- LT

7/9/2018
R2721_hyd_prm_wet_psh_07d.xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 20 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-324

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

430 420 410 400 390 380 370

8:1 414.23 8:1 0.020 0.020 2:1

WETLAND WETLAND

FILL IN WETLAND (WG)

380.56

54+00.00

8:1 415.02 8:1 0.020 0.020 2:1

WETLAND

FILL IN WETLAND (WG)

53+50.00

4:1 415.78 8:1 0.020 0.02 2:1

WETLAND

FILL IN WETLAND (WG)

53+00.00

SITE 6

-L- RT

7/9/2018
R2721gd_prm_wet_psh_07e_xpl.dgn
jharvey

PERMIT DRAWING SHEET 21 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
E E DENOTES EXCAVATION IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83/95

STREAM SG
STREAM SH
STREAM SJ
WETLAND WI
SITE 7
SITE 8
SITE 9
SITE 10

CL I RIPRAP LENGTH=10 FT SEE DETAIL 1A
CL I RIPRAP LENGTH=12 FT SEE DETAIL 1A
LAT 6' BASE DITCH w/CL I RIPRAP SEE DETAIL 6A
TOE PROTECTION SEE DETAIL 38A

-L- TS Sta. 60+14.85
-L- SC Sta. 65+39.35

MATCHLINE SHEET 7 -L- STA 58+00.00
MATCHLINE SHEET 9 -L- STA 71+00.00

16 MCI ENTERPRISES, LLC
15 BESSIE H. JONES
17 CSP COMMUNITY OWNER, LLC
18 HSA PROPERTIES LLC
10

CRYSTAL LYNN RAY
LISA M. AND TIMOTHY P. ELLIS
JOHN AND PAULETTE GALLAGHER
BEVERLY FARAH
ASHLEY JANELLE BISCOE
ROY MITCHELL III
GARY T. AND ELANA I. MURRAY
JACQUELINE B. SMITH
SANDRA N. SHECKELLS
TIMOTHY R. GARDNER
SUNSET HILLS SUBDIVISION
JERRY W. AND PAMELA E. LEE
AMH 2014-2 BORROWER, LLC
KEVIN T. BELL
RICHARD B. CLARK AND ANNETTE N. ALDRIDGE
CHRISTINA AND TRACY EVANS
ANDRE LEROUX
DANA AND WAYLON EDELEN
AARON M. AND LAURA N. RACZ

SEE SHEET 68 FOR -L- PROFILE

51499

PERMIT DRAWING SHEET 22 OF 119

F F DENOTES FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

S S DENOTES ft^2 IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

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NC License Number F-0159

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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83/95

STREAM SH

STREAM SG

STREAM SJ

WETLAND WI

SITE 7

SITE 8

SITE 9

SITE 10

-L- TS Sta. 60+14.85

-L- SC Sta. 65+39.35

MATCHLINE SHEET 7
-L- STA 58+00.00

MATCHLINE SHEET 9
-L- STA 71+00.00

S 78° 10' 00.1" E

60+00

65+00

70+00

CL I RIPRAP LENGTH = 10 FT SEE DETAIL 1A

CL I RIPRAP LENGTH = 12 FT SEE DETAIL 1A

TOE PROTECTION SEE DETAIL 38A

LAT 6' BASE DITCH w/CL I RIPRAP SEE DETAIL 6A

16 MCI ENTERPRISES, LLC

15 BESSIE H. JONES

17 CSP COMMUNITY OWNER, LLC

18 HSA PROPERTIES LLC

10

CRYSTAL LYNN RAY

LISA M. AND TIMOTHY P. ELLIS

JOHN AND PAULETTE GALLAGHER

BEVERLY FARAH

ASHLEY JANELLE BISCOE

ROY MITCHELL III

GARY T. AND ELANA I. MURRAY

JACQUELINE B. SMITH

SANDRA N. SHECKELLS

TIMOTHY R. GARDNER

JERRY W. AND PAMELA E. SEE

KEVIN T. BELL

AMH 2014-2 BORROWER LLC

RICHARD B. CLARK AND ANNETTE N. ALDRIDGE

CHRISTINA AND TRACY EVANS

ANDRE LEROUX

DANA AND WAYLON EOBLEN

AARON M. AND LAURA N. RACZ

SUNSET HILLS SUBDIVISION

SUNSHINE CREST CT

SPRING DOVE LN

REUNION CREEK PKWY

REUNION PLACE RD

AT&T FIBER INSTALLED SINCE COMPLETION OF FIELD SURVEY

THOROUGHFARE BUFFER BM 2000 PG 1820

SEE SHEET 68 FOR -L- PROFILE

7/2/2018
R2721_Hyd_prm_wet_psh_08a.dgn
jlharvey

6/23/16

PERMIT DRAWING SHEET 23 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-43

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

400 390 380 370 360 350

IMPACTS IN SURFACE WATER (SH)

FILL IN WETLAND (W1)

WETLAND

WETLAND

2:1

12:1

2:1

2:1

0.080

8:1

5.2

390.35

371.45

69+00.00

IMPACTS IN SURFACE WATER (SH)

FILL IN WETLAND (W1)

WETLAND

WETLAND

2:1

12:1

2:1

2:1

0.080

8:1

5.2

391.14

374.52

68+50.00

SITE 8

SITE 9

IMPACTS IN SURFACE WATER (SH)

FILL IN WETLAND (W1)

WETLAND

WETLAND

2:1

12:1

2:1

2:1

0.080

0.080

8:1

5.2

391.93

375.44

68+00.00

-L- LT

7/8/2018
R2721HGI_prm_wet_psh_08b_xpl.dgn
jharvey

51499

PERMIT DRAWING SHEET 24 OF 119

E E — DENOTES EXCAVATION IN WETLAND

F F — DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

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NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	9

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 8
-L- STA 71+00.00

MATCHLINE SHEET 10
-L- STA 83+00.00

SITE 11 — SITE 8 — SITE 13 — SITE 12 — SITE 10

WETLAND WK — WETLAND WL — WETLAND WL

STREAM SH — STREAM SJ — STREAM SH

HSA PROPERTIES, LLC

TRIANGLE GREENWAYS COUNCIL

LAT 6' BASE DITCH wCL I RIPRAP SEE DETAIL 6A

SANITARY SEWER EASEMENT 24" DIP

SINGLE FACE BARRIER

1@6'X8' RCBC — 1.07%

30" RCP-III — 15" RCP-IV

TOE PROTECTION SEE DETAIL 38A

LAT 2' BASE DITCH wCL B RIPRAP SEE DETAIL 4A

CL B RIPRAP OUTLET CHANNEL SEE DETAIL 47A

LAT 6' BASE DITCH wCL I RIPRAP SEE DETAIL 6A

END FENCE 8.20 FT -L- 84.42' LT

15" W/ 2 ELBOWS JB wMH

36" — 18"

72" WD — 15" CONC — 18" CONC — 24" CONC

JAMES AND DONNA MULLEN

MATTHEW J. KRISTIV AND MELISSA M. DIFONDI

DAVID L. AND ELIZABETH S. DOUGLAS

CLIFFORD J. BARTH

STEVEN DICKENS

JARED AND AMANDA MESTLER

NEAL GOODWIN

BRADLEY O. AND DIANA I. RINGLIEN

COREY A. NORTON

WILLIAM D. HAYES AND KIMBERLY A. BURRELL

SUNSET HILLS HOMEOWNERS' ASSOC.

JUNCTION BOX #1

THORNCREST DR

AT&T FIBER INSTALLED SINCE COMPLETION OF FIELD SURVEY

DETAIL 47A
CULVERT OUTLET CHANNEL STABILIZATION
(Not to Scale)

Natural Bed Elevation — NG — CL 'B' RIPRAP — CL 'I' RIPRAP — CL 'I' RIPRAP LINED CHANNEL BED — Geotextile — Length (Outlet)= 60 Ft. — 1.5' — 6'

STA. 79+00 -L- RT

8" PVC END UNK

INV=356.85
TOP=362.70'

SEE SHEET 69 FOR -L- PROFILE

51499

PERMIT DRAWING SHEET 25 OF 119

50' 25' 0 50' 100'
SCALE: 1" = 100'

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NC License Number F-0159

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

E E DENOTES EXCAVATION IN WETLAND
F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 8 -L- STA 71+00.00

MATCHLINE SHEET 10 -L- STA 83+00.00

SITE 11 · SITE 8 · SITE 10 · SITE 13 · SITE 12

WETLAND WK · WETLAND WL · STREAM SH · STREAM SJ

SINGLE FACE BARRIER · 30" RCP-III · 1@6'X8' RCBC · 15" RCP-IV · 24" DIP · 8" DIP · 8" PVC END UNK

LAT 6' BASE DITCH wCL I RIPRAP SEE DETAIL 6A

LAT 2' BASE DITCH wCL B RIPRAP SEE DETAIL 4A

LAT 6' BASE DITCH wCL I RIPRAP SEE DETAIL 8A

TOE PROTECTION SEE DETAIL 28A

TREE PROTECTION SEE DETAIL 38A

CL B RIPRAP OUTLET CHANNEL SEE DETAIL 47A

SANITARY SEWER EASEMENT

TRIANGLE GREENWAYS COUNCIL

HSA PROPERTIES, LLC

JAMES AND DONNA MULLEN

MATTHEW J. KRISTIV AND MELISSA M. DIFONDI

DAVID L. AND ELIZABETH S. DOUGLAS

CLIFFORD J. BARTH

STEVEN DICKENS

JARED AND AMANDA MESTLER

NEAL GOODWIN

BRADLEY O. AND DIANA T. RINGLIEN

COREY A. NORTON

SUNSET HILLS HOMEOWNERS' ASSOC.

WILLIAM D. HAYES AND KIMBERLY A. VBURRELL

THORNCREST DR

AT&T FIBER INSTALLED SINCE COMPLETION OF FIELD SURVEY

DETAIL 47A
CULVERT OUTLET CHANNEL STABILIZATION
(Not to Scale)
Length (Outlet)= 60 Ft.
STA. 79+00 -L- RT

SEE SHEET 69 FOR -L- PROFILE

782018
R2721_hyd_prm_wet_psh_09a.dgn
jlhoover

5/28/99

PERMIT DRAWING SHEET 26 OF 119

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 260	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 357.9	FT
BASE DISCHARGE	= 280	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 358.2	FT
OVERTOPPING DISCHARGE	= 680	CFS
OVERTOPPING FREQUENCY	= > 500	YRS
OVERTOPPING ELEVATION	= 364.2	FT

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NC License Number F-0159

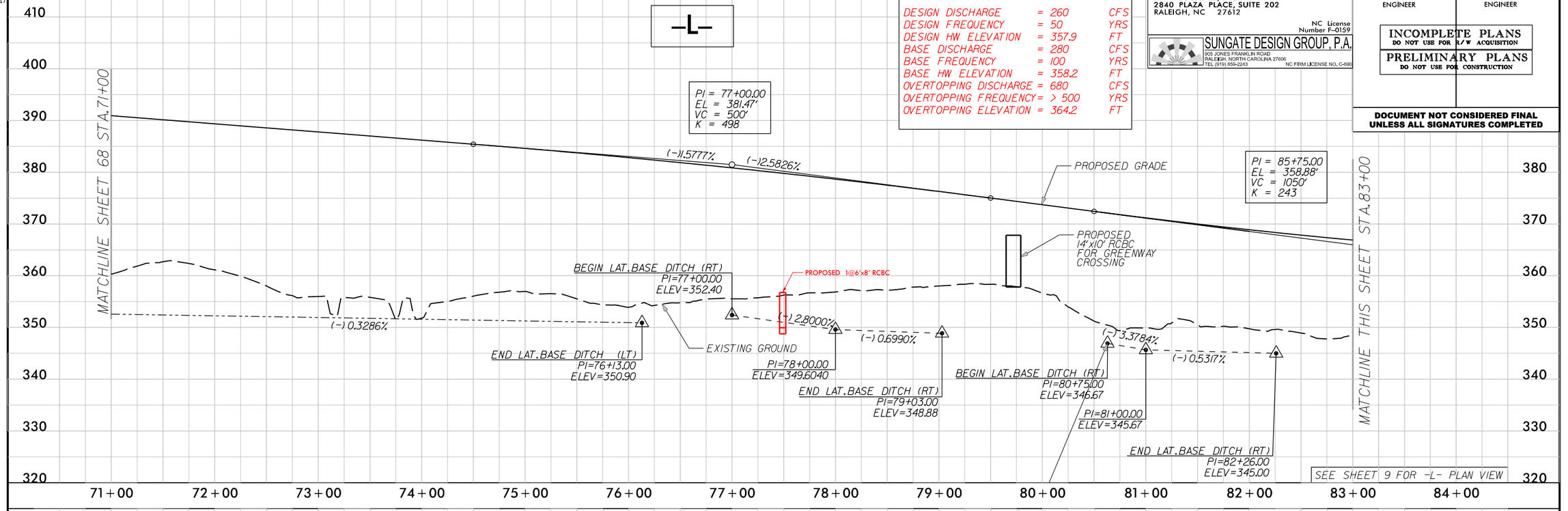
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	69
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

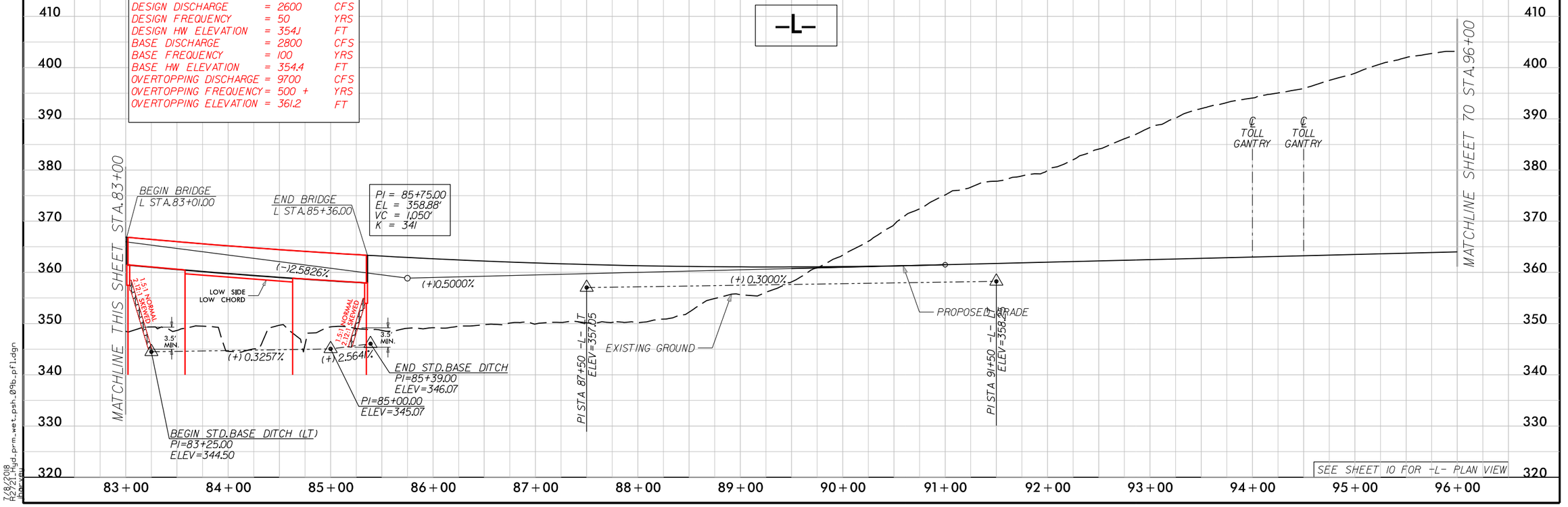
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



STRUCTURE HYDRAULIC DATA

DESIGN DISCHARGE	= 2600	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 354.1	FT
BASE DISCHARGE	= 2800	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 354.4	FT
OVERTOPPING DISCHARGE	= 9700	CFS
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING ELEVATION	= 361.2	FT



7/8/2018
R2721hyd_prm_wet_psh_09b_pfl.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 27 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-46

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

400 390 380 370 360 350

0.080
8:1
5.2
383.25
355.83
73+50.00
2:1
12:1
2:1
2:1

WETLAND
SITE 11
EXCAVATION
FILL IN WETLAND
(WK)
WETLAND
IMPACTS IN SURFACE WATER
(SH)
0.080
8:1
5.2
384.04
SITE 8
356.00
73+00.00
2:1
12:1
2:1
2:1

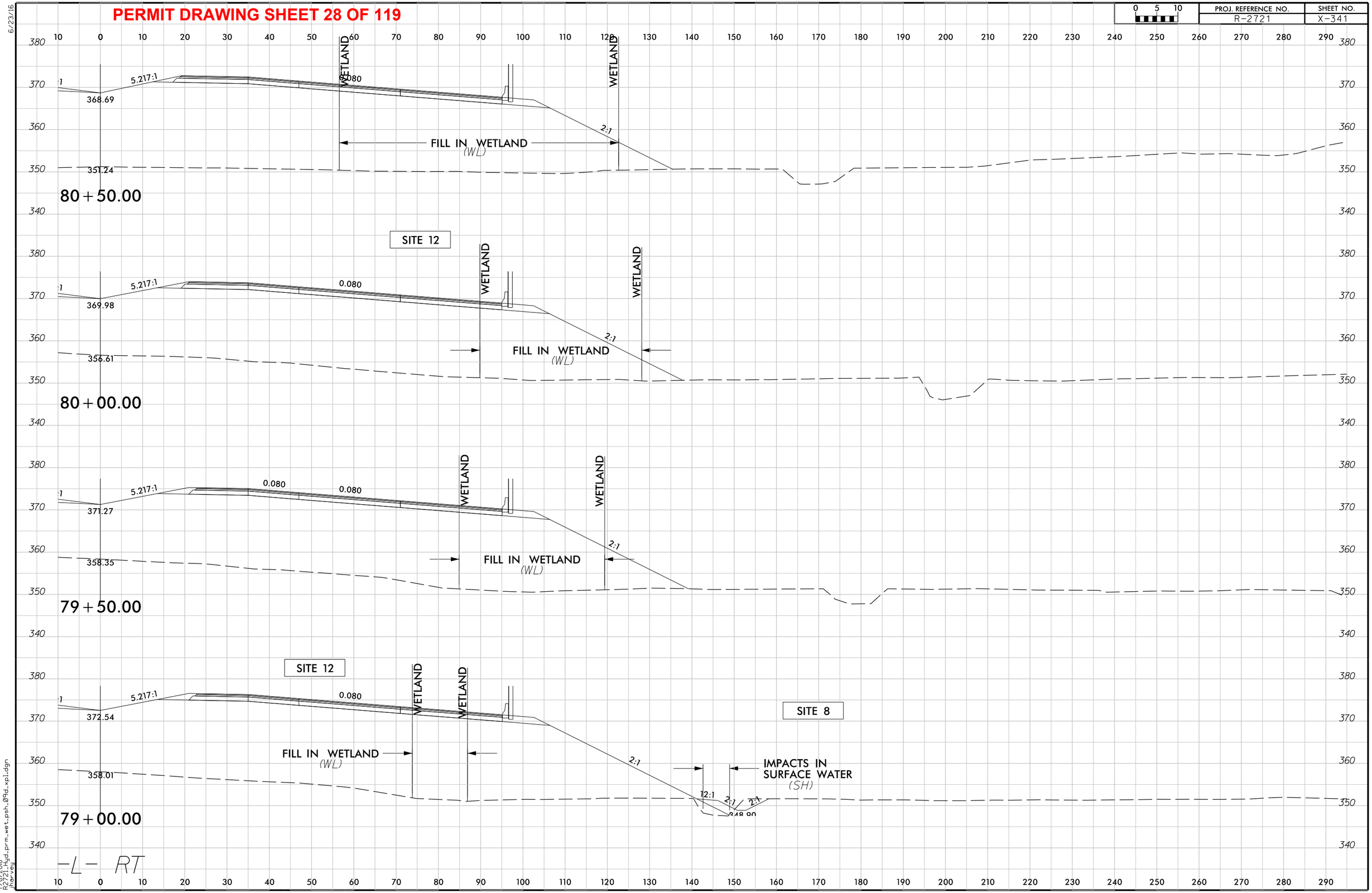
0.080
8:1
5.2
384.83
SITE 8
IMPACTS IN SURFACE WATER
(SH)
358.02
72+50.00
-L- LT
2:1
12:1
2:1
2:1

7/9/2018
R2721_std_prm_wet_psh_09c_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 28 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-341



7/9/2018
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jharvey

6/23/16

PERMIT DRAWING SHEET 29 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-51

0 5 10

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

380 370 360 350 340

SITE 13

WETLAND

WETLAND

2:1

FILL IN WETLAND
(WL)

0.060

8:1

6.0

365.43

349.75

82 + 00.00

WETLAND

SITE 12

0.066

2:1

FILL IN WETLAND
(WL)

WETLAND

8:1

5.7

366.45

350.53

81 + 50.00

WETLAND

0.074

2:1

FILL IN WETLAND
(WL)

8:1

5.4

367.52

349.90

81 + 00.00

SITE 12

WETLAND

WETLAND

WETLAND

WETLAND

0.080

2:1

FILL IN WETLAND
(WL)

8:1

5.2

368.69

351.24

80 + 50.00

-L- LT

7/9/2018
R2721hyd_prm_wet_psh_09e_xpl.dgn
jharvey

5/14/99

PERMIT DRAWING SHEET 30 OF 119

PROJECT REFERENCE NO.	SHEET NO.
U-2721	9F
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

300 200 100 0 100 200 300

CL STA 77+49 –L–
GP ELEV = 379.80
SKEW = 46 DEGREES
1 @ 6' X 8' RCBC

2:1 NORMAL
2.78:1 SKEWED

2:1 NORMAL
2.78:1 SKEWED

380

370

6" BEVELED HW

PROP. 100–YR = 358.2

PROP. 50–YR = 357.9

360

PROPOSED BASE DITCH GRADE

350

340

7/8/2018
R-2721_hyd_prm_wet_psh_09f_sec.dgn
bgravely

PERMIT DRAWING SHEET 31 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 9
-L- STA 83+00.00

MATCHLINE SHEET 11
-L- STA 96+00.00

-L- CS Sta. 83+79.88
-L- ST Sta. 89+04.88
-L- S 30° 52' 10.3" E

STREAM SM
WETLAND WR
SITE 14
SITE 14A
SITE 15
TS
S
BEGIN FENCE
54.35' SF
84.42' LF
STANDARD BASE DITCH SEE DETAIL 32A
TOE PROTECTION SEE DETAIL 38A
SPEC CUT V-DITCH SEE DETAIL 12A
TAIL DITCH w/CL II RIPRAP SEE DETAIL 37A
TOE PROTECTION SEE DETAIL 38A
CURB INLET
DROP INLET
JUNCTION BOX
FES
RCP
2GI
2GI-A
15" RCP-III
18" RCP-III
24" RCP-III
48" RCP-III
54" RCP-III
85+00
90+00
95+00

JACLYN AND JEREMY KRING
CURRIN BROS. INC
TRIANGLE GREENWAYS COUNCIL
BRIAN L. AND DEANNA C. HAMILTON
LOUIS C. III AND SHIRLEY R. DAVIS
DERRICK P. AND MICHELLE G. ARQUIETT
TIANLIN AND JUHONG LIU WANG
NC DEPT. OF TRANSPORTATION
HSA PROPERTIES LLC
SUNSET HILLS HOMEOWNERS ASSOCIATION
SUNSET HILLS HOMEOWNERS ASSOCIATION

PRIVATE UTILITY EASEMENT
PUE
SIG-COLONIAL PIPELINE EASEMENT
BOOK 1524 PG 1450
BM 1994 PG 161
20' SEWER EASEMENT BM 1998 PG 817
24" PVC END OPEN-SEE DETAIL

SEE SHEET 2B-26 FOR BRIDGE SKETCH
SEE SHEET 69 FOR -L- PROFILE

7/2/2018
R-2721_Hyd_prm_wet_psh_10.dgn
jhopper

PERMIT DRAWING SHEET 32 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND
S S TS TS DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 9
-L- STA 83+00.00

MATCHLINE SHEET 11
-L- STA 96+00.00

JACLYN AND JEREMY KRING
CURRIN BROS. INC
TRIANGLE GREENWAYS COUNCIL
BRIAN L. AND DEANNA C. HAMILTON
LOUIS C. III AND SHIRLEY R. DAVIS
TIANLIN AND JUHONG LIU WANG
DERRICK P. AND MICHELLE G. ARQUIETT
PRIVATE UTILITY EASEMENT
NC DEPT. OF TRANSPORTATION
HSA PROPERTIES LLC
SUNSET HILLS HOMEOWNERS ASSOCIATION

STREAM SM
WETLAND WR
-L- CS Sta. 83+79.88
-L- ST Sta. 89+04.88
SITE 14
SITE 14A
SITE 15
STANDARD BASE DITCH SEE DETAIL 32A
TOE PROTECTION SEE DETAIL 38A
SPEC CUT V-DITCH SEE DETAIL 12A
BEGIN FENCE 54.35 LT 84.42 LT
TAIL DITCH w/CL II RIPRAP SEE DETAIL 37A
24" PVC END UNK
85+00
90+00
95+00
S 30° 52' 10.3" E

SEE SHEET 2B-26 FOR BRIDGE SKETCH
SEE SHEET 69 FOR -L- PROFILE

7/8/2018
R-2721_Hyd_prm_wet_psh_10a.dgn
jhadley

6/23/16

PERMIT DRAWING SHEET 33 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-53

0 5 10

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

370 360 350 340

WETLAND

WETLAND

WETLAND

WETLAND

WETLAND

SITE 15

SITE 14A

0.060 2:13:1 8:1 6.0

358.76

FILL IN WETLAND (WR)

349.79

86+50.00

0.060 2:1 8:1 6.0

359.21

FILL IN WETLAND (WR)

349.20

86+00.00

0.060 2:1 8:1 6.0

359.73

FILL IN WETLAND (WR)

348.66

85+50.00

0.020

IMPACTS IN SURFACE WATER (SM)

349.36

85+00.00

2:1 2:1 12:1

345.81

0.020

2:1 2:1 12:1

345.57

349.70

84+50.00

—L— LT

7/8/2018
R2721_hgd_prm_wet_psh_10b_xpl.dgn
jharvey

PERMIT DRAWING SHEET 34 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-345

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

380 370 360 350 340

WETLAND

WETLAND

WETLAND

1 7.869:1 0.023 0.023 2:1

359.15

357.90

FILL IN WETLAND (WR)

FILL IN WETLAND (WR)

89 + 50.00

WETLAND

1 7.567:1 0.031 0.031 2:1

357.90

355.66

FILL IN WETLAND (WR)

89 + 00.00

WETLAND

WETLAND

1 7.290:1 0.038 2:1

357.98

352.24

FILL IN WETLAND (WR)

SITE 15

88 + 50.00

WETLAND

1 6.841:1 0.046 2:1

358.05

350.21

FILL IN WETLAND (WR)

88 + 00.00

-L- RT

51499

PERMIT DRAWING SHEET 35 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

ALVIN L. AND STACEY CARTER COLEY
SCOTT A. AND JENNIFER B. LANGFELDT
ANDREW J. AND MELISSA R. FELTON
LIZA M. RIVERA
JOHN C. VOLPI
NASIM AHMED
29 JAMES C. AND LIAN LIU WALKER
28 JORDAN C. AND CALLIE E. HESS
ALYSIA DANETTE DAGADU BENOIT K. AND
24 NC DEPT. OF TRANSPORTATION
25
26 THE MATA FAMILY, LLC
27 THE MATA FAMILY, LLC

MATCHLINE SHEET 43 -Y3- STA 32+00.00
MATCHLINE SHEET 10 -L- STA 96+00.00
MATCHLINE SHEET 12 -L- STA 109+00.00
MATCHLINE SHEET 42 -Y3- STA 22+00.00

-L- TS Sta. 98+31.10
-L- SC Sta. 101+51.10
-Y3- PC Sta. 23+09.88
-L- POC Sta.103+53.19=
-Y3- POC Sta.27+12.96
Δ = 133°23'27.16"

BERM DITCH STA. 102+00 – 103+90 -L- LT
24" W/ 3 ELBOWS
24" W/ 2 ELBOWS
24" RCP-IV
-L- S 30° 52' 10.3" E
-Y3- S 68° 08' 00.2" E
100+00
105+00
25+00
REMOVE
SPEC CUT V-DITCH SEE DETAIL 12A
WETLAND WU
PUE
SITE 16
TOTAL TAKE

E E DENOTES EXCAVATION IN WETLAND

SEE SHEET 101 FOR -Y3- PROFILE
SEE SHEET 2B-26 FOR BRIDGE SKETCH | SEE SHEET 70 FOR -L- PROFILE

7/8/2018
R-2721_Hyd_prm_wet_psh_11.dgn
lhunter

51499

PERMIT DRAWING SHEET 36 OF 119

SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 43
-Y3- STA 32+00.00

MATCHLINE SHEET 10
-L- STA 96+00.00

MATCHLINE SHEET 12
-L- STA 109+00.00

MATCHLINE SHEET 42
-Y3- STA 22+00.00

ALYSIA DANETTE DAGADUT
BENOIT K. AND

JAMES C. AND LIAN LIU WALKER

ALVIN L. AND STACEY CARTER COLEY

SCOTT A. AND JENNIFER B. LANGFELDT

ANDREW J. AND MELISSA R. FELTON

LIZA M. RIVERA

JOHN C. VOLPI

NASIM AHMED

JORDAN C. AND CALLIE E. HESS

NC DEPT. OF TRANSPORTATION

THE MATA FAMILY, LLC

WETLAND WU

SITE 16

TOTAL TAKE

E E DENOTES EXCAVATION IN WETLAND

-L- TS Sta. 98+31.10

-L- SC Sta. 101+51.10

-Y3- PC Sta. 23+09.88

-L- POC Sta. 103+53.19=
-Y3- POC Sta. 27+12.96
Δ = 133°23'27.16"

-L- S 30° 52' 10.3" E

S 68° 08' 00.2" -L-

BERM DITCH
STA. 102+00 - 103+90 -L- LT

SPEC CUT Y-DITCH
SEE DETAIL 12A

SEE SHEET 101 FOR -Y3- PROFILE

SEE SHEET 2B-26 FOR BRIDGE SKETCH | SEE SHEET 70 FOR -L- PROFILE

7/8/2018
R-2721 Hyd_prm_wet_psh_11a.dgn
lhorvat

PERMIT DRAWING SHEET 37 OF 119

51499

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

BM 2008 PG 105

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

M/I HOMES OF RALEIGH LLC U/C

KEVIN AND SUSAN CASSANO

SCHANTEL AND RODERICK BOURKNIGHT

ROBERT AND JENNIFER SMITH

MICHAEL AND PAMELA WHITE

MAURICE AND JAMILA MINGA

M/I HOMES OF RALEIGH LLC

M/I HOMES OF RALEIGH LLC

BERM DITCH STA. 108+80 – 111+00 –L– LT

BERM DITCH STA. 116+00 – 117+50 –L– LT

TDE

BDO

26 THE MATA FAMILY, LLC

36 HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

37 NC DEPT OF TRANSPORTATION

WETLAND WU

WETLAND WV

SITE 16

SITE 17

27 THE MATA FAMILY, LLC

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

50' I-540 C-255 BUFFER BM 2008 PG 109

25' COMMON OPEN SPACE BM 2008 PG 109

20' TOWN OF HOLLY SPRINGS WATERLINE EASEMENT BM 2011 PG 72

50' TEMPORARY ACCESS & AT-WILL ENCROACHMENT EASEMENT BM 2007 PG 2789 BM 2011 PG 72

MATCHLINE SHEET 11 –L– STA 109+00.00

MATCHLINE SHEET 13 –L– STA 122+00.00

42" RCP-III

18" RCP-III

15" RCP-III

2GI

2GI-D

2GI-B

FS

110+00

115+00

120+00

DAYLIGHT DITCH

TOE PROTECTION SEE DETAIL 38A

CL I RIPRAP

LAT V-DITCH w/CL I RIPRAP SEE DETAIL 28A

GRADE TO DRAIN (GTD)

38 NC DEPT OF TRANSPORTATION

50' I-540 C-255 BUFFER BM 2016 PG 455

20' TYPE A-20 PERIMETER BUFFER BM 2016 PG 455

M/I HOMES OF RALEIGH LLC

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

32

33

34

35 RETAIN

1,5SFD YAN QIN

EXISTING R/W

F F DENOTES FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

SEE SHEET 70 FOR –L– PROFILE

7/8/2018
R2721_Hyd_prm_wet_psh_12.dgn
jhorney

PERMIT DRAWING SHEET 38 OF 119

51499

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 11 -L- STA 109+00.00

MATCHLINE SHEET 13 -L- STA 122+00.00

BM 2008 PG 105

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

M/I HOMES OF RALEIGH LLC U/C

KEVIN AND SUSAN CASSANO

SCHANTEL AND RODERICK BOURKNIGHT

ROBERT AND JENNIFER SMITH

MICHAEL AND PAMELA WHITE

MAURICE AND JAMILA MINGA

M/I HOMES OF RALEIGH LLC

M/I HOMES OF RALEIGH LLC

BERM DITCH STA. 108+80 – 111+00 –L– LT

BERM DITCH STA. 116+80 – 117+50 –L– LT

TDE

BDO

26" W 2 ELBOWS

18" W 2 ELBOWS

42" RCP-III

18" RCP-III

15" RCP-III

WETLAND WU

WETLAND WV

SITE 16

SITE 17

THE MATA FAMILY, LLC

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

NC DEPT OF TRANSPORTATION

50' I-540 C-255 BUFFER BM 2008 PG 109

25' COMMON OPEN SPACE BM 2008 PG 109

20' TOWN OF HOLLY SPRINGS WATERLINE EASEMENT BM 2011 PG 72

50' I-540 C-255 BUFFER BM 2016 PG 455

20' TYPE A-20 PERIMETER BUFFER BM 2016 PG 455

50' TEMPORARY ACCESS & AT-WILL ENCROACHMENT EASEMENT BM 2007 PG 2789 BM 2011 PG 72

DAYLIGHT DITCH

TOE PROTECTION SEE DETAIL 38A

CL I RIPRAP

LAT V-DITCH w/CL I RIPRAP SEE DETAIL 28A

GRADE TO DRAIN (GTD)

RETAIN

1.5SFD

YAN QIN

EXISTING R/W

F F DENOTES FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

SEE SHEET 70 FOR -L- PROFILE

782018
R2721_Hyd_prm_wet_psh_12a.dgn
lhorvey

5/28/99

PERMIT DRAWING SHEET 39 OF 119

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

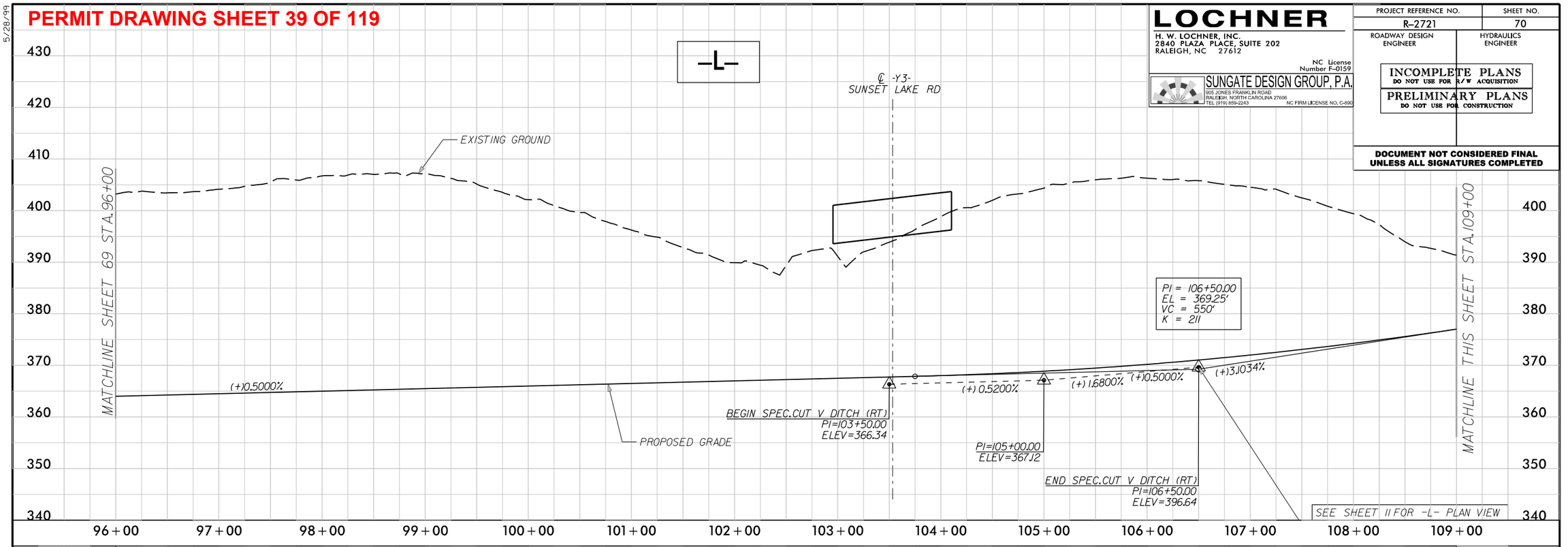
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

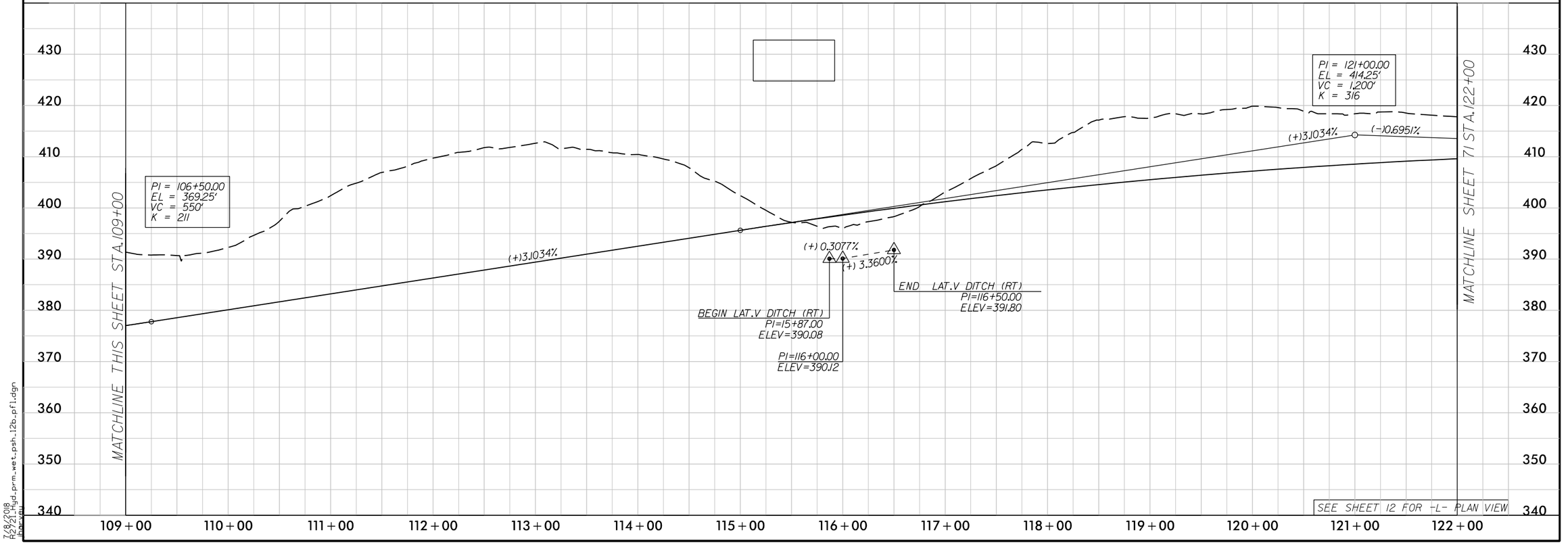
PROJECT REFERENCE NO.	SHEET NO.
R-2721	70
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





7/8/2018
R-2721_hyd_prm_wet_psh_12b_pf1.dgn
barvel

6/23/16

PERMIT DRAWING SHEET 40 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-74

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

SITE 16

WETLAND

EXCAVATION
(WU)

420 410 400 390 380 370 360

3.05:1

4:1 6:1 0.050 0.050 6.593:1

373.55 375.24 390.70

109+50.00

3.03:1

4:1 6:1 0.050 0.050 6.593:1

372.30 373.70 391.38

109+00.00

-L- LT

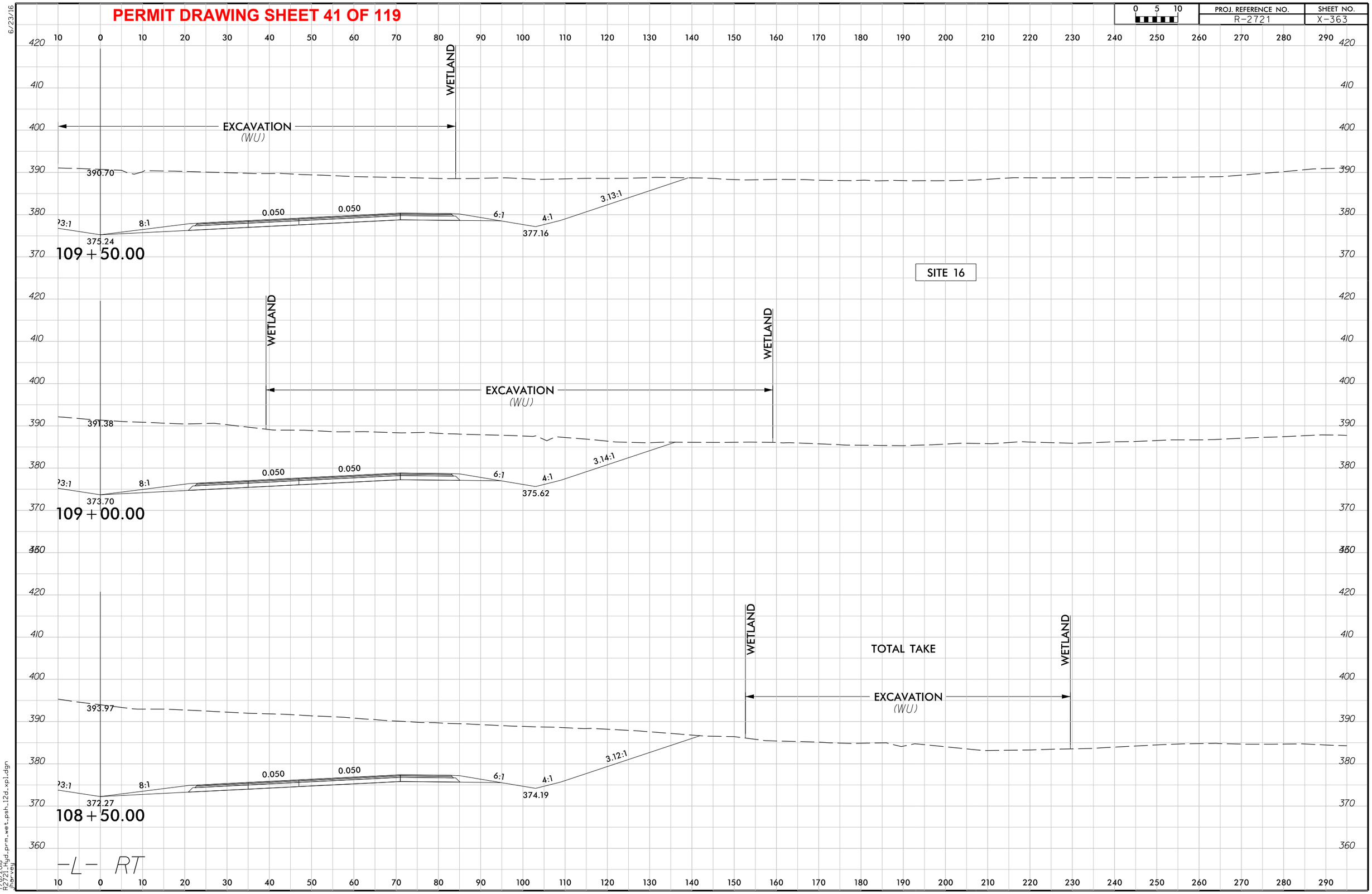
7/8/2018
R2721_Grd_prm_wet_psh_12c-xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 41 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-363

SITE 16



7/9/2018
R2721hyd_prm_wet_psh_12d_xpl.dgn
jharvey

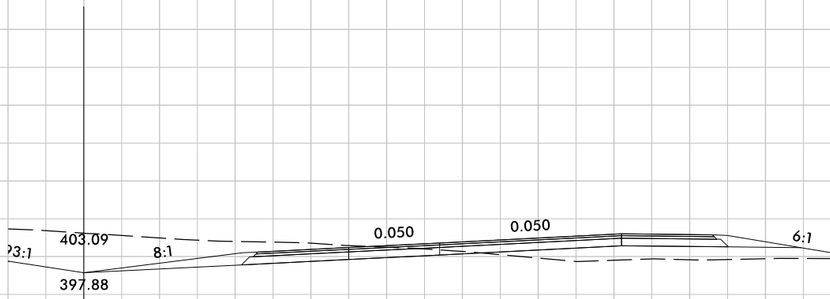
6/23/16

PERMIT DRAWING SHEET 42 OF 119

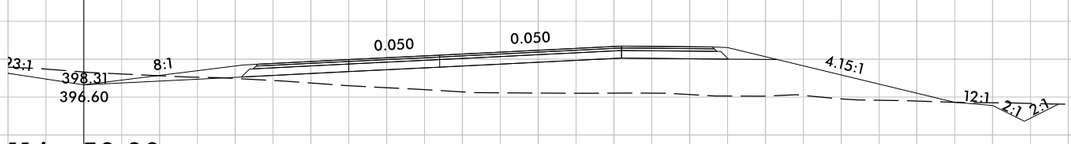
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	R-2721	X-368

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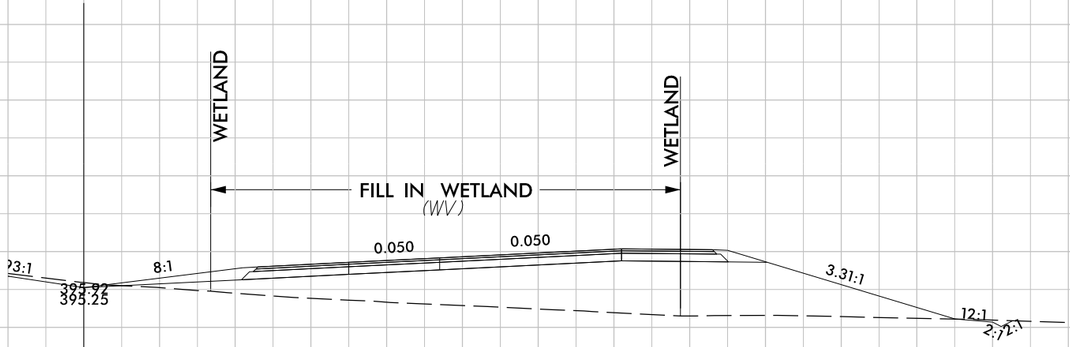
440 430 420 410 400 390 380



117 + 00.00



116 + 50.00



116 + 00.00

-L- RT

7/9/2018
R2721hyd_prm_wet_psh_12e_xpl.dgn
jharvey

51499

PERMIT DRAWING SHEET 43 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1" =100′

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LAWRENCE AND JULIA BOURDEAU
PABLO AND SUSAN LIZARAZO
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2012 PG 865
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2011 PG 72
25' COMMON OPEN SPACE BM 2008 PG 2093
50' I-540 C-255 BUFFER BM 2008 PG 1083
30' PUBLIC AT-WILL GREENWAY ENCROACHMENT BM 2011 PG 72
-Y3A- PC Sta. 13+95.82
-Y3A- PRC Sta. 14+58.19
-Y3A- PT Sta. 15+17.18
-Y3A- POT Sta. 15+56.64
-Y3A- PT Sta. 11+58.72
-Y3A- PRC Sta. 11+14.18
-Y3A- PC Sta. 10+30.42
-Y3A- POT Sta. 10+00.00
SITE 18
SITE 18A
STREAM SS
STREAM SQ
WETLAND WX
INLET CHANNEL SEE DETAIL 48A
TOE PROTECTION SEE DETAIL 38A
CL B RIPRAP
GRADE TO DRAIN (GTD)
1@6'X4' RCBC
24" RCP-III
15" RCP-IV
18" RCP-III
2GI
2GI-A
FS
TS
S
MATCHLINE SHEET 12 -L- STA 122+00.00
MATCHLINE SHEET 14 -L- STA 135+00.00
125+00
130+00
39
NC DEPT OF TRANSPORTATION
38
NC DEPT OF TRANSPORTATION
M/I HOMES OF RALEIGH LLC
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
TAYLOR MORRISON OF CAROLINAS INC
KEMING CAO
EDWIN WITTIG
DEREK MCCONNACHIE
DALE AND NANCY LEE
LUJIE LIN
LEAH NORMANN
JOHN LANGAKER
BISHAN YE
ANNA FLORIAN
CORY ROYSTER
VICTOR AND KIMBERLEY POWLEY
JINGXU HE AND YAN YAN ZHANG
ALEX AMBROSE
MAYFIELD DR
MYSTIC PINE PL
CONC PATIOS AND 72" PVC FENCES
BLK WALL W/36" MTL RAIL
GEO PLASTIC
CONC RISER
PVC END UNIT
63 DAN

SEE SHEET 71 FOR -L- PROFILE

7/8/2018
8:07:27 AM
lhorzer

R-2721_Hyd_prm_wet_psh_13.dgn

51499

PERMIT DRAWING SHEET 44 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1″ =100′

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

LAWRENCE AND JULIA BOURDEAU
PABLO AND SUSAN LIZARAZO
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2012 PG 865
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2011 PG 72
30' PUBLIC CAT-WILLIAMS GREENWAY ENCROACHMENT BM 2011 PG 72
COMMON OPEN SPACE BM 2008 PG 1083
50' I-540 C 255 BUFFER BM 2008 PG 1083
-Y3A- POB Sta. 15+56.64
-Y3A- PT Sta. 15+17.18
-Y3A- PRC Sta. 14+58.19
-Y3A- PC Sta. 13+95.82
-Y3A- PT Sta. 11+58.72
-Y3A- PRC Sta. 11+14.18
-Y3A- PC Sta. 10+30.42
-Y3A- POT Sta. 10+00.00
N 14° 48' 18" E 1529.18'
S 14° 48' 18" W 1529.18'
SITE 18
SITE 18A
STREAM SS
STREAM SQ
WETLAND WX
INLET CHANNEL SEE DETAIL 48A
TOE PROTECTION SEE DETAIL 38A
GRADE TO DRAIN (GTD)
CL B RIPRAP
2GI
2GI-A
FS
TS
S
1@6'X3' RCBC
24" RCP-III
15" RCP-IV
18" RCP-III
12" CPP
15" CPP
18" CPP
RIP RAP
CONC RISER
DEC PLASTIC
BLK WALL W/36" MTL RAIL
72" RCP
MYSTIC PINE PL
20' BST
25' BST
MAYFIELD DR
EXISTING R/W
CONC PATIOS AND 72" PVC FENCES
NC DEPT OF TRANSPORTATION
M/I HOMES OF RALEIGH LLC
M/I HOMES OF U/C RALEIGH LLC
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
TAYLOR MORRISON OF CAROLINAS INC
KEMING CAO
EDWIN WITTIG
DEREK MCCONNACHIE
DALE AND NANCY LEE
LEAH NORMANN
JOHN LANGAKER
ANNA FLORIAN
BISHAN YE
LIJIE LIN
CORY ROYSTER
VICTOR AND KIMBERLEY POWLEY
JINGXU HE AND YAN YAN ZHANG
ALEX AMBROSE
MATCHLINE SHEET 12 -L- STA 122+00.00
MATCHLINE SHEET 14 -L- STA 135+00.00
125+00
130+00

SEE SHEET 71 FOR -L- PROFILE

7/8/2018
R2721_Hyd_prm_wet_psh_13a.dgn
lhoward

5/28/99

PERMIT DRAWING SHEET 45 OF 119

LOCHNER	PROJECT REFERENCE NO.	SHEET NO.
H. W. LOCHNER, INC. 2840 PLAZA PLACE, SUITE 202 RALEIGH, NC 27612 NC License Number F-0159	R-2721	71
SUNGATE DESIGN GROUP, P.A. 905 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 TEL (919) 859-2243 NC FIRM LICENSE NO. C-890	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 150	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 390.2	FT
BASE DISCHARGE	= 160	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 390.3	FT
OVERTOPPING DISCHARGE	= 950	CFS
OVERTOPPING FREQUENCY	= > 500	YRS
OVERTOPPING ELEVATION	= 404.5	FT

-L-

PI = 121+00.00
EL = 414.25'
VC = 1,200'
K = 316

(-)0.6951%

(-)0.6951%

PROPOSED 14'x10' RCBC FOR GREENWAY CROSSING

PROPOSED 1@6'x8' RCBC

WS ON 3-7-18 =386.6

PROPOSED GRADE

EXISTING GROUND

MATCHLINE SHEET 70 STA.122+00

MATCHLINE THIS SHEET STA.135+00

SEE SHEET 15 FOR -L- PLAN VIEW

440 430 420 410 400 390 380 370

122+00 123+00 124+00 125+00 126+00 127+00 128+00 129+00 130+00 131+00 132+00 133+00 134+00 135+00

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 180	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 377.3	FT
BASE DISCHARGE	= 190	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 377.5	FT
OVERTOPPING DISCHARGE	= 1030	CFS
OVERTOPPING FREQUENCY	= > 500	YRS
OVERTOPPING ELEVATION	= 393.1	FT

-L-

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 130	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 377.4	FT
BASE DISCHARGE	= 140	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 377.6	FT
OVERTOPPING DISCHARGE	= 542	CFS
OVERTOPPING FREQUENCY	= > 500	YRS
OVERTOPPING ELEVATION	= 383.5	FT

PI = 144+60.00
EL = 397.85'
VC = 400'
K = 335

(-)0.6951%

(+)0.5005%

PROPOSED GRADE

EXISTING GROUND

PROPOSED 1@6'x8' RCBC

WS ON 3-7-18 =373.3

(-) 0.3056%

(-) 5.6400%

BEGIN LAT.V DITCH (RT)
PI=141+50.00
ELEV=371.65

PI=142+00.00
ELEV=368.83

END LAT.BASE DITCH (RT)
PI=142+36.00
ELEV=368.72

PROPOSED 1@6'x8' RCBC

WS ON 3-7-18 =373.3

(-) 5.1908%

LAT.BASE DITCH (RT)
PI=146+00.00
ELEV=374.10

END LAT.BASE DITCH (RT)
PI=147+31.00
ELEV=367.30

MATCHLINE THIS SHEET STA.135+00

MATCHLINE SHEET 72 STA.148+00

SEE SHEET 16 FOR -L- PLAN VIEW

440 430 420 410 400 390 380 370 360 350

135+00 136+00 137+00 138+00 139+00 140+00 141+00 142+00 143+00 144+00 145+00 146+00 147+00 148+00

7/8/2018
R-2721_std_prm_wet_psh_13b_pfl.dgn
bpowell

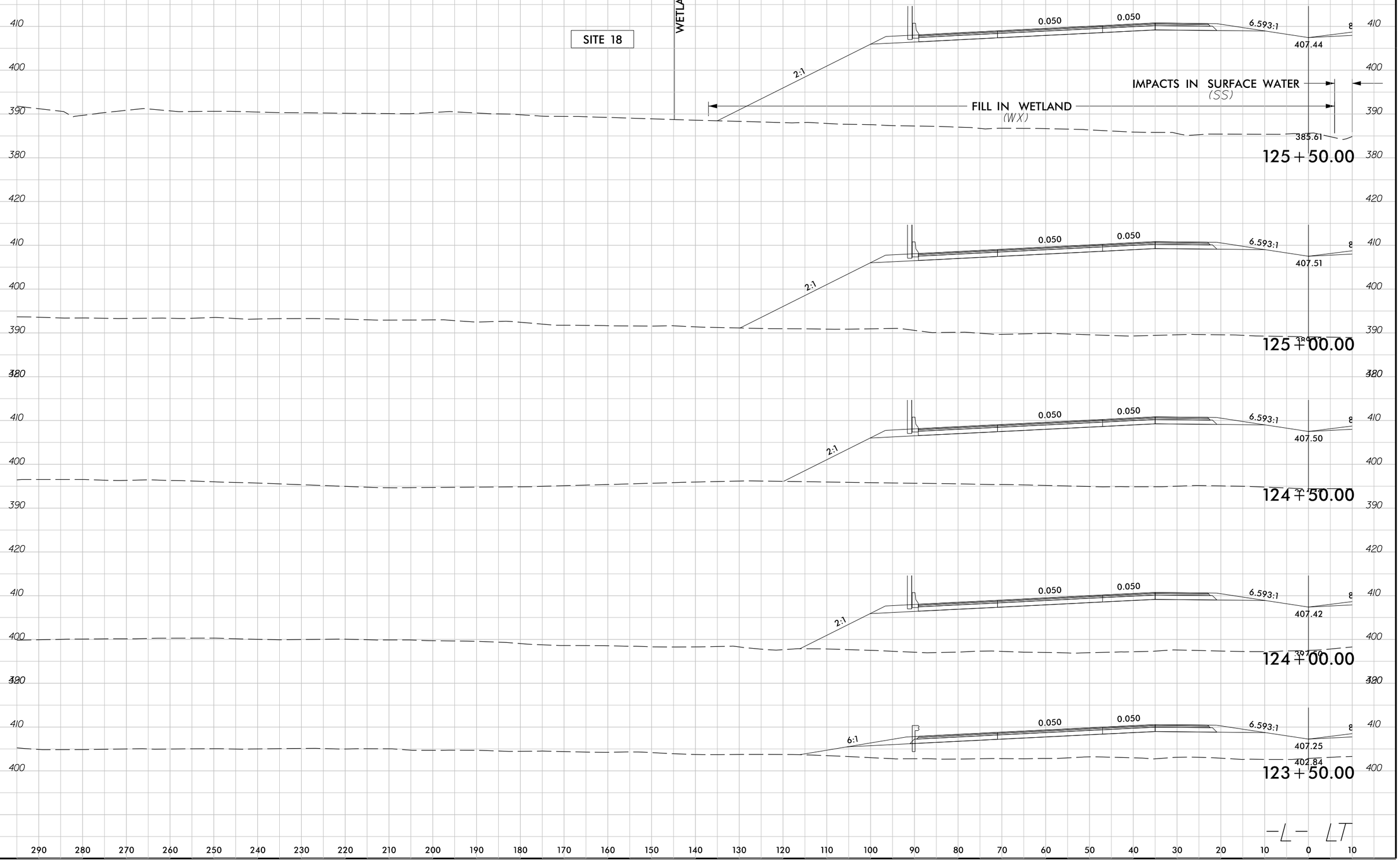
6/23/16

PERMIT DRAWING SHEET 46 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-83

SITE 18

WETLAND



7/8/2018
R2721hyd_prm_wet_psh_13c_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 47 OF 119

0 5 10

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-373

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

420 410 400 390 380

3:1 8:1 406.75 0.050 0.050 2:1

FILL IN WETLAND (WX)

WETLAND

389.56

127+00.00

420 410 400 390 380

WETLAND 3:1 8:1 407.06 0.050 0.050 2:1

FILL IN WETLAND (WX)

389.20

126+50.00

SITE 18

WETLAND

420 410 400 390 380

3:1 8:1 407.29 WETLAND 0.050 0.050 WETLAND 2:1

FILL IN WETLAND (WX)

386.72

126+00.00

370

—L— RT

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

7/8/2018
R2721_hwy_prm_wet_psh_13d_xpl.dgn
jharvey

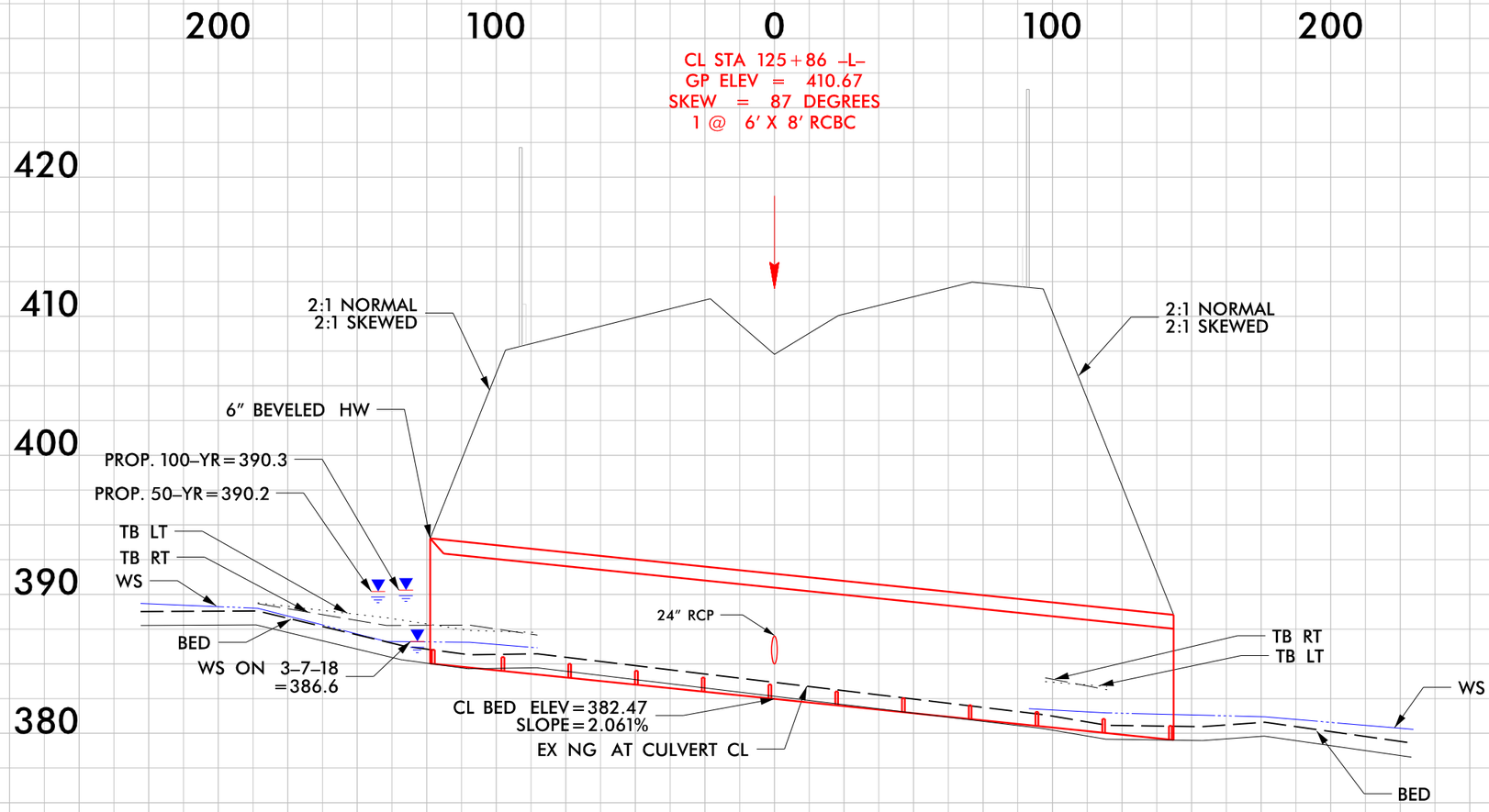
5/14/99

PERMIT DRAWING SHEET 48 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	13E
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/8/2018
R2721_hyd_prm_wet_psh_13e_sec.dgn
jbarvel

51499

PERMIT DRAWING SHEET 49 OF 119

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

E E DENOTES EXCAVATION IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 13 -L- STA 122+00.00

MATCHLINE SHEET 15 -L- STA 148+00.00

WALLACE FARRINGTON

NEW HOPE CHURCH ROAD

8" DIP

8" PVC

WETLAND WY

39 NC DEPT OF TRANSPORTATION

40 NATALIE AND THOMAS BROOKS

41 NC DEPT OF TRANSPORTATION

43 BENJAMIN MCDONALD

44 WILLIAM AND BERTHA TURNER

45 WILLIAM GRIFFIN

46 JAMES TURNER AND WILLIAM TURNER

47 H&B STEPHENSON FAMILY LLC

STREAM SV

STREAM ST

WETLAND WZ

SITE 19

SITE 20

SITE 21

INLET CHANNEL SEE DETAIL 49A

BEGIN FENCE -L- 19.33 130.83' LT

END FENCE -L- 91.85 130.94' LT

TOE PROTECTION SEE DETAIL 38A

BEGIN FENCE -L- 90.49 127.47' LT

END FENCE -L- 65.46 127.39' LT

1@6'X8' RCBC

1.63%

1.47%

30" W/ 2 ELBOWS

24" W/ 2 ELBOWS

LAT 3' BASE DITCH w/CL B RIPRAP SEE DETAIL 10A

LAT 3' BASE DITCH w/CL B RIPRAP SEE DETAIL 5A

OUTLET CHANNEL SEE DETAIL 49A

OUTLET CHANNEL SEE DETAIL 50A

60' PRIVATE ROAD EASEMENT BM 1981 PG 1000

140+00

145+00

18" RCP-III

15" RCP-III

15" RCP-IV

24" RCP-III

30" RCP-III

SINGLE FACE BARRIER

BRIDGET GWALTNEY

TAYLOR MORRISON OF CAROLINAS INC

DIANE COX

ALLISON AND STEVEN HARRIS

WOODCREEK NEIGHBORHOOD ASSN INC

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

ERIN KAMM

MATTHEW AND HEATHER JONES

TIMOTHY REINHARDT AND APRIL SMITH

BASKETBALL

TENNIS COURTS

PLAY GROUND

SEE SHEET 71 FOR -L- PROFILE

7/8/2018
8:37:21 AM
lhorzay

R-2721_Hyd_prm_wet_psh_14.dgn

51499

PERMIT DRAWING SHEET 50 OF 119

SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

E E DENOTES EXCAVATION IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 13 -L- STA 122+00.00

MATCHLINE SHEET 15 -L- STA 148+00.00

WALLACE FARRINGTON

WETLAND WY 40 NATALIE AND THOMAS BROOKS

WETLAND WZ

STREAM SV

STREAM ST

SITE 19

SITE 20

SITE 21

BEGIN FENCE +19.33 -L- 130.83' LT

END FENCE +91.85 -L- 130.94' LT

BEGIN FENCE +90.49 -L- 127.47' LT

END FENCE +69.46 -L- 127.39' LT

TOE PROTECTION SEE DETAIL 38A

1@6'X8' RCBC

63%

1.47%

18" RCP-III

15" RCP-IV

30" RCP-III

24" RCP-III

24" W/ 2 ELBOWS

30" W/ 2 ELBOWS

LAT 3' BASE DITCH w/CL B RIPRAP SEE DETAIL 10A

LAT 3' BASE DITCH w/CL B RIPRAP SEE DETAIL 5A

140+00

145+00

BRIDGET GWALTNEY

TAYLOR MORRISON OF CAROLINAS INC

WOODCREEK NEIGHBORHOOD ASSN INC

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC

NC DEPT OF TRANSPORTATION

60' PRIVATE ROAD EASEMENT BM 1981 PG 1000

MATTHEW AND HEATHER JONES

TIMOTHY REINHARDT AND APRIL SMITH

ERIN KAHL

IE COX

25TH

BASKETBALL

TENNIS COURTS

PLAY GROUND

SINGLE FACE BARRIER

SEE SHEET 71 FOR -L- PROFILE

6/22/2018
R2721_Hyd_prm_wet_psh_14o.dgn
jhatvary

6/23/16

PERMIT DRAWING SHEET 51 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-91

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

SITE 19

WETLAND

WETLAND

FILL IN WETLAND

IMPACTS IN SURFACE WATER (ST)

410 400 390 380 370

397.5 0.050 0.050 6.590:1 8

396.67

SITE 19

374.98

141+50.00

397.8 0.050 0.050 6.590:1 8

397.02

375.68

141+00.00

398.2 0.050 0.050 6.590:1 8

397.37

382.79

140+50.00

3.03:1 0.050 0.050 6.593:1 8

397.72

388.84

140+00.00

-L- LT

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

7/9/2018
R2721Hyd_prm_wet_psh_14b_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 52 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-95

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

410 400 390 380 370 360

SITE 20

WETLAND

WETLAND

WETLAND

FILL IN WETLAND
(WZ)

FILL IN WETLAND
(WZ)

396.8 0.050 0.050 6.590:1 8 395.97 374.15

147+50.00

396.5 0.050 0.050 6.590:1 8 395.72 375.91

147+00.00

396.3 0.050 0.050 6.590:1 8 395.47 377.65

146+50.00

-L- LT

7/8/2018
R2721_hgd_prm_wet_psh_14c_xpl.dgn
jharvey

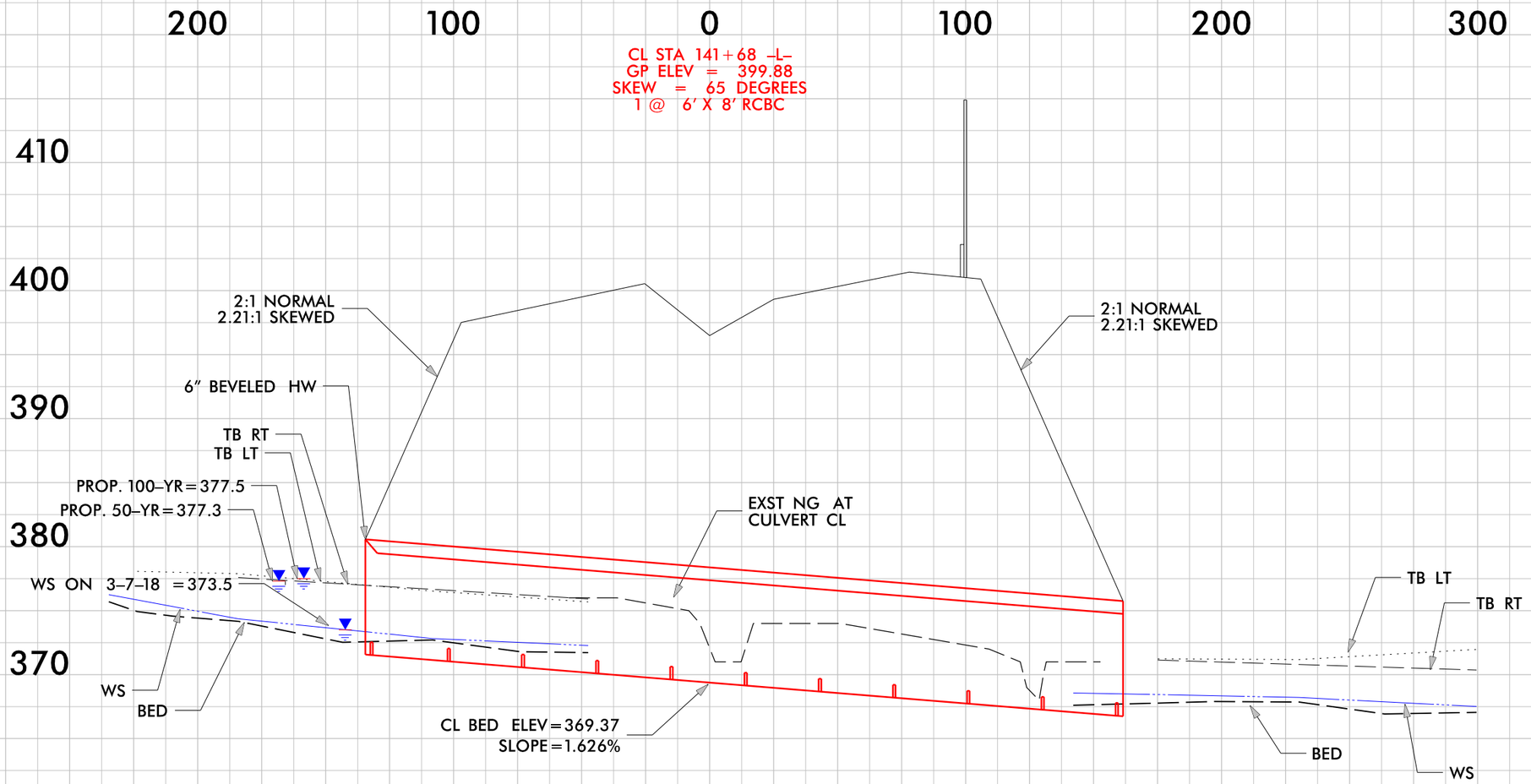
5/14/99

PERMIT DRAWING SHEET 53 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	14D
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



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R2721_hyd_prm_wet_psh_14d_sec.dgn
bgravel

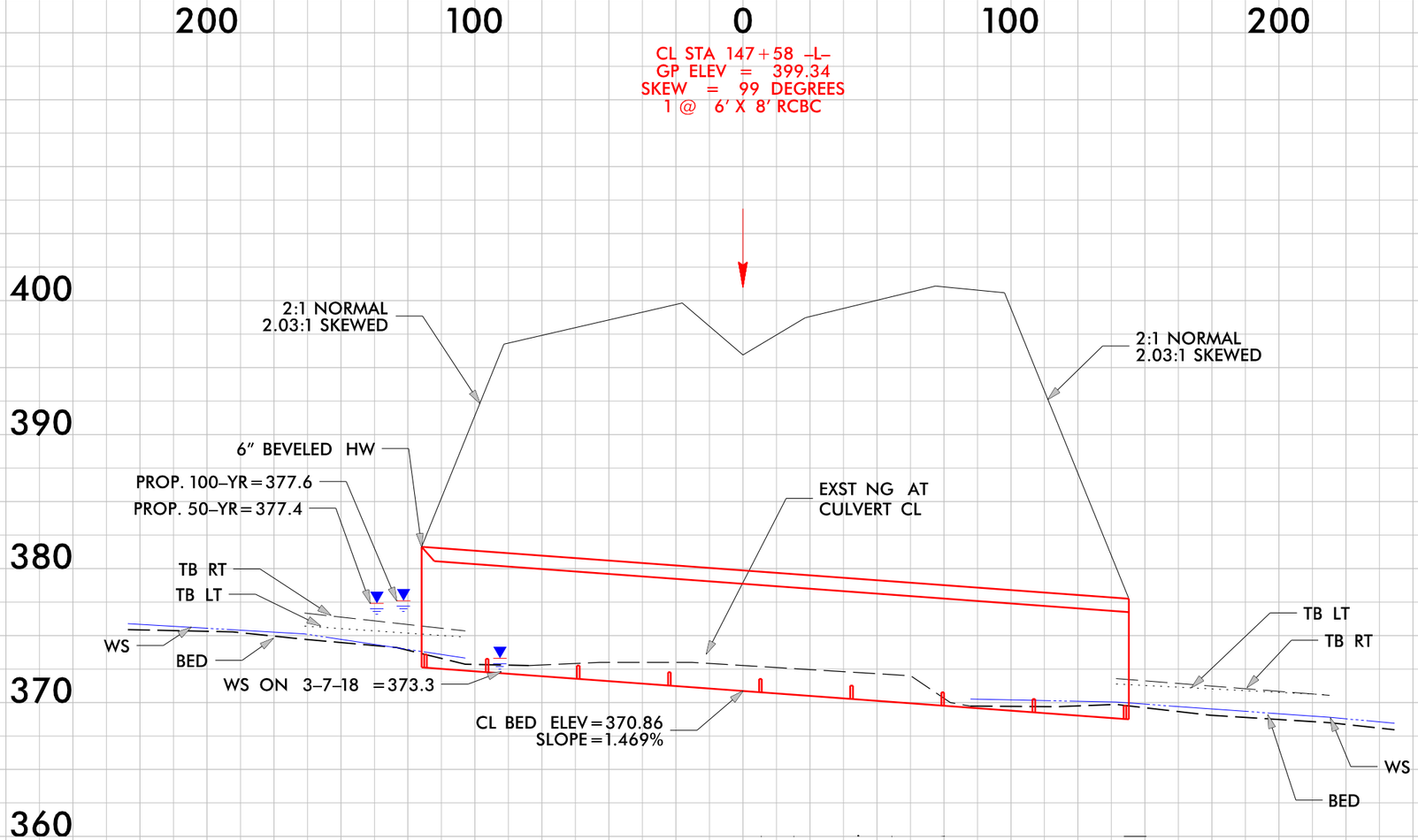
5/14/99

PERMIT DRAWING SHEET 54 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	14D
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/8/2018
R2721_hyd_prm_wet_psh_14e_sec.dgn
barvej

51499

PERMIT DRAWING SHEET 55 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

MATCHLINE SHEET 45 -Y4- STA 31+00.00

NC DEPT OF TRANSPORTATION
50 43201I_PSD
+70.03 -Y4DET- 40.00' RT
+83.87 -Y4DET- 40.00' RT

43 BENJAMIN MCDONALD
48 BULL LAND INC
51 TAWFIQ DARDEL (GTD) AND SULEIMAN ASAD
52
53 CHARLES MCKOY
54

SITE 24
SITE 22
SITE 23

SPEC CUT 2' BASE DITCH SEE DETAIL 21A
HEAD DITCH w/CL I RIPRAP SEE DETAIL 40A
TOE PROTECTION SEE DETAIL 38A
15" W/ 2 ELBOWS
24" W/ 2 ELBOWS
30" W/ 2 ELBOWS
15" W/ 3 ELBOWS
15" W/ 2 ELBOW
GRADE TO REMOVE
SPEC CUT V-DITCH SEE DETAIL 23A
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
TAIL DITCH w/CL I RIPRAP SEE DETAIL 40A
BERM DITCH STA. 155+00 – 158+91 -L- RT

-L- PTC Sta.159+27.72
-Y4- POT Sta.27+02.15
Δ = 79°12'26.54"
-L- CS Sta. 159+13.20

WETLAND WAC
WETLAND WAB
STREAM SW
H&E STREAM

44 WILLIAM AND BERTHA TURNER
45 WILLIAM GRIFFIN
46 JAMES TURNER AND WILLIAM TURNER
47
49 CHARLES MCKOY
MICHAEL A. & DEIDRE M BRICE
ABDELWAHED DARSI

CLYDE DR
SR 1501 SUNSET LAKES

MATCHLINE SHEET 14 -L- STA 148+00.00
MATCHLINE SHEET 16 -L- STA 161+00.00
MATCHLINE SHEET 44 -Y4- STA 23+00.00

SEE SHEET 72 FOR -L- PROFILE
SEE SHEET 2B-27 FOR BRIDGE SKETCH
SEE SHEET 102 FOR -Y4- PROFILE

7R2018
R-2721_Hyd_prm_wet_psh_15.dgn
jbarney

51499

PERMIT DRAWING SHEET 56 OF 119

SCALE: 1" = 100'

NAD 83

F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
E E	DENOTES EXCAVATION IN WETLAND
S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
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NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

MATCHLINE SHEET 45 -Y4- STA 31+00.00

MATCHLINE SHEET 14 -L- STA 148+00.00

MATCHLINE SHEET 16 -L- STA 161+00.00

MATCHLINE SHEET 44 -Y4- STA 23+00.00

NC DEPT OF TRANSPORTATION

43 BENJAMIN MCDONALD

44 WILLIAM AND BERTHA TURNER

45 WILLIAM GRIFFIN

46 JAMES TURNER AND WILLIAM TURNER

47 H&B STEPHENS

48 BULL LAND INC

49 CHARLES MCKOY

50 43201_PSD +70.05 -Y4DET- 40.00' RT

51 TAWFIQ DARDEL GHANI AND SULEIMAN ASAD

52

53 CHARLES MCKOY

54

ABDELWAHED DARSI

MICHAEL A. & DEIDRE M BRICE

WILLIAM GRIFFIN

SITE 22

SITE 23

SITE 24

STREAM SW

WETLAND WAC

WETLAND WAB

-L- PC Sta 159+27.72 -Y4- POT Sta 27+02.15 Δ = 7912'26.54"

-L- CS Sta. 159+13.20

+83.87 -Y4DET- 40.00' RT

SPEC CUT 2' BASE DITCH SEE DETAIL 21A

SPEC CUT 2' BASE DITCH SEE DETAIL 21A

HEAD DITCH wCL I RIPRAP SEE DETAIL 40A

TOE PROTECTION SEE DETAIL 38A

TAIL DITCH wCL I RIPRAP SEE DETAIL 40A

LAT 2' BASE DITCH wCL B RIPRAP SEE DETAIL 4A

SPEC CUT V-DITCH SEE DETAIL 23A

SPEC CUT V-DITCH SEE DETAIL 23A

BERM DITCH STA. 153+00 – 158+91 -L- RT

15" W/ 2 ELBOWS

30" W/ 2 ELBOWS

24" W/ ELBOWS

15" W/ 3 ELBOWS

GRADE AND REMOVE

SR 1501 SUNSET LAKE RD

SEE SHEET 72 FOR -L- PROFILE
SEE SHEET 2B-27 FOR BRIDGE SKETCH
SEE SHEET 102 FOR -Y4- PROFILE

7R2018_R2721_hyd_prm_wet_psh_15a.dgn
lhorney

5/28/99

PERMIT DRAWING SHEET 57 OF 119

PIPE HYDRAULIC DATA 30" RCP Sta. 149+64 -L-		
DRAINAGE AREA	= 8.7	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 27	CFS
DESIGN HW ELEVATION	= 383.0	FT
100 YEAR DISCHARGE	= 28	CFS
100 YEAR HW ELEVATION	= 383.1	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 34	CFS
OVERTOPPING ELEVATION	= 383.5	FT

-L-

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
605 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	72
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

℄ -Y4- SUNSET LAKE RD

MATCHLINE SHEET 71 STA.148+00

MATCHLINE THIS SHEET STA.161+00

MATCHLINE SHEET 73 STA.174+00

PI = 153+75.00
EL = 402.42'
VC = 400'
K = 500

BEGIN LAT.BASE DITCH (RT)
PI=148+32.00
ELEV=371.22

PI=150+00.00
ELEV=375.44

30" RCP

(+) 2.5119%

(+) 0.1484%

EXISTING GROUND

BEGIN SPEC.CUT BASE DITCH (LT)
PI=154+00.00
ELEV=396.54

END LAT.BASE DITCH (RT)
PI=154+01.00
ELEV=376.03

PI=155+50.00
ELEV=395.30

(+)0.5005%

(-)0.3000%

BEGIN SPEC.CUT V DITCH (RT)
PI=155+00.00
ELEV=399.50

(-) 0.8267%

(+) 0.3143%

END SPEC.CUT V DITCH (RT)
PI=158+50.00
ELEV=400.60

PROPOSED GRADE

(+) 0.3192%

END SPEC.CUT BASE DITCH (LT)
PI=158+10.00
ELEV=396.13

BEGIN SPEC.CUT "V" DITCH (RT)
PI=160+50.00
ELEV=397.97

(-) 0.7920%

SEE SHEET 17 FOR -L- PLAN VIEW

CULVERT HYDRAULIC DATA		
DESIGN DISCHARGE	= 820	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 375.3	FT
BASE DISCHARGE	= 910	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 375.5	FT
OVERTOPPING DISCHARGE	= 3100	CFS
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING ELEVATION	= 399.0	FT

-L-

PI = 165+60.00
EL = 398.87'
VC = 230'
K = 285

EXISTING GROUND

(-) 0.7920%

(-)0.3000%

(+)0.5061%

END SPEC.CUT "V" DITCH (RT)
PI=163+00.00
ELEV=395.99

PROPOSED GRADE

PI = 174+75.00
EL = 403.50'
VC = 600'
K = 571

(+)0.5061%

2@9'x8' RCBC

NWS ELEV. ON 1-10-18 =369.8

(+) 4.0066%

BEGIN LAT.BASE DITCH (LT)
PI=170+68.00
ELEV=377.80

END LAT.BASE DITCH (LT)
PI=173+70.00
ELEV=389.90

SEE SHEET 17 FOR -L- PLAN VIEW

7/8/2018
R2721_hyd_prm_wet_psh_15b_pf1.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 58 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-97

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

410 400 390 380

WETLAND

398.82 0.050 0.050 6.590:1 8

FILL IN WETLAND (WAC)

397.97

387.37

151 + 50.00

WETLAND

398.57 0.050 0.050 6.590:1 8

FILL IN WETLAND (WAC)

397.72

385.44

151 + 00.00

SITE 24

WETLAND

398.3 0.050 0.050 6.590:1 8

FILL IN WETLAND (WAC)

397.47

383.86

150 + 50.00

WETLAND

398.0 0.050 0.050 6.590:1 8

FILL IN WETLAND (WAC)

397.22

380.00

150 + 00.00

410 400 390 380 370

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

-L- LT

7/9/2018
R-2721_hyd_prm_wet_psh_15c_xpl.dgn
jharvey

PERMIT DRAWING SHEET 59 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-386

0 5 10

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

410 400 390 380

WETLAND

0.050 0.050

20:1 8:1 2:1

398.22

FILL IN WETLAND
(WAC)

389.41

152 + 00.00

WETLAND

0.050 0.050

20:1 8:1 2:1

397.97

FILL IN WETLAND

387.37

151 + 50.00

SITE 24

WETLAND

0.050 0.050

20:1 8:1 2:1

397.72

FILL IN WETLAND
(WAC)

385.44

151 + 00.00

WETLAND WETLAND WETLAND

0.050 0.050

20:1 8:1 2:1

397.47

FILL IN WETLAND
(WAC)

FILL IN WETLAND
(WAC)

EXCAVATION
(WAC)

383.86

150 + 50.00

-L- RT

6/23/16

7/9/2018
R2721_Hyd_prm_wet_psh_15d_xpl.dgn
jharvey

51499

PERMIT DRAWING SHEET 60 OF 119

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

2SFD DARREN AND KIMBERLY ANDRUS

2SFD JENNIFER WARD AND JENNIFER REEVES

56 WILL PIERSON & KAYLEE JAKUBOWSKI

55 CDP LEASING INC

50 NC DEPT OF TRANSPORTATION

57 SYLVIA SAMS

STREAM SX

WETLAND WAE

WETLAND WAF

SITE 25

SITE 26

SITE 27

SITE 28

SITE 29

POND PB

51 TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

52 TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

-L- ST Sta. 162+33.20

-L- TS Sta. 166+45.42

-L- SC Sta. 170+45.42

-Y5RPC- SC Sta. 12+16.00

-Y5RPC- ST Sta. 10+00.00

-L- Sta. 165+00

-L- Sta. 170+00

-L- Sta. 15+00

INLET CHANNEL SEE DETAIL 52A

TOE PROTECTION SEE DETAIL 38A

CL B RIPRAP

15" W/ ELBOWS

36" W/ ELBOWS

SPEC CUT V-DITCH SEE DETAIL 23A

CL I RIPRAP

OUTLET CHANNEL SEE DETAIL 52A

DAYLIGHT DITCH

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 10A

2-208'x 8' RCBC

MATCHLINE SHEET 15 -L- STA 161+00.00

MATCHLINE SHEET 17 -L- STA 174+00.00

MATCHLINE SHEET 44

782018
R-2721_Hyd_prm_wet_psh_16.dgn
lhotzer

51499

PERMIT DRAWING SHEET 61 OF 119

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1"=100'

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

2SFD DARREN AND KIMBERLY ANDRUS

2SFD JENNIFER WARD AND JENNIFER REEVES

56 WILL PIERSON & KAYLEE JAKUBOWSKI

55 CDP LEASING INC

57 SYLVIA SAMS

50 NC DEPT OF TRANSPORTATION

51 TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

52 TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

DETAIL 52A
OUTLET & OUTLET CHANNEL STABILIZATION
(Not to Scale)

STREAM SX

WETLAND WAE

WETLAND WAF

SITE 25

SITE 26

SITE 27

SITE 28

SITE 29

POND PB

-L- ST Sta. 162+33.20

-L- TS Sta. 166+45.42

-L- SC Sta. 170+45.42

-Y5RPC- SC Sta. 12+16.00

-Y5RPC- ST Sta. 10+00.00
71.00' RT

-L- TS Sta. 166+45.42

INLET CHANNEL SEE DETAIL 52A

TOE PROTECTION SEE DETAIL 38A

CL B RIPRAP

DAYLIGHT DITCH

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 10A

SPEC CUT V-DITCH SEE DETAIL 23A

OUTLET CHANNEL SEE DETAIL 52A

GRADE TO DRAIN (GTD)

MATCHLINE SHEET 15 -L- STA 161+00.00

MATCHLINE SHEET 17 -L- STA 174+00.00

MATCHLINE SHEET 44

782018
R2721_Hyd_prm_wet_psh_16a.dgn
jlovray

6/23/16

PERMIT DRAWING SHEET 62 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-105

SITE 26

WETLAND

0.007 0.020 7.996:1 8

396.39

2:1

FILL IN WETLAND
(WAE)

371.06

167+00.00

0.001 0.020 8:1 8

396.15

2:1

WETLAND WETLAND

FILL IN WETLAND
(WAE)

382.69

166+50.00

0.006 0.020 7.997:1 8

395.99

6:1

392.06

166+00.00

0.012 0.020 8:1 8

397.47

3.33:1 4:1 6:1

395.38

395.91

165+50.00

—L— LT

7/9/2018
R2721_hyd_prm_wet_psh_16b_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 63 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-394

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

410 400 390 380 370 360

0.011 | 8:1 | 0.019 | 0.029 | 0.043

396.90

WETLAND

WETLAND

2:1

FILL IN WETLAND
(WAE)

371.95

168 + 00.00

SITE 26

0.013 | 8:1 | 0.023

396.64

WETLAND

WETLAND

2:1

FILL IN WETLAND
(WAE)

WETLAND

FILL IN WETLAND
(WAE)

371.39

167 + 50.00

0.007 | 8:1 | 0.020

396.39

WETLAND

2:1

FILL IN WETLAND
(WAE)

371.06

167 + 00.00

-L- RT

7/8/2018
R2721_grd_prm_wet_psh_16c_xpl.dgn
jharvey

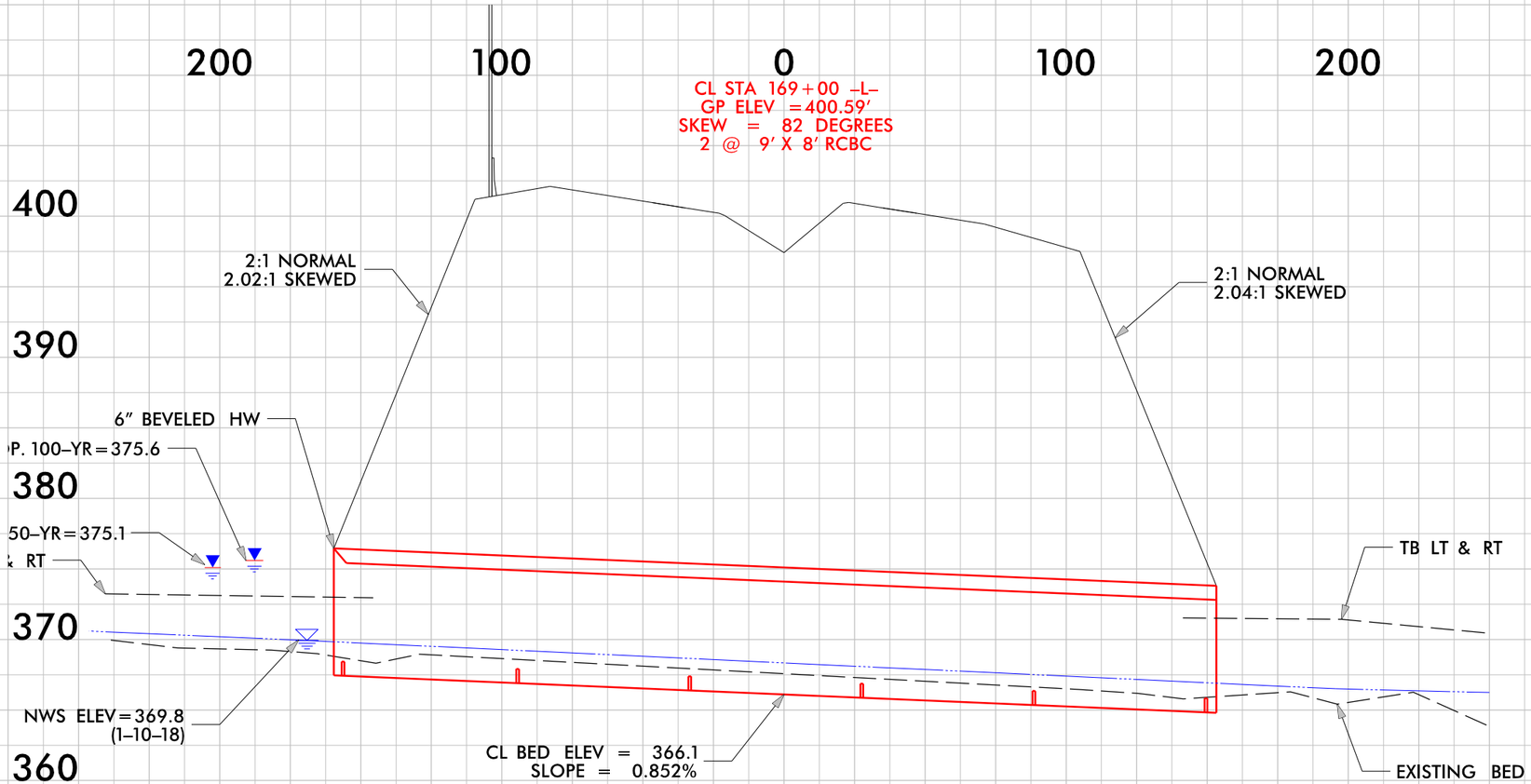
5/14/99

PERMIT DRAWING SHEET 64 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	16D
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

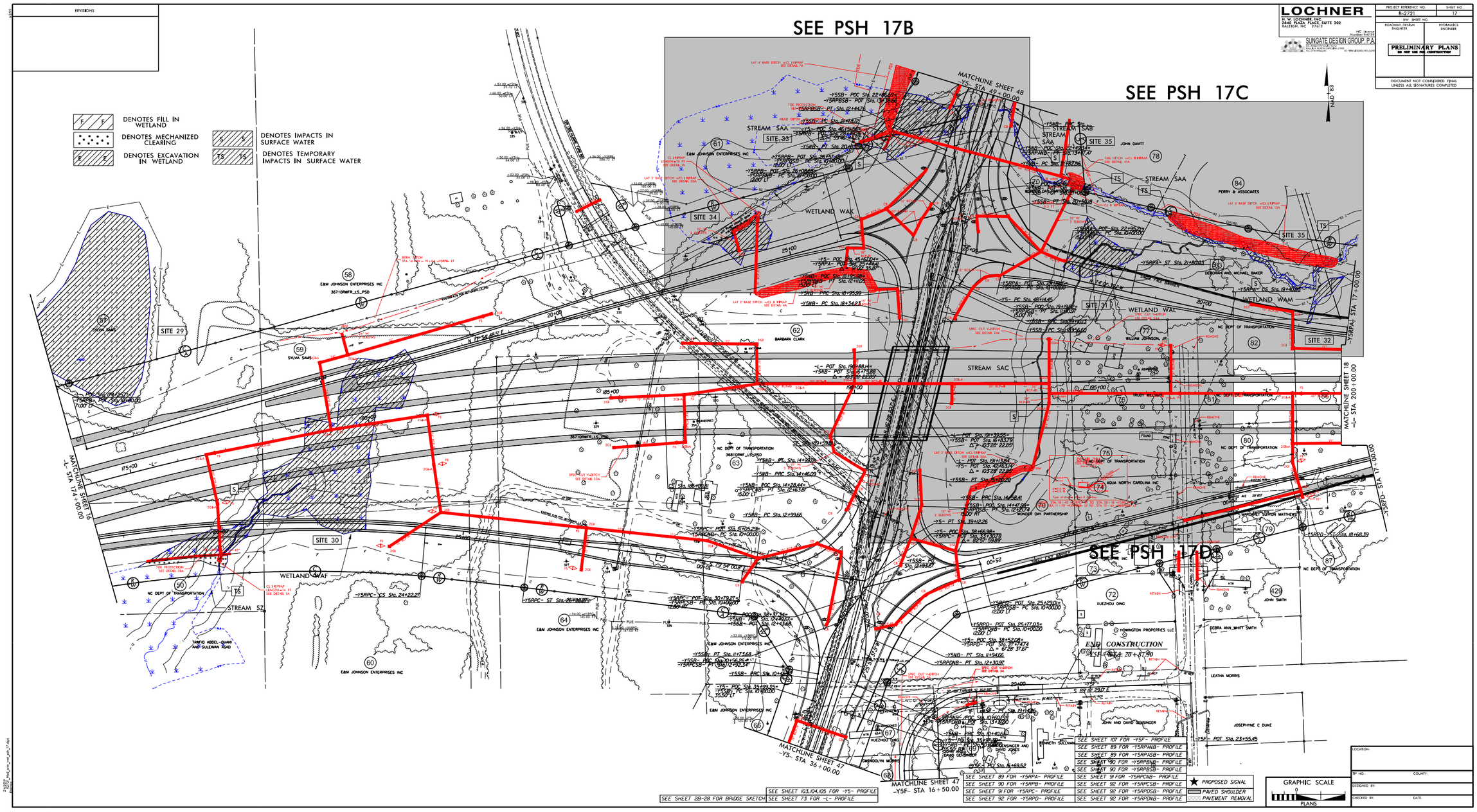
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

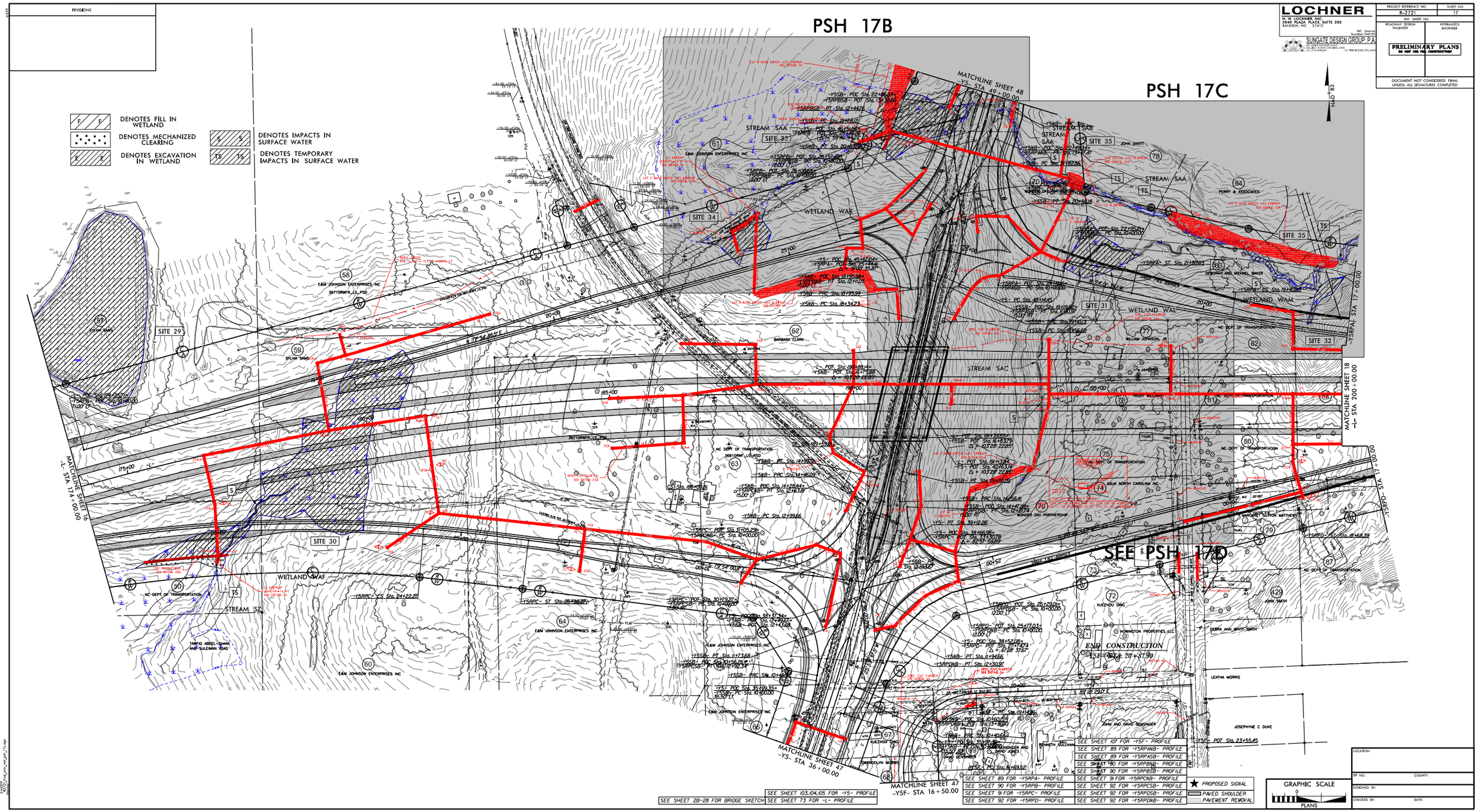


7/8/2008
R2721_hyd_prm_wet_psh_16d_sec.dgn
jarvej

PERMIT DRAWING SHEET 65 OF 119



PERMIT DRAWING SHEET 66 OF 119



8/17/99

PERMIT DRAWING SHEET 67 OF 119

F F DENOTES FILL IN WETLAND

E E DENOTES EXCAVATION IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

25' 12.5' 0 25' 50'
SCALE: 1" = 50'

PROJECT REFERENCE NO.	SHEET NO.
R-2721	17B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LAT 4' BASE DITCH w/CL I RIPRAP SEE DETAIL 7A

TOE PROTECTION SEE DETAIL 38A

HEAD DITCH w/CL II RIPRAP SEE DETAIL 45A

STREAM SAB

STREAM SAA

STREAM SAA

STREAM SAA

WETLAND WAK

SITE 33

SITE 34

TS

S

61

E&M JOHNSON ENTERPRISES INC

TDE

PDE

PDI

RUE

WLB

BZ 1

BZ 2

4.65%

66" RCP-ED

BURY INVERT 2.3 FT

15" RCP-IV

18" RCP-IV

15" RCP-III

18" RCP-III

18" W/ 2 ELBOWS

15" W/ 2 ELBOWS

CB

2GI

REMOVE 36" CMP

20' POWER EASEMENT FROM DUKE ENERGY PROGRESS

25+00

IPRAP
10 FT
IL 1A

W/CL I RIPRAP
DETAIL 20A

B–
LT

RPB–
) LT

8/17/99

PERMIT DRAWING SHEET 68 OF 119

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

25′ 12.5′ 0 25′ 50′
SCALE: 1″=50′

PROJECT REFERENCE NO.	SHEET NO.
R-2721	17C
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SITE 35

JOHN DAVITT

78

71

WONDER DAY PARTNERSHIP

84

PERRY & ASSOCIATES

83

DEBORAH AND MICHAEL BAKER

77

WILLIAM JOHNSON, JR

82

NC DEPT OF TRANSPORTATION

SITE 31

SITE 32

STREAM SAA

STREAM SAC

WETLAND WAL

WETLAND WAM

CB

66″ RCP-CD

JB w/MH

66″ BURY INVERT 0.3 FT

30″

15″ W/ 2 ELBOWS

15″ RCP-III

15″ RCP-IV

CL B RIPRAP

LAT 5′ BASE DITCH w/CL I RIPRAP SEE DETAIL 13A

SPEC CUT V-DITCH SEE DETAIL 24A

REMOVE

SINGLE FACE BARRIER

N 74° 01′ 39.″ W

20+00

2GI

FS

PDE

BZ 1

BZ 2

7/8/2018
R2721H_sheet_plan_prm_wet_psh_17c_ViewIn.dgn
jgreen

PERMIT DRAWING SHEET 69 OF 119

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2721	17D
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

S S DENOTES IMPACTS IN SURFACE WATER

SCALE: 1"=50'

SITE 31

WETLAND WAL

STREAM SAC

77 WILLIAM JOHNSON, JR

76 TRUDY WILLIAMS

75 NC DEPT OF TRANSPORTATION

74 AQUA NORTH CAROLINA INC

70 WONDER DAY PARTNERSHIP

81 NC

ABANDONED

ISFD

195+00

2GI

2GI-A

FS

HW

JB w/MH

REMOVE

15" RCP-IV

24" RCP-III

30" RCP-III

36" RCP-III

42" RCP-III

15" RCP-III

24" RCP-III

LAT 2' BASE DITCH w/CL I RIPRAP
SEE DETAIL 20A

15" W/
2 ELBOWS

16" LINK

15" RCP

FOUND CONC

8' GR

9' GR

SR 1462

S 78° 40' 38" W

N 16° 28' 22" E

STATION N 16° 28' 22" E 409.59'

V=409.59'

7/8/2018
R2721_hyd_prm_wet_psh_17d_ViewIn.dgn
hperkins

5/28/99

PERMIT DRAWING SHEET 70 OF 119

-L-

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

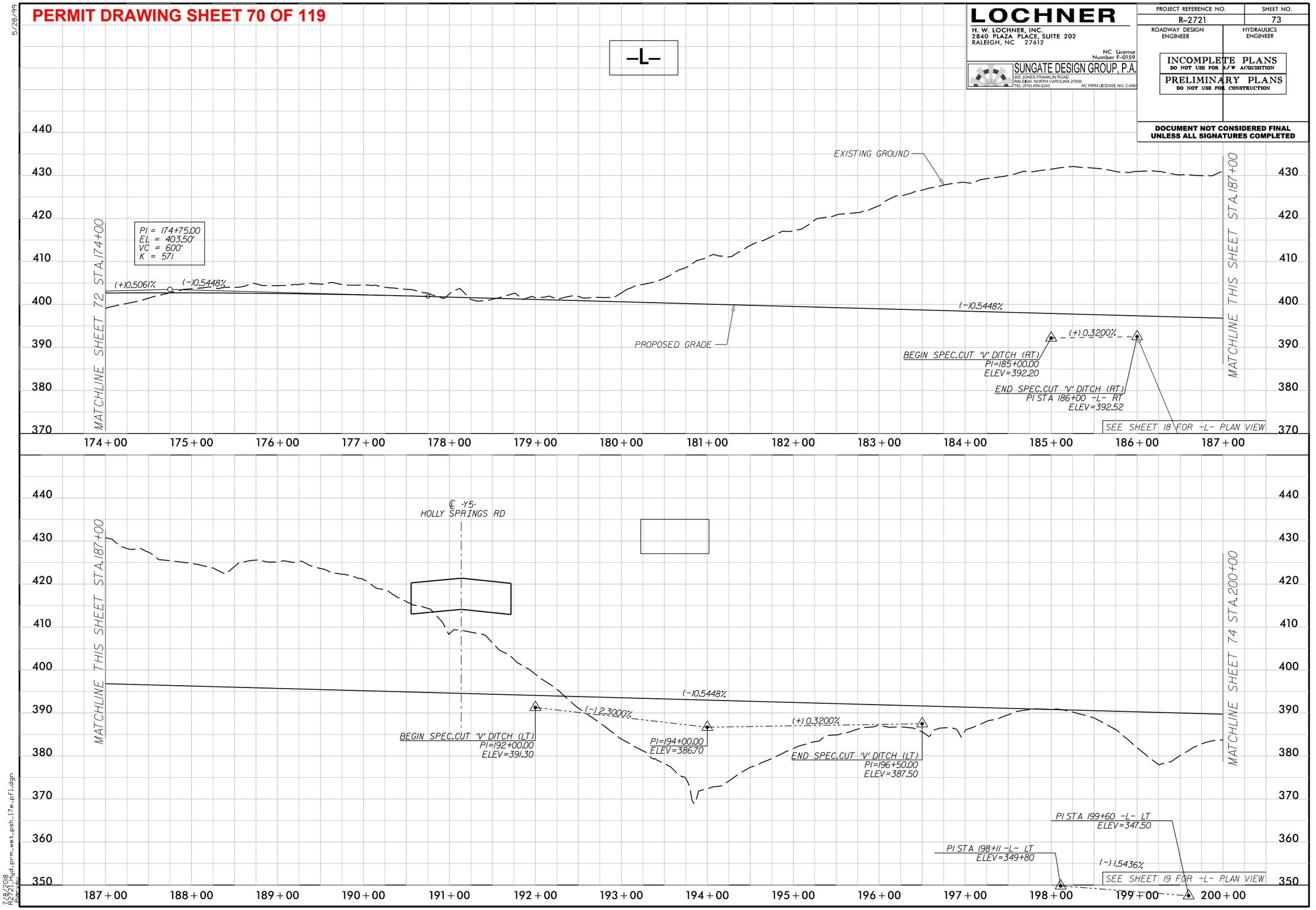
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	73
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/8/2018
R2721_hyd_prm_wet_psh_17e_pfl.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 71 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-113

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

440 430 420 410 400 390

WETLAND

WETLAND

FILL IN WETLAND

3:1 4:1 6:1 401.23 0.013 16.21:1 3:1 6:1 0.050 0.050 0.033 8:1 6.5 411.03 396.77

181 + 00.00

SITE 30

WETLAND

WETLAND

FILL IN WETLAND

3.14:1 4.04:1 6:1 401.28 0.03 6:1 6:1 0.050 0.050 8:1 6.5 406.11 397.04

180 + 50.00

WETLAND

FILL IN WETLAND

3.15:1 4.03:1 6:1 401.46 0.046 0.050 0.050 0.029 8:1 6.5 402.68 397.31

180 + 00.00

-L- LT

7/8/2018
R2721_fld_prm_wet_psh_17f_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 72 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-400

0 5 10

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

430 420 410 400 390

WETLAND

FILL IN WETLAND (WAF)

0.050 0.050 4:1

401.60 6.593:1 397.86

179+00.00

WETLAND WETLAND

FILL IN WETLAND (WAF)

0.050 0.050 4:1

401.21 6.593:1 398.13

178+50.00

SITE 30

WETLAND WETLAND

0.026 402.45 6.593:1 398.40

0.050 0.050

FILL IN WETLAND (WAF)

5.27:1 394.36

4:1

0.056 4.743:1

FILL IN WETLAND (WAF)

IMPACTS IN SURFACE WATER (SZ)

178+00.00

WETLAND WETLAND

403.53 6.593:1 398.67

0.050 0.050

FILL IN WETLAND (WAF) 5:1

4:1

0.056 3.567:1

394.94

FILL IN WETLAND (WAF)

IMPACTS IN SURFACE WATER (SZ)

177+50.00

-L- RT

7/9/2018
R2721_Hyd_prm_wet_psh_17g_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 73 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-694

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

430 420 410 400 390 380 370 360 350

0.020 0.020

2:1 2:1 2:1

SITE 35

374.06

IMPACTS IN SURFACE WATER
(SAB)

49+00.00

SITE 33

WETLAND WETLAND WETLAND

FILL IN WETLAND
(WAK)

FILL IN
WETLAND
(WAK)

IMPACTS IN SURFACE WATER
(SAA)

374.62

48+50.00

-Y5-

7/9/2018
R2721_std_prm_wet_psh_17h_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 74 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-123

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

420 410 400 390 380 370 360 350

0.012 0.012 3.878:1 4:1 0.020 0.020 36.013:1

387.00 391.32 381.75

WETLAND

FILL IN WETLAND
(WAL)

195+00.00

SITE 31

0.013 0.013 4:1 0.020 0.020 31.025:1

386.90 392.82 377.37

WETLAND WETLAND

FILL IN WETLAND
(WAL)

IMPACTS IN SURFACE WATER
(SAC)

194+50.00

-L- LT

7/8/2018
R2721Hgd_prm_wet_psh17_j.xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 75 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-128

200 + 50.00

0.047 0.047 4:1 4:1 0.020 0.020 8:1 8

387.57 386.29

2:1 11.60:1 381.19

0.046 0.046 4:1 4:1 0.020 0.020 8:1 8

387.60 386.56

383.65

200 + 00.00

0.045 0.045 4:1 4:1 0.020 0.020 8:1 8

387.60 386.83

380.12

SITE 35

SITE 32

WETLAND

WETLAND

IMPACT IN SURFACE WATER (SAA)

FILL IN WETLAND (WAM)

2:1 2:1 12:1

199 + 50.00

-L- LT

7/8/2018
R2721_Hyd_prm_wet_psh_17k_xpl.dgn
jharvey

PERMIT DRAWING SHEET 76 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″ = 100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AQUA NORTH CAROLINA, INC.

88 SEAN AND ANNA STARR

85 THOMAS AND DEBORAH ATKINSON

SITE 35
-Y5RPA- TS Sta.

20' DRAINAGE EASEMENT SCALED FROM BM 1985 PG 422

INLET CHANNEL SEE DETAIL 53A

PDE

PACKFILL TO NC DOT STD 840.01

LAT 5' BASE DITCH wCL I RIPRAP SEE DETAIL 4A

-Y5RPA- SC Sta. 15+40.72

89 FRANS OUDSHOORN

90 KAREN JETTON

91 THOMAS ANS SUSAN SLUCHAK

92 QUAD TRI LLC OLIVE, MARTHA

LAT 2' BASE DITCH wCL B RIPRAP SEE DETAIL 4A

-L- POT Sta. 207+09.24= -Y5RPA- POT Sta. 10+00.00 71.00' LT

LAT 2' BASE DITCH wCL B RIPRAP SEE DETAIL 4A

WETLAND WAO(2)

LAT 2' BASE DITCH wCL B RIPRAP SEE DETAIL 4A

CL I RIPRAP LENGTH=14 FT SEE DETAIL 1A

TS Sta. 212+05.98

TOE PROTECTION SEE DETAIL 38A

DAYLIGHT DITCH

DAYLIGHT DITCH

BURY INVERT 0.3 FT

PAVEMENT REMOVAL
PAVED SHOULDER

MATCHLINE SHEET 17 -L- STA 200+00.00

-Y5RPA- STA 17+00.00

N 83° 00' 23.2" W

SITE 36

0.78%

15" W/ 2 ELBOWS

3@9'x 8' RCBC

205+00

210+00

18" W/ 2 ELBOWS

2.86%

S 87° 00' 00.1" E

NC DEPT OF TRANSPORTATION 86

42" W/ 2 ELBOWS

LAT 2' BASE DITCH wCL I RIPRAP SEE DETAIL 20A

TOE PROTECTION SEE DETAIL 38A

BEGIN DITCH RIPRAP ABOVE ROCK

OUTLET CHANNEL SEE DETAIL 53A

-L- POT Sta. 207+54.92= -Y5RPD- ST Sta. 10+00.00 71.00' RT

SITE 38

24" W/ 2 ELBOWS

BURY INVERT 0.3 FT

TYPE B-77

-Y5RPD- STA 17+00.00

-Y5RPD- CS Sta. 16+18.39

-Y5RPD- SC Sta. 12+50.00

+73.00 -Y5RPD- 51.97' LT

+08.09 -Y5RPD- 58.00' LT

SITE 37

CL I RIPRAP

WETLAND WAO(1)

STREAM SAE

CL I RIPRAP LENGTH=14 FT SEE DETAIL 1A

LAT 2' BASE DITCH wCL I RIPRAP SEE DETAIL 20A

87 NC DEPT OF TRANSPORTATION

93 GEORGE I BOGER

MATCHLINE SHEET 19 -L- STA 213+00.00

F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
E E	DENOTES EXCAVATION IN WETLAND
S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEET 89 FOR -Y5RPA- PROFILE
SEE SHEET 92 FOR -Y5RPD- PROFILE
SEE SHEET 73 FOR -L- PROFILE

7822018
R2721_Hyd_prm_wet_psh_18.dgn
lhowell

PERMIT DRAWING SHEET 77 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″ = 100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

AQUA NORTH CAROLINA, INC.
88 SEAN AND ANNA STARR
20' DRAINAGE EASEMENT SCALED FROM BM 1985 PG 422
85 THOMAS AND DEBORAH ATKINSON
INLET CHANNEL SEE DETAIL 53A
SITE 35
-Y5RPA- TS Sta. 14+30.72
PDE
BACKFILL TO NC DOT STD 840.31
LAT 6' BASE DITCH w/CL I RIPRAP SEE DETAIL 4A
-Y5RPA- SC Sta. 15+40.72
89 FRANS OUDSHOORN
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
90 KAREN JETTON
-L- POT Sta. 207+09.24 = -Y5RPA- POT Sta. 10+00.00 71.00' LT
91 THOMAS ANS SUSAN SLUCHAK
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
92 QUAD TRI LLC OLIVE, MARTHA
WETLAND WAO(2)
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
CL I RIPRAP LENGTH = 14 FT SEE DETAIL 1A
-Y5RPA- TS Sta. 212+05.98
TOE PROTECTION SEE DETAIL 38A
DAYLIGHT DITCH
DAYLIGHT DITCH
BURY INVERT 0.3 FT
-Y5RPA- STA 17+00.00
MATCHLINE SHEET 17 -L- STA 200+00.00
MATCHLINE SHEET 19 -L- STA 213+00.00
N 83° 00' 23.2" W
S 87° 00' 00.1" E
0.78%
2.86%
15" W/ 2 ELBOWS
18" W/ 2 ELBOWS
24" W/ 2 ELBOWS
42" W/ 2 ELBOWS
3@9'x 8' RCBC
15" RCP-IV
18" RCP-IV
24" RCP-IV
42" RCP-III
42" RCP-IV
205+00
210+00
215+00
-L- POT Sta. 207+54.92 = -Y5RPD- ST Sta. 10+00.00 71.00' RT
-Y5RPD- CS Sta. 16+18.39
-Y5RPD- SC Sta. 12+50.00
+73.00 -Y5RPD- (51.97' LT)
+08.00 -Y5RPD- (48.00' LT)
OUTLET CHANNEL SEE DETAIL 53A
LAT 2' BASE DITCH w/CL I RIPRAP SEE DETAIL 20A
CL I RIPRAP LENGTH = 14 FT SEE DETAIL 1A
TOE PROTECTION SEE DETAIL 38A
BEGIN DITCH FLOW
ABOVE FLOW
SITE 36
SITE 37
SITE 38
WETLAND WAO(1)
STREAM SAE
86 NC DEPT OF TRANSPORTATION
87 NC DEPT OF TRANSPORTATION
93 GEORGE BOGER
92 QUAD TRI LLC OLIVE, MARTHA
TYPE B-77
FOUND

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEET 89 FOR -Y5RPA- PROFILE
SEE SHEET 92 FOR -Y5RPD- PROFILE
SEE SHEET 73 FOR -L- PROFILE

78200B
R2721_Hyd_prm_wet_psh_18a.dgn
jlowder

6/23/16

PERMIT DRAWING SHEET 78 OF 119

0 5 10

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-418

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

400 390 380 370 360 350 340 330

384.11

8:1

0.020

0.020

SITE 36

WETLAND

WETLAND

SITE 37

2.01:1

FILL IN WETLAND
(WAO(I))

IMPACTS IN SURFACE AREA

349.16

12:1

2:1

2:1

344.20

204+50.00

384.38

8:1

0.020

0.020

0.06

0.06

SITE 36

WETLAND

SITE 37

WETLAND

2.01:1

FILL IN WETLAND
(WAO(I))

IMPACTS IN SURFACE AREA

348.20

204+00.00

-L- RT

7/9/2018
R2721_hyd_prm_wet_psh_18b_xpl.dgn
jharvey

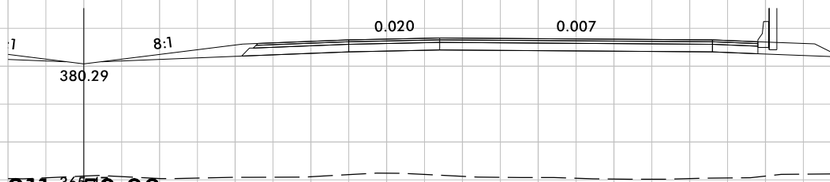
6/23/16

PERMIT DRAWING SHEET 79 OF 119

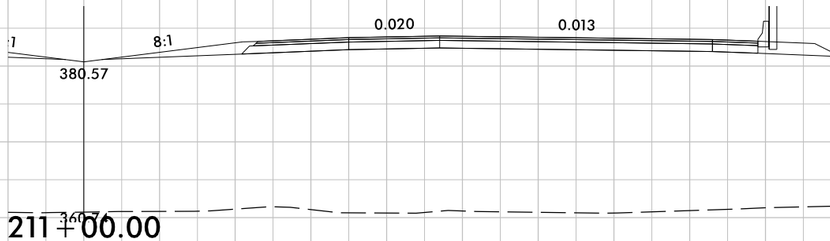
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	R-2721	X-423

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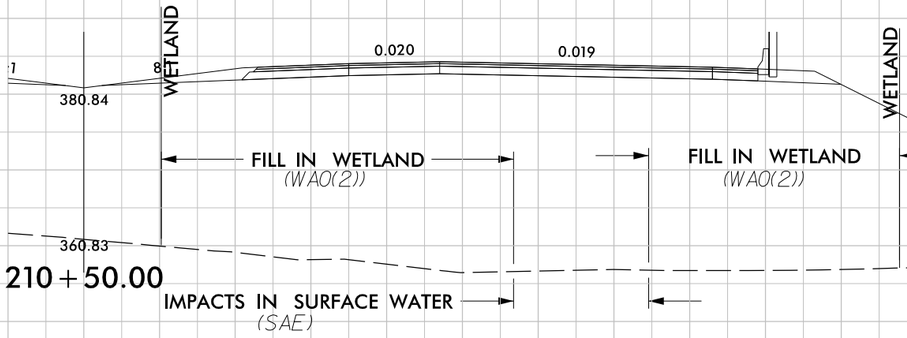
390 380 370 360 350



211+50.00

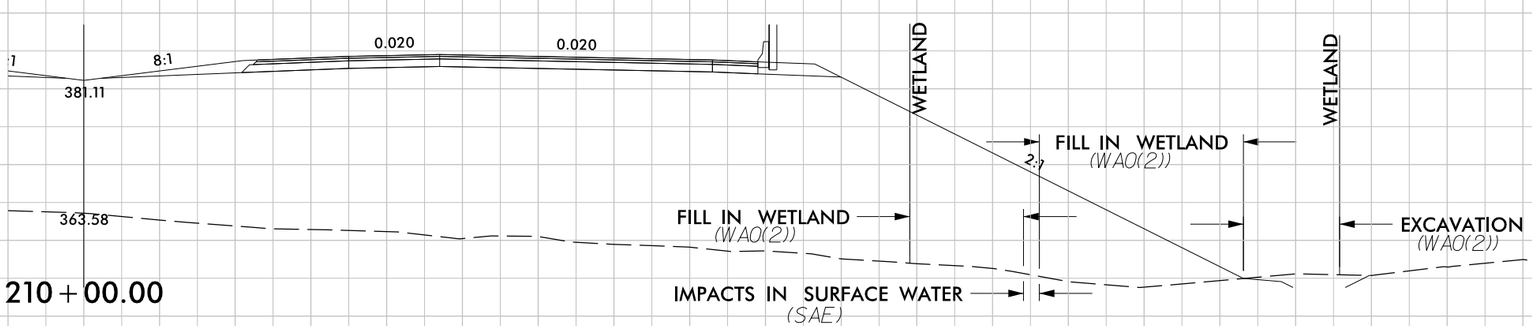


211+00.00



210+50.00

SITE 38



210+00.00

-L- RT

7/8/2018
R2721_hyd_prm_wet_psh_18c_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 80 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-137

0 5 10

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

390 380 370 360 350

WETLAND

WETLAND

WETLAND

WETLAND

SITE 38

EXCAVATION (WAO(2))

FILL IN WETLAND (WAO(2))

FILL IN WETLAND (WAO(2))

0.020 0.006 8:1 7.9 379.75 373.87 2:1 2:1 2:1 12:1

212+50.00

0.020 0.001 8:1 380.02 2:1 2:1 2:1

212+00.00

0.020 0.007 8:1 380.29 2:1

211+50.00

0.020 0.013 8:1 380.57

211+00.00

0.020 0.019 8:1 380.84 2:1 2:1 2:1 12:1 364.27 360.83

210+50.00

—L— LT

7/9/2018
R2721_Hyd_prm_wet_psh_18d.xpl.dgn
jharvey

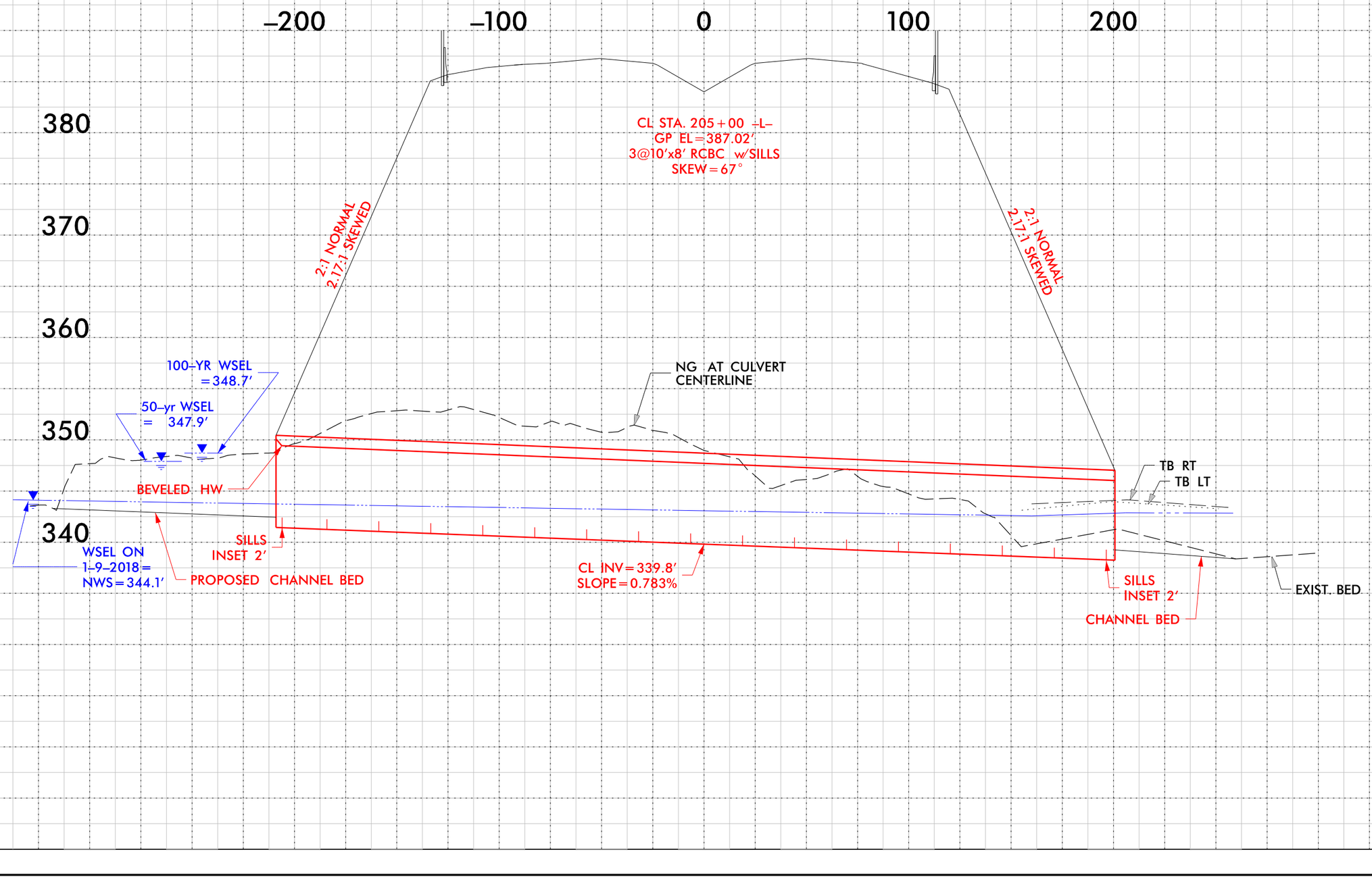
5/14/99

PERMIT DRAWING SHEET 81 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	18E
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

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7/8/2018
R2721_hyd_prm_wet_psh_18e_sec.dgn
barvel

51499

PERMIT DRAWING SHEET 82 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1″ = 100′

NAD 83

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
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NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

92
QUAD TRI LLC
OLIVE, MARTHA

BERM DITCH
STA. 218+50 – 220+70 -L- LT

BERM DITCH
STA. 213+00 – 215+25 -L- LT

BDO

15" W/ 2 ELBOWS

SPEC CUT 2' BASE DITCH
SEE DETAIL 15A

PC Sta. 214+45.98

MATCHLINE SHEET 18
-L- STA 213+00.00

MATCHLINE SHEET 20
-L- STA 226+00.00

215+00

220+00

225+00

15" RCP-IV

24" RCP-III

18" RCP-III

15" RCP-III

2GI

2GI-A

FS

STREAM SAG

WETLAND WAQ

TOE PROTECTION
SEE DETAIL 38A

SITE 39

TS

JS STARTS

TAIL DITCH w/CL I RIPRAP
SEE DETAIL 42

STREAM SAH

SEE SHEET 19B FOR VIEW IN

SEE SHEET 73 FOR -L- PROFILE

782018
R2721_Hyd_prm_wet_pstn_19.dgn
jlhoover

51499

PERMIT DRAWING SHEET 83 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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PROJECT REFERENCE NO.	SHEET NO.
R-2721	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

92 QUAD TRI LLC OLIVE, MARTHA

BERM DITCH STA. 213+00 – 215+25 –L– LT

BERM DITCH STA. 218+50 – 220+70 –L– LT

SPEC CUT 2' BASE DITCH SEE DETAIL 15A

BC Sta. 214+45.98

15" W. 2 ELBOWS

MATCHLINE SHEET 18 –L– STA 213+00.00

MATCHLINE SHEET 20 –L– STA 226+00.00

15" RCP-IV

24" RCP-III

18" RCP-III

15" RCP-III

215+00

220+00

225+00

STREAM SAG

WETLAND WAQ

TOE PROTECTION SEE DETAIL 38A

SITE 39

TS

JS STARTS

TAIL DITCH–w/CL I RIPRAP SEE DETAIL 42

STREAM SAH

92 QUAD TRI LLC OLIVE, MARTHA

SEE SHEET 19B FOR VIEW IN

SEE SHEET 73 FOR –L– PROFILE

7820118
R-2721_hyd_prm_wet_psh_19a.dgn
jhunsley

PERMIT DRAWING SHEET 84 OF 119

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2721	19B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

12.5' 6.25' 0 12.5' 25'
SCALE: 1"=25'

24" RCP–III

15" RCP–III

42" RCP–III

2GI

2GI

STREAM SAG

WETLAND WAQ

SITE 39

SITE 40

S

E

TS

TS

JS STARTS

BZ 1

BZ 2

WLB

F

**

*

TAIL DITCH w/CL I RIPRAP
SEE DETAIL 42

R/W

JS

E E DENOTES EXCAVATION IN WETLAND

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

7/8/2018
R2721_19b_grd_prm_wet_psh_19b_ViewIn.dgn
jharvey

5/28/99

PERMIT DRAWING SHEET 85 OF 119

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 1049	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 347.6	FT
BASE DISCHARGE	= 1287	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 348.4	FT
OVERTOPPING DISCHARGE	= 3850	CFS
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING ELEVATION	= 369.0	FT

-L-

PIPE HYDRAULIC DATA

30" RCP Sta. 149+64 -L-

DRAINAGE AREA	= 8.7	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 27	CFS
DESIGN HW ELEVATION	= 383.0	FT
100 YEAR DISCHARGE	= 28	CFS
100 YEAR HW ELEVATION	= 383.1	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 34	CFS
OVERTOPPING ELEVATION	= 383.5	FT

LOCHNER
H. W. LOCHNER, INC.
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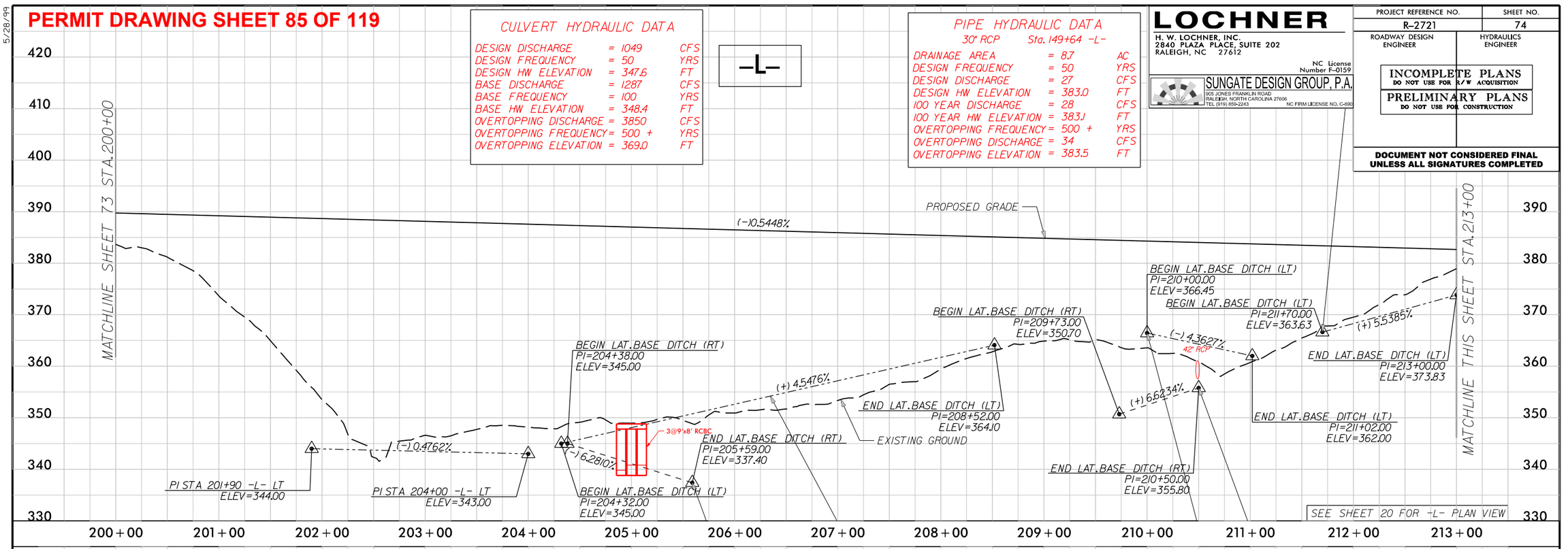
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

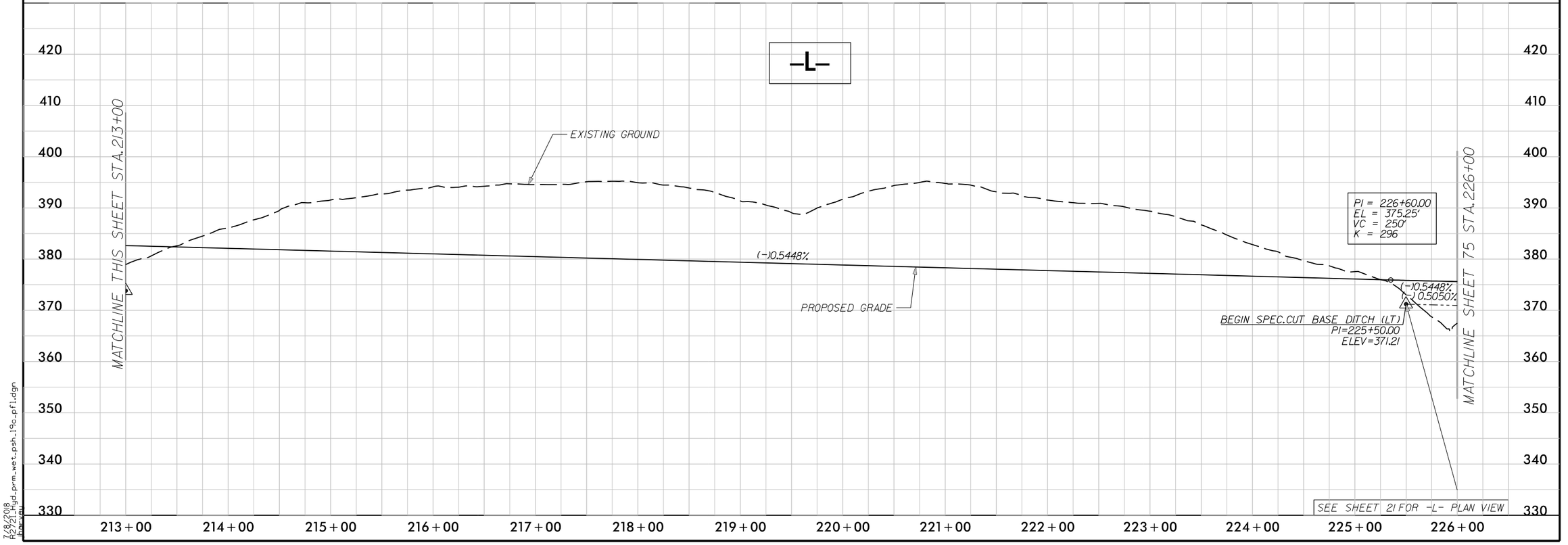
PROJECT REFERENCE NO.	SHEET NO.
R-2721	74
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





7/8/2018
R-2721BD_prd_prm_wet_psh_19c_pfl.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 86 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-431

0 5 10

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

390 380 370 360

SITE 39

WETLAND

FILL IN WETLAND (WAQ)

0.030 0.030

2.5:1 8:1

372.46

367.50

4:1

226+00.00

SITE 40

WETLAND WETLAND WETLAND WETLAND

FILL IN WETLAND (WAQ)

EXCAVATION (WAQ)

WETLAND WETLAND WETLAND

0.030 0.030

2.5:1 8:1

377.05

372.87

4:1

FILL IN WETLAND (WAQ)

IMPACTS IN SURFACE WATER (SAG)

225+50.00

SITE 39

WETLAND

IMPACTS IN SURFACE WATER (SAG)

377.56

372.94

3.48:1

225+00.00

379.70

373.21

6:1

5.99:1

374.04

224+50.00

-L- RT

PERMIT DRAWING SHEET 87 OF 119

51499

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
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RALEIGH, NORTH CAROLINA 27606
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

E E DENOTES EXCAVATION IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 53
-Y6- STA 21+00.00

MATCHLINE SHEET 19
-L- STA 226+00.00

MATCHLINE SHEET 21
-L- STA 239+00.00

92
QUAD TRI LLC
OLIVE, MARTHA

92
QUAD TRI LLC

STREAM SAG

SITE 39

SITE 40

WETLAND WAQ

SPEC LAT V-DITCH SEE DETAIL 14A

SPEC CUT V-DITCH SEE DETAIL 19A

CL B RIPRAP

PDE

HEAD DITCH w/CL I RIPRAP SEE DETAIL 44A

HEAD DITCH w/CL I RIPRAP SEE DETAIL 40A

TOE PROTECTION SEE DETAIL 38A

FALSE CUT SEE DETAIL 27A

SPEC CUT 2' BASE DITCH SEE DETAIL 15A

36" W/ 2 ELBOWS

-L- POC Sta. 231+09.54
-Y6- POT Sta. 16+65.83
Δ = 84°46'56.15"

-L- CS Sta. 233+93.56

-L- ST Sta. 236+03.56

-Y6- PT Sta. 14+76.32

-Y6- PRC Sta. 12+82.77

-L- N 77° 00' 00.1" E

CEMETERY

15" W/ 2 ELBOW

15" W/ 3 ELBOWS

BDO

REMOVE

BERM DITCH STA. 229+54 – 230+50 -L- RT

50' POWER LINE EASEMENT BM 1979 PG 361

50' R/W TRANSMISSION LINE (DKY) BM 1979 PG 361

SR 1959 PIERCE OLIVE RD 20' EST

EXISTING R/W

BEGIN CONSTRUCTION
-Y6- STA. 12+00.00

SEE SHEET 109 FOR -Y6- PROFILE
SEE SHEET 2B-28 FOR BRIDGE SKETCH | SEE SHEET 75 FOR -L- PROFILE

7/8/2018
R-2721_Hyd_prm_wet_psh_20.dgn
jhoover

51499

PERMIT DRAWING SHEET 88 OF 119

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
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NC License Number F-0159

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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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MATCHLINE SHEET 53
-Y6- STA 21+00.00

DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES EXCAVATION IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

STREAM SAG
SITE 39
SITE 40
WETLAND WAQ

92 QUAD TRI LLC OLIVE, MARTHA

92 QUAD TRI LLC

-L- POC Sta. 231+09.54
-Y6- POT Sta. 16+65.83
Δ = 84°46'56.15"

-L- CS Sta. 233+93.56
-L- ST Sta. 236+03.56
-Y6- PT Sta. 14+76.32
-Y6- PRC Sta. 12+82.77

SPEC LAT V-DITCH SEE DETAIL 14A
CL B RIPRAP
HEAD DITCH w/CL I RIPRAP SEE DETAIL 40A
HEAD DITCH w/CL I RIPRAP SEE DETAIL 44A
TOE PROTECTION SEE DETAIL 38A
FALSE CUT SEE DETAIL 27A
SPEC CUT V-DITCH SEE DETAIL 19A
SPEC CUT 2' BASE DITCH SEE DETAIL 15A
36" W/ 2 ELBOWS
15" W/ 2 ELBOW
15" W/ 3 ELBOWS
BERM / DITCH STA. 229+54 - 230+50 -L- RT
REMOVE
CEMETERY
EXISTING R/W
SR 1359 (PEDEN RD) 20' PAVE
50' POWER LINE EASEMENT DB 1879 PG 361
TRANSMISSION LINE 100kV DB 1879 PG 361
50' R/W DB 1879 PG 361

MATCHLINE SHEET 19
-L- STA 226+00.00

MATCHLINE SHEET 21
-L- STA 239+00.00

BEGIN CONSTRUCTION
-Y6- STA. 12+00.00

SEE SHEET 109 FOR -Y6- PROFILE
SEE SHEET 2B-28 FOR BRIDGE SKETCH
SEE SHEET 75 FOR -L- PROFILE

782018
R2721_hyd_prm_wet_pth_20a.dgn
jhussey

5/28/99

PERMIT DRAWING SHEET 89 OF 119

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

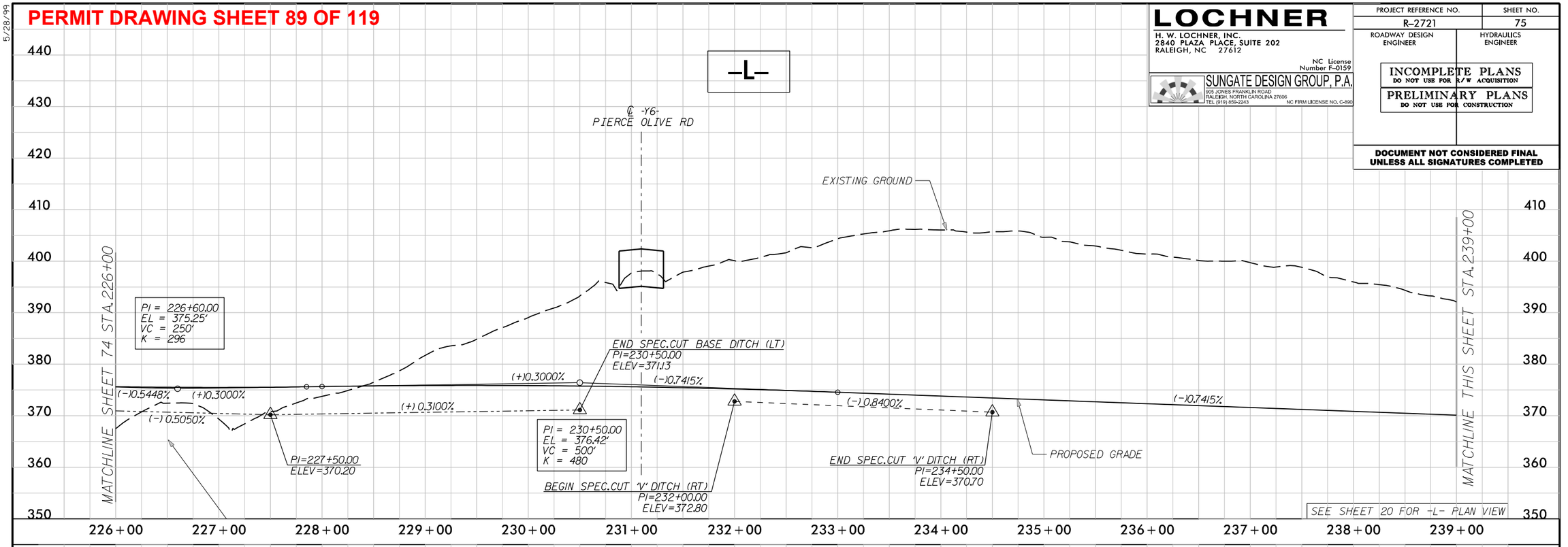
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

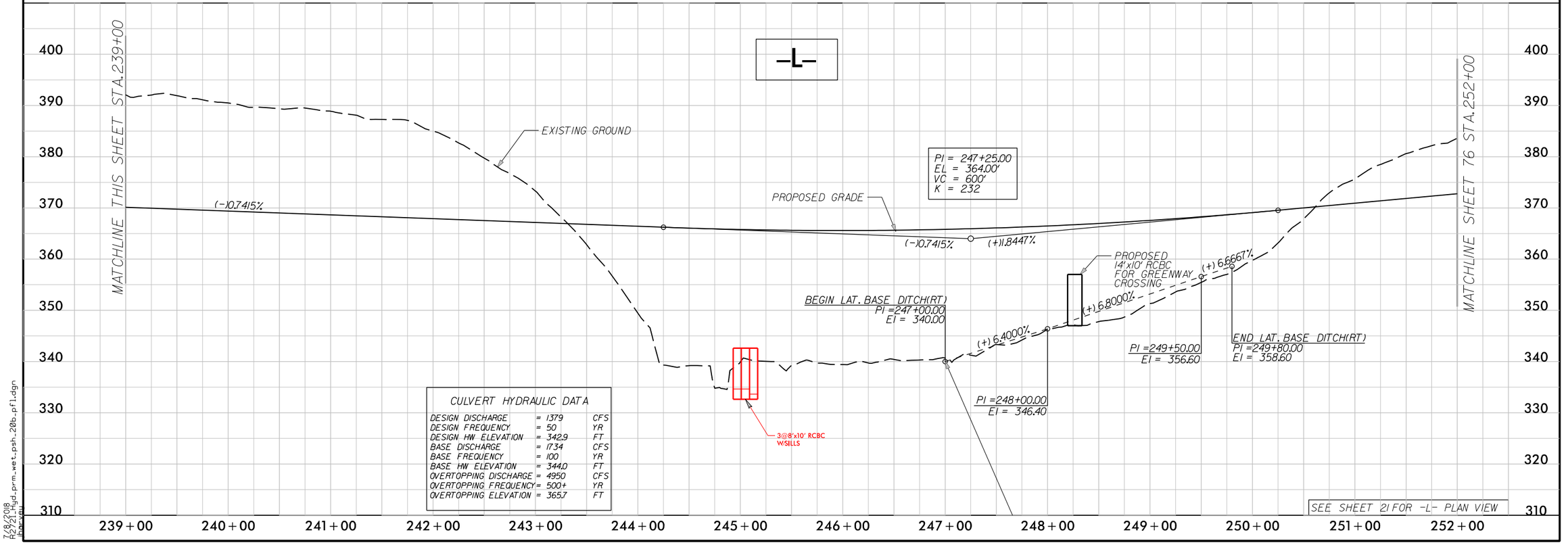
PROJECT REFERENCE NO.	SHEET NO.
R-2721	75
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED





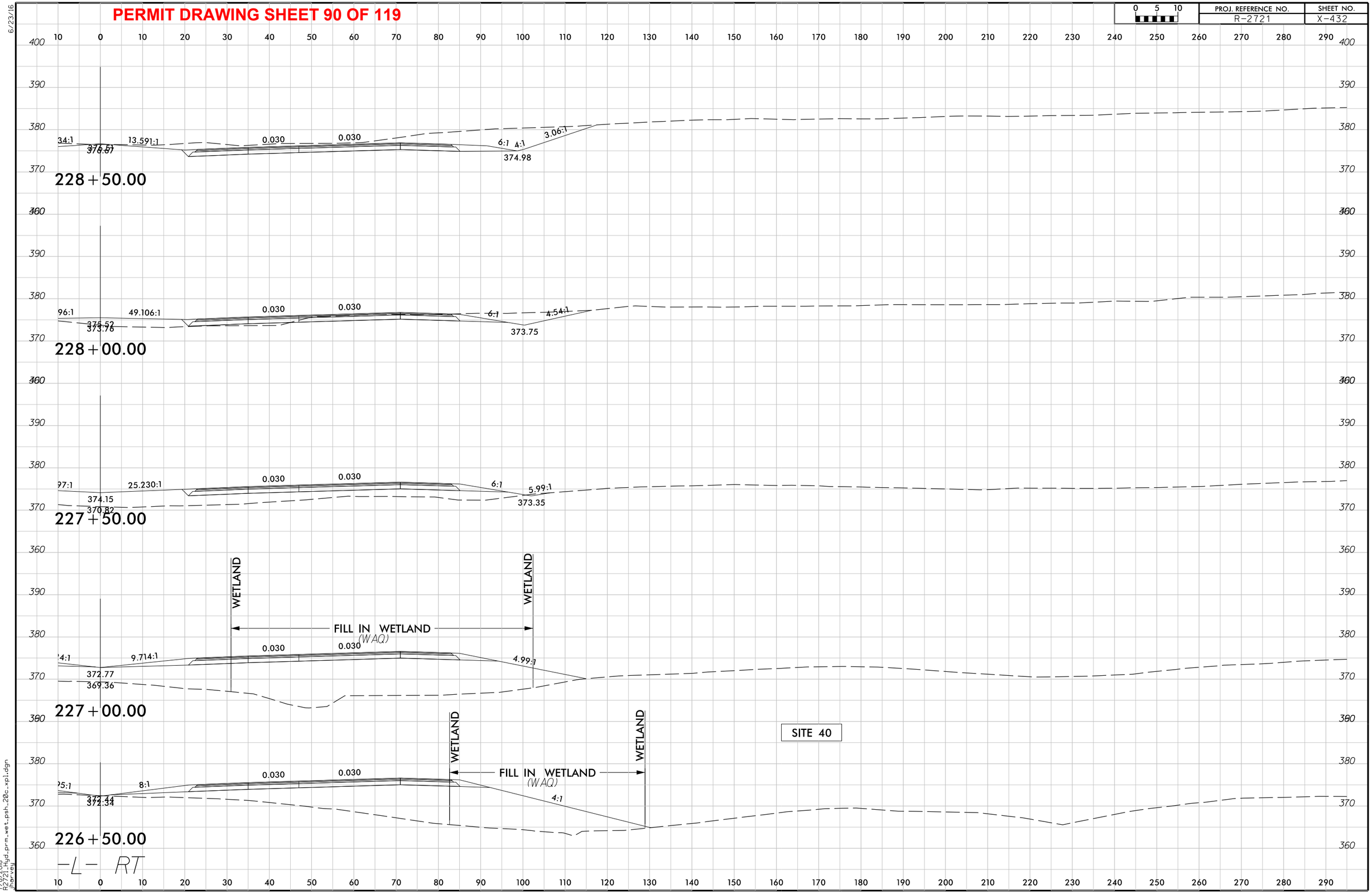
7/8/2018
R-2721_std_prm_wet_psh_20b_pf1.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 90 OF 119

0 5 10

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-432



7/9/2018
R2721_hyd_prm_wet_psh_20c_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 91 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-145

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

390 380 370 360 350

WETLAND

WETLAND

WETLAND

FILL IN WETLAND (WAQ)

SITE 39

FILL IN WETLAND (WAQ)

IMPACTS IN SURFACE WATER (SAG)

227+00.00

2.263:1 6:1 370.85 0.030 0.030 9.124:1 9.7 372.77 369.36

226+50.00

2:1 2:1 6:1 370.89 0.030 0.030 7.595:1 8 372.44 372.34

226+00.00

4:1 6:1 370.96 0.030 0.030 7.595:1 8 372.46 367.50

225+50.00

3.26:1 4:1 6:1 371.21 0.030 0.030 7.595:1 8 373.05 372.67

225+00.00

3.22:1 4:1 6:1 371.48 0.030 0.030 7.595:1 377.56 8 372.94

-L- LT

7/8/2018
R2721_grd_prm_wet_psh_20d_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 92 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-146

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

400 390 380 370 360

3:1 4:1 4:1 370.67 0.030 0.030 9.427:1 381.70 377.54 8.8

229+00.00

3:1 4:1 4:1 370.51 0.030 0.030 15.134:1 376.87 13.5

228+50.00

2:1 2:1 4.715:1 370.36 0.030 0.030 74.496:1 375.52 373.76 49.1

228+00.00

WETLAND WETLAND WETLAND

SITE 40

FILL IN WETLAND (WAQ)

EXCAVATION (WAQ)

6:1 370.20 0.030 0.030 21.597:1 374.15 370.82 25.2

227+50.00

-L- LT

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

7/8/2016
R2721HWY-prm_wet_psh_20e_xpl.dgn
jharvey

51499

PERMIT DRAWING SHEET 93 OF 119

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

NAD 83

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	40
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

PATSY SMITH MORGAN, TRUSTEE
SMITH FAMILY CHARITABLE TRUST

EXISTING R/W

R/W MON

215
R. MARKHAM &
RUTH B. STEWART
MELISSA S. &
ANTHONY K. WOODELL

412
ANTHONY K. WOODELL AND
MELISSA S. WOODELL

STREAM SB

NOT RIPARIAN SURFACE WATER PER BM 2002 PG 335

CL II RIPRAP
LENGTH=26 FT
SEE DETAIL 2A

SITE 51

S

RIPRAP

48" WW

NC 55 BYP SBL 58' BST

NC 55 BYP SBL 45' BST

NC 55 BYP NBL 57' BST

NC 55 BYP NBL 32' BST

MTL

RETAIN

CONC ISL

DI 15" RCP

24" RCP

18" RCP

30" RCP

15" RCP

48" RCP

20+00

25+00

30+00

2.09%

SITE 41

COLLAR
REMOVE HW

JB w/MH
HW

48" RCP-III
3%

48"

2.50%

LAT V-DITCH w/CL B RIPRAP
SEE DETAIL 22A

HEAD DITCH w/CL I RIPRAP
SEE DETAIL 43A

TS

R=440

216

ANTHONY K. WOODELL AND
MELISSA S. WOODELL

100' RIPARIAN SURFACE WATER BUFFER PER BM 2002 PG 335

PATSY SMITH MORGAN, TRUSTEE
SMITH FAMILY CHARITABLE TRUST

R. MARKHAM &
RUTH B. STEWART

TOP=378.45'

TOP=379.55'

CB

CONC HW

SR 1172 OLD SMITHFIELD RD

MATCHLINE SHEET 6
-Y1- STA 31+00.00

S S DENOTES IMPACTS IN SURFACE WATER

782018
R2721_Hyd_prm_vert_psh_40.dgn
lhorney

51499

PERMIT DRAWING SHEET 94 OF 119

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

NAD 83

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	40
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

PATSY SMITH MORGAN, TRUSTEE
SMITH FAMILY CHARITABLE TRUST

PATSY SMITH MORGAN, TRUSTEE
SMITH FAMILY CHARITABLE TRUST

PATSY SMITH MORGAN, TRUSTEE
SMITH FAMILY CHARITABLE TRUST

215
R. MARKHAM &
RUTH B. STEWART
MELISSA S. &
ANTHONY K. WOODELL

412
ANTHONY K. WOODELL AND
MELISSA S. WOODELL

STREAM SB

SITE 51

SITE 41

CL II RIPRAP, LENGTH=26 FT
SEE DETAIL 2A

LAT V-DITCH w/CL B RIPRAP
SEE DETAIL 22A

HEAD DITCH w/CL I RIPRAP
SEE DETAIL 43A

COLLAR
REMOVE
HW

JB w/MH
SW

48" RCP III

2.50%

2.09%

RETAIN

NC 55 BYP SBL 58' BST

NC 55 BYP SBL 45' BST

NC 55 BYP NBL 57' BST

NC 55 BYP NBL 32' BST

SR 2210 OLD SMITHFIELD RD

MATCHLINE SHEET 6
-Y1- STA 31+00.00

PATSY SMITH MORGAN, TRUSTEE
SMITH FAMILY CHARITABLE TRUST

R. MARKHAM &
RUTH B. STEWART

S S DENOTES IMPACTS IN SURFACE WATER

7822018
R-2721_hyd_prm_wet_psh_40a.dgn
lhorney

51499

PERMIT DRAWING SHEET 95 OF 119

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	42
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

21 SUNSET HILLS HOMEOWNERS ASSOCIATION

22 HSA PROPERTIES LLC

WETLAND WS
218 D.R. HORTON, INC
PRIVATE OPEN SPACE

STREAM SO

SITE 42

SITE 44

SITE 43

TS

217 TOWN OF APEX PUMP STATION EASEMENT

24 NC DEPT. OF TRANSPORTATION

26 THE MATA FAMILY, LLC

220 TOWN OF HOLLY SPRINGS

219 ARBOR CREEK KS, LLC

221 BNRICO, LLC

KELLY M. MCGEE
CATHERINE E. CARVER
MINNIE J. AND WILLIE C. BRIDGES
JOSH D. PALADENI
CHAD D. WOODARD
CHARLIE K. CHAN AND IRIS Y. CHU
ROSE PROPERTY ONE, LLC
FRANK TOMS III AND LAURA DAVES TOMS
JOHN LUCIDO
RAQUEL BROOKS
SEN LOUIE AND LILY CHOW
AMANDA MARIE KRIARIS
TUSHAR AND LEENA BAJAJ
ROBERT AND COLLEEN BALES
ZACHARY LEWIS HALL DARIN S. LEIGH
EARNEST B. III AND JENNIFER N. GOODRICH
SREENIVAS VEMULAPALLI AND SRIVALLI DONTHINENI
CHANDRA YELLAPANTULA AND HARINATH APPANI
ZACHARY DARGATZ AND KRISTEN KNIGHT
CURRIN BROS., INC

-Y3- PT Sta. 14+65.18
-Y3- POT Sta. 10+00.00
-Y3- STA 20+00.00
-Y3- STA 22+00.00
S 83° 58' 49" E
S 68° 08' 00.2" E
BEGIN CONSTRUCTION -Y3- STA. 10+00.00

TOE PROTECTION SEE DETAIL 38A
CL B RIPRAP
RETAIN
REMOVE
INLET CHANNEL SEE DETAIL 54A
OUTLET CHANNEL SEE DETAIL 54A
LAT 2' BASE DITCH w/CL I RIPRAP SEE DETAIL 20A
MATCHLINE SHEET 11 -Y3- STA 22+00.00
MATCHLINE SHEET 11

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEET 2B-27 FOR BRIDGE SKETCH | SEE SHEET 101 FOR -Y3- PROFILE

782018
R2721_Hyd_prm_wet_psh_42.dgn
lhoover

PERMIT DRAWING SHEET 96 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	42
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

21 SUNSET HILLS HOMEOWNERS ASSOCIATION

22 HSA PROPERTIES LLC

24 NC DEPT. OF TRANSPORTATION

26 THE MATA FAMILY, LLC

217 TOWN OF HOLLY SPRINGS PUMP STATION EASEMENT

218 D.R. HORTON, INC
PRIVATE OPEN SPACE

219 ARBOR CREEK KS, LLC

220 TOWN OF HOLLY SPRINGS

221 BNRICH LLC

WETLAND WS

STREAM SO

SITE 42

SITE 43

SITE 44

TS

BEGIN CONSTRUCTION
-Y3- STA. 10+00.00

-Y3- POT Sta. 10+00.00

-Y3- PT Sta. 14+65.18

-Y3- S 83° 58' 49" E

-Y3- S 68° 08' 00.2" E

MATCHLINE SHEET 11
-Y3- STA 22+00.00

MATCHLINE SHEET 11

TOE PROTECTION SEE DETAIL 38A

OUTLET CHANNEL SEE DETAIL 54A

INLET CHANNEL SEE DETAIL 54A

LAT 2' BASE DITCH w/CL I RIPRAP SEE DETAIL 20A

CL B RIPRAP

F F	DENOTES FILL IN WETLAND
	DENOTES MECHANIZED CLEARING
S S	DENOTES IMPACTS IN SURFACE WATER
TS TS	DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEET 2B-27 FOR BRIDGE SKETCH | SEE SHEET 101 FOR -Y3- PROFILE

7/8/2018
R2721_hyd_prm_wet_psh_42a.dgn
lhoover

5/28/99

PERMIT DRAWING SHEET 97 OF 119

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 2600	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 350.6	FT
BASE DISCHARGE	= 2800	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 351.1	FT
OVERTOPPING DISCHARGE	= 4000	CFS
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING ELEVATION	= 354.5	FT

–Y3–
SUNSET LAKE RD

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	101
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BEGIN GRADE
-Y3- STA.10+00.00
EL. 366.09

PI = 11+30.00
EL = 356.82'
VC = 260'
K = 48
V = 30mph

(-)17.1328%

(-)11.6646%

EXISTING GROUND

END BRIDGE
Y3 STA.16+02.37

BEGIN BRIDGE
Y3 STA.15+12.37

EXISTING CULVERTS TO BE REMOVED

PROPOSED GRADE

PI = 16+30.00
EL = 348.50'
VC = 700'
K = 97

(+)11.6646%

(+)0.8475%

(+)5.5409%

WS ELEV. ON 3-7-18 = 343.1'

4@12'x8' RCBC

BEGIN LAT 2' BASE DITCH (RT)
PI STA 15+84
ELEV=344.00

END LAT 2' BASE DITCH (RT)
PI STA 16+43
ELEV=344.50

PI = 24+85.00
EL = 395.88'
VC = 1,000'
K = 355

(+)5.5409%

MATCHLINE THIS SHEET STA.23+00

SEE SHEETS 11 & 42 FOR -Y3- PLAN VIEW

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

380 370 360 350 340 330 320

–Y3–
SUNSET LAKE RD

MATCHLINE THIS SHEET STA.23+00

PI = 24+85.00
EL = 395.88'
VC = 1,000'
K = 355

BEGIN BRIDGE
Y3 STA.25+47.84

(+)2.7279%

℄ -L-
COMPLETE 540

END BRIDGE
Y3 STA.29+02.86

EXISTING GROUND

PI = 32+00.00
EL = 415.38'
VC = 150'
K = 1733

(+)2.7279%

(+)2.8145%

PROPOSED GRADE

PI = 34+25.00
EL = 421.71'
VC = 150'
K = 212

(+)2.8145%

(+)3.5226%

MATCHLINE SHEET 102 STA.36+00

SEE SHEETS 11 & 43 FOR -Y3- PLAN VIEW

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00

440 430 420 410 400 390 380 370 360

7/8/2018
R-2721_hyd_prm_wet_psh_42b_pfl.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 98 OF 119

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-659

0 5 10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

360 350 340

SITE 44

2:1 0.005 353.40 0.020 2:1

16+00.00

IMPACTS IN SURFACE WATER (SO)

2:1 0.006 353.07 0.020 2:1

IMPACTS IN SURFACE WATER (SO)

15+50.00

WETLAND

2:1 0.018 352.87 0.020 2:1

15+00.00

SITE 42

FILL IN WETLAND (WS)

WETLAND 3:1 0.030 352.83 0.030 WETLAND

(WS) FILL IN WETLAND 2:1

SITE 43

14+50.00

FILL IN WETLAND (WS)

WETLAND 3:1 0.040 352.85 0.040 WETLAND 2:1

FILL IN WETLAND (WS)

SITE 43

14+00.00

FILL IN WETLAND (WS)

WETLAND 3:1 0.040 353.14 0.040 WETLAND

(WS) FILL IN WETLAND 4:1

13+50.00

-Y3-

7/9/2018
R2721HWY_prm_wet_psh_42c_xpl.dgn
jharvey

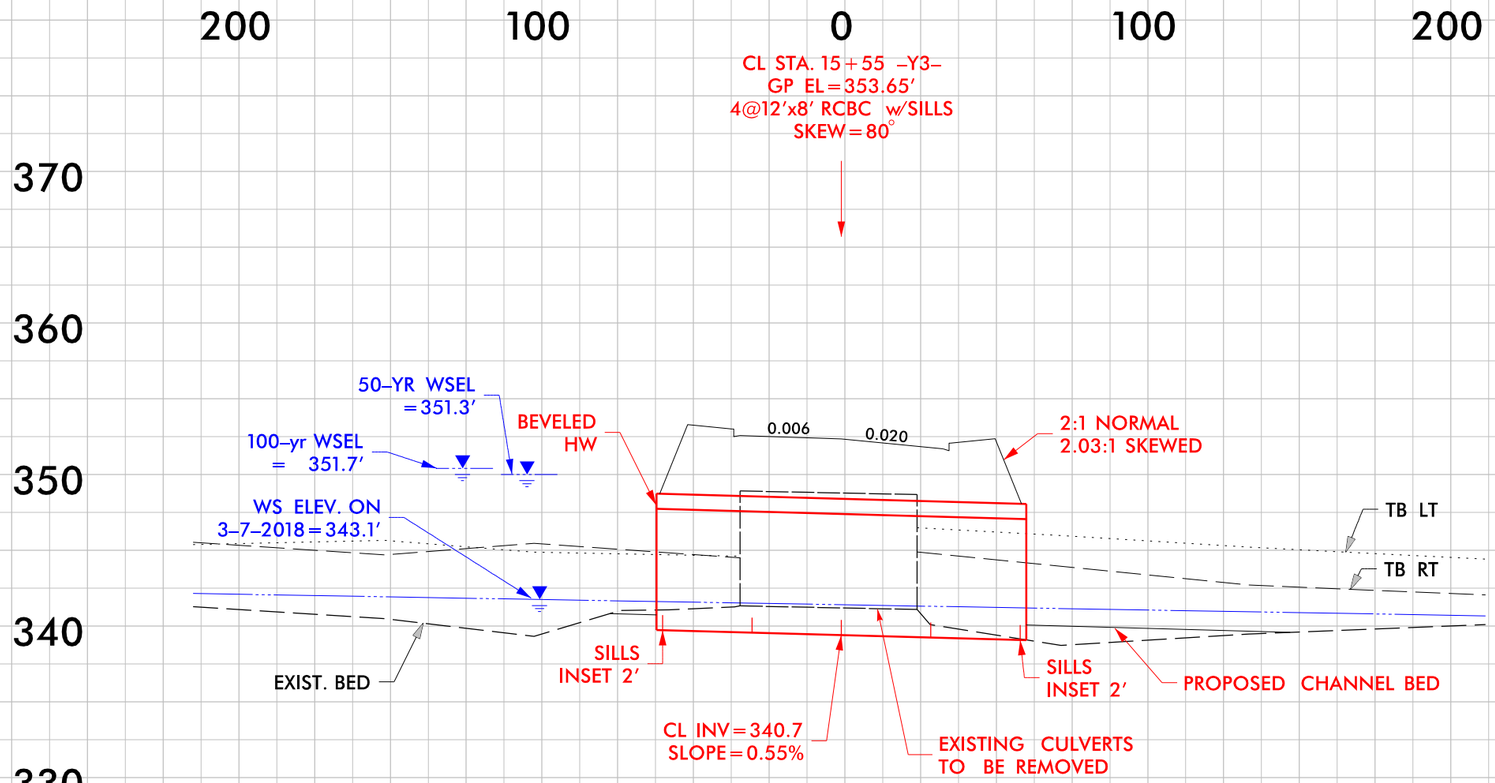
5/14/99

PERMIT DRAWING SHEET 99 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	42D
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/8/2018
R2721_hyd_prm_wet_psh_42d_sec.dgn
jharvell

PERMIT DRAWING SHEET 100 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PAVEMENT REMOVAL
PAVED SHOULDER
PROPOSED SIGNAL

BEGIN CONSTRUCTION
-Y5D- STA. 10+00.00
-Y5D- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y5- STA. 11+58.52

-Y5- PT Sta. 19+04.92
-Y5- PC Sta. 17+93.07
-Y5I- PC Sta. 11+45.25
-Y5D- POT Sta. 12+65.36
-Y5I- POT Sta. 10+00.00
Δ = 89°37'43.7"

WETLAND WAG

SITE 45
SITE 46
SITE 47

AMERICAN PROPERTIES HOLDINGS LLC
PARMINDER AND PARDEEP SANDHAR
CVS 5886 NC LLC
SIV-J LLC
TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2004 PG 446
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT DB 8688 PG 116
J&D PEACOCK PROPERTIES LLC
UNKNOWN
PAULINE FRAZIER
LOCKHOLLY LLC
BETTY AND EARLIE MOORE
DONALD AND MARGARET MCNEILL
CREEK CLUB, LTD
ROSEN HOLLY SPRINGS II LLC
ROSEN HOLLY SPRINGS LLC
JORDAN REAL ESTATE HOLDINGS LLC
TA PROPERTIES LLC
WADE & ORA BURT
WILLIAM & WADE BURT
VARIABLE WIDTH TOWN OF HOLLY SPRINGS UTILITY EASEMENT BM 2005 PG 1874
PERMANENT DRAINAGE EASEMENT w/ BM 2006 MS 951
PERMANENT DRAINAGE EASEMENT BM 2006 PG 458
VARIABLE WIDTH TOWN OF HOLLY SPRINGS UTILITY EASEMENT BM 2005 PG 1874

STREAM SX

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 47
-Y5- STA 24+00.00

MATCHLINE SHEET 50
-Y5I- STA 13+00.00

SEE SHEET 103 FOR -Y5- PROFILE
SEE SHEET 106 FOR -Y5D- PROFILE
SEE SHEET 108 FOR -Y5I- PROFILE

782018
78272_Hyd_prm_wet_psh_46.dgn
lhoover

PERMIT DRAWING SHEET 101 OF 119

51499

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

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RALEIGH, NORTH CAROLINA 27606
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PAVEMENT REMOVAL
PAVED SHOULDER
PROPOSED SIGNAL

BEGIN CONSTRUCTION
-Y5D- STA. 10+00.00
-Y5D- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y5- STA. 11+58.52

-Y5- POT Sta. 10+00.00

-Y5- PT Sta. 19+04.92

-Y5- PC Sta. 17+93.07

-Y5D- POT Sta. 12+65.36

-Y5I- POT Sta. 10+00.00

Δ = 89°37'43.7"

-Y5- POT Sta. 22+67.79

-Y5- PC Sta. 11+45.25

MATCHLINE SHEET 47
-Y5- STA 24+00.00

MATCHLINE SHEET 50
-Y5I- STA 13+00.00

AMERICAN PROPERTIES HOLDINGS LLC
PARMINDER AND PARDEEP SANDHAR
CVS 5886 NC LLC
SIV-J LLC
CREEK CLUB, LTD
ROSEN HOLLY SPRINGS II LLC
ROSEN HOLLY SPRINGS LLC
JORDAN REAL ESTATE HOLDINGS LLC
J&D PEACOCK PROPERTIES LLC
UNKNOWN
PAULINE FRAZIER
LOCKHOLLY LLC
BETTY AND EARLIE MOORE
DONALD AND MARGARET MCNEILL
TA PROPERTIES LLC TA PROPERTIES LLC TA PROPERTIES LLC
WADE & ORA BURT
WILLIAM & WADE BURT

STREAM SX
WETLAND WAG

SITE 45
SITE 46
SITE 47

20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT DB 8688 PG 116

TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2004 PG 946

VARIABLE WIDTH TOWN OF HOLLY SPRINGS UTILITY EASEMENT BM 2005 PG 1874

PERMANENT DRAINAGE EASEMENT W/ BM 2006 PG 351

PERMANENT DRAINAGE EASEMENT BM 2005 PG 1874

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEET 103 FOR -Y5- PROFILE
SEE SHEET 106 FOR -Y5D- PROFILE
SEE SHEET 108 FOR -Y5I- PROFILE

7/8/2018
R2721_Hyd_prm_wet_pstn_46a.dgn
jhorvay

5/28/99

PERMIT DRAWING SHEET 102 OF 119

CULVERT HYDRAULIC DATA		
DESIGN DISCHARGE	= 930	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 357.0	FT
BASE DISCHARGE	= 1030	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 357.4	FT
OVERTOPPING DISCHARGE	= 1900	CFS
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING ELEVATION	= 362.4	FT

-Y5-
HOLLY SPRINGS RD

BEGIN GRADE
-Y5- STA. 11+78.16
EL. 388.92

PROPOSED GRADE

EXISTING GROUND

PI = 17+70.00
EL = 352.85'
VC = 615'
K = 49
V = 35mph

2@9'x8' RCBC

(-)6.0962%

(+)6.3918%

(+)7.7432%

EX 2@60" CMP
TO BE REMOVED

PI STA 16+26 -Y5- RT
ELEV=347.50

WS ON 01-10-18
=350.8

PI STA 17+00 -Y5- RT
ELEV=353.23

℄ -Y5D- & -Y5I-
LOCKLEY RD

PI = 23+30.00
EL = 388.64'
VC = 490'
K = 84

(+)6.3918%

MATCHLINE THIS SHEET STA. 23+00

MATCHLINE SHEET STA. 23+00

SEE SHEET 46 FOR -Y5- PLAN VIEW

12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

340 350 360 370 380 390 400 410 420 430

-Y5-
HOLLY SPRINGS RD

MATCHLINE THIS SHEET STA. 23+00

PI = 23+30.00
EL = 388.64'
VC = 490'
K = 84

(+)6.3918%

(+)0.5735%

PROPOSED GRADE

PI STA 27+50 -Y5- RT
ELEV=389.03

℄ -Y5C-
OLD CENTER ST

PI STA 28+50 -Y5- RT
ELEV=392.21

PI = 29+05.00
EL = 391.94'
VC = 470'
K = 106

(-)0.3000%

(+)0.2811%

(+)3.1800%

(+)0.5735%

(+)5.0276%

PI STA 27+00 -Y5- LT
ELEV=384.38

PI STA 27+50 -Y5- LT
ELEV=384.23

PI STA 27+71.54 -Y5- LT
ELEV=385.55

℄ -Y5E-
CATHERINE PL

EXISTING GROUND

PI = 35+65.00
EL = 425.12'
VC = 530'
K = 95

(+)5.0276%

MATCHLINE SHEET 104 STA. 36+00

SEE SHEETS 17, 46, AND 47 FOR -Y5- PLAN VIEW

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00

340 350 360 370 380 390 400 410 420 430

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	103
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

7/8/2018
R2721_hyd_prm_wet_psh_46b_pfl.dgn
bpowell

6/23/16

PERMIT DRAWING SHEET 103 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-678

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

370 360 380 370 360 350 380 370 360 350 380 370 360 350

SITE 46

WETLAND WETLAND

(WAG) FILL IN WETLAND

3:1 0.020 0.020 3:1

360.18

16+50.00

SITE 45

IMPACTS IN SURFACE WATER (SX)

IMPACTS IN SURFACE WATER (SX)

3:1 0.020 0.020 3:1

361.66

16+00.00

3:1 0.020 0.020 3:1

363.70

15+50.00

3:1 0.020 0.020 3:1

366.48

15+00.00

3:1 0.020 0.020 3:1

369.96

14+50.00

-Y5-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

7/9/2018
R2721_hyd_prm_wet_psh_46c_xpl.dgn
jharvey

6/23/16

PERMIT DRAWING SHEET 104 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-679

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

380 370 360 350

WETLAND WETLAND

4:1 0.020 0.020 4:1

362.41

19+50.00

WETLAND WETLAND

3:1 0.020 0.020 4:1

360.92

19+00.00

WETLAND WETLAND

3:1 0.020 0.020 3:1

359.74

18+50.00

SITE 47

WETLAND WETLAND WETLAND WETLAND

3:1 0.020 0.020 3:1

FILL IN WETLAND (WAH)

358.98

18+00.00

WETLAND WETLAND WETLAND

FILL IN WETLAND (WAG)

3:1 0.020 0.020 3:1

FILL IN WETLAND (WAH)

358.80

17+50.00

SITE 46

WETLAND WETLAND

FILL IN WETLAND (WAG)

3:1 0.020 0.020 3:1

359.35

17+00.00

-Y5-

7/9/2018
R2721_Hyd_prm_wet_psh_46d_xpl.dgn
jharvey

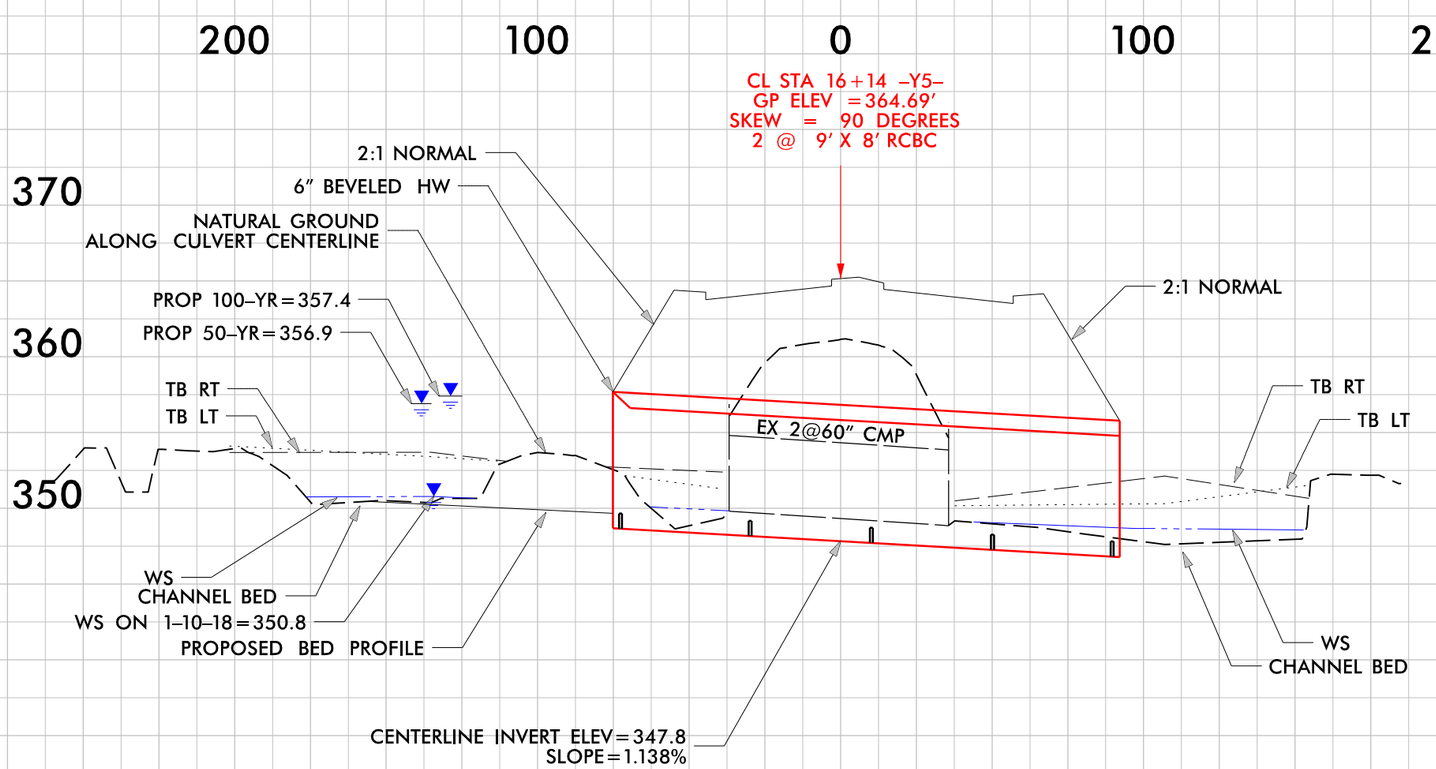
5/14/99

PERMIT DRAWING SHEET 105 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	46D
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/8/2018
R2721_hyd_prn_wet_psh_46e_sec.dgn
jbarnes

PERMIT DRAWING SHEET 106 OF 119

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	48
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER
PROPOSED SIGNAL

MATCHLINE SHEET 51
-Y5A- STA 14+00.00

MATCHLINE SHEET 17
-Y5- STA 49+00.00

MATCHLINE SHEET 49
-Y5- STA 62+00.00

NAD 83

TAIL DITCH w/CL I RIPRAP SEE DETAIL 9

BURY INVERT 0.3 FT

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A

BACKFILL TO NG EL 404

LAT 4' BASE DITCH w/CL I RIPRAP SEE DETAIL 7A

-Y5SB- PRC Sta. 23+31.80
-Y5SB- PT Sta. 23+80.55

STREAM SAB

WETLAND WAJ

SITE 48

SITE 35

E&M JOHNSON ENTERPRISES INC

DONALD ANDREWS

WILLIE WATSON

CHARLES AND KOREA DUNCAN

-Y5A- PC Sta. 11+08.85

GARRY RICHTER

JOSEPH AND NANCY MACK

JOHN MITCHELL

-Y5- POC Sta. 49+50.25=
-Y5SB- PT Sta. 23+80.55
35.50' LT

-Y5- PCC Sta. 50+36.92

MICHAEL FINNERTY

ROLAND AND ANITA TAYLOR

JOHN DAVITT

KEITH AND CONNIE HARSHMAN

-Y5- POC Sta. 56+56.61=
-Y5A1- POT Sta. 10+00.00
-Y5B- POT Sta. 10+00.00
Δ = 90°45'17.65"

JEFFERY AND GAIL SANDERS

STEVEN AND MICHELLE LESLIE

-Y5B- PT Sta. 14+61.01
S 44°15'54.9"E
-Y5B- POT Sta. 14+86.41

-Y5- PT Sta. 57+23.62

MICHAEL AND LAURIE PARKER

-Y5- PC Sta. 60+93.81

JAMES HAMPTON, JR.

AMY AND DAVID PATTERSON

ERIC PETTY

MANUEL AND LISA SUAREZ

JOSEPH CICHOCKI

END CONSTRUCTION
-Y5B- STA. 14+37.50

SEE SHEET Y5 FOR -104- PROFILE
SEE SHEET Y5A FOR -105- PROFILE
SEE SHEET Y5B FOR -1056- PROFILE

7822018
8/27/2021
jhopper

T:\7822018_HydI_prm_wet_psh_48.dgn

PERMIT DRAWING SHEET 107 OF 119

51499

F E DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
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SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	48
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER
PROPOSED SIGNAL

MATCHLINE SHEET 51
-Y5A- STA 14+00.00

MATCHLINE SHEET 17
-Y5- STA 49+00.00

MATCHLINE SHEET 49
-Y5- STA 62+00.00

NAD 83

-Y5B- PC Sta. 23+79.80
-Y5B- PT Sta. 27+59.63
-Y5A- PT Sta. 25+09.92

-Y5- POC Sta. 49+50.25=
-Y5SB- PT Sta. 23+80.55
35.50' LT

-Y5- PCC Sta. 50+96.92

-Y5- POC Sta. 56+56.61=
-Y5A- POT Sta. 10+00.00
-Y5B- POT Sta. 10+00.00
Δ = 90°45'17.65"

-Y5- PC Sta. 11+08.85

-Y5- PT Sta. 57+23.62

-Y5- PC Sta. 60+93.81

-Y5B- PT Sta. 14+61.01
S 44°15'54.9" E

-Y5B- POT Sta. 14+86.41

END CONSTRUCTION
-Y5B- STA. 14+37.50

N 59°05'32.0" W

N 153°07'01.5"

S 39°05'32.0" E

STREAM SAB

WETLAND WAJ

SITE 48

SITE 35

E&M JOHNSON ENTERPRISES INC

DONALD ANDREWS

WILLIE WATSON

GARRY RICHTER

JOSEPH AND NANCY MACK

CHARLES AND KOREA DUNCAN

JOHN MITCHELL

MICHAEL AND LAURIE PARKER

JAMES HAMPTON, JR.

AMY AND DAVID PATTERSON

ERIC PETTY

JOSEPH CICHOCKI

MANUEL AND LISA SUAREZ

ROLAND AND ANITA TAYLOR

MICHAEL FINNERTY

JEFFERY AND GAIL SANDERS

JOHN DAVITT

KEITH AND CONNIE HARSHMAN

STEVEN AND MICHELLE LESLIE

SR 1152 HOLLY SPRINGS RD (SR 23 BST)

SR 3922 ASHWILL CT (T-BST)

TAIL DITCH w/CL I RIPRAP SEE DETAIL 9

LAT 2 BASE DITCH w/CL I RIPRAP SEE DETAIL 4A

LAT 4 BASE DITCH w/CL I RIPRAP SEE DETAIL 7A

LAT 2 BASE DITCH w/CL I RIPRAP SEE DETAIL 10A

BURY INVERT 0.3' FT

BACKFILL TO NG EL 404

REMOVE

RETAIN

ADDITIONAL R/W REQUIRED FOR SLOPE EASEMENT

ADDITIONAL R/W REQUIRED FOR SLOPE EASEMENT 10' BEYOND SLOPE EASEMENT

SEE SHEET Y5 FOR -I04- PROFILE
SEE SHEET Y5A FOR -I05- PROFILE
SEE SHEET Y5B FOR -I056- PROFILE

7/8/2018
R2721_Hyd_prm_wet_psh_48o.dgn
jhoney

6/23/16

PERMIT DRAWING SHEET 108 OF 119

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-696

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

430 420 410 400 390 380 370

0.004 0.020

2:1 12:1 2:1 2:1

SITE 48 SITE 35

WETLAND WETLAND

FILL IN WETLAND (WAJ)

IMPACTS IN SURFACE WATER (SAB)

377.48

51+00.00

0.006 0.020

2:1 12:1 2:1 2:1

SITE 48 SITE 35

WETLAND WETLAND

FILL IN WETLAND (WAJ)

IMPACTS IN SURFACE WATER (SAB)

375.58

50+50.00

-Y5-

7/9/2018
R-2721_Hyd_prm_wet_psh_48b_xpl.dgn
jharvey

PERMIT DRAWING SHEET 109 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	49
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

BEGIN CONSTRUCTION
-Y5G- STA. 12+87.50

-Y5G- PT Sta. 12+43.82

-Y5G- PC Sta. 13+47.56

-Y5G- PT Sta. 16+46.29

END CONSTRUCTION
-Y5- STA. 72+50.00

-Y5- POC Sta. 62+65.48
-Y5G- POT Sta. 17+53.87
Δ = 87°04'50"

-Y5- PT Sta. 70+54.06

-Y5- POT Sta. 72+73.53

BRIAN AND ANNAMARY CHURCH

BRYANT AND VICTORIA PERDUN

GEORGE AND CYNTHIA HARDIN

SECU*RE INC

JOSEPH AND NANCY MACK

JOHN MITCHELL

KATHERINE KALEY

ALAN AND JENNIFER CLEGG

AQUA NORTH CAROLINA
WELL LOT #2

WILLIAM AND BETSY HINE

GARY AND JEAN WINGLER

RUSSELL MILLER AND KIMBERLY KORB

HALLMARK INVESTORS

STREAM SEE
CHARLES AND LINDA PULLIAM

SILAS AND EVON WARD

JAMES HAMPTON, JR.

ST MARYS BAPTIST CHURCH

SITE 49

SITE 50

20' DRAINAGE EASEMENT BM 1985 PG 1289

20' ACCESS EASEMENT BM 1985 PG 1794

APPROXIMATE LOCATION OF 30' DRAINAGE EASEMENT SCALED FROM BM 1986 PG 1040

SR 1152 HOLLY SPRINGS RD 2ST BST

65.00'

N 55°02'17" E

MATCHLINE SHEET 48
-Y5- STA 62+00.00

RETAIN
REMOVE
DITCH BLOCK
SPEC CUT V-DITCH SEE DETAIL 3A
LAT V-DITCH w/CL B RIPRAP SEE DETAIL 22A
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
INLET CHANNEL SEE DETAIL 56A
OUTLET CHANNEL SEE DETAIL 56A
CL B RIPRAP
2@7'x5' RCBC
15" RCP
18" RCP
24" RCP
30" RCP
48" RCP
72" WD
48" WD
PUE
TS
S
RW

SEE SHEET 105 FOR -Y5- PROFILE
SEE SHEET 107 FOR -Y5G- PROFILE

7/9/2018
R2721_Hyd_prm_wet_psh_49.dgn
lhaney

PERMIT DRAWING SHEET 110 OF 119

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	49
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

-Y5G- PT Sta. 12+43.82
BEGIN CONSTRUCTION
-Y5G- STA. 12+87.50

-Y5G- PC Sta. 13+47.58

-Y5G- PT Sta. 16+46.29

-Y5- POC Sta. 62+62.48
-Y5G- POT Sta. 17+33.87
Δ = 87°04'30"

-Y5- POT Sta. 72+73.53

-Y5- POT Sta. 70+54.06

END CONSTRUCTION
SITE 50 -Y5- STA. 72+50.00

SITE 49

MATCHLINE SHEET 48
-Y5- STA 62+00.00

BRIAN AND ANNAMARY CHURCH
BRYANT AND VICTORIA PERDUN
GEORGE AND CYNTHIA HARDIN
SECURE INC
ALAN AND JENNIFER CLEGG
WILLIAM AND BETSY HINE
GARY AND JEAN WINGLER
JOSEPH AND NANCY MACK
JOHN MITCHELL
KATHERINE KALEY
AQUA NORTH CAROLINA
WELL LOT #2
HALLMARK INVESTORS
RUSSELL MILLER AND KIMBERLY KORB
CHARLES AND LINDA PULLIAM
SILAS AND EVON WARD
JAMES HAMPTON, JR.
ST MARYS BAPTIST CHURCH

20' DRAINAGE EASEMENT BM 1985 PG 1288
20' ACCESS EASEMENT BM 1985 PG 1794
APPROXIMATE LOCATION OF 30' DRAINAGE EASEMENT SCALED FROM BM 1986 PG 1040

STREAM SEE 296
STREAM SEE 298

INLET CHANNEL SEE DETAIL 56A
OUTLET CHANNEL SEE DETAIL 56A
LT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
LAT V-DITCH w/CL B RIPRAP SEE DETAIL 22A
SPEC CUT V-DITCH SEE DETAIL 3A
CL B RIPRAP
DITCH BLOCK
RETAIN
REMOVE
2@7'x 5' RCBC
48" RCP
60" RCP
72" RCP
48" WD
72" WD
SF 1152 HOLLY SPRINGS RD SBST
65+00
70+00
N 55°02'17" E
N 15°47'50" E
PUE
TS
S
RW

SEE SHEET 105 FOR -Y5- PROFILE
SEE SHEET 107 FOR -Y5G- PROFILE

7/2/2018
R2721_hyd_prm_wet_psh_49a.dgn
lhardee

5/28/99

PERMIT DRAWING SHEET 111 OF 119

–Y5–
HOLLY SPRINGS RD

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 897	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 367.0	FT
BASE DISCHARGE	= 1074	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 368.1	FT
OVERTOPPING DISCHARGE	= 1360	CFS
OVERTOPPING FREQUENCY	= 100 +	YRS
OVERTOPPING ELEVATION	= 369.8	FT

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

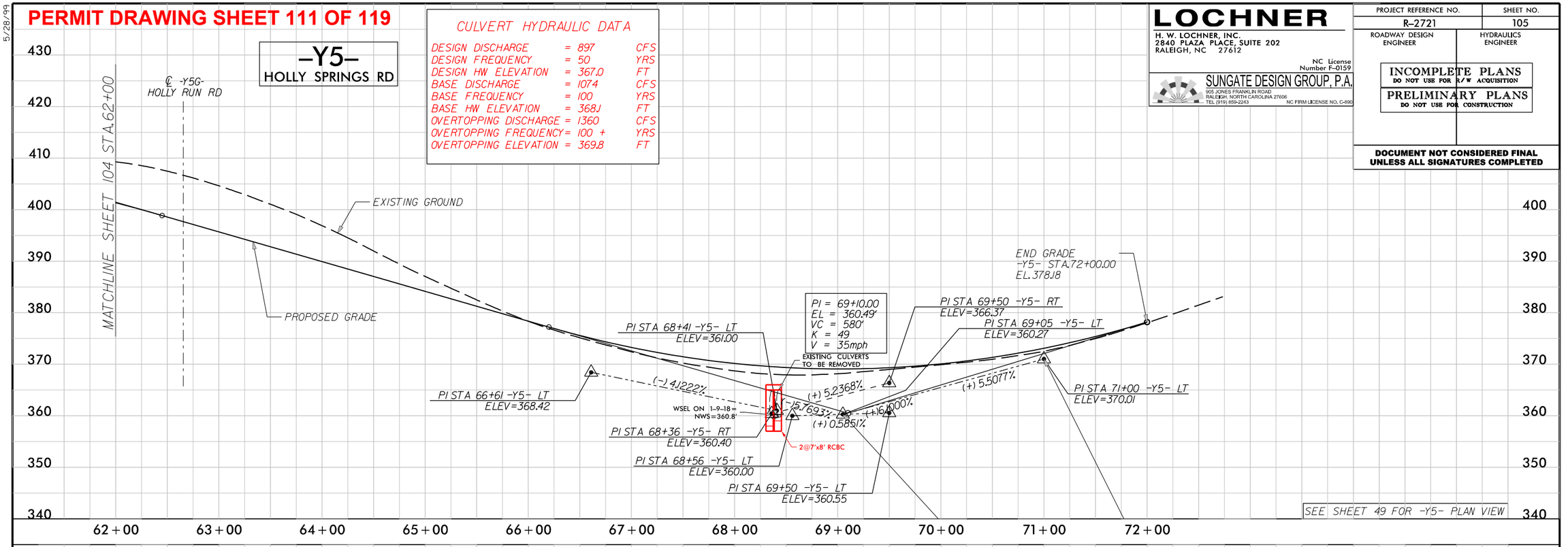
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R–2721	105
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

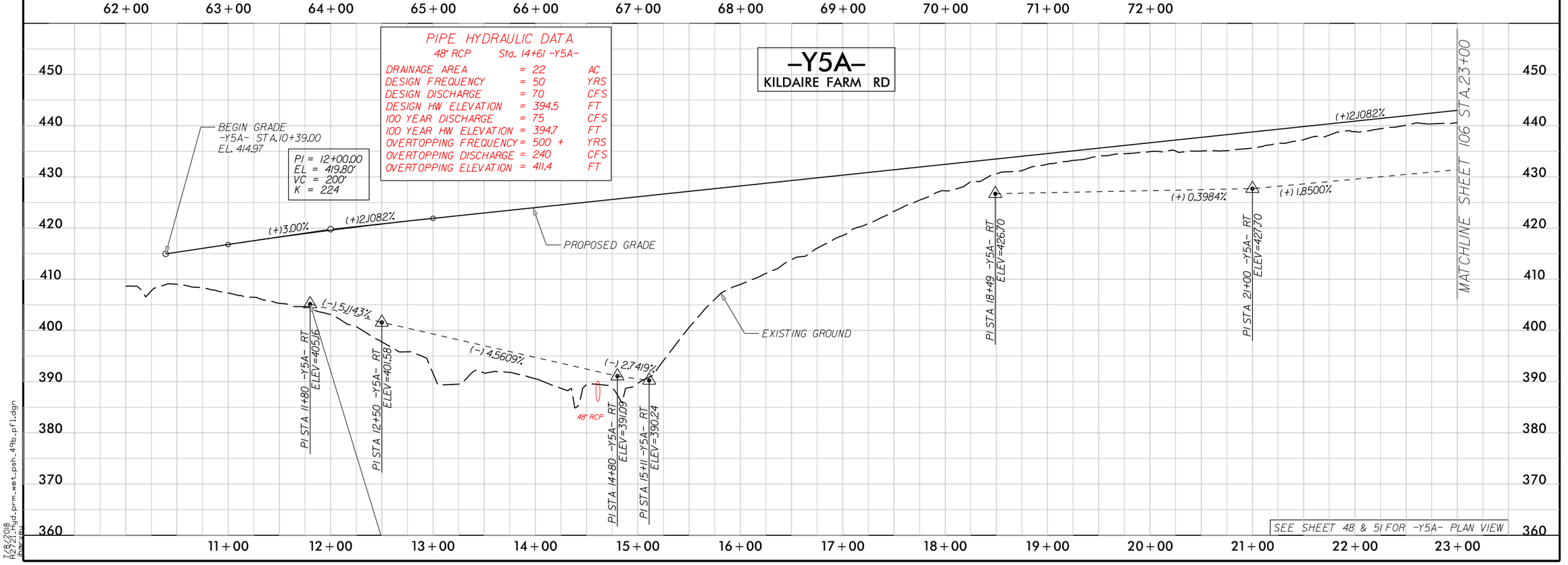
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



PIPE HYDRAULIC DATA
48" RCP Sta. 14+61 –Y5A–

DRAINAGE AREA	= 22	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 70	CFS
DESIGN HW ELEVATION	= 394.5	FT
100 YEAR DISCHARGE	= 75	CFS
100 YEAR HW ELEVATION	= 394.7	FT
OVERTOPPING FREQUENCY	= 500 +	YRS
OVERTOPPING DISCHARGE	= 240	CFS
OVERTOPPING ELEVATION	= 411.4	FT

–Y5A–
KILDAIRE FARM RD



7/8/2018
R2721_hyd_prm_wet_psh_49b_pf1.dgn
bpowell

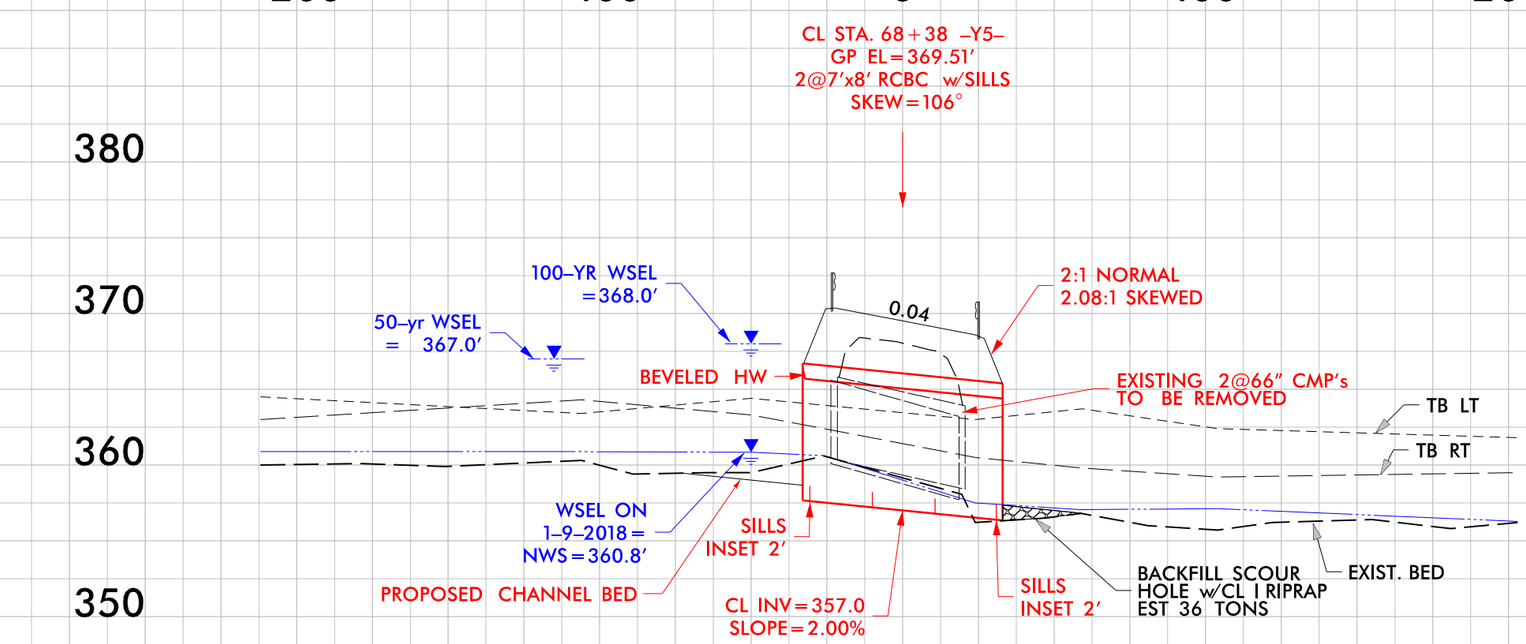
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PERMIT DRAWING SHEET 112 OF 119

PROJECT REFERENCE NO.	SHEET NO.
R-2721	49C
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



7/8/2018
R2721_rdwy4_prm_wet_psh_49c_sec.dgn
jbarvel

51499

PERMIT DRAWING SHEET 113 OF 119

F F — DENOTES FILL IN WETLAND

S S — DENOTES IMPACTS IN SURFACE WATER

TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

E E — DENOTES EXCAVATION IN WETLAND

61
E&M JOHNSON ENTERPRISES INC

50' 25' 0 50' 100'
SCALE: 1"=100'

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	51
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

-Y5A- PC Sta. 17+59.57
-Y5H- PC Sta.13+10.29
-Y5A- POC Sta.23+63.53=
-Y5H- POT Sta.14+17.30
△ = 90°00'00"
-Y5H- N 8° 04' 24.5" W 163.
-Y5H- N 46° 54' 39.9" E
-Y5A- N 84° 37' 06.3" W
-Y5A- PT Sta.14+83.08
-Y5K- POT Sta.12+49.55
-Y5K- N 8° 45' 56.0" E
-Y5A- POC Sta.26+48.64=
-Y5K- POT Sta.10+00.00
△ = 74°15'53.25"

SR 1300 KILDAIRE FARM RD
PC LINK
SCOTSTOWNE LN
SCOTSTOWNE LN — 24' BST
SCOTSTOWNE LN — 24' BST
SCOTSTOWNE LN — 24' BST

51499

PERMIT DRAWING SHEET 114 OF 119

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

E E DENOTES EXCAVATION IN WETLAND

SCALE: 1" = 100'

NAD 83

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H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	51
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

SITE 35

WETLAND WAI

STREAM SAB

MATCHLINE SHEET 48 -Y5A- STA 14+00.00

MATCHLINE SHEET 52 -Y5A- STA 27+00.00

-Y5A- N 84° 37' 06.3" W

-Y5H- N 84° 24' 45.6" W

-Y5K- N 81° 45' 36.0" E

-Y5H- N 46° 34' 39.9" E

E&M JOHNSON ENTERPRISES INC

ALICE WATSON

MEI BIN JIANG AND XING XIAN WANG

JAWED AND MUMTAZ KHAN

THAMOTHARAMPILLAI SIVARAJ

NANCY WILSON

SCOTT AND ANGELA SQUIERS

IAN EAGER

MICHALE AND JANICE SPEARS

DAVID AND DONNA MCCALLUM

ERIC RACINE AND RENE LATELLA

CHARLES AND ASHLEY BETTINI

DALLAS PERRY

WILLIE WATSON

ERNEST AND REBECCA KIRSTEIN

SEE SHEETS 105 & 106 FOR -Y5A- PROFILE
SEE SHEET 107 FOR -Y5H- PROFILE
SEE SHEET 108 FOR -Y5K- PROFILE

7/8/2019
R-2721_Hyd_prm_wet_psh_51o.dgn
jhancock

WETLAND AND SURACE WATER IMPACTS 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)
1	19+20 to 19+73 -L-LT	CULVERT						< 0.01	< 0.01	33	13	
		BANK STABILIZATION						< 0.01		10		
2	21+67 to 21+88 -L-LT											
3	15+22 to 15+48-L-LT	18" RCP	< 0.01		< 0.01	< 0.01						
4	40+79 to 41+93-L-RT	ROADWAY FILL	0.02									
		POND						0.21				
5	48+93 to 49+78-L-RT	ROADWAY FILL	0.05			0.02						
6	51+88 to 57+81 -L-	48" RCP	1.53		0.06	0.02		0.02	< 0.01	463	10	
7	59+48 to 60+08-L-	30" RCP						< 0.01	< 0.01	372	16	
8	65+38 to 79+49-L-	ROADWAY FILL						0.20	< 0.01	2302	52	
		STABILIZATION						< 0.01		64		
9	67+37 to 70+18-L-LT	ROADWAY FILL	0.27		< 0.01							
10	70+21 to 71+41-L-	30" RCP						< 0.01	< 0.01	249	10	
		STABILIZATION						< 0.01		13		
11	72+73 to 73+27-L-LT	ROADWAY FILL	0.08		0.03							
12	78+77 to 81+29-L-	ROADWAY FILL	0.48			0.03						
13	81+22 to 82+31-L-LT	ROADWAY FILL	0.17			0.01						
14	81+79 to 86+58-L-	BANK STABILIZATION						< 0.01	< 0.01	57	14	
14A	84+63 to 85+46-L-LT	ROADWAY FILL						0.01	< 0.01	231	15	
15	85+31 to 90+05-L-	ROADWAY FILL	1.73		0.01	0.09		< 0.01	< 0.01	33		
16	108+50 to 110+35-L-	ROADWAY FILL			0.67							
17	115+55 to 116+13 -L-RT	ROADWAY FILL	0.11			0.01						
18	125+08 to 127+71L-L	1@6'x8' RCBC	0.83		0.06	0.06		0.01	< 0.01	273	21	
		STABILIZATION						< 0.01		81		
TOTALS*:			5.27		0.83	0.25		0.51	0.02	4181	151	0

*Rounded totals are sum of actual impacts

NOTES:
Site 2: Removed
Site 4: Wetland considered Isolated
Site 16: Wetland Total Take

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078

WETLAND AND SURACE WATER IMPACTS 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)
18a	125+31 to 125+85-L-	ROADWAY FILL						< 0.01		91		
19	140+61 to 142+44 -L-	1@6'x8' RCBC	0.01		< 0.01	0.04		0.04	< 0.01	333	11	
		STABILIZATION						0.01		122		
20	146+74 to 147+84-L-	1@6'x8' RCBC	0.11		< 0.01	0.04		0.01	< 0.01	277	21	
		STABILIZATION						< 0.01		87		
21	146+88 to 147+06-L-LT	ROADWAY FILL			< 0.01	< 0.01						
22	148+14 to 149+02-L-RT	30" RCP						< 0.01	< 0.01	104	10	
23	148+41 to 141+82-L-RT	ROADWAY FILL			< 0.01	< 0.01						
24	149+11 to 155+85-L-	ROADWAY FILL	1.96		0.02	0.07						
25	162+84 to 164+50-L-RT	POND						0.40				
26	165+94 to 168+54 -L-	ROADWAY FILL	1.24			0.08						
27	168+51 to 169+40-L-	2@9'x8' RCBC				0.02		0.06	< 0.01	314	36	
		STABILIZATION						0.02		119		
28	172+97 to 173+41-L-RT	ROADWAY FILL	< 0.01			< 0.01						
29	173+60 to 176+39-L-LT	POND						1.53				
30	174+63 to 181+12-L-	ROADWAY FILL	1.42			0.04		0.01	< 0.01	251	10	
31	193+15 to 197+24-L-	ROADWAY FILL	0.20					0.04		872		
32	199+29 to 200+06-L-LT	ROADWAY FILL	0.04									
33	47+12 to 48+74 -Y5-LT(SAA)	66" RCP	0.33		0.05	0.03		< 0.01	< 0.01	278	9	
34	23+30 to 24+76-YRRPB-LT	18" CSP	0.12		0.01	0.52						
35	47+58 to 49+64-Y5-RT(SAA,SAB)	ROADWAY FILL						0.03	< 0.01	304	24	
		STABILIZATION						< 0.01		35		
35	196+35 to 200+02-L-LT(SAA)	ROADWAY FILL						0.06	< 0.01	443	21	
TOTALS*:			5.43		0.09	0.86		2.22	0.02	3630	142	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078

WETLAND AND SURACE WATER IMPACTS 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)
35	201+82 to 202+45-L-LT(SAA)	ROADWAY FILL						< 0.01	< 0.01	66	12	
35	50+01-Y5- to 15+32-Y5A-(SAB)	ROADWAY FILL/48" RCP	0.01		< 0.01	< 0.01		0.04	< 0.01	941	20	
		STABILIZATION						< 0.01		44		
36	202+26 to 206+22-L-	3@9'x8' RCBC						0.23	0.01	977	20	
		STABILIZATION						0.03		92		
37	202+42 to 205+59-L-RT	ROADWAY FILL	0.31		0.03	0.09						
38	209+59 to 211+77-L-	42" RCP	0.32		0.02	0.03		0.01	< 0.01	358	10	
		STABILIZATION						< 0.01		18		
39	225+15 to 226+55-L-	36" RCP	0.20		< 0.01	0.03		< 0.01	< 0.01	303	9	
		STABILIZATION						< 0.01		18		
40	225+72 to 227+98-L-	ROADWAY FILL	0.26		< 0.01	0.04			< 0.01		10	
41	29+83 to 30+17-Y1-RT	48" RCP						< 0.01	< 0.01	56	10	
42	13+07 to15+00-Y3-LT	ROADWAY FILL	0.06			< 0.01						
43	11+86 to 15+02-Y3-RT	ROADWAY FILL	0.19			0.07						
44	15+00 to 15+88-Y3-	4@12'x8' RCBC						0.03	0.02	58	30	
		STABILIZATION						0.07		123		
45	15+60 to 16+27-Y5-	2@9'x8' RCBC						0.04	0.01	211	41	
		STABILIZATION						0.03		102		
46	16+20 to 18+23-Y5-LT	ROADWAY FILL	0.07			0.03						
47	17+25 to 18+39-Y5-RT	ROADWAY FILL	0.06			0.03						
48	50+12 to 51+25-Y5-LT	ROADWAY FILL	0.08									
49	68+06 to 68+58-Y5-	2@7'x8' RCBC						0.05	< 0.01	28		
		STABILIZATION						0.02		83		
TOTALS*:			1.56		0.05	0.33		0.56	0.05	3478	162	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078

WETLAND AND SURACE WATER IMPACTS 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)
50	68+54 to 69+62-Y5-LT	ROADWAY FILL						0.01	< 0.01	128	6	
51	29+06 to 29+15-Y1-LT	RIP RAP						< 0.01		13		
	TOTAL PAGE 115		5.27		0.83	0.25		0.51	0.02	4181	151	
	TOTAL PAGE 116		5.43		0.09	0.86		2.22	0.02	3630	142	
	TOTAL PAGE 117		1.56		0.05	0.33		0.56	0.05	3478	162	
TOTALS*:			12.25		0.97	1.44		3.30	0.09	11430	461	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078

WETLAND AND SURACE WATER IMPACTS 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)
1	12+52 to 15+29-Y3DET-LT	ROADWAY FILL	0.38			0.07						
2	16+06 to 16+81-Y3DET-LT	ROADWAY FILL	0.09			0.02						
3	26+16 to 27+13-Y5DET-LT	ROADWAY FILL	0.01			0.02						
TOTALS*:			0.48			0.10				0	0	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721 Detour
6.401078
SHEET 119 OF 119

Revised 2018 Feb

09/08/99

BUFFER DRAWING SHEET 1 OF 22

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

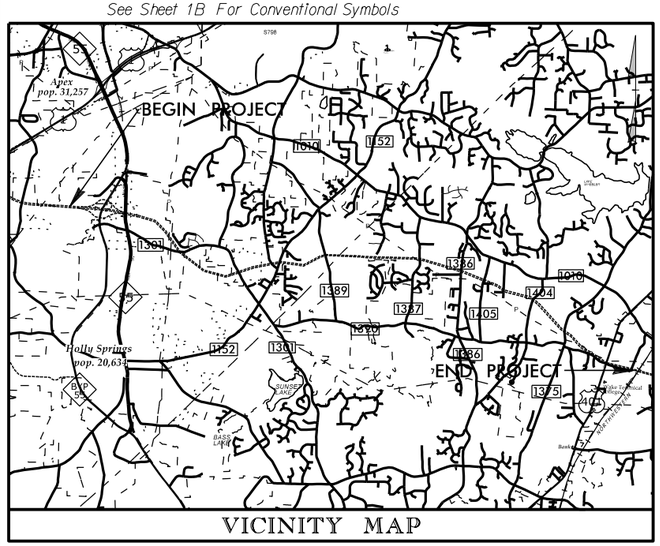
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2721	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
6.401078	STP-540(19)	PE	

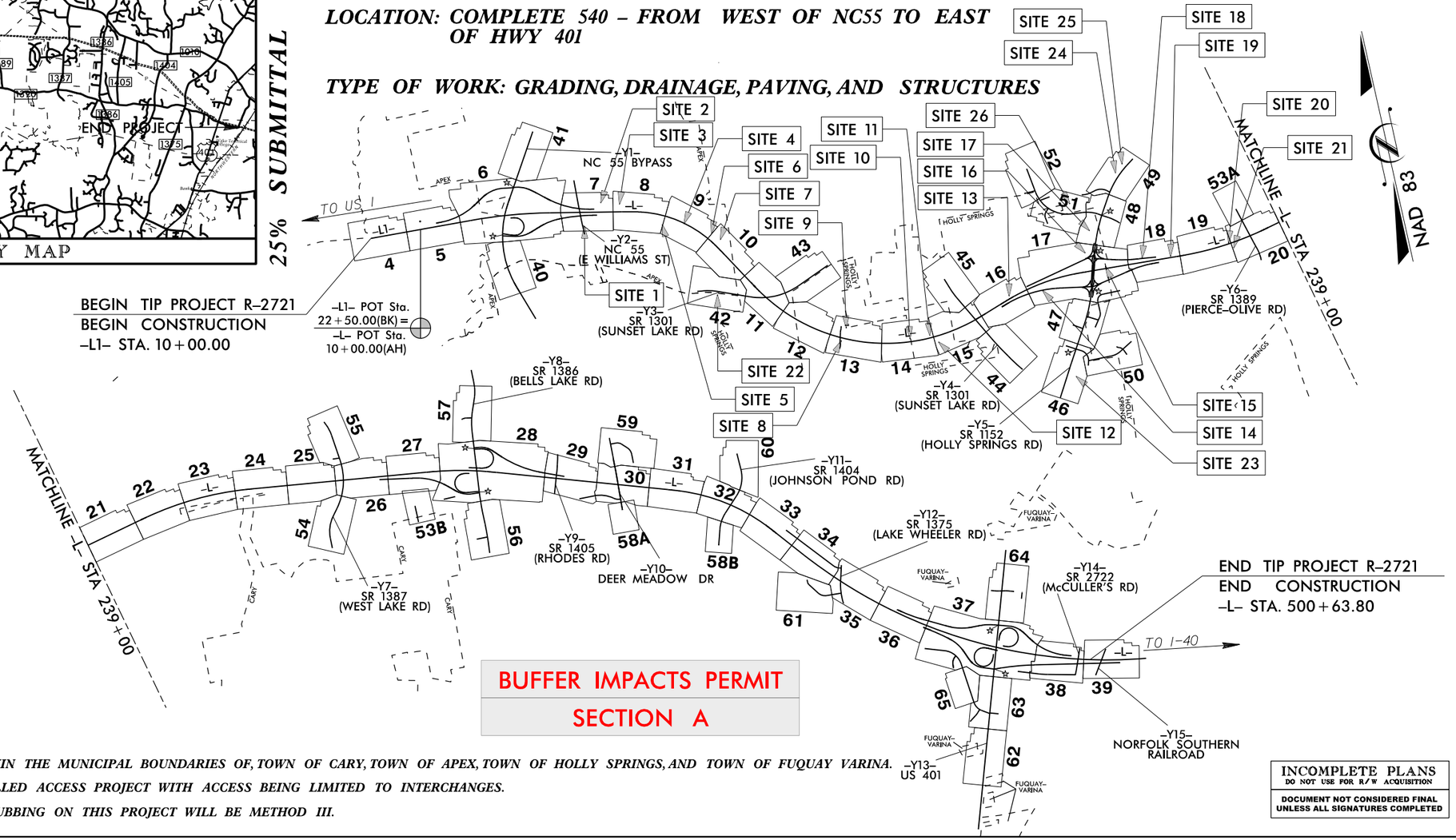
WAKE COUNTY

LOCATION: COMPLETE 540 – FROM WEST OF NC55 TO EAST OF HWY 401

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

See Sheet 1B For Conventional Symbols





BUFFER IMPACTS PERMIT

SECTION A

THIS PROJECT WITHIN THE MUNICIPAL BOUNDARIES OF, TOWN OF CARY, TOWN OF APEX, TOWN OF HOLLY SPRINGS, AND TOWN OF FUQUAY VARINA.

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

CLEARING AND GRUBBING ON THIS PROJECT WILL BE METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

TIP PROJECT: R-2721

CONTRACT:

25% SUBMITTAL

GRAPHIC SCALES

PLANS 50′ 25′ 0 50′ 100′

PROFILE (HORIZONTAL) 50′ 25′ 0 50′ 100′

PROFILE (VERTICAL) 10′ 5′ 0 10′ 20′

DESIGN DATA

ADT 2018 = 28,200
ADT 2040 = 66,400
K = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST = 7% DUAL 4%

FUNC CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2721	*=9.529 Miles*
LENGTH STRUCTURES	*=0.178 Miles*
TOTAL LENGTH TIP PROJECT R-2721	*=9.351 Miles*

Prepared In the Office of:

LOCHNER
A Division of LOCHNER, INC
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-7111
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE Nº F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

SUNGATE DESIGN GROUP, P.A.
205 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-0243 NC FIRM LICENSE NO. C-0990

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
February 18, 2020

LETTING DATE:
February 18, 2020

Brian K. Eason, PE
PROJECT ENGINEER

Christina L. Yokeley, EI
PROJECT DESIGN ENGINEER

NCDOT CONTACT

HYDRAULICS ENGINEER

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.

SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

7/9/2018
R2721_Hyd_prm_buf_psh_01.dgn
jharvey

BUFFER DRAWING SHEET 2 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″ = 100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 2

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

END CONSTRUCTION
-Y2- STA. 19+75.00

BEGIN CONSTRUCTION
-Y2- STA. 13+72.00

-YIRPC- STA 17+00.00
MATCHLINE SHEET 6
-L- STA 45+00.00
MATCHLINE SHEET 8
-L- STA 58+00.00
-YIRPB- STA 14+00.00

NC TURNPIKE AUTHORITY
PAULINE PENNINGTON
MAINER T & UVA R. HOLLAND
MCI ENTERPRISES, LLC
WORD OF TRUTH CHURCH OF GOD
BESSIE H. JONES
HARVEY L. MONTAGUE
IGNACIO RODRIGUEZ IBARRA
LORENE DOBBS
PEGGY S. CANNADY
DARRIN F. MCCLAIN (PER GIS)
HEIR OF HENRY E. MCCLAIN
EDWARD C. AND PATRICIA D. KILEY
DAVID C. AND TERENA M. ROBINSON
THOROUGHFARE BUFFER BM 2000 PG 1820

SITE 1
SITE 2
WETLAND WG
STREAM SF

-Y2- POC Sta.16+50.78=
-YIRPC- POC Sta.13+75.76
Δ 107°05' 36.70"

-Y2- PT Sta.16+71.59
-Y2- PC Sta.15+95.96
-Y2- POT Sta.15+56.34
Δ = 79°27' 37.04"
-Y2- POT Sta.14+68.28=
-YIRPB- POC Sta.14+10.51
Δ 96° 35' 10.37"
-Y2- PT Sta.13+54.88
-Y2- PC Sta.11+18.81
N 1° 24' 41.7" W

-YIRPC- SC Sta.12+05.00
-YIRPB- OS Sta.18+28.32
-YIRPB- SC Sta.12+00.00
-L- POT Sta.53+33.40
-YIRPC- ST Sta.10+00.00
75.00' LT
-L- POT Sta.54+01.62
-YIRPB- ST Sta.10+00.00
75.00' RT
S 78° 10' 00.1" E

TOE PROTECTION SEE DETAIL 38A
CL I RIPRAP LENGTH=16 FT SEE DETAIL 1A
LAT 3' BASE DITCH w/CL I RIPRAP SEE DETAIL 29A
STREAM SF

SEE SHEET 87 FOR -YIRPC- PROFILE
SEE SHEET 86 FOR -YIRPB- PROFILE
SEE SHEET 2B-25 FOR BRIDGE SKETCH
SEE SHEET 68 FOR -L- PROFILE

7/9/2018
R2721_Hyd_prm_buf_psh_07.dgn
thorvez

51499

BUFFER DRAWING SHEET 3 OF 22

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL

PAVED SHOULDER

NAD 83/95

STREAM SH

STREAM SJ

WETLAND WI

SITE 2

SITE 3

SITE 4

SITE 5

CL I RIPRAP LENGTH=10 FT SEE DETAIL 1A

CL I RIPRAP LENGTH=12 FT SEE DETAIL 1A

LAT 6' BASE DITCH w/CL I RIPRAP SEE DETAIL 6A

TOE PROTECTION SEE DETAIL 38A

-L- SC Sta. 65+39.56

-L- TS Sta. 60+39.56

MATCHLINE SHEET 7 -L- STA 58+00.00

MATCHLINE SHEET 9 -L- STA 71+00.00

SEE SHEET 68 FOR -L- PROFILE

7/2/2018
R2721_Hyd_prm_buf_psh_08.dgn
lbarzey

BUFFER DRAWING SHEET 4 OF 22

51499

50' 25' 0 50' 100'

SCALE: 1"=100'

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	9

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

SITE 6

19 TRIANGLE GREENWAYS COUNCIL

SITE 4

SITE 5

18 HSA PROPERTIES LLC

WETLAND WK

WETLAND WL

STREAM SH

STREAM SJ

SINGLE FACE BARRIER

SANITARY SEWER EASEMENT 24" DIP

MIDDLE CREEK

LAT 6' BASE DITCH wCL I RIPRAP SEE DETAIL 6A

TOE PROTECTION SEE DETAIL 38A

1@6'X8' RCBC

30" RCP-III

15" RCP-IV

30" W/ ELBOWS

15" W/ 2 ELBOWS

JB wMH

CL B RIPRAP OUTLET CHANNEL SEE DETAIL 47A

END FENCE 8" PVC L 8432 LT

8" PVC END UNK

MATCHLINE SHEET 8 -L- STA 71+00.00

MATCHLINE SHEET 10 -L- STA 83+00.00

75+00

80+00

JAMES AND DONNA MULLEN

MATTHEW J. KRISTIV AND MELISSA M. DIFONDI

DAVID L. AND ELIZABETH S. DOUGLAS

CLIFFORD J. BARTH

STEVEN DICKENS

JARED AND AMANDA MESTLER

NEAL GOODWIN

BRADLEY O. AND DIANA I. RINGLIEN

COREY A. NORTON

SUNSET HILLS HOMEOWNERS' ASSOC.

WILLIAM D. HAYES AND KIMBERLY A. BURRELL

THORNCREST DR

AT&T FIBER INSTALLED SINCE COMPLETION OF FIELD SURVEY

SEE SHEET 69 FOR -L- PROFILE

7/9/2018
8:27:12 AM
jhancock

BUFFER DRAWING SHEET 5 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1" = 100′

NAD 83

LOCHNER
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2840 PLAZA PLACE, SUITE 202
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SUNGATE DESIGN GROUP, P.A.
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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

JACLYN AND JEREMY KRING

23 CURRIN BROS., INC

19 TRIANGLE GREENWAYS COUNCIL

BRIAN L. AND DEANNA C. HAMILTON

LOUIS C. III AND SHIRLEY R. DAVIS

TIANLIN AND JUHONG LIU WANG

DERRICK P. AND MICHELLE G. ARQUIETT

PRIVATE UTILITY EASEMENT

25 36" COLONIAL PIPELINE EASEMENT BB PROVIDE EXACT LOCATION BB 1338 PG 161 1994 PG 161

24 NC DEPT. OF TRANSPORTATION

22 HSA PROPERTIES LLC

21 SUNSET HILLS HOMEOWNERS ASSOCIATION

SUNSET HILLS HOMEOWNERS ASSOCIATION

STREAM SM

-L- CS Sta. 83+79.88

-L- ST Sta. 89+04.88

SITE 6

SITE 7

WETLAND WR

STANDARD BASE DITCH SEE DETAIL 32A

TOE PROTECTION SEE DETAIL 38A

SPEC CUT V-DITCH SEE DETAIL 12A

TAIL DITCH w/CL II RIPRAP SEE DETAIL 37A

BEGIN FENCE 734.35 RT 84+47.24 RT

MCF

85+00

90+00

95+00

-L- S 30° 52' 10.3" E

2GI 15" 2GI-A 18"

2GI-A FS 54" RCP-III 2GI-A 54" RCP-III 2GI-A 54" RCP-III FS 2GI-A FS 2GI-A 48" RCP-III

15" RCP-III 24" RCP-III

54" RCP-IV LP 2GI-A 15" RCP-IV 2GI

JB w/MH 60"

18" RCP-III 2GI

15" RCP-III 2GI

PUE

MATCHLINE SHEET 9 -L- STA 83+00.00

MATCHLINE SHEET 11 -L- STA 96+00.00

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

SEE SHEET 2B-26 FOR BRIDGE SKETCH
SEE SHEET 69 FOR -L- PROFILE

7/9/2018
R2721_Hyd_prm_buf_psh_10.dgn
jhancey

BUFFER DRAWING SHEET 6 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

LAWRENCE AND JULIA BOURDEAU
PABLO AND SUSAN LIZARAZO
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2012 PG 869
20' TOWN OF HOLLY SPRINGS SANITARY SEWER EASEMENT BM 2011 PG 72
50' I-540 BUFFER C-255 BM 2008 PG 1093
25' COMMON OPEN SPACE BM 2008 PG 2094
30' PUBLIC AT. MU GREENWAY ENCROACHMENT BM 2011 PG 72
-Y3A- PC Sta. 15+56.64
-Y3A- PT Sta. 15+17.18
-Y3A- PRC Sta. 14+58.19
-Y3A- PC Sta. 13+95.82
-Y3A- PT Sta. 11+58.72
-Y3A- PRC Sta. 11+14.18
-Y3A- PC Sta. 10+30.42
-Y3A- POT Sta. 10+00.00
N 15° 26' 59.2" E
N 14° 48' 18.2" E
N 29° 18' 00.0" E
SITE 9
SITE 8
INLET CHANNEL SEE DETAIL 48A
TOE PROTECTION SEE DETAIL 38A
CL B RIPRAP
GRADE TO DRAIN (GTD)
39
NC DEPT OF TRANSPORTATION
38
NC DEPT OF TRANSPORTATION
STREAM SS
STREAM SQ
WETLAND WX
6'6"x4' RCBC
15" RCP-IV
24" RCP-III
18" RCP-III
2GI
2GI-A
FS
130+00
MATCHLINE SHEET 12 -L- STA 122+00.00
MATCHLINE SHEET 14 -L- STA 135+00.00
M/I HOMES OF RALEIGH LLC
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
TAYLOR MORRISON OF CAROLINAS INC
KEMING CAO
EDWIN WITTIG
DALE AND NANCY LEE
LUTE LIN
DEREK MCCONNACHIE
LEAH NORMANN
JOHN LANGAKER
ANNA FLORIAN
BISHAN YE
CORY ROYSTER
VICTOR AND KIMBERLEY POWLEY
JINGXU HE AND YAN YAN ZHANG
ALEX AMBROSE
MAYFIELD DR
MYSTIC PINE PL
CONC PATIOS AND 72" PVC FENCES
BLK WALL W/36" MTL RAIL
CONC RISER
GEO PLASTIC
RIPRAP
72" RCP
8" CPP
12" CPP
15" CPP
18" CPP
2" UNK
25FTH
EXISTING R/W

SEE SHEET 71 FOR -L- PROFILE

7/9/2018
R2721_Hyd_prm_buf_psh_13.dgn
lbarney

BUFFER DRAWING SHEET 7 OF 22

51499

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
WALLACE FARRINGTON
8" DIP
8" PVC
NEW DSW ROAD
40 NATALIE AND THOMAS BROOKS
43 BENJAMIN MCDONALD
STREAM SV
WETLAND WZ
SITE 11
INLET CHANNEL SEE DETAIL 50A
BEGIN FENCE -L- 20.49 RT 127.47' LT
END FENCE -L- 65.44 RT 127.39' LT
TOE PROTECTION SEE DETAIL 38A
39 NC DEPT OF TRANSPORTATION
INLET CHANNEL SEE DETAIL 49A
BEGIN FENCE -L- 19.33 RT 130.83' LT
END FENCE -L- 91.65 LT 136.94' LT
SITE 10
WILLIAM AND BERTHA TURNER
44
STREAM ST
1@6'X8' RCBC
WILLIAM GRIFFIN
45
MATCHLINE SHEET 13 -L- STA 122+00.00
MATCHLINE SHEET 15 -L- STA 148+00.00
140+00
145+00
18" RCP-III
15" RCP-IV
30" RCP-III
24" RCP-III
2GI
2GI-A
FS
SINGLE FACE BARRIER
JAMES TURNER AND WILLIAM TURNER
46
24" W 2 ELBOWS
30" W 2 ELBOWS
TOE PROTECTION SEE DETAIL 38A
LAT 3' BASE DITCH w/CL B RIPRAP SEE DETAIL 10A
LAT 3' BASE DITCH w/CL B RIPRAP SEE DETAIL 5A
OUTLET CHANNEL SEE DETAIL 49A
OUTLET CHANNEL SEE DETAIL 50A
41 NC DEPT OF TRANSPORTATION
47 H&B STEPHENSON FAMILY LLC
60' PRIVATE ROAD EASEMENT BM 1981 PG 1000
STREAM SW
SITE 12
BRIDGET GWALTNEY
TAYLOR MORRISON OF CAROLINAS, INC
DIANE COX
ALLISON AND STEVEN HARRIS
WOODCREEK NEIGHBORHOOD ASSN INC
HOLLY SPRINGS RESIDENTIAL PROPERTIES LLC
ERIN KAMM
MATTHEW AND HEATHER JONES
TIMOTHY REINHARDT AND APRIL SMITH
PLAY GROUND
BASKETBALL
TENNIS COURTS

SEE SHEET 7I FOR -L- PROFILE

7/9/2018
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lhorcas
R-2721_Hyd_prm_buf_psh_14.dgn

BUFFER DRAWING SHEET 8 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 45
-Y4- STA 31+00.00

NC DEPT OF TRANSPORTATION

50 432011_PSD
+70.03 -Y4DET- 40.00' RT

+83.87 -Y4DET- 40.00' RT

48 BULL LAND INC

43 STREAM SV
BENJAMIN MCDONALD

SITE 11

SPEC CUT 2' BASE DITCH SEE DETAIL 21A

HEAD DITCH w/CL I RIPRAP SEE DETAIL 40A

TOE PROTECTION SEE DETAIL 38A

-L- PTC Sta.159+27.72
-Y4- POT Sta.27+02.15
Δ = 79°12'26.54"

24" W/ 3 ELBOWS

51 TAWFIQ DARDEL (GTD) AND SULEIMAN ASAD

GRADE & REMOVE

WETLAND WAC

44 WILLIAM AND BERTHA TURNER

MATCHLINE SHEET 14
-L- STA 148+00.00

150+00

155+00

160+00

MATCHLINE SHEET 16
-L- STA 161+00.00

WILLIAM GRIFFIN 45

JAMES TURNER AND WILLIAM TURNER 46

30" W/ 2 ELBOWS

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A

47 H&B STEPHENSON FAMILY LLC
SITE 12

STREAM SW

TAIL DITCH w/CL I RIPRAP SEE DETAIL 40A

WETLAND WAB

49 CHARLES MCKOY

15" W/ 2 ELBOW

SPEC CUT V-DITCH SEE DETAIL 23A

-L- CS Sta. 159+13.20

BERM DITCH
STA. 155+00 – 158+91 -L- RT

MICHAEL A. & DEIDRE M BRICE

ABDELWAHED DARSI

53 CHARLES MCKOY

52

54

SPEC CUT V-DITCH SEE DETAIL 23A

15" W/ 3 ELBOWS

SR 1510 SUNSET LAKES

MATCHLINE SHEET 44
-Y4- STA 23+00.00

SEE SHEET 72 FOR -L- PROFILE

SEE SHEET 2B-27 FOR BRIDGE SKETCH | SEE SHEET 102 FOR -Y4- PROFILE

7/9/2018
R-2721_Hyd_prm_buf_pth_15.dgn
lbarcay

51499

BUFFER DRAWING SHEET 9 OF 22

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

50' 25' 0 50' 100'

SCALE: 1"=100'

PAVEMENT REMOVAL

PAVED SHOULDER

NAD 83

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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SUNGATE DESIGN GROUP, P.A.
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RALEIGH, NORTH CAROLINA 27606
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

2SFD DARREN AND KIMBERLY ANDRUS

2SFD JENNIFER WARD AND JENNIFER REEVES

56 WILL PIERSON & KAYLEE JAKUBOWSKI

55 CDP LEASING INC

50 NC DEPT OF TRANSPORTATION

57 SYLVIA SAMS

51 TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

52 TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

TAWFIQ ABDEL-GHANI AND SULEIMAN ASAD

STREAM SX

WETLAND WAE

SITE 13

-L- ST Sta. 162+33.20

-L- TS Sta. 166+45.42

-L- SC Sta. 170+45.42

-L- POT Sta. 166+43.12= -Y5RPC- ST Sta. 10+00.00 71.00' RT

-Y5RPC- SC Sta. 12+16.00

GRADE TO DRAIN (GTD)

TOE PROTECTION SEE DETAIL 38A

CL B RIPRAP

INLET CHANNEL SEE DETAIL 52A

DAYLIGHT DITCH

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 10A

SPEC CUT V-DITCH SEE DETAIL 23A

OUTLET CHANNEL SEE DETAIL 52A

CL I RIPRAP

SINGLE FACE BARRIER

20'x 4' RCBC

15" W/ ELBOWS

36" W/ 2 ELBOWS

JB V MH

END FENCE +04.71 -L- 160.33 RT

BEGIN FENCE -L- 164+98.49 160.93 RT

POND

RUINS

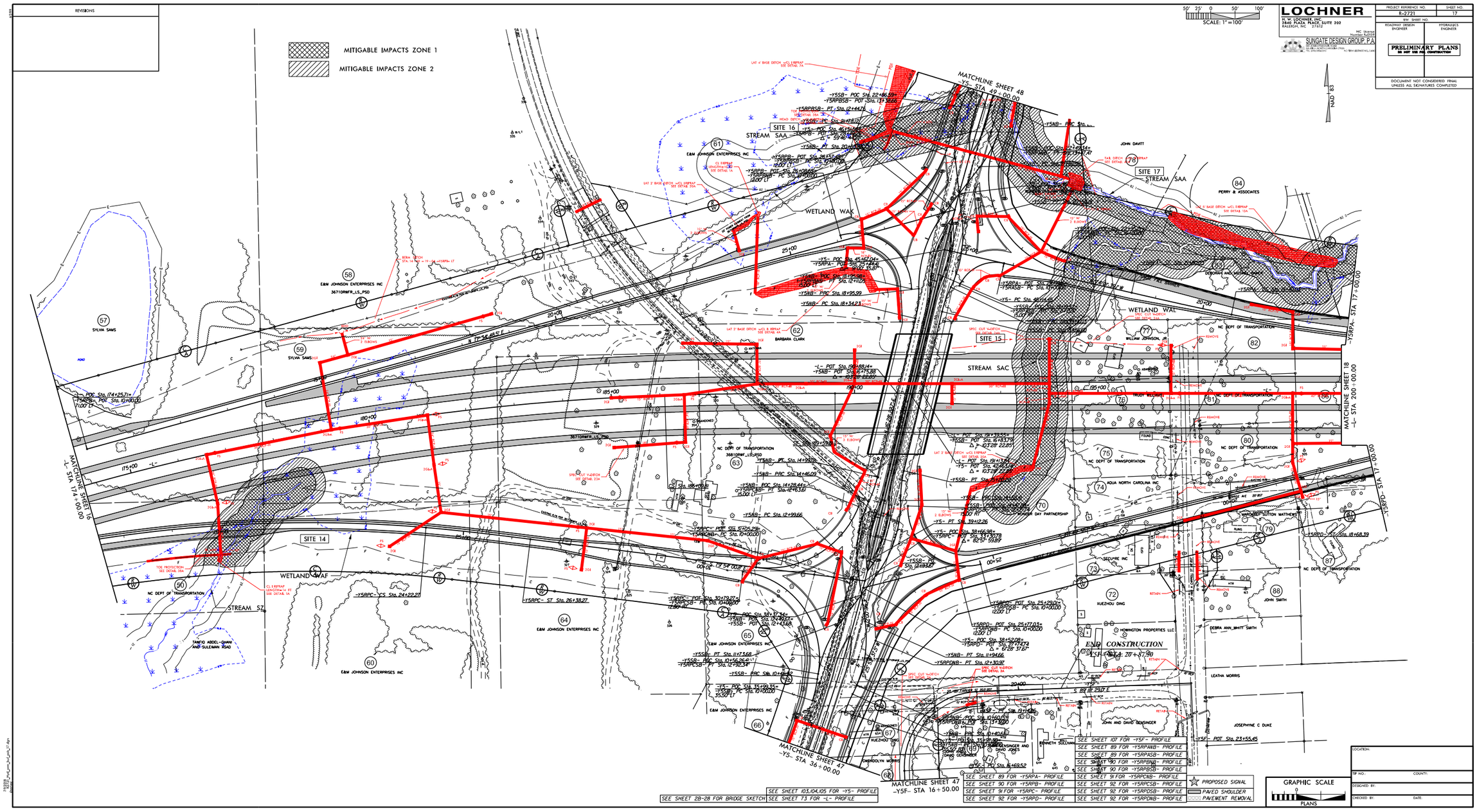
MATCHLINE SHEET 15 -L- STA 161+00.00

MATCHLINE SHEET 17 -L- STA 174+00.00

MATCHLINE SHEET 44

7/9/2018
R2721_Hyd_prm_buf_psh_16.dgn
jhancock

BUFFER DRAWING SHEET 10 OF 22



BUFFER DRAWING SHEET 11 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″ = 100′

LOCHNER
H. W. LOCHNER, INC.
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RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

AQUA NORTH CAROLINA, INC.

SITE 17

SITE 18

SITE 19

85 THOMAS AND DEBORAH ATKINSON

88 SEAN AND ANNA STARR

89 FRANS OUDSHOORN

90 KAREN JETTON

91 THOMAS ANS SUSAN SLUCHAK

92 QUAD TRI LLC OLIVE, MARTHA

86 NC DEPT OF TRANSPORTATION

87 NC DEPT OF TRANSPORTATION

93 GEORGE I BOGER

20' DRAINAGE EASEMENT SCALED FROM BM 1985 PG 422

INLET CHANNEL SEE DETAIL 53A

-Y5RPA- TS Sta. 14+30.72

STREAM SAA

-Y5RPA- SC Sta. 16+40.22

-Y5RPA- STA 17+00.00

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A

-L- POT Sta. 207+09.24= -Y5RPA- POT Sta. 10+00.00 71.00' LT

-L- POT Sta. 207+54.92= -Y5RPD- ST Sta. 10+00.00 71.00' RT

WETLAND WAO(2)

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A

CL I RIPRAP LENGTH=14 FT SEE DETAIL 1A

TS Sta. 212+05.98

TOE PROTECTION SEE DETAIL 38A

DAYLIGHT DITCH

BURY INVERT 0.3 FT

15" W/ 2 ELBOWS

18" W/ 2 ELBOWS

3@9'x 8' RCBC

205+00

210+00

N 83° 00' 23.2" W

S 18° 00' 00.1" E

15" RCP-III

15" RCP-IV

18" RCP-IV

42" RCP-III

24" RCP-III

24" RCP-IV

2GI

2GI-A

FS

TB 2GI

TB 2GI-A

TYPE B-77

MATCHLINE SHEET 17 -L- STA 200+00.00

MATCHLINE SHEET 17 -L- STA 17+00.00

MATCHLINE SHEET 19 -L- STA 213+00.00

-Y5RPD- CS Sta. 16+18.39

-Y5RPD- SC Sta. 12+50.00

-Y5RPD- ST Sta. 10+00.00

BEGIN DITCH 1 FOOT ABOVE NG

OUTLET CHANNEL SEE DETAIL 53A

CL I RIPRAP

WETLAND WAO(1)

PAVEMENT REMOVAL

PAVED SHOULDER

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

SEE SHEET 89 FOR -Y5RPA- PROFILE
SEE SHEET 92 FOR -Y5RPD- PROFILE
SEE SHEET 73 FOR -L- PROFILE

7/2/2018
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lhorney

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BUFFER DRAWING SHEET 12 OF 22

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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PAVEMENT REMOVAL
PAVED SHOULDER

92
QUAD TRI LLC
OLIVE, MARTHA

BERM DITCH
STA. 213+00 – 215+25 -L- LT

BERM DITCH
STA. 218+50 – 220+70 -L- LT

BDO

SPEC CUT 2' BASE DITCH
SEE DETAIL 15A

MATCHLINE SHEET 18
-L- STA 213+00.00

MATCHLINE SHEET 20
-L- STA 226+00.00

BC Sta. 214+45.98

15" RCP-IV
24" RCP-III
18" RCP-III
15" W/ 2 ELBOWS
2GI
2GI-A
FS
215+00
220+00
225+00

STREAM SAG

WETLAND WAQ

TOE PROTECTION
SEE DETAIL 38A

SITE 20

TAIL DITCH w/CL I RIPRAP
SEE DETAIL 42

STREAM SAH

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

SEE SHEET 73 FOR -L- PROFILE

7/9/2018
R-2721_Hyd_prm_buf_pth_19.dgn
jbarzee

BUFFER DRAWING SHEET 13 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

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RALEIGH, NORTH CAROLINA 27606
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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PAVEMENT REMOVAL
PAVED SHOULDER

NAD 83

MATCHLINE SHEET 53
-Y6- STA 21+00.00

MATCHLINE SHEET 19
-L- STA 226+00.00

MATCHLINE SHEET 21
-L- STA 239+00.00

92 QUAD TRI LLC
OLIVE, MARTHA

92 QUAD TRILLC

STREAM SAG

SITE 20

SITE 21

WETLAND WAQ

HEAD DITCH w/CL I RIPRAP SEE DETAIL 40A
TOE PROTECTION SEE DETAIL 38A
FALSE CUT SEE DETAIL 27A
HEAD DITCH w/CL I RIPRAP SEE DETAIL 44A
TOE PROTECTION SEE DETAIL 38A
FALSE CUT SEE DETAIL 27A
SPEC CUT V-DITCH SEE DETAIL 19A
SPEC CUT 2' BASE DITCH SEE DETAIL 15A
SPEC LAT V-DITCH SEE DETAIL 14A
CL B RIPRAP
TOE PROTECTION SEE DETAIL 38A
BERM DITCH STA. 229+54 – 230+50 -L- RT
REMOVE
BDO

-L- POC Sta. 231+09.54
-Y6- POT Sta. 16+65.83
Δ = 84°46'56.5"
-L- CS Sta. 233+93.56
-L- ST Sta. 236+03.56
-Y6- PT Sta. 14+76.32
-Y6- PRC Sta. 12+82.77

CEMETERY

50' POWER LINE EASEMENT BM 1979 PG 361

50' R/W CP&L TRANSMISSION LINE (OKV) BM 1979 PG 361

SR 1959 PIERCE OLIVE RD 20' BST

EXISTING R/W

BEGIN CONSTRUCTION
-Y6- STA. 12+00.00

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

SEE SHEET 109 FOR -Y6- PROFILE
SEE SHEET 2B-28 FOR BRIDGE SKETCH
SEE SHEET 75 FOR -L- PROFILE

7/6/2018
R-2721
jhopper
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BUFFER DRAWING SHEET 14 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	42
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

21 SUNSET HILLS HOMEOWNERS ASSOCIATION
22 HSA PROPERTIES LLC
218 D.R. HORTON, INC
PRIVATE OPEN SPACE
217 TOWN OF APEX PUMP STATION EASEMENT
220 TOWN OF HO
219 ARBOR CREEK KS, LLC
24 NC DEPT. OF TRANSPORTATION
26 THE MATA FAMILY, LLC
221 BNRICH, M

KELLY M. MCGEE
CATHERINE E. CARVER
MINNIE J. AND WILLIE C. BRIDGES
JOSH D. PALADENI
CHAD D. WOODARD
CHARLIE K. CHAN AND IRIS Y. CHU
ROSE PROPERTY ONE, LLC
FRANK TOMS III AND LAURA DAVES TOMS
JOHN LUCIDO
RAQUEL BROOKS
SEN LOUIE AND LILY CHOW
AMANDA MARIE KRIARIS
ZACHARY DARGATZ AND KRISTEN KNIGHT
TUSHAR AND LEENA BAJAJ
ROBERT AND COLLEEN BALES
ZACHARY LEWIS HALL DARIN S. LEIGH
EARNEST B. III AND JENNIFER N. GOODRICH
SREENIVAS VEMULAPALLI AND SRIVALLI DONTHINENI
CHANDRA YELLAPANTULA AND HARINATH APPANI
CURRIN BROS., INC

STREAM SO
WETLAND WS
MIDDLE CREEK
HOLLY SPRINGS GREENWAY TRAIL
ARBOR CREEK SUBDIVISION

-Y3- PT Sta. 14+65.18
-Y3- POT Sta. 10+00.00
-Y3- Sta. 20+05.62
-Y3- Sta. 20+00
S 83° 58' 49" E
S 68° 08' 00.2" E

BEGIN CONSTRUCTION
-Y3- STA. 10+00.00

SITE 22

TOE PROTECTION SEE DETAIL 38A
INLET CHANNEL SEE DETAIL 54A
OUTLET CHANNEL SEE DETAIL 54A
LAT 2' BASE DITCH w/CL I RIPRAP SEE DETAIL 20A
CL B RIPRAP
TDE WALL
REMOVE
RETAIN
MATCHLINE SHEET 11
-Y3- STA 22+00.00

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

SEE SHEET 2B-27 FOR BRIDGE SKETCH | SEE SHEET 101 FOR -Y3- PROFILE

7/9/2018
R2721_Hyd_prm_buf_psh_42.dgn
thorvez

BUFFER DRAWING SHEET 15 OF 22

51499

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-690

PROJECT REFERENCE NO.	SHEET NO.
R-2721	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PAVEMENT REMOVAL
PAVED SHOULDER
PROPOSED SIGNAL

BEGIN CONSTRUCTION
-Y5D- STA. 10+00.00
-Y5D- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y5- STA. 11+58.52

-Y5- PT Sta. 19+04.92
-Y5- PC Sta. 17+93.07
-Y5- PC Sta. 11+45.25
-Y5D- POT Sta. 12+65.36
-Y5D- POT Sta. 10+00.00
-Y5I- POT Sta. 10+00.00
Δ = 89°37'43.7"

WETLAND WAG
STREAM SX
SITE 23

MATCHLINE SHEET 47
-Y5- STA 24+00.00

MATCHLINE SHEET 50
-Y5I- STA 13+00.00

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

SEE SHEET 103 FOR -Y5- PROFILE
SEE SHEET 106 FOR -Y5D- PROFILE
SEE SHEET 108 FOR -Y5I- PROFILE

7/9/2018
R2721_Hyd_prm_buf_psh_46.dgn
lhoward

BUFFER DRAWING SHEET 16 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	48
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER
PROPOSED SIGNAL

MATCHLINE SHEET 51
-Y5A- STA 14+00.00

MATCHLINE SHEET 17
-Y5- STA 49+00.00

MATCHLINE SHEET 49
-Y5- STA 62+00.00

NAD 83

SITE 17

TAIL DITCH w/CL I RIPRAP SEE DETAIL 9

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A

LAT 4' BASE DITCH w/CL I RIPRAP SEE DETAIL 7A

BACKFILL TO NG EL 404

LAT 2' BASE DITCH w/CL I RIPRAP SEE DETAIL 20A

-Y5- POC Sta. 49+50.25=
-Y5SB- PT Sta. 23+80.55
35.50' LT

-Y5- PCC Sta. 50+36.92

-Y5- POC Sta. 56+56.61=
-Y5A1- POT Sta. 10+00.00
-Y5B- POT Sta. 10+00.00
Δ = 90°45'17.65"

-Y5A- PC Sta. 11+08.85

-Y5- PT Sta. 57+23.62

-Y5- PC Sta. 60+93.81

-Y5B- PT Sta. 14+61.01
S 44°15'54.9" E
-Y5B- POT Sta. 14+86.41

END CONSTRUCTION
-Y5B- STA. 14+37.50

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

WETLAND WAJ

STREAM SAB

STREAM SAB

284 WILLIE WATSON

420 GARRY RICHTER

414 JOSEPH AND NANCY MACK

283 CHARLES AND KOREA DUNCAN

285 JOHN MITCHELL

282 DONALD ANDREWS

81 B&M JOHNSON ENTERPRISES INC

71

287 ROLAND AND ANITA TAYLOR

288 MICHAEL FINNERTY

289 JEFFERY AND GAIL SANDERS

286 KEITH AND CONNIE HARSHMAN

JOHN DAVITT

290 MICHAEL AND LAURIE PARKER

291 JAMES HAMPTON, JR.

292 AMY AND DAVID PATTERSON

ERIC PETTY

STEVEN AND MICHELLE LESLIE

MANUEL AND LISA SUAREZ

JOSEPH CICHOCKI

SR 1150 HOLLY SPRINGS RD 23' BST

SR 3922 ASHWILL CT 17' BST

SEE SHEET Y5 FOR -104- PROFILE
SEE SHEET Y5A FOR -105- PROFILE
SEE SHEET Y5B FOR -1056- PROFILE

7/2/2018
R-2721_Hyd_prm_buf_psh_48.dgn
jhopkins

BUFFER DRAWING SHEET 17 OF 22

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

NAD 83

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	49
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

-Y5G- PT Sta. 12+43.82

BEGIN CONSTRUCTION
-Y5G- STA. 12+87.50

-Y5G- PC Sta. 13+47.56

-Y5G- PT Sta. 16+46.29

-Y5- PC Sta. 62+65.48=
-Y5G- POT Sta. 17+33.87
Δ = 87°04'30"

-Y5- PT Sta. 70+54.06

-Y5- POT Sta. 72+73.53

END CONSTRUCTION
-Y5- STA. 72+50.00

MATCHLINE SHEET 48
-Y5- STA 62+00.00

MATCHLINE SHEET 50
-Y5- STA 72+00.00

BRIAN AND ANNAMARY CHURCH
BRYANT AND VICTORIA PERDUN
GEORGE AND CYNTHIA HARDIN
SECU*RE INC
JOSEPH AND NANCY MACK
JOHN MITCHELL
KATHERINE KALEY
ALAN AND JENNIFER CLEGG
WILLIAM AND BETSY HINE
GARY AND JEAN WINGLER
AQUA NORTH CAROLINA
WELL LOT #2
PUMP STATION ONE COMMUNITY
RUSSELL MILLER AND KIMBERLY KORB
HALLMARK INVESTORS
CHARLES AND LINDA PULLIAM
SILAS AND EVON WARD
JAMES HAMPTON, JR.
ST MARYS BAPTIST CHURCH

SITE 24
SITE 25

STREAM SEE
STREAM SEE

20' DRAINAGE EASEMENT BM 1985 PG 1285
20' ACCESS EASEMENT BM 1985 PG 1794
APPROXIMATE LOCATION OF 30' DRAINAGE EASEMENT SCALED FROM BM 1985 PG 1040

SR 1152 HOLLY SPRINGS RD 22' BST
65.00'
N 55°02'17" E
70+00

RETAIN
SPEC CUT V-DITCH SEE DETAIL 23A
DITCH BLOCK
REMOVE
CL B RIPRAP
INLET CHANNEL SEE DETAIL 56A
LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A
LAT V-DITCH w/CL B RIPRAP SEE DETAIL 22A
SPEC CUT V-DITCH SEE DETAIL 3A
OUTLET CHANNEL SEE DETAIL 56A
2@7'x3' RCBC
15" RCP
18" RCP
24" RCP
48" WD
72" WD
16' LINK
10'±
PUE
RIP RAP
BLK WALL
POOL
GAZEBO

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

SEE SHEET 105 FOR -Y5- PROFILE
SEE SHEET 107 FOR -Y5G- PROFILE

7/9/2018
R2721_Hyd_prm_buf_psh_49.dgn
lhotzer

BUFFER DRAWING SHEET 18 OF 22

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

SCALE: 1"=100'

NAD 83

PAVEMENT REMOVAL

PAVED SHOULDER

SITE 17

SITE 26

61 E&M JOHNSON ENTERPRISES INC

306 ALICE WATSON

308 THAMOTHARAMPILLAI SIVARAJ

309 IAN EAGER

310 NANCY WILSON

311 SCOTT AND ANGELA SOUDERS

307

284 STREAM SAB
WILLIE WATSON

MEI QIN JIANG AND XING XIAN WANG

JAWED AND MUMTAZ KHAN

MICHALE AND JANICE SPEARS

ERIC RACINE AND RENE LATELLA

DAVID AND DONNA MCCALLUM

CHARLES AND ASHLEY BETTINI

DALLAS PERRY

ERNEST AND REBECCA KIRSTEIN

WETLAND WAI

MATCHLINE SHEET 48 -Y5A- STA 14+00.00

MATCHLINE SHEET 52 -Y5A- STA 27+00.00

-Y5A- N 84° 37' 06.3" W

-Y5H- N 80° 04' 24.5" W

-Y5H- N 46° 54' 39.9" E

-Y5K- N 81° 45' 56.0" E

20+00

SPEC CUT V-DITCH SEE DETAIL 3A

SPEC LAT V-DITCH SEE DETAIL 3A

18" W/ 2 ELBOWS

CL B RIPRAP

HEAD DITCH w/CL I RIPRAP SEE DETAIL 43A

LAT 2' BASE DITCH w/CL B RIPRAP SEE DETAIL 4A

RETAIN

GTD

GRADE TO DRAIN (GTD)

SEE SHEETS 105 & 106 FOR -Y5A- PROFILE

SEE SHEET 107 FOR -Y5H- PROFILE

SEE SHEET 108 FOR -Y5K- PROFILE

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243 NC FIRM LICENSE NO. C-890

PROJECT REFERENCE NO.	SHEET NO.
R-2721	51

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

7/2/2018
R2721_Hyd_prm_buf_psh_51.dgn
jhoover

RIPARIAN BUFFER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	11+11 to 11+73-Y1RPB-LT	48" RCP			X		1100	1100					
2	52+99 to 58+32 -L-LT	ROADWAY FILL			X				29408	18956	48364		
3	59+05 to 60+25-L-	30" RCP	X						24273	16141	40414		
4	65+01 to 82+52-L-	ROADWAY FILL	X						132681	69262	201943		
5	69+55 to 71+59 -L-	30" RCP	X						10459	8389	18848		
6	81+56 to 87+64-L-	BRIDGE		X		26603	14543	41146	617	3309	3926		
7	84+60 to 85+96 -L-LT	ROADWAY FILL			X	2809	748	3557	9867	4783	14650		
8	124+80 to 125+32 -L-	ROADWAY FILL	X			1831	3121	4952					
9	124+47 to 126+48 -L-	1@6'x8' RCBC	X						18345	12510	30855		
10	140+32 to 142+97-L-	1@6'x8' RCBC	X						28484	18802	47286		
11	146+80 to 148+37-L-	1@6'x8' RCBC	X						32299	46835	79134		
12	147+44 to 149+51-L-RT	30" RCP			X				8561	6046	14607		
13	168+13 to 169+95-L-	2@9'x8' RCBC	X						27842	18095	45937		
14	19+36 to 22+13-Y5RPC-	ROADWAY FILL	X						17040	12724	29764		
15	192+63 to 197+32-L-	ROADWAY FILL	X						48780	31001	79781		
16	46+92 to 49+14 -Y5-LT	ROADWAY FILL			X				15703	9430	25133		
17	15+80-Y5A- to 48+68-Y5-(SAB)	ROADWAY FILL	X						64580	39181	103761		
	48+68-Y5- to 202+41-L-(SAA)	ROADWAY FILL	X						55312	28011	83323		
18	201+74 to 206+80-L-	3@9'x8' RCBC	X						63401	35703	99104		
19	209+01 to 211.28 -L-	42" RCP			X				16825	12033	28858		
20	224+83 to 226+97-L-	ROADWAY FILL	X						22669	14026	36695		
21	225+70 to 226+35-L-LT	ROADWAY FILL			X	2521	784	3305					
22	14+60 to 16+35 -Y3-	4@12'x8' RCBC	X						18564	10568	29132		
23	15+10 to 16+77-Y5-	2@9'x8' RCBC	X						19377	8151	27528		
TOTALS*:						**33764**	**20296**	**54060**	**665087**	**423956**	**1089043**	**0**	**0**

NOTES:

Revised 2018 Feb

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078
SHEET 19 OF 22

RIPARIAN BUFFER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
24	66+72 to 69+30 -Y5-	2@7'x8' RCBC	X						9758	5594	15352		
25	69+01 to 69+70-Y5-LT	ROADWAY FILL			X	5086	2081	7167					
26	16+25 to 16+89-Y5A-RT	DRAINAGE PIPE			X				1112	889	2001		

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
1	11+00 to 13+44-Y1RPB-LT		0	1100
2	52+99 to 58+32 -L-LT		21740	8886
4	65+01 to 82+52-L-		4296	8310
6	81+56 to 87+64-L-		305	5848
7	84+60 to 85+96 -L-LT		1578	2822
8	124+80 to 125+32 -L-		2767	537
9	124+47 to 126+48 -L-		15816	5499
10	140+32 to 142+97-L-		2466	1755
11	146+80 to 148+37-L-		4788	1931
12	147+44 to 149+51-L-RT		1455	1459
13	168+13 to 169+95-L-		1926	3348
14	19+36 to 22+13-Y5RPC-		11351	6545
15	192+63 to 197+32-L-		6735	1270
16	46+92 to 49+14 -Y5-LT		11955	3997
17	15+80-Y5A- to 202+41-L-		3387	2052
18	201+74 to 206+80-L-		3972	6105
19	209+01 to 211.28 -L-		8324	736
20	224+83 to 226+97-L-		10895	109
TOTAL:			**113756**	**62309**

Revised 2018 Feb

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
21	225+70 to 226+35-L-LT		1748	367
22	14+60 to 16+35 -Y3-		210	2581
23	15+10 to 16+77-Y5-		476	594
	TOTAL FROM THIS SHEET		**2434**	**3542**
	TOTAL FROM SHEET 21		**113756**	**62309**
TOTAL:			**116190**	**65851**

Revised 2018 Feb

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/9/2018
WAKE COUNTY
R-2721
6.401078
SHEET 22 OF 22

09/08/99

TIP PROJECT: R-2721

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PERMIT DRAWING
SHEET 1 OF 69

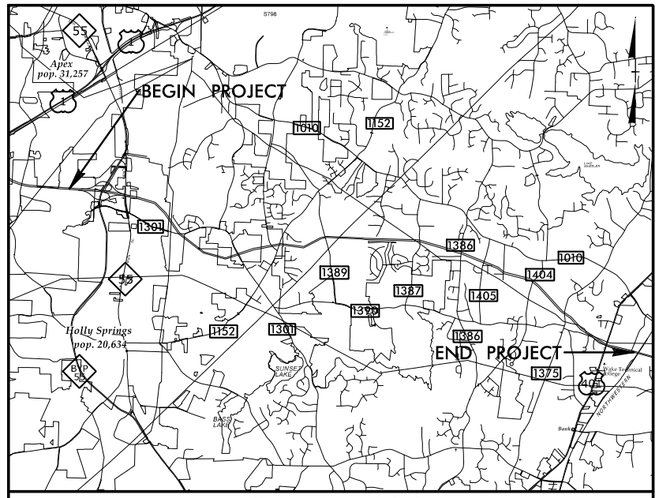
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2721	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
6.401078	STP-540(19)	PE

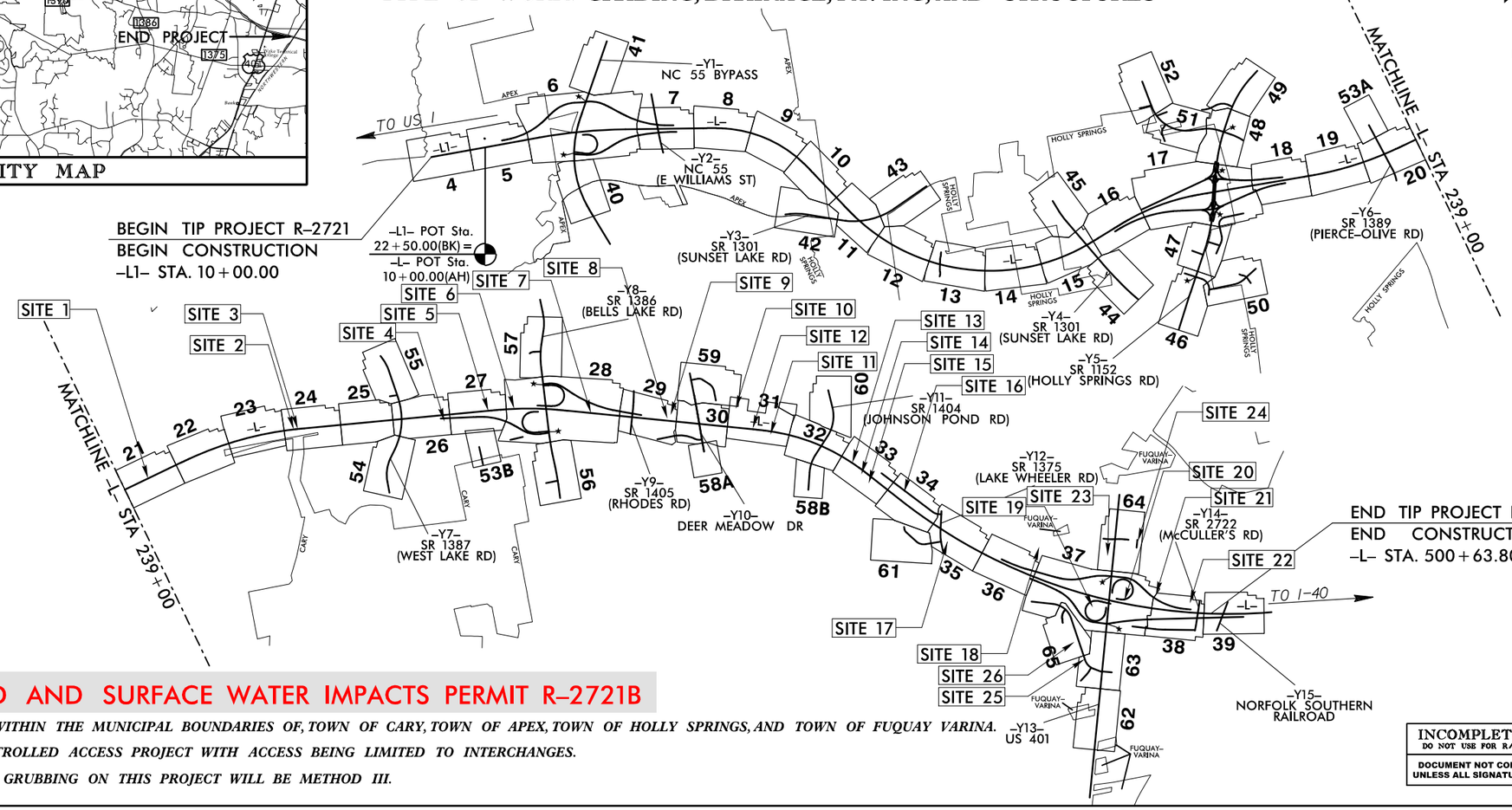
WAKE COUNTY

LOCATION: COMPLETE 540 – FROM WEST OF NC55 TO EAST OF HWY 401

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES



VICINITY MAP



WETLAND AND SURFACE WATER IMPACTS PERMIT R-2721B

THIS PROJECT WITHIN THE MUNICIPAL BOUNDARIES OF, TOWN OF CARY, TOWN OF APEX, TOWN OF HOLLY SPRINGS, AND TOWN OF FUQUAY VARINA.

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

CLEARING AND GRUBBING ON THIS PROJECT WILL BE METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 2018 = 28,200
ADT 2040 = 66,400
K = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST = 7% DUAL 4%

FUNC CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-2721	*=9.529 Miles*
LENGTH STRUCTURES	*=0.178 Miles*
TOTAL LENGTH TIP PROJECT R-2721	*=9.351 Miles*

Prepared In the Office of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-7111
NC License Number P-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-0490

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: February 18, 2020

LETTING DATE: February 18, 2020

Brian K. Eason, PE
PROJECT ENGINEER

Christina L. Yokeley, EI
PROJECT DESIGN ENGINEER

NCDOT CONTACT

HYDRAULICS ENGINEER

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.

SIGNATURE:

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

12:42:27 PM
R:\Hydraulics\PERMITS_Environmental\Drawings\PSH\R2721_PSH_01TSH_wet.dgn
davidcooper

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 2 OF 69

100' 0' 100'
GRAPHIC SCALE

END TIP PROJECT R-2721A
BEGIN TIP PROJECT R-2721B
-L- STA. 240+00.00

MATCHLINE SHEET 20
-L- STA 239+00.00

MATCHLINE SHEET 22
-L- STA 252+00.00

STREAM AJ
STREAM AK
WETLAND AR
WETLAND AS
SITE 1
TS
S
SAJ
SAK
WAR
WAS
WLB

CLASS B RIP RAP
EST 3 TONS
EST 11 SY
GEOTEXTILE

CLASS II RIP RAP
EST 160 TONS
EST 245 GEOTEXTILE

CLASS II RIP RAP
EST 195 TONS
EST 215 GEOTEXTILE

TOE PROTECTION
SEE DETAIL 1B

BEGIN SBG+55
END SBG+50
BEGIN SBG +50
CAT-1
GREU TL-3

240+00
245+00
250+00

SYSTEM TIES WITH R2721A

30" RCP-III
24" RCP-III
36" RCP-III
15" RCP-III
3@8'x10' RCBC

30" W/ELBOWS

ENERGY DISSIPATOR BASIN

LATERAL DITCH
W/ CLASS I RIP RAP
SEE DETAIL 2B

TDE

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES EXCAVATION IN WETLAND

INLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 32 TONS
NG
CLASS II RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 2'
FILL W/ CLASS II RIP RAP

OUTLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 26 TONS
NG
CLASS II RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 2'
CLASS I RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 1.5'
FILL W/ CLASS II RIP RAP
CLASS II RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 2'

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droadcoope

51499

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H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 2A OF 69

100' 0' 100'
GRAPHIC SCALE

END TIP PROJECT R-2721A
BEGIN TIP PROJECT R-2721B
-L- STA. 240+00.00

STREAM AJ
STREAM AK
WETLAND AR
WETLAND AS
SITE 1
SAJ
SAK
WAR
WAS
WLB

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES EXCAVATION IN WETLAND

CLASS B RIP RAP
EST 3 TONS
EST 11 SY
GEOTEXTILE

CLASS II RIP RAP
EST 160 TONS
EST 245 GEOTEXTILE

TOE PROTECTION
SEE DETAIL 1B

BEGIN SBG+55
END SBG+50
CAT-1
GREU TL-3
SYSTEM TIES WITH R2721A
30" RCP-III
24" RCP-III
36" RCP-III
15" RCP-III
3@8'x10' RCBC
30" W/ELBOWS
BEGIN SBG+50

CLASS II RIP RAP
EST 195 TONS
EST 215 GEOTEXTILE

ENERGY DISSIPATOR
BASIN

LATERAL DITCH
W/ CLASS I RIP RAP
SEE DETAIL 2B

TDE

240+00
245+00
250+00

MATCHLINE SHEET 20
-L- STA 239+00.00

MATCHLINE SHEET 22
-L- STA 252+00.00

INLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 32 TONS
NG
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'
FILL W/ CLASS II
RIP RAP

OUTLET DETAIL
NTS

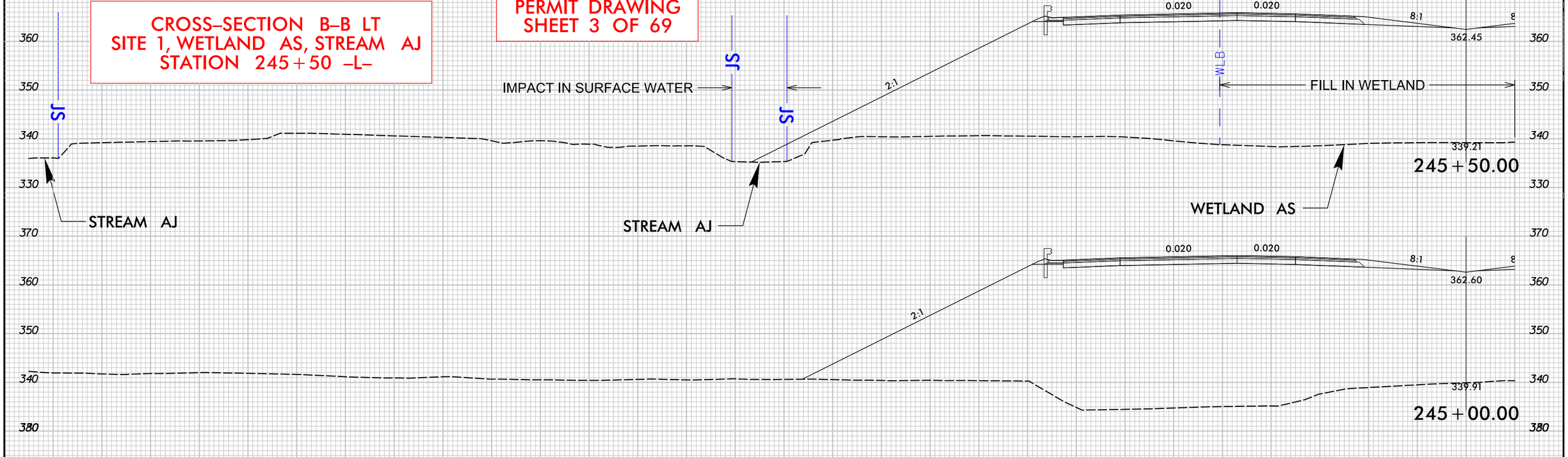
3 @ 8'x10' RCBC
EXCAVATION
EST 26 TONS
NG
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'
CLASS I RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 1.5'
FILL W/
CLASS II
RIP RAP
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'

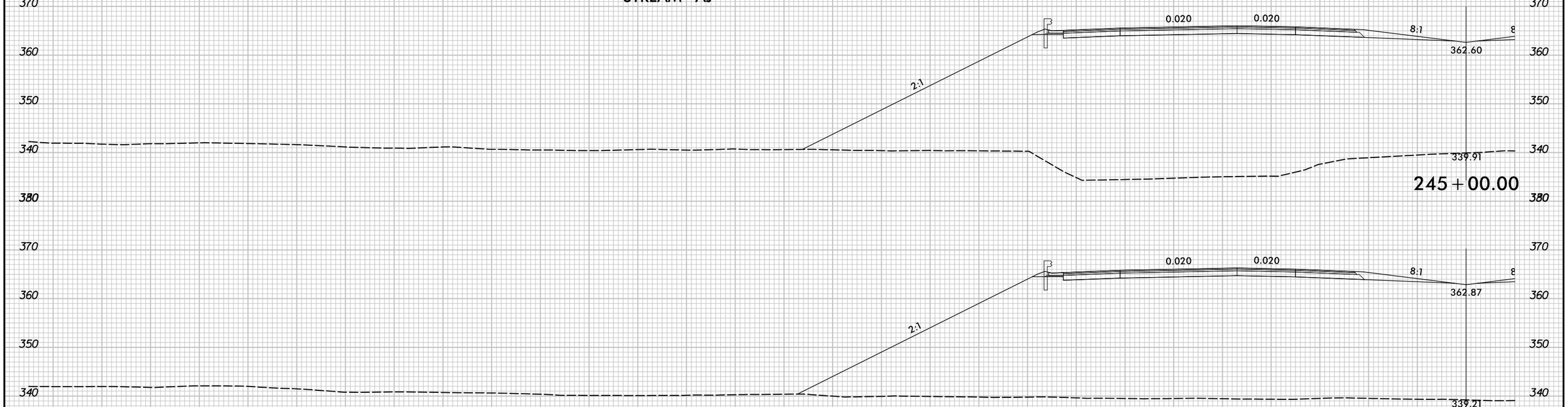
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dcooper

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	R-2721	X-156

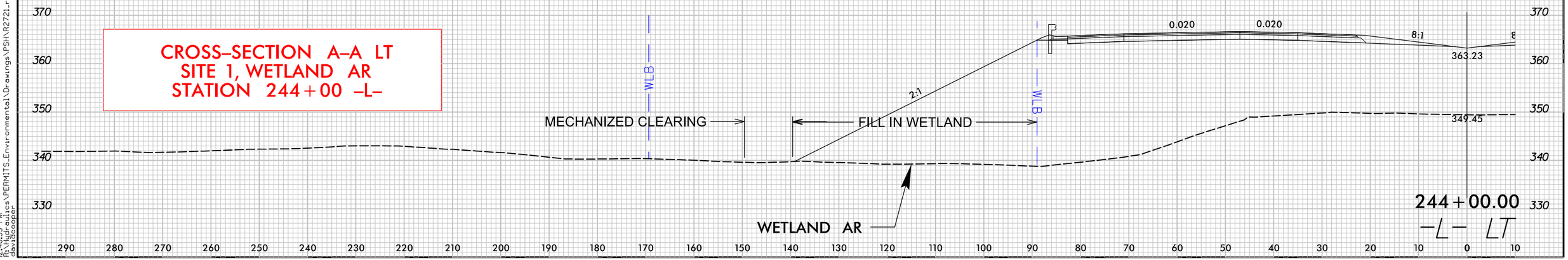
CROSS–SECTION B–B LT
SITE 1, WETLAND AS, STREAM AJ
STATION 245+50 –L–

PERMIT DRAWING
SHEET 3 OF 69





CROSS–SECTION A–A LT
SITE 1, WETLAND AR
STATION 244+00 –L–

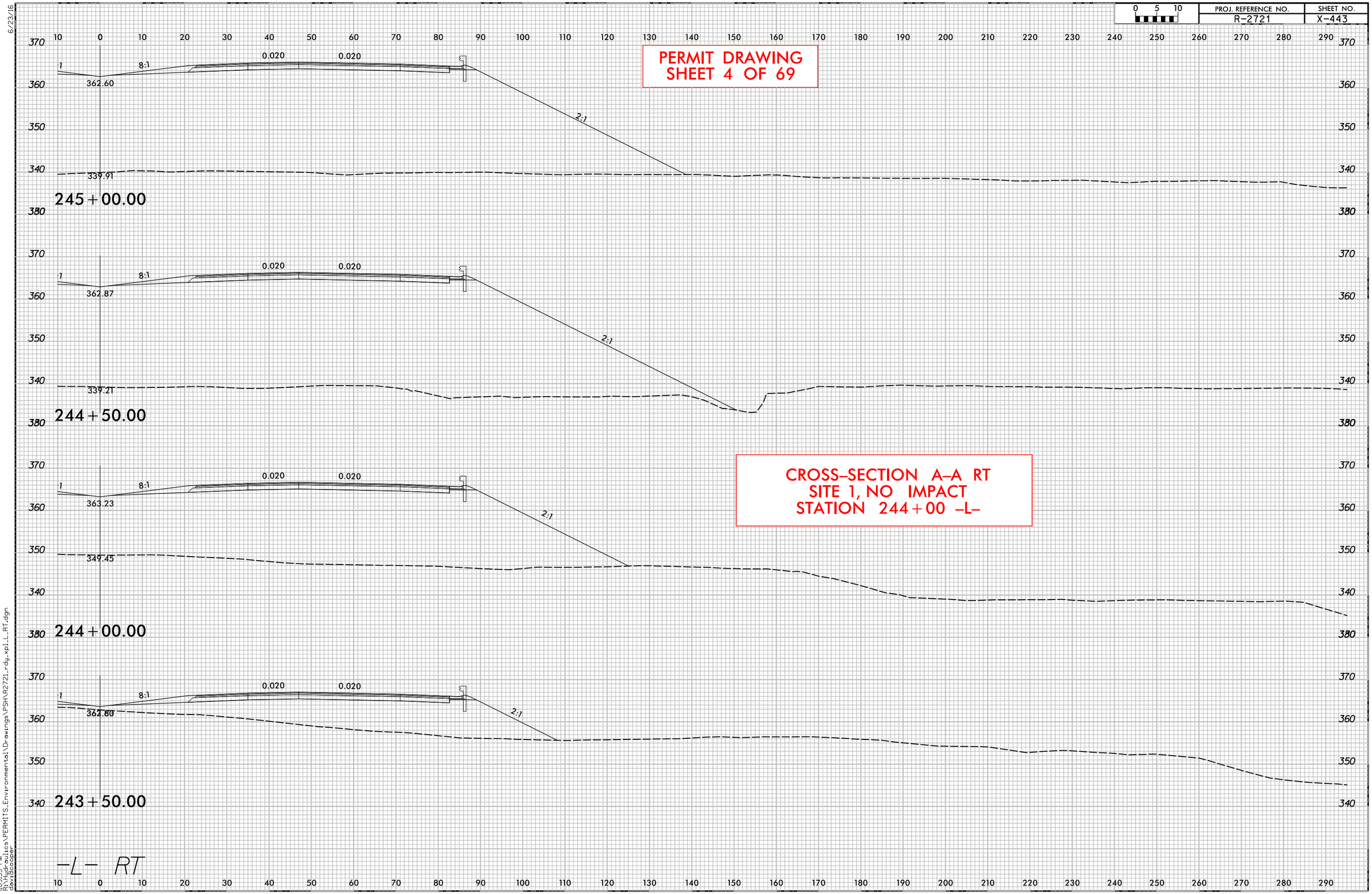


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6/23/16

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	R-2721	X-443

PERMIT DRAWING
SHEET 4 OF 69

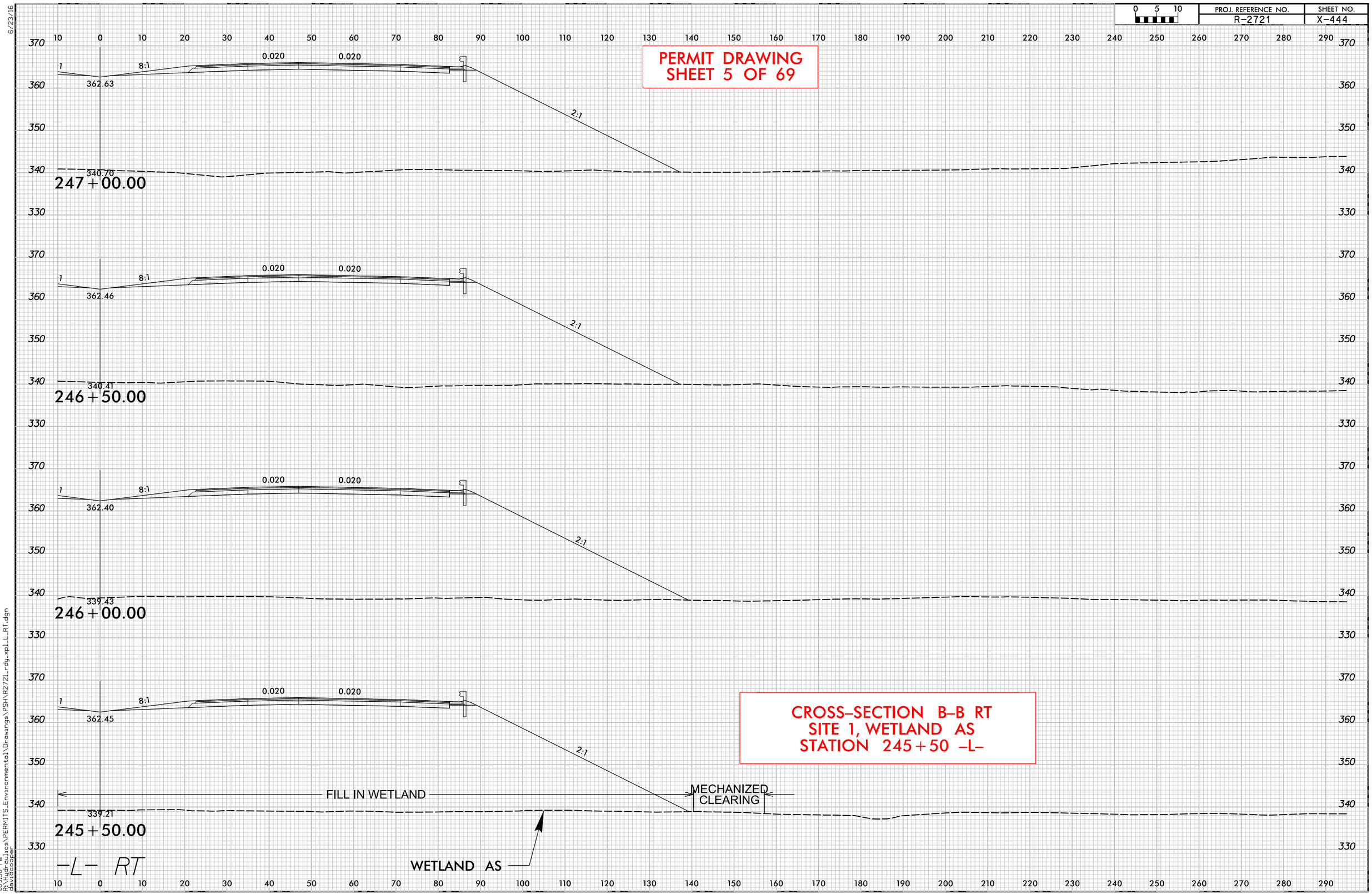


CROSS-SECTION A-A RT
SITE 1, NO IMPACT
STATION 244+00 -L-

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-444

PERMIT DRAWING
SHEET 5 OF 69



CROSS-SECTION B-B RT
SITE 1, WETLAND AS
STATION 245+50 -L-

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Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING SHEET 6 OF 69

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100' 0' 100'
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)



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dougliccar

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Number F-0159

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PROJECT REFERENCE NO.	SHEET NO.
R-2721	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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PERMIT DRAWING
SHEET 6A OF 69

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

100' 0' 100'
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

MATCHLINE SHEET 22
-L- STA 265+00.00

MATCHLINE SHEET 24
-L- STA 278+00.00

SITE 2

POND D

SAE

PROP. NOISEWALL (I8)

CAT-1 TYPE B-77

GREU TL-3

270+00

275+00

97 98 99 95 96

R/W

C/A

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POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

POND D

PD

WAW (2)

WLB

SAO

100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING
SHEET 7 OF 69

DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

TDE TDE

TS

S

SITE 3

CS Sta. 280+59.00

PROP. NOISEWALL (IB)
SINGLE FACE BARRIER

TYPE B-77

GREU TL-3

CAT-1

SAL

WETLAND AW

280+00

285+00

290+00

STREAM AL

SITE 2

STREAM AM

2@7'x8' RCBC

SAM

SAT

SINGLE FACE BARRIER

ST Sta. 282+69.00

WAW (1)

SAN

96

95

101

102

103

MATCHLINE SHEET 23
-L- STA 278+00.00

MATCHLINE SHEET 25
-L- STA 291+00.00

TAIL

NG

S.I.R.I.P. RAP
GEOTEXTILE (TYP)
NESS = 15"

EXISTING R/W

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(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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dodd.cooper

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POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

POND D

PD

WAW (2)

WLB

SAO

TS

S

TDE

SITE 3

CS Sta. 280+59.00

PROP. NOISEWALL (IB)
SINGLE FACE BARRIER

SAL

WETLAND AW

SAM

280+00

285+00

290+00

STREAM AL

SITE 2

STREAM AM

2@7'x8' RCBC

TYPE B-77

SINGLE FACE BARRIER

ST Sta. 282+69.00

GREU TL-3

CAT-1

WAW (1)

SAN

TAIL

NG

S RIP RAP
GEOTEXTILE (TYP)
NESS = 15'

MATCHLINE SHEET 23
-L- STA 278+00.00

MATCHLINE SHEET 25
-L- STA 291+00.00

95 101 102 103 96

GRAPHIC SCALE
100' 0' 100'

PERMIT DRAWING
SHEET 7A OF 69

DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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PROJECT REFERENCE NO.	SHEET NO.
R-2721	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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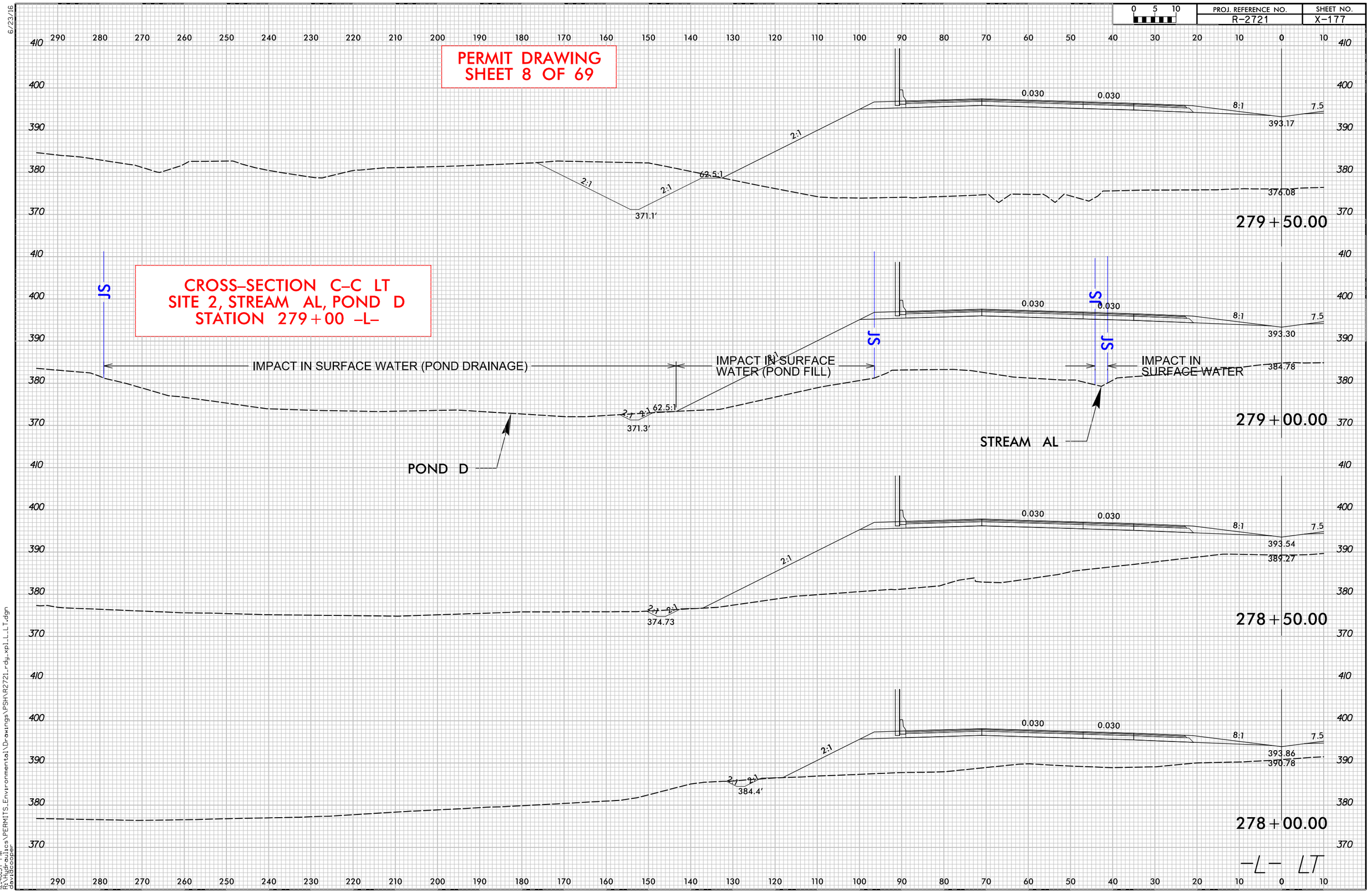
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PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-177

PERMIT DRAWING
SHEET 8 OF 69

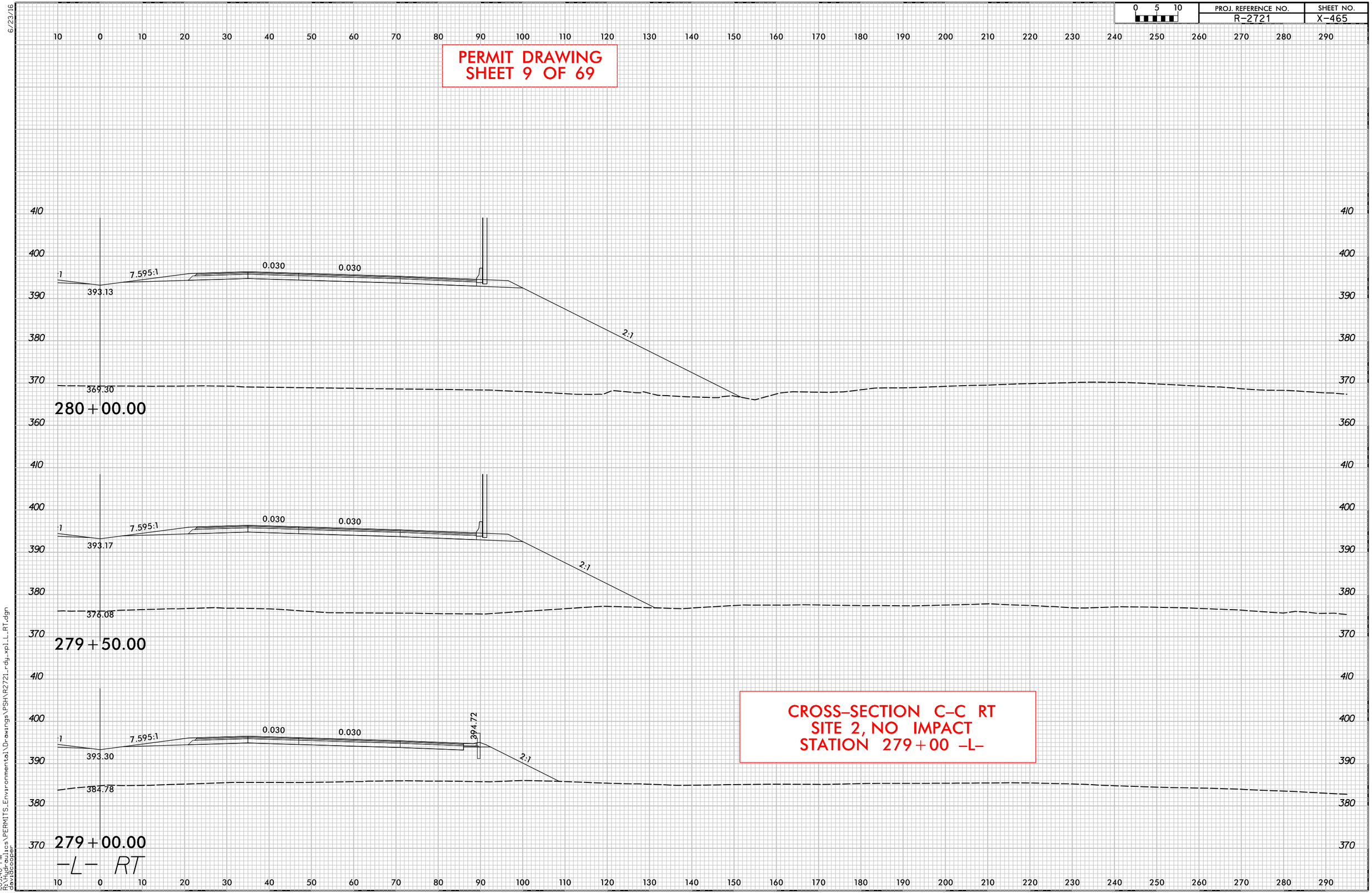
CROSS-SECTION C-C LT
SITE 2, STREAM AL, POND D
STATION 279+00 -L-



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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-465

PERMIT DRAWING
SHEET 9 OF 69



CROSS-SECTION C-C RT
SITE 2, NO IMPACT
STATION 279+00 -L-

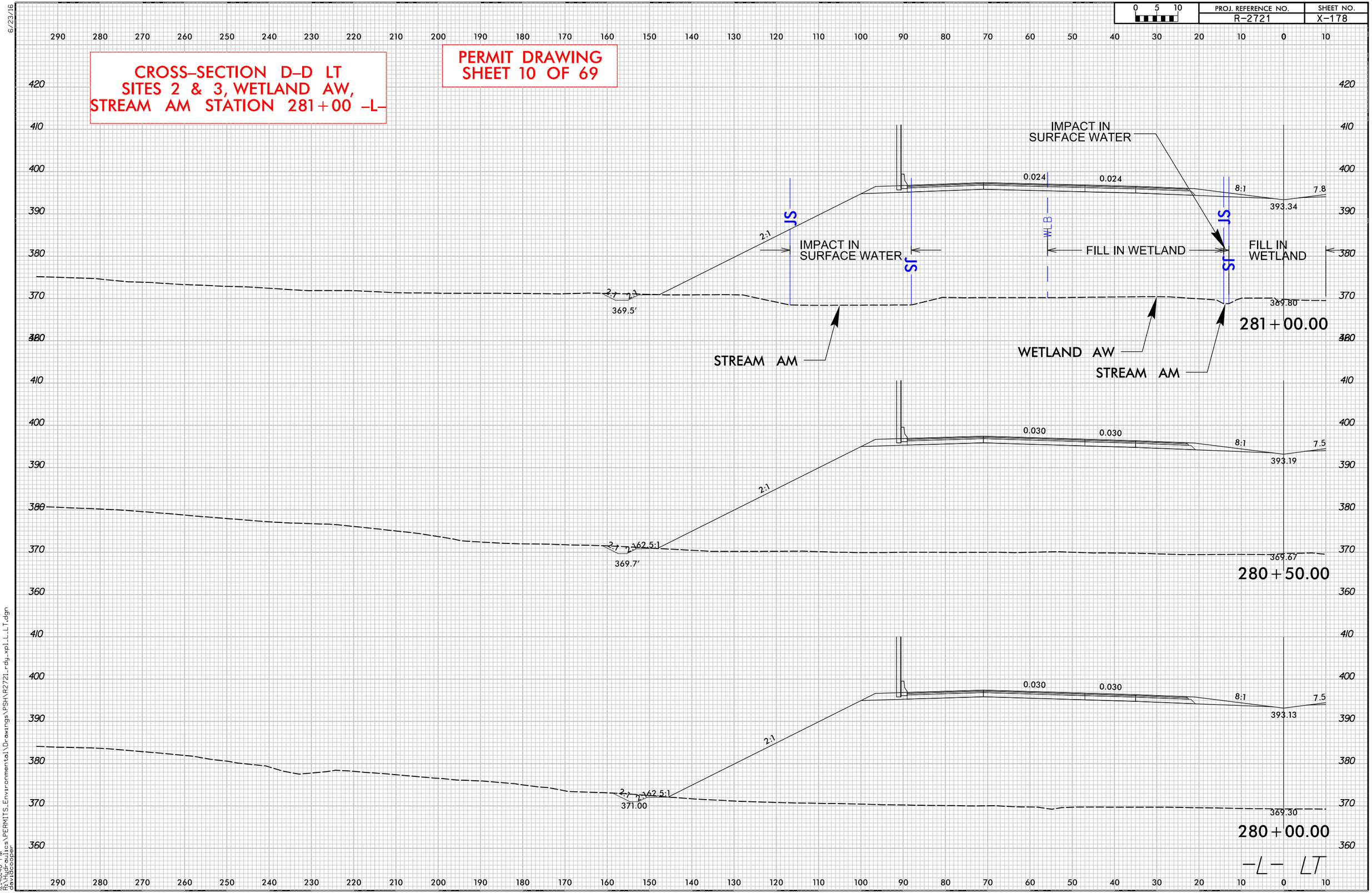
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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-178

CROSS–SECTION D–D LT
SITES 2 & 3, WETLAND AW, STREAM AM STATION 281+00 –L–

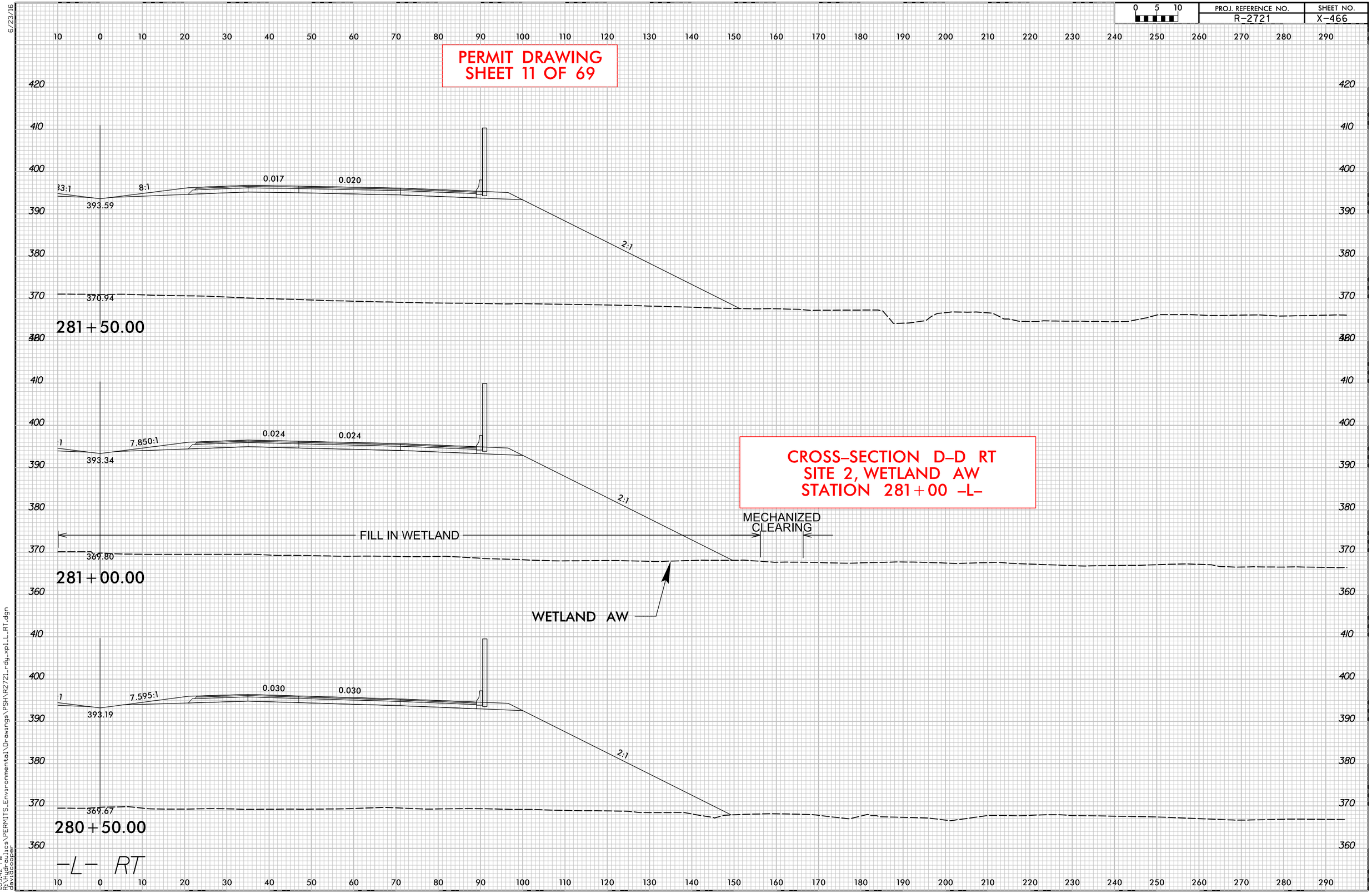
PERMIT DRAWING
SHEET 10 OF 69



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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-466

PERMIT DRAWING
SHEET 11 OF 69



CROSS-SECTION D-D RT
SITE 2, WETLAND AW
STATION 281+00 -L-

51499

100′ 0′ 100′
GRAPHIC SCALE

PERMIT DRAWING SHEET 12 OF 69

DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING

MATCHLINE SHEET 55
-Y7- STA 31+50.00

SR 1387 WEST LAKE RD

GREU TL-3

TYPE-III

106

107

18" W/ELBOWS

24" RCP-III

15" RCP-III

30" RCP-III

30" RCP-III

30" RCP-III

305+00

310+00

315+00

MATCHLINE SHEET 25
-L- STA 303+00.00

MATCHLINE SHEET 27
-L- STA 316+00.00

WETLAND AX

WET FILE START PT.

STREAM AR

SINGLE FACE BARRIER

TYPE B-77

-L- POT Sta.304+98.17=
-Y7- POC Sta.27+46.89
Δ = 95°02'38.28"

-L- POT Sta.313+88.48=
-Y8RPC- POT Sta. 10+00.00
71.00' RT

TDE

TDE

S

TS

SITE 4

WETLAND AY

95

107

EASEMENT NEEDED FOR DETOUR

25+00

105

108

329

MATCHLINE SHEET 54
-Y7- STA 23+50.00

EXISTING R/W

LOCHNER
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RALEIGH, NC 27612
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ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING SHEET 12A OF 69

DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES MECHANIZED CLEARING

MATCHLINE SHEET 55
-Y7- STA 31+50.00

MATCHLINE SHEET 25
-L- STA 303+00.00

MATCHLINE SHEET 27
-L- STA 316+00.00

MATCHLINE SHEET 54
-Y7- STA 23+50.00

SR 1387 WEST LAKE RD

GREU TL-3

TYPE-III

TYPE E-77

SINGLE FACE BARRIER

EXISTING R/W

EASEMENT NEEDED FOR DETOUR

18" W/ELBOWS

24" RCP-III

15" RCP-III

30" RCP-III

30" RCP-III

30" RCP-III

15" RCP-III

-L- POT Sta. 304+98.17=
-Y7- POC Sta. 27+46.89
Δ = 95°02'38.28"

-L- POT Sta. 313+88.48=
-Y8RPC- POT Sta. 10+00.00
71.00' RT

WETLAND AX

WET FILE START PT.

STREAM AR

WETLAND AY

SITE 4

TDE

TDE

S

TS

BZ

PB

305+00

310+00

315+00

25+00

30+00

106

107

95

105

108

329

C/A

R/W

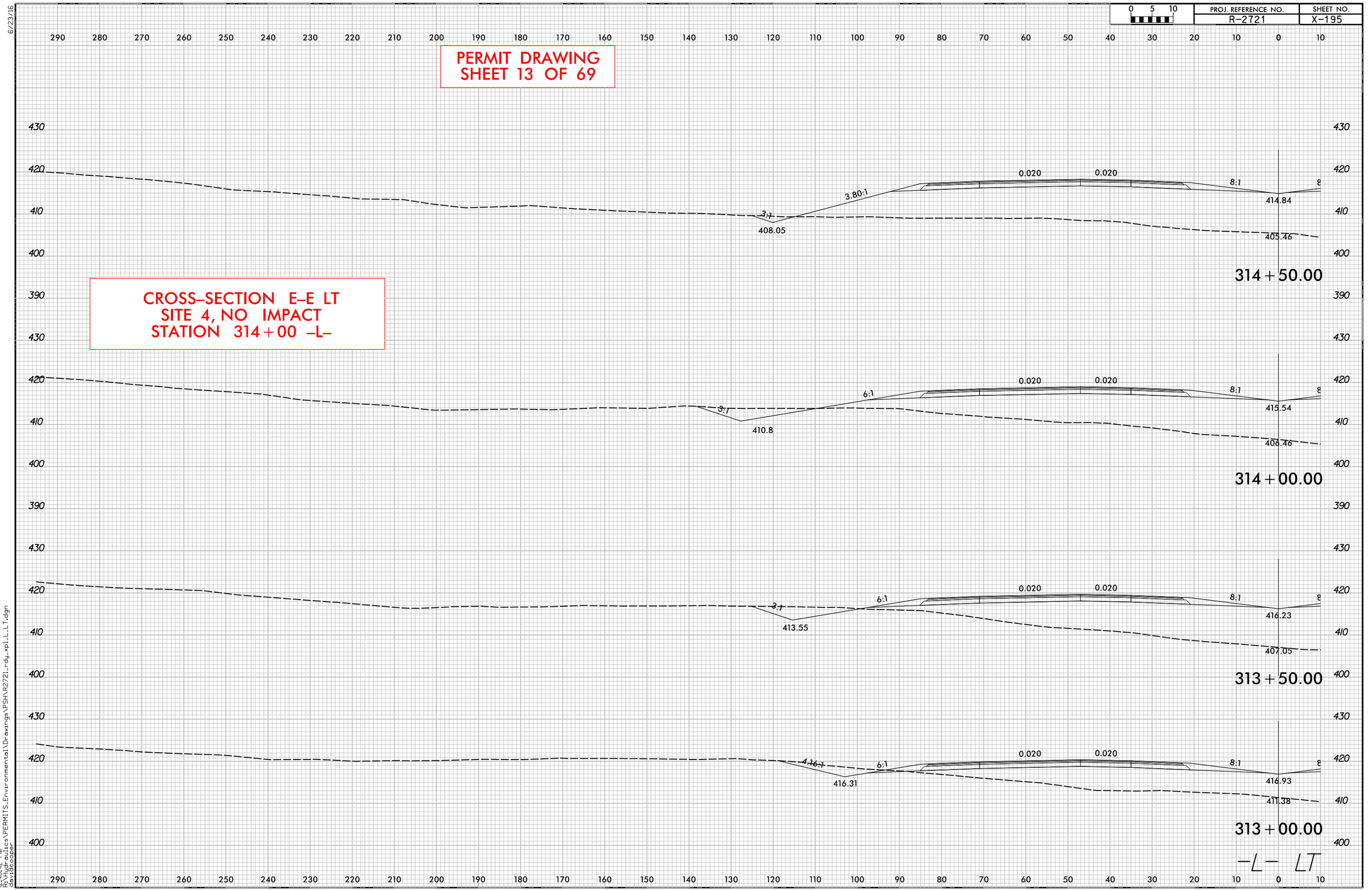
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dcraddock

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-195

PERMIT DRAWING
SHEET 13 OF 69

CROSS-SECTION E-E LT
SITE 4, NO IMPACT
STATION 314+00 -L-



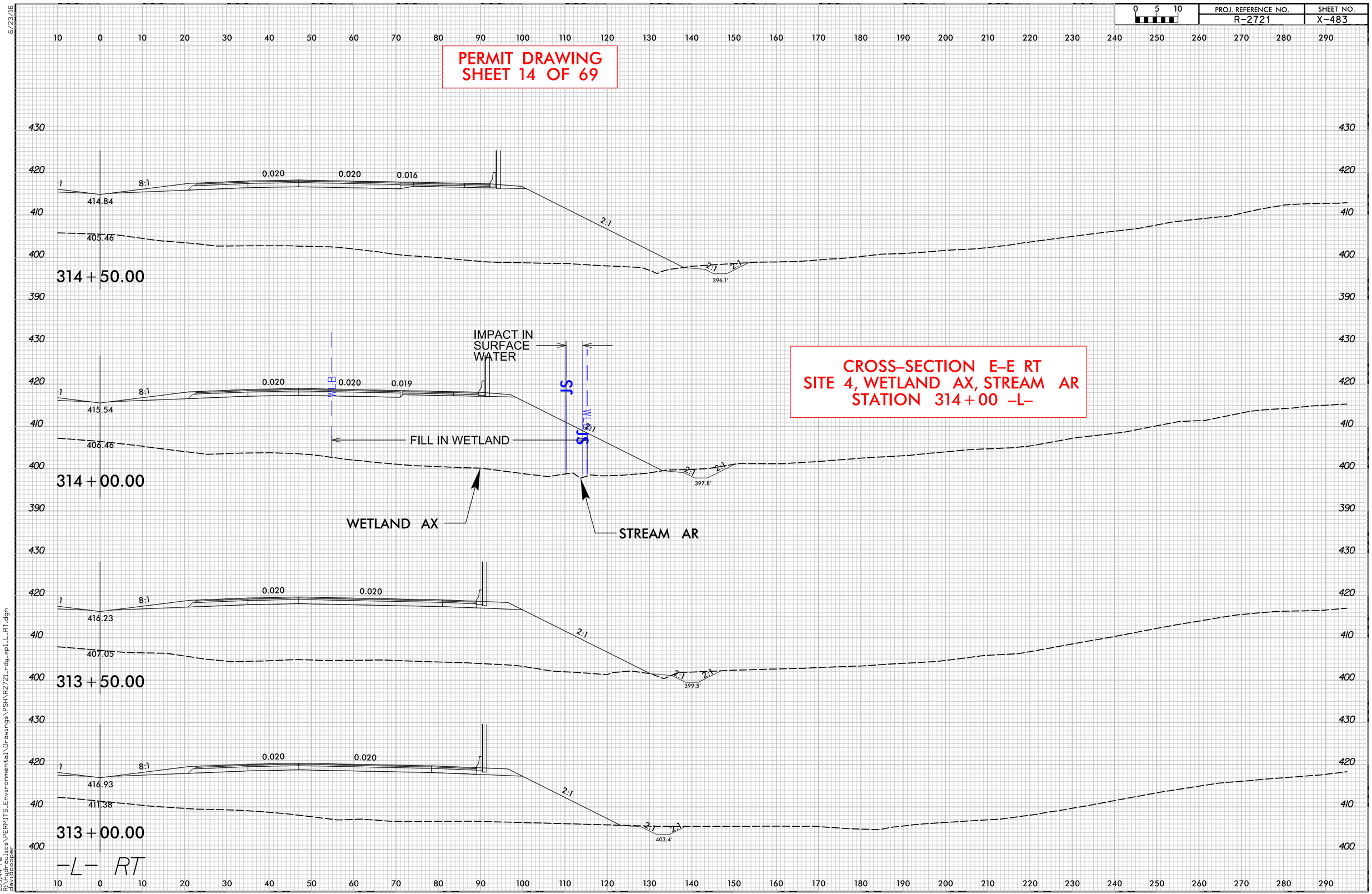
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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-483

PERMIT DRAWING
SHEET 14 OF 69

CROSS-SECTION E-E RT
SITE 4, WETLAND AX, STREAM AR
STATION 314+00 -L-



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davidcooper

51499

100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING
SHEET 15 OF 69

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
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(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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MATCHLINE SHEET 26
-L- STA 316+00.00

320+00

15" RCP-III

18" RCP-III

WETLAND AY

SINGLE FACE BARRIER

15" RCP-III

00+SI

TYPE B-77

SITE 4

SAR

WBA

WAZ

WBB

-Y8RPC- TS Sta. 17+50.00

CHORD

109

107

WETLAND BC

WBD

WBC

WBB

WLB

325+00

-L- TS Sta. 325+61.50

-Y8RPC- SC Sta. 20+00.00

STREAM AQ

15" W/ELBOWS

-L- SC Sta. 327+71.50

SITE 5

18" RCP-III

MATCHLINE SHEET 28
-L- STA 329+00.00

MATCHLINE SHEET 28
-Y8RPC- STA 25+00.00

CAT-1

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dodriscoar

51499

100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING SHEET 15A OF 69

F F DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 26 –L– STA 316+00.00

MATCHLINE SHEET 28 –L– STA 329+00.00

MATCHLINE SHEET 28 –Y8RPC– STA 25+00.00

320+00

325+00

WETLAND BC

WETLAND AY

SITE 4

SITE 5

WBA

WBB

WBC

WLB

SAR

WAZ

107

109

CAT-1

SINGLE FACE BARRIER

15" RCP-III

18" RCP-III

TYPE B-77

CHORD

–Y8RPC– TS Sta. 17+50.00

–Y8RPC– SC Sta. 20+00.00

–TS Sta. 325+61.50

–L– SC Sta. 327+71.50

STREAM AQ

15" W/ELBOWS

PDE

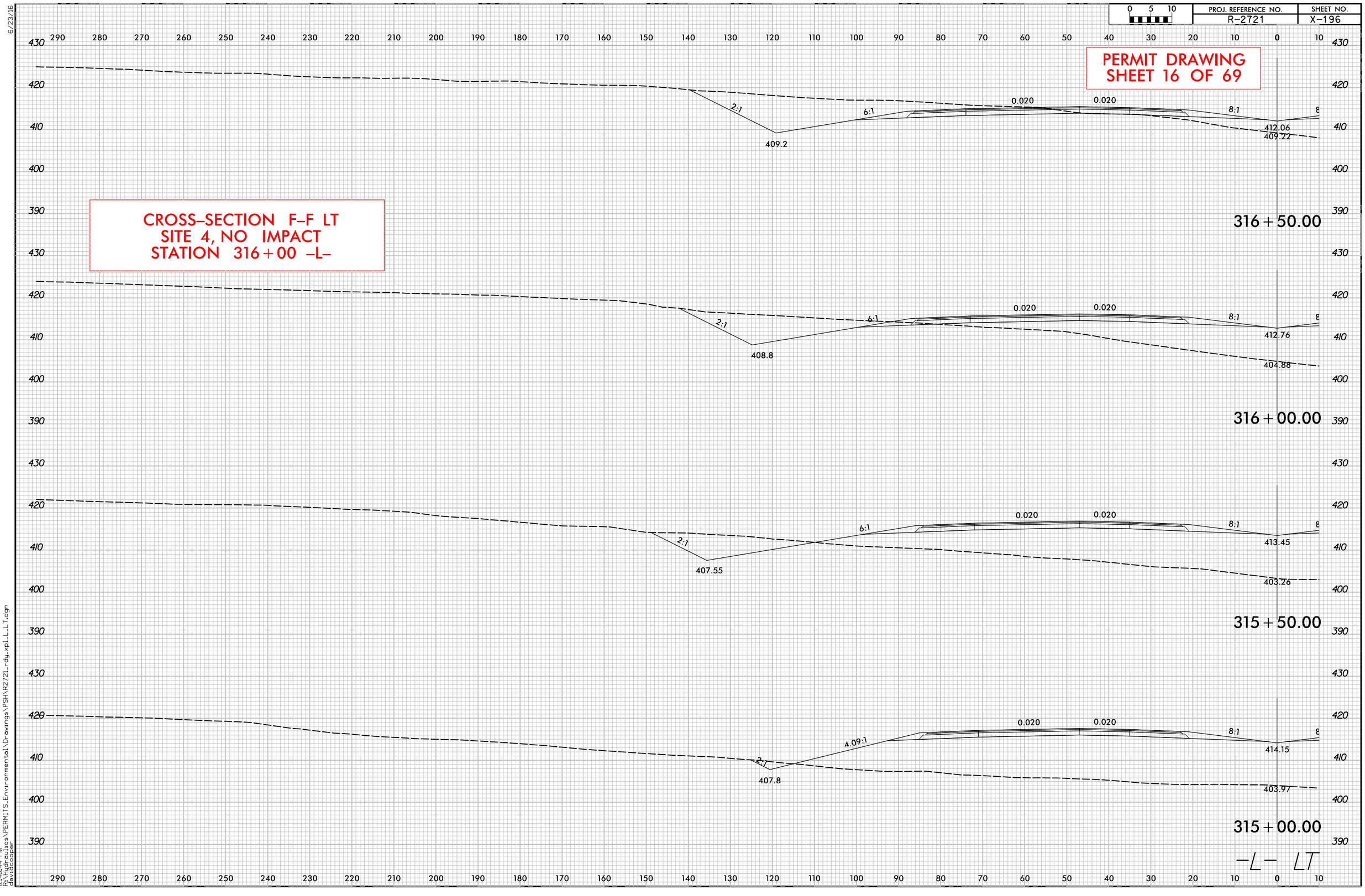
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dawidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-196

PERMIT DRAWING
SHEET 16 OF 69

CROSS-SECTION F-F LT
SITE 4, NO IMPACT
STATION 316+00 -L-



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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-484

PERMIT DRAWING
SHEET 17 OF 69

316+50.00

1 8:1 0.020 0.020 0.015 2:1

412.06
409.22

316+00.00

1 8:1 0.020 0.020 0.015 2:1

412.76
404.88

WLB

FILL IN WETLAND

MECHANIZED CLEARING

JS WLB JS

CROSS-SECTION F-F RT
SITE 4, WETLAND AY, STREAM AR
STATION 316+00 -L-

WETLAND AY

STREAM AR
NO IMPACT

315+50.00

1 8:1 0.020 0.020 0.015 2:1

413.45
403.26

315+00.00

1 8:1 0.020 0.020 0.015 2:1

414.15
403.97

-L- RT

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

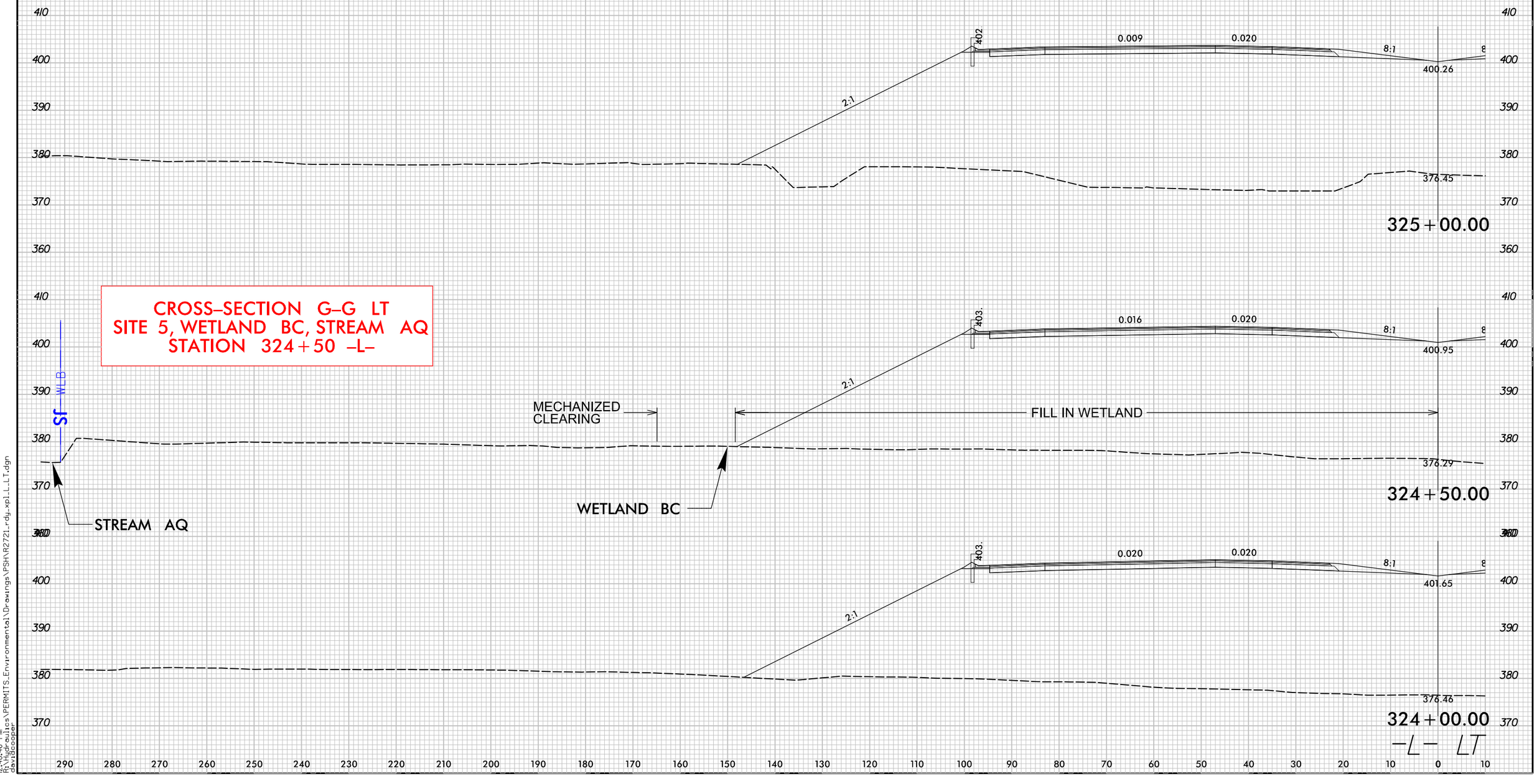
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6/23/16

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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-201

PERMIT DRAWING
SHEET 18 OF 69



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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-489

PERMIT DRAWING
SHEET 19 OF 69

CROSS-SECTION G-G RT
SITE 5, WETLAND BC
STATION 324+50 -L-

410
400
390
380
370
360

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

1 8:1 400.26 0.009 0.020 4:1 396.58 4.132:1 0.081 0.081 2:1

376.45

325+00.00

1 8:1 400.95 0.016 0.020 4:1 398.52 4:1 0.081 0.081

WLB WLB

FILL IN WETLAND FILL IN WETLAND MECHANIZED CLEARING

376.29

324+50.00

WETLAND BC WETLAND BC

1 8:1 401.65 0.020 0.020 4:1 400.24 4:1 0.081 0.081 2:1

376.46

324+00.00

-L- RT

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

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davidcooper

PERMIT DRAWING SHEET 20 OF 69

LOCHNER
H. W. LOCHNER, INC.
3840 NUMA PLAZA, SUITE 200
RALEIGH, NC 27612
NC License Number P-0155
ECOLOGICAL ENGINEERING
NC 28804 US 64 & Rte 64 W
US 74 E/I-26 Carl's Parkway
Exit 28
Lake Rd / Rte 64
35.06.10 N 82.54.29 W

PROJECT REFERENCE NO.	SHEET NO.
R-2721	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES EXCAVATION IN WETLAND
DENOTES TEMPORARY FILL IN WETLAND

200′ 0′ 200′
GRAPHIC SCALE

MATCHLINE SHEET 56
-Y8- STA 38+00.00

MATCHLINE SHEET X
X STA XX+XX.00

MATCHLINE SHEET 27
-L- STA 329+00.00

MATCHLINE SHEET 27
-Y8RPC- STA 252+00.00

MATCHLINE SHEET 55
-Y8- STA 23+00.00

MATCHLINE SHEET 29
-L- STA 355+00.00

SITE 6

SITE 7

WETLAND BE

WETLAND BF

TEMPORARY CAUSEWAYS

STREAM AS

EASEMENT NEEDED FOR DETOUR

-Y8RPA- SC Sta. 30+65.28
-Y8RPA- FT Sta. 32+65.43
-Y8RPA- SRS Sta. 28+15.28
-Y8RPA- CS Sta. 26+15.28
-Y8LPA- ST Sta. 22+39.31
-Y8LPA- CS Sta. 19+89.31
-Y8LPA- SC Sta. 15+00.00
-Y8- POT Sta. 31+32.98
-Y8LPA- POT Sta. 14+89.86
-Y8LPA- SRS Sta. 12+50.00
-L- POC Sta. 336+19.84=
-Y8LPA- ST Sta. 10+00.00
71.00' LT
-L- POC Sta. 336+29.67=
-Y8LPC- ST Sta. 10+00.00
71.00' LT
-Y8LPC- SC Sta. 12+50.00
-L- POC Sta. 338+11.04
-Y8- POT Sta. 30+60.37
Δ=87°16'02.82"
CS Sta. 340+19.78
ST Sta. 343+19.78
-Y8RPC- CS Sta. 25+01.55
-Y8LPC- CS Sta. 17+16.52
-Y8LPC- ST Sta. 19+96.52
-Y8- PT Sta. 25+67.41
-Y8- POT Sta. 25+14.70
-Y8RPC- POT Sta. 27+88.85
Δ = 91°47'54.18"
-Y8- POT Sta. 25+11.70
-Y8RPC- POT Sta. 33+55.90
Δ = 89°01'42.24"
-Y8RPC- SRS Sta. 28+57.55
-Y8RPC- SC Sta. 30+57.55
-Y8RPC- FT Sta. 33+16.14
-Y8- POT Sta. 10+00.00
-Y8RPA- SC Sta. 16+67.57
-Y8RPA- SRS Sta. 18+67.57

TS
S
WLB
SAS
SAS
SAS

8:55 PM
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PERMIT DRAWING SHEET 20A OF 69

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 200
RALEIGH, NC 27612
NC License Number P0155

ECOLOGICAL ENGINEERING

PROJECT REFERENCE NO.	SHEET NO.
R-2721	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
E E DENOTES EXCAVATION IN WETLAND
T T DENOTES TEMPORARY FILL IN WETLAND

200′ 0′ 200′
GRAPHIC SCALE

MATCHLINE SHEET 56
-Y8- STA 38+00.00

MATCHLINE SHEET X
-X- STA 39+XX.00

MATCHLINE SHEET 27
-L- STA 329+00.00

MATCHLINE SHEET 27
-Y88PC- STA 25+00.00

MATCHLINE SHEET 55
-Y8- STA 23+00.00

MATCHLINE SHEET 29
-L- STA 355+00.00

SITE 6
SITE 7
WETLAND BE
WETLAND BF
STREAM AS
TEMPORARY CAUSEWAYS
EASEMENT NEEDED FOR DETOUR
TS
S
SAS
WLB
BLW

-Y88PA- SC Sta. 30+65.28
-Y88PA- PT Sta. 32+65.43
-Y88PA- SRS Sta. 28+15.28
-Y88PA- CS Sta. 26+15.28
-Y8- POT Sta. 36+03.11
-Y8LPA- POT Sta. 23+57.69
Δ= 92°07'50.83"
-Y8- POT Sta. 36+35.11
-Y88PA- POT Sta. 33+82.17
Δ= 92°07'00.04"
-Y8LPA- ST Sta. 22+38.31
-Y8LPA- CS Sta. 19+89.31
-Y8LPA- SC Sta. 15+00.00
-Y8- POT Sta. 31+32.98
-Y8LPA- POT Sta. 11+89.06
-Y8LPA- SRS Sta. 12+50.00
-L- POC Sta. 336+10.84=
-Y8LPA- ST Sta. 10+00.00
71.00' LT
-L- POC Sta. 336+29.67=
-Y8LPC- ST Sta. 10+00.00
71.00' LT
-Y8LPC- SC Sta. 12+50.00
-Y88PC- CS Sta. 86+01.55
-Y11PC- CS Sta. 11+46.52
-Y8LPC- ST Sta. 13+96.52
-Y88PC- SRS Sta. 28+57.52
-Y88- POT Sta. 15+25.55
-Y88- POT Sta. 10+00.00
-Y88PC- ST Sta. 30+57.55
-Y88PC- PT Sta. 33+16.34
-L- POC Sta. 338+11.04
-Y8- POT Sta. 30+60.37
Δ=80°16'02.82"
CS Sta. 340+16.78
ST Sta. 341+02.78
-Y8- PT Sta. 25+67.61
-Y8- POT Sta. 25+14.70
-Y8LPC- POT Sta. 22+62.85
Δ = 91°41'34.8"
-Y8- POT Sta. 25+14.70
-Y88PC- POT Sta. 35+55.90
Δ = 85°01'14.24"
-Y88PA- SC Sta. 15+67.57
-Y88PA- ST Sta. 13+00.00

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-204

PERMIT DRAWING
SHEET 21 OF 69

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

410 400 390 380 370

2:1 2:1 2:1 6:1 0.030 0.030 8:1 7.5

394.2 393.1 394.01 393.07

332+50.00

2:1 2:1 6:1 0.030 0.030 8:1 7.5

391.2 393.02 389.98

332+00.00

2:1 2:1 3.73:1 0.030 0.030 8:1 7.5

388.2 393.07 384.29

331+50.00

CROSS-SECTION H-H LT
SITE 6, WETLAND BE
STATION 331+00 -L-

WLB WLB

2:1 2:1 3.31:1 0.030 0.030 8:1 7.5

FILL IN WETLAND FILL IN WETLAND

385.9 393.22 383.45

331+00.00

WETLAND BE WETLAND BE

-L- LT

290 280 270 260 250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10

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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-492

PERMIT DRAWING
SHEET 22 OF 69

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

410 400 390 380 370

1 7.595:1 0.030 0.030 4:1
394.01
393.07

332+50.00

1 7.595:1 0.030 0.030 4:1
393.02
389.98

332+00.00

1 7.595:1 0.030 0.030 4:1
393.07
384.29

331+50.00

IMPACT IN SURFACE WATER
FILL IN WETLAND
FILL IN WETLAND
JS
SF
1 7.595:1 0.030 0.030 4:1
393.22
383.45

331+00.00

WETLAND BE
WETLAND BE
STREAM AS* NO IMPACT THIS LOCATION

—L— RT

CROSS-SECTION H-H RT
SITE 6, WETLAND BE, STREAM AS*
STATION 331+00 -L-

*note Stream AS begins downstream of this location in the .WET file. XS shown per FS file.

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davidcooper

6/23/16

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-210

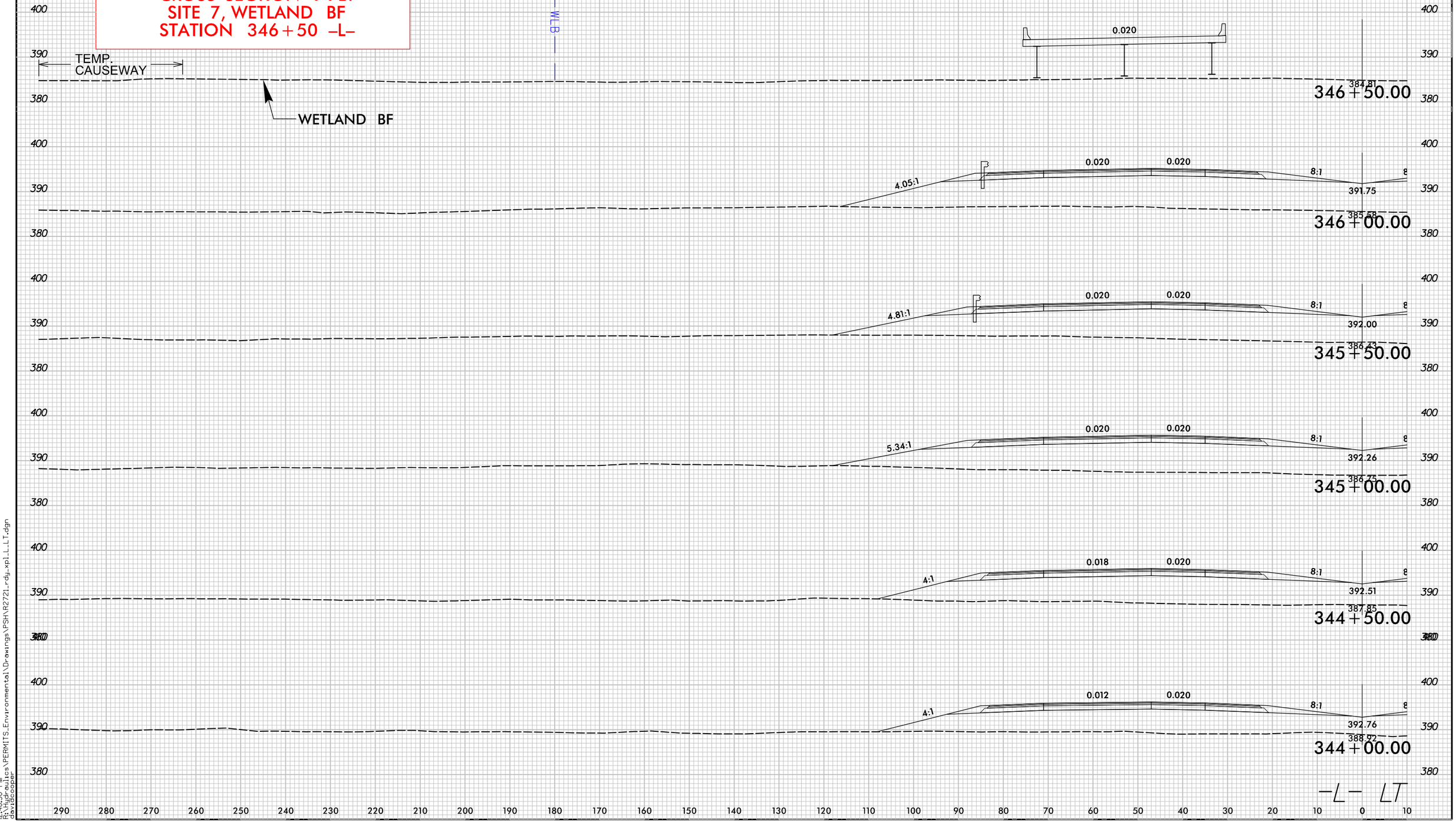
PERMIT DRAWING
SHEET 23 OF 69

CROSS–SECTION I–I LT
SITE 7, WETLAND BF
STATION 346+50 –L–

WLB

TEMP. CAUSEWAY

WETLAND BF



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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-499

PERMIT DRAWING
SHEET 24 OF 69

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400 / 390 / 380

1 8:1 0.020 0.020 2.33:1 2.65:1

390.22

383.07

349+00.00

0.020

382.34

348+50.00

0.020

384.46

348+00.00

0.020

382.47

347+50.00

0.020

383.59

347+00.00

WLB WLB WLB

0.020

TEMPORARY CAUSEWAY

NO IMPACT

384.81

346+50.00

-L- RT

WETLAND BF WETLAND BF

CROSS-SECTION I-I RT
SITE 7, WETLAND BF
STATION 346+50 -L-

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290

400 / 390 / 380

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5/28/99

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

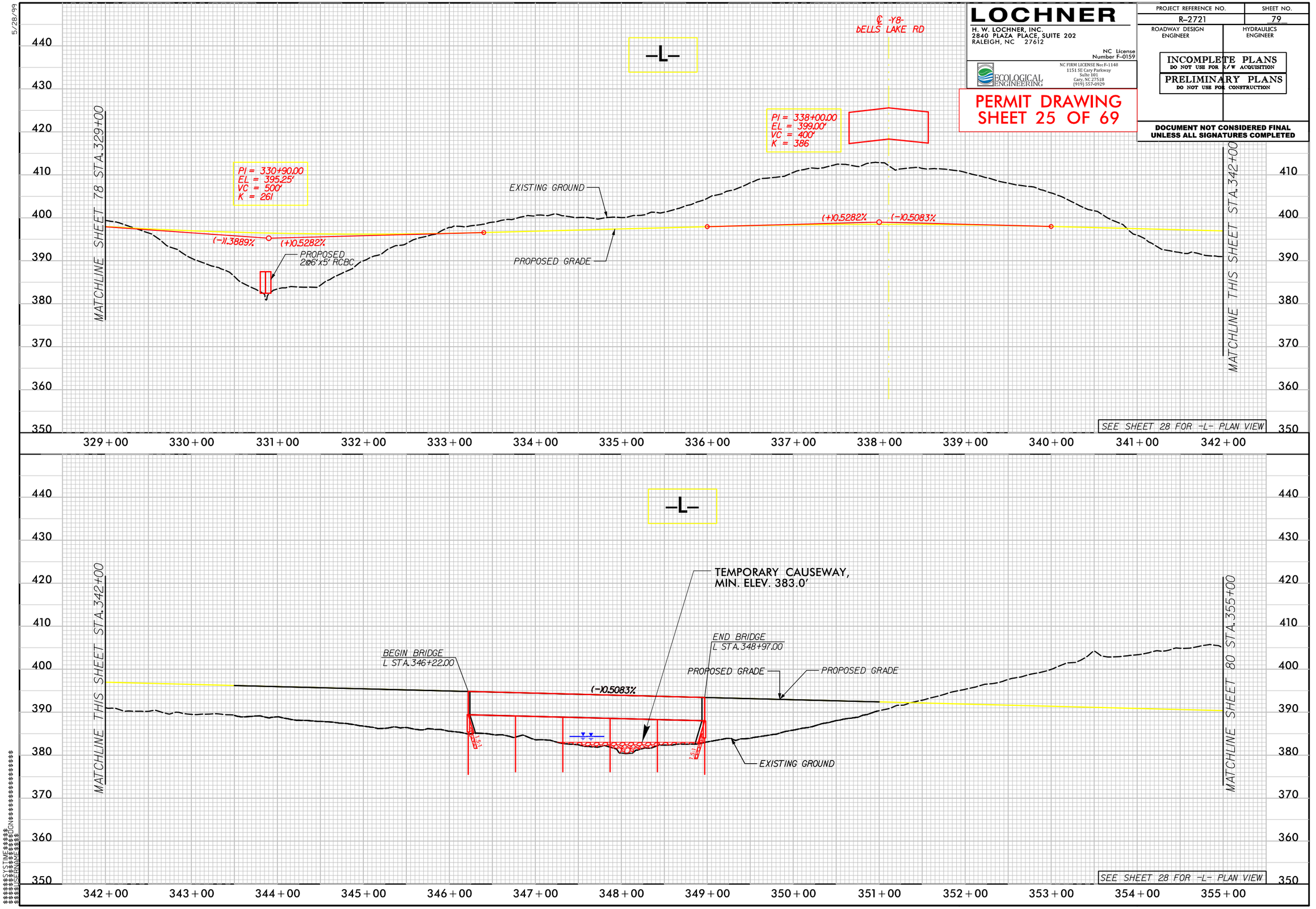
PROJECT REFERENCE NO.	SHEET NO.
R-2721	79
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING SHEET 25 OF 69

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$$$$$SYSTIME$$$$
$$$$$USERNAME$$$$
$$$$$DGN$$$$$

5/28/99

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
	94
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 26 OF 69

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y8RPA-

BEGIN GRADE
-Y8RPA- STA.10+00.00
EL. 387.59

PI = 11+50.00
EL = 388.31'
VC = 200'
K = 1277

(+)0.4787%

(+)0.3220%

EXISTING GROUND

PI = 15+00.00
EL = 389.44'
VC = 200'
K = 228

(+)0.3220%

(+)1.1984%

PROPOSED GRADE

TEMPORARY CAUSEWAY,
MIN. ELEV. 387.0'

BEGIN BRIDGE
Y8RPA STA.20+75.00

(+)0.3220%

MATCHLINE THIS SHEET STA.23+00

SEE SHEETS 28 & 29 FOR -Y8RPA- PLAN VIEW

420 410 400 390 380 370 360

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

-Y8RPA-

TEMPORARY CAUSEWAY,
MIN. ELEV. 387.0'

END BRIDGE
Y8RPA STA.25+15.00

(+)1.1984%

(+)0.3220%

(+)3.5353%

MATCHLINE THIS SHEET STA.23+00

PROPOSED GRADE

PI = 28+75.00
EL = 405.91'
VC = 320'
K = 137

(+)1.1984%

(+)3.5353%

PI = 31+60.00
EL = 415.99'
VC = 150'
K = 70

(+)3.5353%

(+)1.3885%

PI = 33+00.00
EL = 417.93'
VC = 120'
K = 196

(+)1.3885%

(+)2.0000%

PI = 33+69.61
EL = 419.33'

(+)1.9986%

BEGIN GRADE
-Y8RPA- STA.11+50.00
EL. 419.80

EXISTING GROUND

SEE SHEET 28 FOR -Y8RPC- PLAN VIEW

420 410 400 390 380 370 360

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00

$$$$USERNAME$$$$ $$$$SYSTIME$$$$ $$$$DGN$$$$

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 27 OF 69

100' 0' 100'
GRAPHIC SCALE

S1 S1 DENOTES IMPACTS IN SURFACE WATER
TS1 TS1 DENOTES TEMPORARY IMPACTS IN SURFACE WATER
T1 T1 DENOTES TEMPORARY FILL IN WETLAND
F1 F1 DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
E1 E1 DENOTES EXCAVATION IN WETLAND

INLET DETAIL
NTS
EXCAVATION = 25 CY
1@ 6' x 8' RCBC
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/GEOTEXTILE(TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
EXCAVATION = 22 CY
1@ 6' x 8' RCBC
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/GEOTEXTILE(TYP) THICKNESS = 2'

-Y9- PC Sta. 17+38.14
-Y9- PT Sta. 16+55.65
-Y9- POT Sta. 14+76.68
-Y8RPA- POT Sta. 12+01.10 = 93°41'01.43"
-Y8RPA- TS Sta. 14+67.57
-Y9- PC Sta. 14+90.46
-L- POT Sta. 359+88.39
-Y8RPA- POT Sta. 10+00.00
71.00' LT
-Y10A- POT Sta. 10+00.00
-Y10A- PC Sta. 13+83.50

MATCHLINE SHEET 28 -L- STA 355+00.00
-Y8RPA- STA 15+00.00
MATCHLINE SHEET 30 -L- STA 368+00.00
-Y10A- STA 14+00.00

WETLAND BG
WETLAND BH
STREAM AU
STREAM AT
SITE 9
SITE 8

15" RCP-III
18" RCP-III
24" RCP-III
30" RCP-III
36" RCP-III
36" W/ELBOWS
CAT-1
GREU TL-3
TDE
E
F
S
S1
Z1
Z2
Z8
B1
B2
B4
B8
117
131
132
133
134
135
136
137
138

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dcraig

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 27A OF 69

INLET DETAIL
NTS
EXCAVATION = 25 CY
I@ 6' x 8' RCBC
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/GEOTEXTILE(TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
EXCAVATION = 22 CY
I@ 6' x 8' RCBC
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/GEOTEXTILE(TYP) THICKNESS = 2'

100' 0' 100'
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES EXCAVATION IN WETLAND

-Y9- PC Sta. 17+38.14
-Y9- PT Sta. 16+55.65
-Y9- POT Sta. 14+76.68
-Y8RPA- POT Sta. 12+01.10 = 93°41'01.43"
-Y8RPA- TS Sta. 14+67.57
-Y9- PC Sta. 14+90.46
-L- POT Sta. 359+88.39
-Y8RPA- POT Sta. 10+00.00
71.00' LT
-Y10A- POT Sta. 10+00.00
-Y10A- PC Sta. 13+83.50

MATCHLINE SHEET 28 -L- STA 355+00.00
-Y8RPA- STA 15+00.00
MATCHLINE SHEET 30 -L- STA 368+00.00
MATCHLINE SHEET 30 -Y10A- STA 14+00.00

STREAM AU
STREAM AT
WETLAND BG
WETLAND BH
SITE 8
SITE 9

15" RCP-III
18" RCP-III
24" RCP-III
30" RCP-III
36" RCP-III
36" W/ELBOWS
CAT-1
GREU TL-3
TDE
PDE
TES
EXISTING RIP RAP
EXISTING ROCK
EXISTING ROCK RETAINING WALL
EXISTING ROCK RETAINING WALL TO BE REMOVED
EXISTING ROCK RETAINING WALL TO BE REMOVED AND REPLACED
EXISTING ROCK RETAINING WALL TO BE REMOVED AND REPLACED WITH RIP RAP
EXISTING ROCK RETAINING WALL TO BE REMOVED AND REPLACED WITH RIP RAP AND GEOTEXTILE
EXISTING ROCK RETAINING WALL TO BE REMOVED AND REPLACED WITH RIP RAP AND GEOTEXTILE AND BACKFILLED

117 131 132 133 134 135 136 137 138

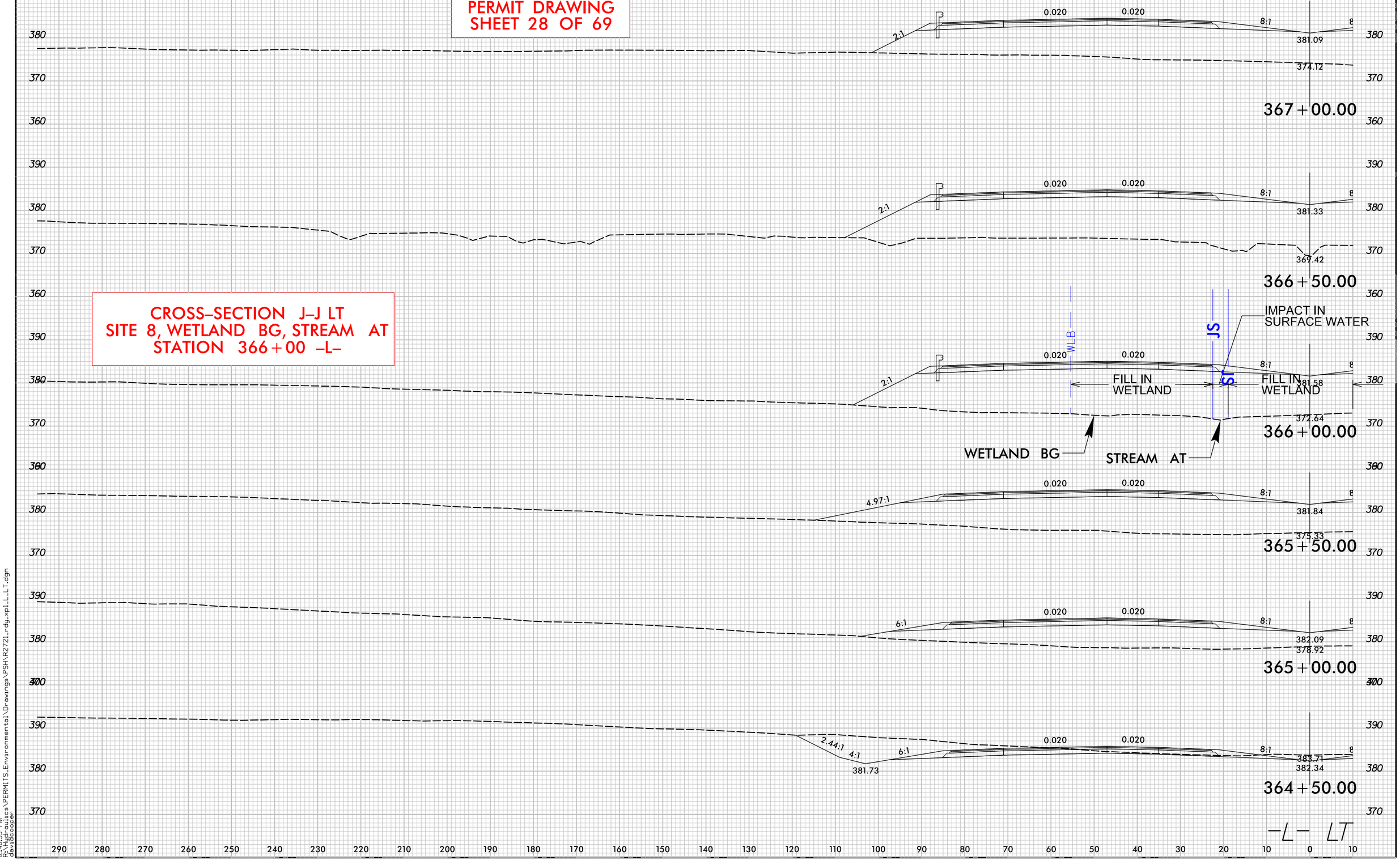
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droadcoogan

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-219

PERMIT DRAWING
SHEET 28 OF 69

CROSS-SECTION J-J LT
SITE 8, WETLAND BG, STREAM AT
STATION 366+00 -L-



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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-507

PERMIT DRAWING
SHEET 29 OF 69

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390 380 370 360

1 8:1 0.020 0.020 2:1

381.09
374.12

367+00.00

381.33
369.42

366+50.00

FILL IN WETLAND

WLB

381.58
372.64

366+00.00

WETLAND BG

381.84
375.33

365+50.00

382.09
378.92

365+00.00

-L- RT

CROSS-SECTION J-J RT
SITES 8 & 9, WETLANDS BG & BH
STATION 366+00 -L-

WETLAND BH
NO IMPACT

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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-769

PERMIT DRAWING
SHEET 30 OF 69

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

400 390 380 390 380 390 380 380 370 380 370 380 370 360

0.020 0.020 2:1 4:1 3:1 387.49 385.10

16+50.00

0.020 0.020 2:1 4:1 3:1 384.78 382.30

16+00.00

0.020 0.020 3:1 4:1 4:1 3:1 381.91 379.66 379.66

15+50.00

0.020 0.020 2:1 2:1 378.88 377.3

15+00.00

0.020 0.020 2:1 2:1 374.81 373.8

14+50.00

0.020 0.020 3.87:1 2:1 369.95 370.3

14+00.00

WLB WLB WLB

0.020 0.020 2:1 2:1 366.34 365.8

13+50.00

-Y10A-

MECHANIZED CLEARING

FILL IN WETLAND

MECHANIZED CLEARING

WETLAND BH

WETLAND BH

WETLAND BH

CROSS-SECTION K-K
SITE 9, WETLAND BH
STATION 13+50 -Y10A-

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davidcooper

51499

100' 0' 100'

PERMIT DRAWING SHEET 31 OF 69

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
P P DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND

INSET

POND F
MATCHLINE THIS SHEET

POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

MATCHLINE SHEET INSET

SITE 10
STANDARD BASE DITCH SEE DETAIL 34B SLOPE = 3.1% DDE = XX CY
163
POND TO BE DRAINED
148
149
150
164
165
166
167
168
POND G
POND F
SPECIAL CUT DITCH SEE DETAIL 65B
SPECIAL CUT DITCH SEE DETAIL 65B
SPECIAL LATERAL V DITCH W/RIP RAP SEE DETAIL 8B
STANDARD BASE DITCH SEE DETAIL 34B SLOPE = 3.1% DDE = XX CY
SPECIAL LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 8B
LATERAL BASE DITCH W/CLASS B RIP RAP SEE DETAIL 8B
-L- SC Sta. 389+19.97
-L- TS Sta. 385+69.10
WETLAND B
STREAM AX
STREAM AW
SINGLE FACE BARRIER
TYPE B-77
CAT-1
CHORD
SITE 12
SITE 11
TOE PROTECTION SEE DETAIL 1B
SPECIAL CUT DITCH SEE DETAIL 4B
LATERAL BASE DITCH SEE DETAIL 30B
SPECIAL LATERAL BASE DITCH SEE DETAIL 35B
SPECIAL CUT DITCH SEE DETAIL 4B
18" W/ELBOWS
MATCHLINE SHEET 30 -L- STA 379+75.00
MATCHLINE SHEET 32 -L- STA 394+00.00
380+00
385+00
390+00
SAW
WBI
WLB
SBBJ

4:00:02 PM
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dcarlcooper

51499

100' 0' 100'

PERMIT DRAWING SHEET 31A OF 69

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	31
R/W SHEET NO.	

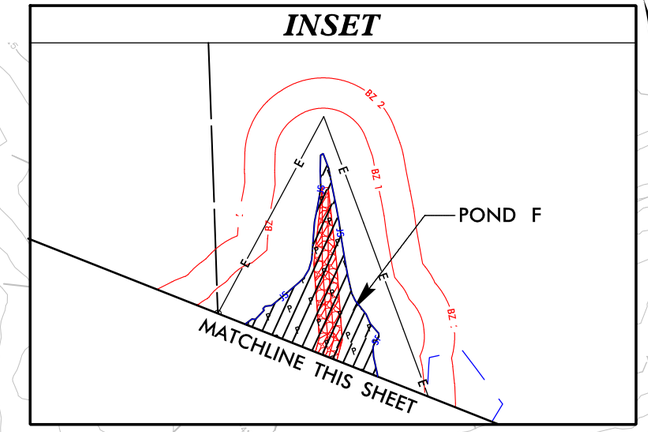
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
P P DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES MECHANIZED CLEARING
E E DENOTES EXCAVATION IN WETLAND

INSET



POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

SITE 10

STANDARD BASE DITCH
SEE DETAIL 34B
SLOPE = 3.1%
DDE = XX CY

POND TO BE DRAINED

POND G

SPECIAL CUT DITCH
SEE DETAIL 65B

SPECIAL CUT DITCH
SEE DETAIL 65B

SPECIAL LATERAL V DITCH W/RIP RAP
SEE DETAIL 8B

SPECIAL CUT DITCH
SEE DETAIL 4B

TOE PROTECTION
SEE DETAIL 1B

SPECIAL LATERAL BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 8B

STANDARD BASE DITCH
SEE DETAIL 34B
SLOPE = 3.1%
DDE = XX CY

LATERAL BASE DITCH
W/CLASS B RIP RAP
SEE DETAIL 8B

LATERAL BASE DITCH
SEE DETAIL 30B

SPECIAL LATERAL BASE DITCH
SEE DETAIL 35B

MATCHLINE SHEET INSET

MATCHLINE SHEET 30 -L- STA 379+75.00

MATCHLINE SHEET 32 -L- STA 394+00.00

-L- SC Sta. 389+19.97

-L- TS Sta. 385+69.10

WETLAND B
STREAM AX
STREAM AW
SINGLE FACE BARRIER
SITE 12
SITE 11
CHORD
TYPE B-77
CAT-1
TYPE RB
REMOVE
FS
BDO
TDE
PDE
SAW
WBI
WLB
SBBJ

380+00 385+00 390+00

163 164 165 166 167 148 149 150 158 168

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dcarlcoop

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-226

PERMIT DRAWING
SHEET 32 OF 69

383+00.00

382+50.00

382+00.00

381+50.00

381+00.00

CROSS-SECTION L-L LT
SITE 10, POND G
STATION 381+00 -L-

IMPACT IN SURFACE WATER (POND)

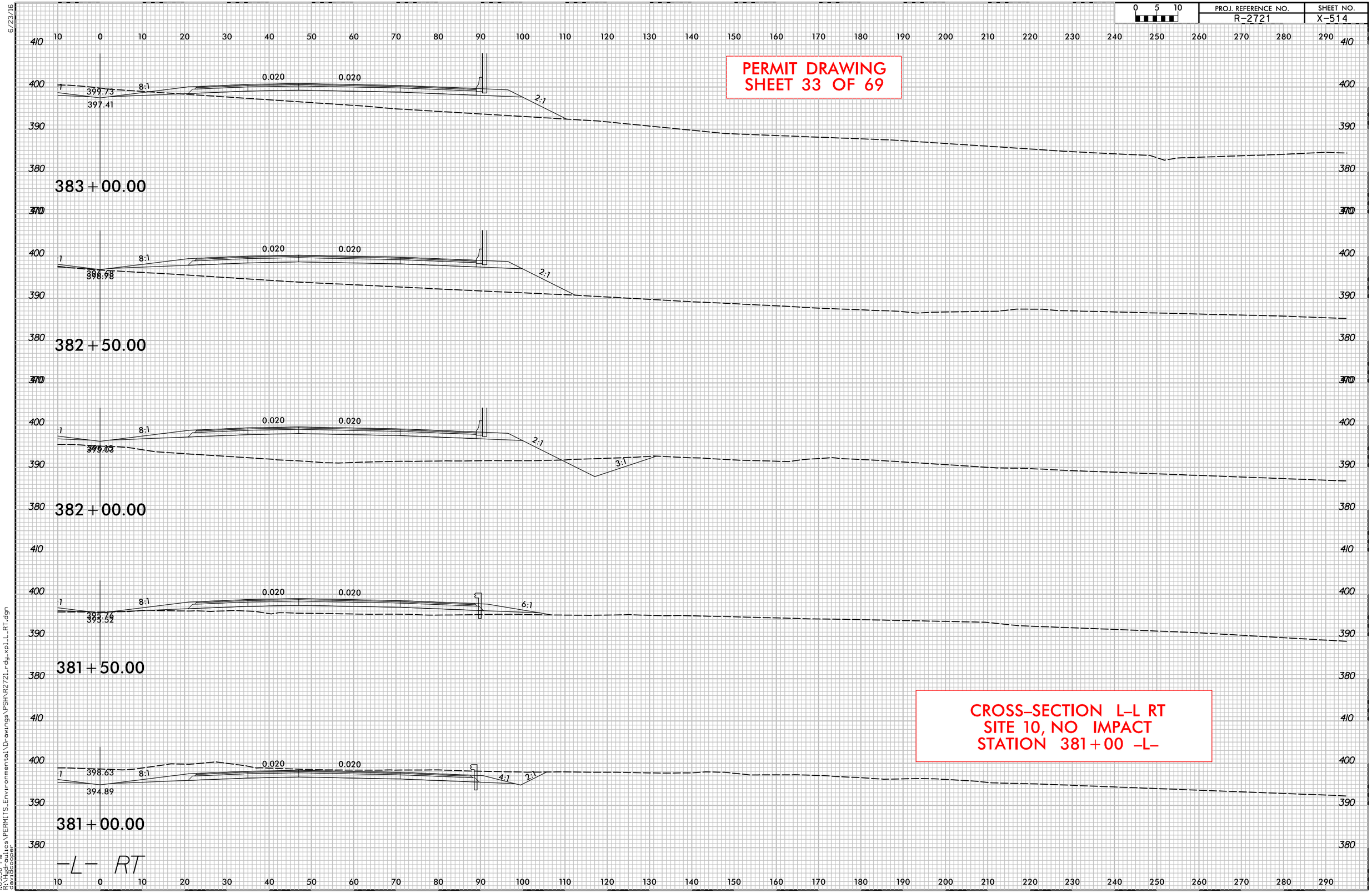
POND G

-L- LT

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	R-2721	X-514

PERMIT DRAWING
SHEET 33 OF 69



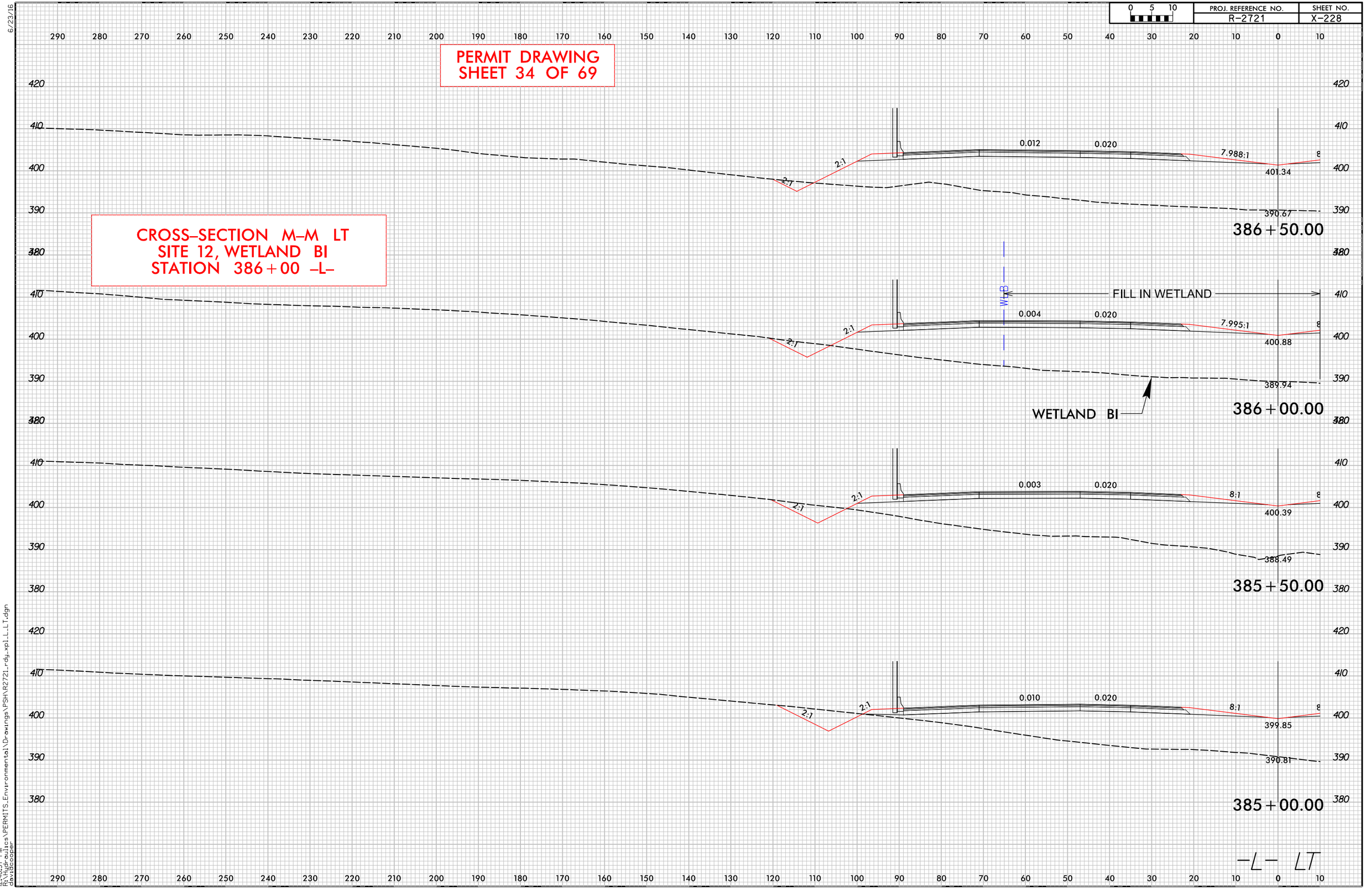
CROSS-SECTION L-L RT
SITE 10, NO IMPACT
STATION 381+00 -L-

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davidcooper

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	R-2721	X-228

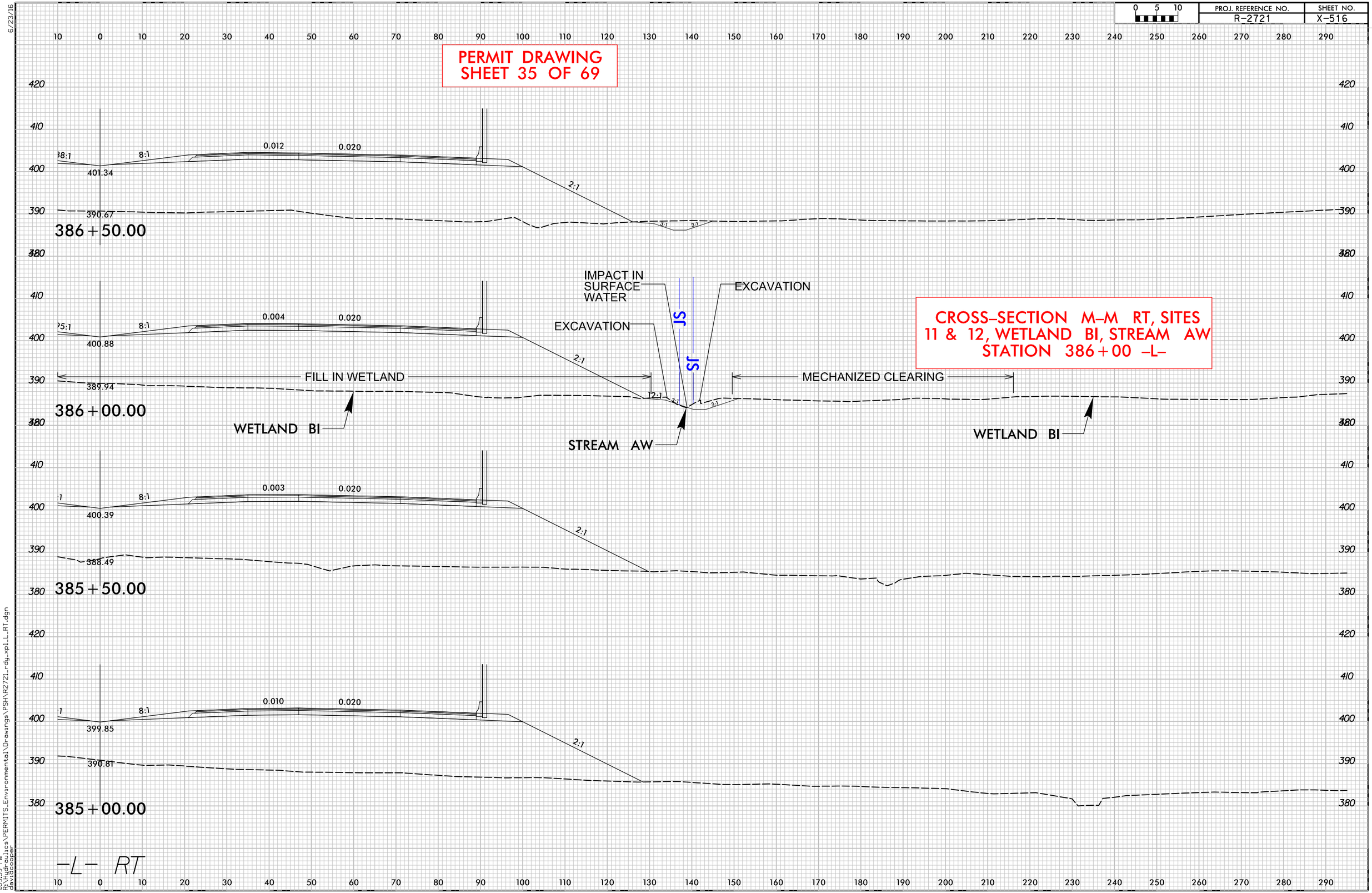
PERMIT DRAWING
SHEET 34 OF 69

CROSS-SECTION M-M LT
SITE 12, WETLAND BI
STATION 386+00 -L-



0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-516

PERMIT DRAWING
SHEET 35 OF 69



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davidcooper

6/23/16

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	R-2721	X-229

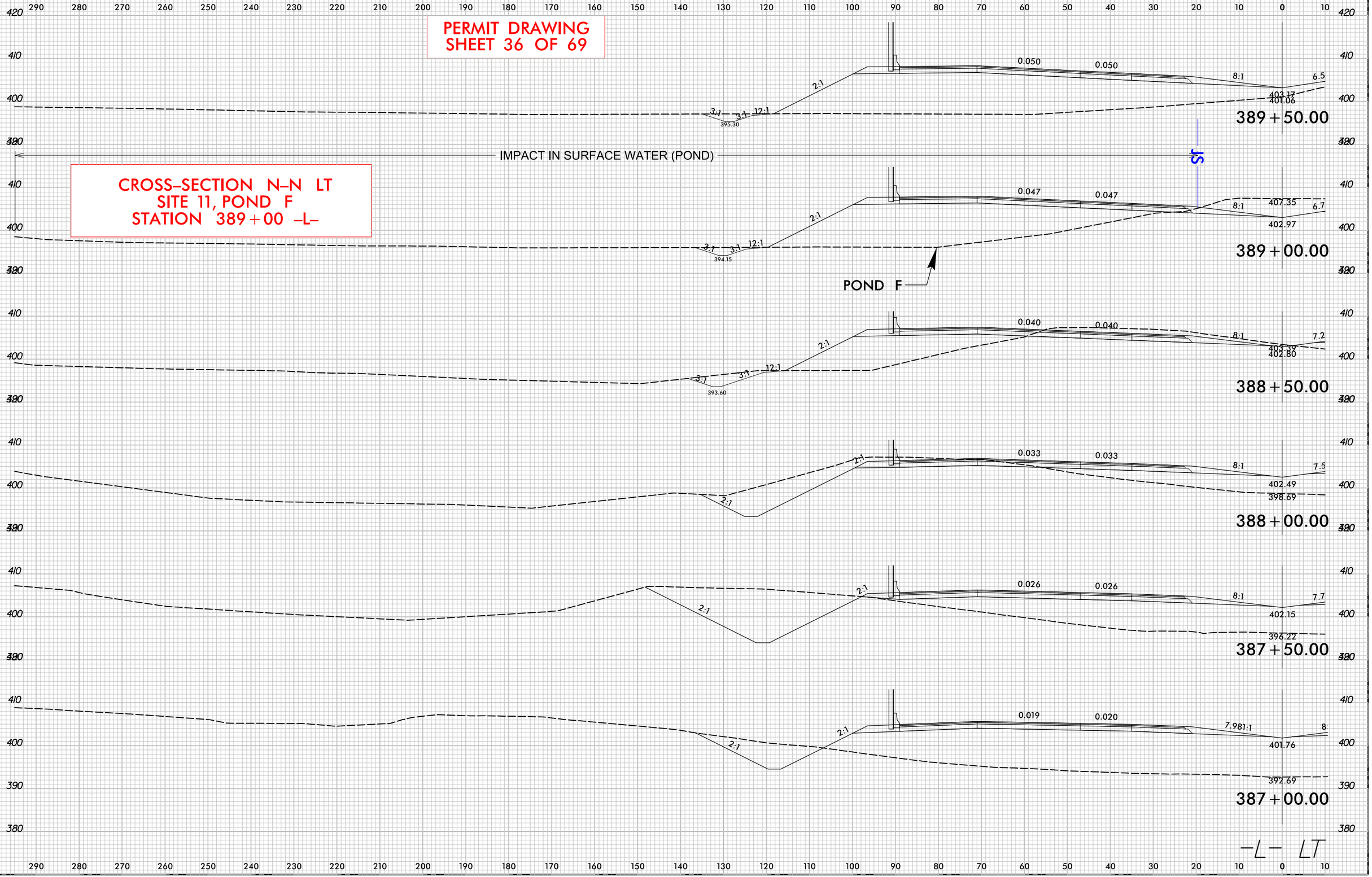
PERMIT DRAWING
SHEET 36 OF 69

CROSS-SECTION N-N LT
SITE 11, POND F
STATION 389+00 -L-

IMPACT IN SURFACE WATER (POND)

SF

POND F



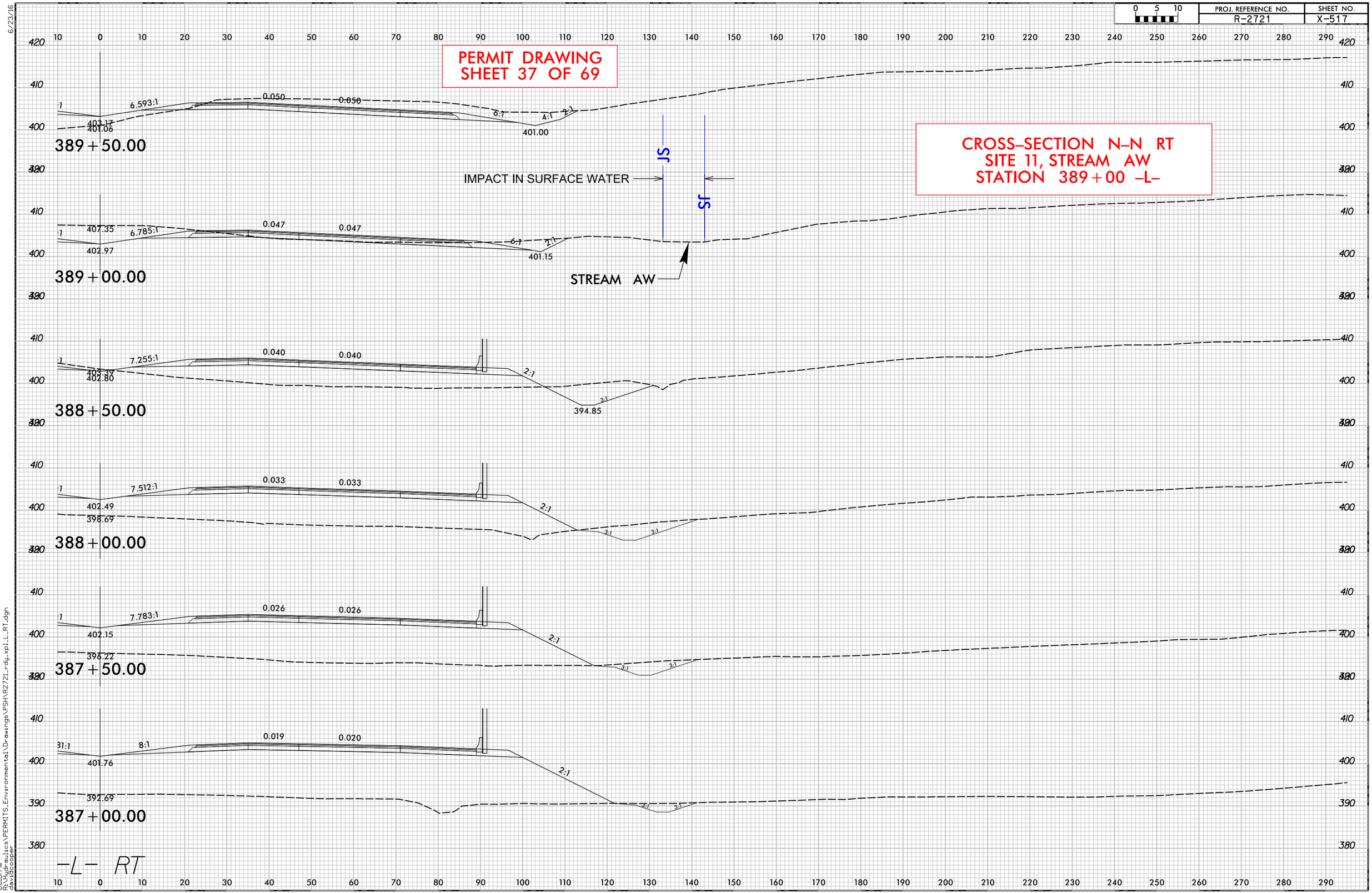
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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-517

PERMIT DRAWING
SHEET 37 OF 69

CROSS-SECTION N-N RT
SITE 11, STREAM AW
STATION 389+00 -L-



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davidcooper

51499

POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

PERMIT DRAWING
SHEET 38 OF 69

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES IMPACTS IN SURFACE WATER (POND)
- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING
- DENOTES EXCAVATION IN WETLAND
- DENOTES TEMPORARY FILL IN WETLAND

100' 0' 100'

171 178 177

POND 1

POND TO BE DRAINED

-Y12A- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y12A- STA. 10+50.00

-L- CS Sta. 411+69.36

-L- ST Sta. 415+19.36

MATCHLINE SHEET 32
-L- STA 407+00.00

MATCHLINE SHEET 34
-L- STA 420+00.00

SITE 13

SITE 14

SITE 15

WETLAND BK

STREAM AZ

STREAM BA

WETLAND BN (1)

WBN (1)

SAZ

SBA

WBA

WBL

SBL

SBBM

410+00

415+00

15" RCP-IV

24" RCP-III

18" RCP-III

CAT-1

GREU TL-3

TDE

INLET DETAIL
NTS
1@ 7' x 8' RCBC
EXCAVATION EST XX TONS
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
1@ 7' x 8' RCBC
EXCAVATION EST 7 TONS
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

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dodriscoll

51499

POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

PERMIT DRAWING
SHEET 38A OF 69

DENOTES TEMPORARY IMPACTS IN SURFACE WATER	DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER	DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER (POND)	DENOTES EXCAVATION IN WETLAND
	DENOTES TEMPORARY FILL IN WETLAND

100' 0' 100'

POND 1

POND TO BE DRAINED

-Y12A- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y12A- STA. 10+50.00

-L- CS Sta. 411+69.56

-L- ST Sta. 415+19.36

STREAM BA

STREAM AZ

WETLAND BK

WETLAND BN (1)

SITE 13

SITE 14

SITE 15

MATCHLINE SHEET 32
-L- STA 407+00.00

MATCHLINE SHEET 34
-L- STA 420+00.00

410+00

415+00

171

177

178

CAT-1

15" RCP-IV

24" RCP-III

18" RCP-III

15" RCP-III

7' x 8' RCBC

GREU TL-3

INLET DETAIL
NTS
EXCAVATION EST XX TONS
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
EXCAVATION EST 7 TONS
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

LOCHNER
H. W. LOCHNER, INC.
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ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

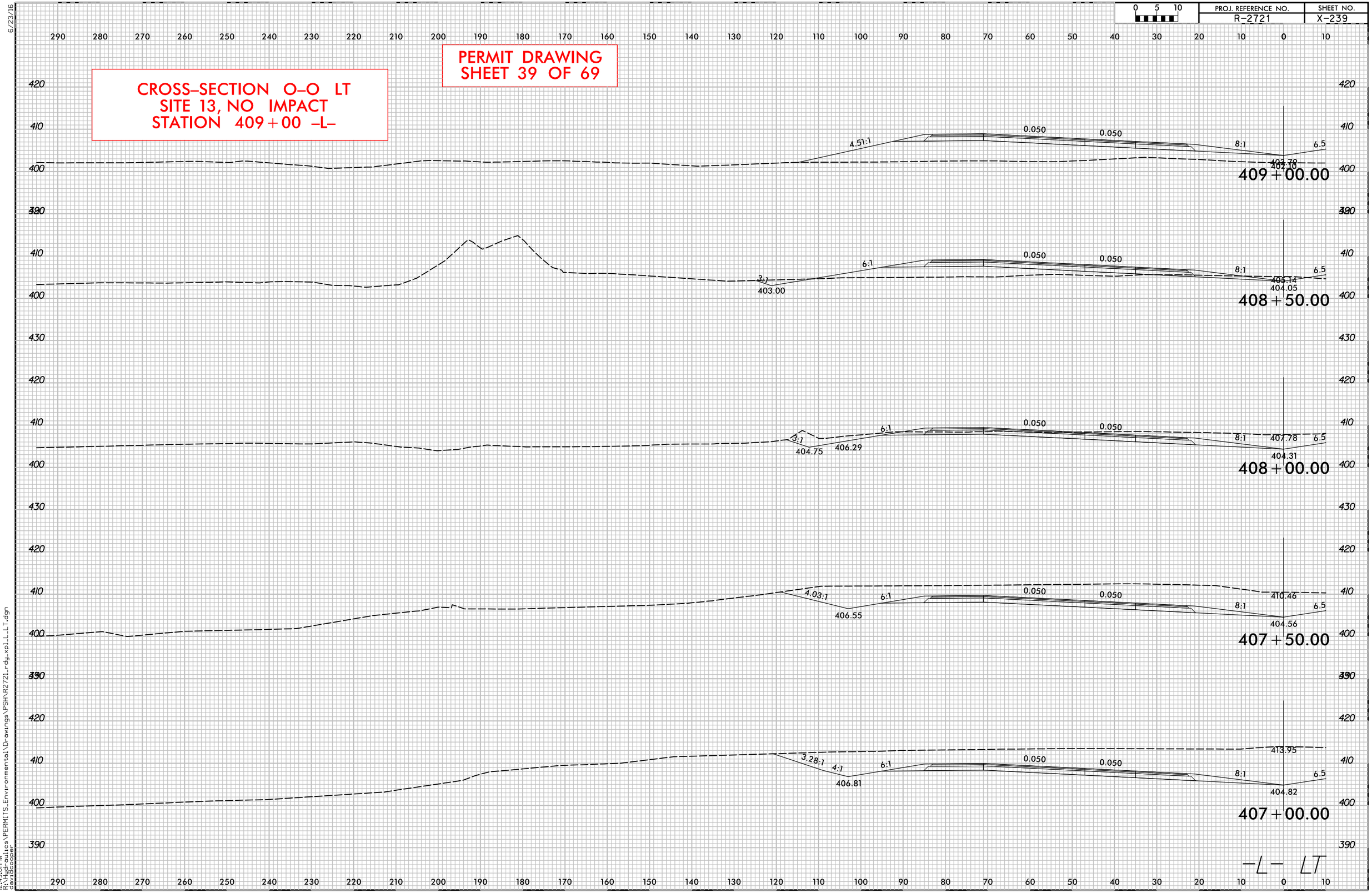
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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dpadgett

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	R-2721	X-239

PERMIT DRAWING
SHEET 39 OF 69

CROSS-SECTION O-O LT
SITE 13, NO IMPACT
STATION 409+00 -L-



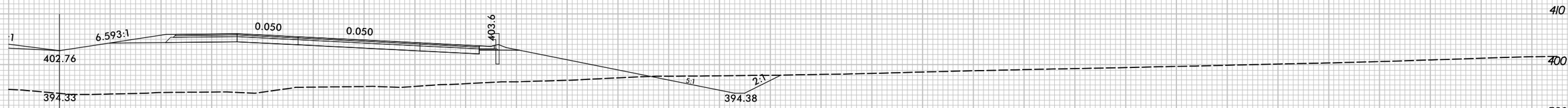
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davidcooper

6/23/16

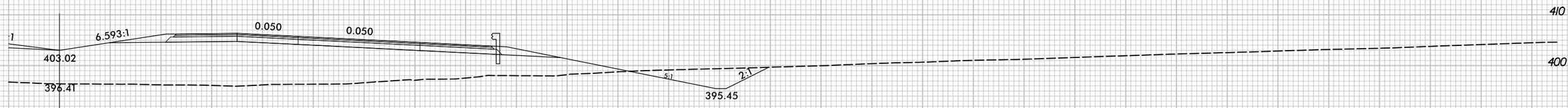
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PERMIT DRAWING
SHEET 40 OF 69

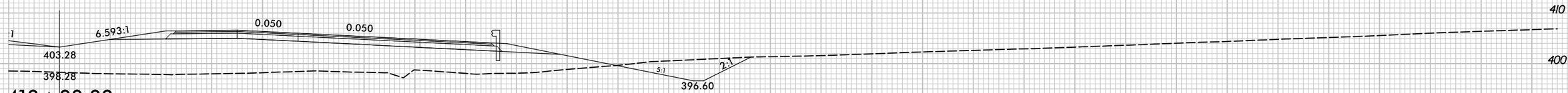
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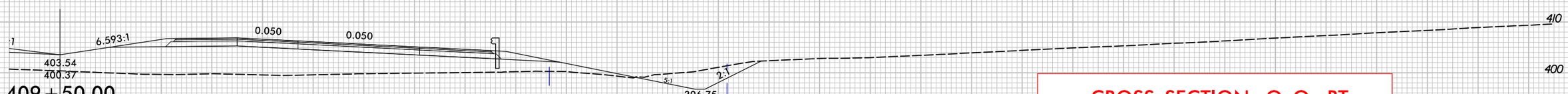
410+50.00



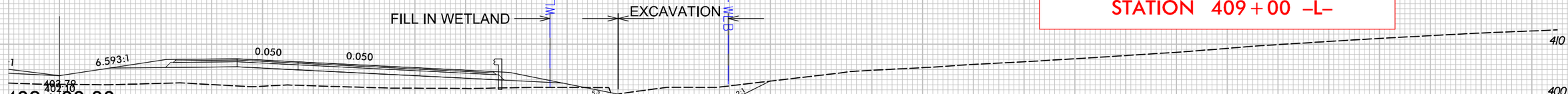
410+00.00



409+50.00



409+00.00



FILL IN WETLAND
WLB
EXCAVATION
BTW
WETLAND BK

-L- RT

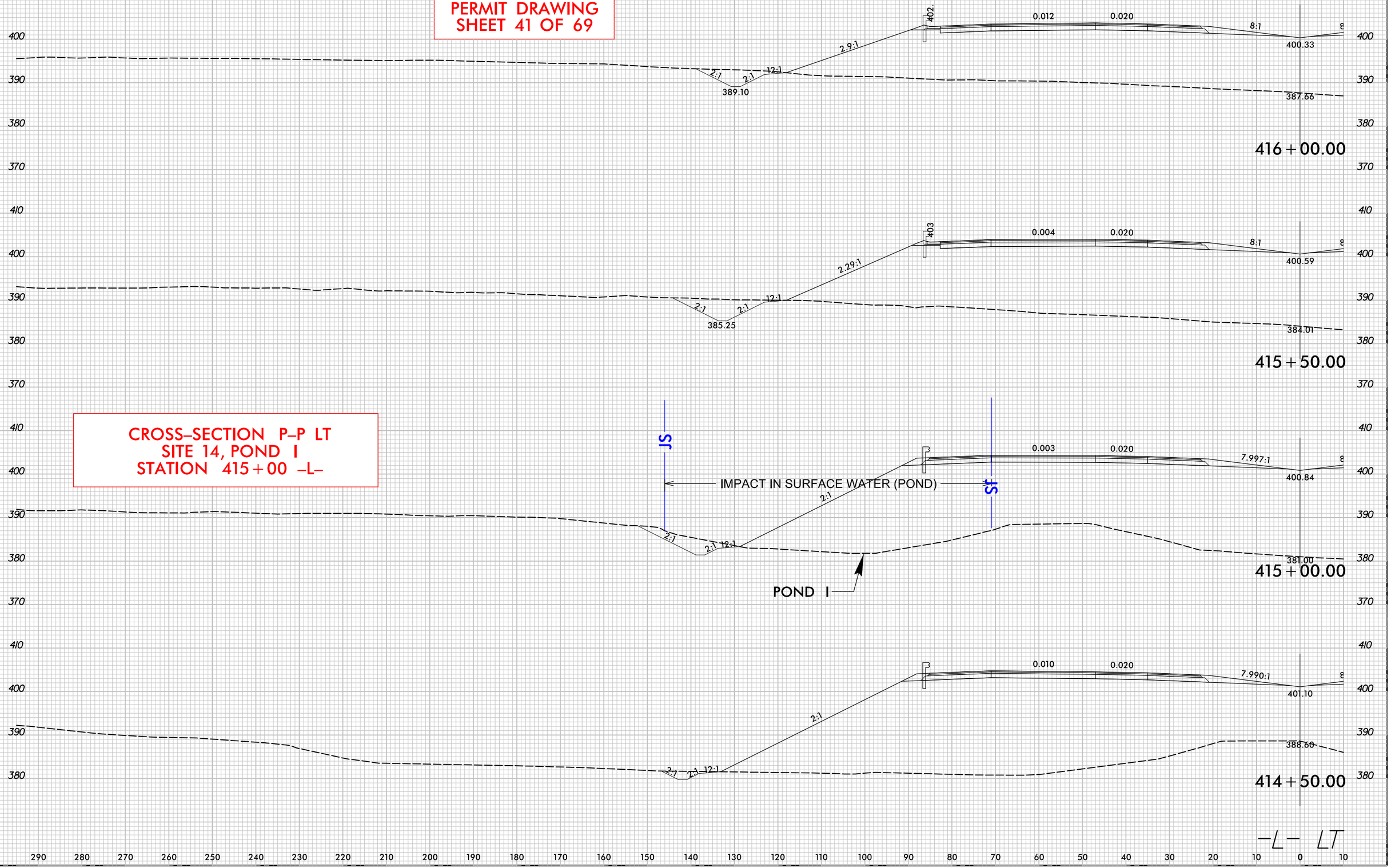
CROSS-SECTION O-O RT
SITE 13, WETLAND BK
STATION 409+00 -L-

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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-242

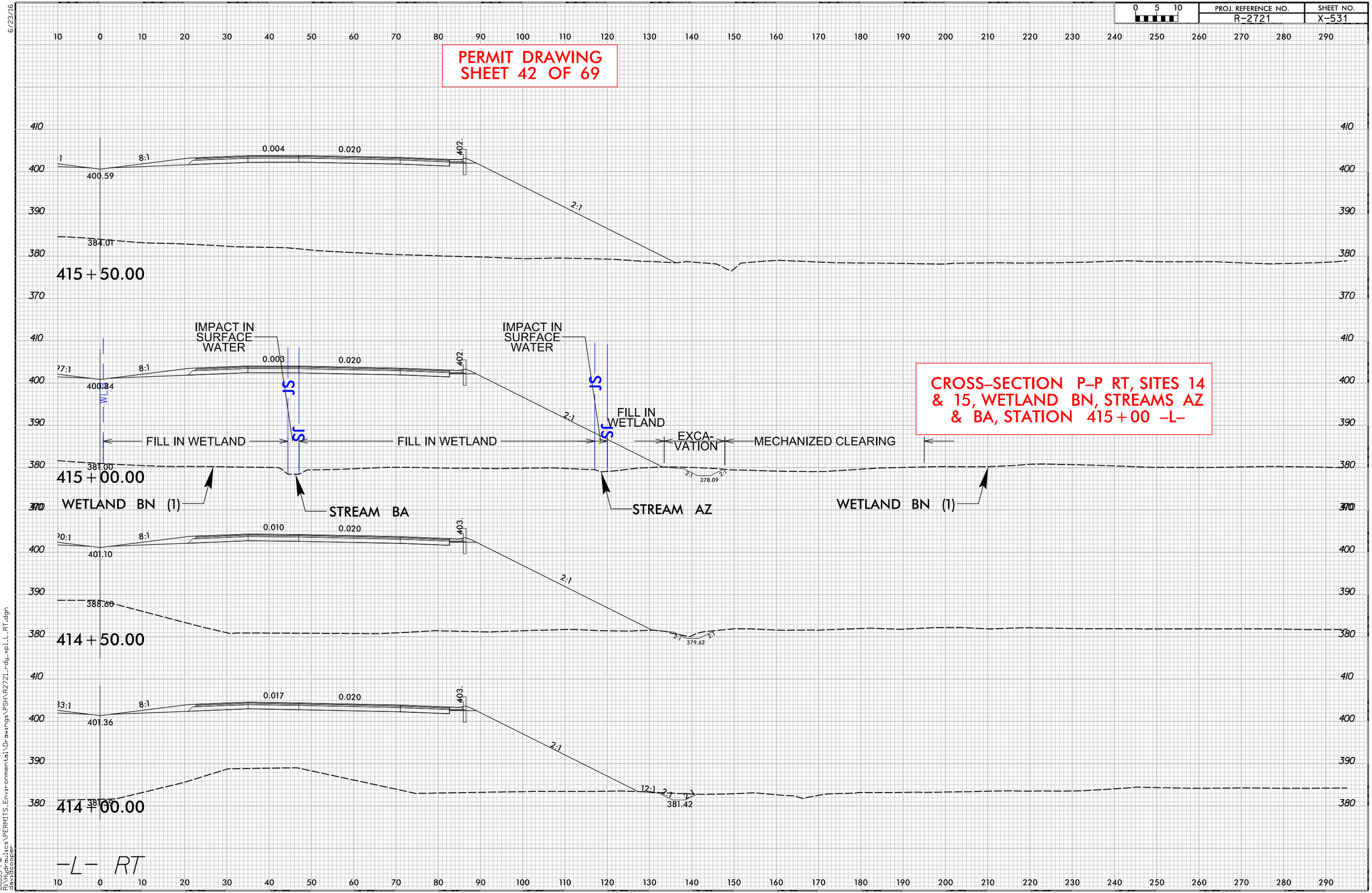
PERMIT DRAWING
SHEET 41 OF 69



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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-531

PERMIT DRAWING
SHEET 42 OF 69



CROSS-SECTION P-P RT, SITES 14 & 15, WETLAND BN, STREAMS AZ & BA, STATION 415+00 -L-

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davidcooper

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	34
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

100' 0' 100'

PERMIT DRAWING SHEET 43 OF 69

- DENOTES FILL IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES MECHANIZED CLEARING
- DENOTES EXCAVATION IN WETLAND

178 179 180 181 183 184 185 186 187

SITE 16

WETLAND BN (2)

STREAM BB

-Y12A- PC Sta. 24+74.16

MATCHLINE SHEET 35 -Y12A- STA 26+00.00

-L- PC Sta. 423+88.20

MATCHLINE SHEET 33 -L- STA 420+00.00

MATCHLINE SHEET 35 -L- STA 433+00.00

15+00 20+00 25+00 425+00 430+00

15" W/ELBOWS

GREU TL-3

CAT-1

15" RCP-III

15" RCP-IV

FS

TYPE B-77

SINGLE FACE BARRIER

SBB

BZ 1

BZ 2

S

TS

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dandcooper
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LOCHNER

H. W. LOCHNER, INC.
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NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
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Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	34

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

100' 0' 100'

PERMIT DRAWING SHEET 43A OF 69

- DENOTES FILL IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES MECHANIZED CLEARING
- DENOTES EXCAVATION IN WETLAND

178 179 180 181 183 184 185 186 187

WETLAND BN (2)

SITE 16

STREAM BB

-Y12A- PC Sta. 24+74.16

-L- PC Sta. 423+88.20

MATCHLINE SHEET 35 -Y12A- STA 26+00.00

MATCHLINE SHEET 33 -L- STA 420+00.00

MATCHLINE SHEET 35 -L- STA 433+00.00

15+00 20+00 25+00 425+00 430+00

15" W/ELBOWS

15" RCP-III

15" RCP-IV

GREU TL-3

CAT-1

FS

TYPE B-77

SINGLE FACE BARRIER

SBB

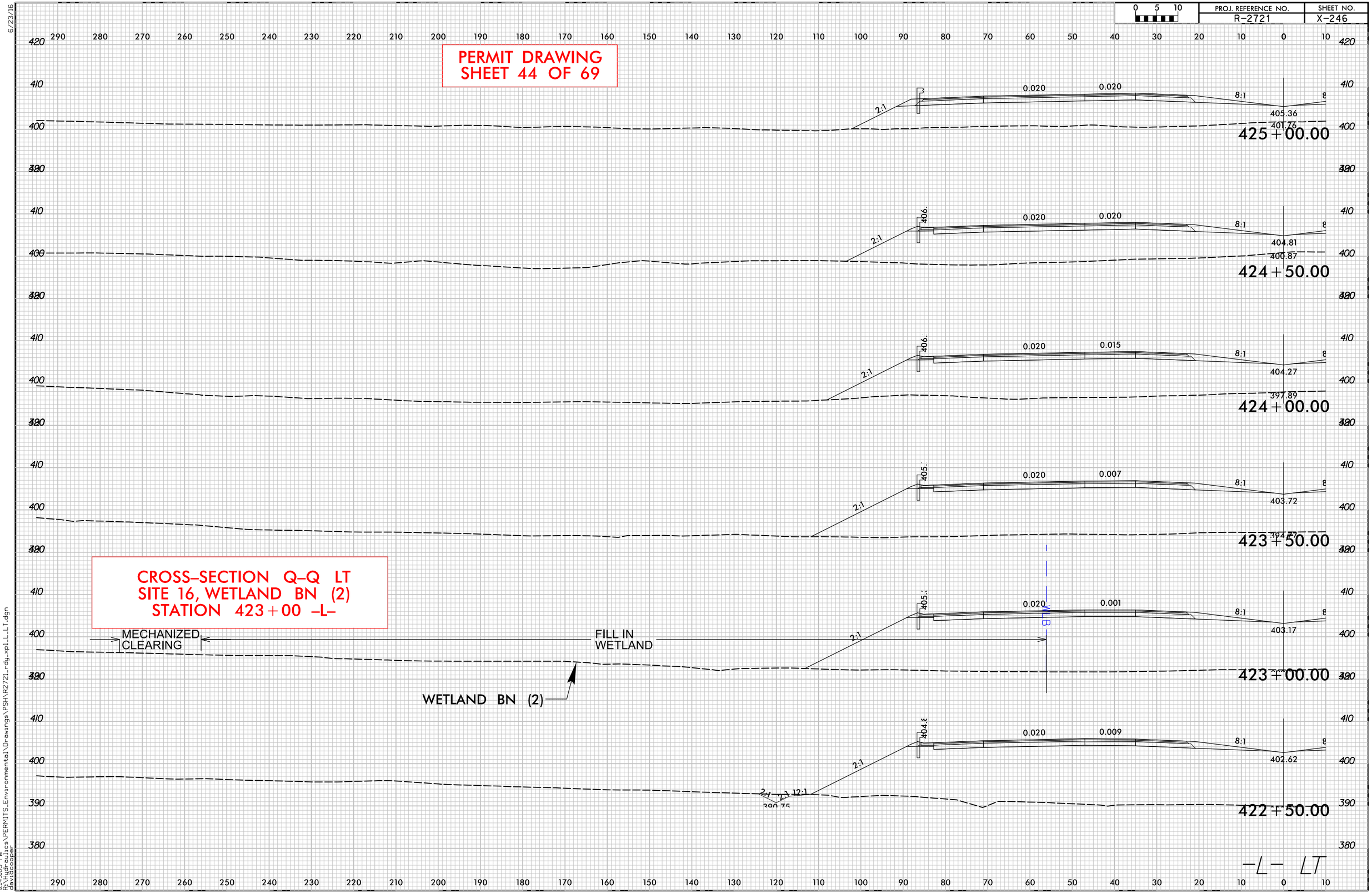
BZ 1 BZ 2

S TS

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-246

PERMIT DRAWING
SHEET 44 OF 69



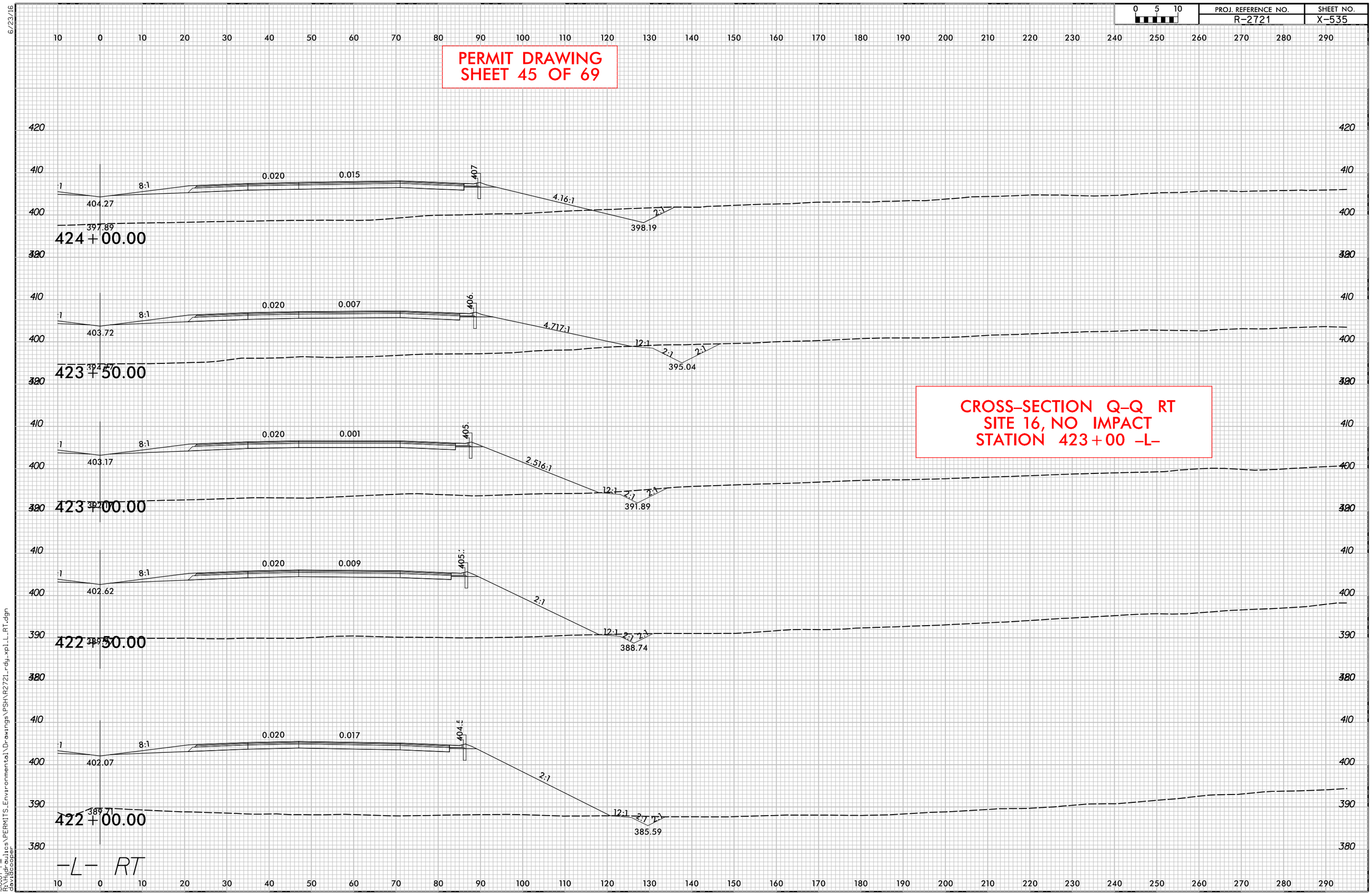
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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-535

PERMIT DRAWING
SHEET 45 OF 69

CROSS-SECTION Q-Q RT
SITE 16, NO IMPACT
STATION 423+00 -L-



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NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 46 OF 69

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100'

-Y12A- PT
Sta. 26+21.01

-Y12- POT Sta. 19+61.01
END CONSTRUCTION
-Y12A- STA. 26+62.98

-Y12- POT Sta. 18+87.33
-Y12A- POT Sta. 26+75.76
Δ = 90°26'12.13"

-L- POC Sta.435+01.42
-Y12- POT Sta. 15+58.87
Δ = 59°57'08.41"

-Y12- PT Sta. 15+31.58

-Y12- POC Sta. 12+90.09

STREAM BF

WETLAND BP

SITE 17

-Y12- POC Sta. 12+63.56=
-Y12B- POT Sta. 20+31.83
END CONSTRUCTION
-Y12B- STA. 20+20.59

-Y12- PC
Sta. 10+37.25

TDE-Y12- POT Sta. 10+00.00

MATCHLINE SHEET 34
-L- STA 433+00.00

MATCHLINE SHEET 36
-L- STA 446+00.00

MATCHLINE SHEET 61
-Y12B- STA 18+00.00

410 181 183 184 188 189 190 191

15" RCP-III
15" WELBOWS
30" RCP-V
36" RCP-V
GREU TL-3
TYPE B-77
SINGLE FACE BARRIER
435+00
440+00
445+00
15+00
20+00

WLB SBF WBP WLB

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dodgcooper

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RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 46A OF 69

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100'

-Y12A- PT
Sta. 26+21.01

-Y12- POT Sta. 19+61.01
END CONSTRUCTION
-Y12A- STA. 26+62.98

-Y12- POT Sta. 18+87.33
-Y12A- POT Sta. 26+75.76
Δ = 90°26'12.13"

-Y12A- STA 26+00.00

-L- POC Sta. 435+01.42
-Y12- POT Sta. 15+58.87
Δ = 59°57'08.41"

-Y12- PT Sta. 15+31.58

MATCHLINE SHEET 34
-L- STA 433+00.00

MATCHLINE SHEET 36
-L- STA 446+00.00

MATCHLINE SHEET 61
-Y12B- STA 18+00.00

STREAM BF
WETLAND BP
SBF
WBP
WLB

-Y12- POC Sta. 12+90.09

SITE 17

-Y12- POC Sta. 12+63.56=
-Y12B- POT Sta. 20+31.83
END CONSTRUCTION
-Y12B- STA. 20+20.59

-Y12- PC
Sta. 10+37.25

-Y12- POT Sta. 10+00.00

15" RCP-III
30" RCP-V
15" WELBOWS
TYPE B-77
GREU TL-3
SINGLE FACE BARRIER
RW
CA
TS
S

435+00
440+00
445+00
450+00
455+00
460+00
20+00

+79.07 -Y12- 40.00' LT
+92.40 -Y12- 40.00' LT
+33.50 -Y12- 50.00' LT
+37.78 -Y12- 50.00' LT
+12.53 -Y12- 30.00' RT
+13.22 -L- 175.00' RT

181 183 184 188 189 190 191

410

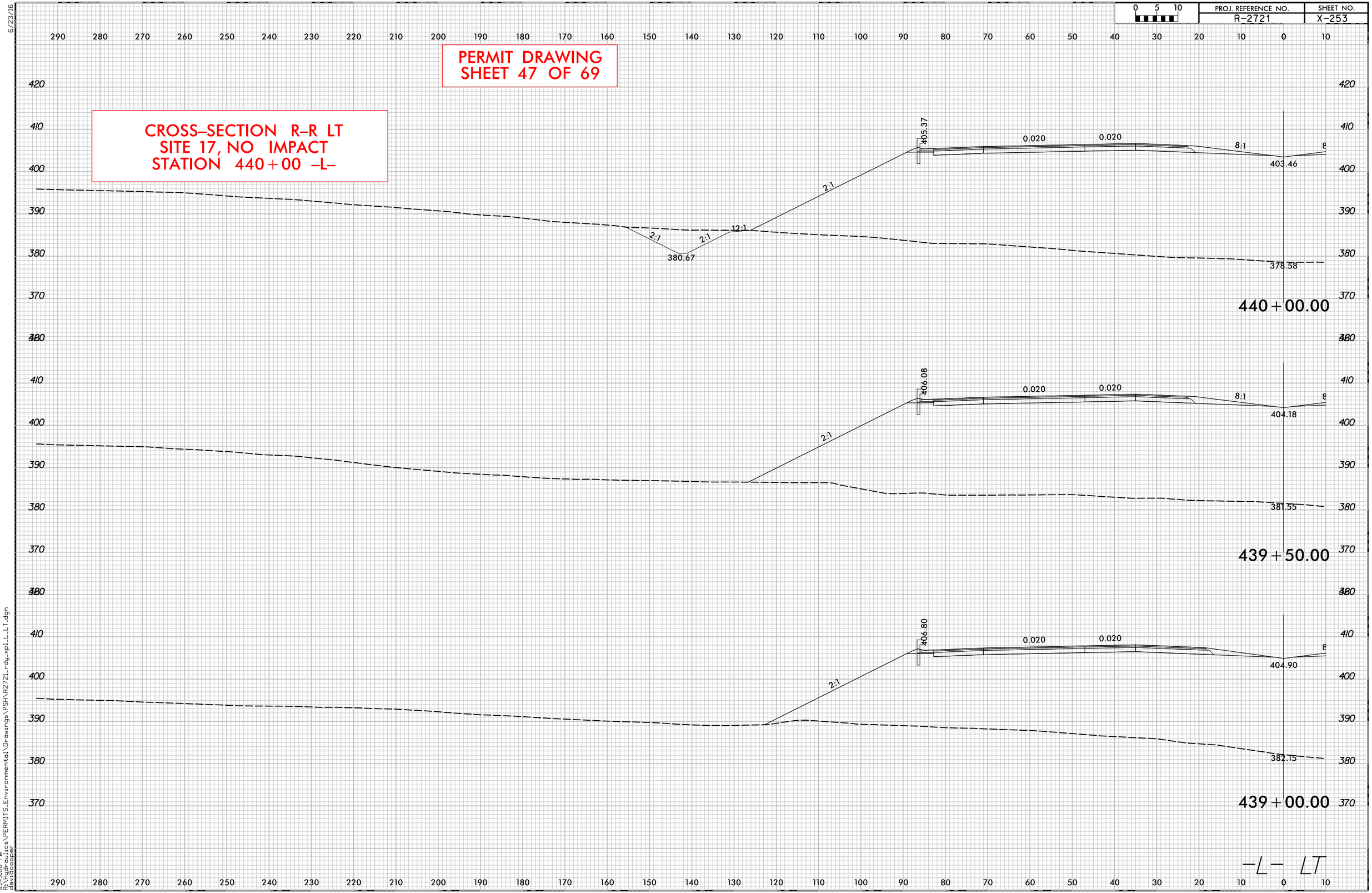
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dbrooks

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-253

PERMIT DRAWING
SHEET 47 OF 69

CROSS-SECTION R-R LT
SITE 17, NO IMPACT
STATION 440+00 -L-



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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-542

PERMIT DRAWING
SHEET 48 OF 69

CROSS-SECTION R-R RT
SITE 17, WETLAND BP, STREAM BF
STATION 440+00 -L-

440+00.00

439+50.00

439+00.00

-L- RT

IMPACT IN SURFACE WATER

FILL IN WETLAND

MECHANIZED CLEARING

WETLAND BP

STREAM BF

WETLAND BP

WLB

JS

JF

WLB

403.46

378.58

404.18

381.55

404.90

382.15

8:1

2:1

0.020

0.020

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davidcooper

PERMIT DRAWING
SHEET 49 OF 69

200' 0' 200'
GRAPHIC SCALE

S S DENOTES IMPACTS IN SURFACE WATER
F F DENOTES FILL IN WETLAND
E E DENOTES EXCAVATION IN WETLAND
P P DENOTES IMPACTS IN SURFACE WATER (POND)
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number 769959
ECOLOGICAL ENGINEERING

PROJECT REFERENCE NO.	SHEET NO.
R-2721	37

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
NO RIGHT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 37A

SITE 18
POND K
WETLAND BR
WETLAND BQ
WETLAND BS
WETLAND BV
STREAM BH
STREAM BF
SITE 17 CONT'D.
SITE 19
SITE 20
SITE 21
WETLAND BZ
STREAM BJ
STREAM BI
WETLAND BY

MATCHLINE SHEET 36
-L- STA 459+00.00

MATCHLINE SHEET 64
-Y13- STA 62+00.00

MATCHLINE SHEET 38
-L- STA 487+00.00

MATCHLINE SHEET 65
-Y13A- STA 24+00.00

MATCHLINE SHEET 37
-Y13- STA 48+00.00

BEGIN CONSTRUCTION
-Y13C- STA. 10+25.00

END CONSTRUCTION
-Y13A- STA. 35+37.50

BEGIN CONSTRUCTION
-Y14A- STA. 10+50.00

-Y13RPA- PT Sta. 27+38.59
-Y13RPA- SRS Sta. 22
-Y13RPA- CS Sta. 25+07.83
-Y13RPA- SC Sta. 19+00.00
-Y13RPA- CS Sta. 21+08.80
-Y13RPA- SC Sta. 12+00.00
-Y13RPB- SC Sta. 24+38.15
-Y13RPB- CS Sta. 28+11.83
-Y13RPB- SRS Sta. 30+18.83
-Y13RPB- SC Sta. 32+18.83
-Y13RPB- PT Sta. 34+96.07
-Y13RPB- POT Sta.50+46.66
-Y13RPA- POT Sta.30+15.70
-Y13RPB- POT Sta.33+78.67
-Y13RPA- POT Sta.47+09.82
-Y13RPA- SF Sta. 23+08.80
5.00 RT
-Y13RPA- SC Sta. 12+00.00
-L- POC Sta. 471+08.46
-Y13- POT Sta. 55+33.98
Δ = 92°34'00.49"
-L- POC Sta. 471+57.59
-Y13RPC- SF Sta. 10+00.00
71.00' RT
-Y13RPC- SRS Sta. 12+00.00
-Y13RPC- SC Sta. 15+00.00
-Y13RPC- CS Sta. 17+79.47
-Y13RPC- CS Sta. 20+02.27
-Y13RPC- SRS Sta. 23+07.07
-Y13RPC- SC Sta. 25+57.01
-Y13RPC- PT Sta. 28+17.63
-Y13RPC- CS Sta. 15+49.47
-Y13RPC- SC Sta. 11+79.47
-Y13RPC- SC Sta. 11+00.00
-Y13RPD- CS Sta. 39+37.46
-Y13RPD- ST Sta. 40+37.46
-Y13RPD- SC Sta. 32+10.50
-Y13RPD- SRS Sta. 32+10.50
-Y13RPD- SRS Sta. 27+10.50
-Y13RPD- POT Sta. 40+89.28
-Y13RPC- POT Sta. 37+12.36
-Y13RPD- POT Sta. 41+29.99
-Y14A- POT Sta. 10+00.00
-Y13A- POT Sta. 35+52.56
-Y13RPB- POT Sta. 30+53.90
-Y13RPB- SF Sta. 30+53.90
-Y13RPB- SF Sta. 32+18.83
-Y13RPB- SF Sta. 34+96.07
-Y13RPB- SF Sta. 33+78.67
-Y13RPB- SF Sta. 32+18.83
-Y13RPB- SF Sta. 28+11.83
-Y13RPB- SF Sta. 24+38.15
-Y13RPA- SF Sta. 23+08.80
-Y13RPA- SF Sta. 21+08.80
-Y13RPA- SF Sta. 19+00.00
-Y13RPA- SF Sta. 12+00.00
-Y13RPC- SF Sta. 17+79.47
-Y13RPC- SF Sta. 15+49.47
-Y13RPC- SF Sta. 11+79.47
-Y13RPC- SF Sta. 11+00.00
-Y13RPD- SF Sta. 39+37.46
-Y13RPD- SF Sta. 40+37.46
-Y13RPD- SF Sta. 32+10.50
-Y13RPD- SF Sta. 27+10.50
-Y13RPD- SF Sta. 32+18.36
-Y13RPD- SF Sta. 41+29.99
-Y14A- SF Sta. 10+00.00

WETLAND PROTECTION SEE DETAIL 18
CLASS B RIP RAP EMBEDDED INTO DIAMOND MED. STONE EST 100 SY GEOTEXTILE
CLASS I RIP RAP EST 180 TONS EST 270 SY GEOTEXTILE
CLASS I RIP RAP EST 300 TONS EST 450 SY GEOTEXTILE
CLASS B RIP RAP EMBEDDED INTO DIAMOND MED. STONE EST 100 SY GEOTEXTILE
CLASS I RIP RAP EST 300 TONS EST 450 SY GEOTEXTILE
CLASS B RIP RAP EMBEDDED INTO DIAMOND MED. STONE EST 90 SY GEOTEXTILE
CLASS I RIP RAP EST 300 TONS EST 450 SY GEOTEXTILE
CLASS B RIP RAP EMBEDDED INTO DIAMOND MED. STONE EST 90 SY GEOTEXTILE
CLASS I RIP RAP EST 300 TONS EST 450 SY GEOTEXTILE
CLASS B RIP RAP EMBEDDED INTO DIAMOND MED. STONE EST 100

PERMIT DRAWING
SHEET 49A OF 69

200' 0' 200'
GRAPHIC SCALE

DENOTES IMPACTS IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES EXCAVATION IN WETLAND
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number 769919
ECOLOGICAL ENGINEERING
NC FIRM LICENSE P.A. # C-1111
1311 S. Cary Parkway
Suite 102
Cary, NC 27511
(919) 557-6424

PROJECT REFERENCE NO.	SHEET NO.
R-2721	37

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
NO RIGHT OF WAY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 37A

SITE 18
POND K
WETLAND BR
WETLAND BQ
WETLAND BS
STREAM BH
STREAM BF
WETLAND BV
SITE 19
SITE 20
SITE 21
WETLAND BZ
STREAM BJ
WETLAND BY
STREAM BI
SITE 17 CONT'D.

END CONSTRUCTION
-Y13A- STA. 35+37.50

BEGIN CONSTRUCTION
-Y13C- STA. 10+25.00

BEGIN CONSTRUCTION
-Y14A- STA. 10+50.00

MATCHLINE SHEET 36
-L- STA 459+00.00

MATCHLINE SHEET 38
-L- STA 487+00.00

MATCHLINE SHEET 64
-Y13- STA 62+00.00

MATCHLINE SHEET 65
-Y13A- STA 24+00.00

MATCHLINE SHEET 37
-Y13- STA 48+00.00

MATCHLINE SHEET 63
-Y13- STA 48+00.00

MATCHLINE SHEET 38
-Y14A- STA 19+00.00

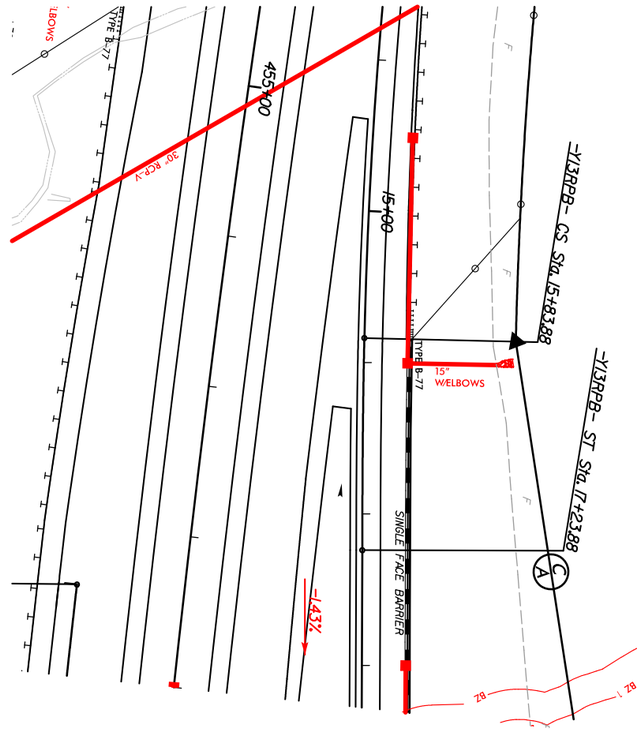
MATCHLINE SHEET 38
-Y14A- STA 32+00.00

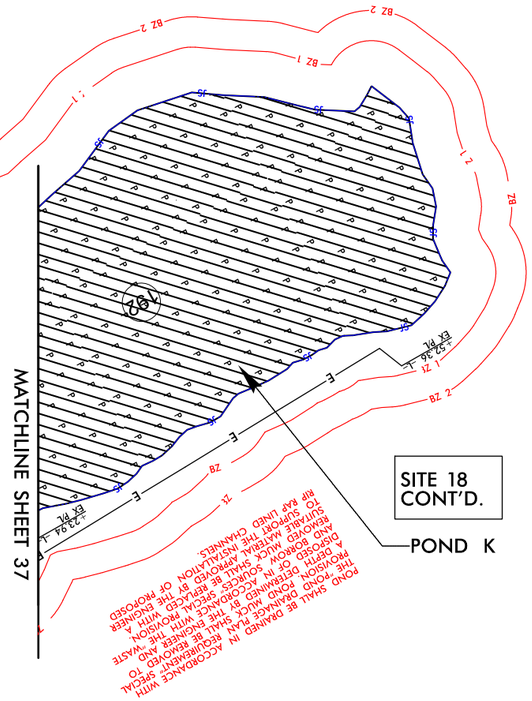
MATCHLINE SHEET 38
-Y14A- STA 13+00.00

SEE SHEET 7 FOR DETAILS

NOTE: DRIVE MUST BE PAVED OTHERWISE, WATER BARS REQUIRED

51499





LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

100' 0' 100'
GRAPHIC SCALE

PROJECT REFERENCE NO.	SHEET NO.
R-2721	37A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
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PERMIT DRAWING
SHEET 50 OF 69

DENOTES IMPACTS IN SURFACE WATER (POND)

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dawidcooper

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	37A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 50A OF 69

DENOTES IMPACTS IN SURFACE WATER (POND)

100' 0' 100'
GRAPHIC SCALE

455+00

15+00

-L- STA. 15+83.88

-L- STA. 17+23.88

30° ECP-V

TYPE B-77

18 DWS

15° W/ELBOWS

SINGLE FACE BARRIER

-L- 43%

MATCHLINE SHEET 37

SITE 18 CONT'D.

POND K

RIP RAP LINED CHANNEL

SUITABLE IMPORT MATERIAL SHALL BE PLACED IN ACCORDANCE WITH SPECIAL PROVISION "POND REMOVAL" AND THE EROSION CONTROL PLAN. ALL SOURCES OF IMPORT MATERIAL SHALL BE APPROVED BY THE ENGINEER PRIOR TO DELIVERY TO THE SITE. ALL MUCK REMOVED FROM THE POND SHALL BE DRAINED AND DISPOSED OF IN AN APPROVED MANNER. WASTE MATERIAL SHALL BE PLACED WITH A MINIMUM OF 2 FEET OF COVER AND SHAPED TO DRAIN. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED IMMEDIATELY.

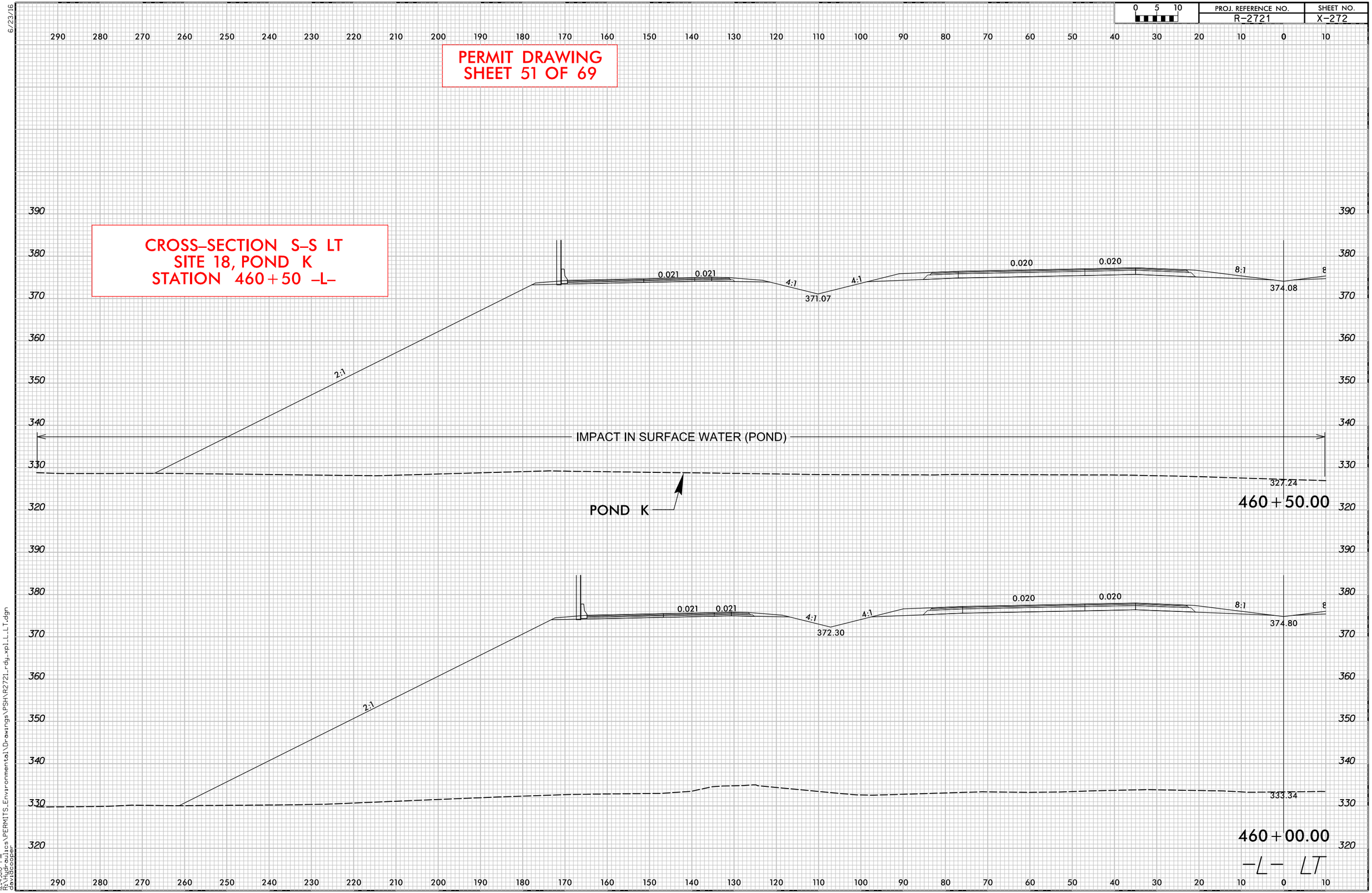
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dougcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-272

PERMIT DRAWING
SHEET 51 OF 69

CROSS-SECTION S-S LT
SITE 18, POND K
STATION 460+50 -L-

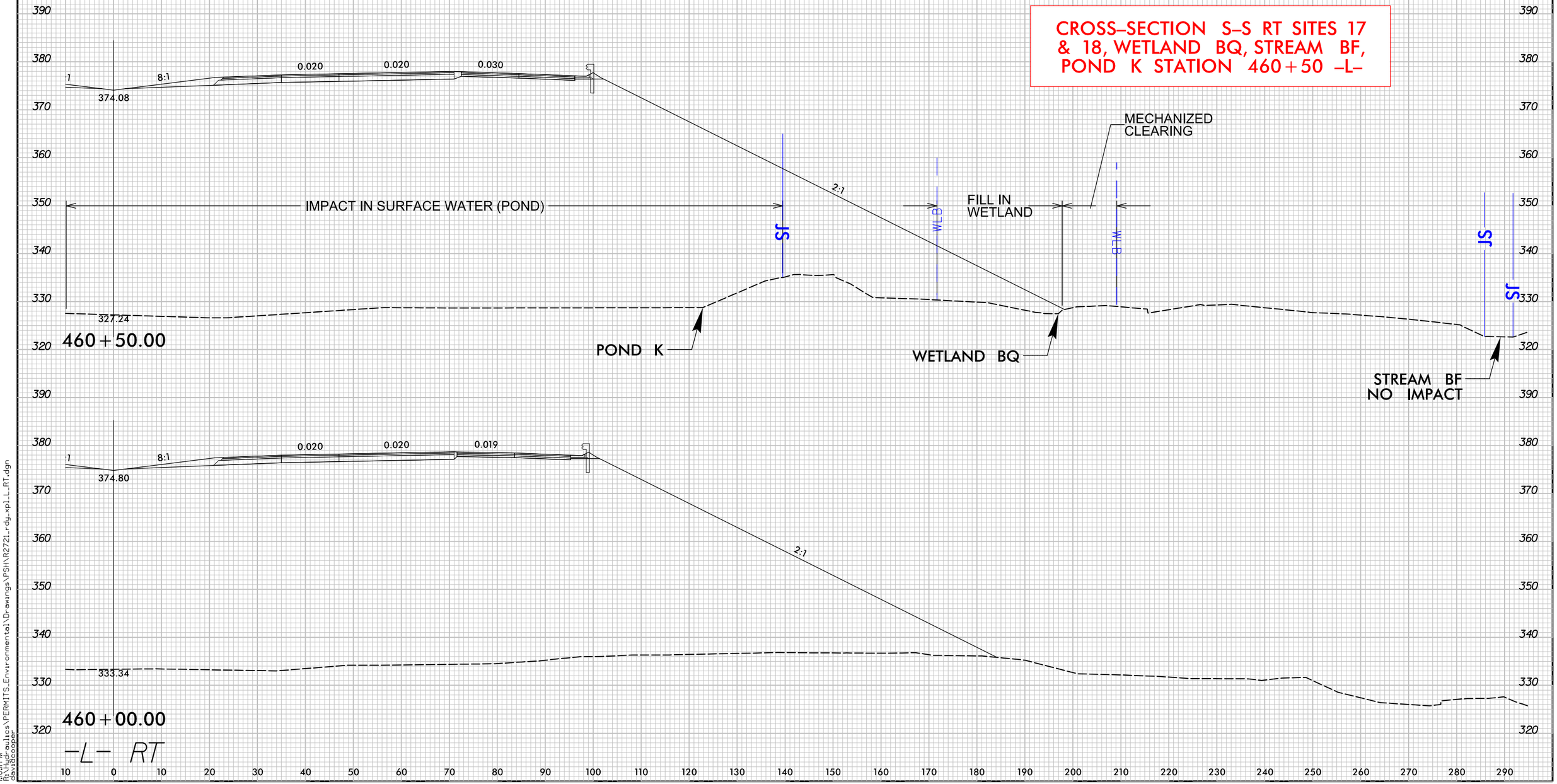


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davidcooper

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-561

PERMIT DRAWING
SHEET 52 OF 69

CROSS-SECTION S-S RT SITES 17 & 18, WETLAND BQ, STREAM BF, POND K STATION 460+50 -L-

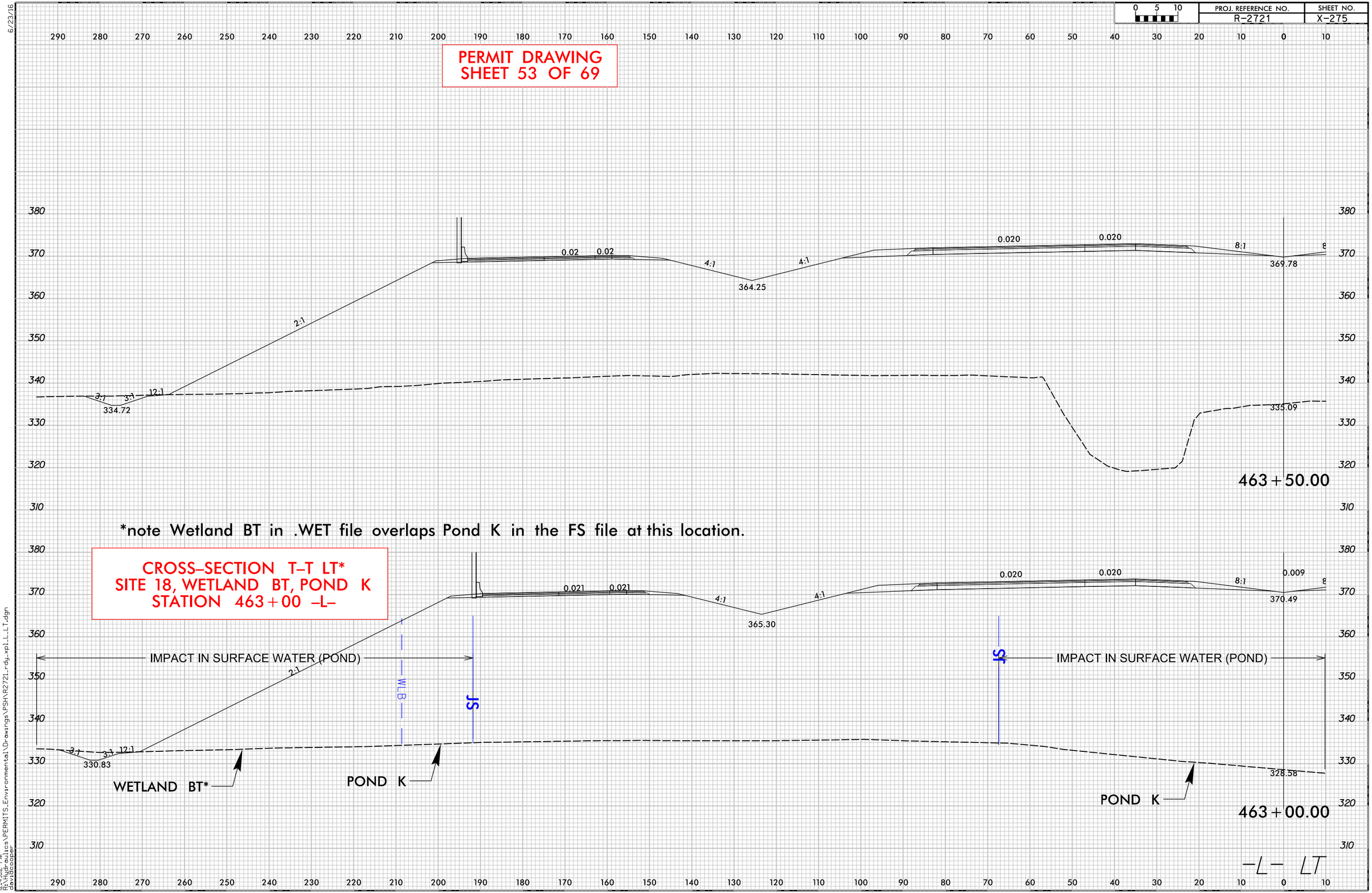


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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-275

PERMIT DRAWING
SHEET 53 OF 69

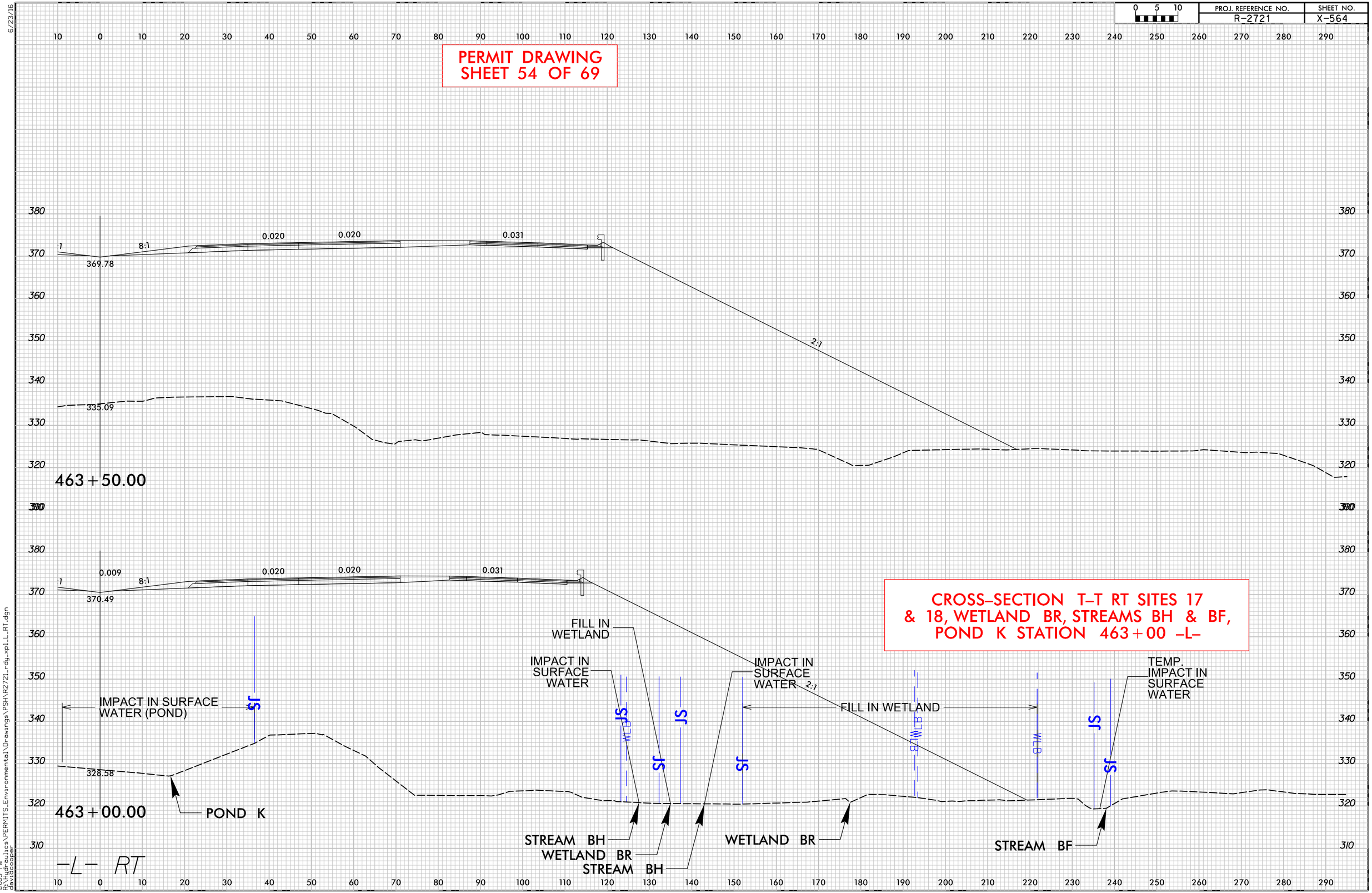


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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-564

PERMIT DRAWING
SHEET 54 OF 69



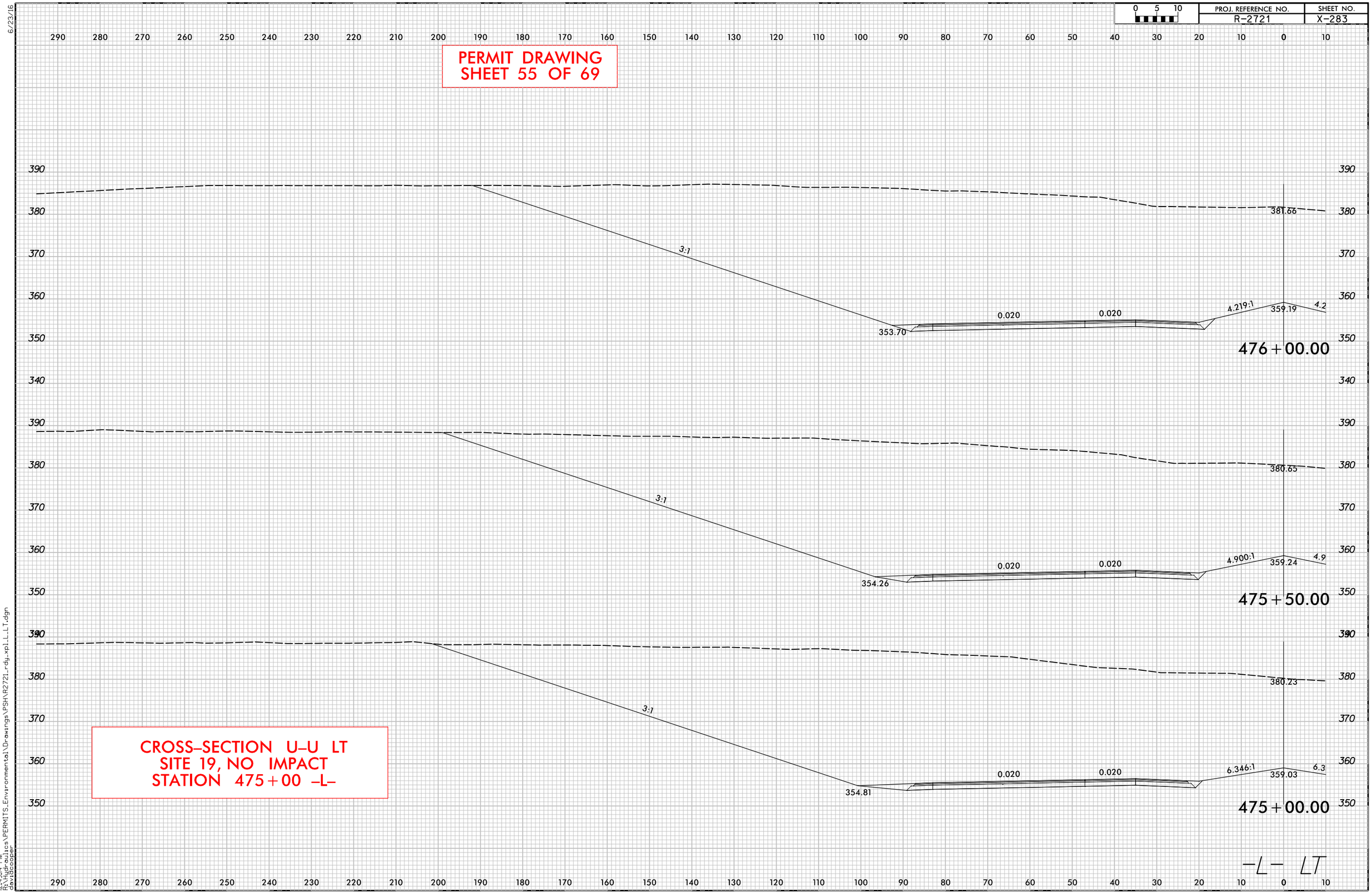
CROSS-SECTION T-T RT SITES 17 & 18, WETLAND BR, STREAMS BH & BF, POND K STATION 463+00 -L-

10:03 PM
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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-283

PERMIT DRAWING
SHEET 55 OF 69



CROSS-SECTION U-U LT
SITE 19, NO IMPACT
STATION 475+00 -L-

12:49:4 PM
R:\Hydraulics\PERMITS_Environmental\Drawings\PSH\R2721_rdy_xpl_L_LT.dgn
davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-571

PERMIT DRAWING
SHEET 56 OF 69

WLP

EXCAVATION

WETLAND BV

CROSS-SECTION U-U RT
SITE 19, WETLAND BV
STATION 475+00 -L-

475+00.00

380.23 | 3:1 | 371.95 | 3:1 | 3:1 | 359.03 | 6.346:1 | 0.020 | 0.020 | 0.019

474+50.00

380.65 | 3:1 | 371.8 | 3:1 | 3:1 | 358.88 | 8.767:1 | 0.020 | 0.020 | 0.022 | 356.47

474+00.00

381.46 | 3:1 | 371.65 | 3:1 | 358.79 | 13.502:1 | 0.020 | 0.020 | 0.017

473+50.00

382.65 | 3:1 | 371.50 | 3:1 | 3.83:1 | 358.49 | 47.402:1 | 0.020 | 0.020 | 6:1 | 6.555:1 | 0.023 | 0.026 | 359.20

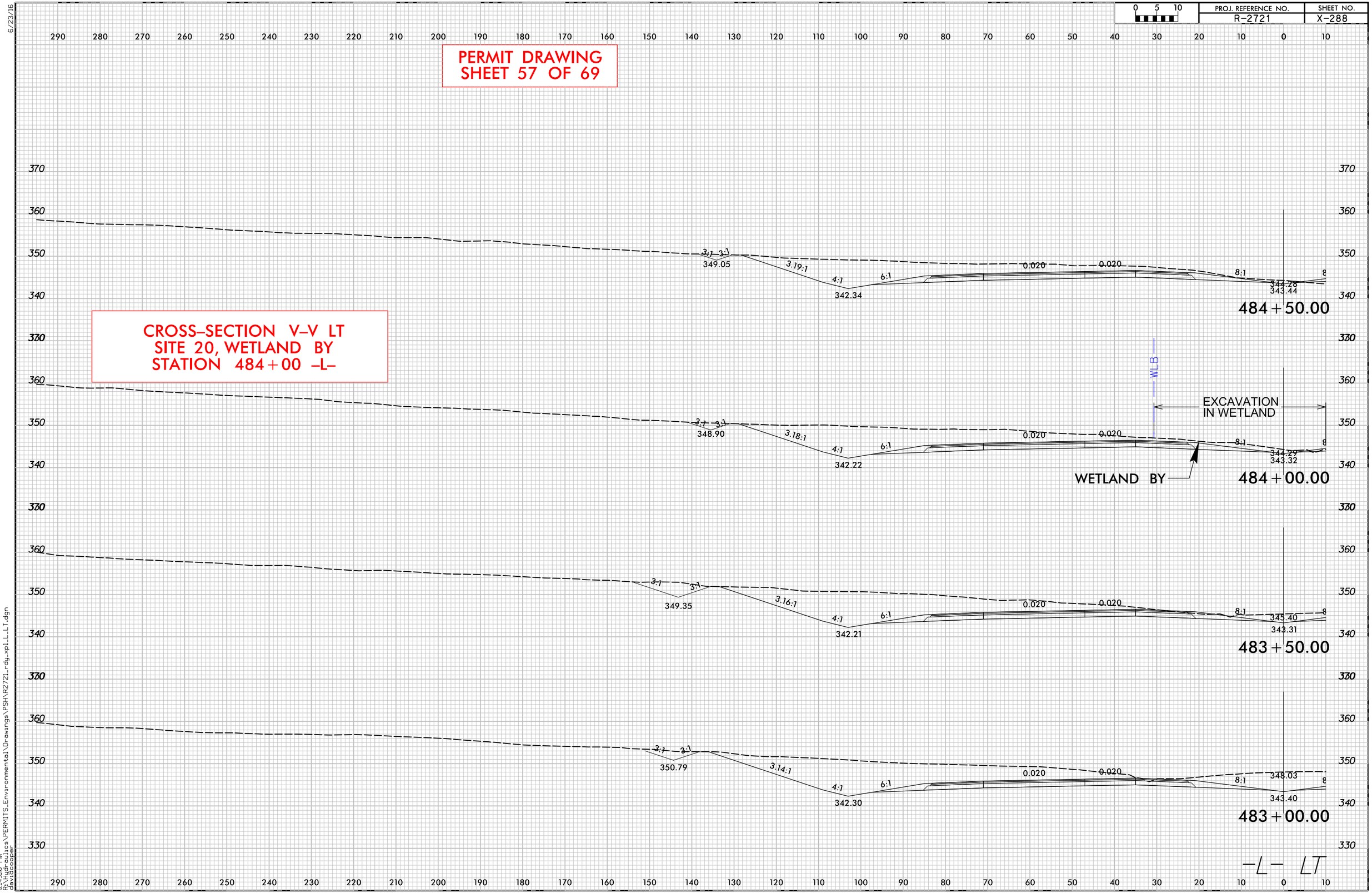
-L- RT

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davidcooper

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	R-2721	X-288

PERMIT DRAWING
SHEET 57 OF 69

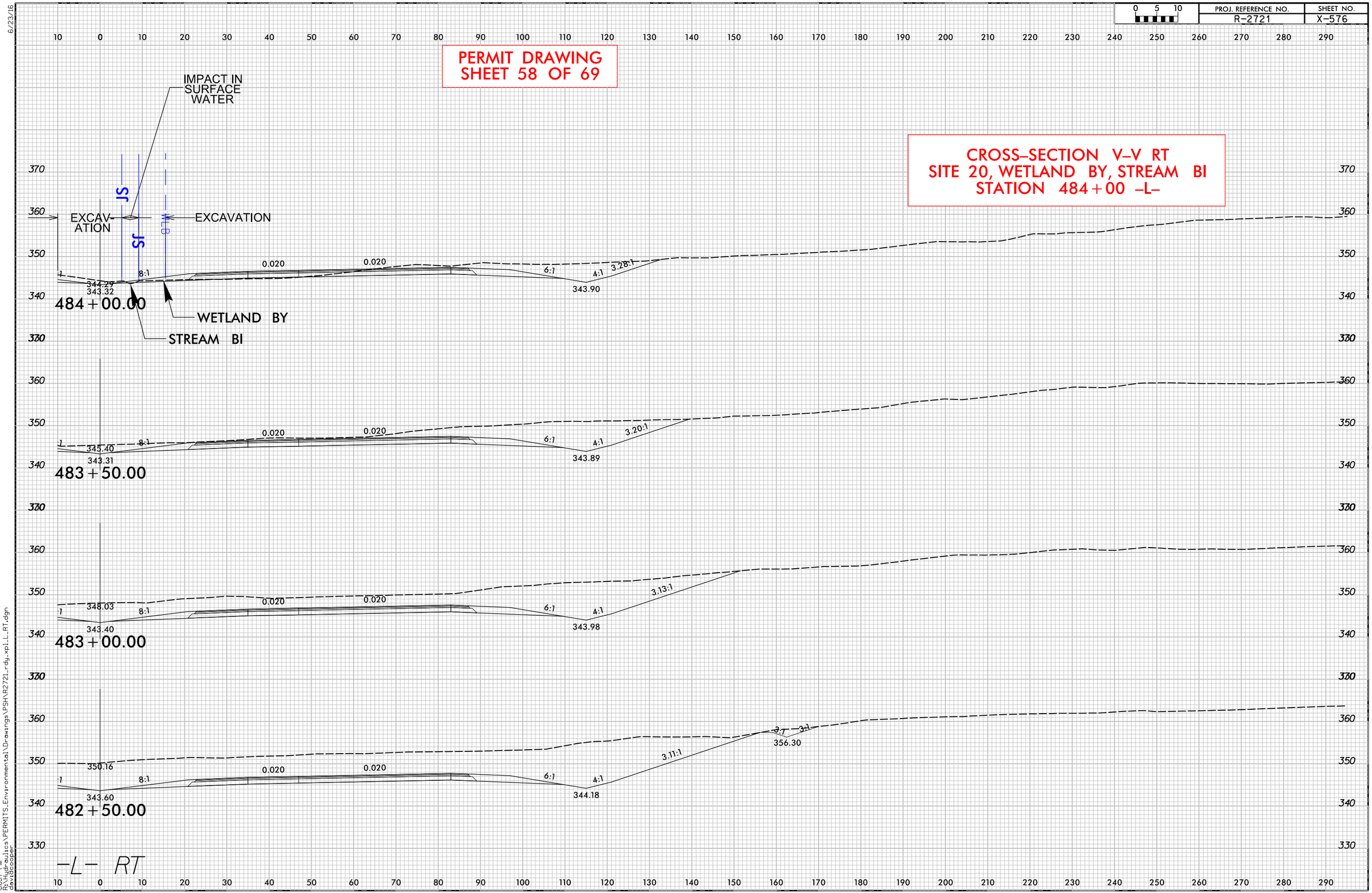
CROSS-SECTION V-V LT
SITE 20, WETLAND BY
STATION 484+00 -L-



0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-576

PERMIT DRAWING
SHEET 58 OF 69

CROSS-SECTION V-V RT
SITE 20, WETLAND BY, STREAM BI
STATION 484+00 -L-



10/17 PM
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PERMIT DRAWING
SHEET 59 OF 69

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	38
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

100' 0' 100'

DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES EXCAVATION IN WETLAND
DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 37
-L- STA 487+00.00

MATCHLINE SHEET 39
-L- STA 499+00.00

-Y13RPA- STA 19+00.00

-Y13RPD- STA 32+00.00

-Y14A- STA 13+00.00

CLASS II RIP RAP
EST 170 TONS
EST 240 SY
GEOTEXTILE

WETLAND BZ

SITE 21

WETLAND BY

SITE 20
CONT'D.

STREAM BI

STREAM BJ

SITE 21

SITE 22

STREAM BK

WETLAND CB

-Y13RPA- SC Sta. 12+40.00

-Y14- POT Sta. 16+80.46

CLASS II RIP RAP EST 92 TONS
EST 128 SY GEOTEXTILE

-L- POT Sta. 495+92.92=
-Y13RPA- ST Sta. 10+00.00
71.00 LT

-L- POC Sta. 497+59.48
-Y14- POT Sta. 14+05.38
Δ = 95°37'12.37"

-Y13RPD- TS
Sta. 31+01.50

-Y14- PI Sta. 11+25.51

-Y14- POT Sta. 10+10.67
-Y14A- POT Sta. 24+34.33
Δ = 79°44'23.27"

-Y14- POT Sta. 10+00.00

-Y14A- PC Sta. 15+28.47

-Y14A- PT Sta. 17+52.54

END CONSTRUCTION
-Y14A- STA. 24+25.19

2@6'x8' RCBC

2@7'x7' RCBC

15" W/ELBOWS

18" W/ELBOWS

15" RCP-IV

15" RCP-III

18" RCP-III

TOE PROTECTION
SEE DETAIL 1B

CLASS II RIP RAP
EST 95 TONS
EST 110 SY GEOTEXTILE

CLASS II RIP RAP
EST 38 TONS
EST 125 SY
GEOTEXTILE

CLASS II RIP RAP
EST 45 TONS
EST 80 SY GEOTEXTILE

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 42 TONS
EST 64 SY GEOTEXTILE

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 31 TONS
EST 65 SY GEOTEXTILE

GREU TL-3

TYPE B-77

SR 2122 MCALLISTER RD

205 206 207 209 210 211 212 213 214 203 204

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dcooper

PERMIT DRAWING
SHEET 59A OF 69

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	38
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

100' 0' 100'

F F DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
E E DENOTES EXCAVATION IN WETLAND
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 37
-L- STA 487+00.00

MATCHLINE SHEET 39
-L- STA 499+00.00

-Y13RPA- STA 19+00.00

-Y13RPD- STA 32+00.00

-Y14A- STA 13+00.00

-Y13RPA- SC Sta. 12+40.00

-Y14- POT Sta. 16+80.46

-L- POT Sta. 495+92.92=
-Y13RPA- ST Sta. 10+00.00
71.000 LT

-L- POC Sta. 497+59.48
-Y14- POT Sta. 14+05.38
Δ = 95°37'12.37"

-Y13RPD- TS
Sta. 31+01.50

-Y14- PI Sta. 11+25.51

-Y14- POT Sta. 10+10.67
-Y14A- POT Sta. 24+34.33
Δ = 79°44'23.27"

-Y14- POT Sta. 10+00.00

-Y14A- PC Sta. 15+28.47

-Y14A- PT Sta. 17+52.54

END CONSTRUCTION
-Y14A- STA. 24+25.19

WETLAND BZ
WETLAND BY
WETLAND CB

STREAM BI
STREAM BJ
STREAM BK

SITE 21
SITE 20 CONT'D.
SITE 22

SBI
SBJ
SBK

CLASS II RIP RAP
EST 170 TONS
EST 240 SY
GEOTEXTILE

CLASS II RIP RAP
EST 92 TONS
EST 128 SY GEOTEXTILE

CLASS II RIP RAP
EST 95 TONS
EST 110 SY GEOTEXTILE

CLASS II RIP RAP
EST 45 TONS
EST 80 SY GEOTEXTILE

CLASS II RIP RAP
EST 38 TONS
EST 125 SY
GEOTEXTILE

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 42 TONS
EST 64 SY GEOTEXTILE

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 31 TONS
EST 65 SY GEOTEXTILE

TOE PROTECTION
SEE DETAIL 1B

2@6'x8' RCBC
2@7'x7' RCBC

15" RCP-IV
15" RCP-III
18" RCP-III
15" W/ELBOWS
18" W/ELBOWS

GREU TL-3
TYPE B-77
PUE
PDE
TDE
TS
S
FS
RW

SR 2122 MCALLISTER RD

205 206 207 208 209 210 211 212 213 214 203 204

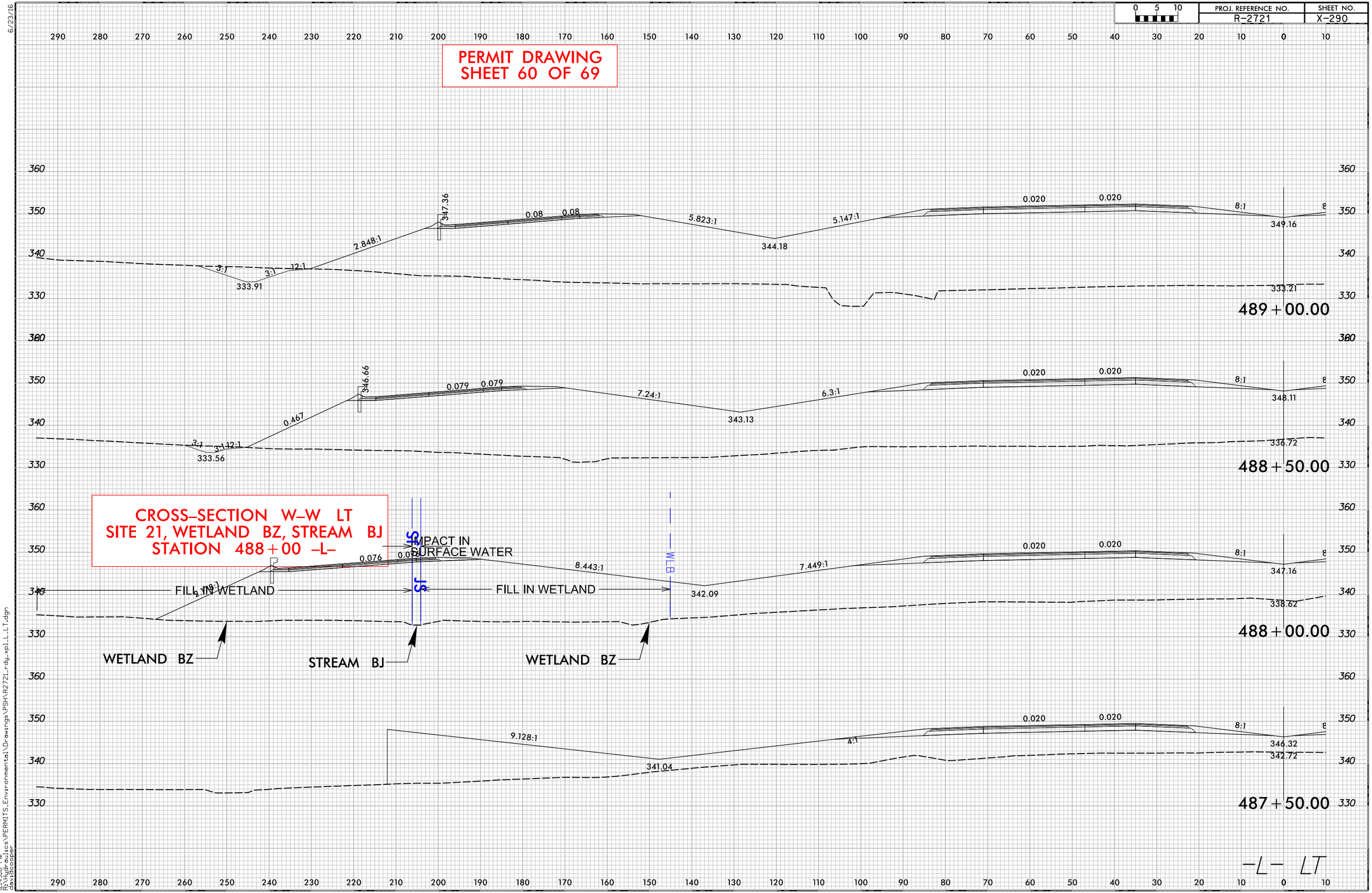
15+00 20+00 10+00 495+00 500+00

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dlovidcooper

6/23/16

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	R-2721	X-290

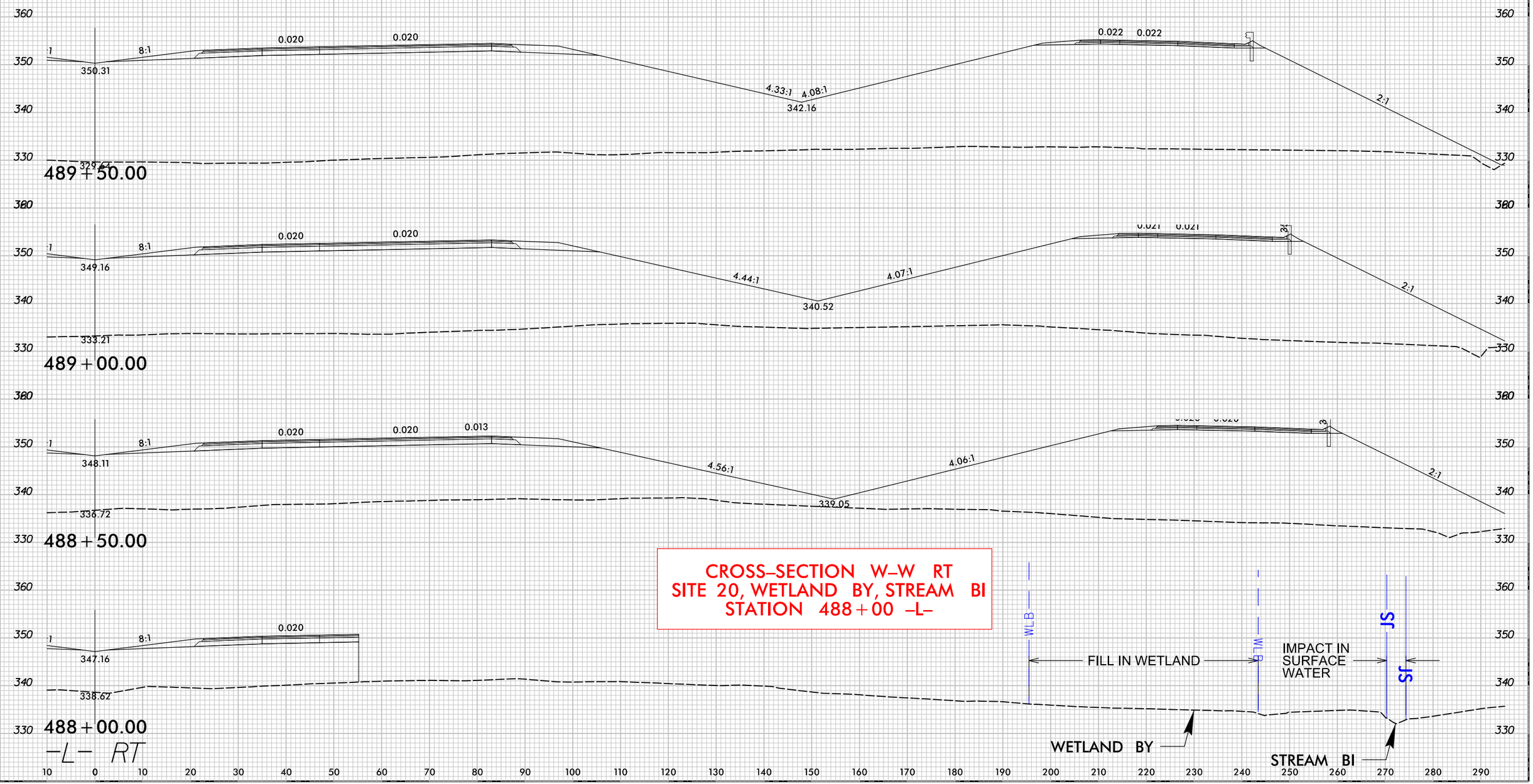
PERMIT DRAWING
SHEET 60 OF 69



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davidcooper

PROJ. REFERENCE NO.	SHEET NO.
R-2721	X-578

PERMIT DRAWING
SHEET 61 OF 69



CROSS-SECTION W-W RT
SITE 20, WETLAND BY, STREAM BI
STATION 488+00 -L-

6/23/16

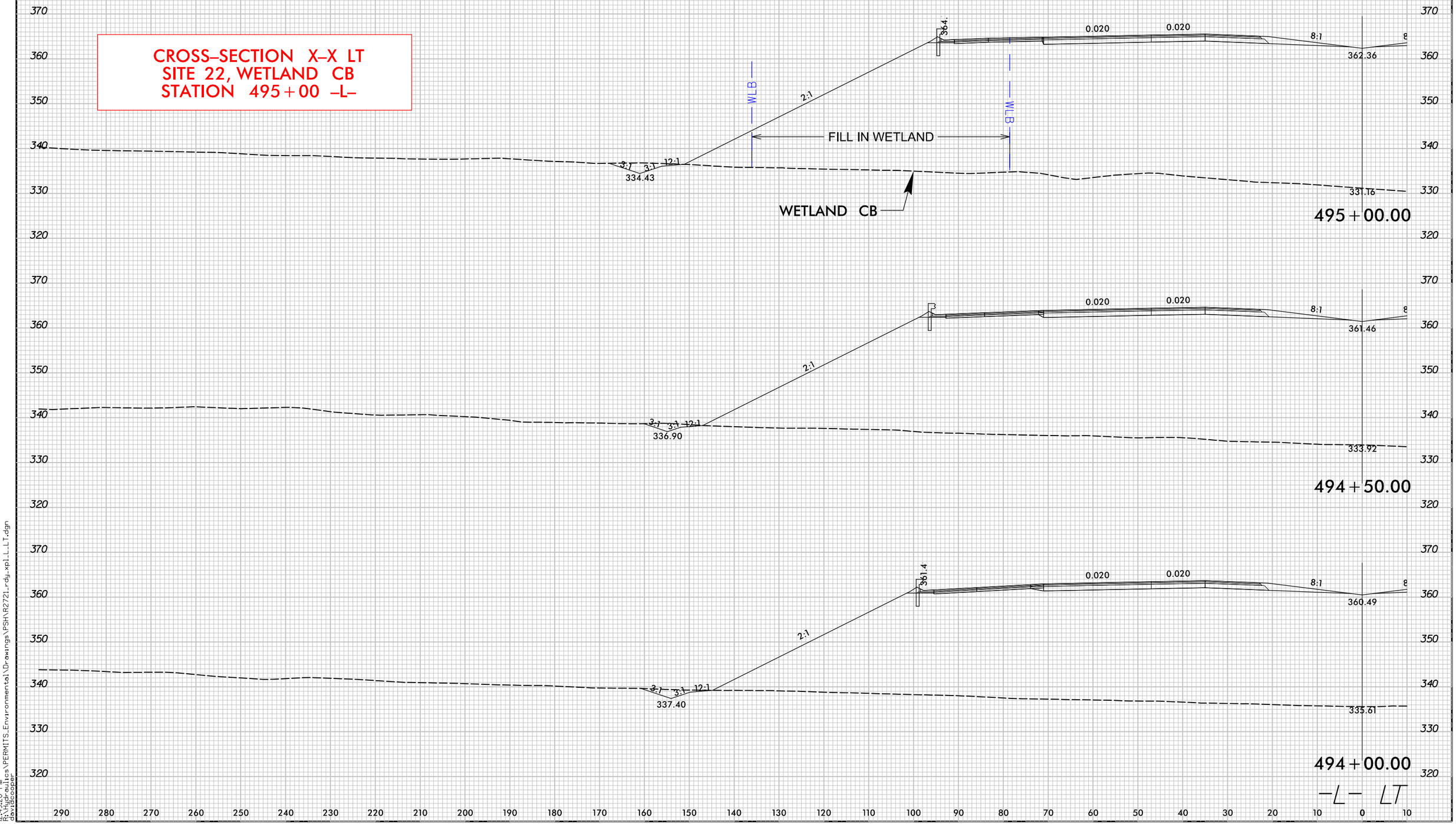
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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-294

PERMIT DRAWING
SHEET 62 OF 69

CROSS–SECTION X–X LT
SITE 22, WETLAND CB
STATION 495+00 –L–



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davidcooper

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-582

PERMIT DRAWING
SHEET 63 OF 69

CROSS-SECTION X-X RT
SITE 22, STREAM BK
STATION 495+00 -L-

495+50.00

363.20 | 359.44 | 334.02 | 328.92

495+00.00

362.36 | 358.10 | 331.16 | 327.08

IMPACTS IN SURFACE WATER

IMPACT IN SURFACE WATER

STREAM BK

STREAM BK

STREAM BK

494+50.00

361.46 | 359.12 | 333.92 | 328.92

-L- RT

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davidcooper

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	63
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 64 OF 69

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100'

BEGIN CONSTRUCTION
-Y13D- STA. 11+00.00

STREAM BO

-Y13A- PT Sta. 14+92.74

-Y13D- PC Sta. 11+94.19

-Y13D- PT Sta. 12+94.26

-Y13D- POT Sta. 10+00.00

MATCHLINE SHEET 65
-Y13A- STA 16+00.00

WETLAND BW

SITE 25

388 389 203 204

REMOVE +/-5' OF 15" RCP

-Y13A- POC Sta. 12+68.41=
-Y13D- POT Sta. 13+82.33
△ = 90°00'00.01"

-Y13A- PC Sta. 12+13.10

PDE

MATCHLINE SHEET 62
-Y13- STA 35+00.00

MATCHLINE SHEET 37
-Y13- STA 48+00.00

18" RCP-IV
15" RCP-IV
30" RCP-IV
24" RCP-IV
REMOVE
REMOVE SYSTEM
JB w/MH
DI
40+00
45+00
US 401 FAYETTEVILLE RD
EXISTING R/W
REMOVE +/- 41' OF 12" RCP

-Y13- POT Sta. 38+84.75
-Y13A- POT Sta. 10+00.00
△ = 105°01'26.97"

-Y13- POT Sta. 38+97.51
-Y13F- POT Sta. 10+00.00
△ = 90°00'00.01"

-Y13F- POT Sta. 12+19.50

END CONSTRUCTION
-Y13F- STA. 12+01.04

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dcordicooper

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2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	63
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 64A OF 69

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

100' 0' 100'

BEGIN CONSTRUCTION
-Y13D- STA. 11+00.00

STREAM BO

-Y13A- PT Sta. 14+92.74

-Y13D- PC Sta. 11+94.19

-Y13D- PT Sta. 12+94.26

-Y13D- POT Sta. 10+00.00

MATCHLINE SHEET 65
-Y13A- STA 16+00.00

WETLAND BW

SITE 25

388

389

203

204

REMOVE +/-5' OF 15" RCP

-Y13A- POC Sta. 12+68.41=
-Y13D- POT Sta. 13+82.33
Δ = 90°00'00.0"

-Y13A- PC Sta. 12+13.10

REMOVE

18" RCP-IV

15" RCP-IV

30" RCP-IV

24" RCP-IV

REMOVE SYSTEM

40+00

45+00

JB w/MH

-Y13- POT Sta. 38+84.75
-Y13A- POT Sta. 10+00.00
Δ = 105°01'26.97"

REMOVE +/- 41' OF 12" RCP

-Y13- POT Sta. 38+97.51
-Y13F- POT Sta. 10+00.00
Δ = 90°00'00.01"

-Y13F- POT Sta. 12+19.50

US 401 FAYETTEVILLE RD

END CONSTRUCTION
-Y13F- STA. 12+01.04

MATCHLINE SHEET 62
-Y13- STA 35+00.00

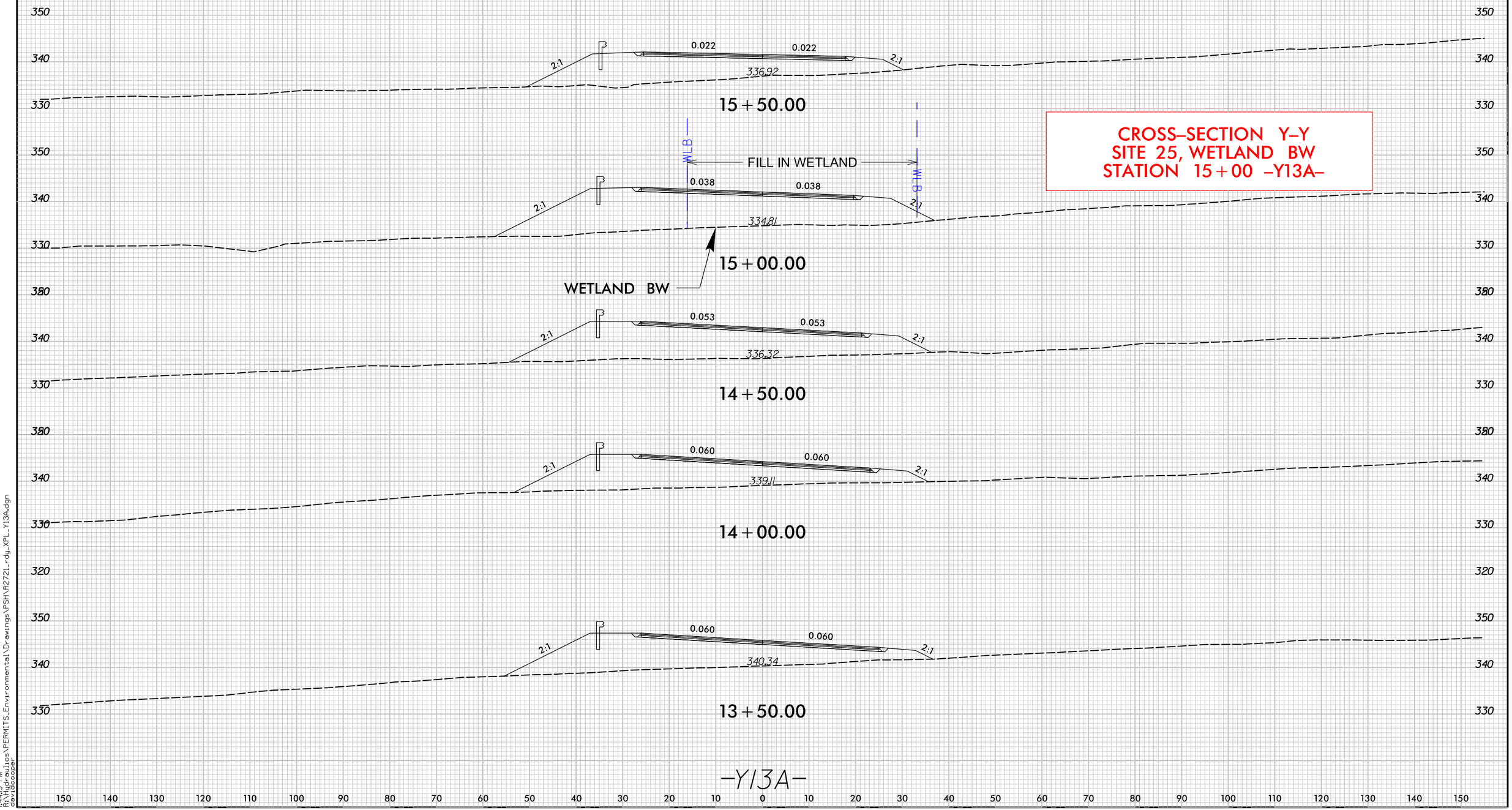
MATCHLINE SHEET 37
-Y13- STA 48+00.00

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	R-2721	X-804

PERMIT DRAWING
SHEET 65 OF 69

CROSS-SECTION Y-Y
SITE 25, WETLAND BW
STATION 15+00 -Y13A-



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davidcooper

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LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	64
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 37
-Y13- STA 62+00.00

BEGIN CONSTRUCTION
-Y13E- STA. 10+37.50

WET FILE START POINT

SITE 23

STREAM BN

PL

WBU

SBN

-Y13E- POT Sta. 10+00.00

-Y13E- PC Sta. 10+77.51

-Y13E- PT Sta. 12+05.68

-Y13- POT Sta. 69+34.40

-Y13E- POT Sta. 12+68.23
Δ = 83°17'47.79"

END CONSTRUCTION
-Y13- STA. 74+00.00

-Y13E- PC Sta. 13+67.64

-Y13E- PCC Sta. 14+86.83

-Y13E- PT Sta. 15+75.22

END CONSTRUCTION
-Y13E- STA. 15+50.00

-Y13B- POT Sta. 10+00.00

-Y13B- POT Sta. 11+61.11

STREAM SI

SITE 24

BEGIN CONSTRUCTION
-Y13B- STA. 10+00.00

END CONSTRUCTION
-Y13B- STA. 11+54.37

US 401 FAYETTEVILLE RD

WBX

PERMIT DRAWING
SHEET 66 OF 69

100' 0' 100'

4:01:45 PM
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dlindemoser

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	64
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE SHEET 37
-Y13- STA 62+00.00

BEGIN CONSTRUCTION
-Y13E- STA. 10+37.50

WET FILE START POINT

SITE 23

STREAM BN

PL

WBU

SBN

-Y13E- POT Sta. 10+00.00

-Y13E- PC Sta. 10+77.51

-Y13E- PT Sta. 12+05.68

-Y13- POT Sta. 69+34.40

-Y13E- POT Sta. 12+68.23
Δ = 83°17'47.79"

END CONSTRUCTION
-Y13- STA. 74+00.00

-Y13E- PC Sta. 13+67.64

-Y13E- PCC Sta. 14+86.83

-Y13E- PT Sta. 15+75.22

END CONSTRUCTION
-Y13E- STA. 15+50.00

-Y13B- POT Sta. 10+00.00

-Y13B- POT Sta. 11+61.11

STREAM SI

SITE 24

SBSI

BEGIN CONSTRUCTION
-Y13B- STA. 10+00.00

END CONSTRUCTION
-Y13B- STA. 11+54.37

WBX

US 401 FAYETTEVILLE RD

PERMIT DRAWING
SHEET 66A OF 69

100' 0' 100'

4:01:51 PM
\\Hydraulics\ PERMITS\ Environmental\ Drawings\ PSH\ R2721_PSH_64_66Awet.dgn
dcaldcooper

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	65
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 67 OF 69

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

100' 0' 100'

411 404 405 406 407 408 203

BEGIN CONSTRUCTION
-Y13C- STA. 10+00.00

-Y13C- POT Sta. 10+00.00

10+00

WETLAND WE

SITE 26

MATCHLINE SHEET 63
-Y13A- STA 16+00.00

MATCHLINE SHEET 37
-Y13A- STA 29+00.00

-Y13C- PC
Sta. 10+90.22

-Y13C- PT
Sta. 13+06.49

-Y13A- POC Sta. 27+43.92
-Y13C- POT Sta. 13+23.75
Δ = 89°37'46.96"

-Y13A- PC
Sta. 25+00.76

20+00

25+00

TS

FS

15" RCP

PDE

TDE

GREU TL-3

EXISTING R/W

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dodd.cooper

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	65
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 67A OF 69

S — DENOTES IMPACTS IN SURFACE WATER

TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES MECHANIZED CLEARING

100' 0' 100'

BEGIN CONSTRUCTION
-Y13C- STA. 10+00.00

-Y13C- POT Sta. 10+00.00

MATCHLINE SHEET 37
-Y13A- STA 29+00.00

MATCHLINE SHEET 63
-Y13A- STA 16+00.00

WETLAND WE

SITE 26

-Y13C- PC
Sta. 10+90.22

-Y13C- PT
Sta. 13+06.49

-Y13A- POC Sta. 27+43.92
-Y13C- POT Sta. 13+23.75
Δ = 89°37'46.96"

-Y13A- PC
Sta. 25+00.76

411 404 405 406 408 407 203

PDE TDE E RW FS 15' RCP TS

GREU TL-3

20+00 25+00

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dlong

WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND 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)	SURFACE WATER IMPACTS: Permanent SW impacts (Pond) (ac)	Permanent SW impacts (Stream) (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	244+00-L-/248+00-L-	3@8'x10' RCBC	1.39		0.01	0.14			0.08	< 0.01	304	45	
		FILL							0.02		119		
		STABILIZATION							0.01		77		
2	279+00-L-/280+22-L-	FILL	0.87			0.12		0.95	0.03	< 0.01	398	11	
3	281+00 -L-/283+00-L-	2@7'X7' RCBC							0.04	< 0.01	316	46	
		FILL							< 0.01		11		
		STABILIZATION							0.01		84		
4	313+00-L-/317+00-L-	FILL	0.19		< 0.01	0.07			0.01	< 0.01	128	10	
5	322+00-L-/325+00-L-	1@6'X8' RCBC	1.12			0.18			0.05	< 0.01	460	32	
		FILL							0.01		77		
6	330+00-L-/332+00-L-	1@6'X8' RCBC (1)	0.54		< 0.01	0.03			0.01	< 0.01	268	30	
		1@6'X8' RCBC (2)							0.02		273		
		FILL							0.03		412		
7	346+00-L-/349+00-L-, 21+00-Y8RPA-/25+00-Y8RPA-	BRIDGES	0.23	0.39		0.02							
8	365+00-L-/366+50-L-	FILL	0.25	< 0.01		0.03			< 0.01		105		
9	366+50-L-/13+50 -Y10A-	1@6'X8' RCBC	0.06		< 0.01	0.25			0.01	< 0.01	252	22	
		66" RCP							< 0.01		105		
		FILL							0.02		283		
		STABILIZATION							< 0.01		38		
10++	380+00 -L-/383+00-L-	42" RCP						1.52					
11	386+00-L-/391+00-L-	48" RCP						4.43	0.04	< 0.01	404	60	
		STABILIZATION							< 0.01		20		
12	384+50-L-/387+00-L-	FILL	0.86		0.03	0.15			0.01	< 0.01	157	46	
TOTALS* THIS SHEET:			5.48	0.40	0.06	0.99		6.90	0.42	0.03	4291	302	0
TOTALS*	**ENTIRE R-2721B:**		**8.75**	**0.45**	**4.63**	**1.73**	**0**	**15.56**	**0.93**	**0.05**	**9443**	**470**	**0**

*Rounded totals are sum of actual impacts. ++Site includes only isolated resources.

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
APRIL 2018
WAKE COUNTY
TIP R-2721B
STATE PROJ. # 6.401078

Revised 2016 09 09

WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND 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)	SURFACE WATER IMPACTS: Permanent SW impacts (Pond) (ac)	Permanent SW impacts (Stream) (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
13++	408+00-L-/411+00-L-	FILL	0.24		0.03								
14	412+00-L-/416+00-L-	FILL	0.39	0.04	0.03	0.15			0.03	< 0.01	402	28	
15	414+50-L-/415+50-L-	1@7'X8' RCBC						2.30	< 0.01		142		
16	420+00-L-/425+00-L-	42" RCP	0.70		0.02	0.41			0.04	< 0.01	315	13	
		FILL							< 0.01		18		
		STABILIZATION							< 0.01		46		
17	437+00-L-/30+00-Y13A-	2@7'X8'RCBC	0.55	< 0.01		0.09			< 0.01	< 0.01	11	46	
		FILL							< 0.01		170		
		STABILIZATION							0.07		368		
18	459+50-L-/463+50-L-	2@7'X8'RCBC	0.18					6.36	0.02		256		
		STABILIZATION							< 0.01		15		
19++	15+00-Y13LPC-	EXCAVATION			2.15								
20	478+00-L-/488+00-L-	FILL	0.62		2.34				0.10		1135		
21	490+00-L-	2@6'X8'RCBC	0.41			0.09			0.08	< 0.01	977	34	
		FILL							0.01		181		
		STABILIZATION							0.03		204		
22	495+00-L-	54" RCP	0.14		< 0.01				0.03	< 0.01	490	13	
		FILL							< 0.01		202		
		STABILIZATION							< 0.01		55		
23	65+30-Y13-	FILL							< 0.01	< 0.01	9	11	
24	10+00-Y13B-	15" RCP							< 0.01	< 0.01	1	17	
		FILL							< 0.01		13		
25	15+00-Y13A-	36" RCP	0.03						0.01	< 0.01	115	6	
		FILL							< 0.01		27		
26++	10+00-Y13A-	FILL				< 0.01							
TOTALS* THIS SHEET:			3.26	0.05	4.57	0.74		8.66	0.47	0.01	5152	168	0
TOTALS*	**ENTIRE R-2721B:**		**8.75**	**0.45**	**4.63**	**1.73**	**0**	**15.56**	**0.93**	**0.05**	**9443**	**470**	**0**

*Rounded totals are sum of actual impacts. ++Site includes only isolated resources.

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
APRIL 2018
WAKE COUNTY
TIP R-2721B
STATE PROJ. # 6.401078

Revised 2016 09 09

09/08/99

CONTRACT: **TIP PROJECT: R–2721**

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

PERMIT DRAWING
SHEET 1 OF 19

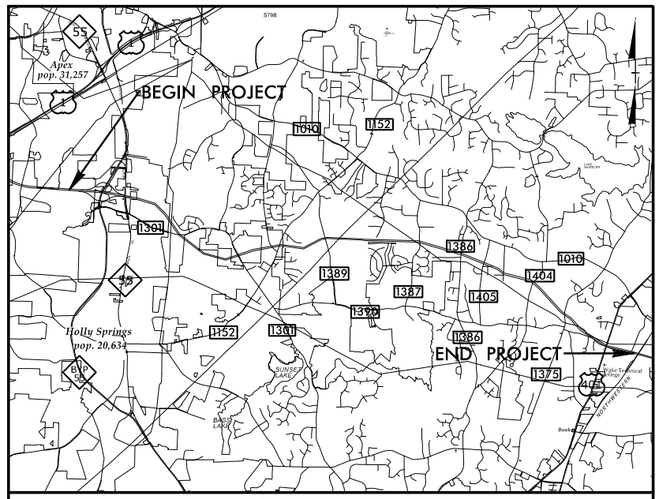
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2721	1	

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
6.401078	STP–540(19)	PE

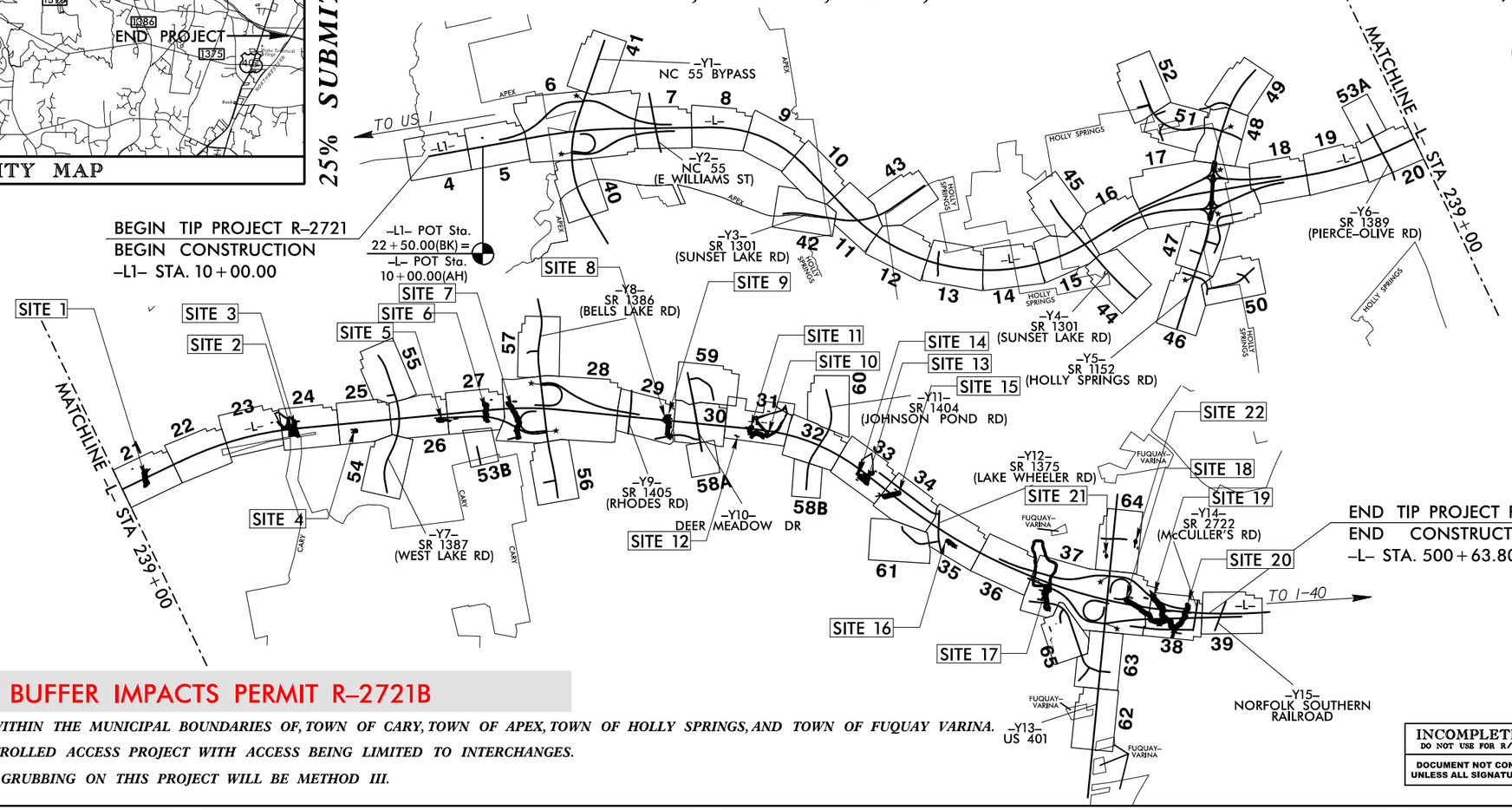
LOCATION: COMPLETE 540 – FROM WEST OF NC55 TO EAST OF HWY 401

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

25% SUBMITTAL



VICINITY MAP



BUFFER IMPACTS PERMIT R–2721B

THIS PROJECT WITHIN THE MUNICIPAL BOUNDARIES OF, TOWN OF CARY, TOWN OF APEX, TOWN OF HOLLY SPRINGS, AND TOWN OF FUQUAY VARINA.

THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

CLEARING AND GRUBBING ON THIS PROJECT WILL BE METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS 50′ 25′ 0 50′ 100′

PROFILE (HORIZONTAL) 50′ 25′ 0 50′ 100′

PROFILE (VERTICAL) 10′ 5′ 0 10′ 20′

DESIGN DATA

ADT 2018 = 28,200
ADT 2040 = 66,400
K = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST = 7% DUAL 4%

FUNC CLASS = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R–2721 =9.529 Miles
LENGTH STRUCTURES =0.178 Miles
TOTAL LENGTH TIP PROJECT R–2721 =9.351 Miles

Prepared In the Office of:

LOCHNER
TO: LOCHNER, INC
2840 PLAZA PLACE, SUITE 202
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(919)571-7111
NC License Number F-0159

ECOLOGICAL ENGINEERING
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(919) 557-0929

SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL: (919) 859-2243 NC FIRM LICENSE NO. C-490

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: February 18, 2020

LETTING DATE: February 18, 2020

Brian K. Eason, PE
PROJECT ENGINEER

Christina L. Yokeley, EI
PROJECT DESIGN ENGINEER

NCDOT CONTACT

HYDRAULICS ENGINEER

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.

SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

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davidcooper

51499

LOCHNER
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1151 SE Cary Parkway
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Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R–2721	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 2 OF 19

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

100' 0' 100'
GRAPHIC SCALE

SITE 1

92

END TIP PROJECT R–2721A
BEGIN TIP PROJECT R–2721B
–L– STA. 240+00.00

MATCHLINE SHEET 20
–L– STA 239+00.00

MATCHLINE SHEET 22
–L– STA 252+00.00

CLASS II RIP RAP
EST 160 TONS
EST 245 GEOTEXTILE

CLASS II RIP RAP
EST 195 TONS
EST 215 GEOTEXTILE

3@8'x10' RCBC

30" WELDED WIRE

24" RCP-III

30" RCP-III

15" RCP-III

18" RCP-III

15" RCP-III

24" RCP-III

36" RCP-III

FS CAT-1

FS GREU TL-3

FS

240+00

245+00

250+00

TDE

WAR

WAS

WLB

INLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 32 TONS
NG
CLASS II RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 2'
FILL W/ CLASS II RIP RAP

OUTLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 26 TONS
NG
CLASS II RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 2'
CLASS I RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 1.5'
FILL W/ CLASS II RIP RAP
CLASS II RIP RAP W/GEOTEXTILE (TYP) THICKNESS = 2'

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dvandecar

51499

100' 0' 100'
GRAPHIC SCALE

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PERMIT DRAWING
SHEET 3 OF 19

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

NOTE: ALTHOUGH BUFFER IMPACT SHOWN EXTENDS TO ROW ONLY, ENTIRE POND BUFFER CALCULATED AS TOTAL TAKE IN IMPACT SUMMARY.

SITE 2

EXISTING R/W

97 98 99 95 96

PROP. NOISEWALL (I8)

2303 2304 2302 2301 2305 2306 2308 2309 2307

30" RCP-III 15" RCP-III 18" RCP-III 36" RCP-III

CAT-1 TYPE B-77

GREU TL-3

270+00 275+00

MATCHLINE SHEET 22
-L- STA 265+00.00

MATCHLINE SHEET 24
-L- STA 278+00.00

SAF

2:1

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dlindcooper
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NOTE: ALTHOUGH BUFFER IMPACT SHOWN EXTENDS TO ROW ONLY, ENTIRE POND BUFFER CALCULATED AS TOTAL TAKE IN IMPACT SUMMARY.

POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

LOCHNER
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 4 OF 19

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

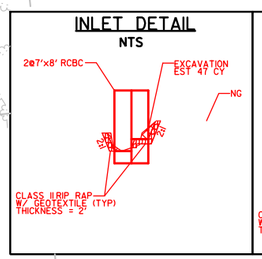
100' 0' 100'
GRAPHIC SCALE

MATCHLINE SHEET 23 -L- STA 278+00.00

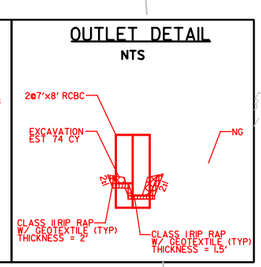
MATCHLINE SHEET 25 -L- STA 291+00.00

WAW (2)
WAW (1)
WLB
SAV
SAN
PD
SITE 3
CS Sta. 280+59.00
ST Sta. 282+69.00
280+00
285+00
290+00
2@7'x8' RCBC
24" RCP-III
18" RCP-III
15" RCP-III
15" W/ELBOWS
TYPE B-77
SINGLE FACE BARRIER
GREU TL-3
CAT-1
CLASS II RIP RAP
EST 115 TONS
EST 180 SY GEOTEXTILE
CLASS II RIP RAP
EST 100 TONS
EST 175 SY GEOTEXTILE
TDE
FS
100
101
95
96
102
103

INLET DETAIL
NTS



OUTLET DETAIL
NTS



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dvadcooper

51499

PERMIT DRAWING
SHEET 5 OF 19

GRAPHIC SCALE 100' 0' 100'

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	25
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 24
-L- STA 291+00.00

MATCHLINE SHEET 26
-L- STA 303+00.00

EXISTING R/W

GREU TL-3

CAT-1

SITE 4

104

95

105

295+00

300+00

36" RCP-III

42" RCP-III

24" RCP-III

18" RCP-III

15" RCP-III

JS

FS

BZ

BZ 1

BZ 2

SAP

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LOCHNER
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2840 PLAZA PLACE, SUITE 202
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ECOLOGICAL ENGINEERING
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(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING
SHEET 6 OF 19

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

MATCHLINE SHEET 55
-Y7- STA 31+00.00

MATCHLINE SHEET 25
-L- STA 303+00.00

MATCHLINE SHEET 27
-L- STA 316+00.00

MATCHLINE SHEET 54
-Y7- STA 23+00.00

SR 1387 WEST LAKE RD

+10.87 -Y7-
80.00' RT

+71.41
-Y7DET-
50.00' LT

+83.65
-Y7DET-
50.00' LT

EASEMENT NEEDED FOR DETOUR

GREU TL-3

TYPE III

305+00 310+00 315+00 30+00 25+00

18" W/ELBOWS
24" RCP-III
15" RCP-III
30" RCP-III
FS

SINGLE FACE BARRIER
TYPE B-77
15" W/ELBOWS

SITE 5

-L- POT Sta. 304+98.17=
-Y7- POC Sta. 27+46.89
Δ = 95°02'38.28"

-L- POT Sta. 313+88.48=
-Y8RPC- POT Sta. 10+00.00
71.00' RT

TDE

106 107 95 105 108 329

EXISTING R/W

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dwadcooper

51499

100' 0' 100'
GRAPHIC SCALE

PERMIT DRAWING SHEET 7 OF 19

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

CULVERT INLET AND OUTLET CHANNEL STABILIZATION
(Not to Scale)
Natural Bed Elevation
Natural Ground
1.5'
Geotextile
Channel Bed (Variable)
Length (Inlet) = 35 Ft.
Length (Outlet) = 40 Ft.
Type of Liner = CL 1 Rip-Rap = Keyed-in

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PROJECT REFERENCE NO.	SHEET NO.
R-2721	27
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 26
-L- STA 316+00.00

MATCHLINE SHEET 28
-L- STA 329+00.00

MATCHLINE SHEET 28
-Y8RPC- STA 25+00.00

SITE 6

SITE 5 CONT'D.

107

109

109

320+00

325+00

15" RCP-III

18" RCP-III

FS

SINGLE FACE BARRIER

TYPE B-77

CHORD

-Y8RPC- TS Sta. 17+50.00

-Y8RPC- SC Sta. 20+00.00

-L- TS Sta. 325+81.50

-L- SC Sta. 327+71.50

15" W/ELBOWS

1@6'x6' RCBC

CAT-1

PDE

TDE

WLB

WBC

WBA

SAR

WAZ

BZ 1

BZ 2

100'

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PERMIT DRAWING
SHEET 8 OF 19

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

GRAPHIC SCALE

200' 0' 200'

LOCHNER

H. W. LOCHNER, INC.
3840 NUMA PLACE, SUITE 200
RALEIGH, NC 27612

NC License Number P0159

ECOLOGICAL ENGINEERING

PROJECT REFERENCE NO.	SHEET NO.
R-2721	28

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 56
-Y8- STA 38+00.00

MATCHLINE SHEET 27
-L- STA 329+00.00

MATCHLINE SHEET 27
-Y8RPC- STA 25+00.00

MATCHLINE SHEET 28
-Y8RPC- STA 25+00.00

MATCHLINE SHEET 55
-Y8- STA 23+00.00

MATCHLINE SHEET 29
-L- STA 355+00.00

SITE 7

EASEMENT NEEDED FOR DETOUR

CULVERT INLET AND OUTLET CHANNEL STABILIZATION

-Y8- POT Sta.36+03.17
-Y8LPA- POT Sta.51+57.69
Δ= 59°07'50.81"

-Y8- POT Sta.36+35.17
-Y8RPA- POT Sta.33+82.13
Δ= 92°00'00.0"

-Y8RPA- SC Sta.30+65.28

-Y8RPA- ST Sta.32+65.43

-Y8RPA- SRS Sta.28+15.28

-Y8RPA- CS Sta.26+15.28

-Y8LPA- ST Sta.22+39.31

-Y8LPA- CS Sta.19+89.31

-Y8LPA- SC Sta.15+00.00

-Y8- POT Sta.31+32.98
-Y8LPA- POT Sta.14+89.86

-Y8LPA- SRS Sta.12+50.00

-L- POC Sta.336+10.84=
-Y8LPA- ST Sta.10+00.00
71.00' LT

-L- POC Sta.338+11.04
-Y8- POT Sta.30+60.37
Δ=87°16'02.86"

-Y8LPC- SC Sta.12+50.00

CS Sta.342+69.78

ST Sta.343+69.78

-Y8RPA- SC Sta.16+67.57

-Y8RPA- STA 15+00.00

-Y8- PT Sta.25+67.41

-Y8- POT Sta.25+46.70
-Y8LPC- POT Sta.22+93.65
Δ= 91°47'54.18"

-Y8- POT Sta.25+14.70
-Y8RPC- POT Sta.15+55.90
Δ= 89°01'42.24"

-Y8RPC- CS Sta.25+01.55

-Y8LPC- CS Sta.17+46.52

-Y8LPC- ST Sta.12+96.52

-Y8RPC- SRS Sta.22+57.55

-Y8- POT Sta.12+75.35

-Y8- POT Sta.10+00.00

-Y8RPC- SC Sta.30+57.55

-Y8RPC- PT Sta.33+46.14

CLASS B RIP RAP

BOSS 36" PE GIBORII W/ CAGE

24" RCP-III

15" WILLOWS

WLB

PE

ROW

CONST

EX. ROW

CAT-1

TYPE B-77

GRAU TL-3

FIG 8-72

FIG 8-77

TYPE B-12

TYPE B-6

TYPE B-8

TYPE B-10

TYPE B-11

TYPE B-13

TYPE B-14

TYPE B-15

TYPE B-16

TYPE B-17

TYPE B-18

TYPE B-19

TYPE B-20

TYPE B-21

TYPE B-22

TYPE B-23

TYPE B-24

TYPE B-25

TYPE B-26

TYPE B-27

TYPE B-28

TYPE B-29

TYPE B-30

TYPE B-31

TYPE B-32

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TYPE B-114

TYPE B-115

TYPE B-116

TYPE B-117

TYPE B-118

TYPE B-119

TYPE B-120

TYPE B-121

TYPE B-122

TYPE B-123

TYPE B-124

TYPE B-125

TYPE B-126

TYPE B-127

TYPE B-128

TYPE B-129

TYPE B-130

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	29
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 9 OF 19

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

100' 0' 100'
GRAPHIC SCALE

INLET DETAIL
NTS
EXCAVATION = 25 CY
1@ 6' x 8' RCBC
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/GEOTEXTILE(TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
EXCAVATION = 22 CY
1@ 6' x 8' RCBC
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/GEOTEXTILE(TYP) THICKNESS = 2'

-Y9- PC Sta. 17+38.14
-Y9- PT Sta. 16+55.65
-Y9- POT Sta. 14+76.68
-Y8RPA- POT Sta. 12+01.10 = 93°41'01.43"
-Y8RPA- TS Sta. 14+67.57
-Y9- PC Sta. 14+90.46
-L- POT Sta. 359+88.39
-Y8RPA- POT Sta. 10+00.00
71.00' LT
-Y10A- POT Sta. 10+00.00
-Y10A- POT Sta. 13+83.69

MATCHLINE SHEET 28
-L- STA 355+00.00
-Y8RPA- STA 15+00.00

MATCHLINE SHEET 30
-L- STA 368+00.00
-Y10A- STA 14+00.00

SITE 7
SITE 8
SITE 9

360+00
365+00

15" RCP-III
18" RCP-III
24" RCP-III
30" RCP-III
36" RCP-III
54" RCP-III
18" WELDBOWS
24" WELDBOWS
36" WELDBOWS
CAT-1
GREU TL-3
TDE
FS
EXISTING R/W
117 118 131 132 133 134 135 136 137 138

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PERMIT DRAWING
SHEET 10 OF 19

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

ALLOWABLE IMPACTS ZONE 2

LOCHNER

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Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

MATCHLINE THIS SHEET

MATCHLINE SHEET INSET

100' 0' 100'

SITE 10

SITE 11

SITE 12

POND TO BE DRAINED

POND TO BE DRAINED

NOTE: ALTHOUGH BUFFER IMPACT SHOWN EXTENDS TO ROW ONLY, ENTIRE POND BUFFER CALCULATED AS TOTAL TAKE IN IMPACT SUMMARY.

MATCHLINE SHEET 30 -L- STA 379+75.00

MATCHLINE SHEET 32 -L- STA 394+00.00

-L- SC Sta. 389+19.97

-L- TS Sta. 385+69.97

380+00

385+00

390+00

163 164 165 166 167 148 149 150 158 167 168

PG PF SAW WBI WLB SBBJ

HW 15" RCP-IV 18" RCP-III 42" RCP-IV 48" RCP-IV 30" 18" W/ELBOWS

TYPE UI CAT-1 TYPE B-77 SINGLE FACE BARRIER TYPE SF CAT-1

ENERGY DISSIPATOR BASIN

CHORD TDE PBD BDD FS RW CA

BZ 1 BZ 2 JS SF

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dcooper

POND SHALL BE DRAINED IN ACCORDANCE WITH THE "POND DRAINAGE PLAN REQUIREMENT" SPECIAL PROVISION. POND MUCK SHALL BE REMOVED TO A DEPTH DETERMINED BY THE ENGINEER AND DISPOSED OF IN ACCORDANCE WITH THE "WASTE AND BORROW SOURCES" SPECIAL PROVISION. REMOVED MUCK SHALL BE REPLACED WITH A SUITABLE MATERIAL APPROVED BY THE ENGINEER TO SUPPORT THE INSTALLATION OF PROPOSED RIP RAP LINED CHANNELS.

171

PERMIT DRAWING
SHEET 11 OF 19

NOTE: ALTHOUGH BUFFER IMPACT SHOWN EXTENDS TO ROW ONLY, ENTIRE POND BUFFER CALCULATED AS TOTAL TAKE IN IMPACT SUMMARY.

POND TO BE DRAINED

-Y12A- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y12A- STA. 10+50.00

-L- CS Sta. 411+69.36

-L- ST Sta. 415+19.36

SITE 13

SITE 14

SITE 15

MATCHLINE SHEET 32
-L- STA 407+00.00

MATCHLINE SHEET 34
-L- STA 420+00.00

410+00

415+00

+32.00 -L- 144.00' LT

PDE

TDE

1@7'x8' RCBC

15" RCP-IV

24" RCP-III

18" RCP-III

15" RCP-III

24"

15"

CAT-1

GREU TL-3

FS

SBA

WBK

WLB

WBN (1)

SAZ

SBP

SBM

WBL

BZ 1

BZ 2

SF

SI

100' 0' 100'

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

177

178

INLET DETAIL
NTS
@ 7' x 8' RCBC
EXCAVATION EST XX TONS
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
@ 7' x 8' RCBC
NG
EXCAVATION EST 7 TONS
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

LOCHNER
H. W. LOCHNER, INC.
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RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	34
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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PERMIT DRAWING
SHEET 12 OF 19

100' 0' 100'

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

178 179 180 181 183 184 185 186 187

-Y12A- PC Sta. 24+74.16

MATCHLINE SHEET 35
-Y12A- STA 26+00.00

-L- PC Sta. 423+88.20

SITE 15

WLB 1

WLB 2

SBB

BZ 1

BZ 2

15" RCP-IV

15" RCP-III

15" W/ELBOWS

GREU TL-3

CAT-1

FS

TYPE 8-77

SINGLE FACE BARRIER

15+00 20+00 25+00 425+00 430+00

MATCHLINE SHEET 33
-L- STA 420+00.00

MATCHLINE SHEET 35
-L- STA 433+00.00

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LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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PERMIT DRAWING SHEET 13 OF 19

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

100' 0' 100'

51499

-Y12A- PT Sta. 26+21.01
STANDARD BASE DITCH SEE DETAIL 16B SLOPE = 0.09 FT/FT EST DDE = XX CY
-Y12- POT Sta. 19+61.01
END CONSTRUCTION
-Y12A- STA. 26+62.98
24" RCP-V
STANDARD BASE DITCH SEE DETAIL 52B SLOPE = 0.004 FT/FT EST DDE = XX CY
-Y12- POT Sta. 18+87.33
-Y12A- POT Sta. 26+75.76
Δ = 90°26'12.13"
-Y12A- STA 26+00.00
30" RCP-V
STANDARD 'V' DITCH SEE DETAIL 51B SLOPE = 25.0% EST DDE = CY EST XX TONS EST XX SY
-L- POC Sta. 435+01.42
-Y12- POT Sta. 15+58.87
Δ = 59°57'08.41"
15" RCP-III
15" WELBOWS
MATCHLINE SHEET 34 -L- STA 433+00.00
MATCHLINE SHEET 36 -L- STA 446+00.00
435+00
440+00
445+00
-Y12- PT Sta. 15+31.58
SINGLE FACE BARRIER
SITE 16
SBF
WLB
WBP
-Y12- PCC Sta. 12+30.09
-Y12- POC Sta. 12+63.56=
-Y12B- POT Sta. 20+31.83
END CONSTRUCTION
-Y12B- STA. 20+20.59
-Y12- PC Sta. 10+37.25
TDE-Y12- POT Sta. 10+00.00
MATCHLINE SHEET 61 -Y12B- STA 18+00.00
GREU TL-3
TYPE B-77
181 183 184 188 189 190 191 410

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PERMIT DRAWING
SHEET 14 OF 19

200' 0' 200'
GRAPHIC SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number P0605
ECOLOGICAL ENGINEERING
NC FIRM LICENSE No. P0605
1100 SW 6th Avenue
Suite 300
Portland, Oregon 97204
(503) 723-2400

PROJECT REFERENCE NO.	SHEET NO.
R-2721	37
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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MATCHLINE SHEET 37A

MATCHLINE SHEET 64
-Y13- STA 62+00.00

MATCHLINE SHEET 36
-L- STA 459+00.00

MATCHLINE SHEET 38
-L- STA 487+00.00

MATCHLINE SHEET 65
-Y13A- STA 24+00.00

MATCHLINE SHEET 63
-Y13- STA 48+00.00

SITE 16
SITE 17
SITE 18
SITE 19

END CONSTRUCTION
-Y13A- STA. 35+37.50

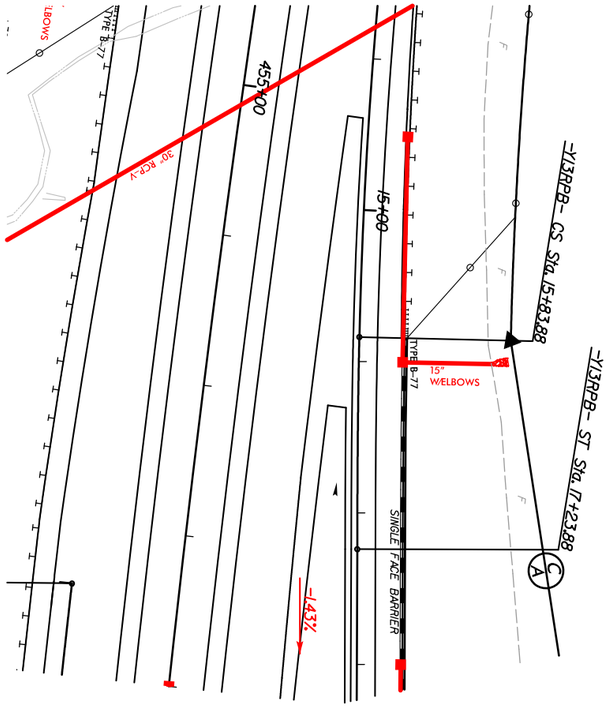
BEGIN CONSTRUCTION
-Y14A- STA. 10+50.00

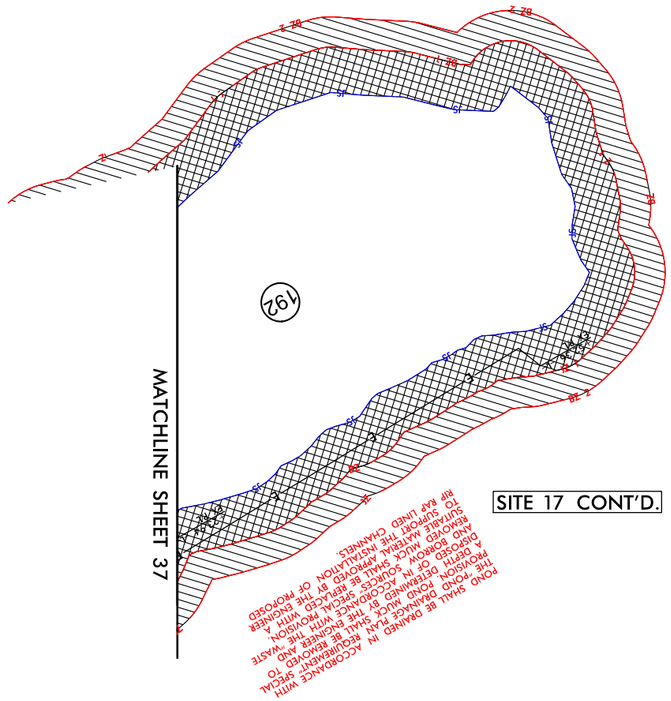
-Y13APA- PT Sta. 27+38.59
-Y13APA- SRS Sta. 25
-Y13APA- CS Sta. 20+11.8
-Y13APA- STA 19+00.00
-Y13APA- CS Sta. 21+08.80
-Y13- POT Sta. 57+09.89
-Y13APA- ST Sta. 23+00.80
51.00 RT
-Y13APA- SC Sta. 12+00.00
-Y13APB- SRS Sta. 30+18.83
-Y13APB- CS Sta. 28+11.83
-Y13APB- PT Sta. 34+19.67
-Y13- POT Sta. 60+18.65
-Y13APB- POT Sta. 30+18.70
-Y13APB- POT Sta. 33+47.87
-Y13APB- TS Sta. 22+33.15
-Y13APB- SC Sta. 24+38.15
-Y13APC- SC Sta. 17+75.91
-Y13APC- CS Sta. 21+08.71
-Y13APC- ST Sta. 12+00.00
-Y13APC- CS Sta. 16+49.47
-Y13APC- SRS Sta. 23+07.27
-Y13APC- CS Sta. 23+18.64
-Y13APC- SC Sta. 23+51.01
-Y13APC- PT Sta. 28+17.63
-Y13APC- SRS Sta. 12+00.00
-Y13APC- SC Sta. 14+00.00
-Y13- POT Sta. 53+29.86
-Y13APC- ST Sta. 25+14.54
51.00 LT
-L- POC Sta. 471+08.46
-Y13- POT Sta. 55+33.98
Δ = 92°49'04.9"
-L- POC Sta. 471+51.99
-Y13APC- ST Sta. 13+00.00
71.00 RT
-L- POC Sta. 476+65.14
-Y13APC- ST Sta. 10+00.00
71.00 LT
-Y13- POT Sta. 49+89.28
-Y13APC- POT Sta. 31+12.36
-Y13APD- POT Sta. 41+29.99
-Y13APD- SC Sta. 32+04.50
-Y13APD- CS Sta. 39+37.46
-Y13APD- ST Sta. 40+37.46
-Y14A- POT Sta. 10+00.00
-Y14A- STA 12+00.00
-Y13A- POT Sta. 35+52.56
-Y13A- SC Sta. 34+52.56
-Y13A- CS Sta. 31+52.56
-Y13A- ST Sta. 29+77.56
-Y13A- SRS Sta. 27+02.56
-Y13A- STA 27+00.00

WBV WLB WLC WLD WLE WLF WLG WLH WLJ WLK WLL WLM WLN WLP WLQ WLR WLS WLT WLV WLW WLX WLY WLZ SBJ SBK SBL SBM SBN SBP SBQ SBR SBS SBT SBV SBW SBX SBY SBZ

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100' 0' 100'

GRAPHIC SCALE

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

DENOTES IMPACTS IN SURFACE WATER (POND)

PERMIT DRAWING
SHEET 15 OF 19

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

ECOLOGICAL ENGINEERING

NC FIRM LICENSE No: F-1148
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	37A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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SHEET 16 OF 19

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

LOCHNER
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2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
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PROJECT REFERENCE NO.	SHEET NO.
R-2721	38
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MATCHLINE SHEET 37
-L- STA 487+00.00

MATCHLINE SHEET 39
-L- STA 499+00.00

-Y13RPA- STA 19+00.00

-Y13RPA- SC Sta. 12+40.00

-Y14- POT Sta. 16+80.46

-L- POT Sta. 495+92.92=
-Y13RPA- ST Sta. 10+00.00
71.00' LT

-L- POC Sta. 497+59.48
-Y14- POT Sta. 14+05.38
Δ = 95°37'12.37"

-Y13RPD- STA 32+00.00

-Y13RPD- TS
Sta. 31+01.50

-Y14- PI Sta. 11+25.51

-Y14- POT Sta. 10+10.67
-Y14A- POT Sta. 24+34.33
Δ = 79°44'23.27"

-Y14- POT Sta. 10+00.00

-Y14A- STA 13+00.00

-Y14A- PC Sta. 15+28.47

-Y14A- PT Sta. 17+52.54

END CONSTRUCTION
-Y14A- STA. 24+25.19

SITE 18 CONT'D.

SITE 19 CONT'D.

SITE 20

SR 2732 MCALLISTER RD

100' 0' 100'

7:46:22 PM
C:\Projects\Hydraulics\PERMITS\Environmental\Drawings\PSH\R2721_PSH_38_16buf.dgn
dlondicooper

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159
ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	64
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

51499

MATCHLINE SHEET 37
-Y13- STA 62+00.00

BEGIN CONSTRUCTION
-Y13E- STA. 10+37.50

SITE 21

STANDARD BASE DITCH
SEE DETAIL 14B
SLOPE = 14.6%
EST DDE = ?
EST XX TONS
EST XX SY GEOTEXTILE

-Y13E- POT Sta. 10+00.00
-Y13E- PC Sta. 10+77.51
-Y13E- PT Sta. 12+05.68
-Y13- POT Sta. 69+34.40
-Y13E- POT Sta. 12+68.23
Δ = 83°17'47.79"

END CONSTRUCTION
-Y13- STA. 74+00.00

-Y13E- PC Sta. 13+67.64

-Y13E- PCC Sta. 14+86.83
-Y13E- PT Sta. 15+75.22

END CONSTRUCTION
-Y13E- STA. 15+50.00

-Y13B- POT Sta. 10+00.00
-Y13B- POT Sta. 11+61.11

BEGIN CONSTRUCTION
-Y13B- STA. 10+00.00

SITE 22

END CONSTRUCTION
-Y13B- STA. 11+54.37

PERMIT DRAWING
SHEET 17 OF 19

100' 0' 100'

2:46:28 PM
Hydraulics\PERMITS Environmental\Drawings\PSH\R2721_PSH_64_17buf.dgn
dougcooper

RIPARIAN BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	3@8'X10' RCBC	244+00 - 248+00 -L-	X					0	29078	15901	44979		
2**	ROADWAY FILL	277+00 - 280+50 -L-	X					0	53530	30845	84374		
3	2@7'X8' RCBC	280+50-L-/282+00-L-	X					0	27228	13512	40741		
4	NOISEWALL & E.C. ACCESS, FENCE	294+00 - 295+00 -L-	X			4514	4637	9152			0		
5	30" RCP	313+00 - 318+00 -L-			X			0	12760	9950	22710		
6	1@6'X8' RCBC	324+00 - 326+00 -L-	X					0	32516	18451	50967		
7	1@6'X8' RCBC (TWO)	329+00 - 333+00 -L-, 28+00 - 30+00 -Y8RPC-	X					0	60417	37018	97435		
8	ROADWAY FILL	365+50-L-/366+00-L-	X			4317	3633	7951			0		
9	1@6'X8' RCBC, 66" RCP	366+00-L-/367+50-L-	X					0	43026	16583	59609		
10**	48" RCP	384+50 - 393+00 -L-	X					0	81719	58771	140489		
11	ROADWAY FILL	384+50-L-/386+50-L-	X					0	12732	9284	22016		
12	EASEMENT	382+00-L-/383+00-L-	X			0	1033	1033			0		
13**	1@7'X8' RCBC	411+00 - 416+00 -L-	X					0	59742	35256	94998		
14	ROADWAY FILL	412+00 - 415+00 -L-			X			0	12570	3470	16040		
15	42" RCP	420+00-L-/422+00-L-	X					0	26651	19936	46587		
16	30" RCP, 2@7'X7' RCBC	438+00-L-/30+00-Y13A-	X					0	50560	26570	77130		
17	2@7'X8' RCBC	459+00-L-/464+00-L-	X					0	99039	61848	160886		
18	48" RCP	481+00-L-/491+00-L-			X			0	67075	44679	111754		
19	2@6'X8' RCBC, 2@7'X7' RCBC	486+00-L-/493+00-L-	X					0	90601	44578	135179		
20	1@ RCBC	493+00-L-/496+00-L-	X					0	45963	25860	71823		
21	24" RCP	65+00 - 66+00 -Y13-	X			2129	2577	4706			0		
22	15" RCP	10+90 - 11+60 -Y13B-	X			2720	2485	5205			0		
TOTAL:						13681	14366	28047	805205	472511	1277716	0	0

**Site includes calculated impacts to entire pond buffers outside ROW

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: TIP R-2721B

DATE 07/31/2018
SHEET 18 OF 19

Rev. SEP 2016

Rev. May 2006

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
1	244+00 - 248+00 -L-		0	1979
2	277+00 - 280+50 -L-		12154	3801
3	280+50-L-/282+00-L-		15366	5784
4	294+00 - 295+00 -L-		0	0
5	313+00 - 318+00 -L-		6369	3782
6	324+00 - 326+00 -L-		12737	8907
7	329+00 - 333+00 -L-, 28+00 - 30+00 -Y8RPC-		18916	3794
8	365+50-L-/366+00-L-		0	0
9	366+00-L-/367+50-L-		18242	2248
10	384+50 - 393+00 -L-		8611	2996
11	384+50-L-/386+50-L-		12073	6870
12	382+00-L-/383+00-L-		0	0
13	411+00 - 416+00 -L-		8237	2948
14	412+00 - 415+00 -L-		12218	2154
15	420+00-L-/422+00-L-		17309	10179
16	438+00-L-/30+00-Y13A-		15737	6092
17	459+00-L-/464+00-L-		2771	1828
18	481+00-L-/491+00-L-		42113	16265
19	486+00-L-/493+00-L-		17540	3825
20	493+00-L-/496+00-L-		3402	1745
21	65+00 - 66+00 -Y13-		0	0
22	10+90 - 11+60 -Y13B-		0	0
TOTAL:			223799	85198

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: TIP R-2721B

DATE 06/13/2018
SHEET 19 OF 19

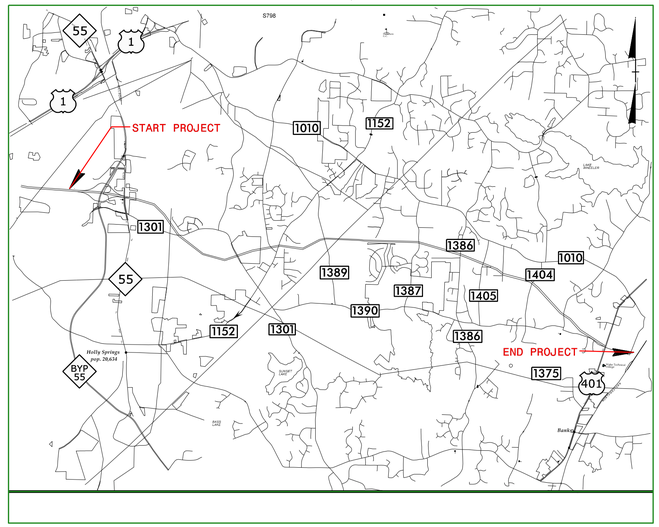
Rev. Jan 2009

09/08/99

CONTRACT:

TIP PROJECT: R-2721

See Sheet 1B For Conventional Symbols



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

EAU PERMIT DRAWINGS
WAKE COUNTY

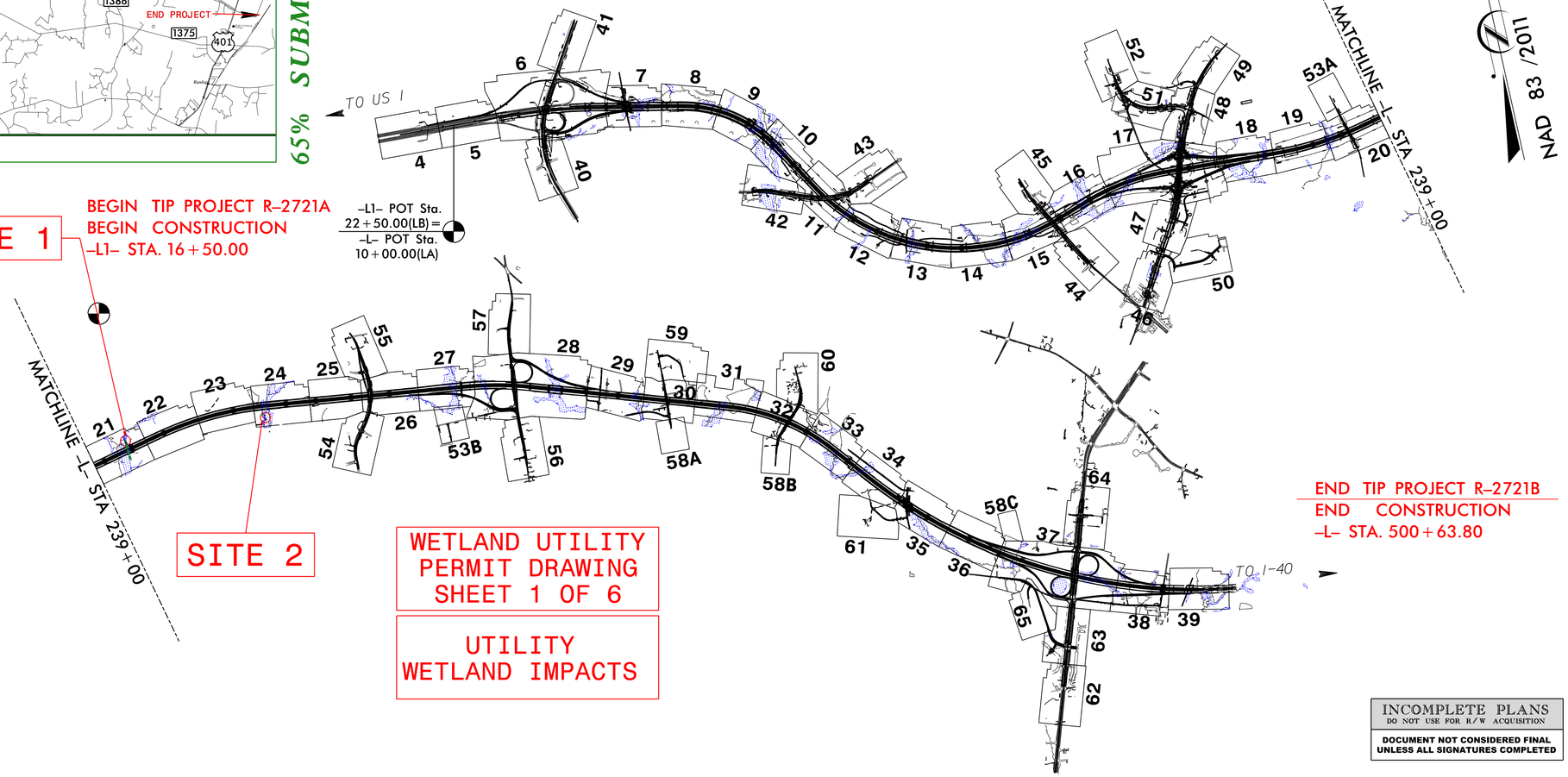
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2721	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
37673.3.GV3 (A)	NHP-0540(041)	PE, R/W
37673.4.GV3 (B)		PE, R/W

LOCATION: *COMPLETE 540 – FROM WEST OF NC55 TO EAST OF HWY 401*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, AND STRUCTURES*

65% SUBMITTAL



BEGIN TIP PROJECT R-2721A
BEGIN CONSTRUCTION
–L1– STA. 16+50.00

SITE 1

SITE 2

END TIP PROJECT R-2721B
END CONSTRUCTION
–L– STA. 500+63.80

WETLAND UTILITY PERMIT DRAWING SHEET 1 OF 6

UTILITY WETLAND IMPACTS

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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 2018 = 28,200
ADT 2040 = 66,400
K = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST = 7% DUAL 4%

FUNC CLASS = INTERSTATE STATEWIDE TIER

PROJECT LENGTH

Prepared In the Office of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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(919) 557-9929

SUNGATE DESIGN GROUP, P.A.
900 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-950

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
February 18, 2020

LETTING DATE:
February 18, 2020

Brian K. Eason, PE
PROJECT ENGINEER

Christina L. Yokeley, EI
PROJECT DESIGN ENGINEER

Dennis Jernigan, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

21-JUN-2018 17:12
S:\Server Files\PROJECTS\2017\A2017902.00_NCDOT_R-2721_Triangle Expressway\Design\Utilities\Engineering\NEU\REV_NEU_PLANS\R2721_RDY_TSH_01_Wetland.dgn
$$$$USERNAME$$$$

51499

HINDE ENGINEERING
License No. C-2639
401 Harrison Oaks Blvd., Suite 145 Cary, NC 27513

SITE 1

LEGEND

- E E — DENOTES EXCAVATION IN WETLAND
- T T — DENOTES TEMPORARY FILL IN WETLAND
- HC HC — DENOTES HAND CLEARING

92
QUAD TRI LLC
DB 16161 PG 089
BM 1979 PG 361

END TIP PROJECT R-2721A
BEGIN TIP PROJECT R-2721B
-L- STA. 240+00.00

PROP. 47" WW FENCE

+95.00 -L-
202.00' LT

CLASS B RIP RAP
EST 3 TONS
EST 11 SY
GEOTEXTILE

TOE PROTECTION
SEE DETAIL 1B

+37.95 -L-
145.31' LT
END FENCE

CLASS II RIP RAP
EST 160 TONS
EST 245 GEOTEXTILE

+83.08 -L-
137.06' LT
BEGIN FENCE

+08.95 -L-
108.60' LT
END FENCE

PROP. GUARDRAIL

BEGIN SBG+55

END SBG+50

30" W/ELBOWS

24" RCP-III

15" RCP-III

18" RCP-III

30" RCP-III

3@8'x10' RCBC

14'x10' RCBC FOR GREENWAY CROSSING

SYSTEM TIES WITH R2721A

BEGIN SBG +50

GREU TL-3

CAT-1

+27.39 -L-
139.52' RT
END FENCE

CLASS II RIP RAP
EST 195 TONS
EST 215 GEOTEXTILE

+69.00 -L-
198.00' RT

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 50 TONS
EST 70 GEOTEXTILE

+66.71 -L-
143.36' RT
BEGIN FENCE

+83.00 -L-
248.00' RT

+08.95 -L-
106.00' RT
END FENCE

+44.17 -L-
106.00' RT
BEGIN FENCE

+76.00 -L-
169.09' RT

+14.00 -L-
147.00' RT

+18.00 -L-
210.39' RT

+27.00 -L-
264.00' RT

+85.00 -L-
223.00' RT

ENERGY DISSIPATOR BASIN

LATERAL DITCH W CLASS I RIP RAP SEE DETAIL 2B

TDE

+50.87 -L-
EX. PL

+39.28 -L-
EX PL

94
UAD TRI LLC
3 16161 PG 089
4 1996 PG 771
4 1979 PG 361

A1 HAND CLEARING WETLANDS
0.05 ACRES
A1 EXCAVATION WETLANDS
0.03 ACRES
A1 TEMPORARY FILL WETLANDS
0.02 ACRES

INV=337.11'
TOP=351.91'
INV=335.50'

INV=334.60'
INV=334.52'
INV=334.35'

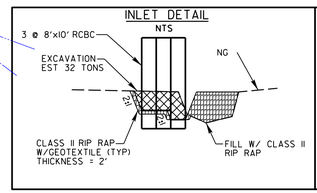
INV=333.55'
TOP=343.35'
INV=333.41'

MATCHLINE SHEET 20
-L- STA 239+00.00

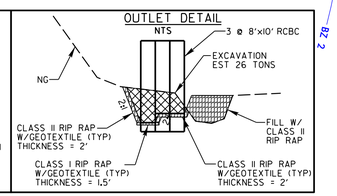
MATCHLINE SHEET 22
-L- STA 252+00.00

PAVEMENT REMOVAL
PAVED SHOULDER

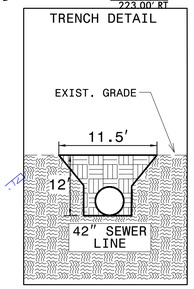
INLET DETAIL
NTS



OUTLET DETAIL
NTS



TRENCH DETAIL



WETLAND UTILITY PERMIT DRAWING SHEET 2 OF 6

SEE SHEET 75 FOR -L- PROFILE

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
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Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

21-JUN-2018 17:14
DOT R-2721 Triangle Expressway Design\Utilities\Engineering\NEU\REV_NEU_PLANS\R2721_RDY_PSH_21_Wetlands.dgn
$$$$USERNAME$$$$

51499

HINDE ENGINEERING
License No. C-2639
401 Harrison Oaks Blvd., Suite 145 Cary, NC 27513

SITE 1

LEGEND

- E E — DENOTES EXCAVATION IN WETLAND
- F F — DENOTES TEMPORARY FILL IN WETLAND
- HC HC — DENOTES HAND CLEARING

92
QUAD TRI LLC
DB 16161 PG 089
BM 1979 PG 361

94
UAD TRI LLC
3 16161 PG 089
4 1996 PG 771
4 1979 PG 361

END TIP PROJECT R-2721A
BEGIN TIP PROJECT R-2721B
-L- STA. 240+00.00

PROP. 47" WW FENCE

+95.00 -L-
202.00' LT

CLASS B RIP RAP
EST 3 TONS
EST 11 SY
GEOTEXTILE

TOE PROTECTION
SEE DETAIL 1B

+37.95 -L-
145.31' LT
END FENCE

CLASS II RIP RAP
EST 160 TONS
EST 245 GEOTEXTILE

+83.08 -L-
137.06' LT
BEGIN FENCE

+50.87 -L-
EX. P/L

A1 HAND CLEARING WETLANDS
0.05 ACRES
A1 EXCAVATION WETLANDS
0.03 ACRES
A1 TEMPORARY FILL WETLANDS
0.02 ACRES

+39.28 -L-
EX P/L

TOE PROTECTION
SEE DETAIL 1B

14'X10' RCBC
FOR GREENWAY
CROSSING

END SBG+50

+08.95 -L-
108.60' LT
END FENCE

BEGIN SBG+55

FS CAT-1

24" W/ELBOWS

24" RCP-III

15" RCP-III

PROP. GUARDRAIL

FS 2GI GREU TL-3

MATCHLINE SHEET 20
-L- STA 239+00.00

240+00

PROP. GUIDERAIL

SYSTEM TIES WITH
R2721A

30" RCP-III

3@8'x10' RCBC

FS

240+00

2GI-A

TOE PROTECTION
SEE DETAIL 1B

30" W/ELBOWS

BEGIN SBG
+50

GREU TL-3

FS 2GI

+27.39 -L-
139.52' RT
END FENCE

CLASS II RIP RAP
EST 195 TONS
EST 215 GEOTEXTILE

PROP. 47" WW FENCE

+69.00 -L-
198.00' RT

CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 50 TONS
EST 70 GEOTEXTILE

92
QUAD TRI LLC
DB 16161 PG 089
BM 1979 PG 361

+66.71 -L-
143.36' RT
BEGIN FENCE

TOE PROTECTION
SEE DETAIL 1B

+83.00 -L-
248.00' RT

15" RCP-III

15" RCP-III

PROP. GUARDRAIL

+08.95 -L-
106.00' RT
END FENCE

PROP. GUIDERAIL

250+00

FS

END SBG+50

CAT-1

FS 2GI-A

36" RCP-III

+44.17 -L-
106.00' RT
BEGIN FENCE

PROP. 47" WW FENCE

+76.00 -L-
169.09' RT

+14.00 -L-
147.00' RT

ENERGY DISSIPATOR
BASIN

+18.00 -L-
210.39' RT

LATERAL DITCH
W. CLASS I RIP RAP
SEE DETAIL 2B

+85.00 -L-
223.00' RT

+27.00 -L-
264.00' RT

TDE

MATCHLINE SHEET 22
-L- STA 252+00.00

INV=337.11'
TOP=351.91'
INV=335.50'

INV=334.60'
INV=334.52'
INV=334.35'

INV=333.55'
TOP=343.35'
INV=333.41'

WLB

INLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 32 TONS
NG
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'
FILL W/ CLASS II
RIP RAP

OUTLET DETAIL
NTS

3 @ 8'x10' RCBC
EXCAVATION
EST 26 TONS
NG
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'
FILL W/
CLASS II
RIP RAP
CLASS I RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 1.5'
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'

TRENCH DETAIL
EXIST. GRADE
11.5'
12'
42" SEWER
LINE

PAVEMENT REMOVAL
PAVED SHOULDER

SEE SHEET 75 FOR -L- PROFILE

WETLAND UTILITY
PERMIT DRAWING
SHEET 3 OF 6

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
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(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	21A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

21-JUN-2018 17:15
...DOT_R-2721_Hinde Engineering\Design\Utilities\Engineering\NEU\REV_NEU_PLANS\R2721_RDY_PSH_21A_Wetlands.dgn
$$$$USERNAME$$$$

HINDE ENGINEERING
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NC License Number F-0159

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Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LEGEND

- S S — DENOTES IMPACTS IN SURFACE WATER
- E E — DENOTES EXCAVATION IN WETLAND
- / / — DENOTES TEMPORARY FILL IN WETLAND
- HC HC — DENOTES HAND CLEARING

-L-
PIs Sta 254+60.65 Θs = 0° 46' 23.8" Ls = 210.00' LT = 140.00' ST = 70.00'
PI Sta 268+06.07 Δ = 18° 37' 12.0" (RT) D = 0° 44' 11.2" L = 2,528.35' T = 1,275.42' R = 7,780.00' SE = 0.03
PIs Sta 281+29.00 Θs = 0° 46' 23.8" Ls = 210.00' LT = 140.00' ST = 70.00'

PAVEMENT REMOVAL
PAVED SHOULDER

MATCHLINE SHEET 23 -L- STA 278+00.00

MATCHLINE SHEET 25 -L- STA 291+00.00

100 ROACH, GREGORY & ROACH, JANET DB 12631 PG 1609 BM 1998 PG 2010

101 COATS, LARRY L DB 8946 PG 954

CARROLL, DAN S & CARROLL, RITA M DB 14029 PG 1156 BM 2006 PG 1572

95 NC DEPARTMENT OF TRANSPORTATION

96 TOWN OF CARY DB 8305 PG 1939 BM 3004 PG 1785 BM 1999 PG 761

102 LAWSON, MICHAEL JR DB 9391 PG 875 BM 1984 PG 609

103 THE COLE FAMILY TRUST DB 7300 PG 93 BM 1984 PG 609

NC DEPARTMENT OF TRANSPORTATION DB 1464 PG 2254

BEGIN SBG+75

3' LATERAL DITCH W/CLASS I RIP RAP SEE DETAIL 7B

CLASS II RIP RAP EST 175 TONS EST 180 SY GEOTEXTILE

3' STANDARD BASE DITCH W/CLASS II RIP RAP SLOPE=3% SEE DETAIL 6B

TOE PROTECTION SEE DETAIL 1B

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

END NOISEWALL (I8) -L- Sta.282+97.04

2' LATERAL DITCH W/CLASS I RIP RAP SEE DETAIL 5B

PROP. 47" WW FENCE

PROP. NOISEWALL (I8)

PROP. GUARDRAIL

PROP. GUIDERAIL

PROP. NOISEWALL (I9-I)

15" W/ELBOWS

24" W/ELBOWS

2@7'x8' RCBC

SINGLE FACE BARRIER

TYPE B-77

GREU TL-3

CAT-1

ABANDON DRIVE

CLASS I RIP RAP EMBEDDED INTO STREAM BED EST 50 TONS EST 96 SY GEOTEXTILE

TOP=368.80' INACCESSIBLE

JAMSON PARK SUBDIVISION

SOUTHWICK & SOUTHW DB 9855 BM 2001

HUGHES, TODD M & HUGHES, STEPHANIE A DB 12975 PG 1589 BM 2001 PG 2061

BECKETT, GRANT S & BECKETT, STEPHANIE C DB 11864 PG 2517 BM 2001 PG 2061

SITE 2

A2 HAND CLEARING WETLANDS 0.03 ACRES
A2 EXCAVATION WETLANDS 0.01 ACRES
A2 TEMPORARY FILL WETLANDS 0.01 ACRES
A2 SURFACE WATER IMPACTS 0.01 ACRES

TRENCH DETAIL
EXIST. GRADE
11.0'
14'
36" SEWER LINE

INLET DETAIL
NTS
2@7'x8' RCBC
EXCAVATION EST 47 CY
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
2@7'x8' RCBC
EXCAVATION EST 74 CY
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'

WETLAND UTILITY PERMIT DRAWING SHEET 4 OF 6

SEE SHEET 77 FOR -L- PROFILE

21-JUN-2018 17:15
J:\DOT_R-2721_Thomas_Brooks\Design\Design Utilities\Engineering\NEU\REV_NEU_PLANS\R2721_RDY_PSH_24_Wetlands.dgn
$$$$USERNAME$$$$

HINDE ENGINEERING
License No. C-2639
401 Harrison Oaks Blvd., Suite 145 Cary, NC 27513

51499

LEGEND

- SS SS — DENOTES IMPACTS IN SURFACE WATER
- E E — DENOTES EXCAVATION IN WETLAND
- // // — DENOTES TEMPORARY FILL IN WETLAND
- HC HC — DENOTES HAND CLEARING

-L-

PIs Sta 254+60.65	PI Sta 268+06.07	PIs Sta 281+29.00
θs = 0° 46' 23.8"	Δ = 18° 37' 12.0" (RT)	θs = 0° 46' 23.8"
Ls = 210.00'	D = 0° 44' 11.2"	Ls = 210.00'
LT = 140.00'	L = 2,528.35'	LT = 140.00'
ST = 70.00'	T = 1,275.42'	ST = 70.00'
	R = 7,780.00'	
	SE = 0.03	

MATCHLINE SHEET 23
-L- STA 278+00.00

MATCHLINE SHEET 25
-L- STA 291+00.00

100 ROACH, GREGORY & ROACH, JANET
DB 12631 PG 1609
BM 1998 PG 2010

101 COATS, LARRY L
DB 8946 PG 954

CARROLL, DAN S & CARROLL, RITA M
DB 14029 PG 1156
BM 2006 PG 1572

95 NC DEPARTMENT OF TRANSPORTATION

96 TOWN OF CARY
DB 8305 PG 1939
BM 3004 PG 1785
BM 1999 PG 761

102 LAWSON, MICHAEL JR
DB 9391 PG 875
BM 1984 PG 609

103 THE COLE FAMILY TRUST
DB 7300 PG 93
BM 1984 PG 609

NC DEPARTMENT OF TRANSPORTATION
DB 1464 PG 2254

HUGHES, TODD M & HUGHES, STEPHANIE A
DB 12975 PG 1589
BM 2001 PG 2061

BECKETT, GRANT S & BECKETT, STEPHANIE C
DB 11864 PG 2517
BM 2001 PG 2061

JAMSON PARK SUBDIVISION

SOUTHWICK & SOUTHW
DB 9855
BM 2001

PAVEMENT REMOVAL
PAVED SHOULDER

3' LATERAL DITCH W/CLASS I RIP RAP SEE DETAIL 7B

3' STANDARD BASE DITCH W/CLASS II RIP RAP SLOPE=3% SEE DETAIL 6B

2' LATERAL DITCH W/CLASS I RIP RAP SEE DETAIL 5B

CLASS II RIP RAP EST 175 TONS EST 180 SY GEOTEXTILE

TOE PROTECTION SEE DETAIL 1B

CLASS B RIP RAP EST 2 TONS EST 7 SY GEOTEXTILE

END NOISEWALL (I8) -L- Sta. 282+97.04

PROP. 47" WW FENCE

PROP. NOISEWALL (I8)

PROP. GUARDRAIL

PROP. GUIDERAIL

PROP. NOISEWALL (I9-I)

SINGLE FACE BARRIER

TYPE B-77

GREU TL-3

15" W/ELBOWS

24" W/ELBOWS

2@7'x8' RCBC

15" RCP-III

18" RCP-III

24" RCP-III

36" RCP-III

CLASS I RIP RAP EMBEDDED INTO STREAM BED EST 50 TONS EST 96 SY GEOTEXTILE

BEGIN SBG+75

ABANDON DRIVE

TOP=368.80' INACCESSIBLE

SITE 2

A2 HAND CLEARING WETLANDS
0.03 ACRES
A2 EXCAVATION WETLANDS
0.01 ACRES
A2 TEMPORARY FILL WETLANDS
0.01 ACRES
A2 SURFACE WATER IMPACTS
0.01 ACRES

TRENCH DETAIL
EXIST. GRADE
11.0'
14'
36" SEWER LINE

INLET DETAIL
NTS
2@7'x8' RCBC
EXCAVATION EST 47 CY
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
2@7'x8' RCBC
EXCAVATION EST 74 CY
NG
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'

WETLAND UTILITY PERMIT DRAWING
SHEET 5 OF 6

SEE SHEET 77 FOR -L- PROFILE

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	24A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

21-JUN-2018 17:16
C:\Projects\R-2721 Lochner Engineering\Design\Utilities\Engineering\NEU REV_NEU PLANS\R2721_RDY_PSH_24A_Wetlands.dgn
ssesusen AMESSSS

WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND 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)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
A1	247+52 to 247+89 -L-	42" Gravity Sewer		0.02	0.03*		0.05					
A2	280+27 to 280+65 -L-	36" Gravity Sewer		0.01	0.01*		0.03		0.01		15	
TOTALS*:			**0.00**	**0.03**	**0.04**	**0.00**	**0.08**	**0.00**	**0.01**	**0**	**15**	**0**

*Excavation in existing maintained sewer easement - Temporary Impact

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
June 21, 2018
WAKE COUNTY
R-2721
37673
SHEET 6 OF 6

Revised 2018 Feb

09/08/99
21-JUN-2018 08:15
S:\Server_Files\PROJECTS\2017\A2017902.00_NCDOT_R-2721_Triangle Expressway\Design\Utilities\Engineering\NEU\REV_NEU_PLANS\R2721_RDY_TSH_01_Buffer.dgn
$$$$USERNAME$$$$

CONTRACT:

TIP PROJECT: R-2721

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2721	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
37673.3.GV3 (A)	NHP-0540(041)	PE, R/W
37673.4.GV3 (B)		PE, R/W

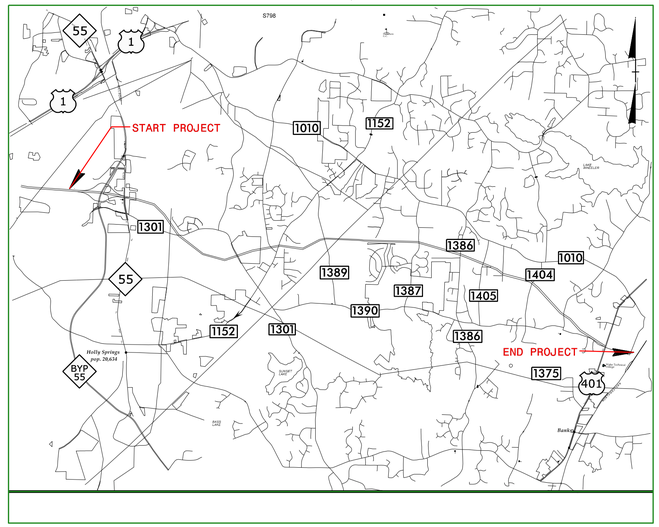
EAU PERMIT DRAWINGS
WAKE COUNTY

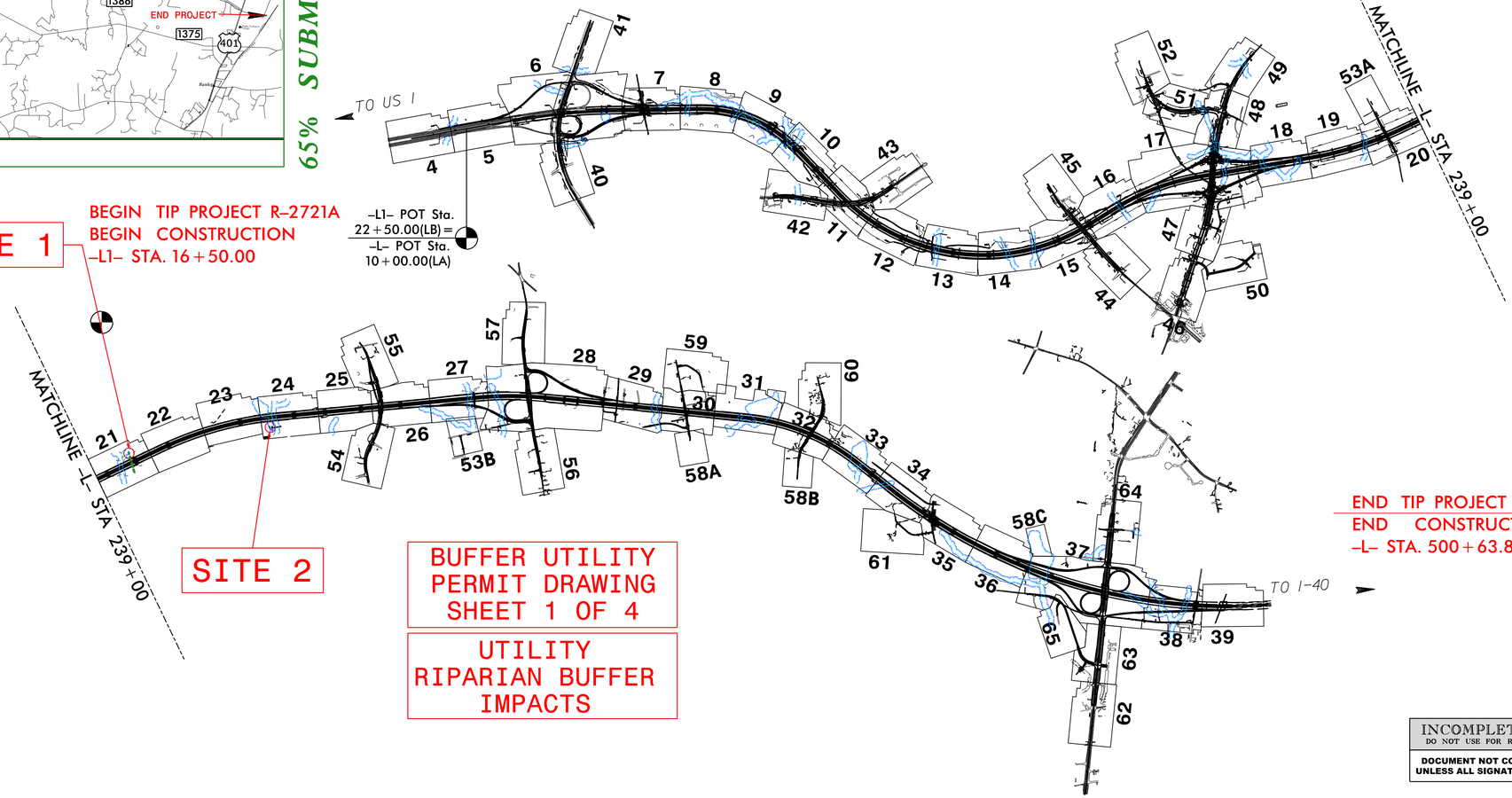
LOCATION: *COMPLETE 540 – FROM WEST OF NC55 TO EAST OF HWY 401*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, AND STRUCTURES*

65% SUBMITTAL

See Sheet 1B For Conventional Symbols





BUFFER UTILITY PERMIT DRAWING SHEET 1 OF 4

UTILITY RIPARIAN BUFFER IMPACTS

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50′ 25′ 0 50′ 100′

PROFILE (HORIZONTAL): 50′ 25′ 0 50′ 100′

PROFILE (VERTICAL): 10′ 5′ 0 10′ 20′

DESIGN DATA

ADT 2018 = 28,200
ADT 2040 = 66,400
K = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST = 7% DUAL 4%

FUNC CLASS = INTERSTATE STATEWIDE TIER

PROJECT LENGTH

Prepared In the Office of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-4929

SUNGATE DESIGN GROUP, P.A.
900 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27606
TEL (919) 859-2243
NC FIRM LICENSE NO. C-950

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
February 18, 2020

LETTING DATE:
February 18, 2020

Brian K. Eason, PE
PROJECT ENGINEER

Christina L. Yokeley, EI
PROJECT DESIGN ENGINEER

Dennis Jernigan, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

51499

HINDE ENGINEERING
License No. C-2639
401 Harrison Oaks Blvd., Suite 145 Cary, NC 27513

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PAVEMENT REMOVAL
PAVED SHOULDER

SITE 1

LEGEND

MITIGABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

92
QUAD TRI LLC
DB 16161 PG 089
BM 1979 PG 361

94
UAD TRI LLC
3 16161 PG 089
4 1996 PG 771
4 1979 PG 361

END TIP PROJECT R-2721A
BEGIN TIP PROJECT R-2721B
-L- STA. 240+00.00

A1 BZ1 35 SF
A1 BZ2 237 SF

MATCHLINE SHEET 20
-L- STA 239+00.00

MATCHLINE SHEET 22
-L- STA 252+00.00

PROP. 47" WW FENCE
+95.00 -L-
202.00' LT
CLASS B RIP RAP
EST 3 TONS
EST 11 SY
GEOTEXTILE
TOE PROTECTION
SEE DETAIL 1B
CLASS II RIP RAP
EST 160 TONS
EST 245 GEOTEXTILE
+37.95 -L-
145.31' LT
END FENCE
+83.08 -L-
137.06' LT
BEGIN FENCE
+50.87 -L-
EX. P/L
+39.28 -L-
EX P/L
14'X10' RCBC
FOR GREENWAY
CROSSING
END SBG+50
+08.95 -L-
108.60' LT
END FENCE
BEGIN SBG+55
FS CAT-1
2GI
2GI-A
24" WELDOWS
24" RCP-III
15" RCP-III
PROP. GUARDRAIL
GREU TL-3
12' PS
36' RCP-III
30" RCP-III
3@8'x10' RCBC
PROP. GUIDERAIL
240+00
250+00
SYSTEM TIES WITH
R2721A
30" W/ELBOWS
BEGIN SBG
+50
+27.39 -L-
139.52' RT
END FENCE
CLASS II RIP RAP
EST 195 TONS
EST 215 GEOTEXTILE
+08.95 -L-
106.00' RT
END FENCE
+44.17 -L-
106.00' RT
BEGIN FENCE
+76.00 -L-
169.09' RT
+14.00 -L-
147.00' RT
+69.00 -L-
198.00' RT
CLASS I RIP RAP
EMBEDDED INTO
STREAM BED
EST 50 TONS
EST 70 GEOTEXTILE
+66.71 -L-
143.36' RT
BEGIN FENCE
TOE PROTECTION
SEE DETAIL 1B
+83.00 -L-
248.00' RT
ENERGY DISSIPATOR
BASIN
+18.00 -L-
210.39' RT
+27.00 -L-
264.00' RT
LATERAL DITCH
W/ CLASS I RIP RAP
SEE DETAIL 2B
+85.00 -L-
223.00' RT
TDE
INV=337.11'
TOP=351.91'
INV=335.50'
INV=334.60'
INV=334.35'
INV=333.55'
TOP=343.35'
INV=333.41'
WLB
CAT-1
FS
2GI
2GI-A
GREU TL-3

INLET DETAIL
NTS
3 ø 8'x10' RCBC
EXCAVATION
EST 32 TONS
NG
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'
FILL W/ CLASS II
RIP RAP

OUTLET DETAIL
NTS
3 ø 8'x10' RCBC
EXCAVATION
EST 26 TONS
NG
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'
FILL W/
CLASS II
RIP RAP
CLASS I RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 1.5'
CLASS II RIP RAP
W/GEOTEXTILE (TYP)
THICKNESS = 2'

TRENCH DETAIL
EXIST. GRADE
11.5'
12'
42" SEWER
LINE

BUFFER UTILITY
PERMIT DRAWING
SHEET 2 OF 4

SEE SHEET 75 FOR -L- PROFILE

21-JUN-2018 17:30
C:\Users\jmcdot\Documents\DOT_R-2721_Turnkey\Design\Utilities\Engineering\NEU\REV_NEU_PLANS\R2721_RDY_PSH_21_Buffer.dgn
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HINDE ENGINEERING
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401 Harrison Oaks Blvd., Suite 145 Cary, NC 27513

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: F-1148
1151 SE Cary Parkway
Suite 101
Cary, NC 27518
(919) 557-0929

PROJECT REFERENCE NO.	SHEET NO.
R-2721	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

LEGEND

- MITIGABLE IMPACTS ZONE 1
- ALLOWABLE IMPACTS ZONE 2

-L-
PIs Sta 254+60.65
Θs = 0° 46' 23.8"
Ls = 210.00'
LT = 140.00'
ST = 70.00'

PI Sta 268+06.07
Δ = 18° 37' 12.0" (RT)
D = 0° 44' 11.2"
L = 2,528.35'
T = 1,275.42'
R = 7,780.00'
SE = 0.03

PIs Sta 281+29.00
Θs = 0° 46' 23.8"
Ls = 210.00'
LT = 140.00'
ST = 70.00'

PAVEMENT REMOVAL
PAVED SHOULDER

MATCHLINE SHEET 23
-L- STA 278+00.00

MATCHLINE SHEET 25
-L- STA 291+00.00

100 ROACH, GREGORY & ROACH, JANET
DB 12631 PG 1609
BM 1998 PG 2010

101 COATS, LARRY L
DB 8946 PG 954

95 NC DEPARTMENT OF TRANSPORTATION

CARROLL, DAN S & CARROLL, RITA M
DB 14029 PG 1156
BM 2006 PG 1572

102 LAWSON, MICHAEL JR
DB 9391 PG 875
BM 1984 PG 609

103 THE COLE FAMILY TRUST
DB 7300 PG 93
BM 1984 PG 609

96 TOWN OF CARY
DB 8305 PG 1939
BM 3004 PG 1785
BM 1999 PG 761

WEINBERG, JILL & WEINBERG, CRAIG
DB 10825 PG 1483
BM 2002 PG 519-521

HUGHES, TODD M & HUGHES, STEPHANIE A
PG 1589
PG 2061

BECKETT, GRANT S & BECKETT, STEPHANIE C
DB 11864 PG 2517
BM 2001 PG 2061

SOUTHWICK & SOUTHW
DB 9855
BM 2001

JAMSON PARK SUBDIVISION

3' LATERAL DITCH W/CLASS I RIP RAP SEE DETAIL 7B

3' STANDARD BASE DITCH W/CLASS II RIP RAP SLOPE=3% SEE DETAIL 6B

2' LATERAL DITCH W/CLASS I RIP RAP SEE DETAIL 5B

CLASS II RIP RAP
EST 175 TONS
EST 180 SY GEOTEXTILE

CLASS B RIP RAP
EST 2 TONS
EST 7 SY
GEOTEXTILE

TOE PROTECTION SEE DETAIL 1B

END NOISEWALL (I8)
-L- Sta. 282+97.04

PROP. 47" WW FENCE

PROP. NOISEWALL (I8)

PROP. GUARDRAIL

PROP. GUIDERAIL

TYPE B-77

SINGLE FACE BARRIER

PROP. NOISEWALL (I9-I)

CLASS II RIP RAP
EST 100 TONS
EST 175 SY GEOTEXTILE

CLASS I RIP RAP
EST 3 TONS
EST 7 SY
GEOTEXTILE

CLASS I RIP RAP
EMBEDDED INTO STREAM BED
EST 50 TONS
EST 96 SY
GEOTEXTILE

BEGIN SBG+75

ABANDON

TOP=368.80' INACCESSIBLE

A2 BZ2 1203 SF

A2 BZ1 1181 SF

SITE 2

TRENCH DETAIL
EXIST. GRADE
11.0'
14'
36" SEWER LINE

INLET DETAIL
NTS
2@7'x8' RCBC
EXCAVATION EST 47 CY
NG
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'

OUTLET DETAIL
NTS
2@7'x8' RCBC
EXCAVATION EST 74 CY
NG
CLASS II RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 2'
CLASS I RIP RAP W/ GEOTEXTILE (TYP) THICKNESS = 1.5'

BUFFER UTILITY PERMIT DRAWING SHEET 3 OF 4

SEE SHEET 77 FOR -L- PROFILE

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CDOT_R-2721_Utilities_Engineering
$$$$USERNAME$$$$

RIPARIAN BUFFER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
A1	247+78 to 247+95 -L-	42" Gravity Sewer			X		237	237	35		35		
A2	279+ 63 to 280+67 -L-	36" Gravity Sewer			X		1203	1203	1181		1181		
TOTALS*:						**0**	**1440**	**1440**	**1216**	**0**	**1216**	**0**	**0**

NOTES:
Impacts othre than perpendicular underground utility crossing (non-electric)

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
June 21, 2018
Wake County
R-2721
37673
SHEET 4 OF 4

Revised 2018 Feb

09/08/99

TIP PROJECT: R–2828

CONTRACT: _____

Approved Preliminary Design
September 2017

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE & JOHNSTON COUNTY

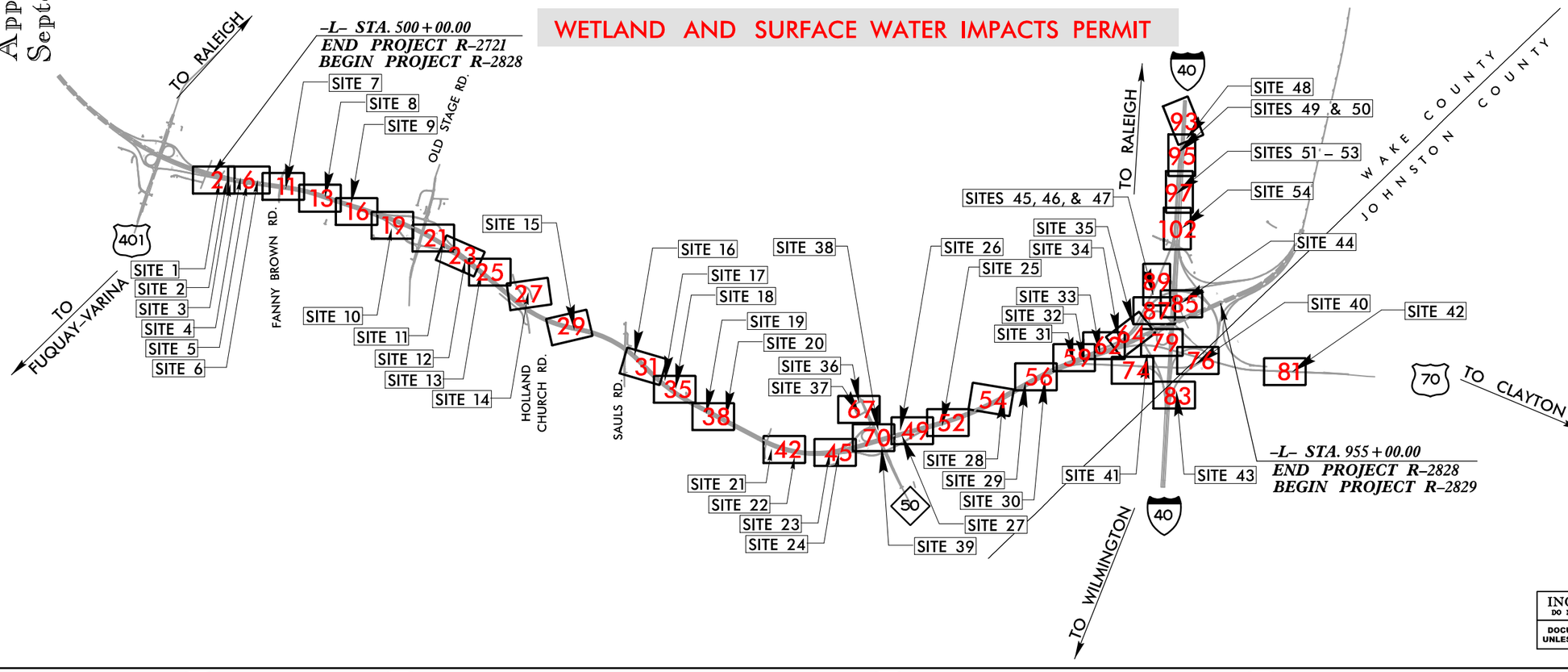
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2828	TS	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
6.401079	STP–540(20)	PE	

PERMIT DRAWING
SHEET 1 OF 105

LOCATION: COMPLETE 540 – FROM EAST OF HWY 401 TO EAST OF I–40

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

WETLAND AND SURFACE WATER IMPACTS PERMIT



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

50 25 0 50 100 — PLANS

15 7.5 0 15 30 — PROFILE (HORIZONTAL)

15 7.5 0 15 30 — PROFILE (VERTICAL)

DESIGN DATA

ADT 2016 = 28,400
ADT 2040 = 53,400
DHV = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST 7% DUAL 4%
FUNC. CLASS. = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY STATE TIP PROJECT R–2828 = 8.617 Miles
TOTAL LENGTH STATE TIP PROJECT R–2828 = 8.617 Miles

Prepared In the Offices of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571–7111
NC License Number P–0102

ECOLOGICAL ENGINEERING
NC FIRM LICENSE Nos P–1148
1531 SE Cary Parkway, Suite 103
Cary, NC 27518
(919) 557–0939

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: _____

LETTING DATE: _____

BRIAN K. EASON, PE
PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

_____ P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

_____ P.E.
SIGNATURE:

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

9:32:19 AM
R:\Individual Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH01_TSH_wet.dgn
davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	4

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 2 OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 6 STA. 508+44.06 –L–

SITE 1

SITE 2

SITE 3

WETLAND CD IMPACT

STREAM BP IMPACT

WETLAND CE IMPACT

STREAM BQ IMPACT

WCD

WCE (1)

WCE (2)

WLB

SBP

SBQ

SBT

PROPOSED 2@6'x5' RCBC

–L– POC Sta. 503+39.23=
–Y15– POT Sta. 14+06.94
=69° 45' 57.7"

–L– POC Sta. 507+88.71
–Y13RPD– 71.00' RT
–Y15– POT Sta. 10+00.00

–Y14– POT Sta. 10+00.00

–Y15– POT Sta. 17+00

N 78° 53' 33.8" W

N 21° 34' 47.1" E

N 33° 27' 50.5" E

495+00

500+00

505+00

15+00 –Y14–

15+00 –Y15–

20+00 –Y13RPD–

12+53.22= 10+00.00

WCB

SBK

JS MT

ISBKD

RHODES, RAYMOND LEONARD

PA GR

PA SOIL

9' SOIL

WALL TANKS

VANTAGE WAY

20' BST

10' BST

MURRIS

718

719

9:37:23 AM
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	4

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PERMIT DRAWING SHEET 2A OF 105

SCALE 50′ 0′ 100′

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS 5/14/99

MATCHLINE SHEET 3 STA. 508+44.06 –L–

SITE 1 — WETLAND CD IMPACT

SITE 2 — STREAM BP IMPACT

SITE 3 — WETLAND CE IMPACT; STREAM BQ IMPACT

WCB (1)

WCD

WCE (1)

WCE (2)

SBP

SBQ

SBT

PROPOSED 2@6'x5' RCBC

–L– POC Sta. 503+39.23= –Y15– POT Sta. 14+06.94 =69° 45' 57.7"

–L– POC Sta. 507+88.71 –Y13RPD– 71.00' RT

–Y15– POT Sta. 10+00.00

–Y14– POT Sta. 10+00.00

N 78° 53' 33.8" W

N 33° 27' 50.5" E

495+00

500+00

505+00

15+00 –Y14–

15+00 –Y15–

20+00 –Y13RPD–

12+53.22= 10+00.00

RHODES, RAYMOND LEONARD

SOUTHERN PROPERTIES

CHIE

MURRYS

TANKS

VANTAGE WAY

WALL

PA GR

PA SOIL

9' SOIL

10' BST

20' BST

SBKD

SFD

718

719

RW

CA

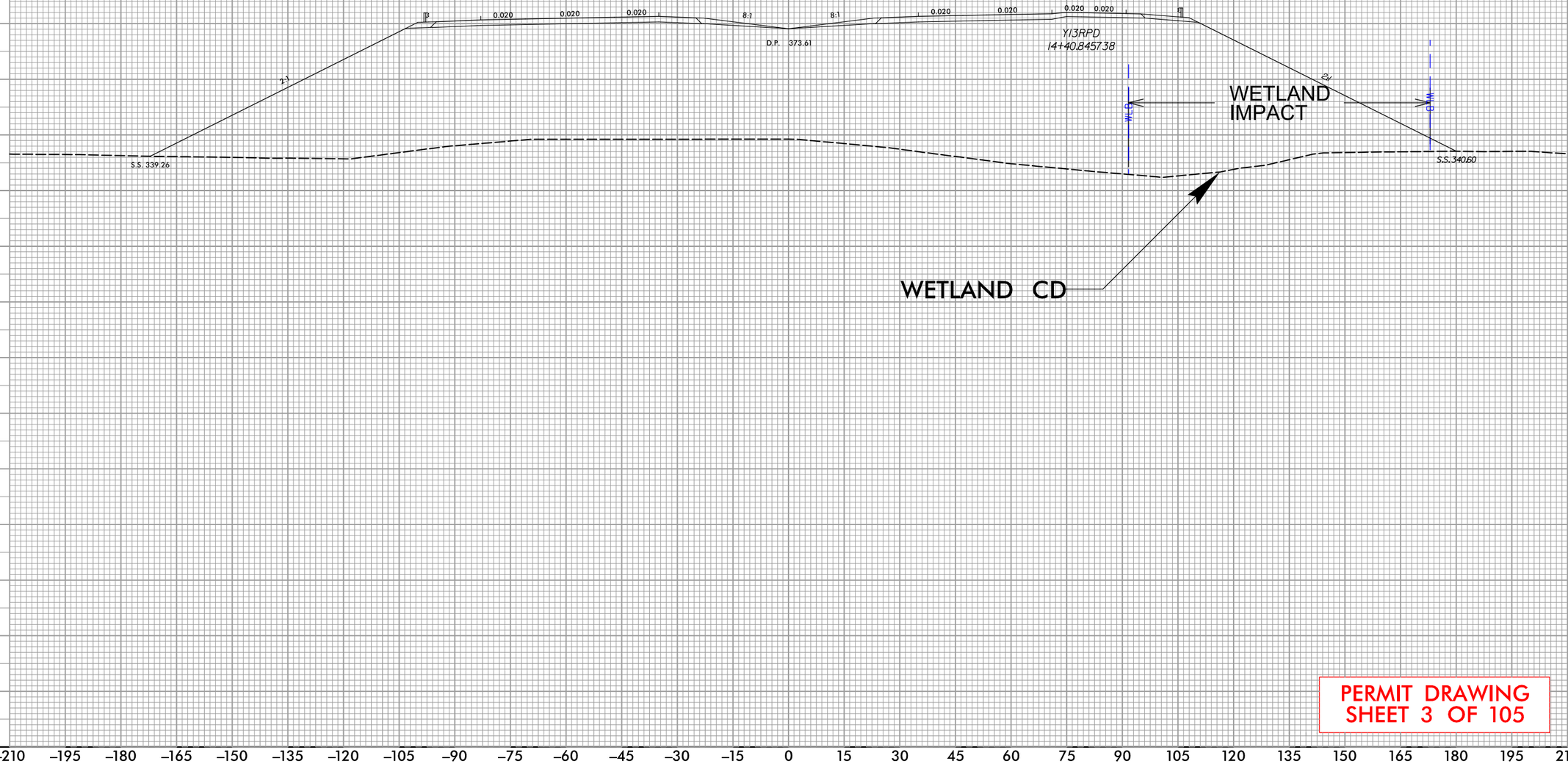
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PROJECT REFERENCE NO.	SHEET NO.
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CROSS–SECTION A–A
SITE 1, WETLAND CD
STATION 503+50 –L–



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SHEET 3 OF 105

REVISIONS

5/14/99

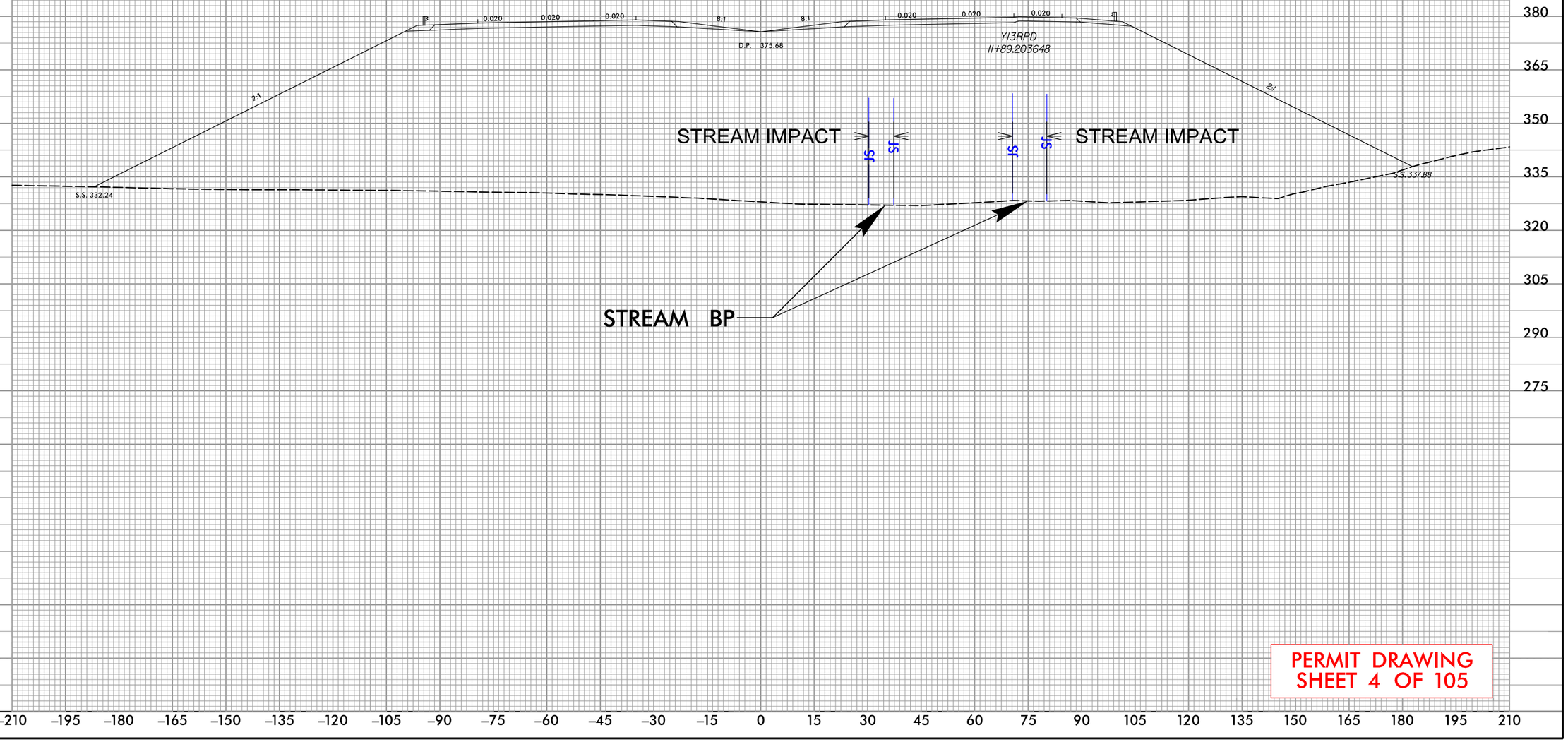
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CROSS–SECTION B–B
SITE 2, STREAM BP
STATION 506+00 –L–



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SHEET 4 OF 105

REVISIONS

5/14/99

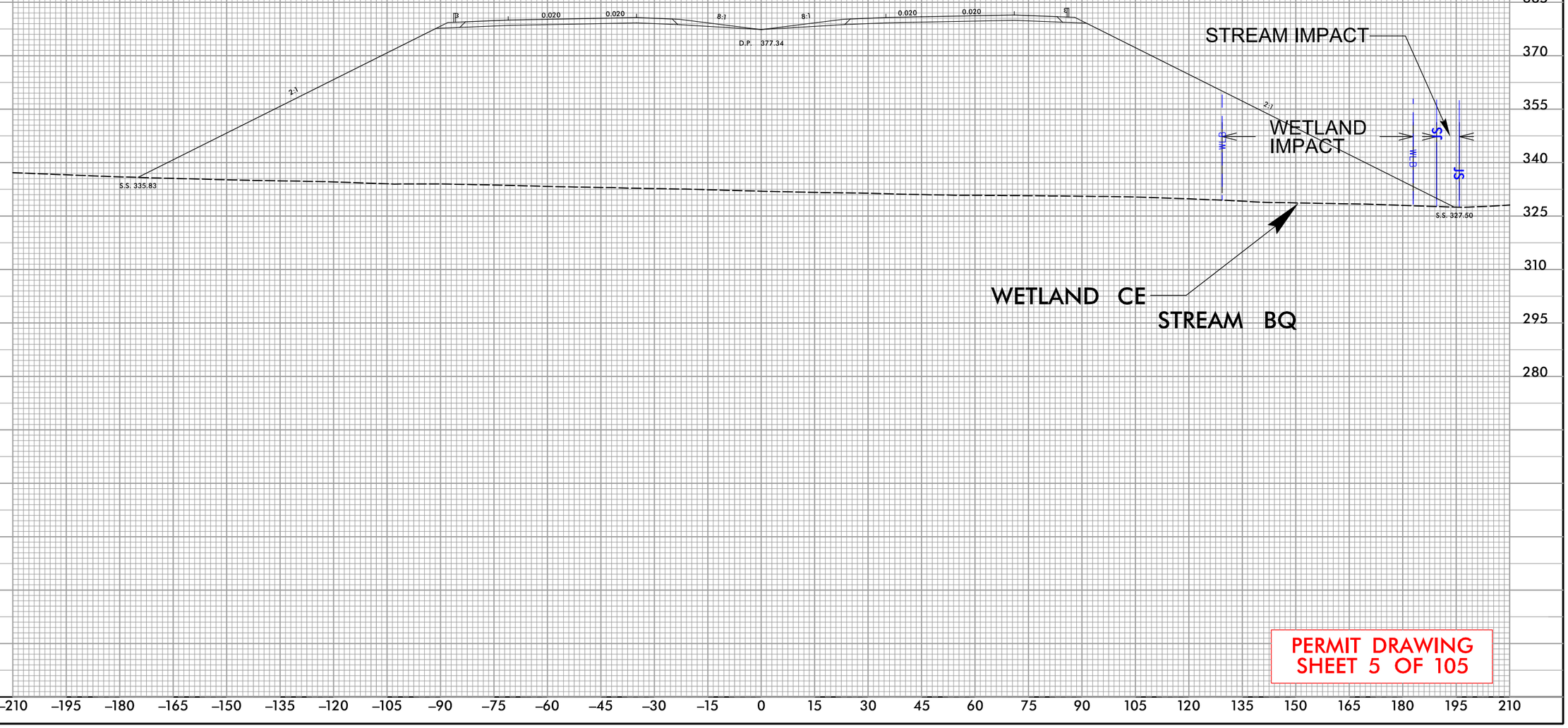
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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CROSS–SECTION C–C
SITE 3, WETLAND CE & STREAM BQ
STATION 508+00 –L–



PERMIT DRAWING
SHEET 5 OF 105

REVISIONS
5/14/99

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PERMIT DRAWING
SHEET 6 OF 105

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

MATCHLINE SHEET 2 STA. 508+44.06 –L–

MATCHLINE SHEET 11 STA. 522+69.20 –L–

–L– PT Sta. 514+45.11

510+00

515+00

520+00

WETLAND CH IMPACT

POND M IMPACT

STREAM BU IMPACT

SITE 4

WETLAND CI IMPACT

STREAM BS IMPACT

SITE 6

SITE 5

WETLAND CF IMPACT

STREAM BR IMPACT

WCH

WCI

WCF

WCG

PM

SBU

SBS

SBR

WLB

JS MIT

BZ 1

BZ 2

ROWLAND, NEAL MORRIS

NC DEPARTMENT OF TRANSPORTATION

FULLER

9:32:50 AM
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PERMIT DRAWING
SHEET 6A OF 105

PROJECT REFERENCE NO.	SHEET NO.
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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)

MATCHLINE SHEET 2 STA. 508+44.06 –L–

MATCHLINE SHEET 11 STA. 522+69.20 –L–

–L– PT Sta. 514+45.11

514+00

515+00

520+00

WETLAND CH IMPACT
STREAM BU IMPACT
POND M IMPACT
SITE 4
WETLAND CI IMPACT
STREAM BS IMPACT
SITE 6
WETLAND CF IMPACT
STREAM BR IMPACT
SITE 5

WCH
SBU
WCI
SBS
WCF
SBR
PM
WCG

WLB
JS
MIT
BZ 1
BZ 2
Z
Z1
Z2

ROWLAND, NEAL MORRIS
NC DEPARTMENT OF TRANSPORTATION
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REVISIONS

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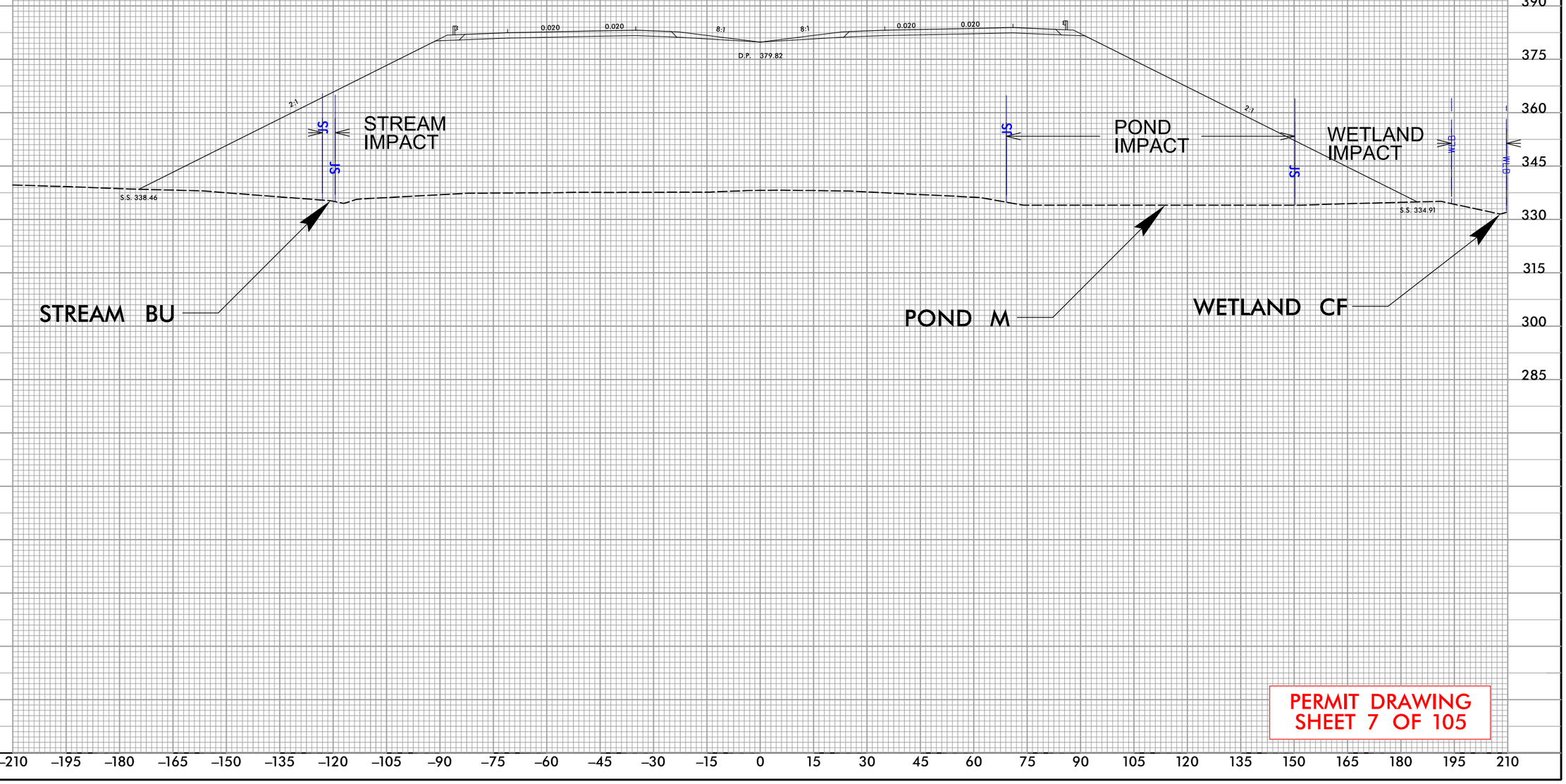
CROSS–SECTION D–D
SITES 4 & 5, STREAM BU, POND M, & WETLAND CF STATION 511+00 –L–

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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SHEET 7 OF 105

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davidcooper

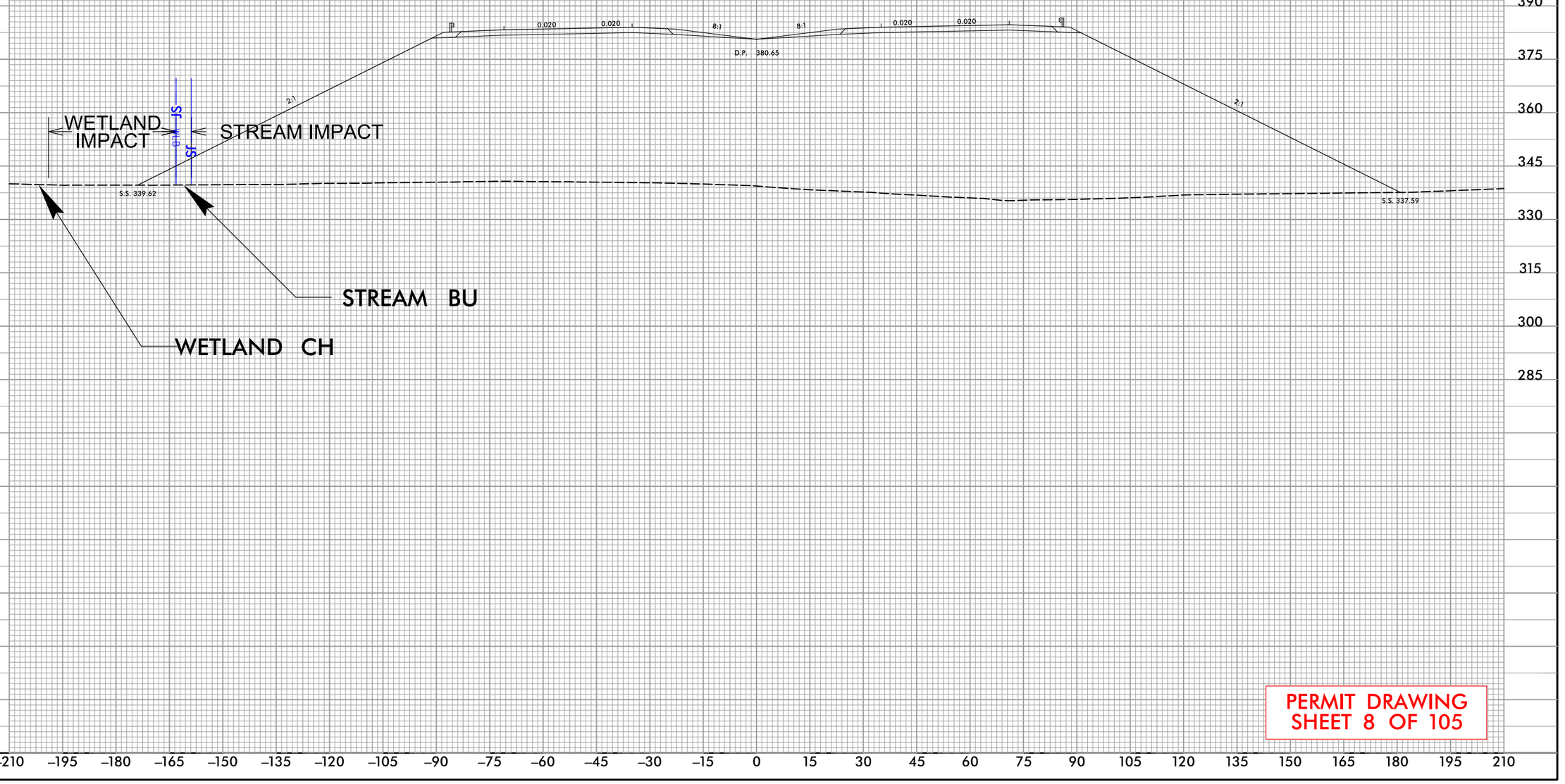
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SITE 4, WETLAND CH & STREAM BU
STATION 512 + 00 –L–

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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SHEET 8 OF 105

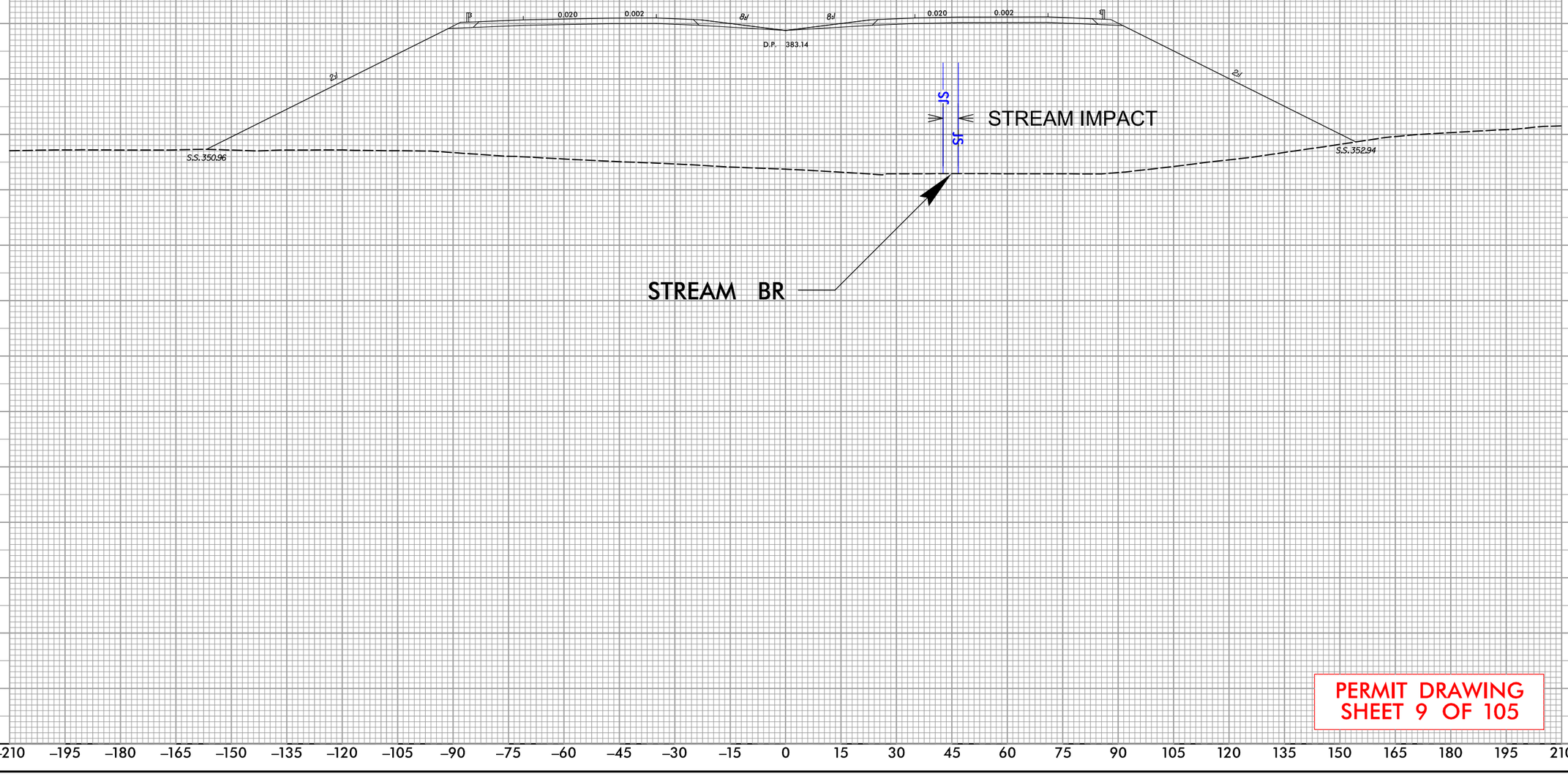
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CROSS–SECTION F–F
SITE 5, STREAM BR
STATION 515+00 –L–



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SHEET 9 OF 105

REVISIONS
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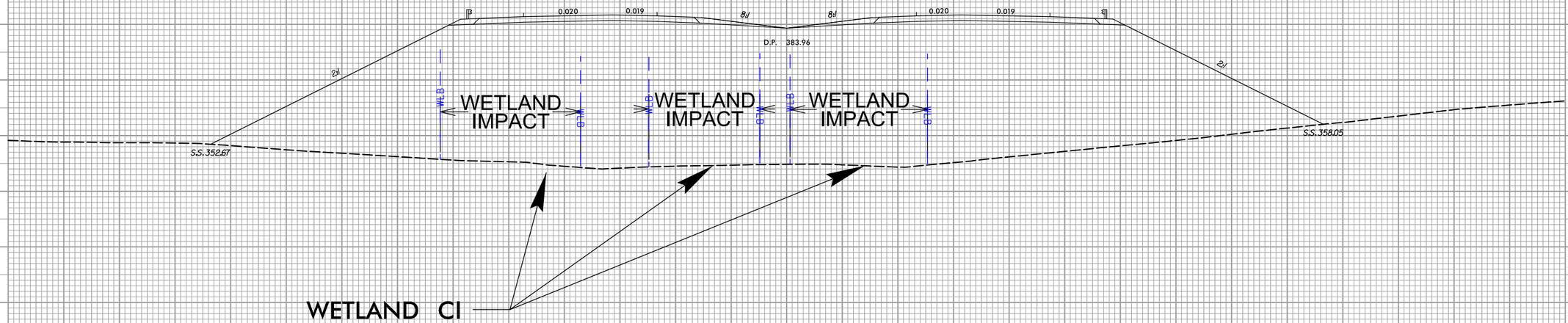
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PROJECT REFERENCE NO.	SHEET NO.
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CROSS–SECTION G–G
SITE 5, WETLAND CI
STATION 516+00 –L–



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SHEET 10 OF 105

REVISIONS

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PERMIT DRAWING
SHEET 11 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

REVISIONS 5/14/99

MATCHLINE SHEET 6 STA. 522+49.20 -L-

POT Sta. 528+22.27 =
-Y16- POT Sta. 16+37.04
=90° 34' 32.6"

20+00
-Y16-

HOLMES, JASON
HOLMES, TRINITY

-Y16- PC Sta. 18+70.92

525+00

15+00
-Y16-

NC DEPARTMENT OF TRANSPORTATION

530+00

WETLAND CJ IMPACT

535+00

SITE 7

WCJ

-L- TS Sta. 529+90.59

-L- SC Sta. 532+00.59

-Y16- PT Sta. 13+41.01

WCJ

MATCHLINE SHEET 13 STA. 537+89.24 -L-

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davidconner

PERMIT DRAWING
SHEET 11A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

REVISIONS

5/14/99

MATCHLINE SHEET 6 STA. 522+49.20 -L-

MATCHLINE SHEET 13 STA. 537+89.24 -L-

20+00 -Y16-

POT Sta. 528+22.27 = -Y16- POT Sta. 16+37.04 =90° 34' 32.6"

-Y16- PC Sta. 18+70.92

525+00

530+00

535+00

15+00 -Y16-

WETLAND CJ IMPACT

SITE 7

-L- TS Sta. 529+90.59

-L- SC Sta. 532+00.59

-Y16- PT Sta. 13+41.01

HOLMES, JASON
HOLMES, TRINITY

NC DEPARTMENT OF TRANSPORTATION

WCJ

WLB

BZ 1

BZ 2

714 709 710 711 707 706 705 704

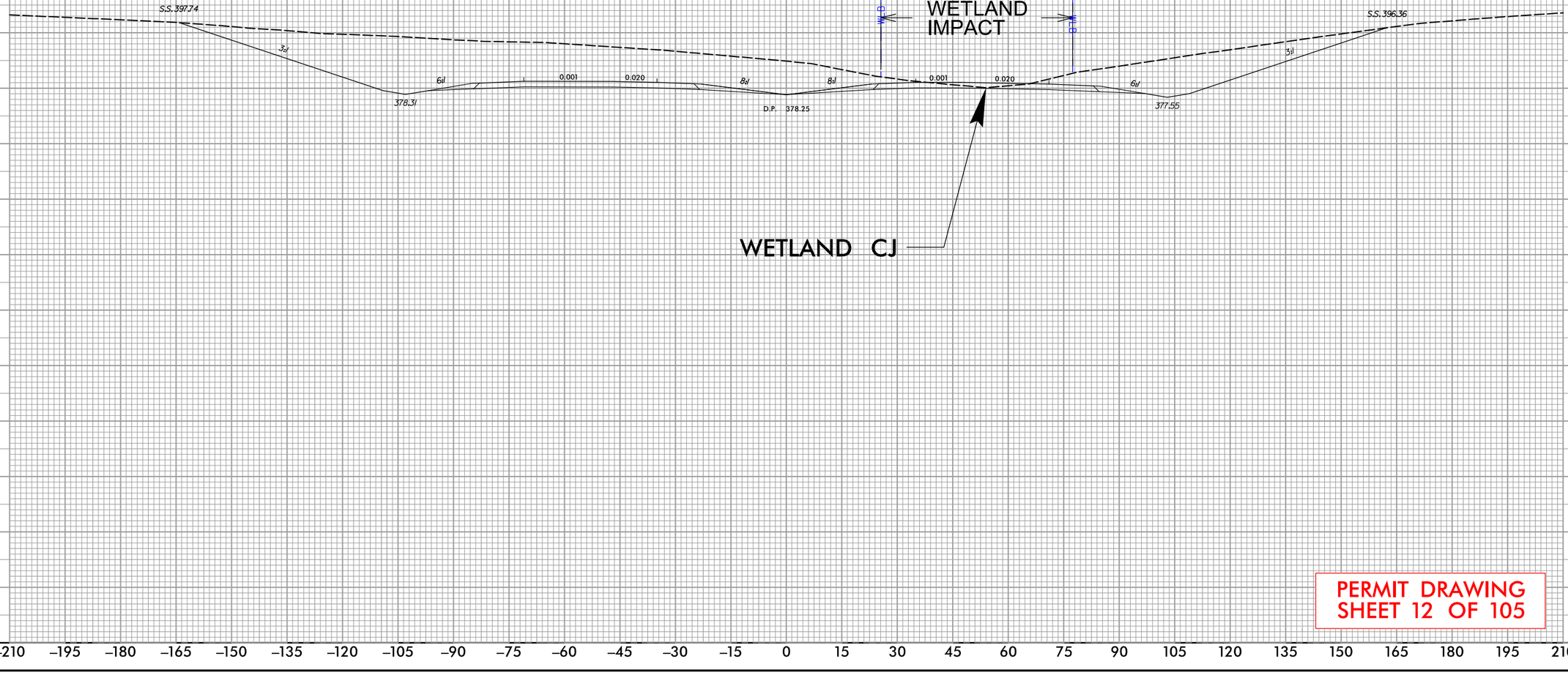
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dwidgenger

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 Dr Gary Parkway, Suite 101
Cary, NC 27513
(919) 557-5909
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CROSS–SECTION H–H
SITE 7, WETLAND CJ
STATION 530+00 –L–



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SHEET 12 OF 105

REVISIONS

5/14/99

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SHEET 13 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

MATCHLINE SHEET 11/STA. 537+89.24 –L–

MATCHLINE SHEET 16/ STA. 553+59.64 –L–

GAS LINE 60' R/W

PROPOSED 2@5'X5' RCBC

WETLAND CL IMPACT

STREAM BY IMPACT

SITE 8

WCL

WCM

WLB

SBY

WCN

JS MIT

WCO

WCP

–L– CS Sta. 543+93.69

–L– ST Sta. 546+03.69

540+00

545+00

550+00

703 702 701 700 699 698 697

1.5SFD 2SFD 1.5S FD

BST

BZ 1 BZ 2

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PERMIT DRAWING
SHEET 13A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 11/ STA. 537+89.24 –L–

MATCHLINE SHEET 16/ STA. 553+69.64 –L–

540+00

545+00

550+00

PROPOSED 2@5'x5' RCBC

WETLAND CL IMPACT

STREAM BY IMPACT

SITE 8

WCM

WLB

WCL

SBY

SBL

WCN

WCO

WCP

–L– CS Sta. 543+93.69

–L– ST Sta. 546+03.69

BZ 1

BZ 2

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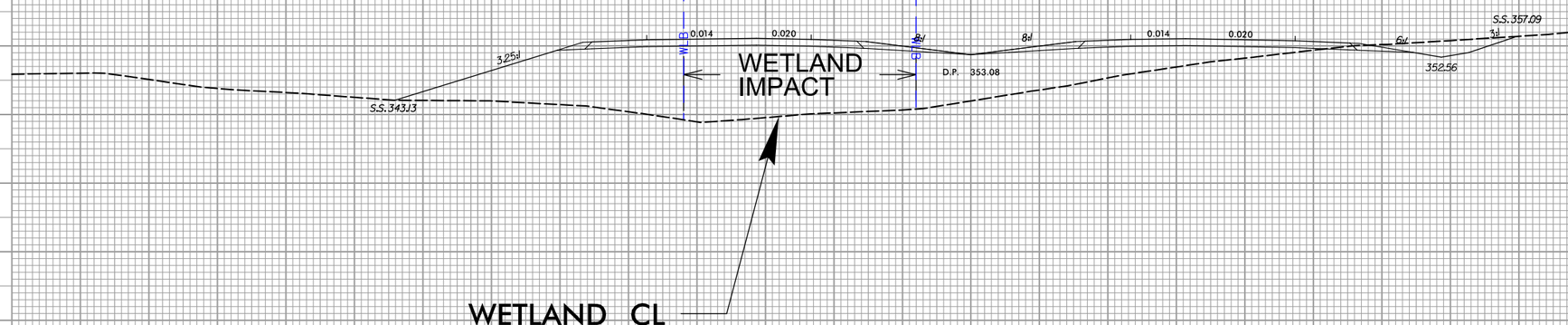
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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CROSS–SECTION I–I
SITE 8, WETLAND CL
STATION 547+00 –L–



PERMIT DRAWING
SHEET 14 OF 105

REVISIONS
5/14/99

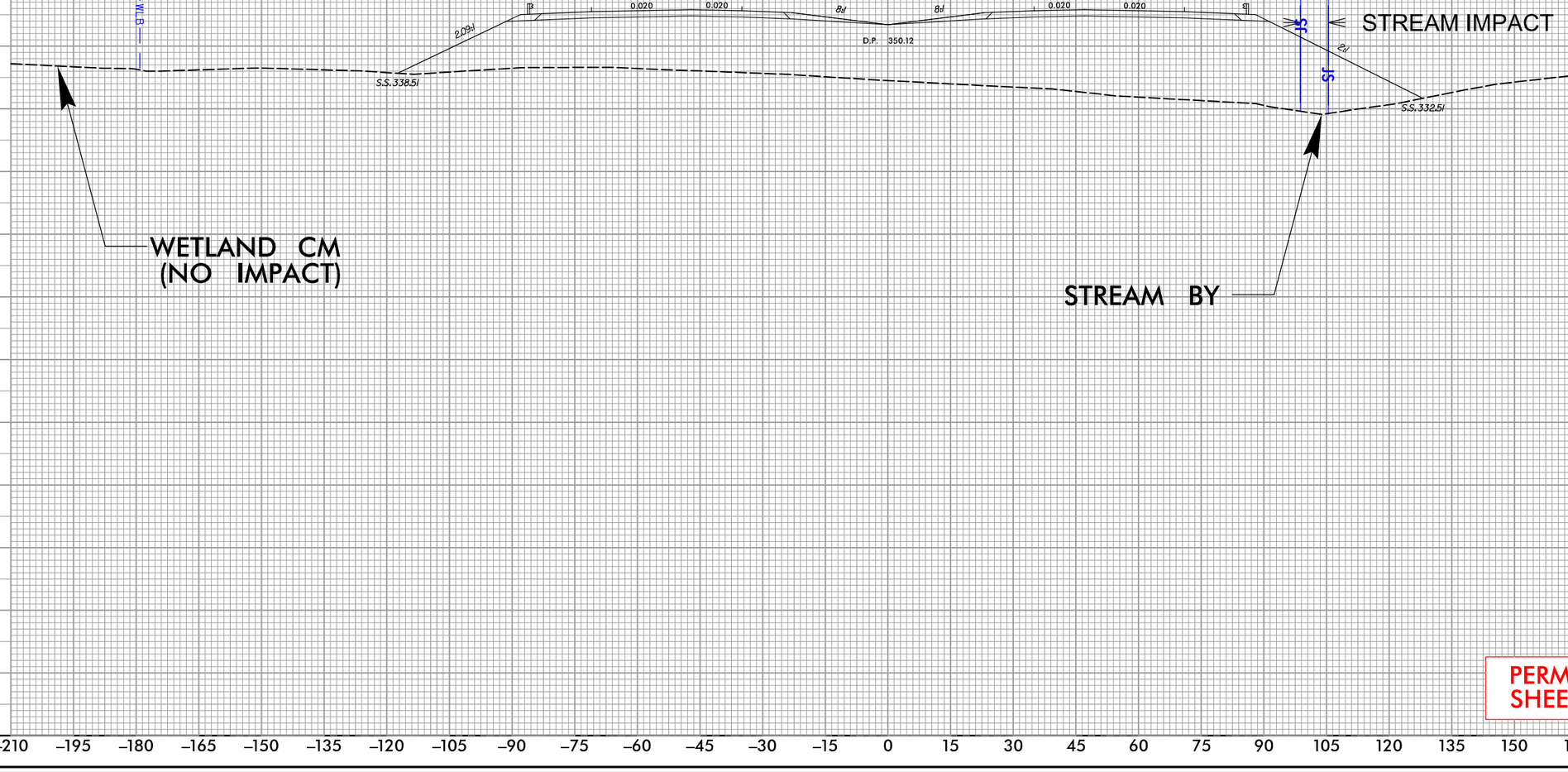
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
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Concord, NC 28027
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CROSS–SECTION J–J
SITE 8, STREAM BY
STATION 549+00 –L–



PERMIT DRAWING
SHEET 15 OF 105

REVISIONS

5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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PERMIT DRAWING SHEET 16 OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 9

WETLAND CQ IMPACT

STREAM BX IMPACT

WETLAND CR IMPACT

PROPOSED 3@8'x5' RCBC

-L- POT Sta. 567+50.00= -Y17RPB- ST Sta. 10+00.00 71.00' LT

-L- POT Sta. 566+50.00 -Y17RPC- POT Sta. 10+00.00 71.00' RT

WCQ WCR WCS WCT WCU SBV SBX

WLB MIT US MIT

555+00 560+00 565+00

MATCHLINE SHEET 13 STA. 558+59.64 -L-

MATCHLINE SHEET 19 STA. 569+3.45 -L-

GAS LINE 60' R/W UNKNOWN

ARMSTRONG, LAKEISHA R

LANERIDGE SUBDIVISION

678 677 676 675 691 687 686 685 693 694 689 688

1.5SBKD 2SBKD 2S BKD 1.5 SBKD 3SFD 39' CONC 1.5S FD 2SFD 18' CONC 1SFD 1.5S FD

REVISIONS 5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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PERMIT DRAWING SHEET 16A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 9

WETLAND CQ IMPACT

STREAM BX IMPACT

WETLAND CR IMPACT

PROPOSED 3@8'x5' RCBC

-L- POT Sta. 567+50.00= -Y17RPB- ST Sta. 10+00.00
71.00' LT

-L- POT Sta. 566+50.00= -Y17RPC- POT Sta. 10+00.00
71.00' RT

MATCHLINE SHEET 13 STA. 553+59.64 -L-

MATCHLINE SHEET 19 STA. 569+3.45 -L-

555+00 560+00 565+00

WCQ WCR WCS WCT WCU SBV SBX

WLB MIT US MIT

UNKNOWN ARMSTRONG, LAKEISHA R

LANERIDGE SUBDIVISION

GAS LINE

REVISIONS

5/14/99

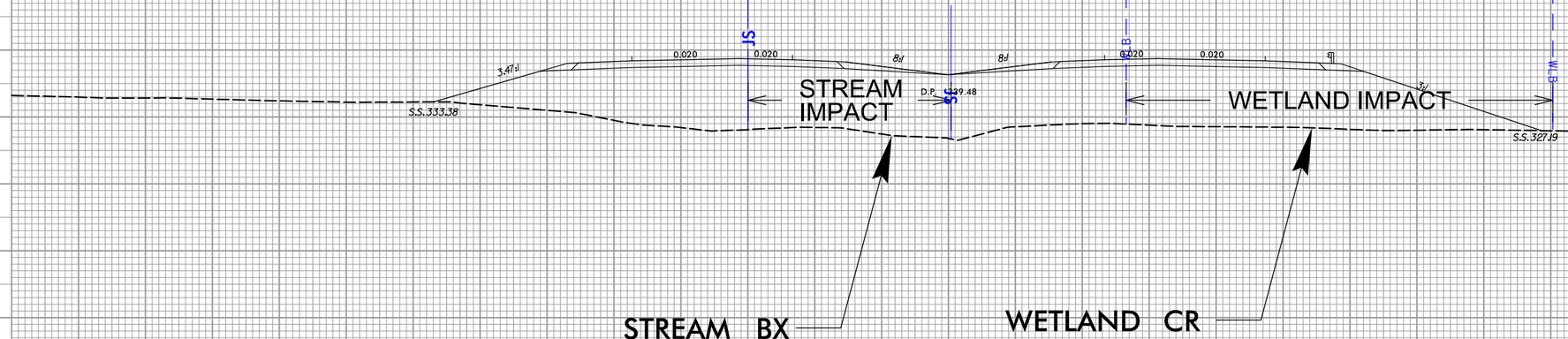
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davidgroger

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1555 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-5909
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CROSS–SECTION K–K
SITE 9, WETLAND CR & STREAM BX
STATION 558+00 –L–



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SHEET 17 OF 105

REVISIONS

5/14/99

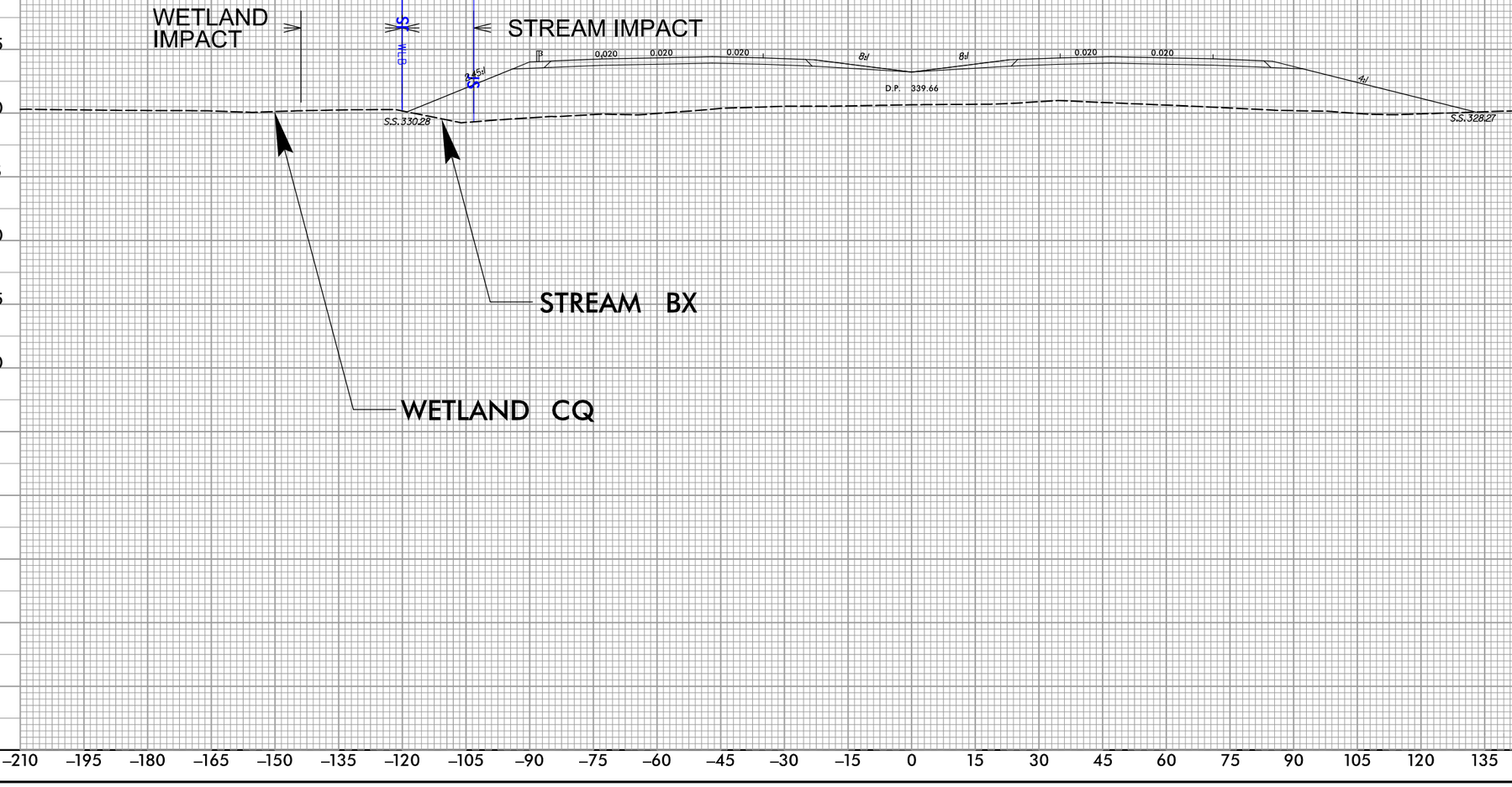
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
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CROSS–SECTION L–L
SITE 9, WETLAND CQ & STREAM BX
STATION 559+00 –L–



PERMIT DRAWING
SHEET 18 OF 105

REVISIONS 5/14/99

9:34:25 AM
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davidcooper

PERMIT DRAWING
SHEET 19 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

MATCHLINE SHEET 16 STA. 569+3.45 -L-

-Y17RPB- 20+00

570+00

575+00

580+00

585

-L-
-Y17

-Y17RPC- PC Sta. 571+70.57

-Y17RPC- SC Sta. 14+85.08

Sta. 12+85.08

-Y17H- PC Sta. 10+00.00

-Y17RPC- CS Sta. 25+12.07

-Y17I- POT Sta. 12+98.44

-Y17RPC- 25+00

WETLAND CW IMPACT

SITE 10

POND N IMPACT

PN

WCW

WBW

WLB

SSC

MIT JS

DAM

BZ 1

BZ 2

E

C

10' SOIL C

BALL, FORREST H
BALL, DELORES G

TETREAULT, PHILLIP J

MONROE, MARK
MONROE, MARILYN

9:34:33 AM
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dmiddlecoper

PERMIT DRAWING
SHEET 19A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

MATCHLINE SHEET 16 STA. 569+34.45 -L-

570+00

575+00

580+00

585

-Y17RPB- 20+00

-Y17RPC- PC Sta. 5+71+70.57

-Y17RPC- SC Sta. 14+85.08

Sta. 12+85.08

-Y17H- PC Sta. 10+00.00

-Y17I- POT Sta. 12+98.44

-Y17RPC- CS Sta. 25+12.07

-Y17RPC- 25+00

WETLAND CW IMPACT

SITE 10

POND N IMPACT

PN

WCW

WBW

BALL, FORREST H
BALL, DELORES G

TETREAULT, PHILLIP J

MONROE, MARK
MONROE, MARILYN

10' SOIL C

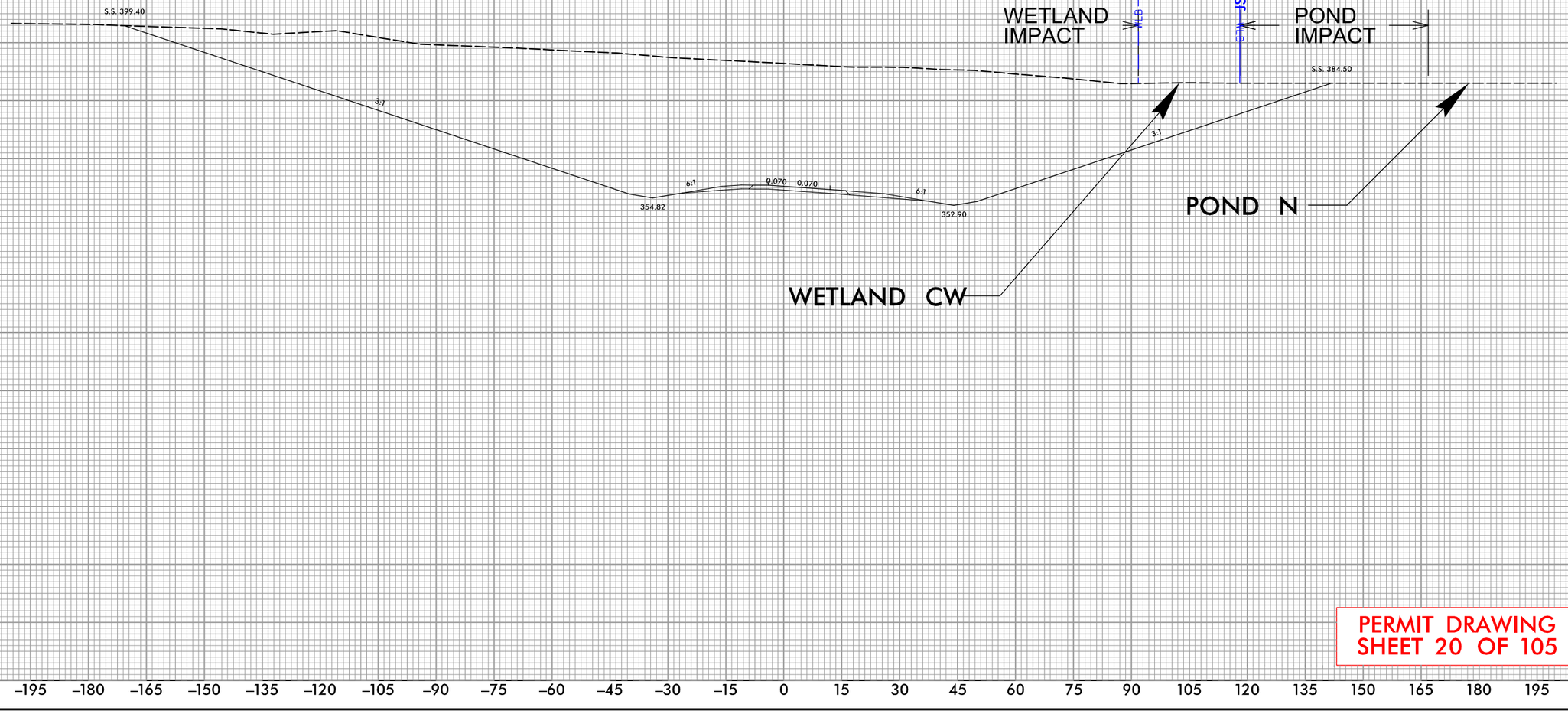
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dmiddlecoper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION M–M
SITE 10, WETLAND CW & POND N
STATION 21+00 –Y17RPC–



PERMIT DRAWING
SHEET 20 OF 105

REVISIONS
5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0959
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 21 OF 105

50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS
5/14/99

645 644 646 643
ISBKD ISBKD ISED ISFD
10' GR
8' SOIL
8' GR
23' BS
CONC

590+00 595+00 600+00
40+00 -Y17- 25+00 -Y17RPA-
35+00 -Y17- 25+00 -Y17RPD-
-Y17RPD- ST Sta 2

POND P IMPACT
SITE 11
PP
HWL
SWL

MARY T BALL PROPERTIES LLC
COMFORT HOMES INC
RACKLEY, SALLIE

MATCHLINE SHEET 23 STA. 600+92.95 -L-

9:34:53 AM
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PERMIT DRAWING
SHEET 21A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 Sit Cary Parkway, Suite 101
Cary, NC 27513
(919) 557-0959
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS
5/14/99

POND P IMPACT

SITE 11

590+00 -Y17-

595+00 -Y17-

600+00

40+00 -Y17-

25+00 -Y17RPA-

35+00 -Y17-

25+00 -Y17RPD-

-Y17RPD- ST Sta 2

MATCHLINE SHEET 23 STA. 600+92.95 -L-

MARY T BALL PROPERTIES LLC

COMFORT HOMES INC

RACKLEY, SALLIE

STAGE RD

645 644 646 643

ISBKD ISED ISFD

10' GR 8' SOIL 8' GR

PP

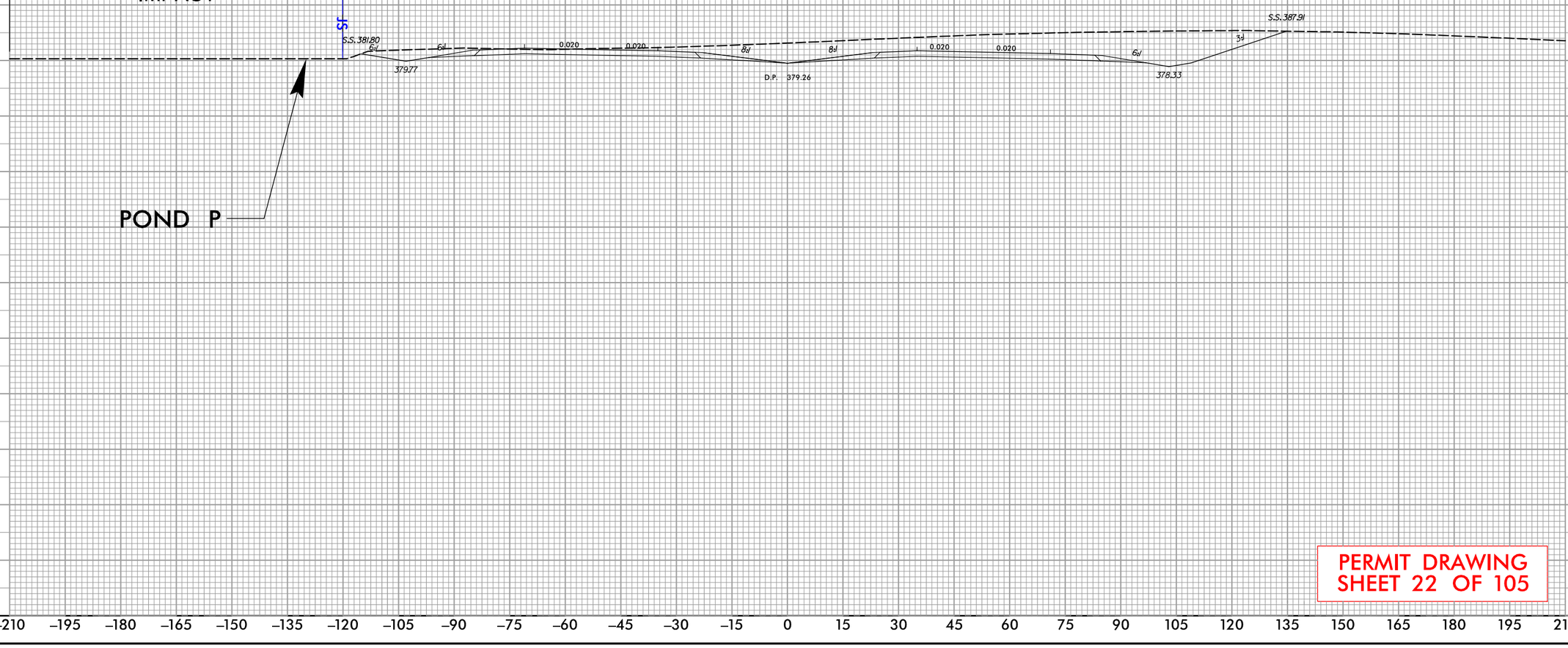
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 Dr Gary Parkway, Suite 101
Concord, NC 28027
(973) 551-0490
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION N–N
SITE 11, POND P
STATION 600+00 –L–



PERMIT DRAWING
SHEET 22 OF 105

REVISIONS

5/14/99

9:35:04 AM
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davidcooper

PERMIT DRAWING
SHEET 23 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SCALE 50′ 0′ 100′

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

MATCHLINE SHEET 21 STA. 600+92.95 -L-

MATCHLINE SHEET 25 STA. 614+45.47 -L-

605+00

610+00

615+00

WETLAND CZ IMPACT

SITE 11 CONT'D.

SITE 12

STREAM CC IMPACT

STREAM CK IMPACT

WETLAND CZ IMPACT

-L- POC Sta. 612+43.15=
-Y17RPA- 7.00' LT Sta. 10+00.00

-L- POC Sta. 609+63.47=
-Y17RPD- ST Sta. 10+00.00
71.00' RT

-Y17RPD- SC Sta. 12+00.00

-Y17RPA- 15+00

-Y17RPA- 42+00

PROPOSED 2@7'x5' RCBC

WCZ (2)

WCZ (2)

SCE

SCD

SCC

SCA

RUINS

CAN

NEAL BALL

BZ 1

BZ 2

WLB

SS MH

CW

C

F

E

9:35:13 AM
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davidcooper

PERMIT DRAWING
SHEET 23A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

MATCHLINE SHEET 21 STA. 600+92.95 -L-

605+00

WETLAND CZ IMPACT

SITE 11 CONT'D.

-L- POC Sta. 612+43.15=
-Y17RPA- 00' LT Sta. 10+00.00

MATCHLINE SHEET 25 STA. 614+45.47 -L-

SITE 12

STREAM CC IMPACT

STREAM CK IMPACT

WETLAND CZ IMPACT

-L- POC Sta. 609+63.47=
-Y17RPD- ST Sta. 10+00.00
71.00' RT

-Y17RPD- SC Sta. 12+00.00

PROPOSED 2@7'x5' RCBC

WCZ (2)

SCE

SCD

SCA

RUINS

NEAL BALL

CAN

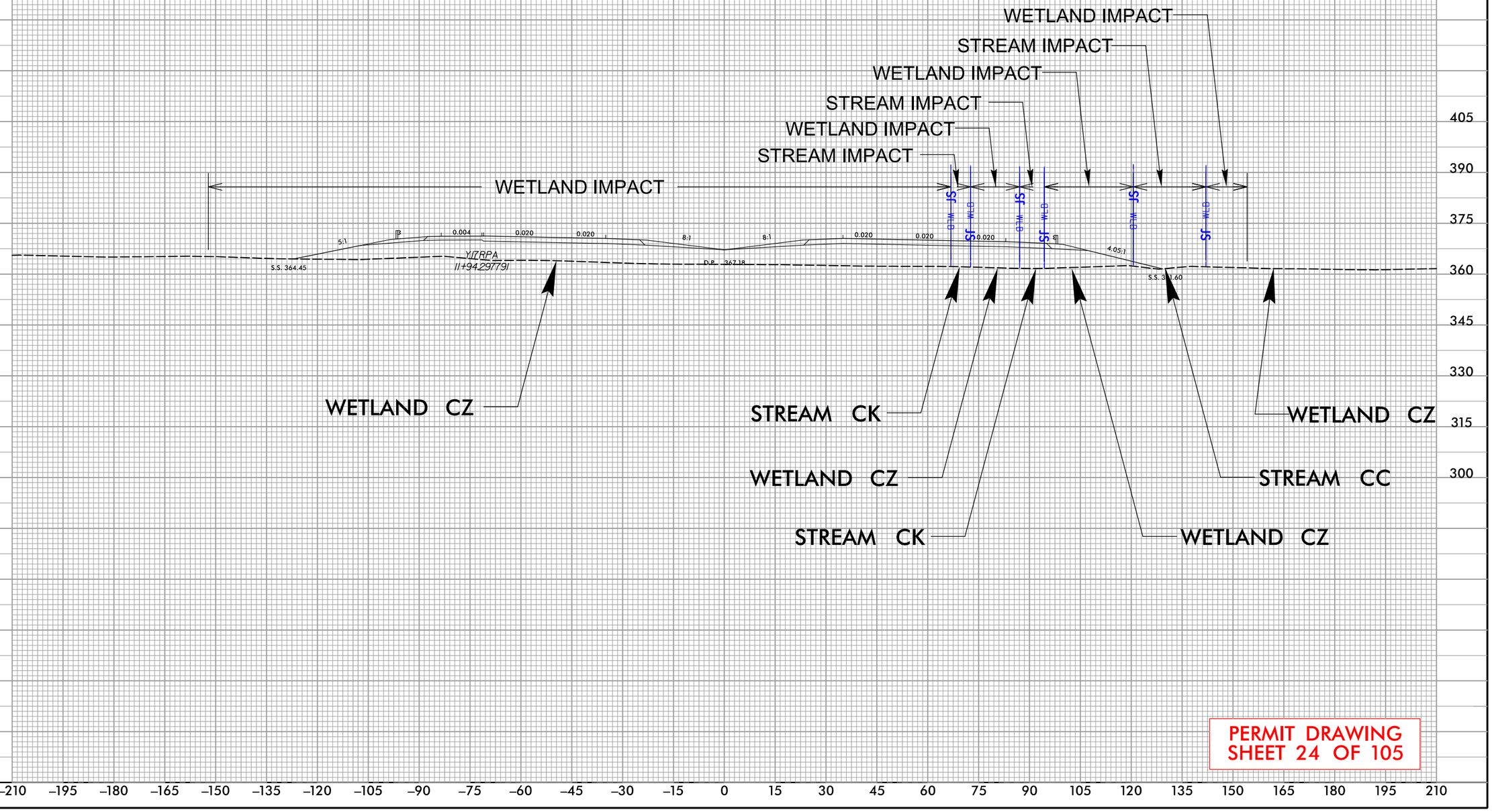
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 Dr Gary Parkway, Suite 101
Cary, NC 27513
(919) 557-5909
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION O–O, SITES 11 & 12, WETLAND CZ, STREAM CC, & STREAM CK STATION 610+50 –L–



PERMIT DRAWING
SHEET 24 OF 105

REVISIONS 5/14/99

9:35:25 AM
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PERMIT DRAWING
SHEET 25 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

MATCHLINE SHEET 23 STA. 614+45.47-L-

615+00

620+00

625+00

35+00 -Y18-

POND Q IMPACT

POND R IMPACT

SITE 13

SITE 11 CONT'D.

WETLAND CZ IMPACT

WDA

PR

PQ

WCZ (1)

WLB

SS MH

SW ST

10' SOIL

PT Sta. 616+66.65

NEAL, SHERRY UPCHURCH
BALL, DAVID W /TR

SHERRY UPCHURCH
DAVID W /TR

9:35:23 AM
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PERMIT DRAWING
SHEET 25A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50′ 0′ 100′
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

MATCHLINE SHEET 23 STA. 614+45.47–L–

615+00

620+00

625+00

35+00 –Y18–

PT Sta. 616+66.65

POND Q IMPACT

POND R IMPACT

SITE 13

SITE 11 CONT'D.

WETLAND CZ IMPACT

WDA

PR

PQ

WCZ (1)

WLB

SF

SHERRY UPCHURCH
DAVID W /TR

NEAL, SHERRY UPCHURCH
BALL, DAVID W /TR

10' SOIL

F380

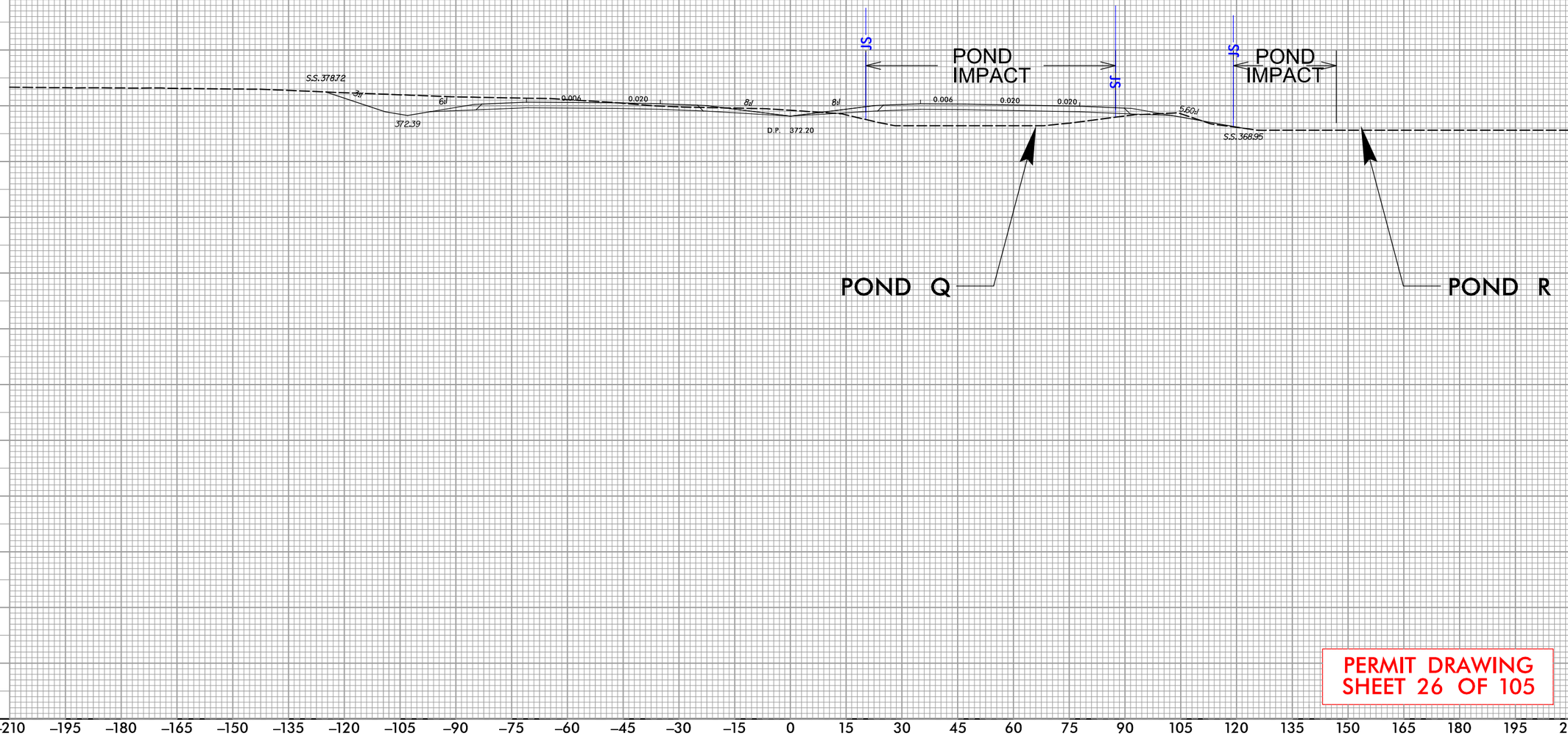
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No.F-1148
1515 SE Gary Parkway, Suite 101
Carv, NC 27511
(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION P–P
SITE 13, PONDS Q & R
STATION 617+00 –L–



PERMIT DRAWING
SHEET 26 OF 105

REVISIONS
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PERMIT DRAWING
SHEET 27 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

-Y18A- PT Sta. 16+46.84

-Y18- PRC Sta. 27+84.54

POND A

JS MIT

NEAL, SHERRY UPCHURCH

WWD

WETLAND WD IMPACT

WETLAND DE IMPACT

SITE 14

MORIN, DEANE JOSEPH

ISFD

WDE

SCF

-Y18A- POT Sta. 19+38.61

-Y18- PC Sta. 24+06.88

STREAM CF IMPACT

-Y18- POC Sta. 641+97.57 =
-Y18- POT Sta. 20+32.67
=136° 31' 54.1"

MARY T. BALL PROPERTIES LLC

15+00 -Y18A-

25+00 -Y18-

640+00

75' R/W

9:37:52 AM
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PERMIT DRAWING
SHEET 27A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27511
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

-Y18A- PT Sta. 16+46.84

-Y18- PRC Sta. 27+84.54

POND A

JS MIT

NEAL, SHERRY UPCHURCH

WWD

WETLAND WD IMPACT

WETLAND DE IMPACT

SITE 14

MORIN, DEANE JOSEPH

MARY T. BALL PROPERTIES LLC

15+00 -Y18A-

25+00 -Y18-

640+00

WDE

SCF

-Y18- PC Sta. 24+06.88

-Y18A- POT Sta. 19+38.61

STREAM CF IMPACT

-Y18- POC Sta. 641+97.57 =
-Y18- POT Sta. 20+32.67
=136° 31' 54.1"

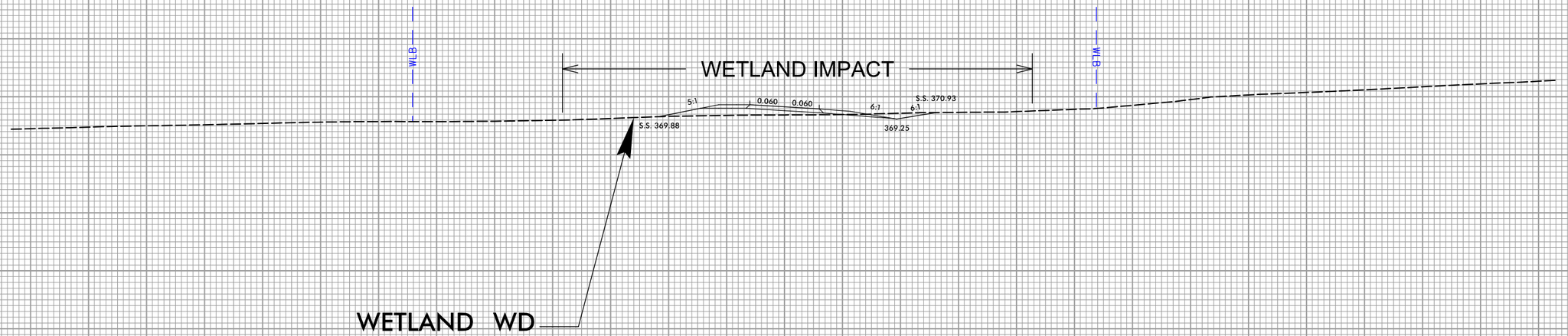
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No.F-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0909
ECOLOGICAL ENGINEERING

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CROSS–SECTION BM–BM
SITE 14, WETLAND WD
STATION 16 + 00 –Y18A–



PERMIT DRAWING
SHEET 28 OF 105

REVISIONS
5/14/99

9:36:03 AM
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davidcooper

435 420 405 390 375 360 345 330

–210 –195 –180 –165 –150 –135 –120 –105 –90 –75 –60 –45 –30 –15 0 15 30 45 60 75 90 105 120 135 150 165 180 195 210

PERMIT DRAWING
SHEET 29 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

5/14/99

REVISIONS

8:36:12 AM
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davidcooper

WETLAND DB IMPACT

WETLAND DB IMPACT

SITE 15

-L- CS Sta. 660+00.86

-L- ST Sta. 663+15.86

-L- TS Sta. 666+31.38

655+00

660+00

665+00

670+00

WDD

SCG

SCI

WLB

SCJ

BZ 1

BZ 2

606 WELL LOT

605

607 ISFD

608 ISFD

609 S

610

611

612

1777

1.5SFD

2SFD

10' CONC

12' CONC

20' BSL

CREST OF CARO SUBDIVISION

NC DEPARTMENT OF TRANSPORTATION

TAVERNIER SUBDIVISION PROPERTY OWNERS ASSN INC

DEVENOW, JOSEPH L IV
DEVENOW, LINSEY C

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No. P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

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PERMIT DRAWING SHEET 29A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

N

REVISIONS

5/14/99

SITE 15

WETLAND DB IMPACT

WETLAND DB IMPACT

-L- CS Sta. 660+00.86

-L- SI Sta. 663+15.86

-L- TS Sta. 666+31.38

655+00

660+00

665+00

670+00

WDB

SCG

SCI

WLB

BZ 1

BZ 2

CREST OF CAROLINA SUBDIVISION

UNDER DR

10' CONC

8" CONC

NC DEPARTMENT OF TRANSPORTATION

TAVERNIER SUBDIVISION PROPERTY OWNERS ASSN INC

DEVENOW, JOSEPH L IV
DEVENOW, LINSEY

606 607 608 609 610 611 612 1777

WELL

TANK

ISFD

1.5SFD

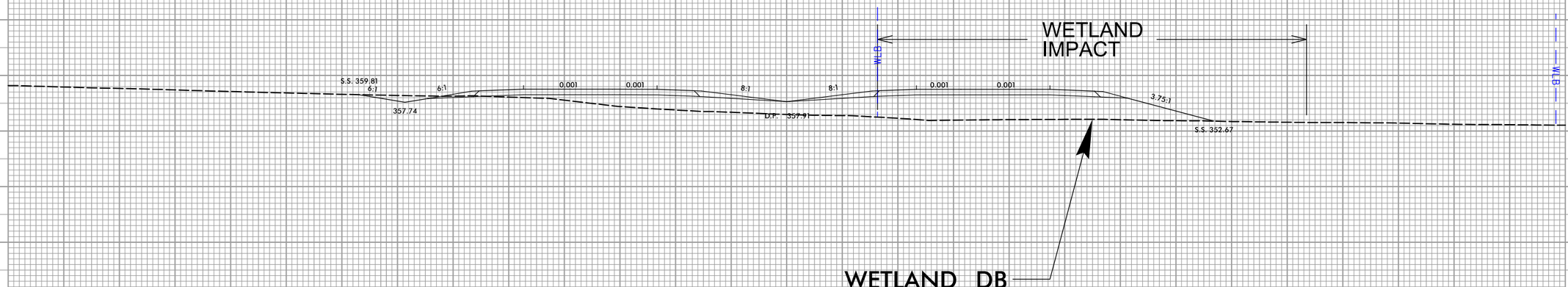
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Carv, NC 27511
(919) 557-5909
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION Q–Q
SITE 15, WETLAND DB
STATION 665+00 –L–



PERMIT DRAWING
SHEET 30 OF 105

REVISIONS

5/14/99

9:36:23 AM
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davidcooper

PERMIT DRAWING
SHEET 31 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

WETLAND DF IMPACT

POND U IMPACT

SITE 16

WETLAND DG IMPACT

POND W IMPACT

STREAM CL IMPACT

POND V IMPACT

-L- ST Sta. 695+73.15

-L- TS Sta. 697+61.58

-L- SC Sta. 699+71.58

MATCHLINE SHEET 35
STA. 705+57.18 -L-

NC DEPARTMENT OF TRANSPORTATION

TURNER FARM SUBDIVISION

HUNTWYCK

SR 3858

HICKS, LINWOOD THOMAS
HICKS, CAROL Y

REVISIONS

5/14/99

8:36:32 AM
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davidcooper

PERMIT DRAWING
SHEET 31A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No. P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

WETLAND DF IMPACT

POND U IMPACT

SITE 16

WETLAND DG IMPACT

POND W IMPACT

STREAM CL IMPACT

POND V IMPACT

-L- ST Sta. 695+73.15

-L- TS Sta. 697+61.58

-L- SC Sta. 699+71.58

-L- CS Sta. 705+00

MATCHLINE SHEET 35
STA. 705+57.18 -L-

NC DEPARTMENT OF TRANSPORTATION

TURNER FARM SUBDIVISION

HICKS, LINWOOD THOMAS
HICKS, CAROL

RAN, MIQUEL P
URAN, AMANDA G

GARNER STATION

SR 3858 HONEYWYCK

567 568 569 570 561 562 563

ISFD 1.5SFD ISBD ISBKD

12' BST 20' CONC

REVISIONS

5/14/99

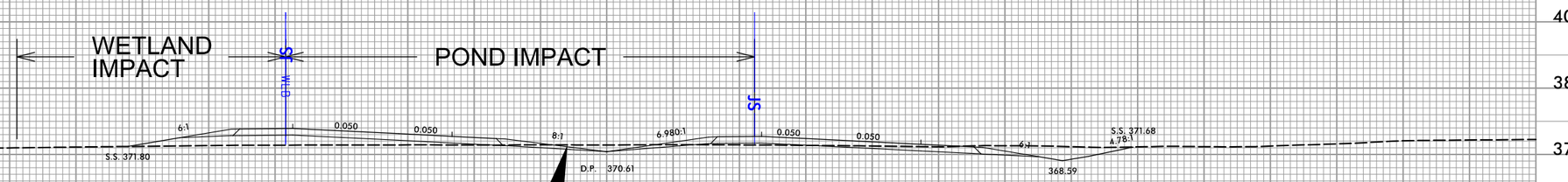
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION R–R
SITE 16, WETLAND DF & POND U
STATION 690+00 –L–



WETLAND DF

POND U

415 400 385 370 355 340 325 310

–210 –195 –180 –165 –150 –135 –120 –105 –90 –75 –60 –45 –30 –15 0 15 30 45 60 75 90 105 120 135 150 165 180 195 210

PERMIT DRAWING
SHEET 32 OF 105

REVISIONS 5/14/99

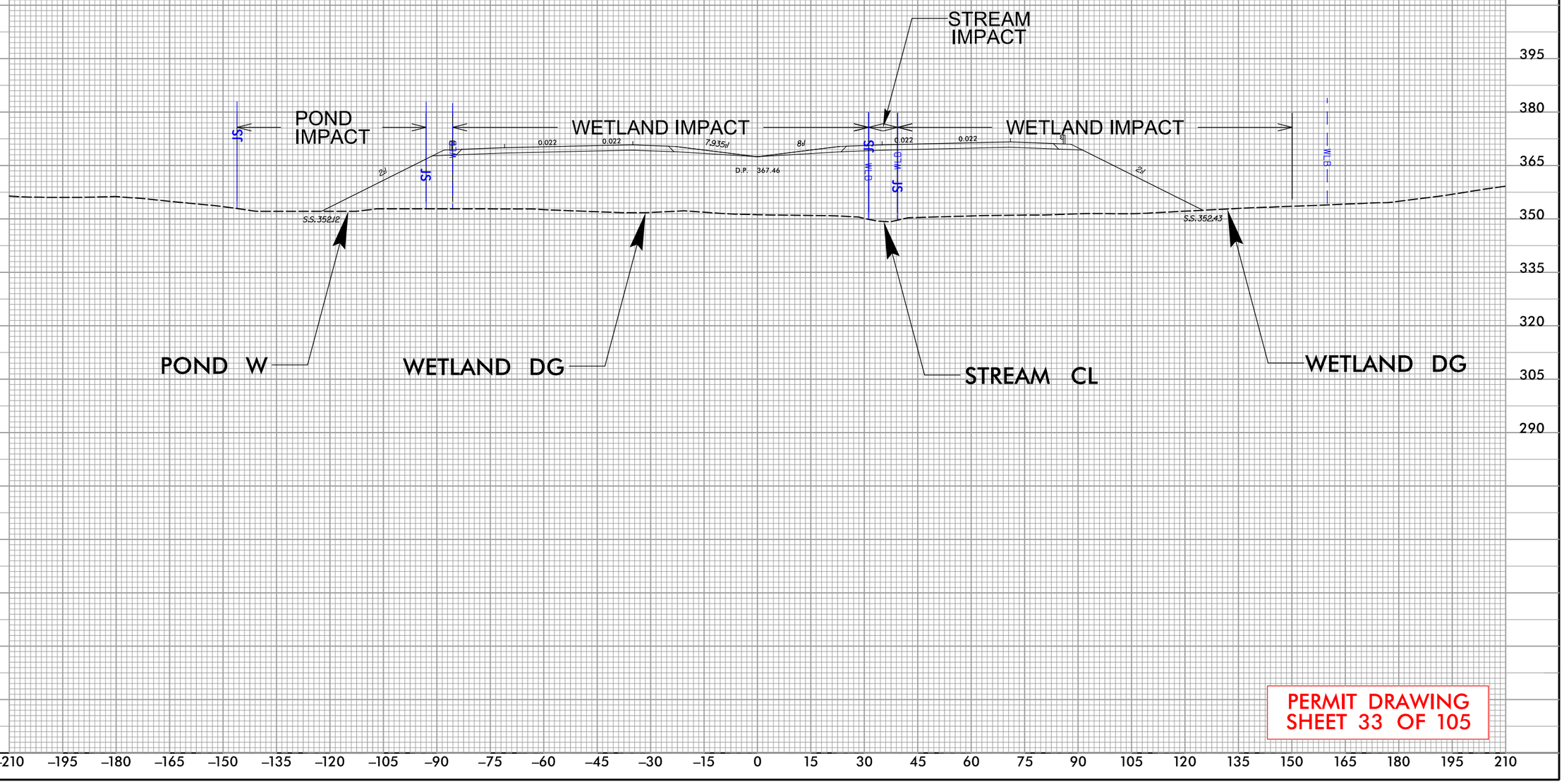
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CROSS–SECTION S–S
SITE 16, WETLAND DG, STREAM CL, & POND W STATION 699+00 –L–



PERMIT DRAWING
SHEET 33 OF 105

REVISIONS

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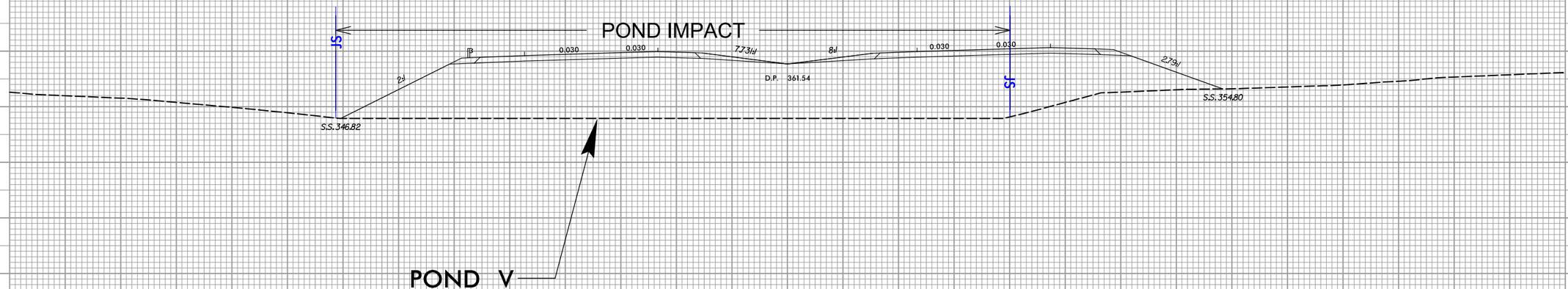
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CROSS–SECTION T–T
SITE 16, POND V
STATION 704+00 –L–



PERMIT DRAWING
SHEET 34 OF 105

REVISIONS
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PERMIT DRAWING
SHEET 35 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 16 CONT'D.

SITE 17

SITE 18

MATCHLINE SHEET 31
STA. 705+57.18 -L-

STREAM CL IMPACT

STREAM CM IMPACT

WETLAND DH IMPACT

STREAM CN IMPACT

PROPOSED 2@7'X5' RCBC

SHANNONDALE DR

SEDALIA PARK SUBDIVISION

JOE LEACH RD

20' BST

10' SOIL

9' SOIL

ANTHONY GARLAND AVENT RVCBLE TRUST

SIMPKINS, WALDO BETTY H HUMPHERSON, AMY H

PENDERGRAFT, HILDA SIMPKINS

715+00

720+00

-L- CS Sta

REVISIONS

5/14/99

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PERMIT DRAWING
SHEET 35A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 16 CONT'D.

MATCHLINE SHEET 31
STA. 705+57.18 -L-

STREAM CL IMPACT

SITE 17

STREAM CM IMPACT

PROPOSED 2@7'X5' RCBC

WETLAND DH IMPACT

STREAM CN IMPACT

SITE 18

715+00

720+00

-L- CS Sta

SEDALIA PARK SUBDIVISION

SHANNONDALE DR

JOE KNIGHT RD

10' SOIL

9' SOIL

ANTHONY GARLAND AVENT RVCBLE TRUST

WALDO, BETTY H HUMPHERSON, AMY H

PENDERGRAF HILDA SIMPKIN

SIMPKIN WALDO

REVISIONS

5/14/99

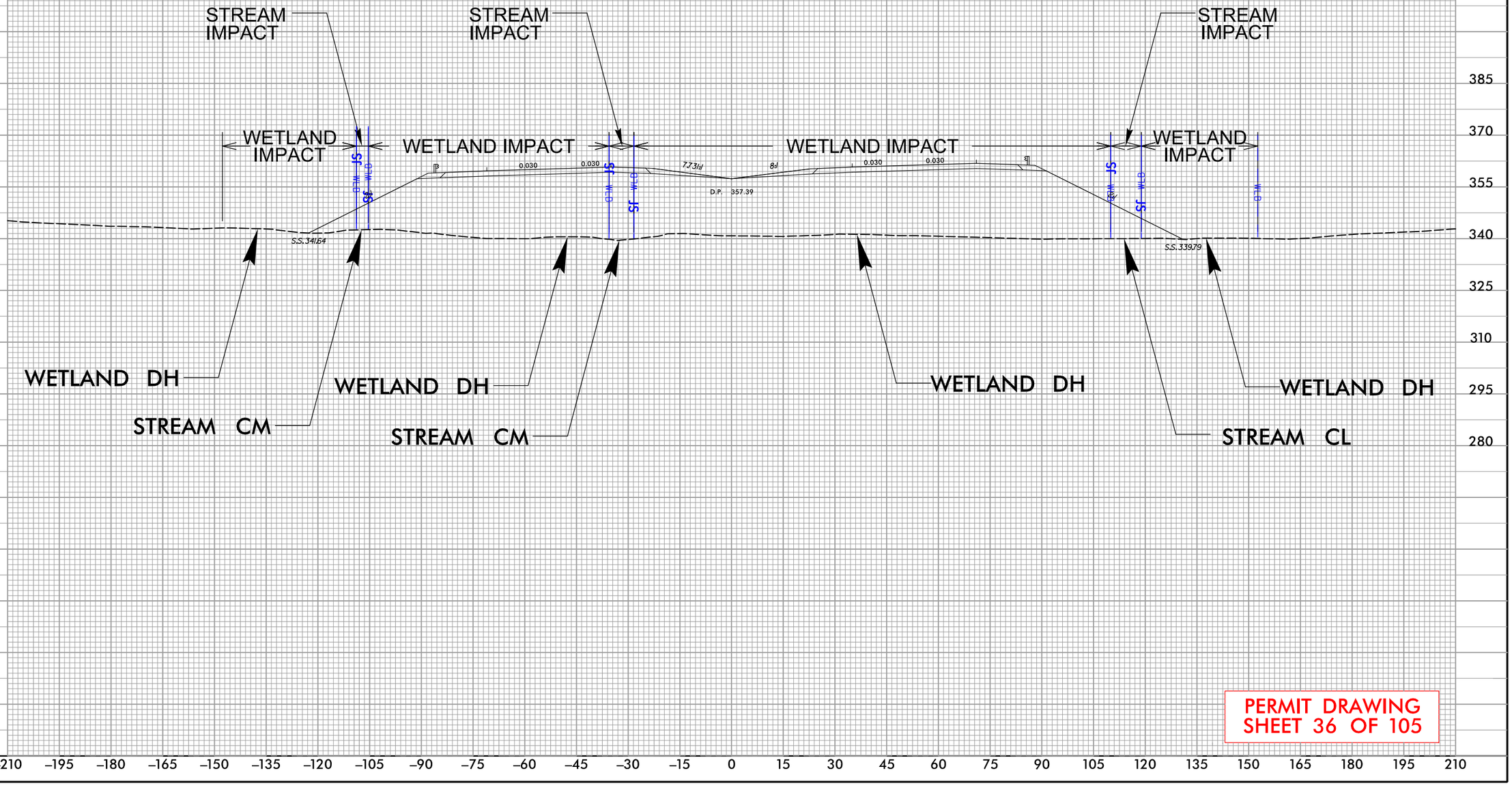
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R-2828	

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CROSS–SECTION U–U, SITES 16 & 17, WETLAND DH, STREAM CL, & STREAM CM STATION 707+50 –L–



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SHEET 36 OF 105

REVISIONS 5/14/99

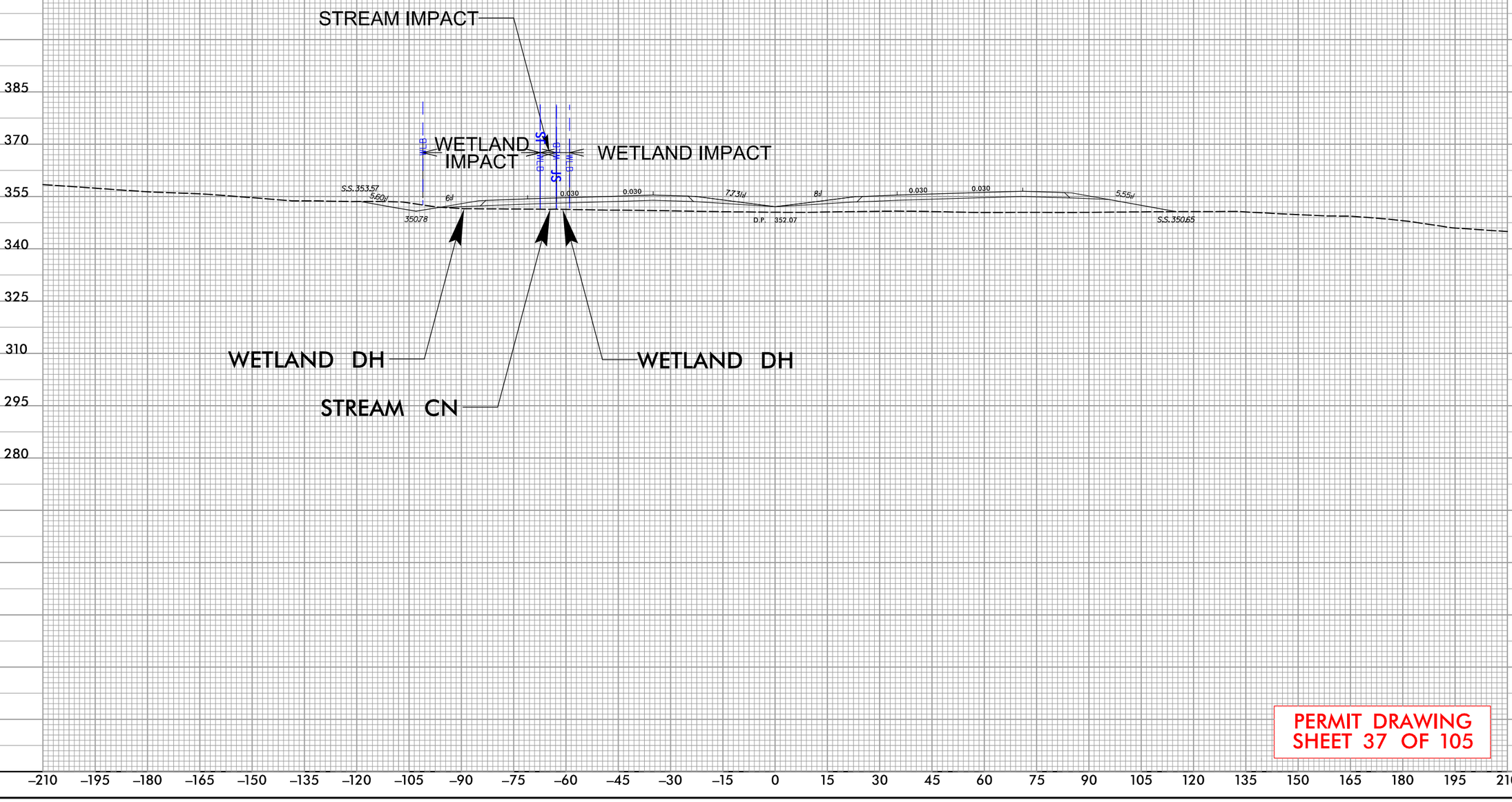
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
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(919) 553-6906
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CROSS–SECTION V–V
SITE 18, WETLAND DH & STREAM CN
STATION 712 + 00 –L–



PERMIT DRAWING
SHEET 37 OF 105

REVISIONS 5/14/99

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PERMIT DRAWING
SHEET 38 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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SCALE 50′ 0′ 100′

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS 5/14/99

725+00

730+00

735+00

740+00

POND Y IMPACT

PY

LASSITER, SUSAN S

SITE 19

SITE 20

STREAM CQ IMPACT

STREAM CQ IMPACT

WETLAND DJ IMPACT

STREAM CP IMPACT

PROPOSED 2@9'x7' RCBC

MCNALLY, KATIE B

MCNALLY, KATIE B

SCO

WDK

WLB

WDJ

SCP

SCQ

MT

JS

BZ 1

BZ 2

E

F

C

RW

CA

9:37:28 AM
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PERMIT DRAWING
SHEET 38A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS
5/14/99

725+00
730+00
735+00
740+00

POND Y IMPACT
PY
LASSITER, SUSAN S
SITE 19
SCO
MIT
STREAM CQ IMPACT
WETLAND DJ IMPACT
WDJ
SCP
SITE 20
MCNALLY, KATIE B
PROPOSED 209' X 7' RCBC
STREAM CP IMPACT
WDK
WLB
WDI
SJS
BZ 1
BZ 2
BZ
RW
CA
E

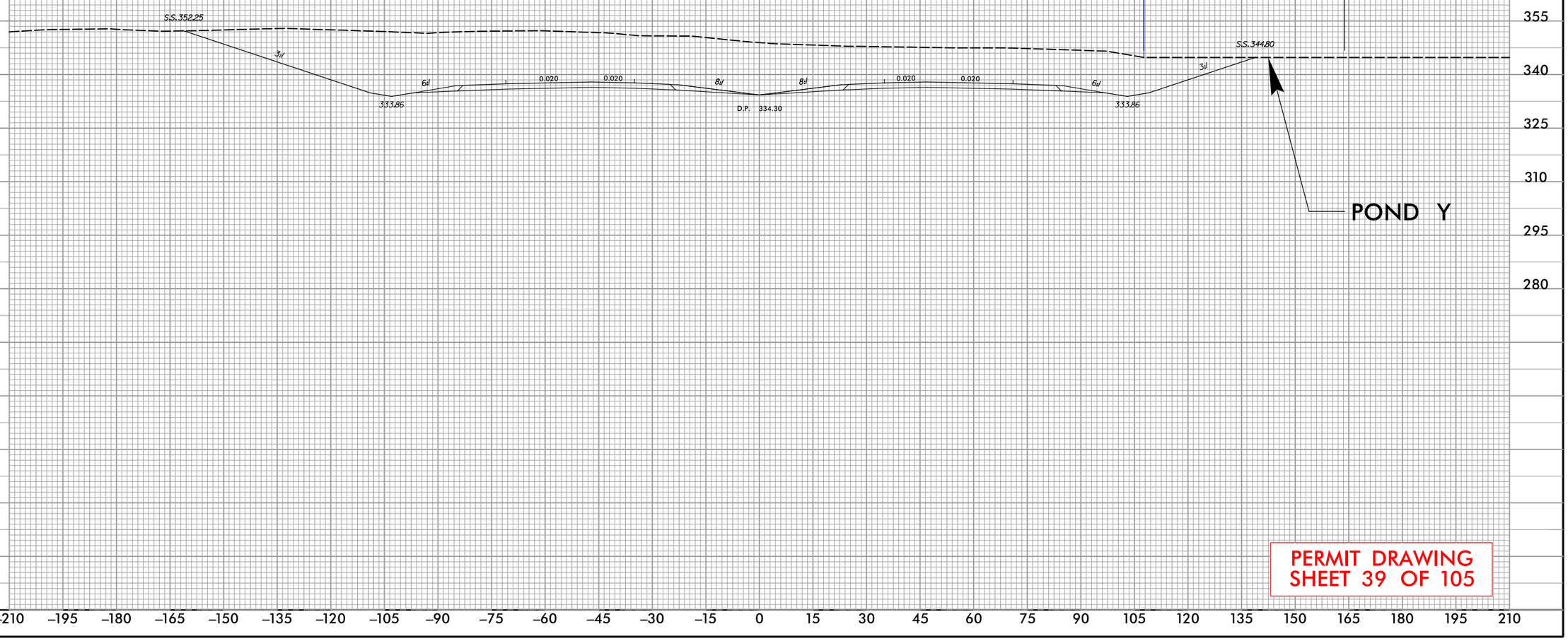
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CROSS–SECTION W–W
SITE 19, POND Y
STATION 727+00 –L–



PERMIT DRAWING
SHEET 39 OF 105

REVISIONS
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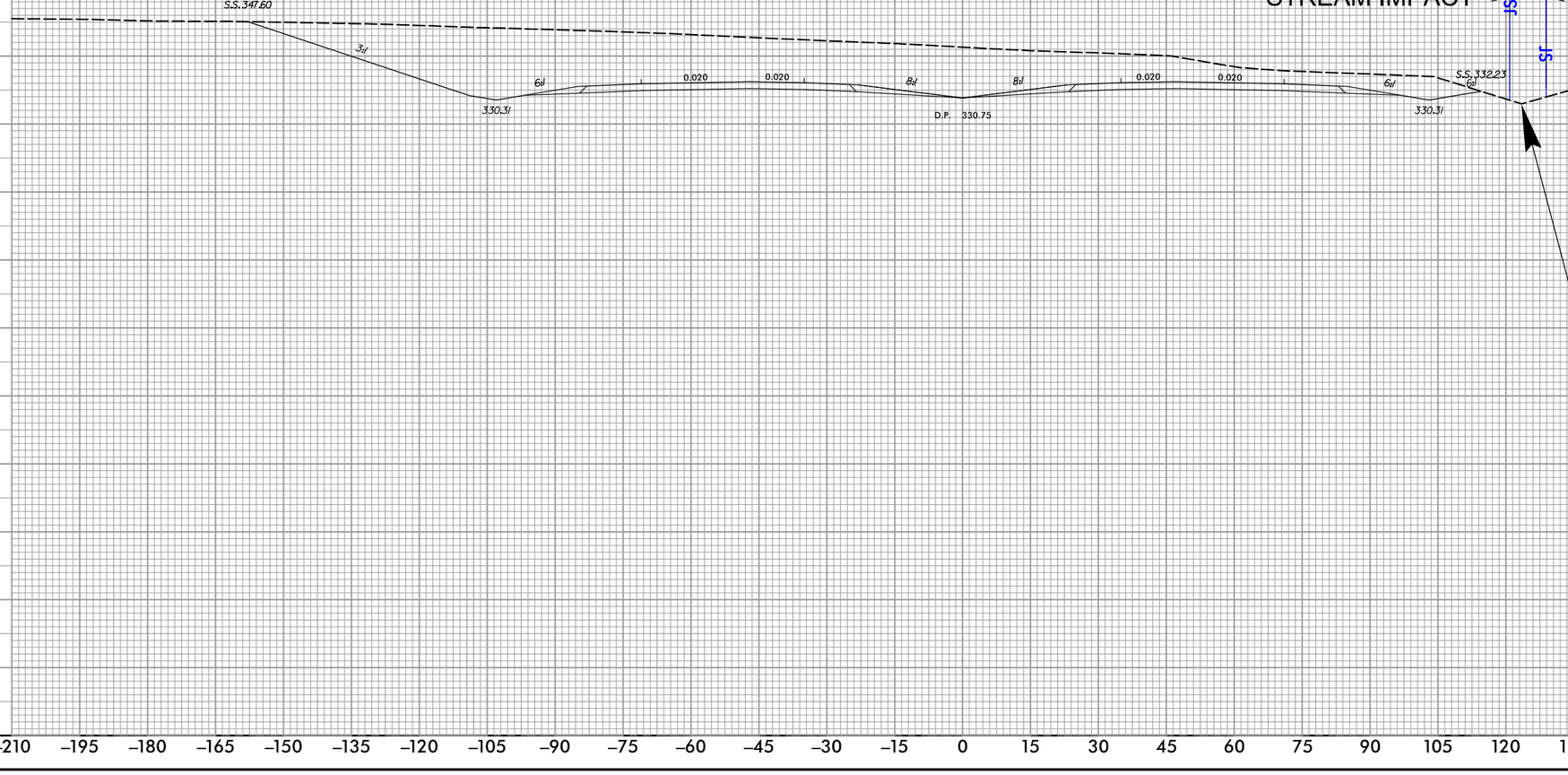
CROSS–SECTION X–X
SITE 19, STREAM CQ
STATION 730+00 –L–

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No.F-1148
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REVISIONS 5/14/99



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SHEET 40 OF 105

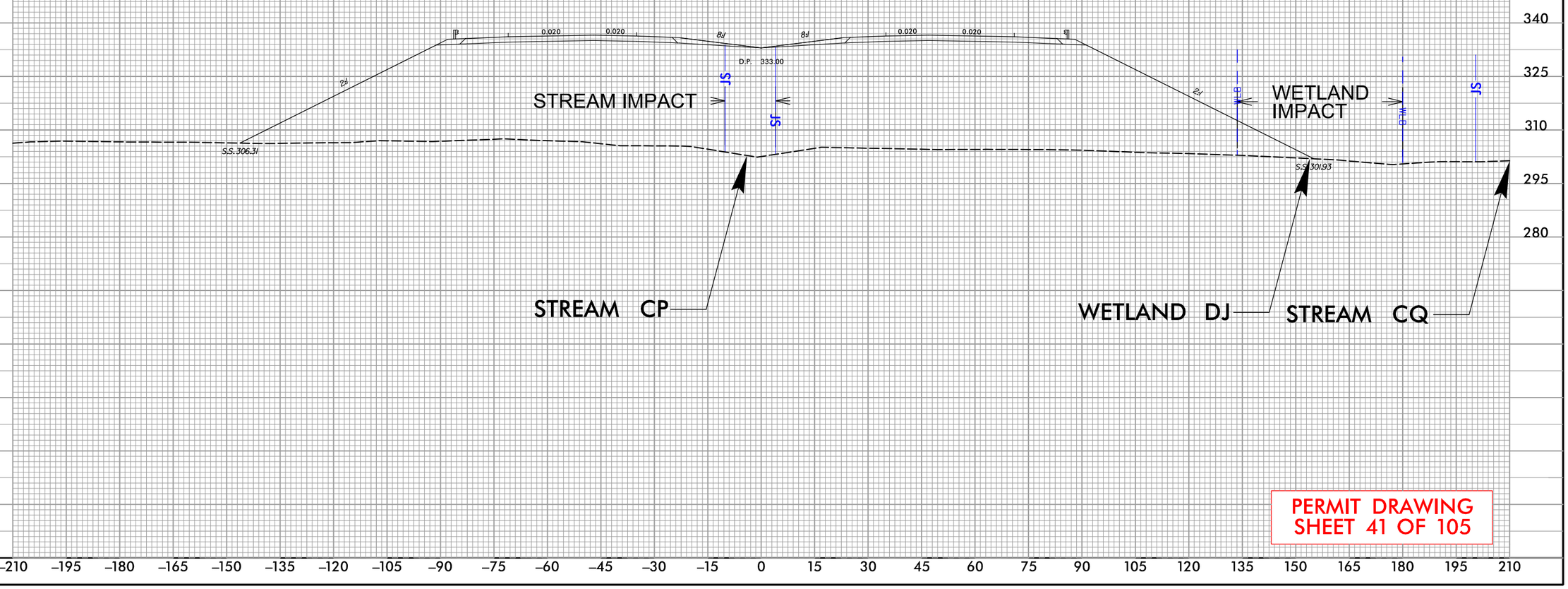
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

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CROSS–SECTION Y–Y
SITE 20, WETLAND DJ, STREAM CP, & STREAM CQ STATION 737+00 –L–



PERMIT DRAWING
SHEET 41 OF 105

REVISIONS
5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
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PERMIT DRAWING SHEET 42 OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

REVISIONS

5/14/99

WINTLER, KARIN K

NC DEPARTMENT OF TRANSPORTATION

PAA

WDM

WDN

BZ 1

Z 2

Z 1

BZ 2

760+00

765+00

770+00

SITE 21

WETLAND DM IMPACT

SITE 22

WETLAND DN IMPACT

-Y20- PT Sta. 16+13.22

-Y20- PC Sta. 10+77.78

-Y20- POT Sta. 10+00.00

SANDY, GEORGE F
SANDY, SHIRLEY H

PHILLIPPE, DONALD KEITH
PHILLIPPE, ERIC

PHILLIPPE, PHILLIPPE,

RUINS

10' SOIL

ISFD

SFD

FSD

530 531 532 534 536

529

8:37:58 AM
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R-2828	

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ECOLOGICAL ENGINEERING

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PERMIT DRAWING SHEET 42A OF 105

50' 0' 100'
SCALE

F F DENOTES FILL IN WETLAND

REVISIONS
5/14/99

WETLAND DM IMPACT

SITE 21

WETLAND DN IMPACT

SITE 22

-Y20- PT Sta. 16+13.22

-Y20- PC Sta. 10+77.78

-Y20- POT Sta. 10+00.00

760+00

765+00

770+00

WDM

WDN

PAA

BZ 1

Z 2

Z 1

BZ 2

WLB

NC DEPARTMENT OF TRANSPORTATION

SANDY, GEORGE F
SANDY, SHIRLEY H

PHILLIPPE, DONALD KEITH
PHILLIPPE, ERIC

FOUND

RUINS

10' SOIL

ISFD

SFD

FD

S

B

531

532

534

530

529

536

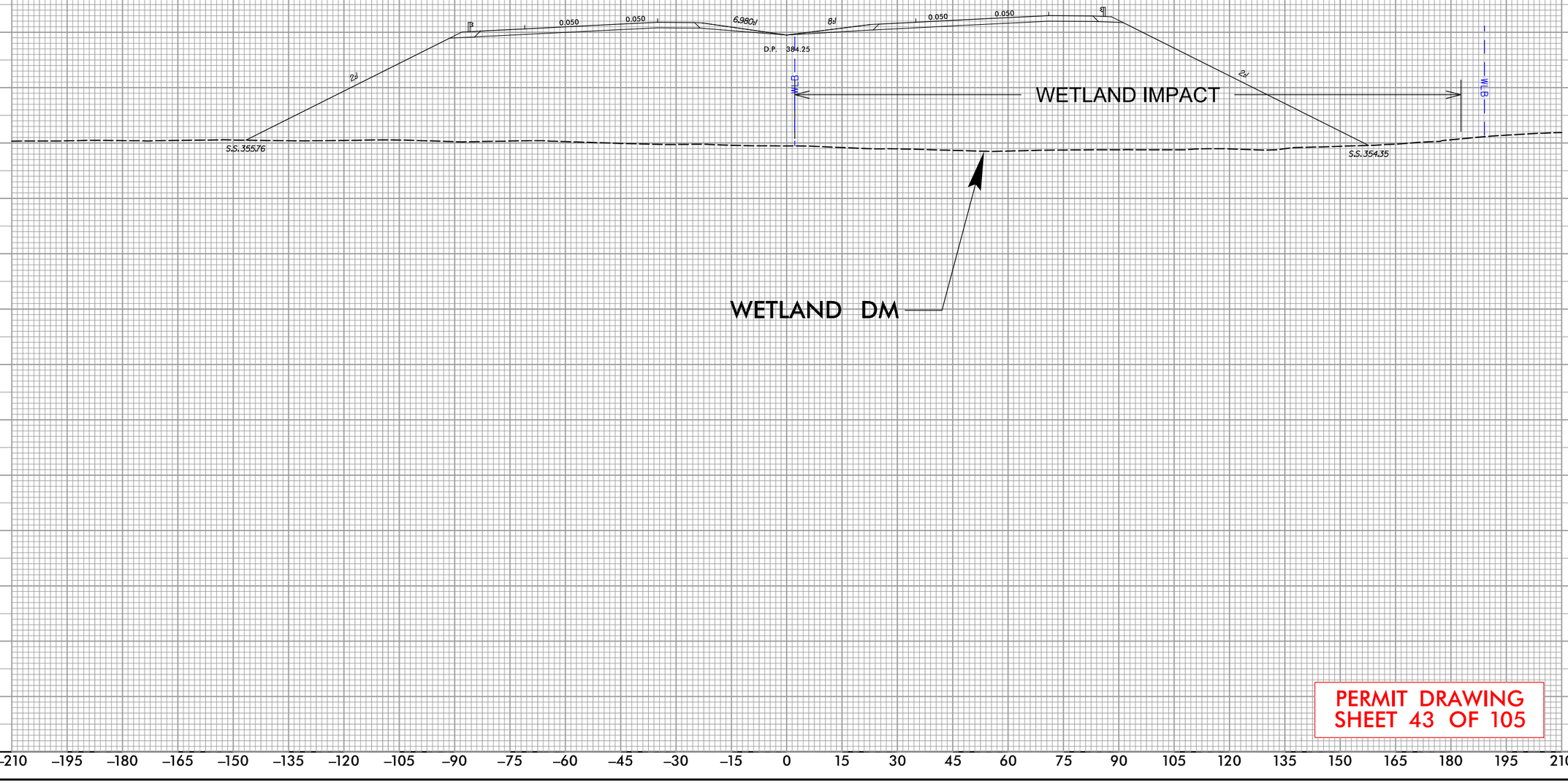
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CROSS–SECTION Z–Z
SITE 21, WETLAND DM
STATION 759+00 –L–



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SHEET 43 OF 105

REVISIONS

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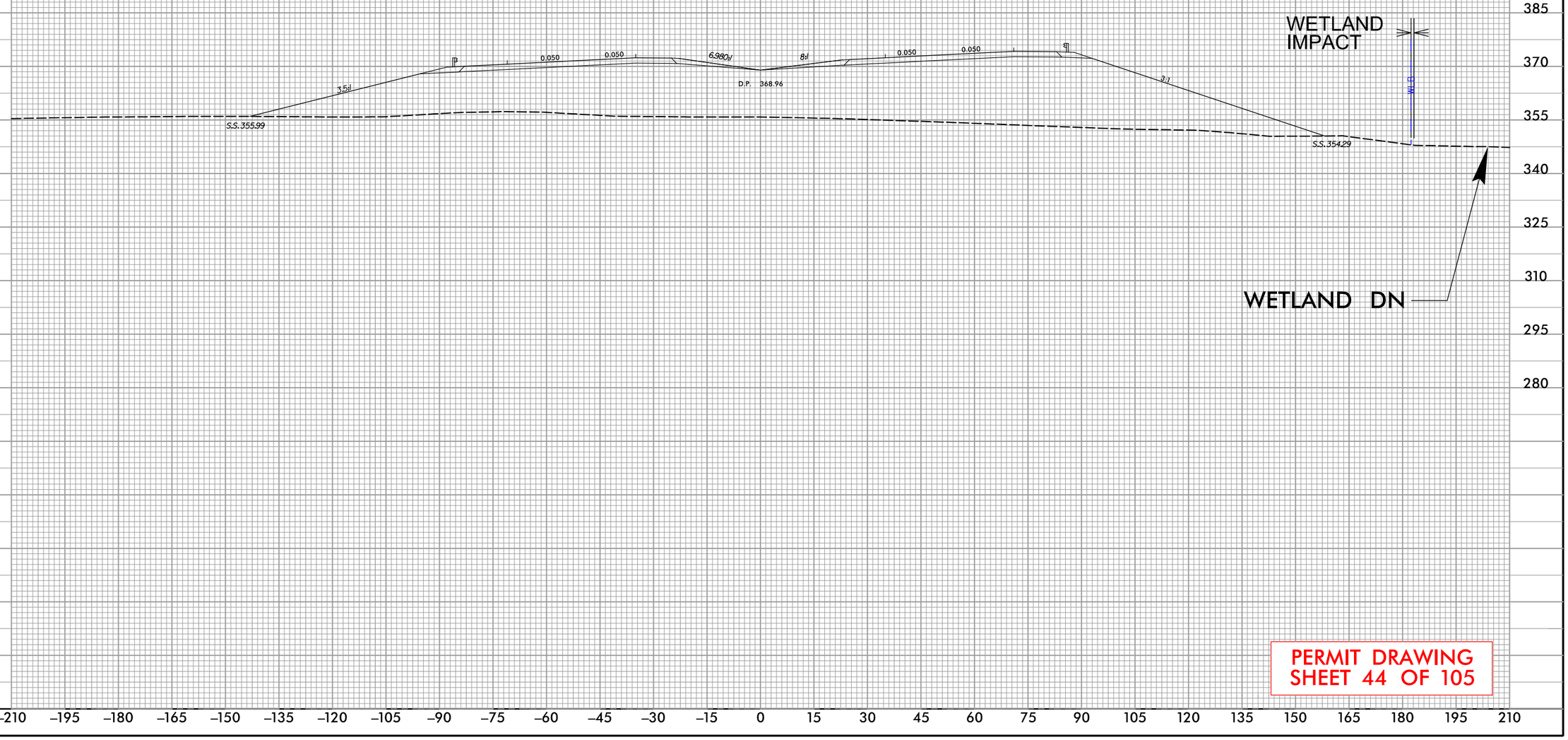
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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CROSS–SECTION AA–AA
SITE 22, WETLAND DN
STATION 768+00 –L–



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SHEET 44 OF 105

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PERMIT DRAWING
SHEET 45 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

-L- CS Sta. 788+92.43

-Y2IRPB- SC Sta. 12+50.00

-L- POC Sta. 783+05.74=
-Y2IRPB- ST Sta. 10+00.00
71.00' LT

-Y2IRPB- TS Sta. 17+00.00

-Y2IRPC- ST Sta. 12+50.00

-Y2IRPC- SC Sta. 19+50.00

-Y2IRPC- CS Sta. 22+5

ST Sta. 10+00.00

WETLAND DP IMPACT

WETLAND DO IMPACT

STREAM CT IMPACT

STREAM CV IMPACT

SITE 23

SITE 24

WDP

WDO

SCV

SCT

PROPOSED 26'X6' RCBC

780+00

785+00

790+00

20+00
-Y2IRPC-

15+00
-Y2IRPC-

506

507

508

509

510

500

501

502

499

ISFD

2SFD

2S FD

IS FD

RIPRAP

20' BST

WELL

10' SOIL

ALI CT

STEVENS OAK SUBDIVISION

PHILLIPPE, DONALD KEITH
PHILLIPPE, ERIC

ENNIS, LLOYD LAVON
ENNIS, T

EWNIS, DAVID LAVON
ENNIS, T

REVISIONS

5/14/99

9:38:22 AM
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PERMIT DRAWING
SHEET 45A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

-L- CS Sta. 788+92.43

-Y2IRPB- SC Sta. 12+50.00

-L- POC Sta. 783+05.74=
-Y2IRPB- ST Sta. 10+00.00
71.00' LT

-Y2IRPB- CS Sta. 22+50.00

-Y2IRPC- TS Sta. 17+00.00

-Y2IRPC- ST Sta. 12+50.00

-Y2IRPC- SC Sta. 19+50.00

-Y2IRPC- CS Sta. 22+5

-Y2IRPB-

-Y2IRPC-

-Y2IRPC- ST Sta. 10+00.00

WETLAND DP IMPACT

WETLAND DO IMPACT

STREAM CT IMPACT

STREAM CV IMPACT

SITE 23

SITE 24

780+00

785+00

790+00

WDP

WDO

SCV

SCT

PROPOSED 2@8'X6' RCBC

REVISIONS

5/14/99

9:38:28 AM
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davidcooper

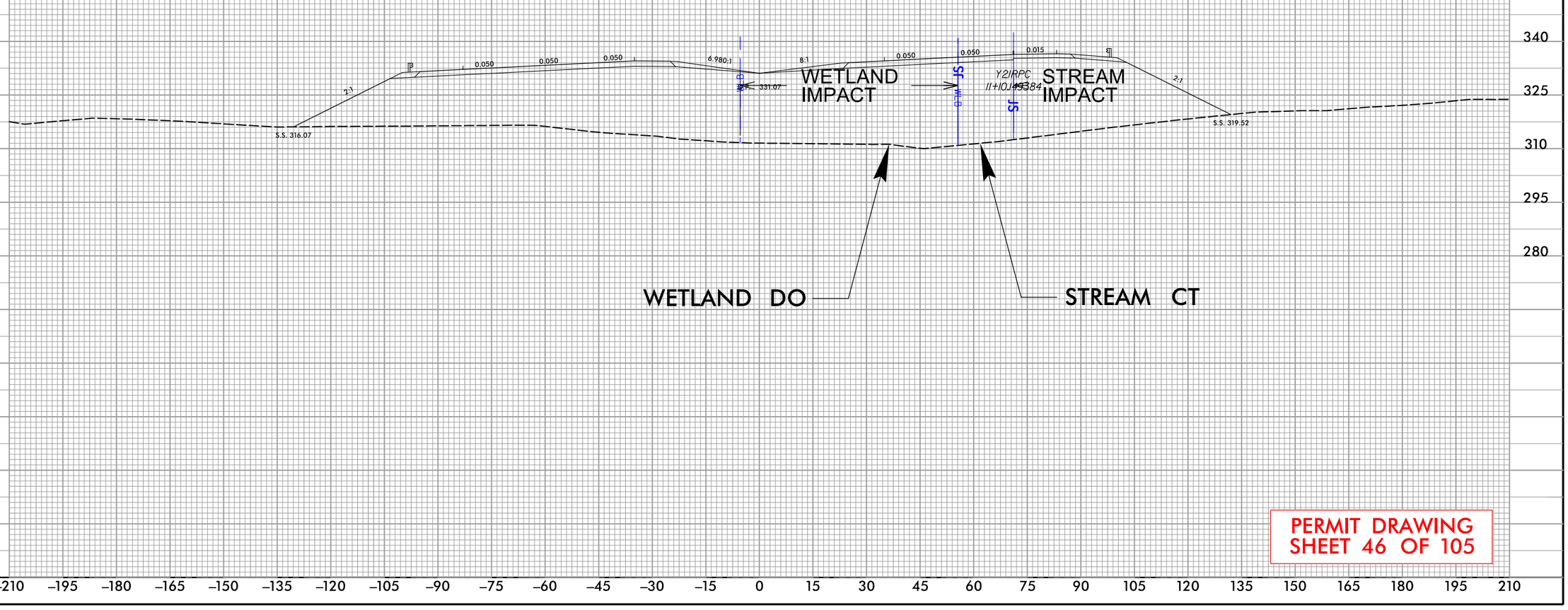
CROSS–SECTION AB–AB
SITE 23, WETLAND DO & STREAM CT
STATION 783+00 –L–

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
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REVISIONS
5/14/99



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SHEET 46 OF 105

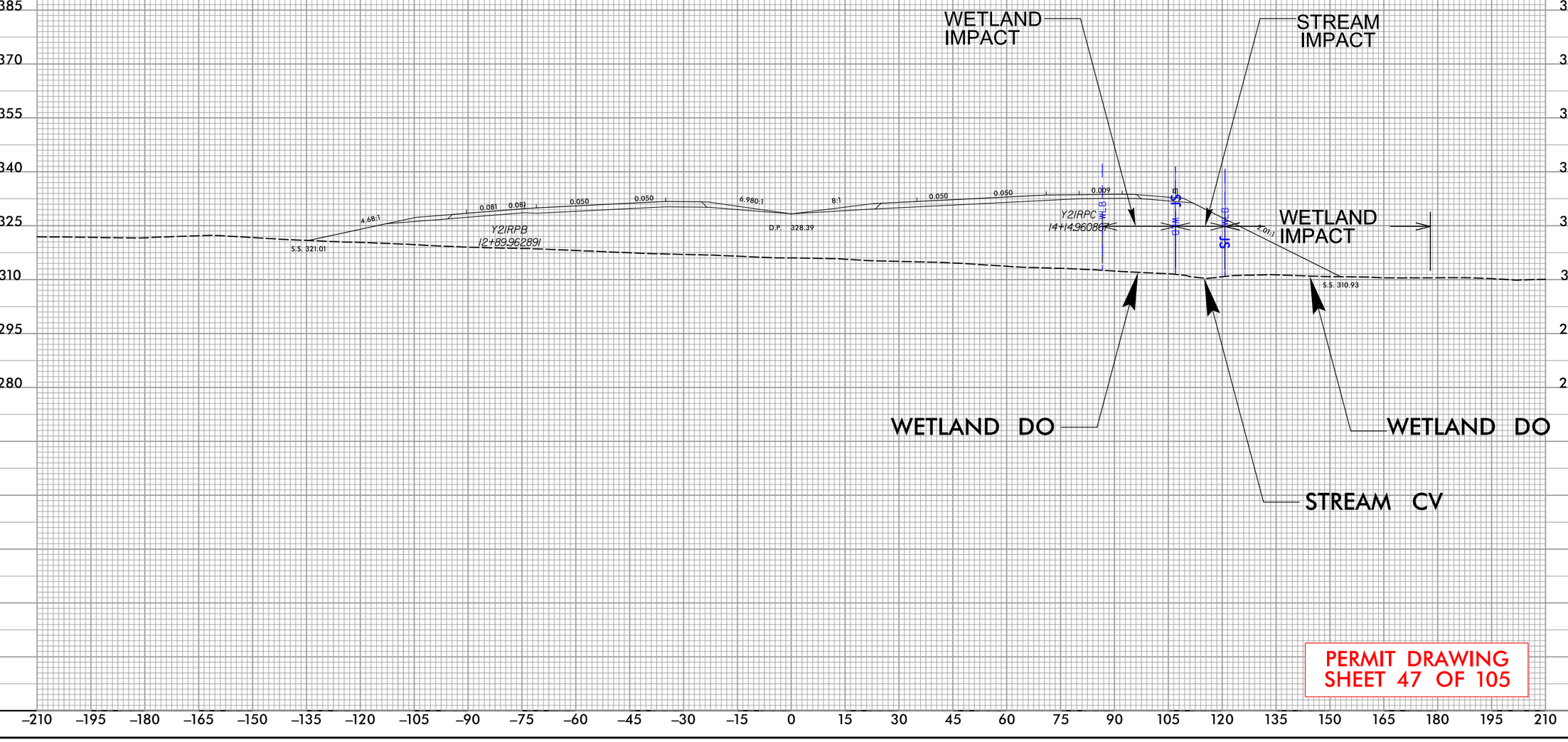
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION AC–AC SITES 23 & 24, WETLAND DO & STREAM CV STATION 786+00 –L–



PERMIT DRAWING
SHEET 47 OF 105

REVISIONS
5/14/99

9:39:39 AM
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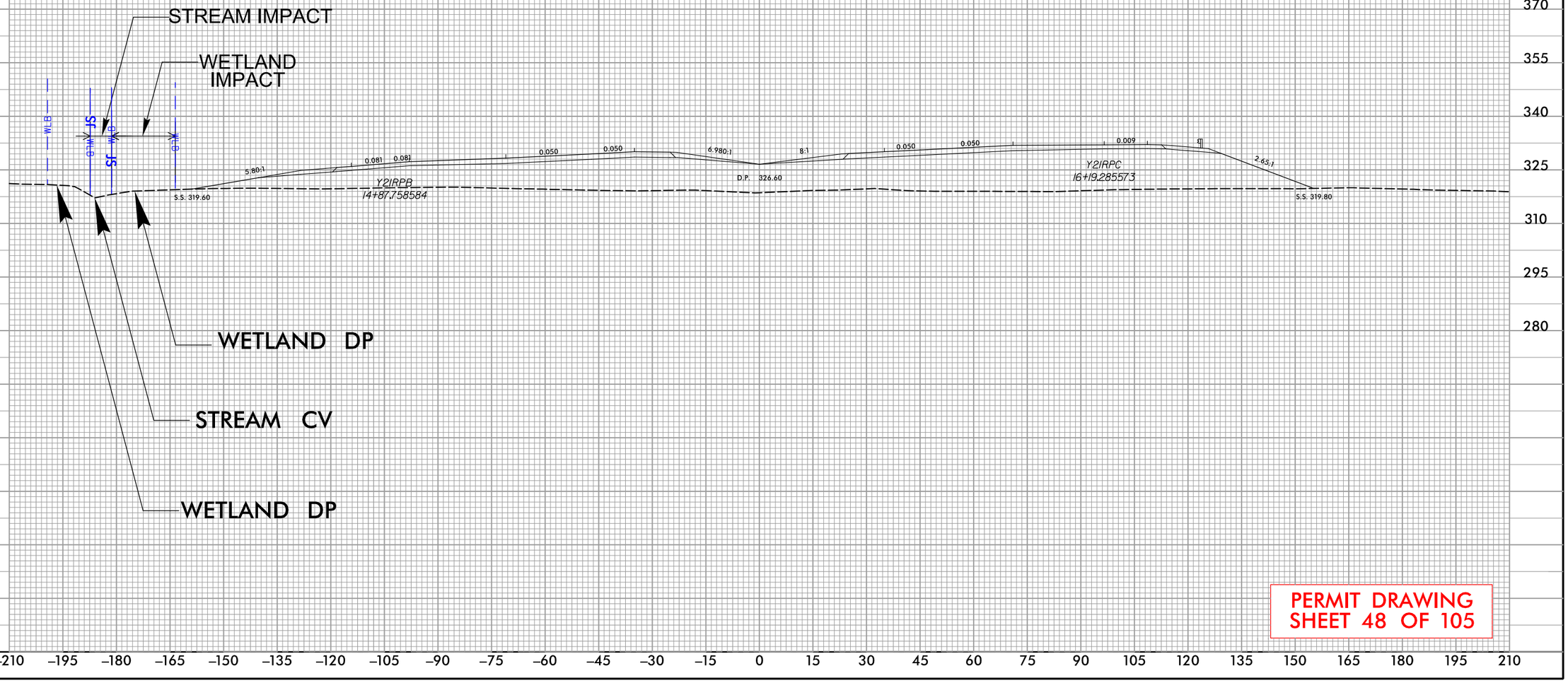
PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 SE Cary Parkway, Suite 101
Cary, NC 27511
(919) 551-4900
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION AD–AD
SITE 24, WETLAND DP & STREAM CV
STATION 788+00 –L–

REVISIONS
5/14/99



PERMIT DRAWING
SHEET 48 OF 105

9:39:44 AM
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
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PERMIT DRAWING SHEET 49 OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS 5/14/99

MATCHLINE SHEET 52 STA. 825+94.25 –L–

825+00
820+00
815+00
20+00 –Y2IRPD–
15+00 –Y2IRPD–

STREAM CY IMPACT
SITE 25
SITE 26
SITE 27
WETLAND DS IMPACT
STREAM DB IMPACT
STREAM DC IMPACT
STREAM CY IMPACT
PROPOSED 2@6'x5' RCBC

–Y2IRPD– CS Sta. 20+09.04
–Y2IRPD– SRS Sta. 22+19.04
Sta. 24+19.04
Sta. 29+52.74

JS MIT
SDA
MIT
WDS
SDS
SDS

TURNER FARMS SUBDIVISION
PETROLIUM LINE 50' R/W
120' R/W
100' R/W
NURSERY
BKD
460
461

BZ 1
BZ 2
Z 1
Z 2

9:37:52 AM
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PROJECT REFERENCE NO.	SHEET NO.
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NC FIRM LICENSE No. P-1148
1151 Sit Cary Parkway, Suite 101
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(919) 557-0939
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PERMIT DRAWING SHEET 49A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 52 STA. 825+94.25 –L–

PETROLIUM LINE 50' R/W

US MIT

SDA

SDB

WDS

SITE 25

SITE 26

SITE 27

STREAM CY IMPACT

WETLAND DS IMPACT

STREAM DB IMPACT

STREAM DC IMPACT

–Y2IRPD– SRS Sta. 22+19.04

–Y2IRPD– CS Sta. 20+09.04

–Y2IRPD– Sta. 24+19.04

–Y2IRPD– Sta. 29+52.74

820+00

815+00

825+00

20+00 –Y2IRPD–

15+00 –Y2IRPD–

PROPOSED 2@6'x5' RCBC

STREAM CY IMPACT

NURSERY

460

461

BZ 1

BZ 2

Z 1

Z 2

Z ZB

R/W

C/A

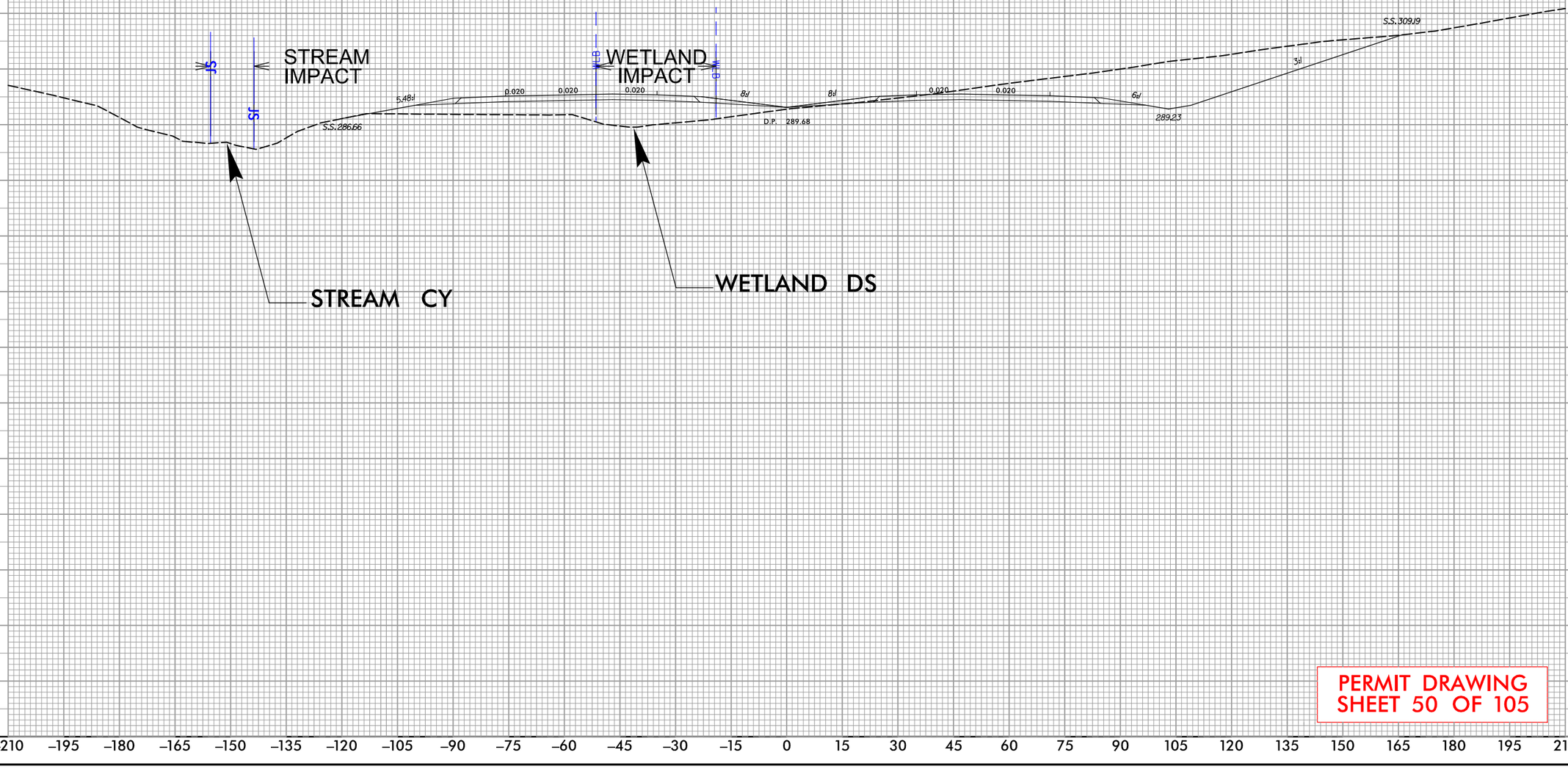
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 SE Cary Parkway, Suite 101
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CROSS–SECTION AE–AE, SITES 25 & 26, WETLAND DS & STREAM CY STATION 812+50 –L–



PERMIT DRAWING SHEET 50 OF 105

REVISIONS

5/14/99

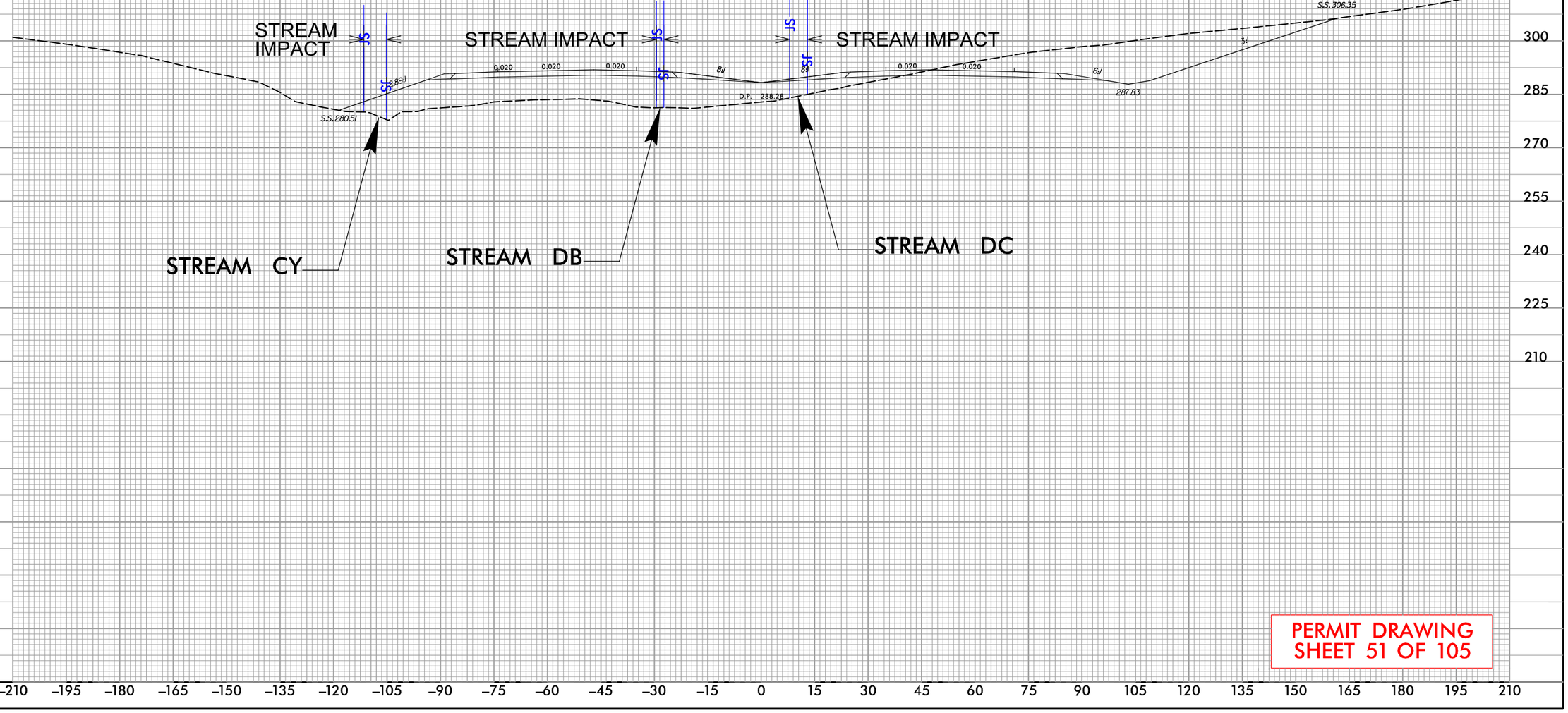
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 Dr Gary Parkway, Suite 101
Concord, NC 28027
(970) 55-0909
ECOLOGICAL ENGINEERING

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CROSS–SECTION AF–AF, SITES 25, 26, & 27, STREAM CY, STREAM DC, & STREAM DB STATION 813+00 –L–



PERMIT DRAWING
SHEET 51 OF 105

REVISIONS
5/14/99

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davidcooper

PERMIT DRAWING
SHEET 52 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0928
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 49 STA. 825+94.25 -L-

-L- PC Sta. 829+71.34

WETLAND DV IMPACT

STREAM CY IMPACT

SITE 25 CONT'D.

-L- POT Sta. 827+71.30=
-Y2IRPD- ST Sta. 10+00.00
71.00' RT

-Y2IRPD- SC Sta. 12+10.00

STREAM CY IMPACT

SCY

WDU

WDT

BAC

WNO

830+00

835+00

840+00

UNKNOWN

T H TURNER FARMS INC

MAYNARD, DONALD G
MAYNARD, PATRICIA J

PENNY, RANDY KENNETH
PENNY, BILLIE ROSE

BIGGERS SUSAN

ALLEN

MANDA
STEVE

454 455 453 452 451 450

2S FD

3N DS

9:39:9 AM
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davidcooper

5/14/99

REVISIONS

MATCHLINE SHEET 49 STA. 825+94.25 -L-

50' 0' 100'

SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

PERMIT DRAWING SHEET 52A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

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-L- PC Sta. 829+71.34

WETLAND DV IMPACT

-L- 835+100

-L- 840+100

-L- 830+100

STREAM CY IMPACT

SITE 25 CONT'D.

SCY

WDU

WDT

STREAM CY IMPACT

-Y2IRPD- 71.00' RT

-L- POT Sta. 827+71.30=
-Y2IRPD- ST Sta. 10+00.00

-Y2IRPD- SC Sta. 12+10.00

TURNER FARMS INC

UNKNOWN

MAYNARD, DONALD G
MAYNARD, PATRICIA J

PENNY, RANDY KENNETH
PENNY, BILLIE ROSE

BIGGERS, SUSAN

ALLEN

MANDA DRIVE

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davidgooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 553-6906
ECOLOGICAL ENGINEERING

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CROSS–SECTION AG–AG
SITE 25, WETLAND DV & STREAM CY
STATION 833+00 –L–



PERMIT DRAWING
SHEET 53 OF 105

REVISIONS
5/14/99

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davidcooper

PERMIT DRAWING
SHEET 54 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No. P-1140
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

F F DENOTES FILL IN WETLAND

REVISIONS
5/14/99

-L- PT Sta. 857+28.52

SITE 28

WETLAND DW IMPACT

WETLAND DV IMPACT

SITE 25 CONT'D.

WETLAND DV IMPACT

SITE 25 CONT'D.

860+00

855+00

850+00

WLB

BZ 1

BZ 2

DAM

WDW

ALLEN, JOSEPH L

BIGGERSTAFF, SUSAN ADAIR

ANDERSON, THOMAS P
ANDERSON, MELISSA T

C A

R W

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davidconner

PERMIT DRAWING
SHEET 54A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1140
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

REVISIONS
5/14/99

-L- PT Sta. 857+28.52

SITE 28

WETLAND DW IMPACT

WETLAND DV IMPACT

SITE 25 CONT'D.

WETLAND DV IMPACT

SITE 25 CONT'D.

860+00

855+00

850+00

BIGGERSTAFF, SUSAN ADAIR

ALLEN, JOSEPH L

ANDERSON, THOMAS
ANDERSON, MELISSA

WLB

BZ 1

BZ 2

C A

R W

WDV

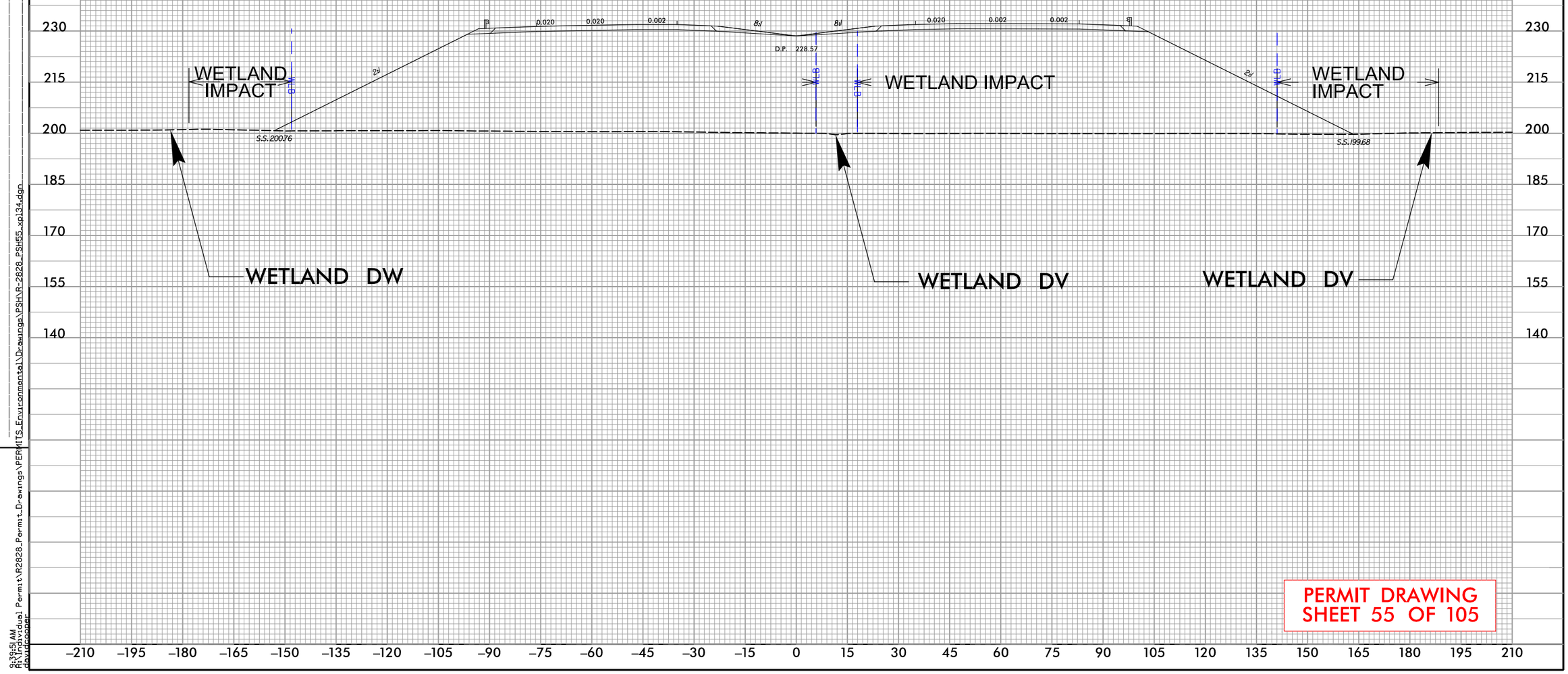
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1555 SE Cary Parkway, Suite 101
Cary, NC 27511
(919) 551-4900
ECOLOGICAL ENGINEERING

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CROSS–SECTION AH–AH SITES 25 & 28, WETLAND DV & WETLAND DW STATION 858+00 –L–



PERMIT DRAWING
SHEET 55 OF 105

REVISIONS

5/14/99

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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
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ECOLOGICAL ENGINEERING

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PERMIT DRAWING SHEET 56 OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

RALEIGH CITY OF

STREAM DJ IMPACT

SITE 30

WETLAND DZ IMPACT

SITE 29

WETLAND DX IMPACT

PROPOSED 26' x 5' RCBC

880+00

875+00

870+00

SDJ

WDZ

WDX

SDG

WLB

JS MT

BZ 1

BZ 2

RW

CA

9:40:00 AM
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 56A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

RALEIGH CITY OF

STREAM DJ IMPACT

SITE 30

WETLAND DZ IMPACT

SITE 29

WETLAND DX IMPACT

PROPOSED 26' X 5' RCBC

880+00

875+00

870+00

SDJ

WDZ

WDX

SDG

WLB

JS MT

BZ 1

BZ 2

8:40:05 AM
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davidcooper

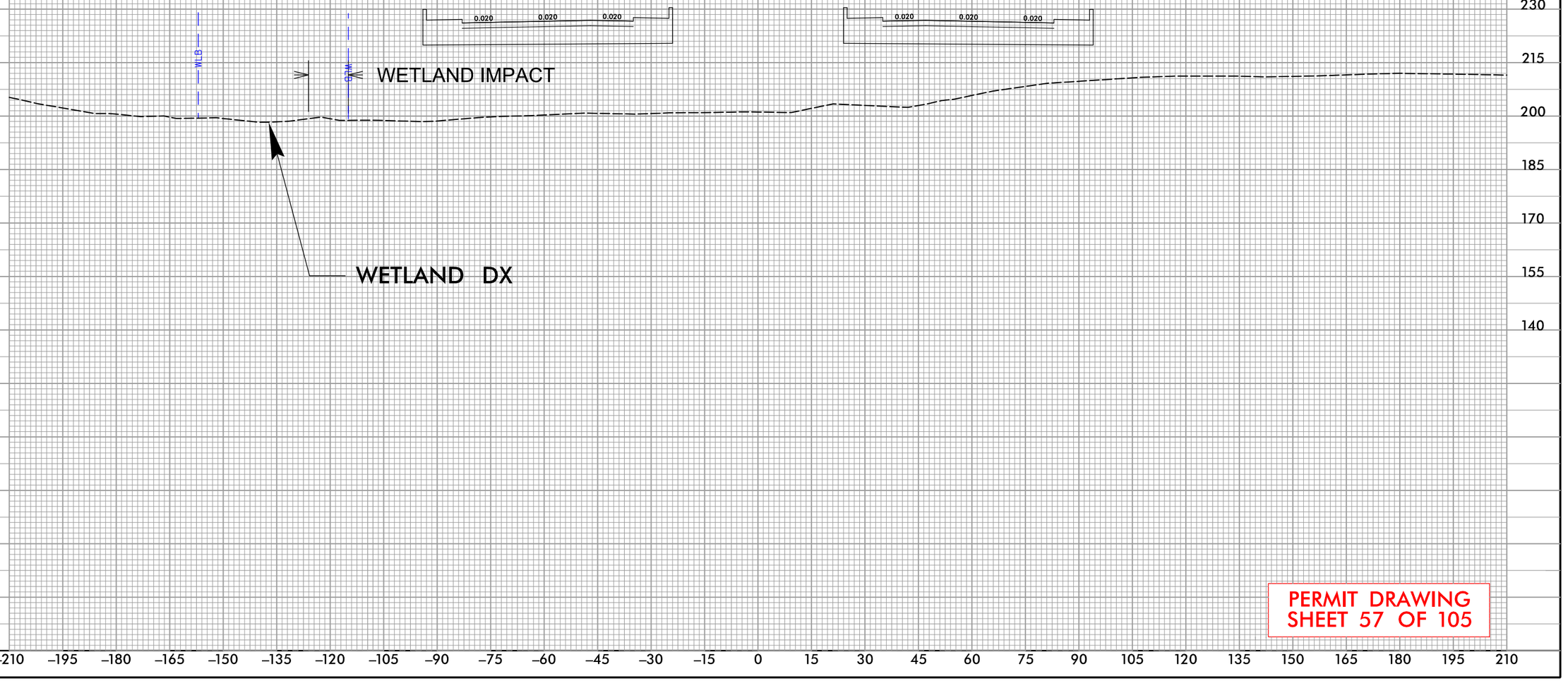
CROSS–SECTION AI–AI
SITE 29, WETLAND DX
STATION 868+50 –L–

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 SE Cary Parkway, Suite 101
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SHEET 57 OF 105

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PROJECT REFERENCE NO.	SHEET NO.
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NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 553-6906
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CROSS–SECTION AJ–AJ
SITE 30, WETLAND DZ & STREAM DJ
STATION 876+00 –L–

REVISIONS
5/14/99

STREAM IMPACT

WETLAND IMPACT

WETLAND IMPACT

W.L.B.

P

0.020 0.020 0.020 8:1 8:1 0.020 0.020 0.020

¶

2:1

D.P. 220.06

S.S. 208.56

JS

S.S. 204.79

W.L.B.

2:1

WETLAND DZ

STREAM DJ

WETLAND DZ

245 230 215 200 185 170 155 140

–210 –195 –180 –165 –150 –135 –120 –105 –90 –75 –60 –45 –30 –15 0 15 30 45 60 75 90 105 120 135 150 165 180 195 210

PERMIT DRAWING
SHEET 58 OF 105

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PERMIT DRAWING
SHEET 59 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

MATCHLINE SHEET 62 STA. 895+87.35 -L-

-L- PRC Sta. 894+68.94

WETLAND EA IMPACT

STREAM DK IMPACT

STREAM DL IMPACT

SITE 31

SITE 32

885+00

890+00

895+00

15+00 -Y22FLYCC-

20+00 -Y22FLYCC-

BZ 1

BZ 2

C

F

FF

SS

WEA

SDL

RW

CA

8/10/25 AM
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PROJECT REFERENCE NO.	SHEET NO.
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PERMIT DRAWING SHEET 59A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

OF

BRYAN, S.

-Y22LT- 15+0

7.98=
Sta. 10+00.00

MATCHLINE SHEET 62 STA. 895+87.35 -L-

WETLAND EA IMPACT

WEA

SITE 31

SITE 32

STREAM DL IMPACT

STREAM DK IMPACT

-L- PRC Sta. 894+68.94

885+00

890+00

895+00

15+00 -L- -Y22FLYCC-

20+00 -L- -Y22FLYCC-

SS MH1

SDMH1

RW

C A

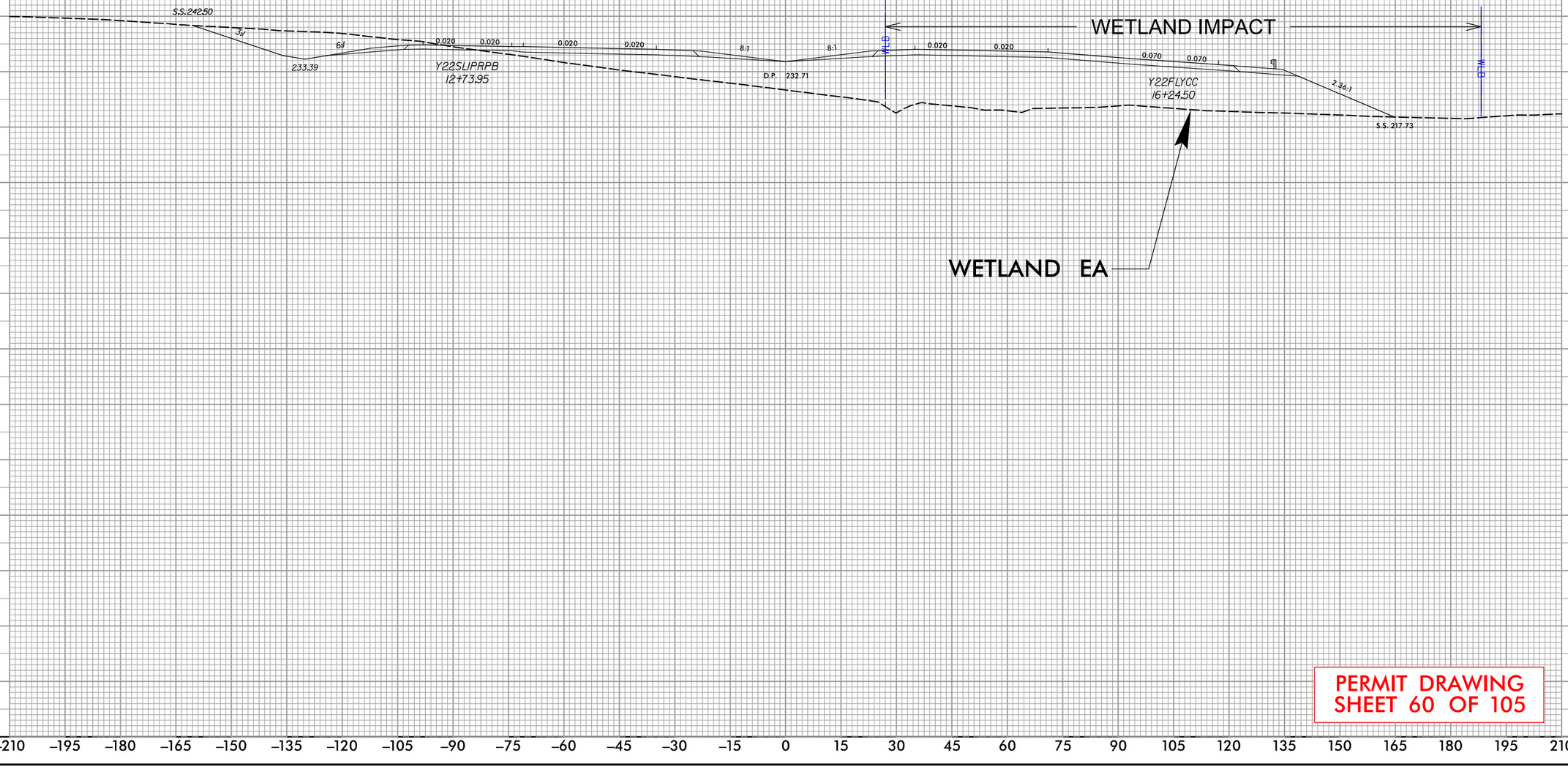
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 557-5909
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CROSS–SECTION AK–AK
SITE 31, WETLAND EA
STATION 889+50 –L–



PERMIT DRAWING
SHEET 60 OF 105

REVISIONS
5/14/99

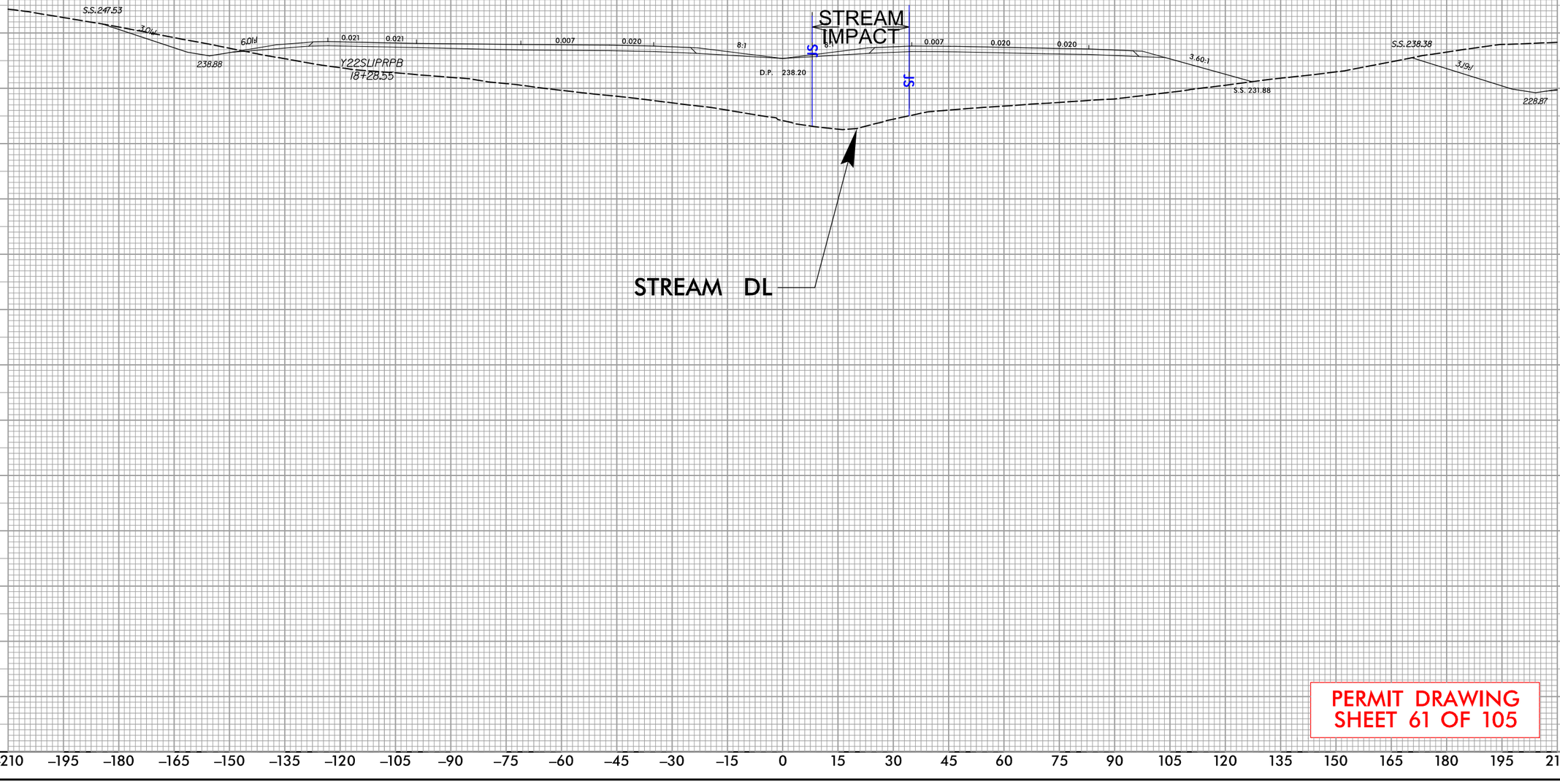
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 Dr Gary Parkway, Suite 101
Concord, NC 28027
(919) 551-4900
ECOLOGICAL ENGINEERING

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CROSS–SECTION AL–AL
SITE 32, STREAM DL
STATION 895+00 –L–



PERMIT DRAWING
SHEET 61 OF 105

REVISIONS

5/14/99

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davidcooper

PERMIT DRAWING
SHEET 62 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER

N

-Y22SLIPRPB- TS Sta. 31+6'

-Y22SLIPRPB- POT Sta. 30+08.55=
-Y22RPB- ST Sta. 10+00.00
12' LT

-Y22SLIPRPB-
25+00

MATCHLINE SHEET 64 STA. 909+37.90 -L-

MATCHLINE SHEET 59 STA. 895+87.35 -L-

905+00

900+00

STREAM DM IMPACT

SITE 33

SDM

WLB JS MIT

BZ 1

BZ 2

Z 1

Z 2

F

C

Sta. 903+76.56=
Sta. 10+00.00
71' RT

12+00.00

15+00
-Y22RPCD-

REVISIONS

5/14/99

8:10:49 AM
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PERMIT DRAWING
SHEET 62A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 Sit Cary Parkway, Suite 101
Cary, NC 27513
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

-Y22SLIPRPB- 25+00

-Y22SLIPRPB- TS Sta. 31+62

-Y22SLIPRPB- POT Sta. 30+08.55=
-Y22RPB- ST Sta. 10+00.00
12' LT

MATCHLINE SHEET 64 STA. 909+37.90 -L-

MATCHLINE SHEET 59 STA. 895+87.35-L-

905+00

900+00

STREAM DM IMPACT

SITE 33

SDM

WLB

PJS

MIT

BZ 1

BZ 2

Z 1

Z 2

Sta. 903+76.56=
ST Sta. 10+00.00
71' RT

12+00.00

-Y22RPCD- 15+00

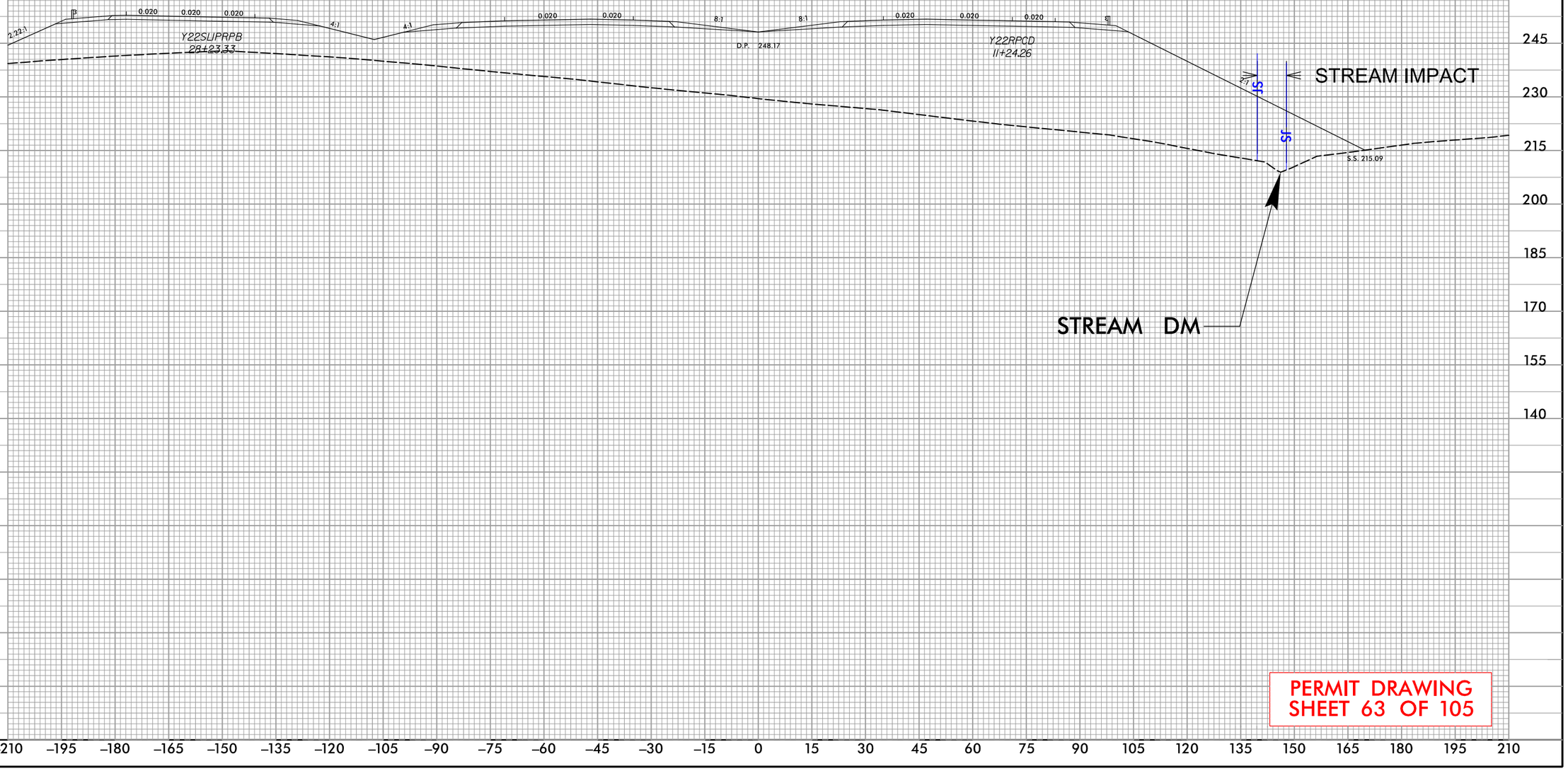
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 553-6906
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION AM–AM
SITE 33, STREAM DM
STATION 905+00 –L–



PERMIT DRAWING
SHEET 63 OF 105

REVISIONS
5/14/99

9:41:02 AM
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davidcooper

PERMIT DRAWING
SHEET 64 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27511
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

8:41:10 AM
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davidgeorge

PT Sta. 33+74.04 -Y22RPB-

35+00 -Y22SLIRPB-

40+00 -Y22SLIRPB-

20+00 -Y22RPB-

25+00 -Y22RPB-

WETLAND EC IMPACT

WETLAND ED IMPACT

STREAM DV IMPACT

STREAM DW IMPACT

SITE 34

SITE 35

PROPOSED 3@9'x5' RCBC

SDW

-Y22FLYCC-

35+00

MATCHLINE SHEET 62 STA 909+37.90 -L-

MATCHLINE SHEET 87 STA 26+39.35 -Y22RPB-

MATCHLINE SHEET 79 STA 921+26.95 -L-

910+00

915+00

920+00

PT Sta. 916+02.04

PERMIT DRAWING
SHEET 64A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

MATCHLINE SHEET 62 STA 909+37.90 -L-

MATCHLINE SHEET 87 STA 26+39.35 -Y22RPB-

MATCHLINE SHEET 79 STA 921+26.95 -L-

Sta. 33+74.04 -Y22SLIPRPB-

35+00 -Y22SLIPRPB-

40+00 -Y22SLIPRPB-

20+00 -Y22RPB-

25+00 -Y22RPB-

910+00

915+00

920+00

-Y22SLIPRPB-

-Y22SLYCC-

PT Sta. 916+02.04

WETLAND EC IMPACT

WETLAND ED IMPACT

STREAM DV IMPACT

STREAM DW IMPACT

SITE 34

SITE 35

PROPOSED 3@9'x5' RCBC

SDW

WLB

BZ 1

BZ 2

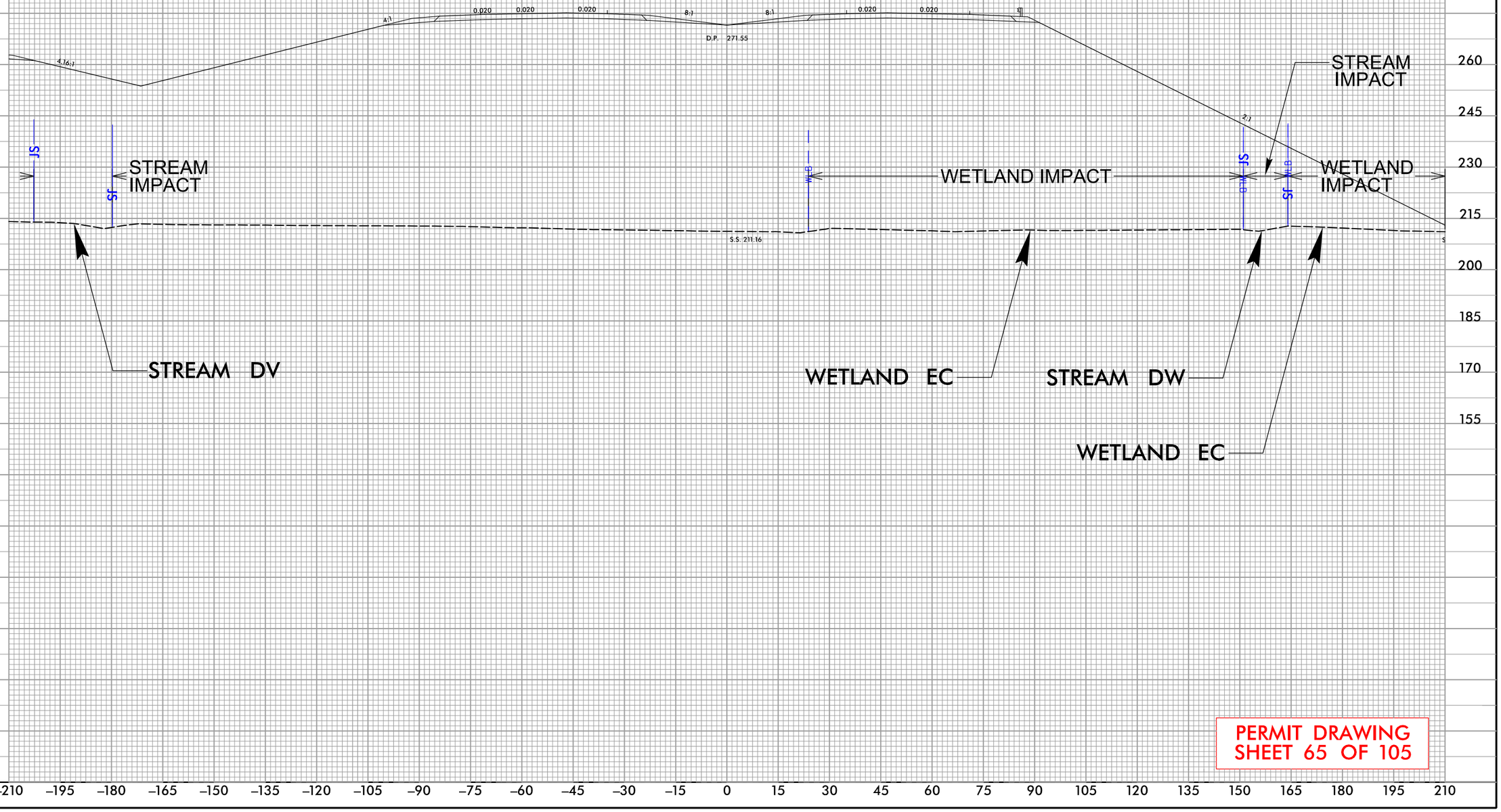
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davidgeorger

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
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CROSS–SECTION AN–AN, SITES 34 & 35, WETLAND EC, STREAM DV, & STREAM DW STATION 915+00 –L–



PERMIT DRAWING
SHEET 65 OF 105

REVISIONS
5/14/99

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davidcooper

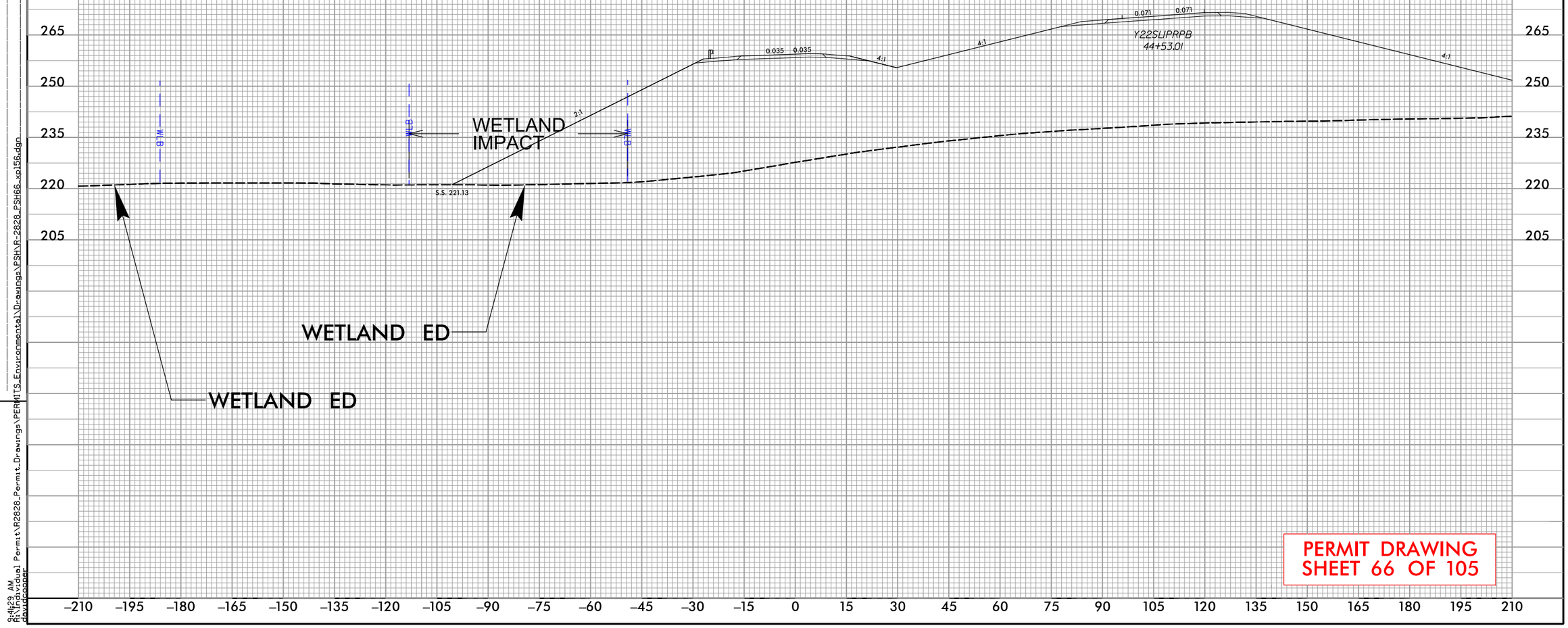
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R-2828	

NC FIRM LICENSE No.F-1148
1515 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-5909
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CROSS–SECTION BB–BB
SITE 35, WETLAND ED
STATION 24+00 –Y22RPB–

REVISIONS
5/14/99



PERMIT DRAWING
SHEET 66 OF 105

9:41:29 AM
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davidcooper

PERMIT DRAWING
SHEET 67 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS
5/14/99

-Y21A- PC Sta. 11+48.32
60+00 -Y21-
-Y21A- PT Sta. 14+05.38
-Y21A- PC Sta. 14+81.95
15+00 -Y21A-
-Y21A- PT Sta. 15+60.55
55+00 -Y21-
-Y21A- POT Sta. 17+81.66
-Y21B- POT Sta. 15+00.00
-Y21- POT Sta. 54+5
-Y21B- POT Sta. 10
30+00 -Y21RPB-
-Y21RPB- PT Sta. 28+86.01

POND AB IMPACT
POND AB IMPACT
POND BI IMPACT
SITE 36
SITE 37

TURNER MEMORIAL BAPT CH
TURNER-POND DR
TURNER POND SUBDIVISION
TURNER FARMS SUBDIVISION
H TURNER FARMS INC
MCLAMB, KEVIN L
MCLAMB, KELSEY J
GRISSOM FARM RD
SR 5530 GRISSOM
SR 55
DENSON RD
NORRIS, BETTY L
AQUA NC
DAM
JS MIT
8' SOIL
12' BST
ISBKD
ISFD
ISBKD
G
S
1783
1784
526
527
525
524
523
522
521
520
519
516
464

BZ 1
BZ 2
3Z 1
3Z 2
RW
CA

9:41:37 AM
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dsvidergar

PERMIT DRAWING
SHEET 67A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS
5/14/99

-Y21A- PC Sta. 11+48.32
60+00 -Y21-
-Y21- POT Sta. 54+5
-Y21B- POT Sta. 10
- PT Sta. 14+05.38
- PC Sta. 14+81.95
15+00 -Y21A-
A- PT Sta. 15+60.55
55+00 -Y21-
-Y21A- POT Sta. 17+81.66
B- POT Sta. 15+00.00
30+00 -Y21RPB-
-Y21RPB- PT Sta. 28+86.01

POND AB IMPACT
POND AB IMPACT
POND BI IMPACT
SITE 36
SITE 37

TURNER MEMORIAL BAPT CH
H TURNER FARMS INC
TURNER POND SUBDIVISION
TURNER FARMS SUBDIVISION
MCLAMB, KEVIN L
MCLAMB, KELSEY J
AQUA NC
NORRIS, BETTY L
GRISSOM FARM RD
SR 5530
DAM
JS MIT
BZ 1
BZ 2
RW
ISBKD
ISFD
8' SOIL
12' BST

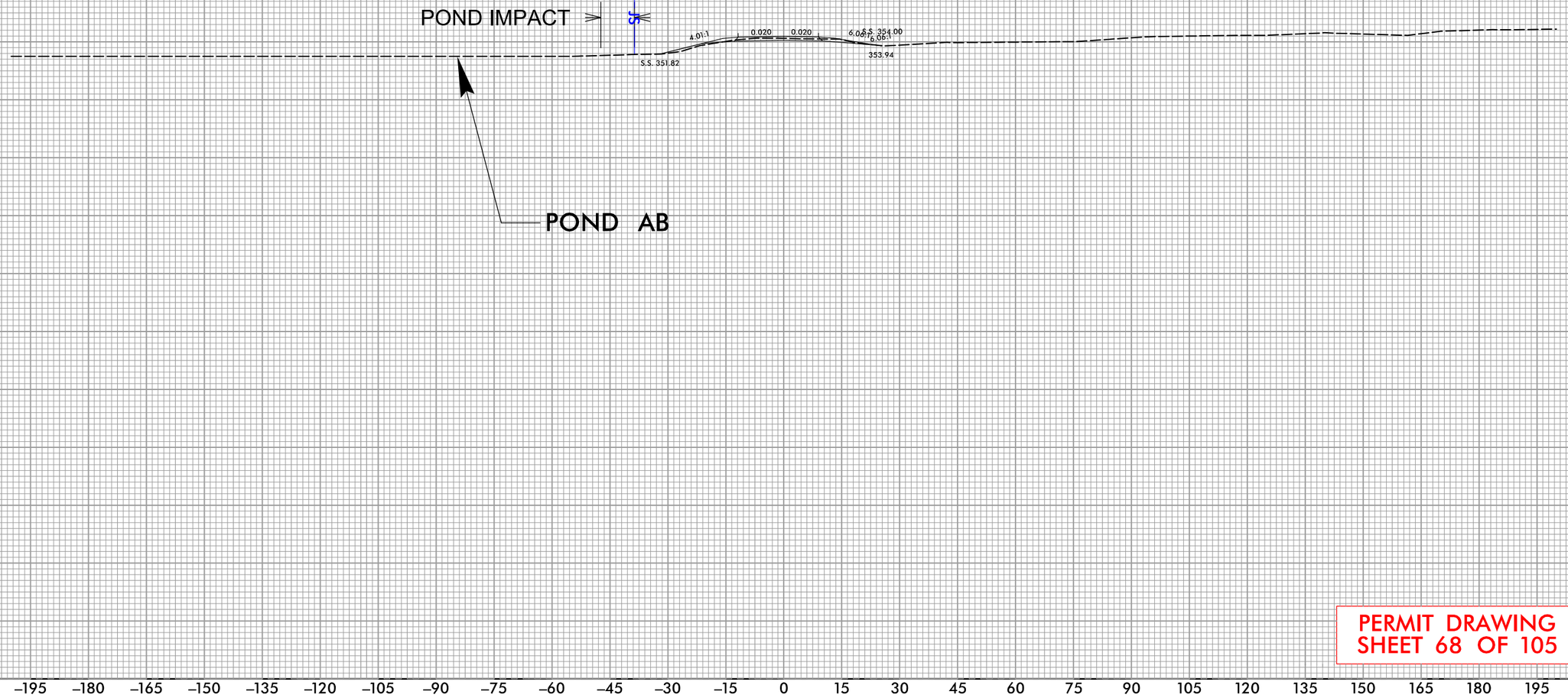
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
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CROSS–SECTION AO–AO
SITE 36, POND AB
STATION 11+00 –Y21A–



PERMIT DRAWING
SHEET 68 OF 105

REVISIONS

5/14/99

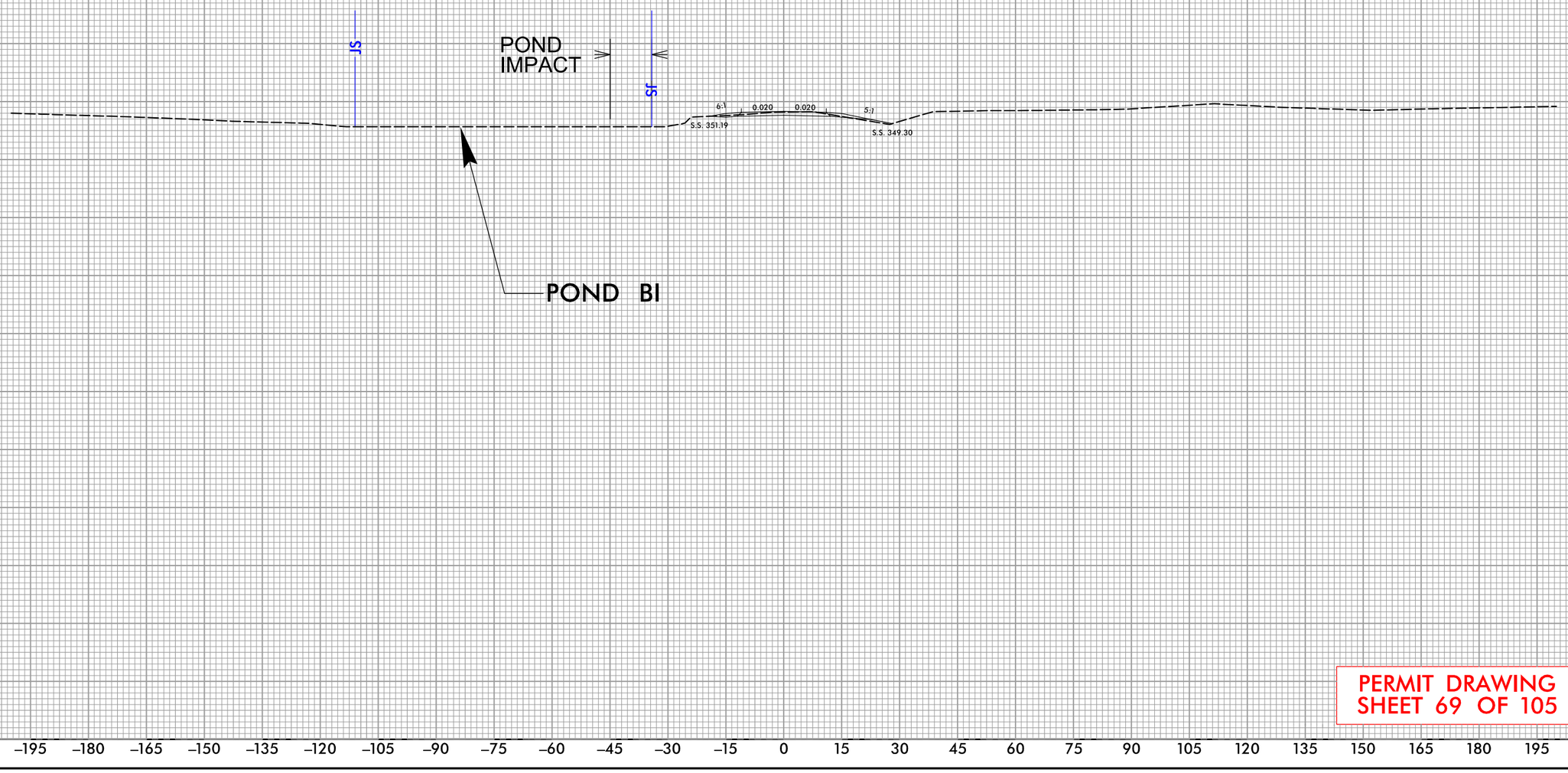
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 557-5909
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CROSS–SECTION AP–AP
SITE 37, POND BI
STATION 13+00 –Y21B–



PERMIT DRAWING
SHEET 69 OF 105

REVISIONS
5/14/99

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davidcooper

PERMIT DRAWING
SHEET 70 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
Cary, NC 27518
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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

STREAM CZ IMPACT
SITE 38
SCZ
SCX
JS MIT
SITE 25 CONT'D.
STREAM CY IMPACT
-L- POT Sta. 803+91.48=
-Y2I- POT Sta. 41+47.50
=99° 03' 40.4"
WDR
WETLAND DR IMPACT
SITE 39

-Y2ILPB- ST Sta. 19+58.34
-Y2ILPB- CS Sta. 17+08.34
-Y2ILPB- SC Sta. 12+50.00
-L- POT Sta. 800+78.45=
-Y2ILPB- ST Sta. 10+00.00
71.00' LT
-Y2I- POT Sta. 36+58.00=
-Y2IRPC- POT Sta. 31+10.03
-Y2IRPD- POT Sta. 33+47.72
-Y2IRP

15+00 -Y2ILPB-
20+00 -Y2ILPB-
45+00 -Y2I-
40+00 -Y2I-
795+00
800+00
805+00
810
31+48.07

UNKNOWN
NC DEPARTMENT OF TRANSPORTATION
RUINS
8" SOIL
10" CONC
IS FD
CS BKD
518
517
463
BZ 1
BZ 2

9/12/01 AM
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
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PERMIT DRAWING SHEET 70A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

STREAM CZ IMPACT

SITE 38

SCZ

SCX

SS MIT

SITE 25 CONT'D.

STREAM CY IMPACT

WDR

SITE 39

WETLAND DR IMPACT

-Y2ILPB- ST Sta. 19+58.34

-Y2ILPB- CS Sta. 17+08.34

-Y2ILPB- SC Sta. 12+50.00

-L- POT Sta. 800+78.45=

-Y2ILPB- ST Sta. 10+00.00

71.00' LT

-L- POT Sta. 803+91.48=

-Y2I- POT Sta. 41+47.50

=99° 03' 40.4"

-Y2I- POT Sta. 36+58.00=

-Y2IRPC- POT Sta. 31+10.03

-Y2IRPD- POT Sta. 33+47.72

-Y2IRP

15+00 -Y2ILPB-

45+00 -Y2I-

20+00 -Y2ILPB-

800+00

795+00

805+00

810

40+00 -Y2I-

31+48.07

UNKNOWN

NC DEPARTMENT OF TRANSPORTATION

463

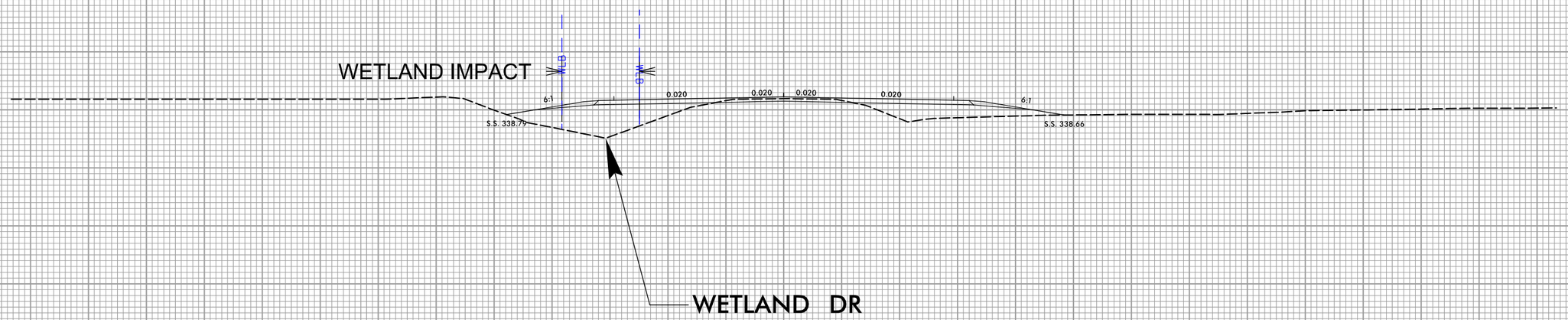
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 Dr Gary Parkway, Suite 101
Cary, NC 27513
(919) 551-4900
ECOLOGICAL ENGINEERING

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CROSS–SECTION AQ–AQ
SITE 39, WETLAND DR
STATION 40+00 –Y21–



385 370 355 340 325 310 295 280

–210 –195 –180 –165 –150 –135 –120 –105 –90 –75 –60 –45 –30 –15 0 15 30 45 60 75 90 105 120 135 150 165 180 195 210

PERMIT DRAWING
SHEET 71 OF 105

REVISIONS

5/14/99

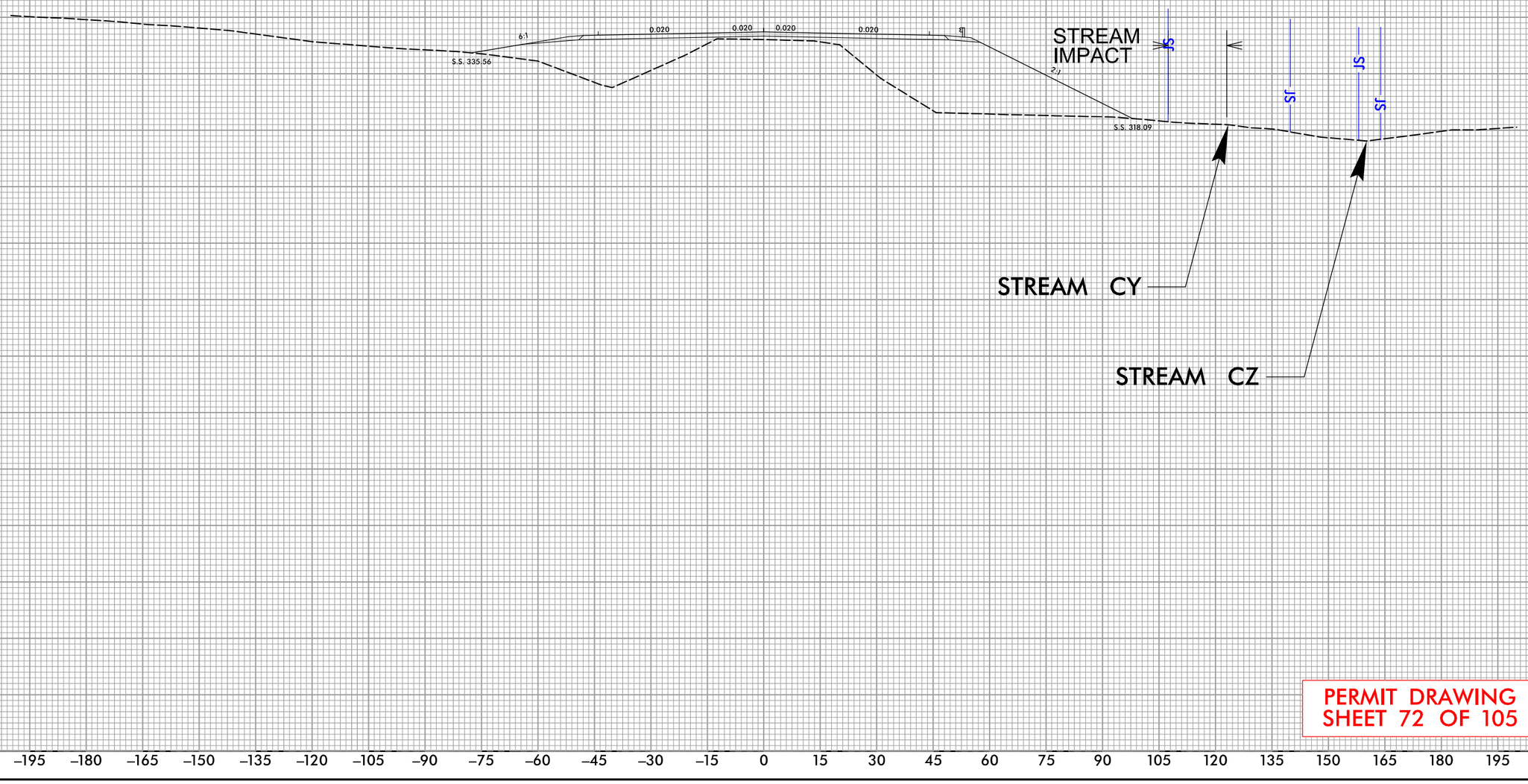
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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CROSS–SECTION AR–AR, SITES 25 & 38, STREAM CY & STREAM CZ STATION 44+50 –Y21–



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SHEET 72 OF 105

REVISIONS
5/14/99

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davidcooper

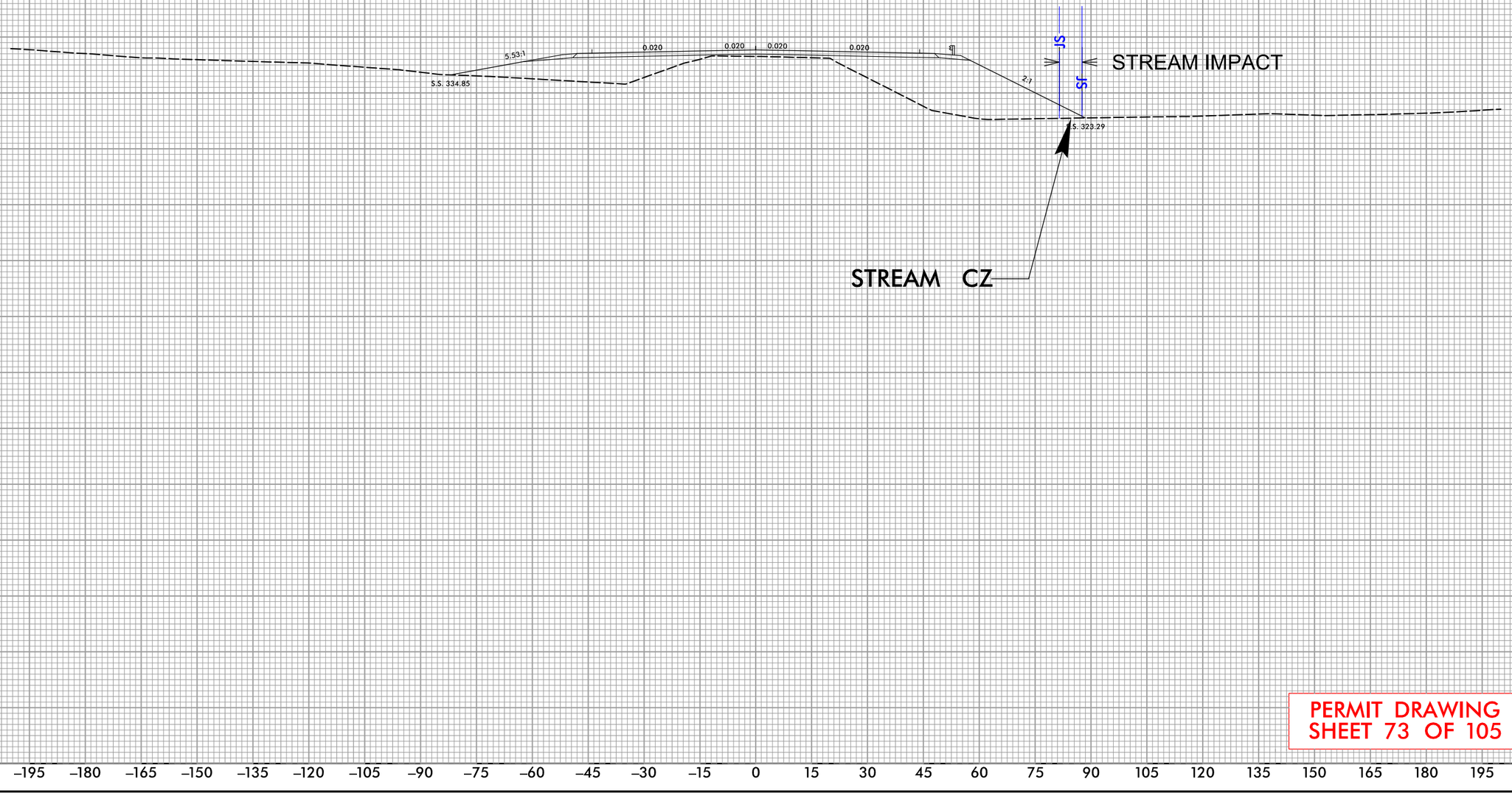
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SITE 38, STREAM CZ
STATION 45+50 –Y21–

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
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Concord, NC 28027
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SHEET 73 OF 105

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davidcooper

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SHEET 74 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 34 CONT'D.

WETLAND EC IMPACT

WETLAND EC IMPACT

STREAM DV IMPACT

-Y22RPCD- SC Sta.

-Y22FLYCC- SC Sta.145+81.98

-Y22FLYCC- POT Sta.50+64.93=

-Y22FLYCC- POC Sta.150+02.25

-Y22FLYCC- POT Sta.42+69.54=

-Y22RPC- ST Sta.10+00.00

-Y22RPC- SC Sta.12+40.00

WEB

SDM

WEC

WLB

SMIT

BZ 1

BZ 2

C
A

35+00 -Y22FLYCC-

40+00 -Y22FLYCC-

145+00 -Y22FLYCC-

150+00 -Y22FLYCC-

45+00 -Y22FLYCC-

15+00 -Y22RPC-

REVISIONS

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dvaldenegro

PERMIT DRAWING
SHEET 74A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

WEB

SDM

WEC

SITE 34 CONT'D.

WETLAND EC IMPACT

WETLAND EC IMPACT

STREAM DV IMPACT

-Y22RPCD- SC Sta.

-Y22FLYCC- SC Sta. 145+81.98

-Y22FLYCC- POT Sta. 50+64.93=

-Y22FLYCC- POC Sta. 150+02.25

-Y22FLYCC- POT Sta. 42+69.54=

-Y22RPC- ST Sta. 10+00.00

-Y22RPC- SC Sta. 12+40.00

35+00 -Y22FLYCC-

40+00 -Y22FLYCC-

145+00 -Y22FLYCC-

150+00 -Y22FLYCC-

45+00 -Y22FLYCC-

15+00 -Y22RPC-

BZ 1

BZ 2

WLB

SMH

REVISIONS

5/14/99

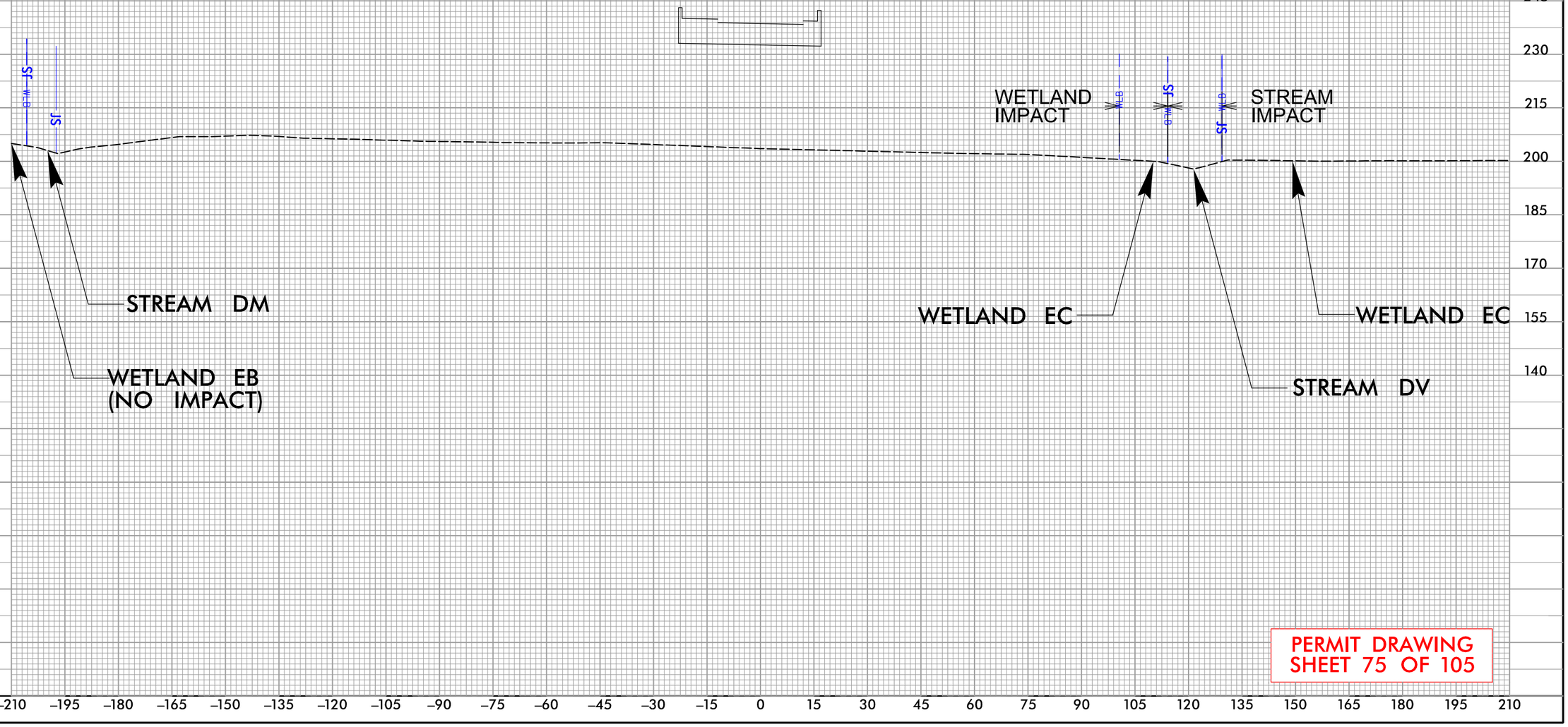
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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CROSS–SECTION AT–AT
SITE 34, WETLAND EB, WETLAND EC, STREAM DM, & STREAM DV
STATION 34+50 –Y22FLYCC–



PERMIT DRAWING
SHEET 75 OF 105

REVISIONS
5/14/99

9:42:43 AM
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davidcooper

PERMIT DRAWING
SHEET 76 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
Cary, NC 27518
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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

WETLAND EW IMPACT

STREAM ET IMPACT

WETLAND EV IMPACT

SITE 40

WEX
WEW
WEV
WEU
STREAM
SUMMIT

POC Sta. 56+47.18 = POC Sta. 14+41.67
-Y22RPD-
-Y22FLYCC- SC Sta. 60+79.59
-Y22RPD-
-Y22RPDFLY- SRS Sta. 33+77.23
-Y22FLYCC- POC Sta. 69+10.50 = Sta. 35+57.23 12.00' RT
-Y22FLYCC- ST

30+00 -Y22RPD- CS Sta. 31+41.46 -Y22RPD- ST Sta. 33+56.46

15+00 -Y22RPD-
25+00 -Y22RPD-
45+00 -Y22RPD-
50+00 -Y22RPD-
55+00 -Y22RPD-
70+00 -Y22FLYCC-
75+00 -Y22F
35+00 -Y22RPDFLY-

CLAYTON BYP
US 70 EBL
CLAYTON BY
30' BST
8' SOIL

WAKE COUNTY
JOHNSTON COUNTY

9:42:52 AM
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davidconner

PERMIT DRAWING
SHEET 76A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

WEX

WEV

WEU

SITE 40

WETLAND EW IMPACT

STREAM ET IMPACT

WETLAND EV IMPACT

30+00 -Y22RPD-

-Y22RPD- CS Sta. 31+41.46

-Y22RPD- ST Sta. 33+56.46

75+00 -Y22F

POC Sta. 56+47.18=

POC Sta. 14+41.67

45+00 -Y22RPCD-

-Y22FLYCC- SC Sta. 60+79.59

15+00 -Y22RPD-

25+00 -Y22R

-Y22RPDFLY- Sta. 30+77.23

50+00 -Y22RPCD

-Y22RPDFLY- SRS Sta. 33+77.23

-Y22FLYCC- POC Sta. 69+10.50=

-Y22RPDFLY- ST Sta. 35+57.23

12.00' RT

70+00 -Y22FLYCC-

35+00 -Y22RPDFLY-

55+00 -Y22RPCD-

WAKE COUNTY
JOHNSTON COUNTY

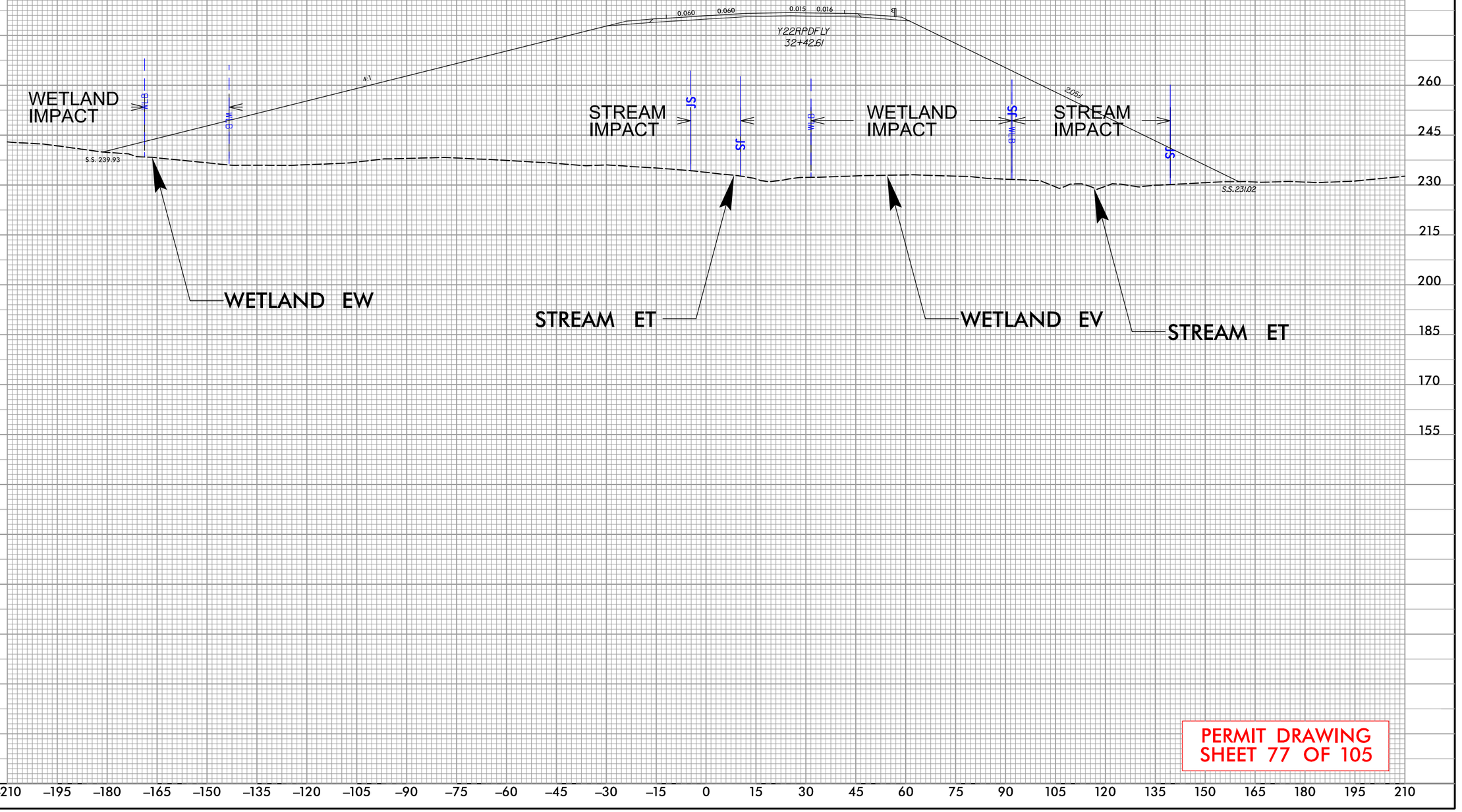
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davidgonger

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 557-5909
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION AU–AU
SITE 40, WETLAND EV,
WETLAND EW, & STREAM ET
STATION 66+00 –Y22FLYCC–



PERMIT DRAWING
SHEET 77 OF 105

REVISIONS
5/14/99

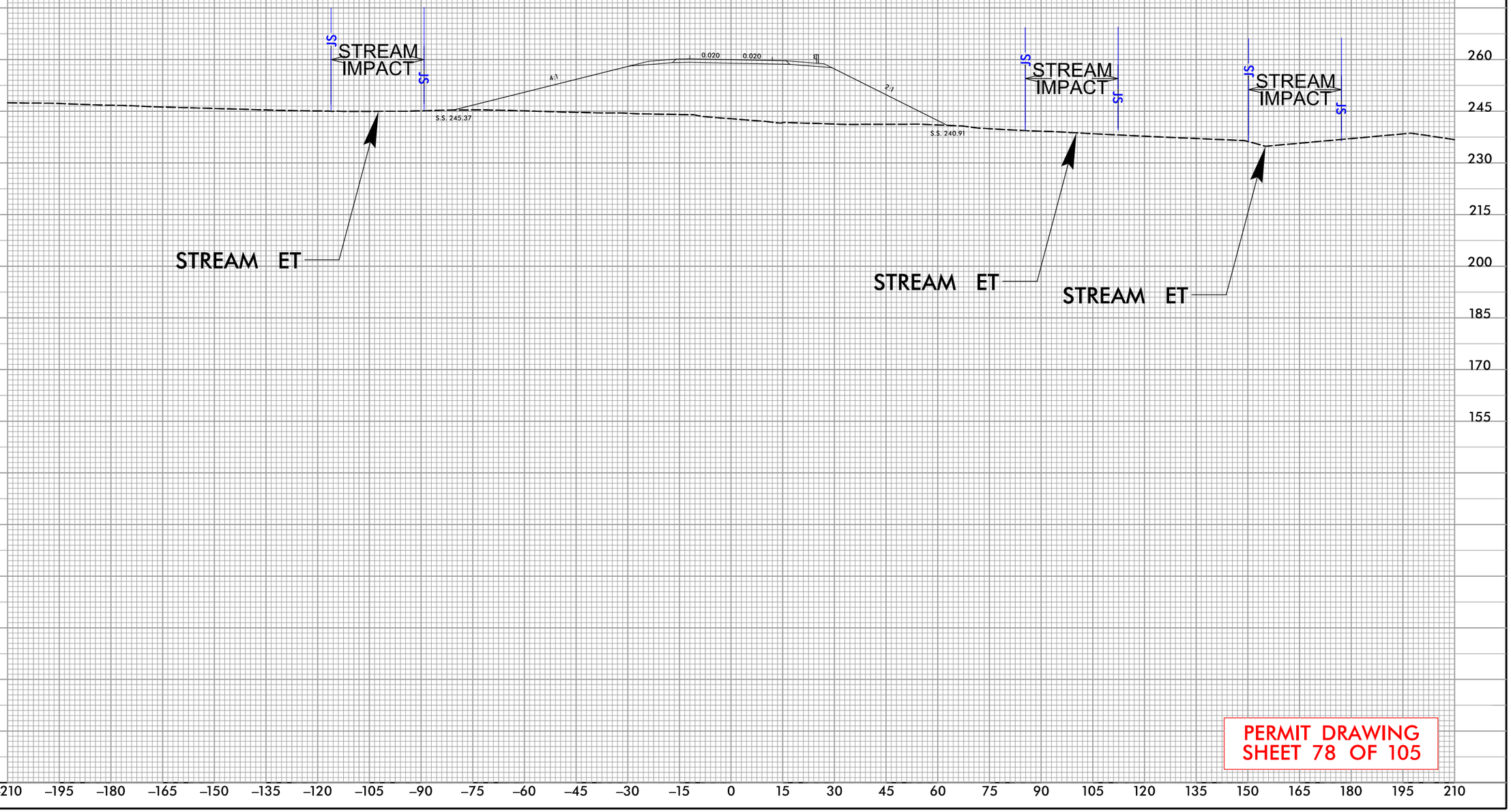
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1515 SE Gary Parkway, Suite 101
Garner, NC 27529
(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION AW–AW
SITE 40, STREAM ET
STATION 47+50 –Y22RPCD–



PERMIT DRAWING
SHEET 78 OF 105

REVISIONS
5/14/99

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davidcooper

PERMIT DRAWING
SHEET 79 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 Sit Cary Parkway, Suite 101
Cary, NC 27513
(919) 557-0939
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

REVISIONS

5/14/99

MATCHLINE SHEET 64 STA. 921+26.95 -L-

-L- POT Sta. 919+95.92=
-Y22FLYCC- POC Sta. 136+09.99
=103° 00' 16.7"

925+00

30+00
-Y22LPB-

-Y22LPC- CS
Sta. 22+75.13

-Y22- POT Sta. 458+79.63=
-Y22LPC- ST Sta. 10+00.00
61' RT

-Y22LPC- SC
Sta. 13+50.00

-Y22LPC- PCC
Sta. 15+21.01

-Y22LPC- PCC
Sta. 19+02.37

-Y22FLYCC- CS
Sta. 140+26.46

-L- Sta. 929+95.00
-Y22LPC- ST
Sta. 26+25.13
71' RT

35+00
-Y22LPB-

20+00
-Y22LPC-

-Y22LPB- TS Sta. 38

-Y22- POT Sta. 464+03.8
-Y22RPCD- POT Sta. 36

-Y22FLYBD- POC Sta.
-Y22LPB- ST Sta. 4

35+00
-Y22RPCD-

30+00
-Y22RPCD-

-Y22RPCD- CS Sta. 33+13.05

-Y22RPCD- ST Sta. 35+13.05

40+00
-Y22RPCD-

SDO

SS MH

BZ 1

BZ 2

SITE 41

STREAM DO IMPACT

RIPRAP

BST

I 40 EBL

I 40 WBL JAMES E HARRINGTON FWY 56' CONC

9:47:17 AM
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dsvidovich

PERMIT DRAWING
SHEET 79A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1140
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER (POND)

MATCHLINE SHEET 64 STA. 921+26.95 -L-

-L- POT Sta. 919+95.92 =
=103° 00' 16.7"
Sta. 136+09.99
-Y22FLYCC- POC

925+00
-L-

30+00
-Y22LPB-

-Y22LPC- CS
Sta. 22+75.13

-Y22- POT
-Y22LPC- ST
Sta. 458+79.63 =
Sta. 10+00.00
61' RT

-Y22LPC- SC
Sta. 13+50.00

-Y22LPC- PCC
Sta. 15+21.01

-Y22LPC- PCC
Sta. 19+02.37

-Y22FLYCC- CS
Sta. 140+26.46

-Y22LPC- ST
Sta. 929+95.00
Sta. 26+25.13
71' RT

SDO

SITE #1

STREAM DO IMPACT

BZ 1

BZ 2

SS

MIT

RIPRAP

I 40 EBL

I 40 WBL

JAMES E HARRINGTON FWY

56' CONC

35+00
-Y22LPB-

20+00
-Y22LPC-

-Y22LPB- TS Sta. 38
Sta. 464+03.8

-Y22- POT Sta. 36
-Y22RPCD- POT

-Y22FLYBD- POC Sta.
-Y22LPB- ST Sta.

-Y2

35+00
-Y22RPCD-

30+00
-Y22RPCD-

-Y22RPCD- CS Sta. 33+13.05

-Y22RPCD- ST Sta. 35+13.05

40+00
-Y22RPCD-

REVISIONS

5/14/99

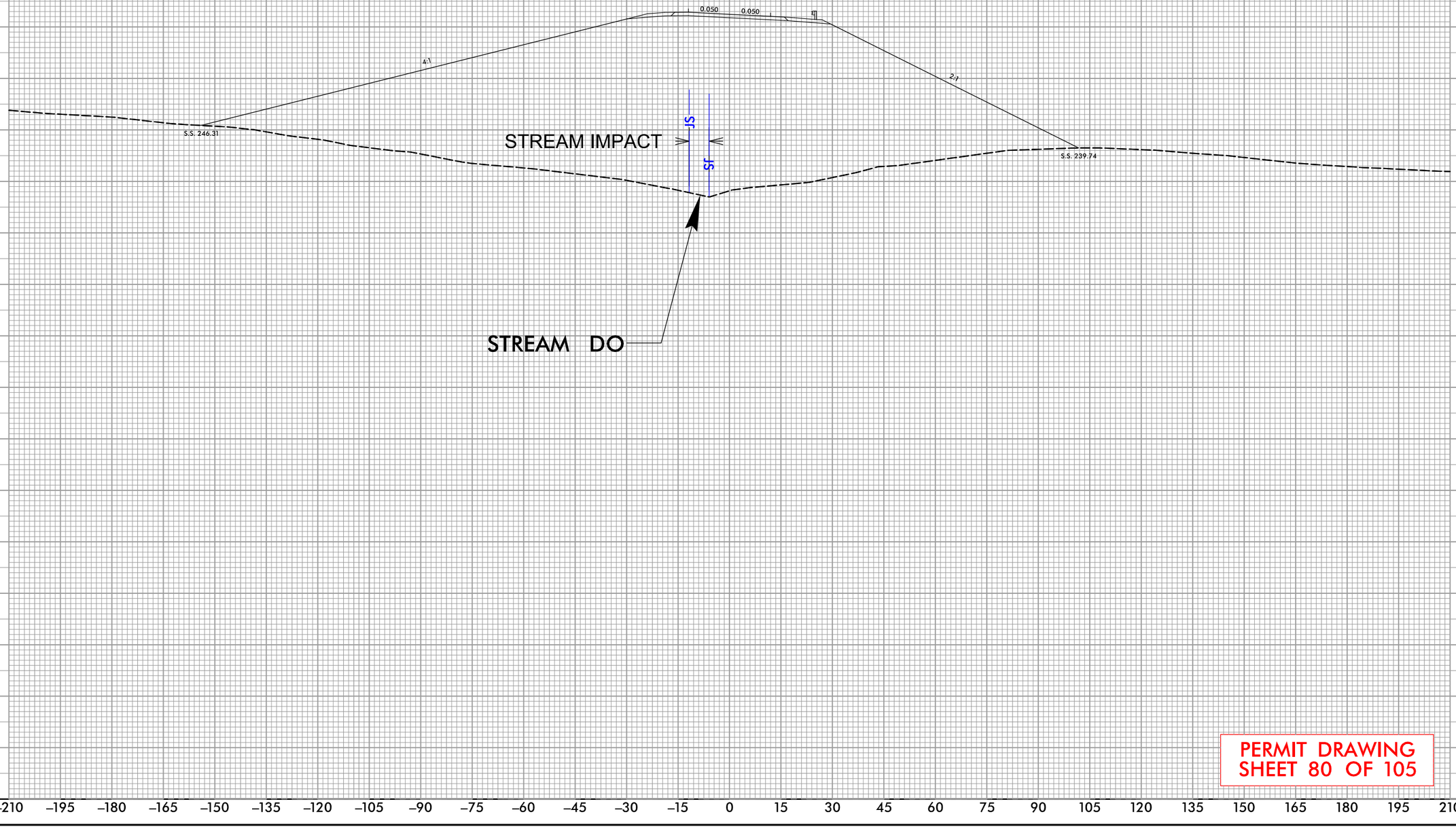
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 SE Cary Parkway, Suite 101
Cary, NC 27511
(919) 551-4900
ECOLOGICAL ENGINEERING

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CROSS–SECTION AV–AV
SITE 41, STREAM DO
STATION 30+00 –Y22RPCD–



PERMIT DRAWING
SHEET 80 OF 105

REVISIONS
5/14/99

9:43:30 AM
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davidcooper

WFN (2)

50′ 0′ 100′

SCALE

DENOTES FILL IN WETLAND

PERMIT DRAWING SHEET 81 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

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REVISIONS

5/14/99

CONC

US 70 WBL

WLB

SITE 42

WETLAND IMPACT

WFN (2)

SEG

JS MITD

80+00 -Y22RPCD-

85+00 -Y22RPCD-

90+00 -Y22RPCD-

CP & L 180' R/W

DRIGGERS, DEREK E

ISFD

TILLER

9:47:38 AM
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davidgeorge

WFN (2)

50′ 0′ 100′
SCALE

F F DENOTES FILL IN WETLAND

PERMIT DRAWING
SHEET 81A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

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REVISIONS
5/14/99

CONC
CONC
US 70 WBL
WLB
WLB
WLB
WLB
SITE 42
WETLAND IMPACT FN
WFN (2)
SEG
WLB
WLB
80+00 -Y22RPCD-
85+00 -Y22RPCD-
90+00 -Y22RPCD-
DRIGGERS, DEREK E
ISFD
TILLER

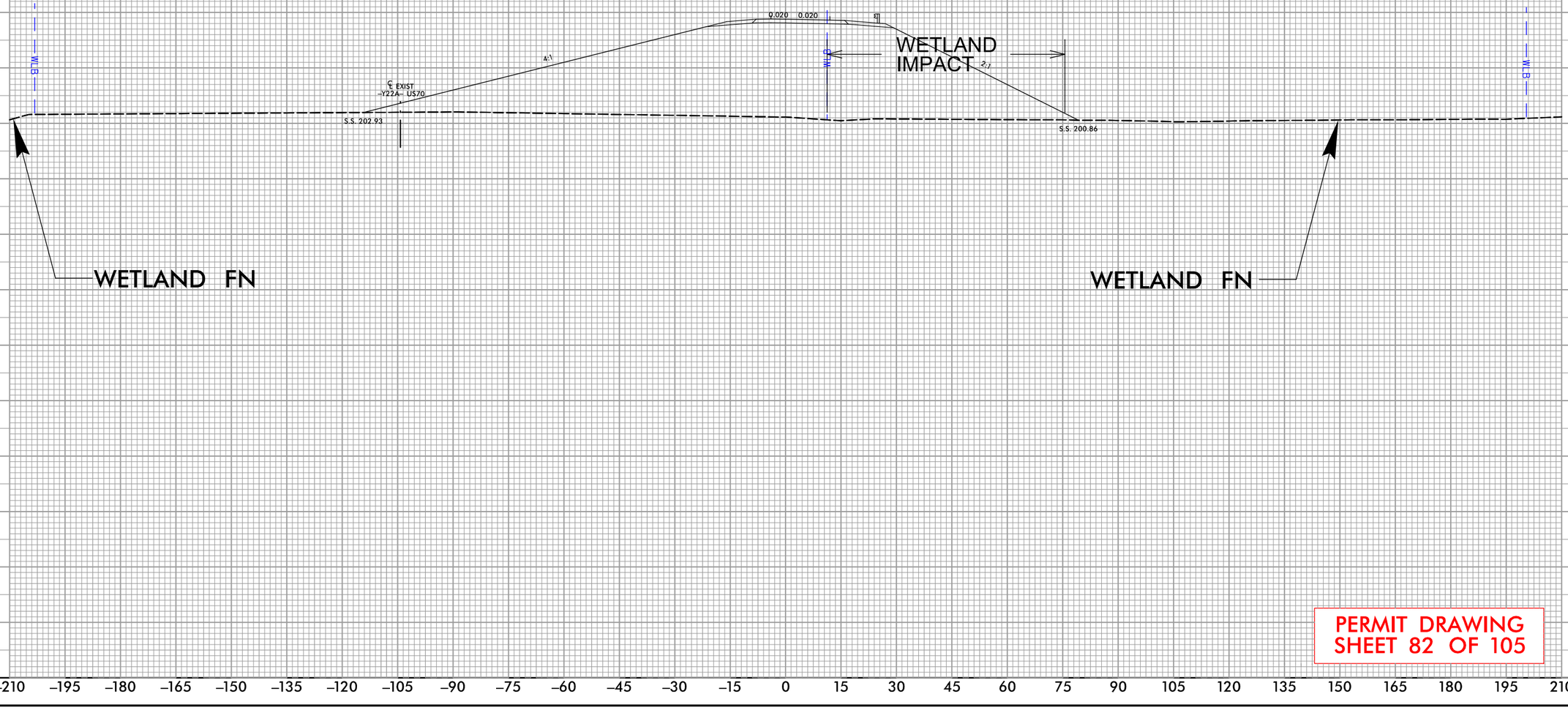
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 551-4900
ECOLOGICAL ENGINEERING

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CROSS–SECTION AX–AX
SITE 42, WETLAND FN
STATION 82 + 00 –Y22RPCD–



PERMIT DRAWING
SHEET 82 OF 105

REVISIONS

5/14/99

9:43:50 AM
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davidcooper

PERMIT DRAWING
SHEET 83 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS
5/14/99

SCALE 50' 0' 100'

DENOTES IMPACTS IN SURFACE WATER

JAMES E HARRINGTON FWY 44' CONC

I 40 EBL JAMES E HARRINGTON FWY 56' CONC

SITE 43

STREAM ES IMPACT

SES

SES MIT

480

485

20+00
-Y22RPDFLY-

15+00
-Y22RPDFLY-

165+00
-Y22FLYCC-

-Y22RPDFLY- SC Sta. 12+10.00

190+59.61

BZ 1

BZ 2

BZ

C

F

W

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dpridgeon

5/14/99

REVISIONS

50′ 0′ 100′

SCALE

DENOTES IMPACTS IN SURFACE WATER

PERMIT DRAWING SHEET 83A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

JAMES E HARRINGTON FWY

44' CONC

140 FBL

56' CONC

BST

SITE 43

STREAM ES IMPACT

SES

SES MIT

SES

SES

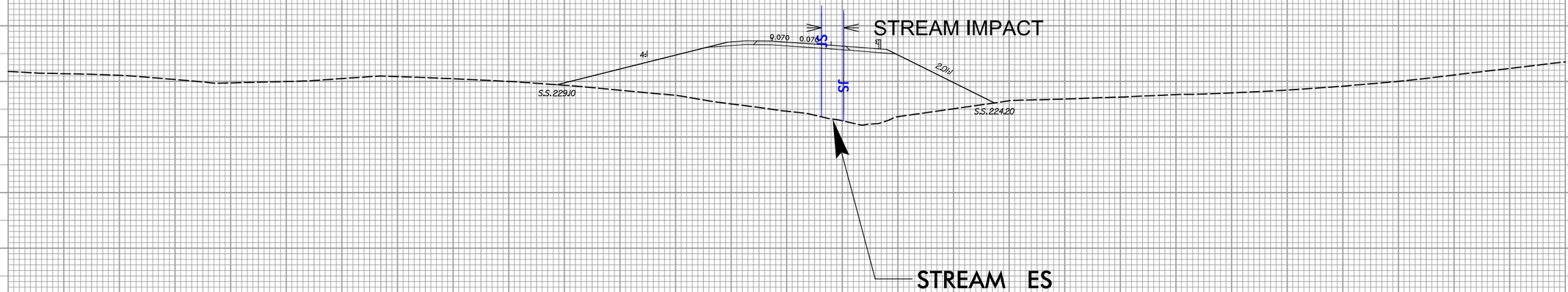
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No.F-1148
1515 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION AY–AY
SITE 43, STREAM ES
STATION 20+00 –Y22RPDFLY–



PERMIT DRAWING
SHEET 84 OF 105

REVISIONS
5/14/99

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davidcooper

PERMIT DRAWING
SHEET 85 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 515-0929
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 89 STA. 113+12.78 -Y22FLYCC-

MATCHLINE SHEET 87 STA. 452+00.90 -Y22-

JAMES E HARRINGTON FWY 70' CONC

I 40 WBL JAMES E HARRINGTON FWY 56' CONC

I 40 EBL JAMES E HARRINGTON FWY BST

110+00 -Y22FLYCC-

105+00 -Y22FLYCC-

115+00

15+00

20+00

25+00

945+00

WETLAND FC IMPACT

STREAM DT IMPACT

WETLAND FD IMPACT

SITE 44

-Y22LPA- CS
Sta. 12+50.00

-Y22LPA- SC
Sta. 25+13.66

-Y22RPEA- POC
Sta. 51+21.52=
-Y22LPA- ST
Sta. 10+00.00
12' RT

-L- POT
Sta. 940+62.94=
-Y22LPA- ST
Sta. 27+63.66
7' LT

-L- POT
Sta. 933+62.00=
-Y22LPB- POT
Sta. 31+34.98
=67° 10' 47.6"

WEB
WEC
WED
WEK
WFA
SDS
SDT
SDT
SDT

NIXON, JOYCE J

SR 2703 NEW BETHEL CHURCH RD

15' CONC

8' GR

IS BKD

SFD

152 PROPERTIES LLC

445

450

408

50

9:44:18 AM
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dwickgroup

PERMIT DRAWING
SHEET 85A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

MATCHLINE SHEET 89 STA. 113+12.78 -Y22FLYCC-

MATCHLINE SHEET 87 STA. 452+00.90 -Y22-

-Y22FLYCC- 110+00

-Y22FLYCC- 105+00

-Y22FLYCC- 115+00

-Y22FLYCC- 15+00

-Y22FLYCC- 20+00

-Y22LPA- CS Sta. 12+50.00

-Y22LPA- SC Sta. 25+13.66

-Y22RPEA- POC Sta. 51+21.52=
-Y22LPA- ST Sta. 10+00.00
12' RT

-L- POT Sta. 940+62.94=
-Y22LPA- ST Sta. 27+63.66
7½' LT

-L- POT Sta. 933+62.00=
-Y22LPB- POT Sta. 31+34.98
=67° 10' 47.6"

-Y22LPA- 25+00

945+00

WETLAND FC IMPACT

STREAM DT IMPACT

WETLAND FD IMPACT

SITE 44

I 40 WBL JAMES E HARRINGTON FWY 70' CONC

I 40 EBL JAMES E HARRINGTON FWY 70' CONC

SR 2703 NEW BETHEL CHURCH RD

15' CONC

8' GR

NIXON, JOYCE J

445

450

408

IS BKD

SFD

WEB WEC WED WEK WFA SDS SDT SDL SDT

BZ 1 BZ 2

C F

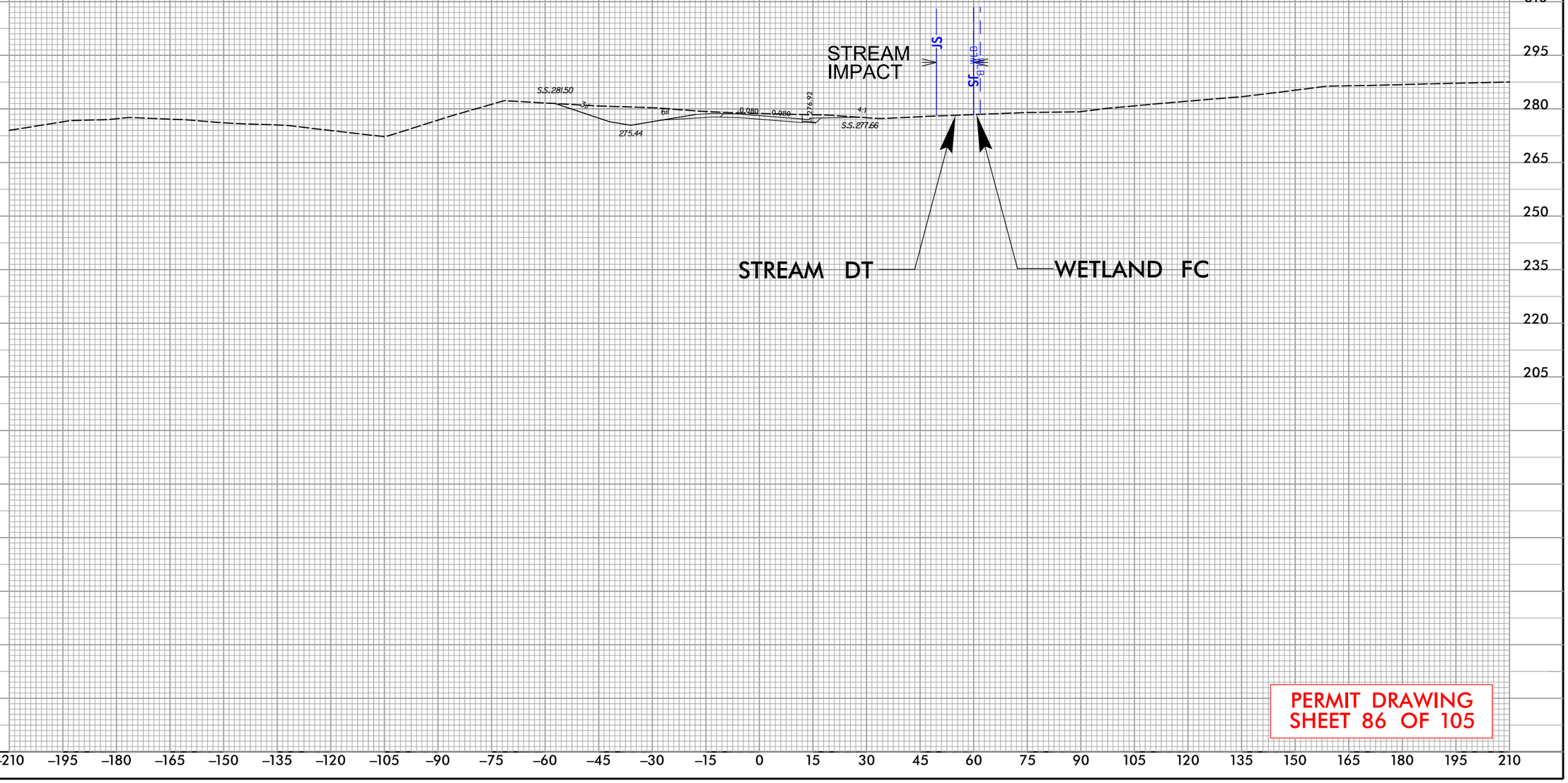
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dwickgoogle

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No.F-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION AZ–AZ
SITE 44, WETLAND FC & STREAM DT
STATION 14+00 –Y22LPA–



PERMIT DRAWING
SHEET 86 OF 105

REVISIONS
5/14/99

9:44:30 AM
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davidcooper

PERMIT DRAWING
SHEET 87 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

MATCHLINE SHEET 89 STA. 34+22.41 -Y22RPB-

MATCHLINE SHEET 85 STA. 452+00.90 -Y22-

MATCHLINE SHEET 64 STA. 26+39.35 -Y22RPB-

SITE 44 CONT'D.

STREAM DT IMPACT

WETLAND EL IMPACT

SDT

IM

WEL

JS MIT

JS MIT

WHITE, MARY
POWELL, WARD
WARD, ISABEL L

NC DEPARTMENT OF TRANSPORTATION

RIP-RAP

-Y22FLYCC- POC Sta.112+
-Y22RPAFLY- ST Sta. 68+80.
12'

-Y22LPB- CS
Sta. 24+23.65

-Y22LPB- ST
Sta. 26+73.65

-L- POT
Sta. 929+47.83=
-Y22LPB- ST
Sta. 10+00.00
71' LT

BZ
BZ 1
BZ 2

45
50

9:44:38 AM
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dwickenger

PERMIT DRAWING
SHEET 87A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS 5/14/99

MATCHLINE SHEET 89 STA. 34+22.41 –Y22RPB–

–Y22FLYCC– POC Sta.112+
–Y22RPAFLY– ST Sta. 68+80.
12'

WETLAND EL IMPACT

SITE 44 CONT'D.

STREAM DT IMPACT

SDT

IMPACTS

WELL

WHITE, MARY
POWELL, WARD
WARD, ISABEL L

MC DEPARTMENT OF TRANSPORTATION

30+00
–Y22RPB–

20+00
–Y22LPB–

–Y22LPB– CS
Sta. 24+23.65

25+00
–Y22LPB–

–Y22LPB– ST
Sta. 26+73.65

15+00
–Y22LPB–

–L– POT
Sta. 929+47.83=
–Y22LPB– ST
Sta. 10+00.00
71' LT

MATCHLINE SHEET 64 STA. 26+39.35 –Y22RPB–

MATCHLINE SHEET 85 STA. 452+00.90 –Y22–

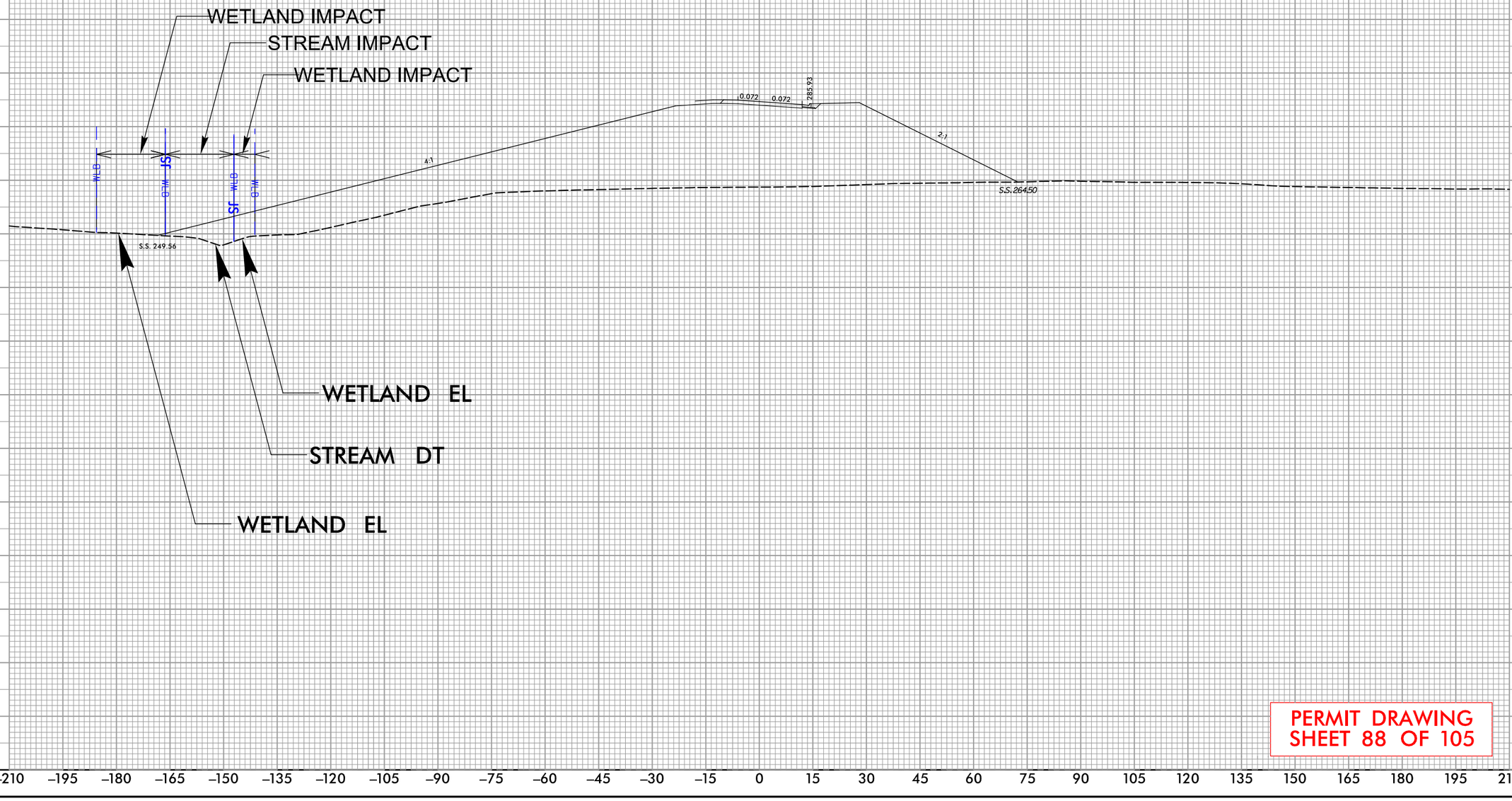
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No.F-1148
1555 SE Cary Parkway, Suite 101
Cary, NC 27511
(919) 557-0909
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

CROSS–SECTION BA–BA
SITE 44, WETLAND EL & STREAM DT
STATION 24+50 –Y22LPB–



PERMIT DRAWING
SHEET 88 OF 105

REVISIONS

5/14/99

9:44:51 AM
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 89 OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

MATCHLINE SHEET 87 STA. 34+22.41 –Y22RPB–

MATCHLINE SHEET 85 STA. 113+12.78 –Y22FLYCC–

STREAM DQ IMPACT

SITE 46

SITE 45

STREAM DX IMPACT

SITE 47

STREAM DR IMPACT

WETLAND EJ IMPACT

SITE 46 CONT'D.

STREAM DQ IMPACT

–Y22RPB– Sta. 40+00.67

–Y22RPB– Sta. 45+00.00

–Y22FLYCC– Sta. 49.61

–Y22FLYEB– ST Sta. 10+00.00

–Y22FLYEB– SC Sta. 13+20.00

–Y22FLYEB– PT Sta. 16+09.90

–Y22FLYBD– Sta. 15+00

WHITE, MARY WARD POWELL ISABEL L WARD,

JS MIT

SDO

SDX

SDR

SDP

WD

WETLAND

40' BSTC

26' SOIL

12' BST

36' BST

RAD

F

C

A

40

30

9:45:00 AM
R:\Projects\Annual Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSHNR-2828_PSH89_wet.dgn
davidcooper

PERMIT DRAWING
SHEET 89A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No. P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 515-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SCALE 50′ 0′ 100′

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

MATCHLINE SHEET 87 STA. 34+22.41 –Y22RPB–

MATCHLINE SHEET 85 STA. 113+12.78 –Y22FLYCC–

STREAM DQ IMPACT

SITE 46

SITE 45

STREAM DX IMPACT

SITE 47

STREAM DR IMPACT

WETLAND EJ IMPACT

STREAM DQ IMPACT

SITE 46 CONT'D.

–Y22RPB– Sta. 40+00.00

–Y22FLYCC– Sta. 117+90.84

–Y22FLYCC– Sta. 149.61

–Y22FLYEB– ST Sta. 10+00.00

–Y22FLYEB– SC Sta. 13+20.00

–Y22FLYEB– PT Sta. 16+09.90

–Y22FLYBD 15+00

–Y22RPB– 45+00

SDX

SDO

SDR

SDP

JS MIT

WHITE, MARY WARD POWELL, ISABEL L WARD,

40

30

BZ 1

BZ 2

TZ 1

TZ 2

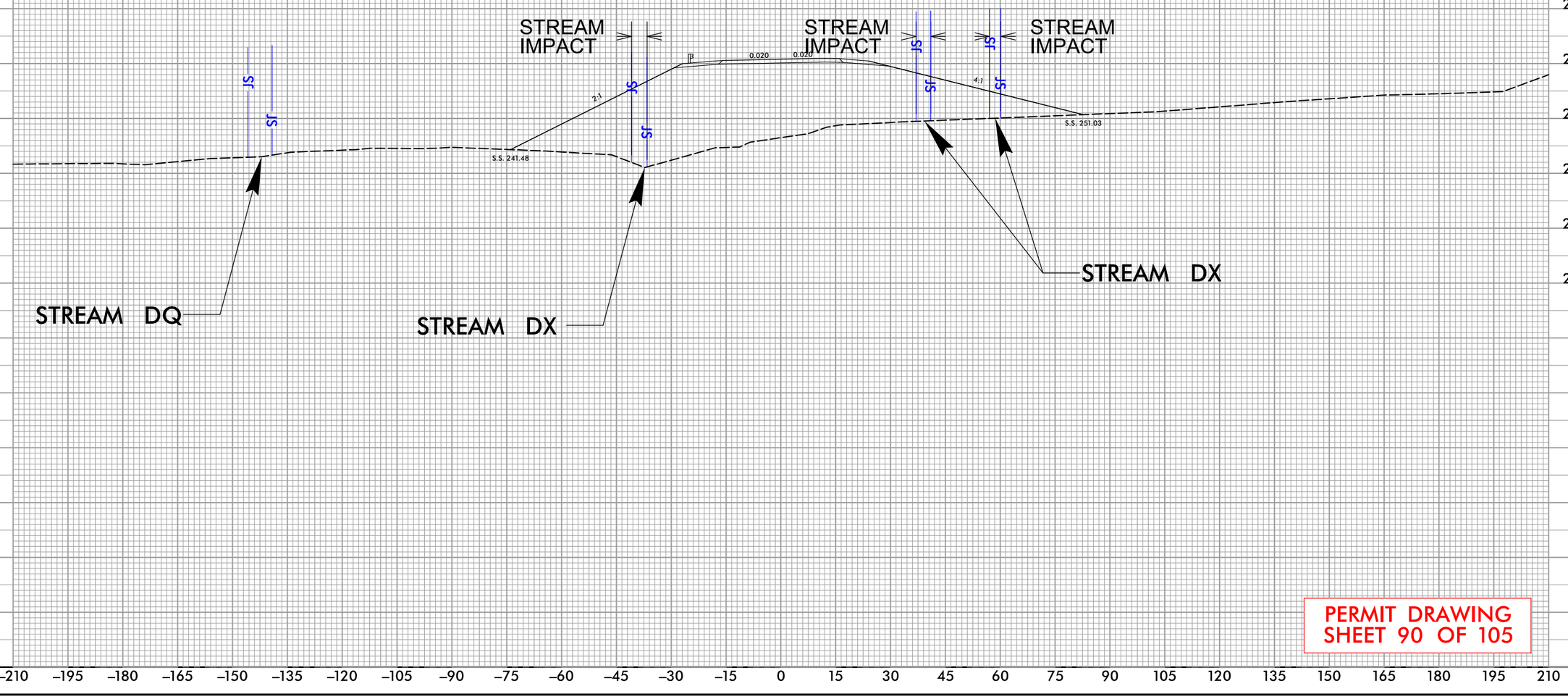
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CROSS–SECTION BC–BC
SITE 45, STREAM DQ & STREAM DX
STATION 37+50 –Y22RPB–



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SHEET 90 OF 105

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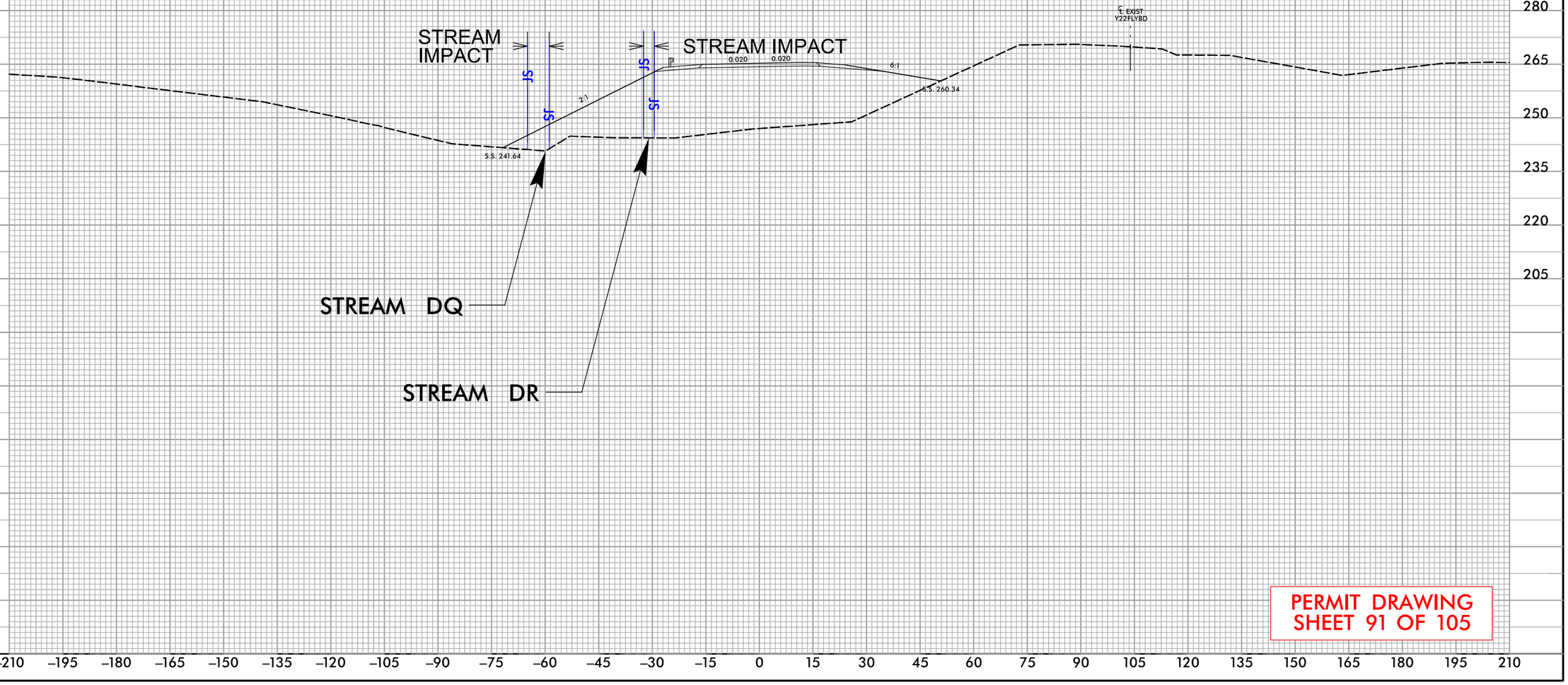
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CROSS–SECTION BD–BD, SITES 46 & 47, STREAM DQ & STREAM DR STATION 41+00 –Y22RPB–



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SHEET 91 OF 105

REVISIONS

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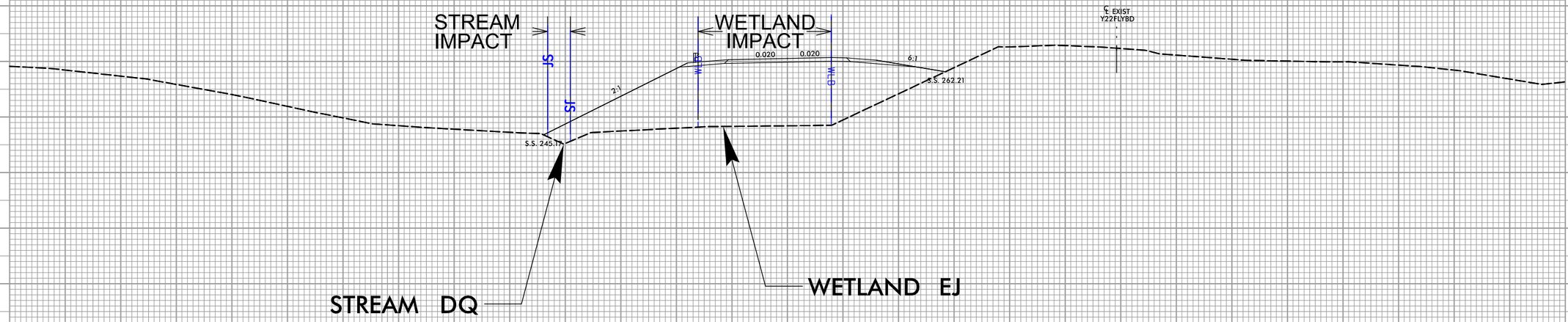
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1555 Dr Gary Parkway, Suite 101
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CROSS–SECTION BE–BE, SITES 46 & 47, WETLAND EJ & STREAM DQ STATION 42+00 –Y22RPB–



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SHEET 92 OF 105

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SHEET 93 OF 105

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 48

STREAM EM IMPACT

WETLAND NQ IMPACT

MATCHLINE SHEET 95 STA 379+81.60 -Y22-

REVISIONS

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PERMIT DRAWING SHEET 93A OF 105

50′ 0′ 100′
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

SITE 48

STREAM EM IMPACT

WETLAND NQ IMPACT

MATCHLINE SHEET 95 STA. 372+18.60 -Y22-

REVISIONS

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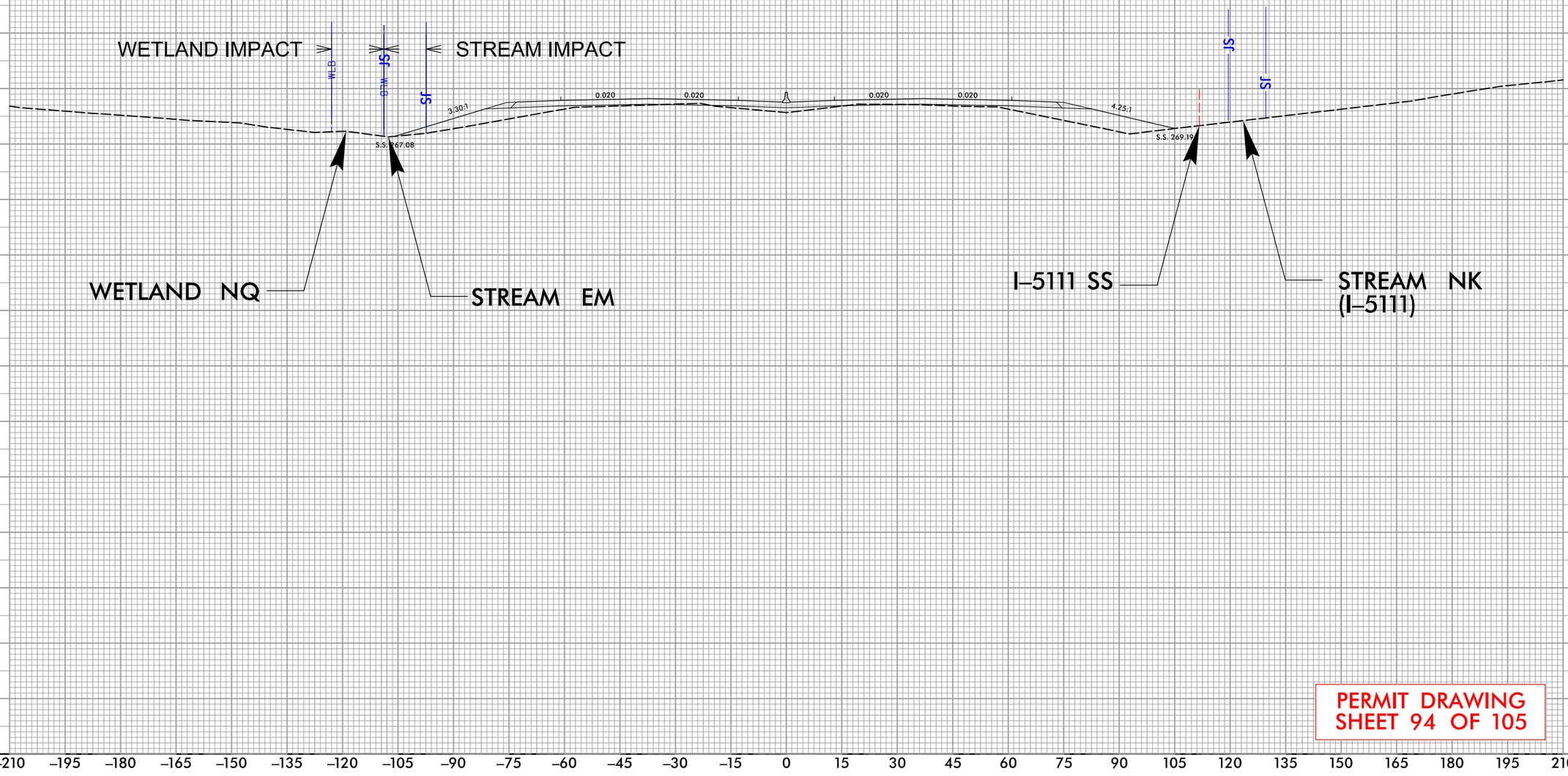
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davidconner

PROJECT REFERENCE NO.	SHEET NO.
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1555 SE Cary Parkway, Suite 101
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CROSS–SECTION BF–BF
SITE 48, WETLAND NQ,
STREAM EM, & STREAM NK
STATION 379+00 –Y22–



PERMIT DRAWING
SHEET 94 OF 105

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SHEET 95 OF 105

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50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

STREAM EM IMPACT

SITE 48 CONT'D.

SEM

STREAM NK IMPACT

SNK

SITE 49

SITE 50

WETLAND QC IMPACT

WQC

WETLAND QA IMPACT

WQA

STREAM NO IMPACT

SNO

SEN

JS MIT

MATCHLINE SHEET 93 STA. 379+81.60 –Y22–

MATCHLINE SHEET 97 STA. 394+13.32 –Y22–

SMITH LANDING SUBDIVISION

SMITH, ROY R

SMITH, ROY B

SMITH, ROY & DICKENS, TINA L

MARLOW, BEATRICE M

SR 2201

8" SOIL

HTR

NC DEPT OF TRANSPORTATION

SAINT AUGUSTINES COLLEGE

JAMES E HARRINGTON FWY 44' CONC

–Y22RPB– POT Sta. 382+38.96

–Y22RPB– SC Sta. 87+68.58

–Y22RPB– CS Sta. 92+46.26

–Y22RPB– ST Sta. 94+62.26

–Y22RPB– 95+00

–Y22RPB– 90+00

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PERMIT DRAWING
SHEET 95A OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS
5/14/99

STREAM EM IMPACT

SITE 48 CONT'D.

SEM

JS MIT

SEN

JS MIT

STREAM NK IMPACT

SNK

SITE 49

SITE 50

WETLAND QC IMPACT

WQC

WETLAND QA IMPACT

WQA

STREAM NO IMPACT

SNO

MATCHLINE SHEET 93 STA. 379+81.60 –Y22–

MATCHLINE SHEET 97 STA. 394+13.32 –Y22–

–Y22RPB– POT Sta. 382+38.96 = –Y22– PI Sta. 99+54

–Y22RPB– ST Sta. 94+62.26

–Y22RPB– CS Sta. 92+46.26

–Y22RPB– SC Sta. 87+68.58

–Y22RPB– 95+00

–Y22RPB– 90+00

–Y22RPB– 5+52.58

380 385 390

F C R W A

BZ 1 BZ 2

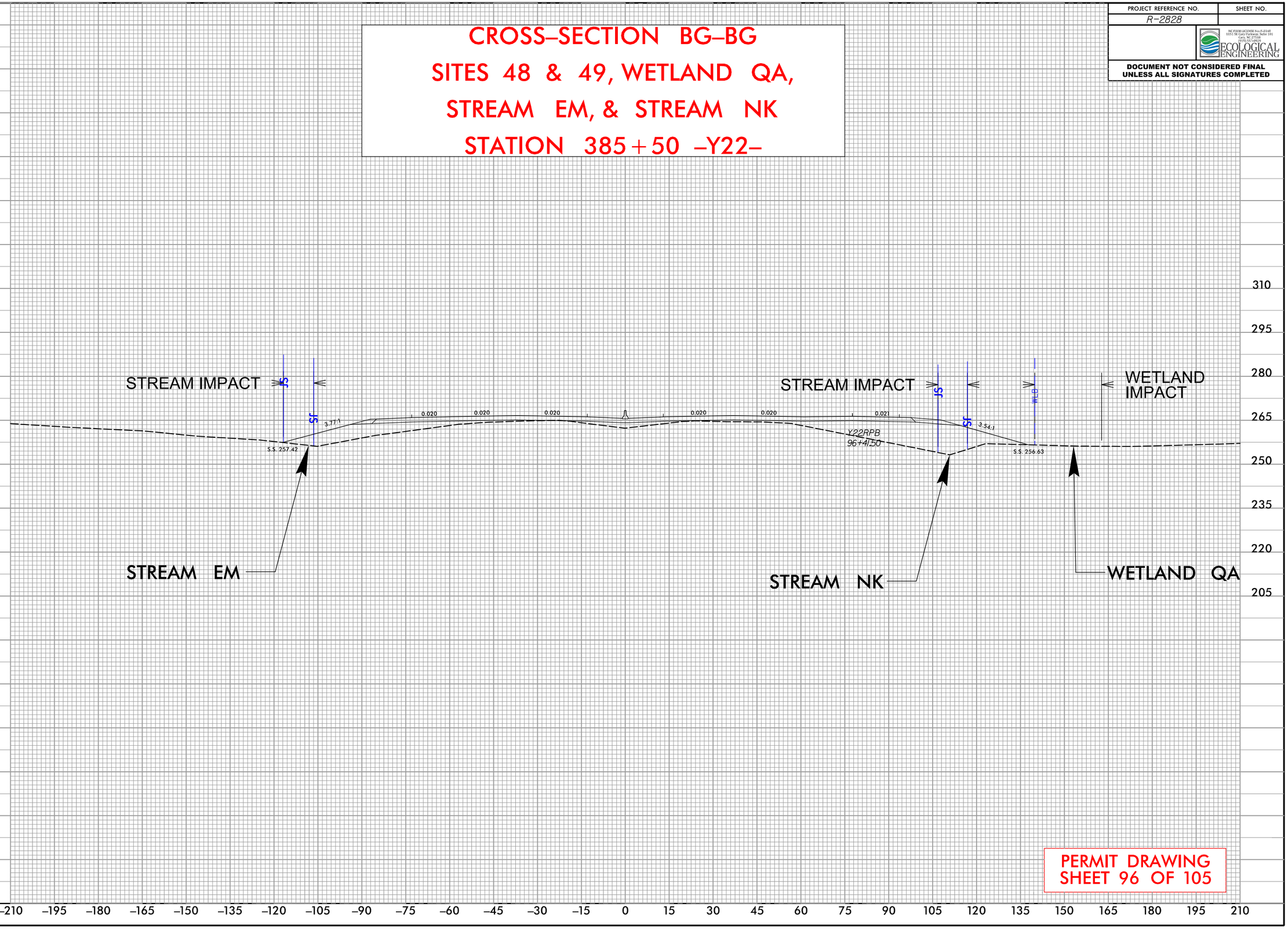
SMITH, ROY R
SMITH, ROY R
SMITH, ROY R
SMITH LANDING SUBDIVISION
MARLOW, BEATRICE M
DICKENS, TINA L
SMITH, ROY R
SMITH, ROY R
SMITH, ROY R

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: F-1148
1555 Dr Gary Parkway, Suite 101
Concord, NC 28027
(970) 557-0928
ECOLOGICAL ENGINEERING

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CROSS–SECTION BG–BG
SITES 48 & 49, WETLAND QA, STREAM EM, & STREAM NK
STATION 385+50 –Y22–



PERMIT DRAWING
SHEET 96 OF 105

REVISIONS

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PERMIT DRAWING
SHEET 97 OF 105

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 95 STA. 394+13.32 -Y22-

MATCHLINE SHEET 102 STA. 409+15.83 -Y22-

STREAM EK IMPACT

STREAM EL IMPACT

SITE 51

SITE 52

SITE 53

WETLAND EF IMPACT

WETLAND EG IMPACT

STREAM EK IMPACT

STREAM EL IMPACT

395 -Y22-

400 -Y22-

405 -Y22-

85+00 -Y22RPB-

80+00 -Y22RPB-

75+00 -Y22RPB-

-Y22RPB- TS Sta. 8

JS MIT

WLB

SEK

SEL

WFF

WEE

BST

140 WBL

140 EBL JAMES E HARRINGTON FWY

68' CONC

SMITH BOY B

BZ 1

BZ 2

E

F

C

RW

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PERMIT DRAWING SHEET 97A OF 105

50' 0' 100'
SCALE

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

STREAM EK IMPACT

STREAM EL IMPACT

WETLAND EF IMPACT

WETLAND EG IMPACT

SITE 51

SITE 52

SITE 53

MATCHLINE SHEET 95 STA. 394+13.32 –Y22–

MATCHLINE SHEET 102 STA. 409+15.83 –Y22–

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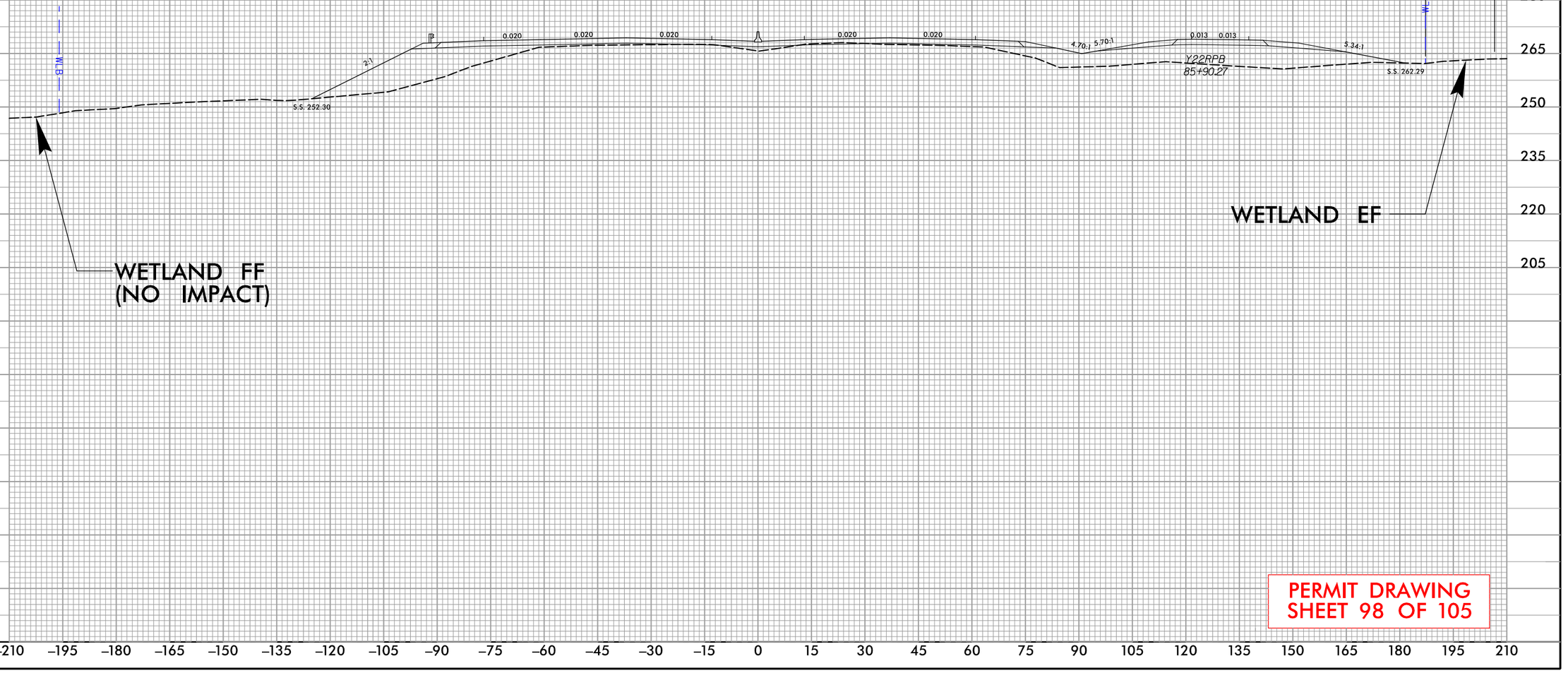
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(919) 557-5909
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CROSS–SECTION BH–BH
SITE 51, WETLAND EF & WETLAND FF
STATION 396+00 –Y22–

REVISIONS 5/14/99



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SHEET 98 OF 105

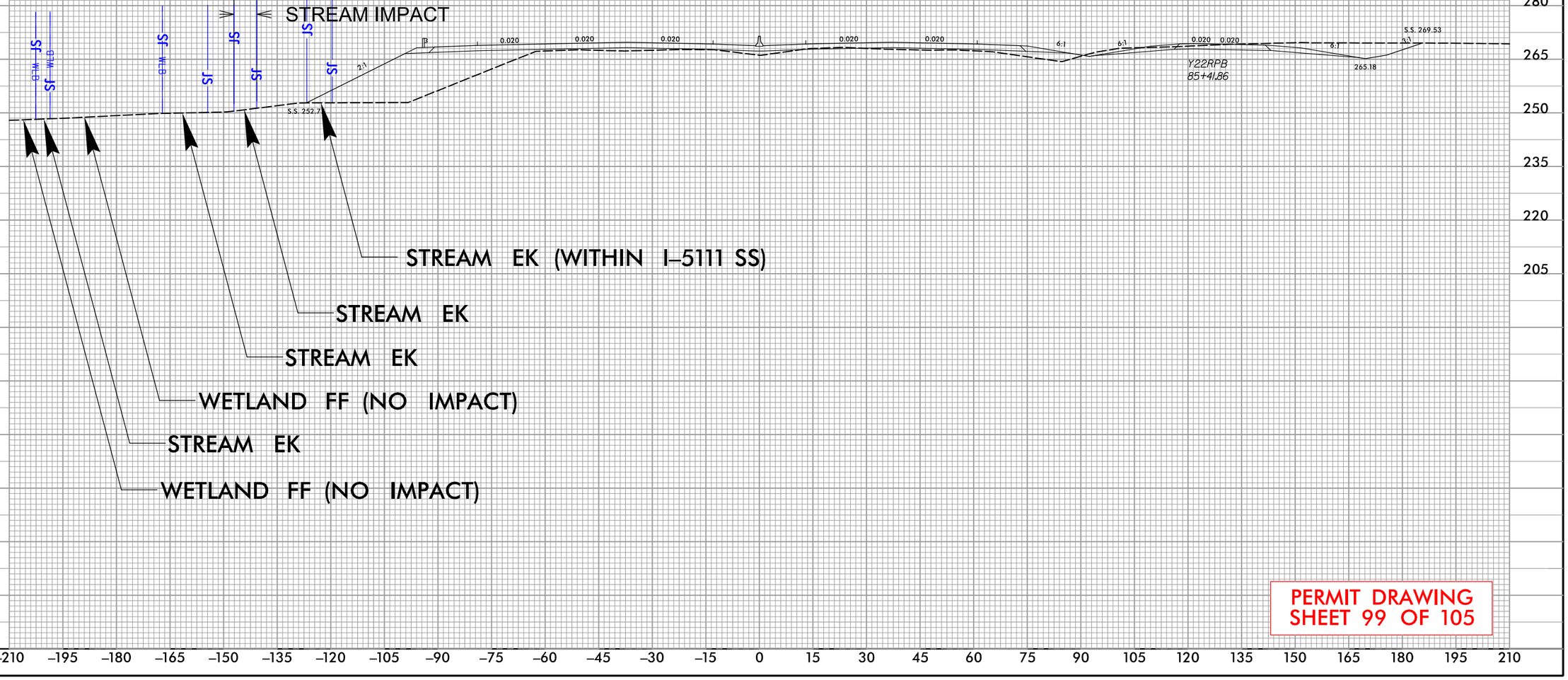
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(919) 557-5909
ECOLOGICAL ENGINEERING

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CROSS–SECTION BI–BI
SITE 51, WETLAND FF & STREAM EK
STATION 396+50 –Y22–



PERMIT DRAWING
SHEET 99 OF 105

REVISIONS

5/14/99

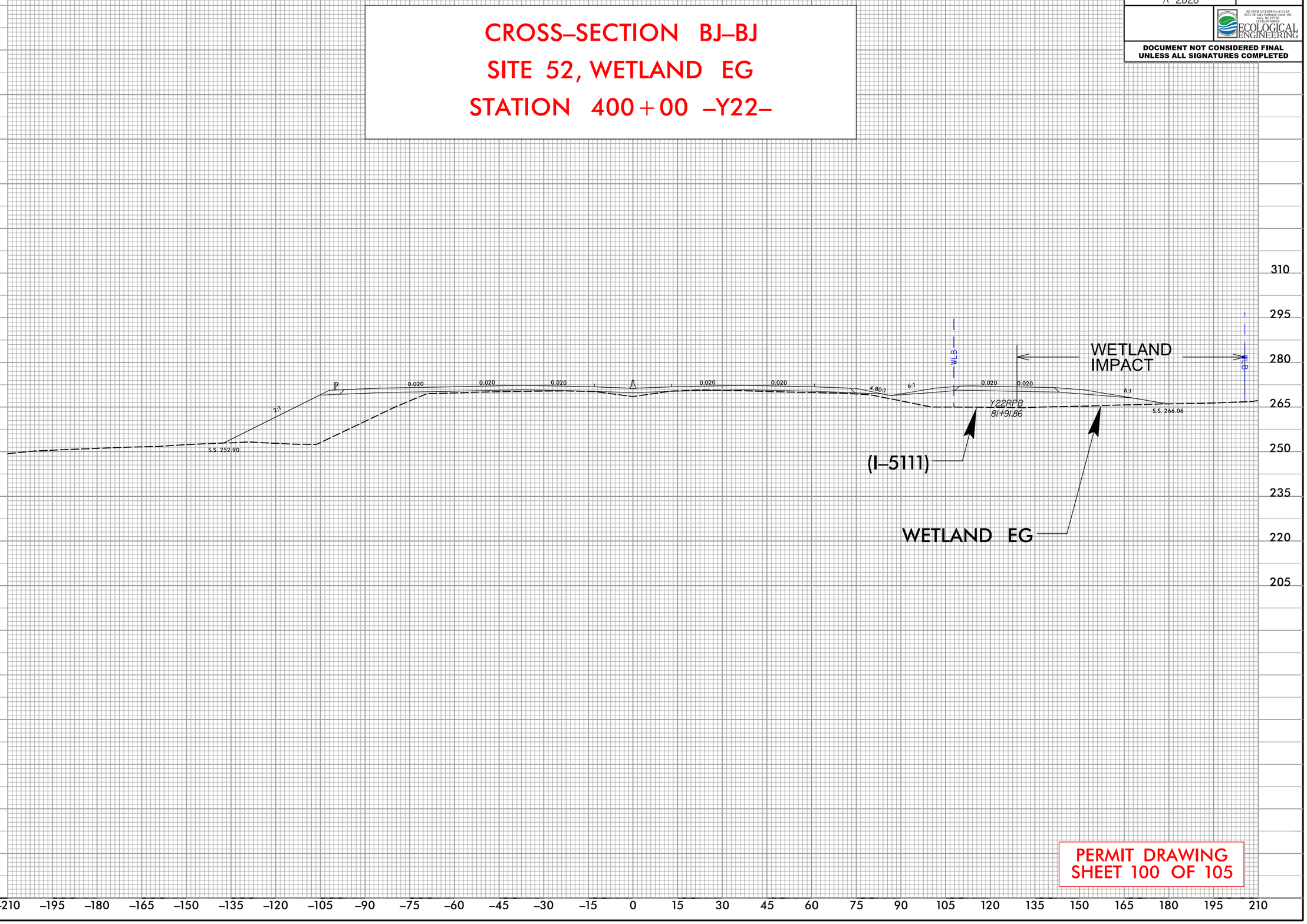
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CROSS–SECTION BJ–BJ
SITE 52, WETLAND EG
STATION 400+00 –Y22–



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SHEET 100 OF 105

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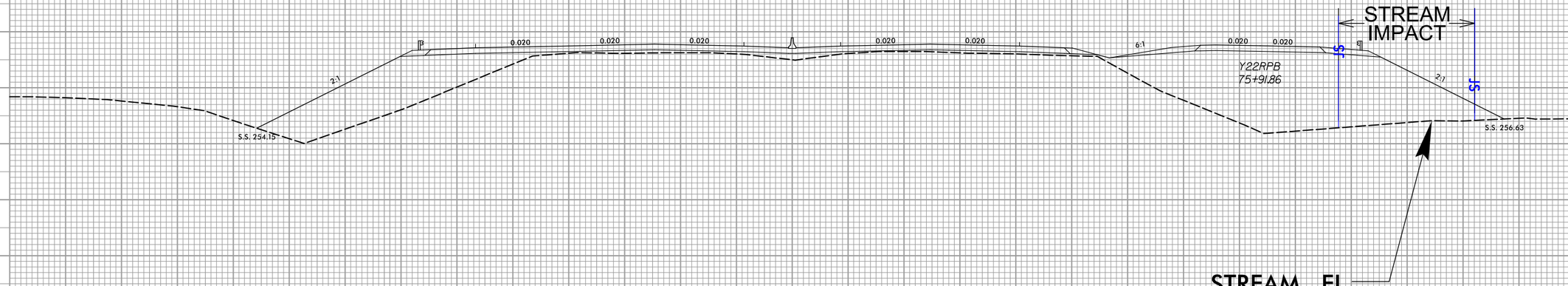
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CROSS–SECTION BK–BK
SITE 53, STREAM EL
STATION 406+00 –Y22–



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SHEET 101 OF 105

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50′ 0′ 100′
SCALE

DENOTES IMPACTS IN SURFACE WATER

PERMIT DRAWING
SHEET 102 OF 105

PROJECT REFERENCE NO.	SHEET NO.
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MATCHLINE SHEET 97 STA. 409+15.83 -Y22-

SITE 54

STREAM EV IMPACT

WETLAND

SEWER

GAS LINE

60' R/W

-Y22- PC Sta. 22+91.42

-Y22RPB- ST Sta. 66+74.52

-Y22- POT Sta. 420+62.55=
-Y22SLPRPA- ST Sta. 41+99.32
73' LT

-Y22SLPRPA- CS Sta. 39+59.32

-Y22B- PT Sta. 17+25.17

-Y22B- PT Sta. 24+70.96

-Y22RPB- 70+00

-Y22RPB- 65+00

-Y22RPB- 40+00

-Y22- 410

-Y22- 415

-Y22- 420

-Y22- 425

-Y22- 430

-Y22- 435

-Y22- 440

-Y22- 445

-Y22- 450

-Y22- 455

-Y22- 460

-Y22- 465

-Y22- 470

-Y22- 475

-Y22- 480

-Y22- 485

-Y22- 490

-Y22- 495

-Y22- 500

-Y22- 505

-Y22-

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SHEET 102A OF 105

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50' 0' 100'
SCALE

DENOTES IMPACTS IN SURFACE WATER

REVISIONS

5/14/99

MATCHLINE SHEET 97 STA. 409+15.83 -Y22-

SITE 54

STREAM EV IMPACT

-Y22- 410+00

-Y22- 415+00

-Y22- 420+00

-Y22- 40+00 -L- PRPA

-Y22B- PT Sta. 17+25.17

-Y22SLPRPA- CS Sta. 39+59.32

-Y22- POT Sta. 420+62.55= -Y22SLPRPA- ST Sta. 41+99.32 73' LT

-Y22RPB- ST Sta. 66+74.52

-Y22B- PC Sta. 22+91.42

-Y22RPB- 70+00

-Y22RPB- 65+00

-Y22B- PT Sta. 24+70.96

SEV JS MIT

WETLAND

GAS LINE

BZ 1

BZ 2

BZ

F E C

JAMES E HARRINGTON FWY

I 40 WB

I 40 EB

BST

CONC

RUINS

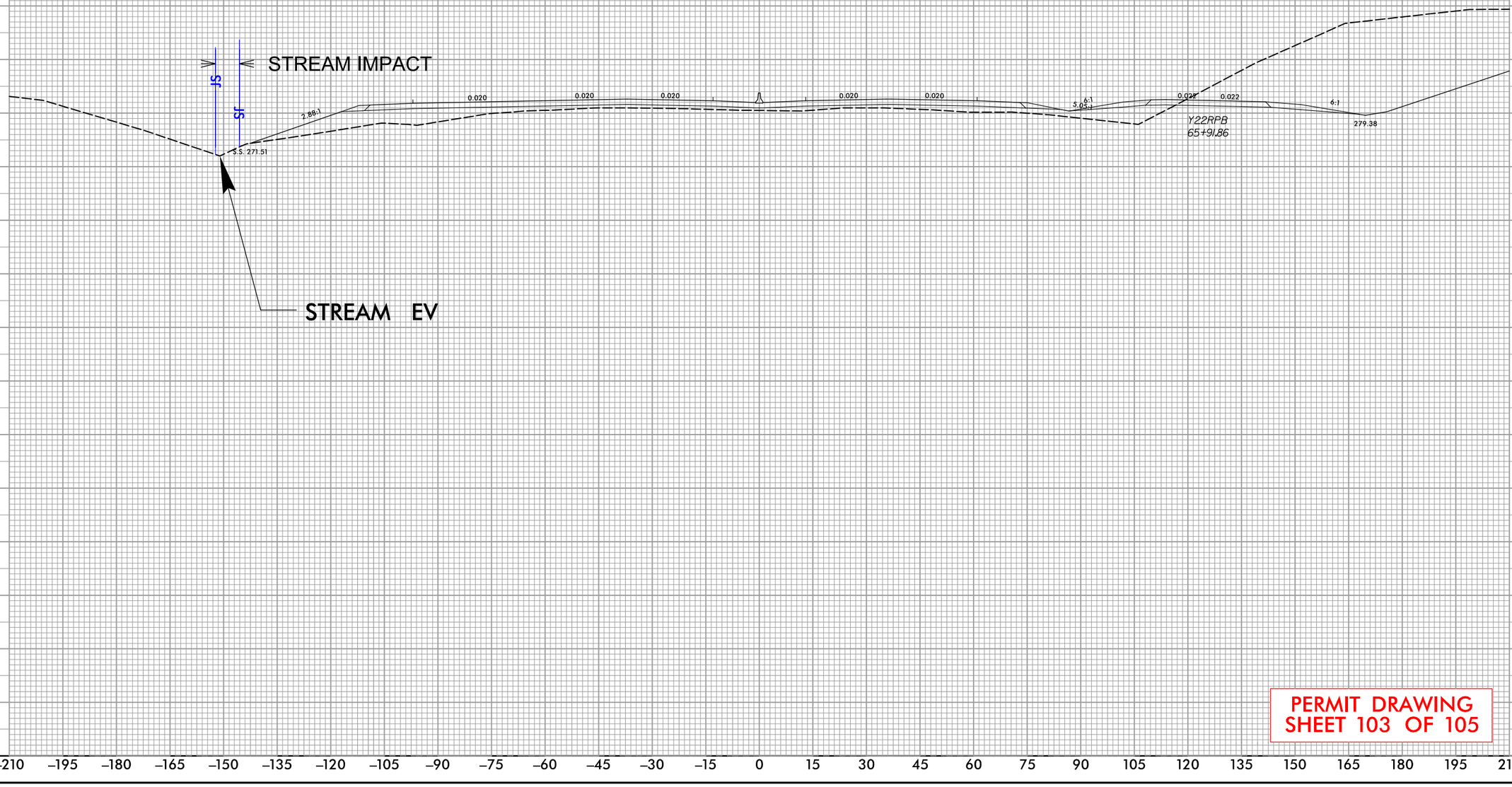
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CROSS–SECTION BL–BL
SITE 54 STREAM EV
STATION 416+00 –Y22–



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SHEET 103 OF 105

REVISIONS
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WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	Permanent Fil In Isolated Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (Pond) (ac)	Permanent SW impacts (Isolated Pond) (ac)	Permanent SW impacts (Stream) (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	503+50 -L-	ROADWAY FILL		0.11											
2	506+00 -L-	2@6'x5' RCBC									0.09		576		
3	506+00-L-/508+00-L-	ROADWAY FILL	0.53								0.19		107		
4	508+50-L-/512+00-L-	ROADWAY FILL	0.05						1.36		0.02		218		
5	511+00-L-/520+00-L-	ROADWAY FILL	0.87								0.04		431		
6	515+00-L-	ROADWAY FILL									< 0.01		28		
7	530+00-L-/531+00-L-	ROADWAY FILL	0.11												
8	545+00-L-/549+00-L-	2@5'X5' RCBC	0.22								0.06		493		
9	557+00-L-/560+00-L-	3@8'X5' RCBC	0.09								0.10		430		
10	575+00-L-/579+00-L-	ROADWAY FILL	0.04						0.31						
11	596+00-L-/623+00-L-	2@7'X5' RCBC	1.80						1.04		0.13		377		
12	16+00 -Y18A-	ROADWAY FILL									0.01		168		
13	615+50-L-/620+00-L-	ROADWAY FILL							1.14						
14	5+00-Y18A-/17+50-Y18A	ROADWAY FILL	0.55								< 0.01		55		
15	653+50-L-/671+00-L-	ROADWAY FILL	2.41												
16	689+00-L-/709+00-L-	ROADWAY FILL	3.78						1.92		0.16		1252		
17	706+00-L-/714+00-L-	2@7'X5' RCBC	2.79								0.04		330		
18	711+00-L-/713+00-L-	ROADWAY FILL									0.02		183		
19	725+50-L-/737+00-L-	ROADWAY FILL							0.21		0.14		761		
20	737+00-L-/738+00-L-	2@9'X7' RCBC	0.41								0.10		451		
21	758+50-L-/760+00-L-	ROADWAY FILL	0.42												
22	767+00-L-/769+00-L-	ROADWAY FILL	0.02												
23	782+00-L-/787+00-L-	2@8'X6' RCBC	0.70								0.10		442		
24	785+50-L-/787+00-L-	ROADWAY FILL	0.02								0.04		470		
25	804+00-L-/861+50-L-	2@6'X5' RCBC, BRIDGE	0.62								0.26		2250		
26	811+50-L-/814+00-L-	ROADWAY FILL	0.08								< 0.01		99		
27	813+00-L-/813+50-L-	ROADWAY FILL									< 0.01		79		
TOTALS* THIS SHEET:			15.51	0.11					5.99		1.51		9200		
TOTALS* ENTIRE R-2828:			**19.30**	**0.30**	**0**	**0**	**0**	**0**	**5.99**	**0.02**	**3.62**	**0.00**	**20086**	**0**	**0**

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
JULY 2018
WAKE & JOHNSTON COUNTIES
TIP R-2828
STATE PROJ. # 6.401079

Revised 2016 09 09

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS						SURFACE WATER IMPACTS						
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Permanent Fill In Isolated Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (Pond) (ac)	Permanent SW impacts (Isolated Pond) (ac)	Permanent SW impacts (Stream) (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
28	857+50-L-/859+50-L-	ROADWAY FILL	0.12												
29	868+50-L-/869+00-L-	BRIDGE	< 0.01												
30	875+00-L-/877+00-L-	2@6'X5' RCBC	0.61								0.06		442		
31	889+00-L-/891+00-L-	ROADWAY FILL	0.28								< 0.01		26		
32	894+00-L-/896+00-L-	ROADWAY FILL									0.15		656		
33	900+00-L-/907+00-L-	ROADWAY FILL									0.20		1092		
34	910+00-L-/917+00-L-	3@9'X5' RCBC	2.33								0.27		777		
35	915+00-L-/918+00-L-	ROADWAY FILL	0.09								0.19		1051		
36	55+00-Y21-/59+00-Y21-	ROADWAY FILL								0.02					
37	54+00-Y21-	ROADWAY FILL							< 0.01						
38	45+00-Y21-/46+00-Y21	ROADWAY FILL									< 0.01		65		
39	38+50-Y21-/41+00-Y21-	ROADWAY FILL		0.09											
40	47+00-Y22RPCD-/49+00-Y22RPCD-	ROADWAY FILL	0.04								0.31		919		
41	29+00-Y22RPCD-/31+00-Y22RPCD-	ROADWAY FILL									0.13		1129		
42	82+00-Y22RPCD-/87+50-Y22RPCD-	BRIDGE	0.09												
43	8+00-Y22RPDFLY-/21+00-Y22RPDFLY	ROADWAY FILL									0.04		350		
44	15+00-Y22LPA-/29+00-Y22RPB-	ROADWAY FILL	0.06								0.33		1469		
45	37+00-Y22RPB-/37+00-Y22RPB-	ROADWAY FILL									0.01		209		
46	38+00-Y22RPB-/48+00-Y22RPB-	ROADWAY FILL									0.11		792		
47	40+50-Y22RPB-/43+00-Y22RPB-	ROADWAY FILL	0.13								< 0.01		139		
48	379+00-Y22-/389+00-Y22-	ROADWAY FILL	< 0.01								0.13		868		
49	381+50-Y22-/386+00-Y22-	ROADWAY FILL	< 0.01								0.10		456		
50	386+00-Y22-/386+50-Y22-	ROADWAY FILL	< 0.01								< 0.01		61		
51	396+00-Y22-/397+00-Y22-	ROADWAY FILL	0.02								0.01		123		
52	400+00-Y22-	ROADWAY FILL		0.10											
53	404+00-Y22-/406+00-Y22-	ROADWAY FILL									0.04		183		
54	415+50-Y22-/416+50-Y22-	ROADWAY FILL									0.01		78		
TOTALS* THIS SHEET:			3.79	0.19					< 0.01	0.02	2.11		10886		
TOTAl	**ENTIRE R-2828:**		**19.30**	**0.30**	**0**	**0**	**0**	**0**	**5.99**	**0.02**	**3.62**	**0.00**	**20086**	**0**	**0**

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
JULY 2018
WAKE & JOHNSTON COUNTIES
TIP R-2828
STATE PROJ. # 6.401079
SHEET 105 OF 105

Revised 2016 09 09

09/08/99

TIP PROJECT: R–2828

CONTRACT: _____

Approved Preliminary Design
September 2017

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE & JOHNSTON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R–2828	TS	

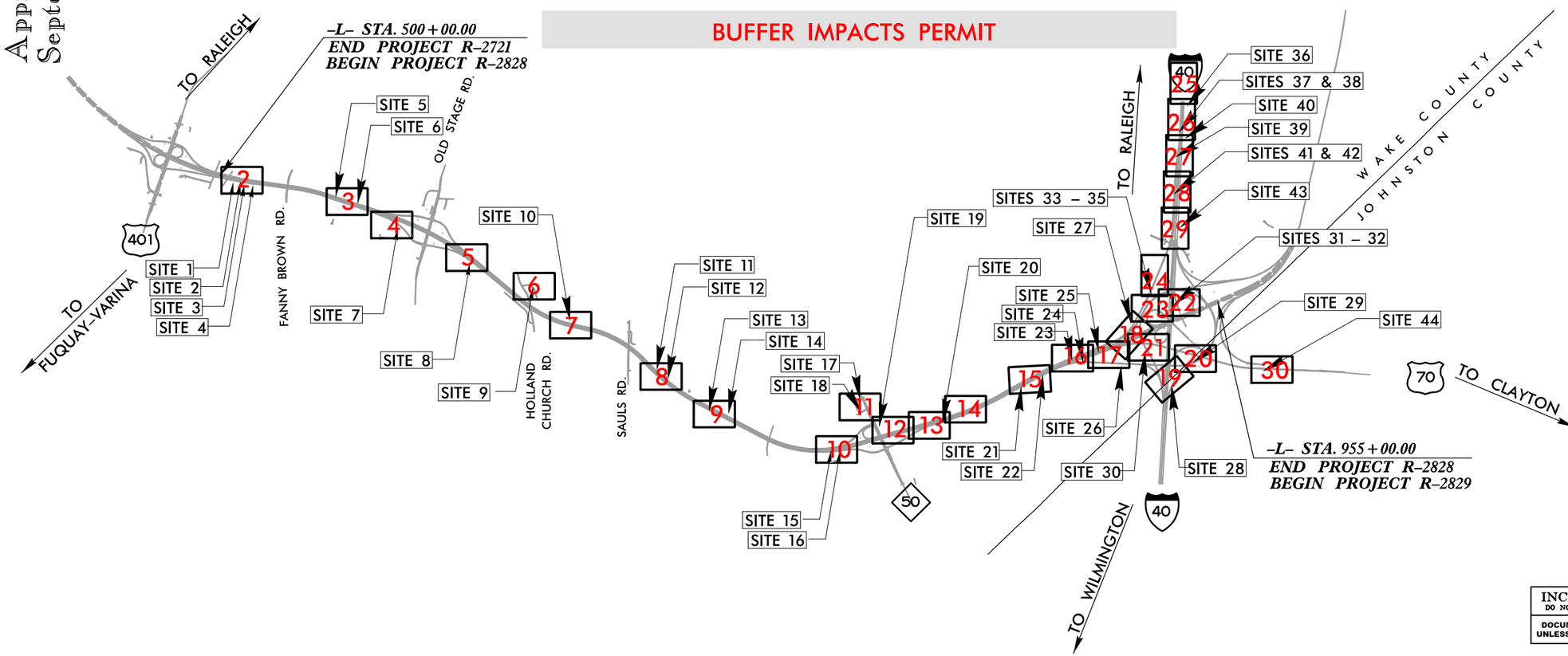
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
6.401079	STP–540(20)	PE

PERMIT DRAWING
SHEET 1 OF 34

LOCATION: COMPLETE 540 – FROM EAST OF HWY 401 TO EAST OF I–40

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

BUFFER IMPACTS PERMIT



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS 50 25 0 50 100

PROFILE (HORIZONTAL) 15 7.5 0 15 30

PROFILE (VERTICAL) 15 7.5 0 15 30

DESIGN DATA

ADT 2016 = 28,400
ADT 2040 = 53,400
DHV = 12 %
D = 65 %
T = 11 % *
V = 75 MPH
* TTST 7% DUAL 4%
FUNC. CLASS. = INTERSTATE

PROJECT LENGTH

LENGTH ROADWAY STATE TIP PROJECT R–2828 = 8.617 Miles
TOTAL LENGTH STATE TIP PROJECT R–2828 = 8.617 Miles

Prepared In the Offices of:

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
(919)571-2111
NC License Number P-0159

ECOLOGICAL ENGINEERING
NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 852-9928

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: _____

LETTING DATE: _____

BRIAN K. EASON, PE
PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

_____ P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

_____ P.E.
SIGNATURE:

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

4:21:45 PM
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davidcooper

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

PERMIT DRAWING SHEET 2 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	4

NC FIRM LICENSE No P-1148
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Cary, NC 27518
(919) 515-0939
ECOLOGICAL ENGINEERING

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REVISIONS
5/14/99

-L- PT Sta. 514+45.11
-L- POC Sta. 503+39.23=
-Y15- POT Sta. 14+06.94
=69° 45' 57.7"
-Y15- POT Sta. 17+00.00
15+00 -Y15-
505+00
510+00
515+00
-L- POC Sta. 507+88.59=
-Y13RPD- POT Sta. 10+00.00
71.00' RT
-Y15- POT Sta. 10+00.00
PROPOSED 2@6'x5' RCBC
SITE 1
SITE 2
SITE 3
SITE 4
WCD
WCE (1)
WCE (2)
WCF
WCH
WCG
PM
SBD
SBE
SBT
SBU
SBR
SBS
WLB
JS MIT
SOIL
ROWLAND, BARBARA O
ROWLAND, ARCHIE L
ROWLAND, NEAL MORRIS
NC DEPARTME TRANSPORTAT
ES INC
SOUTHERN RR

4/21/15 PM
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davidgeiger

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

PERMIT DRAWING SHEET 3 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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REVISIONS
5/14/99

WCM
WLB
WCL
SBT
WCN
JS MIT
WCO
WCP
WCQ
SBU
WCR
SITE 5
SITE 6
550+00
555+00
560+00
Std. 546+03.69
PROPOSED 2@5'x5' RCBC
PROPOSED 3@8'x5' RCBC
GAS LINE
60' R/W
BZ 1
BZ 2
RW
CA

4:25:56 PM
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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PERMIT DRAWING SHEET 4 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS
5/14/99

570+00
575+00
580+00
60' R/W
-Y17RPC- TS Sta. 12+85.08
-Y17RPC- SC Sta. 14+85.08
-Y17RPC- PC Sta. 571+70.57
-Y17RPC- CS Sta. 25+12.07
-Y17H- PC Sta. 10+00.00
-Y17I- POT Sta. 12+98.44
20+00 -Y17RPC-
25+00 -Y17RPC-
SITE 7
WCW
PN
2SBKD
2SFD
BZ 1
BZ 2
E
RW
CA

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dvidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

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PERMIT DRAWING SHEET 5 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

WCZ (1)
WCZ (2)
SITE 8
RW
CA
WLB
SCE
SCD
JS MT
PROPOSED 2@ X5' RCBC
-L- POC Sta. 612+43.15= -Y17RPA- 7.00' LT Sta. 10+00.00
-Y17RPA- SRS Sta. 12+00.00
-Y17RPD- SC Sta. 12+00.00
-L- POC Sta. 609+63.47= -Y17RPD- 7.00' RT Sta. 10+00.00
605+00
610+00
615+00
RUINS
CAN
BZ 1
BZ 2

REVISIONS
5/14/99

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davidcooper

5/14/99

REVISIONS

50' 0' 100'

SCALE

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

PERMIT DRAWING
SHEET 6 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 Sit Cary Parkway, Suite 101
Cary, NC 27513
(919) 557-0959
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y18- PT Sta. 33+34.73

-Y18A- PC Sta. 10+29.91

-Y18A- PT Sta. 16+46.84

POND A

JS MIT

BZ 1

BZ 2

SITE 9

WWD

WLB

WDE

SCF

ISFD

PRC Sta. 27+84.54

15+00 -Y18A-

25+00 -Y18-

-Y18- PC Sta. 24+06.88

-Y18A- POT Sta. 19+38.61

9' GR

4:22:03 PM
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dwidgenor

PERMIT DRAWING
SHEET 7 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

ALLOWABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1

SITE 10

-L- CS Sta. 660+00.86
-L- ST Sta. 663+15.86
-L- TS Sta. 666+31.38

655+00
660+00
665+00

SCG
WDD
SCI
WDB
SCJ
WLB
WHT
MIT
JS
ISFD
2SFD
10' CONC
12' CONC
20' BSL
RW
CA
BZ 1
BZ 2
BZ 3

REVISIONS
5/14/99

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dwidmoyer

PERMIT DRAWING
SHEET 8 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS
5/14/99

SC Sta. 699+71.58
WDG (1)
SCL
PW
PV
WDH
SCM
SCN
SITE 11
SITE 12
705+00
710+00
PROPOSED 2@7'x5' RCBC
SEDALIA PARK SUBDIVISION
SHANNONDALE
WLB
WLB-1
WLB-2
SS
SS-1
SS-2
WLB-TM
SCN-TM
BZ 1
BZ 2
Z 1
Z 2
1.5SFD
1.5 SFD
1.5S BKD
ISFD
BS
S
B
17' BST
20' SOIL
18' SOIL
8' SOIL

4:22:09 PM
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davidgeiger

50′ 0′ 100′
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

PERMIT DRAWING
SHEET 9 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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REVISIONS
5/14/99

725+00
730+00
735+00
740+

RW
CA

PY
SCO
WDJ
WLB
JS
MT
SR

SITE 13
SITE 13 CONT'D.
SITE 14

BZ 1
BZ 2
E

PROPOSED 2@9'x7' RCBC

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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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PERMIT DRAWING SHEET 10 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

-Y2IRPB- SC Sta. 12+50.00
-L- POC Sta. 783+05.74=
-Y2IRPB- ST Sta. 10+00.00
71.00' LT
-L- CS Sta. 788+97.74
-Y2IRPC- TS Sta. 17+00.00
-Y2IRPC- ST Sta. 12+50.00
-Y2IRPC- SC Sta. 19+50.00
-Y2IRPC- CS Sta. 22+5
20+00 -Y2IRPC-
15+00 -Y2IRPC-
ST Sta. 10+00.00

780+00
785+00
790+00

SITE 15
SITE 16

PROPOSED 2@8'X6' RCBC

WDO
SCV
SCT
WDP

RIPRAP
FOUND
WELL
ISFD
2SFD
10' SOIL
STEVENS OAKS SUBDIVISION
KALI CT

REVISIONS
5/14/99

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PERMIT DRAWING
SHEET 11 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

REVISIONS
5/14/99

-Y21A- PC Sta. 11+48.32
60+00 -Y21-
-Y21A- PT Sta. 14+05.38
-Y21A- PC Sta. 14+81.95
15+00 -Y21A-
-Y21A- PT Sta. 15+60.55
-Y21A- POT Sta. 17+81.66
-Y21B- POT Sta. 15+00.00
-Y21- POT Sta. 54+5
-Y21B- POT Sta. 10-
55+00 -Y21-
-Y21RPB- PT Sta. 28+86.01
30+00 -Y21RPB-

TURNER MEMORIAL BAPT CH
VINEYARD
TURNER POND DR
TURNER POND SUBDIVISION
TURNER FARMS SUBDIVISION
GRISSOM FARM RD
GRISSOM SUBDIVISION
SR 5530
SR 1700 DEANON RD
ISBKD
ISFD
ISDAM
2SBKD
AQUA NC
8' SOIL
12' BST
PAB
PBI
SITE 17
SITE 18
JS MIT
DAM
RW
CA
BZ 1
BZ 2

4:22:17 PM
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davidcooper

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

PERMIT DRAWING
SHEET 12 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS
5/14/99

-Y2I- POT Sta. 47+62.15=
-Y2IRPB- POT Sta. 30+86.01

-Y2I- POT Sta. 47+30.00=
-Y2ILPB- POT Sta. 21+95.23

PETROLIUM LINE 50' R/W

SITE 19

SITE 20

SCZ
SCX
JS MIT
JS MIT
JS MIT
WDS
SDS
SDR
WDR

-L- POT Sta. 803+91.48=
-Y2I- POT Sta. 41+47.50
=99° 03' 40.4"

-Y2I- POT Sta. 36+58.00=
-Y2IRPC- POT Sta. 31+10.03
-Y2IRPD- POT Sta. 33+47.72

-Y2IRPD- PT Sta. 29+52.74

-Y2IRPD- CS Sta. 20+09

-Y2IRPD- SRS Sta. 22+19.04

-Y2IRPD- SC Sta. 24+1

805+00
810+00
815+00

MATCHLINE SHEET 13 STA. 817+81.00

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davidcooper

5/14/99

REVISIONS

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

PERMIT DRAWING
SHEET 13 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

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MATCHLINE SHEET 14 STA. 833+41.44 –L–

MATCHLINE SHEET 12 STA. 817+81.00 –L–

SITE 20 CONT'D.

SITE 20 CONT'D.

20' BST

1.5S BKD

1.5S BKD

2SFD

1.5SBKD

S

TURNER FARMS SUBDIVISION

100' R/W

100' R/W

50' R/W

PETROLIUM LINE

JS MIT

JS MIT

SCY

WDU

WDT

PAC

SDD (J)

WNO

SDE

PROPOSED 2@6'x5' RCBC

-L- POT Sta. 827+71.30= -Y2IRPD- ST Sta. 10+00.00 71.00' RT

-Y2IRPD- SC Sta. 12+10.00

825+00

830+00

820+00

815+00 -Y2IRPD-

BZ 1

BZ 2

Z 1

Z 2

R/W

C/A

4:22:22 PM
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dwildcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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(919) 557-0939
ECOLOGICAL ENGINEERING

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PERMIT DRAWING
SHEET 14 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

SITE 20 CONT'D.

MATCHLINE SHEET 13 STA. 833+41.44 –L–

845+00

840+00

835+00

WLB

SDF

JS MIT

RDW

DAM

REVISIONS

5/14/99

4:22:25 PM
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davidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 15 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

REVISIONS
5/14/99

SITE 21
SITE 22
870+00
875+00
865+00
-L- PC Sta. 871+10.91
PROPOSED 26' x 5' RCBC
WDX
WDY
WDZ
SDG
SDJ
JS MIT
WLB
WLBM
RW
CA
BZ 1
BZ 2

4/22/28 PM
R:\2828_Individual Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSHs\R-2828_PSH15_buf.dgn
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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PERMIT DRAWING
SHEET 16 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

REVISIONS
5/14/99

+77.98=
Sta. 10+00.00

885+00

890+00

895+00

Sta. 894+68.94

MATCHLINE SHEET 17 STA. 898+52.87 -L-

-L- PRC Sta. 894+

SITE 23

SITE 24

WEA

SDK

15+00
-Y22FLYCC-

20+00
-Y22FLYCC-

12+75.07

20+47.37

CT Sta. 22+57.37

BZ 1

JS MIT

C F

RW

CA

4:22:31 PM
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davidcooper

5/14/99

REVISIONS

50' 0' 100'

SCALE

PERMIT DRAWING
SHEET 17 OF 34

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

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MATCHLINE SHEET 16 STA. 898+32.81 -L-

MATCHLINE SHEET 18 STA. 908+92.14 -L-

900+00

905+00

SITE 25

SITE 26

-L- POC Sta. 903+76.56=
-Y22RPCD- ST Sta. 10+00.00
71' RT

-Y22RPCD- SRS Sta. 12+00.00

10+00
-Y22RPCD-

15+00
-Y22RPCD-

-Y22RPCD- SC Sta. 14+00.00

SDM

WEB

WLB

SDV

JS MIT

BZ 1

BZ 2

ZB

C F

C A

R W

4:20:23 PM
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davidcooper

PERMIT DRAWING
SHEET 18 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0559
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1

REVISIONS
5/14/99

MATCHLINE SHEET 17 STA. 908+92.14 –L–

MATCHLINE SHEET 23 STA. 26+60.91 –Y22RPB–

MATCHLINE SHEET 21 STA. 24+46.55 –Y22RPCD–

–Y22SLIPRPB–

–Y22SLIPRPA–

–L–

–Y22RPCD–

SITE 26 CONT'D.

SITE 27

PT Sta. 916+02.04

SDW

SDW

SDW

SDW

MLB

MLB

MLB

MLB

BZ

BZ 1

BZ 2

BZ 3

910+00

915+00

920+00

925

20+00

0+00

35+00

100'

4:22:35 PM
4:\2010\Projects\Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH18.buf.dgn
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PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27513
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 19 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS

5/14/99

20+00 -Y22RPC-
155+00
-Y22FLYCC-
55+00 -Y22FLYCC-
-Y22FLYCC
-Y22RPD-
-Y22FLYCC- TS
Sta. 57+49.59
-Y22RPD- TS
Sta. 12+99.58
-Y22- POT
Sta. 47+23.06=
-Y22RPD- POT
Sta. 10+00.00
61' LT
60+00
-Y22FLYCC-
15+00
-Y22RPD-
-Y22RPDFLY-
25+00
-Y22RPDFLY-
20+00
-Y22RPC-
140 EBL JAMES E HARRINGTON FWY 44' CONC
SITE 28
SES
JS MIT
480
475
MATCHLINE SHEET 20 STA. 29+11.10 -Y22RPDFLY-

4:22:38 PM
R:\Projects\Rail Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH19.buf.dgn
davidcooper

PERMIT DRAWING
SHEET 20 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
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ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS
5/14/99

SITE 29

MATCHLINE SHEET 19 STA. 29+11.10 -Y22RPDFLY-

POC Sta. 56+47.18=
POC Sta. 14+41.67

45+00
-Y22RPCD-

2FLYCC- SC
Sta. 60+79.59
-Y22RPD-

25+00
-Y22RPD-

30+00
-Y22RPD-

-Y22RPD- CS
Sta. 31+41.46
-Y22RPD- ST
Sta. 33+56.46

75+00 -Y22F

70+00
-Y22FLYCC-

35+00
-Y22RPDFLY-

55+00
-Y22RPCD-

2RPDFLY-
30+77.23

SRS Sta. 33+77.23

FLYCC- POC Sta. 69+10.50=
FLY- ST Sta. 35+57.23
12.00' RT

+58.13 =

WEX
WEW
WEV
WEU

30' BSL
8' SOIL
CLAYTON BYP
US 70/EBE CLAYTON BY

4:22:41 PM
R:\Projects\Mual Permit\R2828_Permit_Drawings\PERMITS_Environmental Drawings\PSH\R-2828_PSH20_buf.dgn
davidconner

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No P-1148
1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 21 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS
5/14/99

MATCHLINE SHEET 18 STA. 24+46.55 -Y22RPCD-

-L- POC Sta. 139+88.75 =
-Y22FLYCC- POC Sta. 26+31.78

140+00
-Y22FLYCC-

-Y22LPC- PCC
Sta. 19+02.37

-Y22LPC- PCC
Sta. 15+21.01

SITE 30

SDO

RIPRAP

35+00
-Y22RPCD-

-Y22FLYCC- CS Sta. 143+56.46

-Y22FLYCC- TS Sta. 144+21.98

-Y22FLYCC- CS
Sta. 140+26.46

25+00
-Y22RPCD-

145+00 -Y22FLYCC-
Sta. 145+81.98

30+00
-Y22RPCD-

-Y22RPCD- CS Sta. 33+13.05

-Y22RPCD- ST Sta. 35+13.05

-Y22- POT Sta. 472+83.57=
-Y22FLYCC- POT Sta. 55+60.60

Sta. 50+64.93=
+02.25

4:23:43 PM
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davidcooper

PERMIT DRAWING
SHEET 22 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

REVISIONS
5/14/99

MATCHLINE SHEET 23 STA. 444+99.07 –Y22–

–Y22FLYCC–
110+00
105+00
15+00
20+00
25+00
945+00
JAMES E HARRINGTON FWY
140 WBL
70' CONC
15' CONC
8' GR
SR 2703
NEW BETHEL CHURCH RD
20' BST
SFD
IS BKD

WFB
SITE 32
WFC
SITE 31
SDT
WFD
SDT
WFA

–Y22LPA– CS
Sta. 12+50.00
–Y22LPA– SC
Sta. 25+13.66
–Y22RPEA– POC
Sta. 51+21.52=
–Y22LPA– ST
Sta. 10+00.00
12' RT
–L– POT
Sta. 940+62.94=
–Y22LPA– ST
Sta. 27+63.66
71' LT
–L– POT
Sta. 933+62.00=
–Y22LPB– POT
Sta. 31+34.98
67° 10' 47.6"

445
450
55
50

4:22:46 PM
K:\Projects\Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH22_buf.dgn
davidcooper

PERMIT DRAWING
SHEET 23 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0929
ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SCALE 50′ 0′ 100′

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

MATCHLINE SHEET 22 STA. 444+99.07 –Y22–

MATCHLINE SHEET 24 STA. 36+21.32 –Y22RPB–

MATCHLINE SHEET 18 STA. 26+60.91 –Y22RPB–

–Y22FLYCC– POC Sta.112+49.61 =
–Y22RPAFLY– ST Sta. 68+80.04
12′ RT

–Y22RPB– 30+00

–Y22RPB– 115+00

–Y22LPB– 20+00

–Y22LPB– 25+00

–Y22LPB– 15+00

–Y22LPB– CS Sta. 24+23.65

–Y22LPB– ST Sta. 26+73.65

–L– POT 929+47.83 =
Sta. 00.00

SITE 31 CONT'D.

SITE 31 CONT'D.

SDT

SDS

WEK

WEL

SDT

RW

RIP-RAP

I 40 EBL

JAMES E HARRINGTON F

BST

CONC

F

C

40

45

50

REVISIONS

5/14/99

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dsvidergar

PERMIT DRAWING
SHEET 24 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS
5/14/99

SITE 33 CONT'D.
SITE 35
SITE 34
SITE 33

Y-22FLYEB- PT Sta. 16+09.90
Y-22FLYEB- SC Sta. 13+22.00
Y-22FLYEB- ST Sta. 10+00.00
Y-22FLYBD
15+00
50+00 -Y22RPB-
45+00 -Y22RPB-
40+00 -Y22RPB-
Y-22FLYEB- CS Sta. 40+90.84 = 41+00.67

SDP
SDR
SDQ
SDS
WEM
JS MIT
BZ 1
BZ 2
SR 5589
20' BST
30' BST
40' BSTC
30

MATCHLINE SHEET 23 STA. 36+21.32 -Y22RPB-

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davidgeiger

PERMIT DRAWING
SHEET 25 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
Cary, NC 27518
(919) 557-0939
ECOLOGICAL ENGINEERING

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50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

REVISIONS
5/14/99

SITE 36

MATCHLINE SHEET 26 STA. 364+8.28 -Y22-

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davidgooper

PERMIT DRAWING
SHEET 26 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

REVISIONS
5/14/99

MATCHLINE SHEET 25 STA. 364+8.28 –Y22–

MATCHLINE SHEET 27 STA. 379+10.80 –Y22–

SITE 36
SITE 37
SITE 38
SITE 40

SEM
SLL
SLH
WLB
WNR
HTR
SLT
SEMW
JS MIT SEM
JS MIT SNK
SNK
SNM
WPX
WPY
RW
CA
F
E
C
Z
BZ 1
BZ 2
ISFD
2S FD
WALL
RIDGEVIEW SUBDIVISION
140 EBL JAMES E HARRINGTON FWY 38' CONC
HARRINGTON FWY 38' CONC

4:23:00 PM
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davidpooser

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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Cary, NC 27518
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ECOLOGICAL ENGINEERING

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PERMIT DRAWING SHEET 27 OF 34

50' 0' 100'
SCALE

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

MATCHLINE SHEET 26 STA. 379+10.80 –Y22–

SITE 36 CONT'D.

SITE 38 CONT'D.

SITE 39

SMITH LANDING SUBDIVISION

SR 2201

8' SOIL

SEM

SEN

SNK

SNO

WOA

JS MIT

–Y22– POT Sta. 382+38.96 = –Y22RPB– POT Sta. 99+54.88 60' RT

–Y22RPB– SC Sta. 87+68.58

–Y22RPB– CS Sta. 92+46.26

–Y22RPB– ST Sta. 94+62.26

95+00 –Y22RPB–

90+00 –Y22RPB–

MATCHLINE SHEET 28 STA. 394+12.32 –Y22–

JAMES E HARRINGTON FWY 44' CONC

I-40 WBL JAMES E HARRINGTON FWY

REVISIONS

5/14/99

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davidcooper

PERMIT DRAWING
SHEET 28 OF 34

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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1151 SE Cary Parkway, Suite 101
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ECOLOGICAL ENGINEERING

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 0' 100'
SCALE

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

REVISIONS

MATCHLINE SHEET 27 STA. 394+12.32 -Y22-

MATCHLINE SHEET 29 STA. 409+15.83 -Y22-

SITE 41

SITE 42

JS MIT

WLB

SEK

WFM

SEL

WEG

BZ 1

BZ 2

E

F

C

RW

BST

85+00 -Y22RPB-

80+00 -Y22RPB-

75+00 -Y22RPB-

-Y22RPB- TS Sta. 8

I40 WBL

I40 EBL JAMES E HARRINGTON FWY

68' CONC

5/14/99

4:23:06 PM
R:\Projects\Individual Permits\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH28.buf.dgn
devdicenzo

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

NC FIRM LICENSE No: P-1148
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Cary, NC 27518
(919) 557-0939
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PERMIT DRAWING SHEET 29 OF 34

50' 0' 100'
SCALE

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

REVISIONS

MATCHLINE SHEET 28 STA. 409+15.83 -Y22-

SITE 43

-Y22- POT Sta. 420+62.55
-Y22SLIPRPA- ST Sta. 41+99.32
73' LT

-Y22SLIPRPA- CS Sta. 39+59.32

-Y22B- PT Sta. 17+25.17

2+00 -Y22SLIPRPA-

-Y22B- PC Sta. 22+91.42

-Y22RPB- ST Sta. 66+74.52

-Y22B- PT Sta. 24+70.96

70+00 -Y22RPB-

65+00 -Y22RPB-

40+00

SEV JS MIT

WFE

GAS LINE

60' R/W

I 40 EBL JAMES E HARRINGTON FWY

I 40 WBL JAMES E HARRINGTON FWY

BST

CONC

RUINS

SILO

SHED

CAN

SFR

20' RD

4:27:08 PM
R:\Projects\Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH29_buf.dgn
devidcooper

PROJECT REFERENCE NO.	SHEET NO.
R-2828	

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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 30 OF 34

50' 0' 100'
SCALE

ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2

REVISIONS
5/14/99

POT Sta. 101+
54' LT

RIPRAP
CONC
C
F
WLB
SITE 44
DAM
SEH
WFN (2)
SEG
JS MIT
BZ 1
BZ 2
75+00 -Y22RPCD-
80+00 -Y22RPCD-
85+00 -Y22RPCD-
180' R/W
CP &

4:37:11 PM
R:\Individual Permit\R2828_Permit_Drawings\PERMITS_Environmental\Drawings\PSH\R-2828_PSH30_buf.dgn
dwidgoose

RIPARIAN BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	2@6'x5'RCBC	505+00-L-/507+00-L-	X					0	32279	20212	52491		
2	ROADWAY FILL	510+00-L-/513+00-L-	X					0	50072	27340	77412		
3	ROADWAY FILL	512+00-L-/516+00-L-			X			0	26091	17005	43096		
4	ROADWAY FILL	516+00-L-	X			1098	1505	2603			0		
5	2@5'X5'RCBC	547+00-L-/550+00-L-	X					0	28133	17551	45684		
6	3@8'X5'RCBC	557+00-L-/560+00-L-	X					0	26013	16392	42405		
7	ROADWAY FILL	570+00-L-/578+00-L-			X			0	14920	12189	27109		
8	2@7'X5'RCBC	608+00-L-/611+00-L-	X					0	22656	14999	37655		
9	ROADWAY FILL	13+00-Y18A-/15+00-Y18A-	X			1546	4018	5564			0		
10	BRIDGE	659+00-L-/661+00-L-		X		15727	10051	25778			0		
11	ROADWAY FILL	697+00-L-/710+00-L-			X			0	87892	42255	130147		
12	2@7'X5'RCBC	707+00-L-/708+50-L-	X					0	16455	10453	26908		
13	ROADWAY FILL	725+00-L-/737+00-L-			X			0	52758	28261	81019		
14	2@9'X7' RCBC	736+00-L-/738+00-L-	X					0	26417	14867	41284		
15	2@8'X6'RCBC	781+00-L-/785+00-L-	X					0	26144	17335	43479		
16	ROADWAY FILL	785+00-L-/789+00-L-	X					0	27451	17762	45213		
17	ROADWAY FILL	54+50-Y21-/59+50-Y21-	X					0	8883	13885	22768		
18	ROADWAY FILL	54+00-Y21-/54+50-Y21	X			2969	1938	4907			0		
19	ROADWAY FILL	45+00-Y21-/46+00-Y21-	X			4965	3562	8527			0		
20	ROADWAY FILL	804+00-L-/848+00-L-	X					0	6910	3909	10819		
	BRIDGE			X		61695	32849	94544			0		
	2@ 6'X5'RCBC & ROADWAY FILL				X			0	120844	71962	192806		
21	BRIDGE	864+00-L-/869+00-L-		X		24892	13887	38779			0		
22	2@6'X5'RCBC	875+00-L-/877+00-L-	X					0	23873	14941	38814		
23	ROADWAY FILL	888+00-L-/890+00-L-	X			3129	3607	6736			0		
24	ROADWAY FILL	894+00-L-/896+00-L-	X					0	36776	23594	60370		
25	ROADWAY FILL	900+00-L-/907+00-L-	X					0	29815	18991	48806		
	ROADWAY FILL				X			0	29375	15085	44460		
	BRIDGE			X		0	61	61	0	0	0		
SHEET 31 TOTAL:						116021	71478	187499	693757	418988	1112745	0	0
PROJECT TOTAL:						158938	97484	256422	1120360	655005	1775665		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: TIP R-2828

DATE 07/31/2018
SHEET 31 OF 34

Rev. SEP 2016
Rev. May 2006

RIPARIAN BUFFER IMPACTS SUMMARY

			IMPACT									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
26	BRIDGE	33+00-Y22FLYCC-/42+00-Y22SLIPRPB-		X		10167	5662	15829			0		
	ROADWAY FILL		X					0	43388	27834	71222		
	ROADWAY FILL				X			0	2174	3169	5343		
27	3@9'X5'RCBC	915+00-L-/918+00-L-	X					0	55763	36205	91968		
	BRIDGE			X		6346	3986	10332			0		
28	ROADWAY FILL	18+00-Y22RPDFLY-/21+00-Y22RPDFLY-	X					0	22264	15570	37834		
29	ROADWAY FILL	47+00-Y22RPCD-/49+00-Y22RPCD-	X					0	47842	27438	75280		
30	ROADWAY FILL	29+00-Y22RPCD-/31+00-Y22RPCD-	X					0	69077	44626	113703		
31	ROADWAY FILL	15+00-Y22LPA-/29+00-Y22RPB-	X					0	78662	48896	127558		
32	ROADWAY FILL	13+00-Y22LPA-	X			882	267	1149			0		
33	ROADWAY FILL	15+00-Y22FLYCC-	X					0	40745	20599	61344		
34	ROADWAY FILL	37+00-Y22RPB-/48+50-Y22RPB-			X			0	5105	3408	8513		
35	ROADWAY FILL	14+00-Y22FLYEB-/16+00-Y22FLYEB-			X			0	183	3223	3406		
36	ROADWAY FILL	358+00-Y22-/362+00-Y22-			X			0	42611	2716	45327		
37	ROADWAY FILL	362+00-Y22-/392+00-Y22-	X			868	774	1642			0		
38	ROADWAY FILL	372+00-Y22-/373+50-Y22-			X			0	18789	2333	21122		
39	ROADWAY FILL	374+50-Y22-/386+00-Y22-	X			2287	1150	3437			0		
40	ROADWAY FILL	377+00-Y22-/379+00-Y22-	X			439	0	439			0		
41	ROADWAY FILL	395+00-Y22-/397+00-Y22-	X			7242	4745	11987			0		
42	ROADWAY FILL	404+00-Y22-/407+00-Y22-	X			9222	4751	13973			0		
43	ROADWAY FILL	414+00-Y22-/417+00-Y22-	X			5113	2933	8046			0		
44	ROADWAY FILL	77+50-Y22RPCD-/78+50-Y22RPCD-	X			351	1738	2089			0		
SHEET 32 TOTAL:						42917	26006	68923	426603	236017	662620	0	0
PROJECT TOTAL:						158938	97484	256422	1120360	655005	1775665		

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: TIP R-2828

DATE 07/31/2018
SHEET 32 OF 34

Rev. SEP 2016
Rev. May 2006

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
1	505+00-L-/507+00-L-		2545	3834
2	510+00-L-/513+00-L-		7138	4173
3	512+00-L-/516+00-L-		464	896
4	516+00-L-		251	194
5	547+00-L-/550+00-L-		485	645
6	557+00-L-/560+00-L-		2269	1471
7	570+00-L-/578+00-L-		1883	0
8	608+00-L-/611+00-L-		21562	10322
9	13+00-Y18A-/15+00-Y18A-		0	0
10	659+00-L-/661+00-L-		0	0
11	697+00-L-/710+00-L-		53816	25070
12	707+00-L-/708+50-L-		16259	8185
13	725+00-L-/737+00-L-		4740	768
14	736+00-L-/738+00-L-		212	3143
15	781+00-L-/785+00-L-		12009	2516
16	785+00-L-/789+00-L-		10851	1842
17	54+50-Y21-/59+50-Y21-		0	0
18	54+00-Y21-/54+50-Y21		0	0
19	45+00-Y21-/46+00-Y21-		0	0
20	804+00-L-/848+00-L-		2660	1802
21	864+00-L-/869+00-L-		0	0
22	875+00-L-/877+00-L-		15117	6599
23	888+00-L-/890+00-L-		3015	1311
24	894+00-L-/896+00-L-		0	0
25	900+00-L-/907+00-L-		0	0
SHEET 33 TOTAL			155276	72771
PROJECT TOTAL			177517	83313

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: TIP R-2828

DATE 07/31/2018
SHEET 33 OF 34

Rev. Jan 2009

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
26	33+00-Y22FLYCC-/42+00-Y22SLIPRPB-		959	966
27	915+00-L-/918+00-L-		12835	6970
28	18+00-Y22RPDFLY-/21+00-Y22RPDFLY-		0	0
29	47+00-Y22RPCD-/49+00-Y22RPCD-		1893	0
30	29+00-Y22RPCD-/31+00-Y22RPCD-		0	0
31	15+00-Y22LPA-/29+00-Y22RPB-		1716	522
32	13+00-Y22LPA-		0	0
33	15+00-Y22FLYCC-		737	1452
34	37+00-Y22RPB-/48+50-Y22RPB-		1075	322
35	14+00-Y22FLYEB-/16+00-Y22FLYEB-		0	0
36	358+00-Y22-/362+00-Y22-		152	0
37	362+00-Y22-/392+00-Y22-		0	0
38	372+00-Y22-/373+50-Y22-		96	310
39	374+50-Y22-/386+00-Y22-		0	0
40	377+00-Y22-/379+00-Y22-		0	0
41	395+00-Y22-/397+00-Y22-		778	0
42	404+00-Y22-/407+00-Y22-		0	0
43	414+00-Y22-/417+00-Y22-		0	0
44	77+50-Y22RPCD-/78+50-Y22RPCD-		0	0
SHEET 34 TOTAL:			20241	10542
PROJECT TOTAL			175517	83313

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAKE COUNTY
PROJECT: TIP R-2828

DATE 07/31/2018
SHEET 34 OF 34

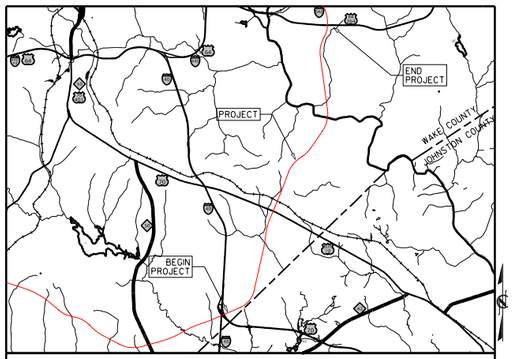
Rev. Jan 2009

09/08/99

TIP PROJECT: R-2829

CONTRACT:

See Sheet 1A For Index of Sheets



VICINITY MAP NTS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2829	1	

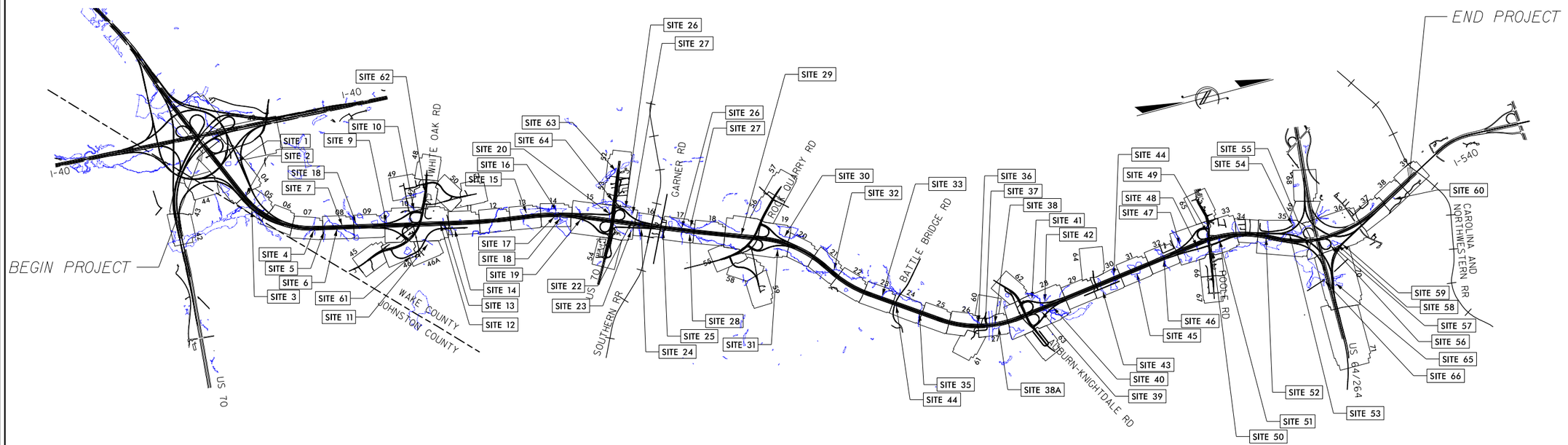
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

PERMIT DRAWING
SHEET 1 OF 108

LOCATION: COMPLETE 540 – EAST OF I-40 TO SOUTH OF US 64 /264

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STURCTURES

WETLAND AND SURFACE WATER IMPACTS PERMIT



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

100 50 0 100 200
PLANS

PROJECT LENGTH

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

7/30/2018
R2829_Hyd_prm_wet_psh_01.dgn
jharvey

REVISIONS

PERMIT DRAWING
SHEET 2 OF 108

LOCHNER
H. W. LOCHNER, INC.
7644 ROLEX ROAD, SUITE 202
RALEIGH, NC 27612
NC License Number P-0559

PROJECT REFERENCE NO.	SHEET NO.
R-2829	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

WETLAND WFG

WETLAND WFJ

SITE 1

SITE 2

A

-Y22SLIPRPA- POT Sta. 20+47.93=
-Y22RPAFLY- POT Sta. 56+66.01

-Y22SLIPRPA- ST Sta. 12+16.00

-L- POT Sta. 950+64.58=
-Y22FLYCC- POC Sta. 94+17.26

-L- POT Sta. 950+77.07=
-Y22SLIPRPA- POS Sta. 10+71.42

-Y22FLYCC- POC Sta. 93+43.60=
-Y22SLIPRPA- ST Sta. 10+00.00
12' RT

-L- TS Sta. 965+00

-Y22LPA- SC
Sta. 25+13.66

-L- POT
1.940+62.94=
Y22LPA- ST
ta. 27+63.66
7' LT

S 83° 49' 14.2" W

N 66° 45' 00.0" E

S 64° 07' 11.0" W

NIXON, JOYCE J

DAVIS, SUSAN C
DAVIS, LARRY E

WHITE, MARY POWELL WARD WARD, ISAB

BRYAN, JEAN BALL ROBERT
ANGUS BRYAN SR FAMILY TRUST

NEW BETHEL CHURCH RD
SR 2203

PROPERTIES LLC

945+00 950+00 955+00 960+00 965+00

DENOTES FILL IN WETLAND

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1"=100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

PERMIT DRAWING
SHEET 3 OF 108

LOCHNER
H. W. LOCHNER, INC.
5960 FAIRVIEW ROAD, SUITE 202
RALEIGH, NC 27612
NC License Number P-0559

PROJECT REFERENCE NO.	SHEET NO.
R-2829	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

WETLAND WFG

WETLAND WFJ

SITE 1

SITE 2

A

-Y22SLIPRPA- POT Sta. 20+47.93=
-Y22RPAFLY- POT Sta. 56+66.01

-Y22SLIPRPA- ST Sta. 12+16.00

-L- POT Sta. 950+64.58=
-Y22FLYCC- POC Sta. 94+17.26

-L- POT Sta. 950+77.07=
-Y22SLIPRPA- POS Sta. 10+71.42

-Y22FLYCC- POC Sta. 93+43.60=
-Y22SLIPRPA- ST Sta. 10+00.00
12' RT

-Y22LPA- SC
Sta. 25+13.66

-L- POT
940+62.94=
-Y22LPA- ST
Sta. 27+63.66
74' LT

N 66° 45' 00.0" E

S 83° 49' 14.2" W

S 64° 07' 11.0" W

DAVIS, SUSAN C
DAVIS, LARRY E

NIXON, JOYCE J

WHITE, MARY POWELL WARD, WARD ISAAC

BRYAN, JEAN BALL ROBERT ANGUS BRYAN SR FAMILY TRUST

PROPERTIES LLC

NEW BETHEL CHURCH RD

SR 2203

PROP. GUARDRAIL

DENOTES FILL IN WETLAND

PAVED SHOULDER / PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100
SCALE: 1"=100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

51499

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

WETLAND WFJ

WETLAND WFN(1)

SITE 2

STREAM SEW

SITE 3

STREAM SEY

SC Sta. 969+20.46

970+00

975+00

980+00

30' GUIDE -Y22RPAFLY

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 25' 0 50' 100'
SCALE: 1"=100'

PAVEMENT REMOVAL
PAVED SHOULDER

PERMIT DRAWING
SHEET 4 OF 108

7/30/2018
R2829_Hyd_prm_wet_psh_05.dgn
lhorney

51499

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 25' 0 50' 100'
SCALE: 1" = 100'

PAVEMENT REMOVAL
PAVED SHOULDER

PERMIT DRAWING
SHEET 5 OF 108

WETLAND WFJ

WETLAND WFN(1)

SITE 2

SC Sta. 969+20.46

STREAM SEW

SITE 3

STREAM SEY

970+00

975+00

980+00

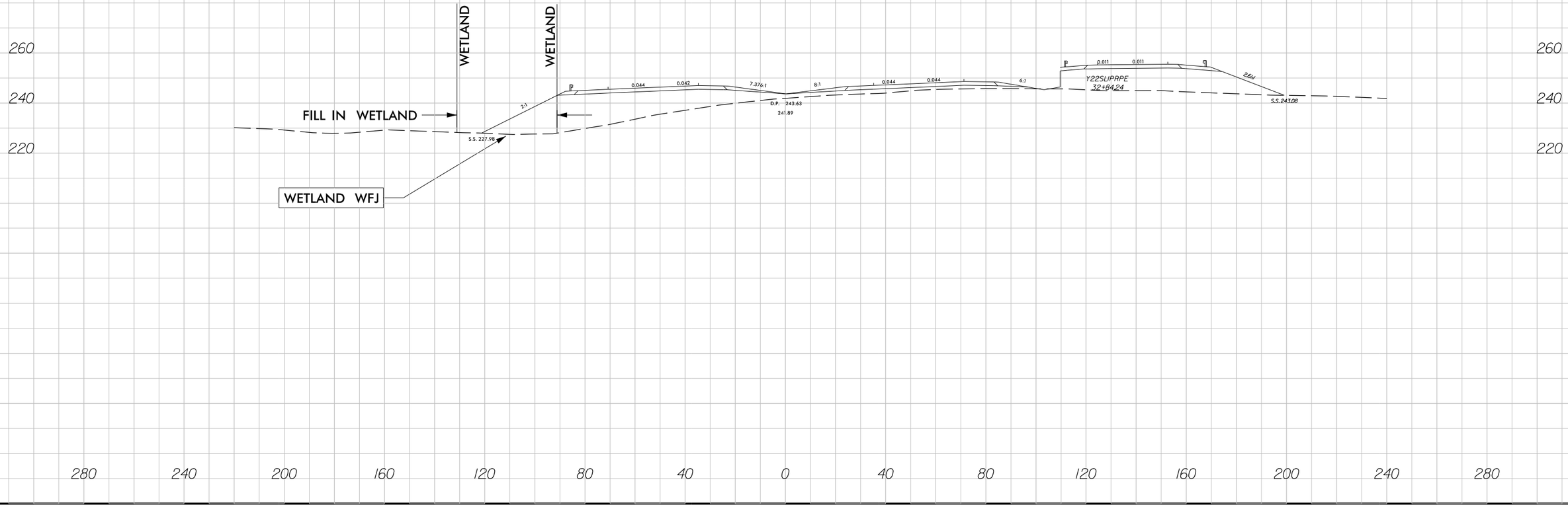
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lhorvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 6 OF 108

CROSS SECTION
SITE 2, WETLAND WFJ
STATION 968+00 –L–



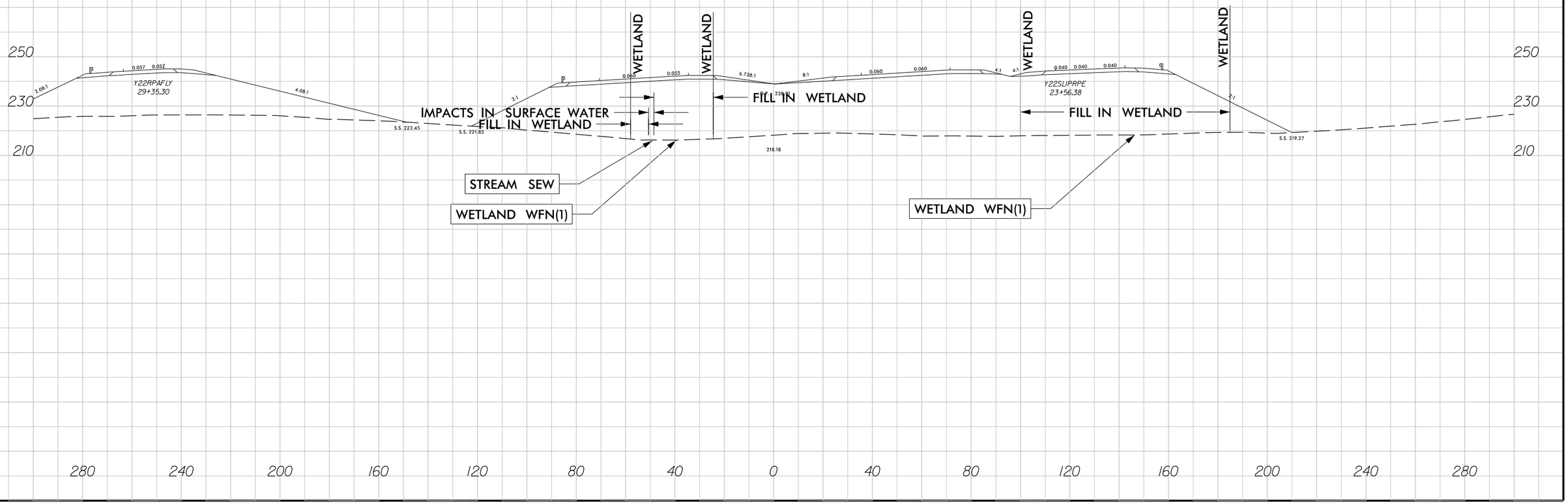
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jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 7 OF 108

CROSS SECTION
SITE 3, WETLAND WFN(1)
STATION 977+00 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_05c_xpl.dgn
jharvey

51499

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 8 OF 108

F F DENOTES FILL IN WETLAND

WETLAND WFY

SITE 4

-L- CS Sta. 1001+60.48

995+00

1000+00

1005+00

AMAN, JOHN R

WLB

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R-2829_Hyd_prm_wet_psh_07.dgn
jhorney

51499

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 9 OF 108

F F DENOTES FILL IN WETLAND

WETLAND WFY

-L- CS Sta. 1001+60.48

SITE 4

995+00

1000+00

1005+00

AMAN, JOHN R

WLB

CC

C

PAVEMENT REMOVAL

PAVED SHOULDER

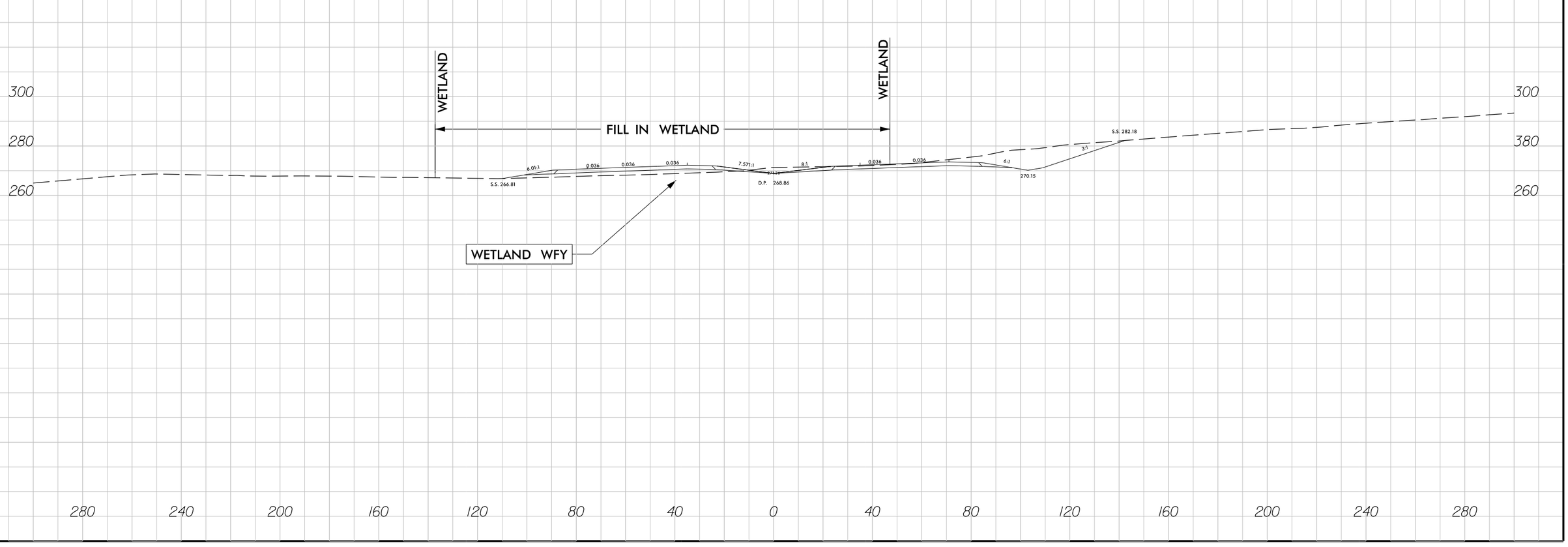
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jburney

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 10 OF 108

CROSS SECTION
SITE 4, WETLAND WFY
STATION 1003+50 -L-



7/30/2018
R2829_Hyd_prm_wet_psh_07b_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1"=100'

BURNETTE, R GARLAND

STREAM SFE

WETLAND WFZ

SITE 5

STREAM SFH

SITE 6

STREAM SFF

SITE 7

GAS LINE 60' R/W

1010+00

1015+00

1020+00

5+40.48

PAVEMENT REMOVAL

PAVED SHOULDER

7/30/2018
R2829_hyd_prm_wet_psh_08.dgn
jhorvay

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 11 OF 108

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" = 100'

BURNETTE, R GARLAND

STREAM SFE

WETLAND WFZ

SITE 5

STREAM SFH

SITE 6

STREAM SFF

SITE 7

GAS LINE 60' R/W

1010+00

1015+00

1020+00

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	8

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 12 OF 108

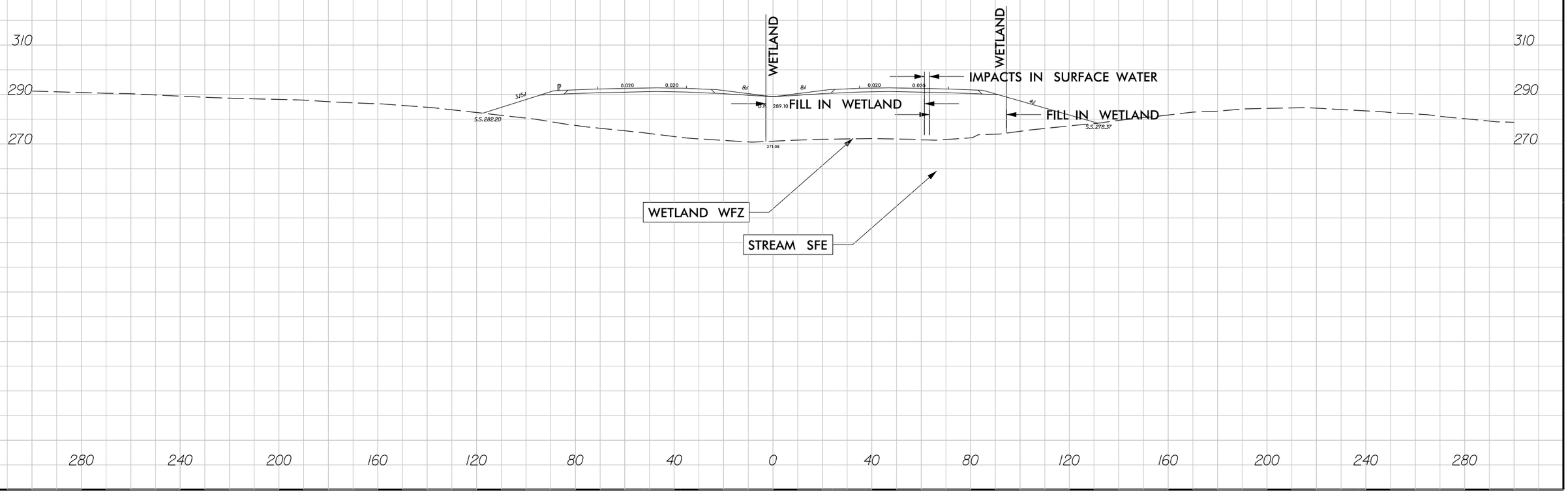
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jhurley
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6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 13 OF 108

CROSS SECTION
SITE 7, WETLAND WFZ
STATION 1017+50 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_08b_xpl.dgn
jharvey

PERMIT DRAWING
SHEET 14 OF 108

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

51499

POND PAD

-L- POT Sta. 1033+09.61=
-Y23RPB- ST Sta. 10+00.00
71.00' LT

SITE 8

SITE 9

WETLAND WGD

WETLAND WGC

STREAM SFB

WETLAND WGB

DAM

1025+00

1030+00

1035+00

N 16° 47' 39.6" E

-L- POT Sta. 1030+20.79=
-Y23RPC- ST Sta. 10+00.00
71.00' RT

-Y23RPC- TS Sta. 13+68.78

BURNEAVE. R GARLAND

15+00
-Y23RPC-

-Y-

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_hyd_prm_wet1_psh_09.dgn
jhorvez

PERMIT DRAWING
SHEET 15 OF 108

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

51499

POND PAD

-L- POT Sta. 1033+09.61=
-Y23RPB- ST Sta. 10+00.00
71.00' LT

WETLAND WGD

SITE 8

WETLAND WGC

STREAM SFB

SITE 9

1025+00

1030+00

1035+00

WETLAND WGB

N 16° 47' 39.6" E

-L- POT Sta. 1030+20.79=
-Y23RPC- ST Sta. 10+00.00
71.00' RT

-Y23RPC- TS Sta. 13+68.78

BURNEATTE, R GARLAND

15+00
-Y23RPC-

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

PAVEMENT REMOVAL
PAVED SHOULDER

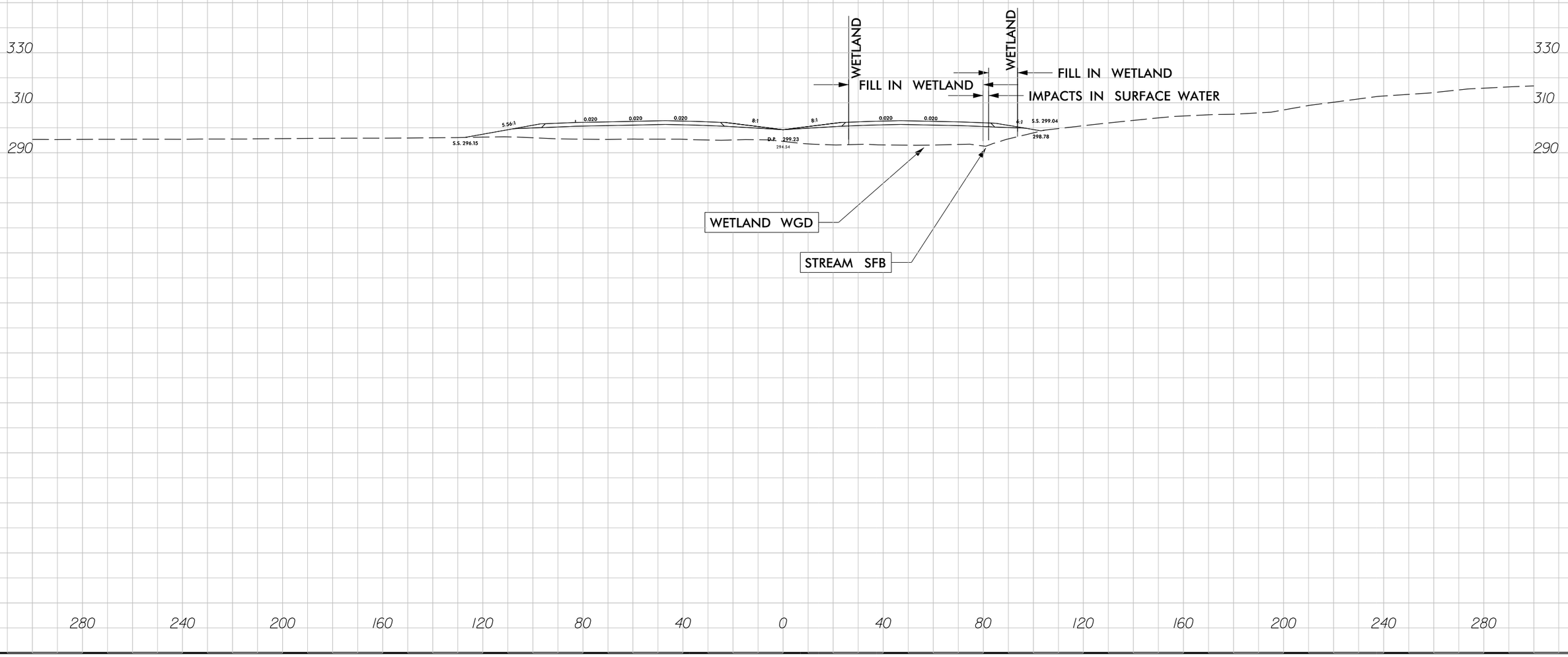
730208
R2829_hyd_prm_wet_psh_09a.dgn
jhoover

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 16 OF 108

CROSS SECTION
SITE 8, WETLAND WGD
STATION 1024+50 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_09b_xpl.dgn
jharvey

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
7600 RALEIGH PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 17 OF 108

WETLAND WGJ
SITE 10
-Y23RPB- PT Sta. 29+53.40
-Y23RPB- SRS Sta. 24+01.92
-Y23RPB- CS Sta. 22+01.92
SR 3815 OLD CASCADE DR
18' BST
N 24° 55' 53" E
-Y23- POT Sta. 55+10.10=
-Y23RPB- POT Sta. 31+23.40
-Y23- POT Sta. 54+78.10=
-Y23LPB- POT Sta. 21+79.47
-Y23E- PT Sta. 14+22.13
-Y23E- PC Sta. 11+18.89
-Y23E- POT Sta. 10+00.00
SC Sta. 12+00.00
POND PAD
SITE 9
-Y23LPB- CS Sta. 17+59.71
-Y23LPB- ST Sta. 20+09.71
MEADOWBROOK ESTATES SUBDIVISION
-Y23LPB- SC Sta. 12+50.00
-L- POT Sta. 1051+12.67=
-Y23LPB- ST Sta. 10+00.00
21.00' LT
HIDDEN ACRES TRL
8' GR
-Y23- PT Sta. 52+17.00
S 24° 43' 41" W
WETLAND WGN
SITE 13
STREAM SFC
WETLAND WGM
WETLAND WGG
N 12° 40' 39.6" E
STREAM SFD
STREAM SFA
SITE 12
-Y23LPC- SC Sta. 12+50.00
-L- POT Sta. 1047+48.32=
-Y23LPC- ST Sta. 10+00.00
83.00' RT
-L- POT Sta. 1051+79.01=
-Y23- POC Sta. 49+55.38
Δ=69° 17' 56.5"
BURNETTE R & JR
-Y23RPC- SC Sta. 15+93.78
-Y23LPC- CS Sta. 15+29.91
-Y23LPC- ST Sta. 11+79.91
-Y23D- PT Sta. 40+51.05
-Y23- POC Sta. 40+68.22=
-Y23LPC- POT Sta. 19+59.64
-Y23RPC- PT Sta. 25+37.17
SITE 11
-Y23D- PC Sta. 32+42.60
STREAM SFX
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
PAVED SHOULDER
PAVEMENT REMOVAL
GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCATION:	
TIP NO.:	COUNTY:
DESIGNED BY:	
CHECKED BY:	DATE:

REVISIONS

LOCHNER
N. W. LOCHNER, INC.
7344 FALLS POINT, SUITE 202
RALEIGH, NC 27612
NC license Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 18 OF 108

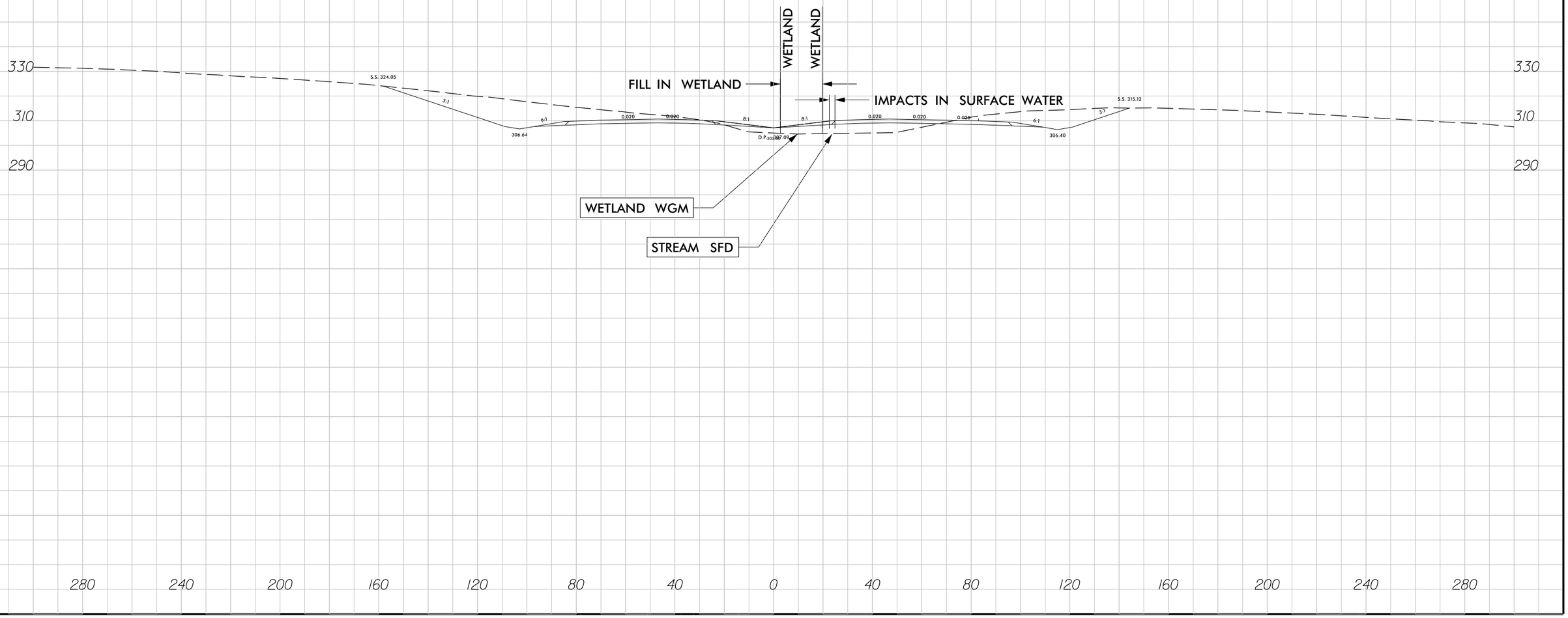
WETLAND WGJ
SITE 10
-Y23RPB- PT Sta. 29+53.40
-Y23RPB- SRS Sta. 24+01.92
-Y23RPB- CS Sta. 22+01.92
-Y23- POT Sta. 55+10.10=
-Y23RPB- POT Sta. 31+23.40
-Y23- POT Sta. 54+78.10=
-Y23LPB- POT Sta. 21+79.47
-Y23F- PT Sta. 14+22.13
-Y23F- PC Sta. 11+18.89
-Y23E- POT Sta. 10+00.00
SC Sta. 12+00.00
POND PAD
SITE 9
-Y23LPB- SC Sta. 12+50.00
-Y23LPB- ST Sta. 20+09.71
-Y23LPB- CS Sta. 17+59.71
-Y23- POT Sta. 105+12.67=
-Y23LPB- ST Sta. 10+00.00
WETLAND WGG
WETLAND WGN
SITE 13
STREAM SFC
WETLAND WGM
STREAM SFA
STREAM SFD
SITE 12
-Y23LPC- SC Sta. 12+50.00
-Y23LPC- ST Sta. 10+00.00
-Y23- POT Sta. 104+48.32=
-Y23- POT Sta. 105+79.01=
-Y23- POC Sta. 49+55.38
Δ=69° 17' 56.5"
-Y23RPC- SC Sta. 15+93.78
-Y23LPC- CS Sta. 15+29.91
-Y23LPC- ST Sta. 17+79.91
STREAM SFC
-Y23D- PT Sta. 40+51.05
-Y23- POC Sta. 40+68.22=
-Y23LPC- POT Sta. 19+59.64
-Y23RPC- PT Sta. 25+37.17
SITE 11
-Y23D- PC Sta. 32+42.60
STREAM SFX
MEADOWBROOK ESTATES SUBDIVISION
FOSTER PARK LLC
OLD CASCADE DR
HIDDEN ACRES TRL
BURNETTE R G JR
MCDONALD RAY DEAN
DEAN R DONALD
WHITE OAK RD
SR 3815
N 12° 40' 39.6" E
N 24° 55' 53.5" E
N 57° 41' 39.6" W
N 65° 24' 43.4" W
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
PAVED SHOULDER
PAVEMENT REMOVAL
GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1"=100'
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 19 OF 108

CROSS SECTION
SITE 12, WETLAND WGM
STATION 1061+50 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_10b_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 20 OF 108

-L- PC Sta. 1071+35.79

HIDDEN ACRES TRL

8' SOIL

ISFD

ELMO T WILLIAMS TRUST

WILLIAMS, ALICE H

EARLY & SARA RAY

1070+00

DAM

1075+00

.02

N 12° 40' 39.6" E

WLB

SITE 14

WETLAND WGO

8' BST

-Y23D- POT Sta. 52+87.60

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_11.dgn
lhorney

51499

DENOTES FILL IN WETLAND

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 21 OF 108

PC Sta. 1071+35.79

HIDDEN ACRES TRL

8" SOIL

ISFD

ELMO T WILLIAMS TRUST

WILLIAMS ALICE H

EARLY SARA RAY

1070+00

DAM

1075+00

N 12° 40' 39.6" E

WLB

SITE 14

WETLAND WGO

8" BST

-Y23D- POT Sta. 52+87.60

PAVEMENT REMOVAL
PAVED SHOULDER

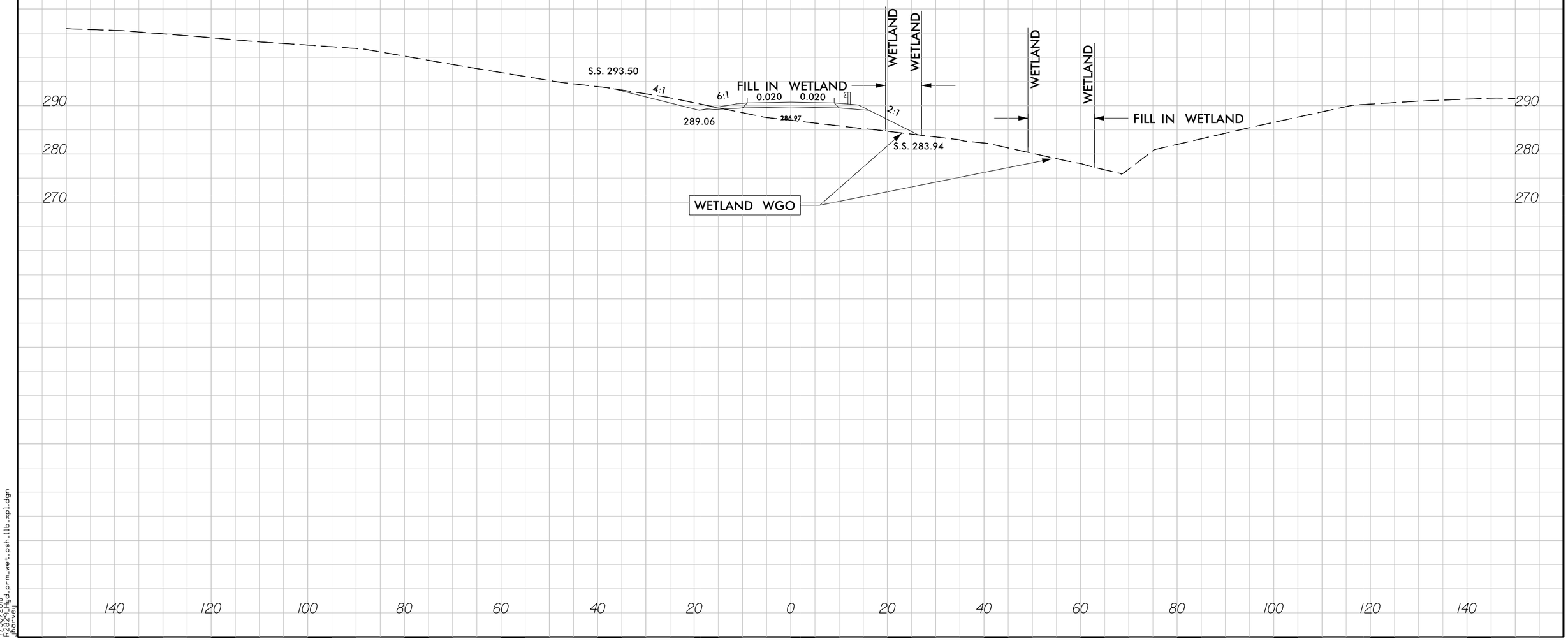
7302018
R2829_Hyd_prm_wet_psh_11a.dgn
jlgoyer

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 22 OF 108

CROSS SECTION
SITE 14, WETLAND WGO
STATION 46+50 –Y23D–



7/30/2018
R2829_Hgd_prm_wet_psh_11b_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 23 OF 108

WETLAND WGR

SITE 15

STREAM SFR

-L- PC Sta. 1102+48.60

091+66.25

1095+00

1100+00

1105+00

N 8° 01' 27.1" E

NC DEPARTMENT OF TRANSPORTATION

CAPITOL BROADCASTING CO INC

WLB

BZ 1

BZ 2

SF

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_13.dgn
lhancox

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 24 OF 108

WETLAND WGR

SITE 15

STREAM SFR

091+66.25

-L- PC Sta. 1102+48.60

NC DEPARTMENT OF TRANSPORTATION

CAPITOL BROADCASTING CO INC

1095+00

1100+00

1105+00

N 8° 01' 27.1" E

WLB

BZ 1

BZ 2

SF

PAVEMENT REMOVAL
PAVED SHOULDER

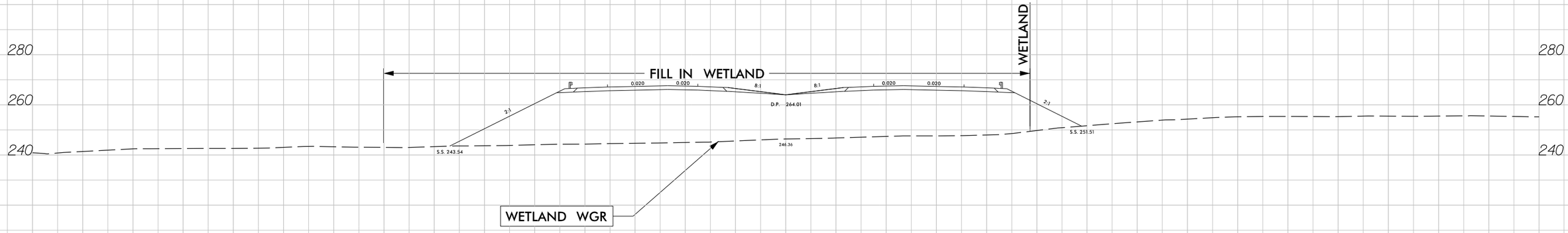
7302018
R2829_Hyd_prm_wet_psh_13a.dgn
lhoover

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 25 OF 108

CROSS SECTION
SITE 15, WETLAND WGR
STATION 1099+50 –L–



7/30/2018
R2829_Hyd_prm_wet_psh.13b.xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" =100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 26 OF 108

WETLAND WGR

-L- POT Sta. 1115+20.79=
-Y24RPB- POT Sta. 10+00.00
71.00' LT

SITE 16

N 16° 07' 23

1110+00

1115+00

1120+00

STREAM SFN

Center of Anchor
30.970 ft. from EOP
39.158 ft. from EOT

Nearest Fence Corner
15.79kft. from EOP
23.808 ft. from EOT

SITE 17

WETLAND WGS

SITE 18

STREAM SFQ

-L- POT Sta. 1119+77.61=
-Y24RPC- ST Sta. 10+00.00
71.00' RT

-Y24RPC- SC Sta. 12

ANTENNA ANCHOR

ANTENNA ANCHOR

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_pth_14.dgn
lhuxley

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 27 OF 108

WETLAND WGR

-L- POT Sta. 1115+20.79=
-Y24RPB- POT Sta. 10+00.00
71.00' LT

SITE 16

1110+00

1120+00

N 16° 07' 23

STREAM SFN

ANTENNA ANCHOR

Center of Anchor
30.970 ft. from EOP
39.158 ft. from EOT

Nearest Fence Corner
15.791 ft. from EOP
23.808 ft. from EOT

SITE 17

WETLAND WGS

SITE 18

STREAM SFQ

-L- POT Sta. 1119+77.61=
-Y24RPC- ST Sta. 10+00.00
71.00' RT

-Y24RPC- SC Sta. 12

PAVEMENT REMOVAL
PAVED SHOULDER

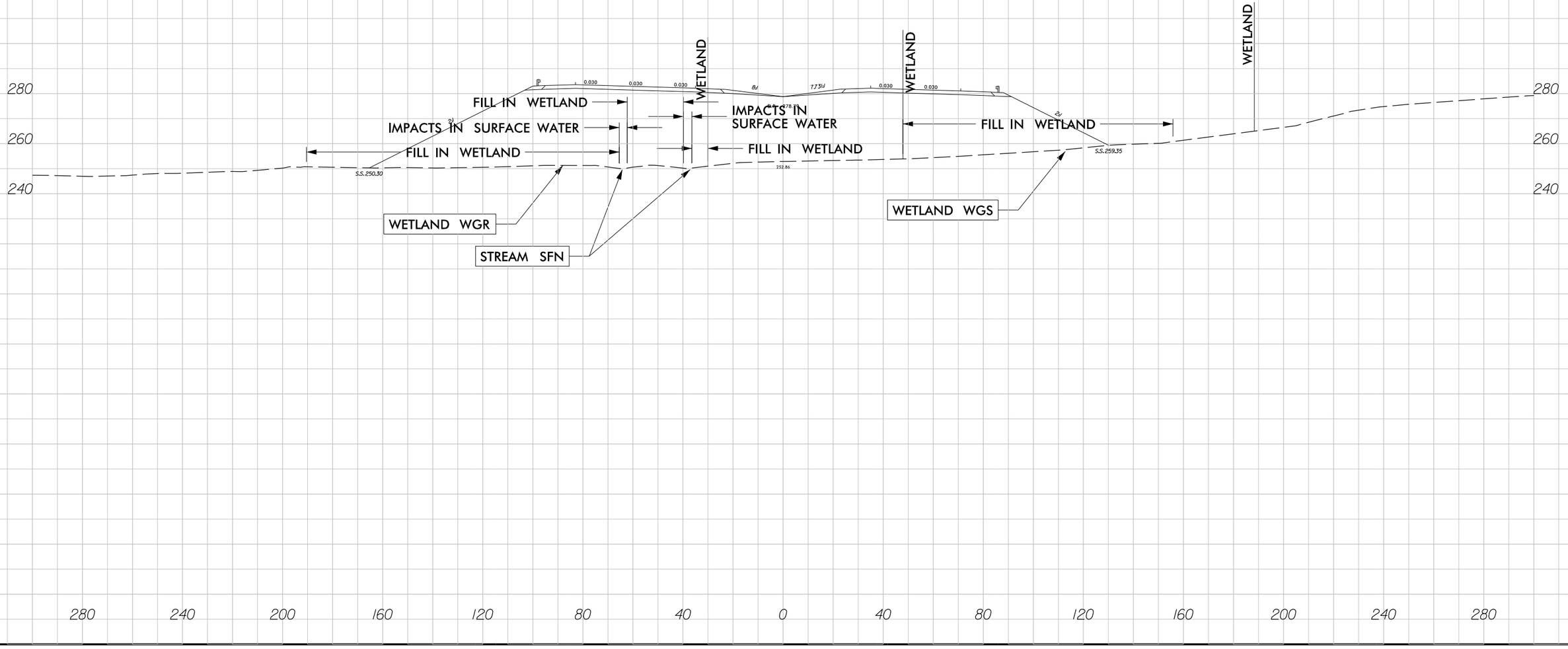
7/30/2018
R2829_Hyd_prm_wet_psh_14a.dgn
jlgroves

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 28 OF 108

CROSS SECTION
SITE 16, WETLAND WGR
SITE 17, WETLAND WGS
STATION 1113+50 –L–



7/30/2018
R2829_Grd_prm_wet_psh_14b_xpl.dgn
jharvey

REVISIONS

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
3840 ROSS ROAD, SUITE 202
RALEIGH, NC 27612
NC license Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 29 OF 108

SITE 19
SITE 20
SITE 21
SITE 22
SITE 23

WETLAND WGR
WETLAND WGX(1)
WETLAND WGX(2)
WETLAND WGY
WETLAND WGZ

STREAM SFS
STREAM SFT
STREAM SFT

A
B
C
D

-Y24- POT Sta. 27+25.00
-Y24RPB- POT Sta. 31+34.92
57.00' RT
-Y24- POT Sta. 27+83.64
-Y24RPA- POT Sta. 32+51.60
-Y24RPB- PT Sta. 23+79.08
-Y24RPB- PC Sta. 21+37.16
-Y24RPB- PT
-Y24RPB- PC Sta. 32+00.88
-Y24- PC Sta. 32+09.24
N 17° 11' 51.6" E
N 68° 27' 50.8" W
S 21° 32' 09.2" W
-Y24LPA- CS Sta. 20+85.53
-Y24LPA- SRS Sta. 23+35.53
-Y24LPA- SC Sta. 12+50.00
-L- POT Sta. 1141+33.67=
-Y24LPA- ST Sta. 10+00.00
71.00' LT
N 22° 35' 44.1" E
-Y24LPC- SC Sta. 12+50.00
-L- POT Sta. 1137+95.17=
-Y24LPC- ST Sta. 10+00.00
71.00' LT
-Y24- POC Sta. 35+94.49=
-Y24LPC- ST Sta. 23+27.85
51.00' RT
-Y24LPC- CS Sta. 20+77.85
-L- PT Sta. 1125+37.47
-Y24RPC- PCC Sta. 18+32.61
-Y24RPC- CS Sta. 21+54.98
-Y24RPC- SRS Sta. 23+59.98
N 25° 15' 37.7" E
-L- POT Sta. 1139+67.12=
-Y24- POC Sta. 33+99.03
Δ=89° 53' 21.0"
-Y24- POC Sta. 34+62.17=
-Y24LPA- ST Sta. 25+85.53
51.00' LT
-Y24RPD- PC Sta. 32+35.86
-Y24RPD- PT Sta. 35+44.88
S 64° 06' 22.9" E
N 30° 01' 30.4" W
-Y24C- POT Sta. 24+30.68
-Y24C- PT Sta. 23+63.27
-Y24C- PC Sta. 21+95.84
-Y24- POC Sta. 40+80.85=

SFS
SFT
SFBUS
HTR
ISBKD
2SBKD
ISBKBUS
ISBLKBUS
PA BST
PA CONC
RIPRAP
9'GR
US 70 BUS EBL 32' BST
LEE LOUNGE

1125+00 1130+00 1135+00 1140+00 1145+00 1150

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1"=100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

F / F DENOTES FILL IN WETLAND

S / S DENOTES IMPACTS IN SURFACE WATER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 30 OF 108

SITE 19

SITE 20

SITE 21

SITE 22

SITE 23

WETLAND WGR

WETLAND WGX(1)

WETLAND WGX(2)

WETLAND WGY

WETLAND WGZ

STREAM SFS

STREAM SFT

STREAM SFT

A

B

C

D

-Y24- POT Sta. 27+25.00=
-Y24RPB- POT Sta. 31+34.92
57.00' RT
-Y24- POT Sta. 27+83.64=
-Y24RPA- POT Sta. 32+51.60

-Y24RPB- PT Sta. 23+79.08

-Y24RPB- PC Sta. 21+37.16

-Y24RPB- PT

-Y24RPB- PC Sta. 32+00.88

-Y24- PC Sta. 32+09.24

N. 17° 11' 51.6" E

S 21° 32' 09.2" W

N 68° 27' 50.8" W

-Y24LPA- CS Sta. 20+85.53

-Y24LPA- SRS Sta. 23+35.53

-Y24LPA- SC Sta. 12+50.00

-L- POT Sta. 1141+33.67=
-Y24LPA- ST Sta. 10+00.00
71.00' LT

N. 22° 35' 44.7" E

-L- POT Sta. 1139+67.12=
-Y24- POC Sta. 33+99.03
Δ=89° 53' 21.0"

-Y24- POC Sta. 34+62.17=
-Y24LPA- ST Sta. 25+85.53
51.00' LT

-Y24RPD- PC Sta. 32+35.86

-Y24RPD- PT Sta. 35+44.88

-Y24C- POT Sta. 24+30.68

-Y24C- PT Sta. 23+53.27

-Y24C- PC Sta. 21+95.84

-L- PT Sta. 1125+37.47

-Y24RPC- PCC Sta. 18+32.61

-Y24RPC- CS Sta. 21+54.98

-Y24RPC- SRS Sta. 23+59.98

-Y24LPC- SC Sta. 12+50.00

-L- POT Sta. 1137+95.17=
-Y24LPC- ST Sta. 10+00.00
71.00' LT

-Y24- POC Sta. 35+94.49=
-Y24LPC- ST Sta. 28+27.85
51.00' RT

-Y24LPC- CS Sta. 20+17.85

N 25° 15' 37.7" E

N 30° 01' 30.4" W

S 64° 06' 29.6" E

ISBLKBUS

PAVED SHOULDER

PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

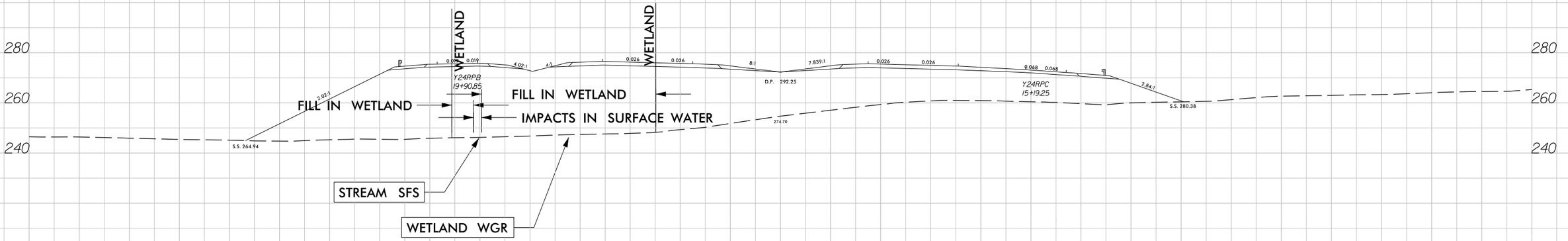
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 31 OF 108

CROSS SECTION
SITE 19, WETLAND WGR
STATION 1125+00 –L–



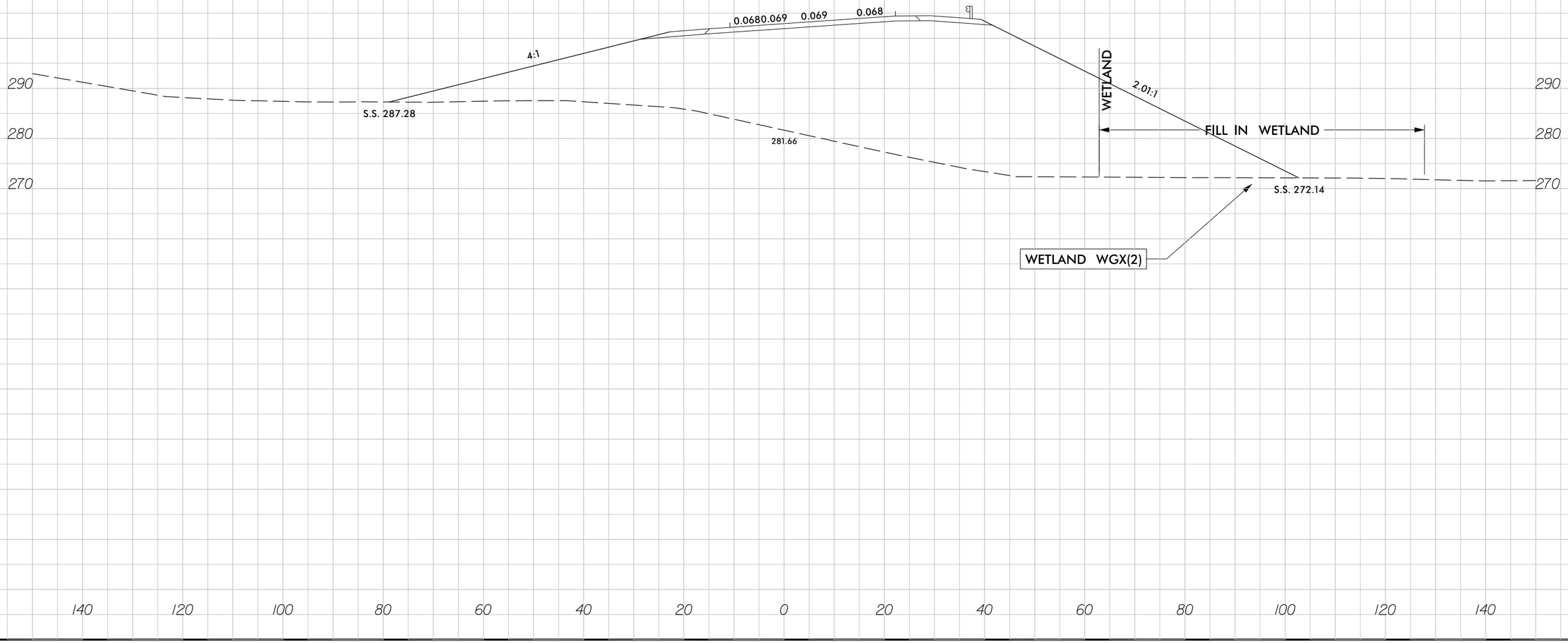
7/30/2018
R2829_hyd_prm_wet_psh_15b_xpl.dgn
jhorvej

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 32 OF 108

CROSS SECTION
SITE 21, WETLAND WGX(2)
STATION 28+00 –Y24RPA–



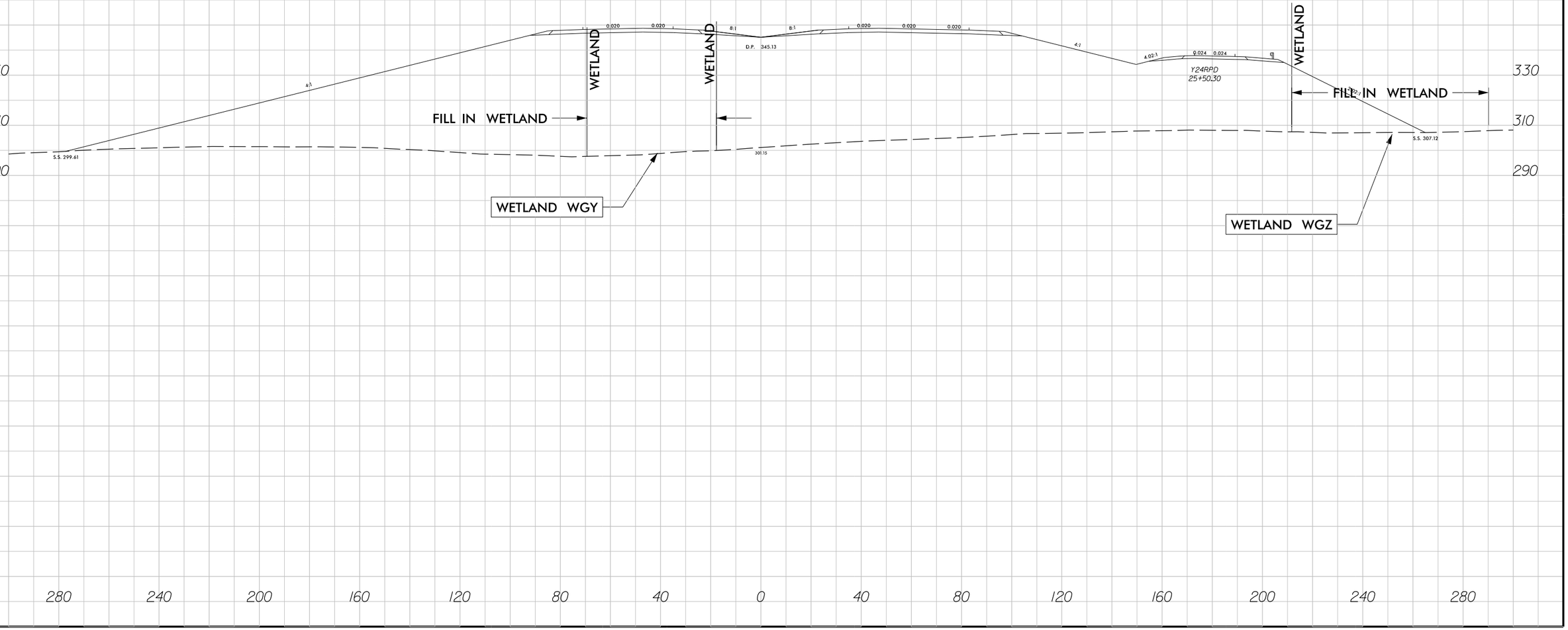
7/30/2018
R2829_Hyd_prm_wet_psh_15c_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 33 OF 108

CROSS SECTION
SITE 24, WETLAND WGY
SITE 23, WETLAND WGZ
STATION 1149+00 –L–



7/30/2018
R2829_hyd_prm_wet_psh_15d_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

STREAM SGC

WETLAND WHB

SITE 24

-Y24RPA- SGC Sta. 17+86.75

-Y24RPA- PT Sta. 19+12.73

-Y24RPD-

20+00 -Y24RPA-

15+00 -Y24RPA-

1155+00

1160+00

S 17° 06' 46.9" W

N 90° 26' 19.7" E

NORFOLK SOUTHERN RR

NC RAILROAD COMPANY

CONRAIL CO PAT

-L- POT Sta. 1160+85.79= -Y24RPA- POT Sta. 10+00.00 71.00' LT

15+00 -Y25-

-L- POT Sta. 1157+44.69= -Y25- POT Sta. 18+03.43 Δ=97° 17' 56.1"

S 26° 35' 44.1" W

S 22° 03' 04.8" W 1004.

-L- POT Sta. 1161+69.62= -Y26- POT Sta. 25+52.90 Δ=93° 20' 53.1"

20+00 -Y25-

25+00 -Y26-

STREAM SGD

SITE 25

10' BST

8' GR

8' BST

ISFD

ISBKD

CONRAIL RD

22' BST

ONO

GGRAVATION

50' 25' 0 50' 100'

SCALE: 1"=100'

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 34 OF 108

7/30/2018
R2829_Hyd_prm_vwt_psh_16.dgn
jhorney

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

STREAM SGC

WETLAND WHB

SITE 24

STREAM SGD

SITE 25

-Y24RPA- SGC Sta. 17+86.75

-Y24RPA- POT Sta. 1160+85.79=

-L- POT Sta. 10+00.00

71.00' LT

-Y25- POT Sta. 1157+44.69=

-L- POT Sta. 18+03.43

Δ=97° 17' 56.1"

S 26° 35' 44.1" W

S 17° 06' 46.9" W

-Y24RPD- PT Sta. 19+12.73

-Y24RPD- PT Sta. 1161+69.62=

-L- POT Sta. 25+52.90

Δ=93° 20' 53.1"

-Y24RPA- PT Sta. 1161+90.26=

-L- PT Sta. 20+67.16

S 82° 30' 04.6" E

SR 1004

NORFOLK SOUTHERN RR

NORFOLK SOUTHERN RAILROAD COMPANY

CSX TRANSPORTATION

RAILROAD COMPANY

10' BST

8' BST

8' GR

ISFD

ISBKD

ISGD

WLB

RW

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 35 OF 108

50' 25' 0 50' 100'
SCALE: 1"=100'

PAVEMENT REMOVAL
PAVED SHOULDER

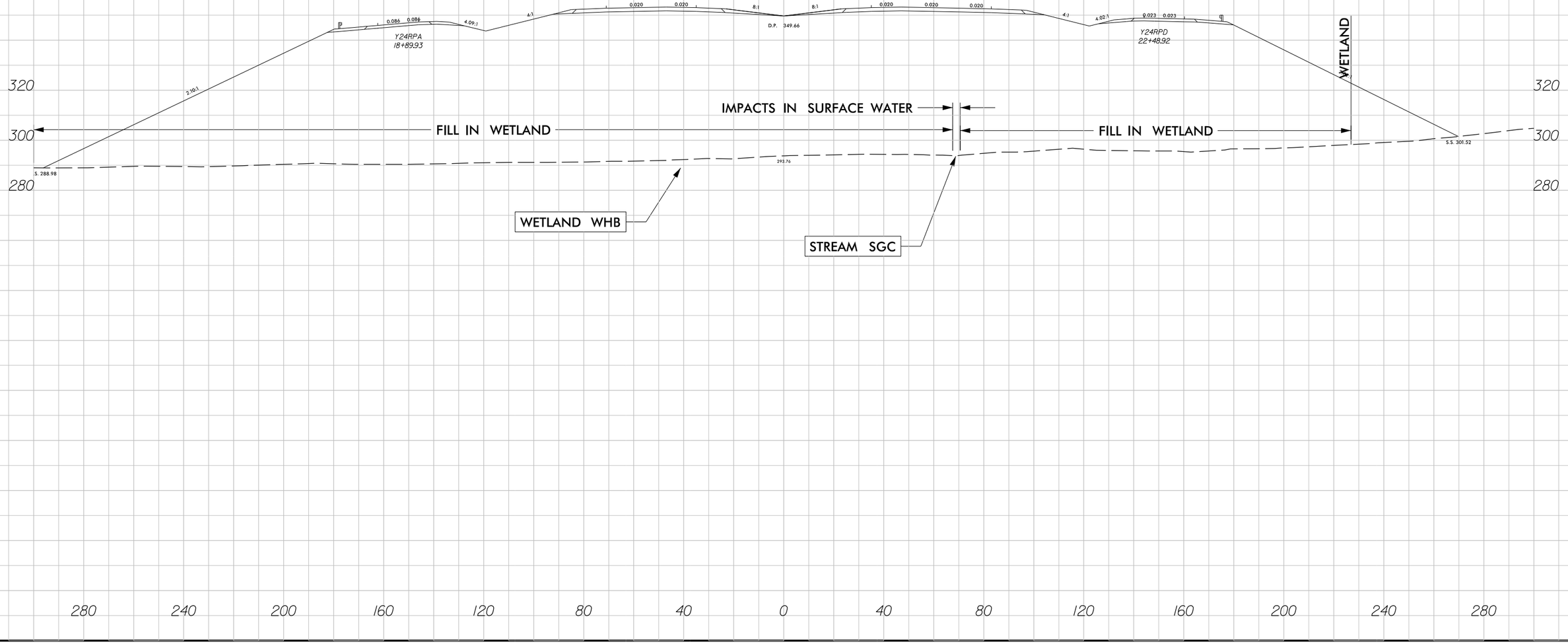
7/30/2018
R2829_hyd_prm_wet_psh_16oc.dgn
lhancock

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 36 OF 108

CROSS SECTION
SITE 24, WETLAND WHB
STATION 1152 + 00 –L–



7/30/2018
R2829_hyd_prm_wet_psh_16b_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

PERMIT DRAWING
SHEET 37 OF 108

STREAM SGF

WETLAND WHD(2)

SITE 27

SITE 26

WETLAND WHD

STREAM SGE

STREAM SGG

SITE 28

Sta. 1164+80.68

1165+00

1170+00

1175+00

DAM

POOL

ISFD

8' GR

WL - POC Sta. 1164+45.61=
=Y24RPD- PC Sta. 10+00.00
41.00' RT

LAURA L WATTS, BARBARA B

MCINTYRE, JOHN BAPTIST

30+00 -Y26-

PAVEMENT REMOVAL
PAVED SHOULDER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

7/30/2018
R2829_hyd_prm_wet_psh_17.dgn
jhatcher

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 38 OF 108

STREAM SGF
WETLAND WHD(2)
SITE 27

SITE 26

WETLAND WHD

STREAM SGE

STREAM SGG

SITE 28

Sta. 1161+80.68

1165+00

1170+00

1175+00

DAM

POOL

ISFD

8" GR

CAN

MCINTYRE'S JOHN BAPTIST

LAURA L WATTS, BARBARA B

WL - POC Sta. 1164+45.61=
-Y24RPD- PC Sta. 10+00.00
-41.00' RT

30+00 -Y26-

PAVEMENT REMOVAL
PAVED SHOULDER

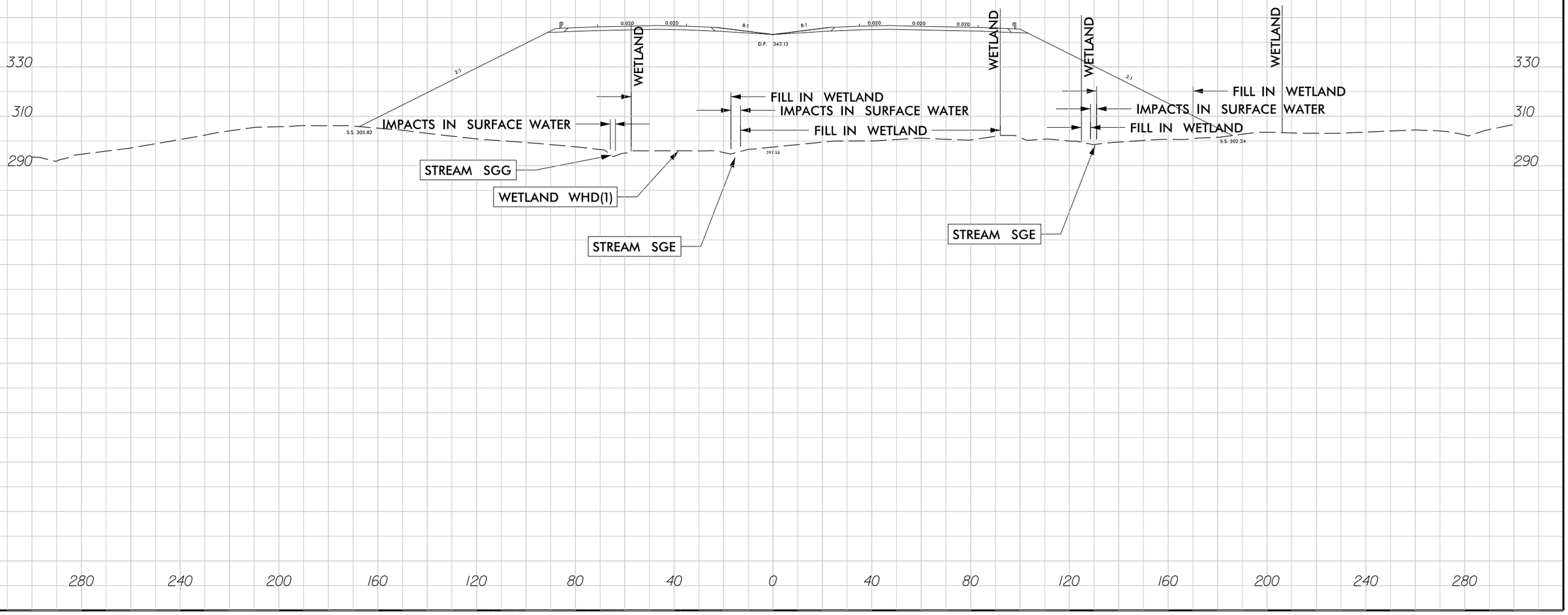
7/30/2018
R2829_hyd_prm_wet_psh_17o.dgn
lhancvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 39 OF 108

CROSS SECTION
SITE 26, WETLAND WHD(1)
STATION 1171+00 –L–



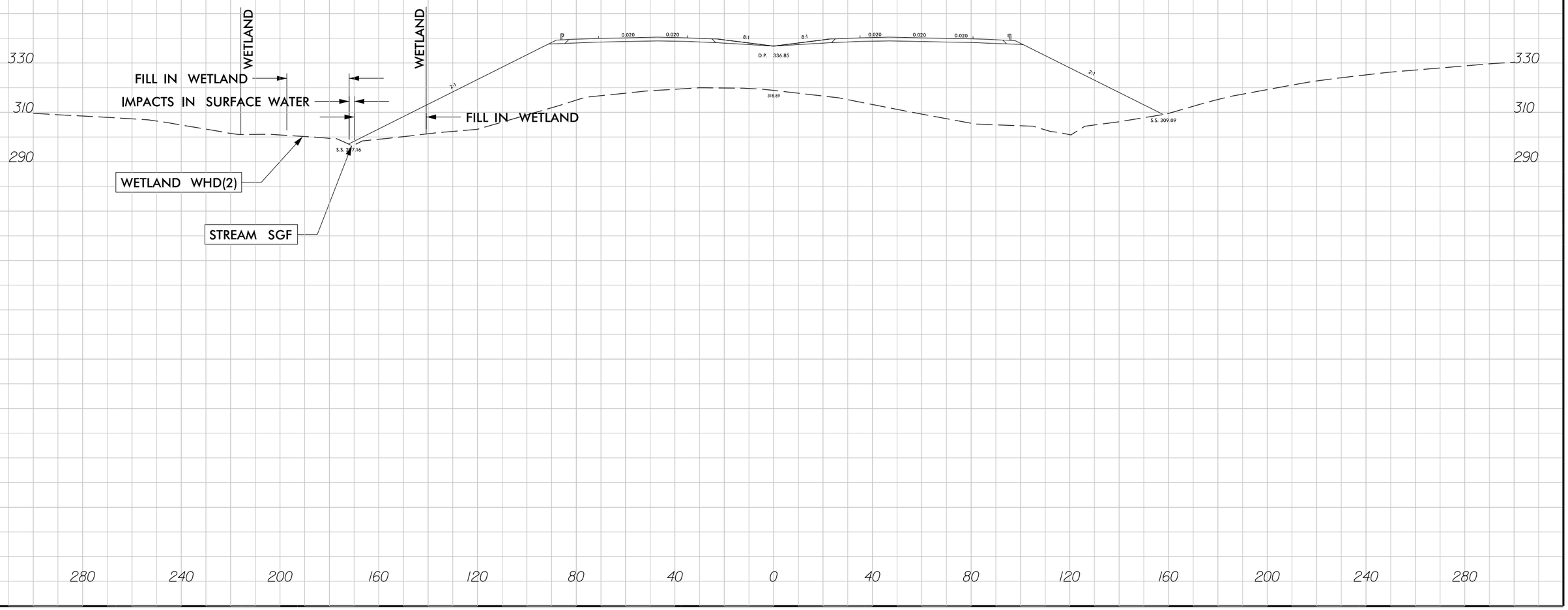
7/30/2018
R2829_Hyd_prm_wet_psh_17b_xpl.dgn
jharvey

6/23/16

PROJ. REFERENCE NO.	SHEET NO.
R-2829	

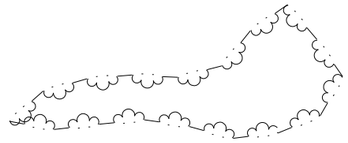
PERMIT DRAWING
SHEET 40 OF 108

CROSS SECTION
SITE 27, WETLAND WHD(2)
STATION 1175+00 –L–



7/30/2018
R2829_hyd_prm_wet_psh_17c_xpl.dgn
jhorvej

51499



F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

STREAM SGF

SITE 27

℄ – PT Sta. 1182+53.04

EDGE OF AUBURN

1180+00

1185+00

1190+00

SITE 28

STREAM SGG

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

PROJECT REFERENCE NO.	SHEET NO.
R-2829	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 41 OF 108

7302018
R2829_Hyd_prm_wet_psh_18.dgn
jhopper

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	18
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 42 OF 108

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

STREAM SGF

SITE 27

PT Sta. 1182+53.04

EDGE OF AUBURN

1180+00 1185+00 1190+00

SITE 28

STREAM SGG

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_18a.dgn
lhorvay

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
7600 PEAK DRIVE, SUITE 202
RALEIGH, NC 27612
NC License Number P-0559

PROJECT REFERENCE NO.	SHEET NO.
R-2829	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PERMIT DRAWING
SHEET 43 OF 108

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y27- BG Sta. 41+69.05
-Y27- POT STA 41+55.33=
-Y27RBA- POT Sta. 30+20.34
-Y27- POT STA 41+23.24=
-Y27LPA- POT Sta. 22+86.27
40+00 -Y27-
-Y27- PT Sta. 37+91.89
-L- POT Sta. 1204+09.01=
-Y27- POC Sta. 34+52.93
Δ=63°12'45.3"
35+00 -Y27-
WETLAND WHH
1195+00
N 20° 36' 59.91" E
1200+00
SITE 29
30+00 -Y27-
-Y27- POC Sta. 30+31.95=
-Y27LPD- POT Sta. 23+28.35
-Y27- POC Sta. 30+00.37=
-Y27RPD- POT Sta. 32+96.62
25+00 -Y27-
WB
GW
705.8
-Y27RPD- PT Sta. 30+58.83
RUINS
SR 5204
ROCK GHARBY RD
SR 5204
N 52° 06' 08.0" W
2SF
14" GR
-Y27LPA- PT Sta. 28+67.04
S 34° 53' 01.0" W
S 32° 53' 01.0" W
-Y27LPA- ST Sta. 21+14.46
-Y27LPA- CS Sta. 18+64.46
20+00 -Y27LPA-
BURNETTE FARMS LLC
-Y27LPA- SC Sta. 14+61.21
25TBST
-L- POT Sta. 1205+10.03=
-Y27LPA- TS Sta. 10+00.00
71.00' LT
-Y27LPA- TS Sta. 12+11.21
N 20° 36' 59.9" E
205+00
10" GR
1210+00
1215+00
MICROWAVE TOWER
-L- POT Sta. 1204+96.04=
-Y27LPD- TS Sta. 10+00.00
71.00' RT
-Y27LPD- SC Sta. 12+50.00
15+00 -Y27LPD-
-Y27LPD- CS Sta. 18+34.39
-Y27LPD- ST Sta. 20+84.39
S 48° 28' 21.5" W
S 50° 28' 21.5" W
RUINS
-Y27RPD- SC Sta. 26+11.50
25+00
-L- SC Sta. 1209+51.03
-L- STS Sta. 1206+36.03
-Y27RPD- SRS Sta. 24+11.50
20+00 -Y27RPD-
WETLAND WHQ
-Y27RPD- CS Sta. 21+86.50
15+00 -Y27RPD-
SITE 31
STREAM SGK
-Y27RPD- SC Sta. 12
-Y27RPA- SC Sta. 26+10.88
25+00 -Y27RPA-
-Y27RPA- SRS Sta. 24+10.88
-Y27RPA- CS Sta. 21+85.88
25+00 -Y27RPA-
PA- ST Sta. 18+25.00
-Y27RPA-
SITE 30
POND PAH
A
D

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
F F DENOTES IMPACTS IN SURFACE WATER (POND)

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
5960 FAIRVIEW ROAD, SUITE 202
RALEIGH, NC 27612
NC license Number P-0559

PERMIT DRAWING
SHEET 44 OF 108

PROJECT REFERENCE NO.	SHEET NO.
R-2829	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y27- BG Sta. 41+69.05
-Y27- POT STA 41+55.33=
-Y27RPA- POT Sta. 30+20.34
-Y27- POT STA 41+23.24=
-Y27LPA- POT Sta. 22+86.27
40+00 -Y27-
-Y27- PT Sta. 37+91.89
-L- POT Sta. 1204+09.01=
-Y27- POC Sta. 34+52.93
Δ=63° 12' 45.3"
35+00 -Y27-
WETLAND WHH
1195+00
N 20° 36' 59.91" E
1200+00
SITE 29
30+00 -Y27-
-Y27- POC Sta. 30+31.95=
-Y27LPD- POT Sta. 23+28.35
-Y27- POC Sta. 30+00.37=
-Y27RPD- POT Sta. 32+96.62
25+00 -Y27-
-Y27RPD- PT Sta. 30+58.83
105.8
-Y27RPD- SC Sta. 26+11.50
25+00
-Y27RPD- SRS Sta. 24+10.88
25+00 -Y27RPA-
-Y27RPA- CS Sta. 21+85.88
-Y27RPA- ST Sta. 21+14.46
-Y27LPA- CS Sta. 18+64.46
-Y27LPA- ST Sta. 20+84.39
-Y27LPA- SC Sta. 14+61.21
-L- POT Sta. 1205+10.03=
-Y27LPA- TS Sta. 10+00.00
71.00' LT
-Y27LPA- TS Sta. 12+11.21
N 20° 36' 59.9" E
205+00
-Y27LPA- PT Sta. 28+67.04
S 34° 53' 01.0" W
S 34° 53' 01.0" W
-Y27LPA- ST Sta. 21+14.46
-Y27LPA- CS Sta. 18+64.46
-Y27LPA- ST Sta. 20+84.39
-Y27LPA- SC Sta. 14+61.21
15+00 -Y27LPA-
-L- POT Sta. 1204+96.04=
-Y27LPD- TS Sta. 10+00.00
71.00' RT
-Y27LPD- SC Sta. 12+50.00
15+00 -Y27LPD-
-Y27LPD- CS Sta. 18+34.39
-Y27LPD- ST Sta. 20+84.39
S 48° 28' 21.5" W
S 48° 28' 21.5" W
-Y27LPD- PT Sta. 30+58.83
-Y27RPD- SC Sta. 26+11.50
25+00
-L- SC Sta. 1209+51.03
-L- TS Sta. 1206+36.03
1210+00
1215+00
1220
SITE 30
SITE 31
POND PAH
STREAM SGK
WETLAND WHQ
-Y27RPD- SRS Sta. 24+11.50
-Y27RPD- CS Sta. 21+86.50
20+00 -Y27RPD-
15+00 -Y27RPD-
-Y27RPD- SC Sta. 12
A
D
RUINS
MICROWAVE TOWER
ROCKY GHARBY RD
BURNETTE FARMS LLC
SR 2204
8" GR
10" GR
14" GR
2SF
S

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
P P DENOTES IMPACTS IN SURFACE WATER (POND)

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

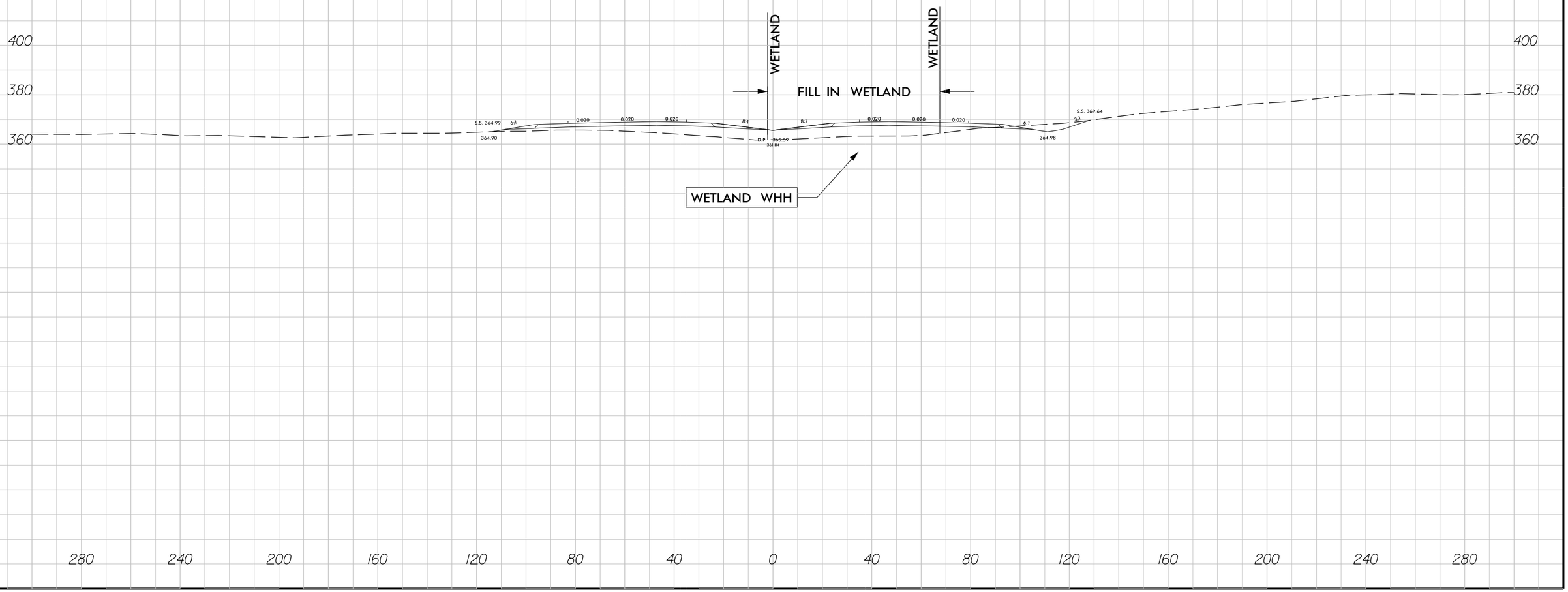
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 45 OF 108

CROSS SECTION
SITE 29, WETLAND WHH
STATION 1198+00 –L–



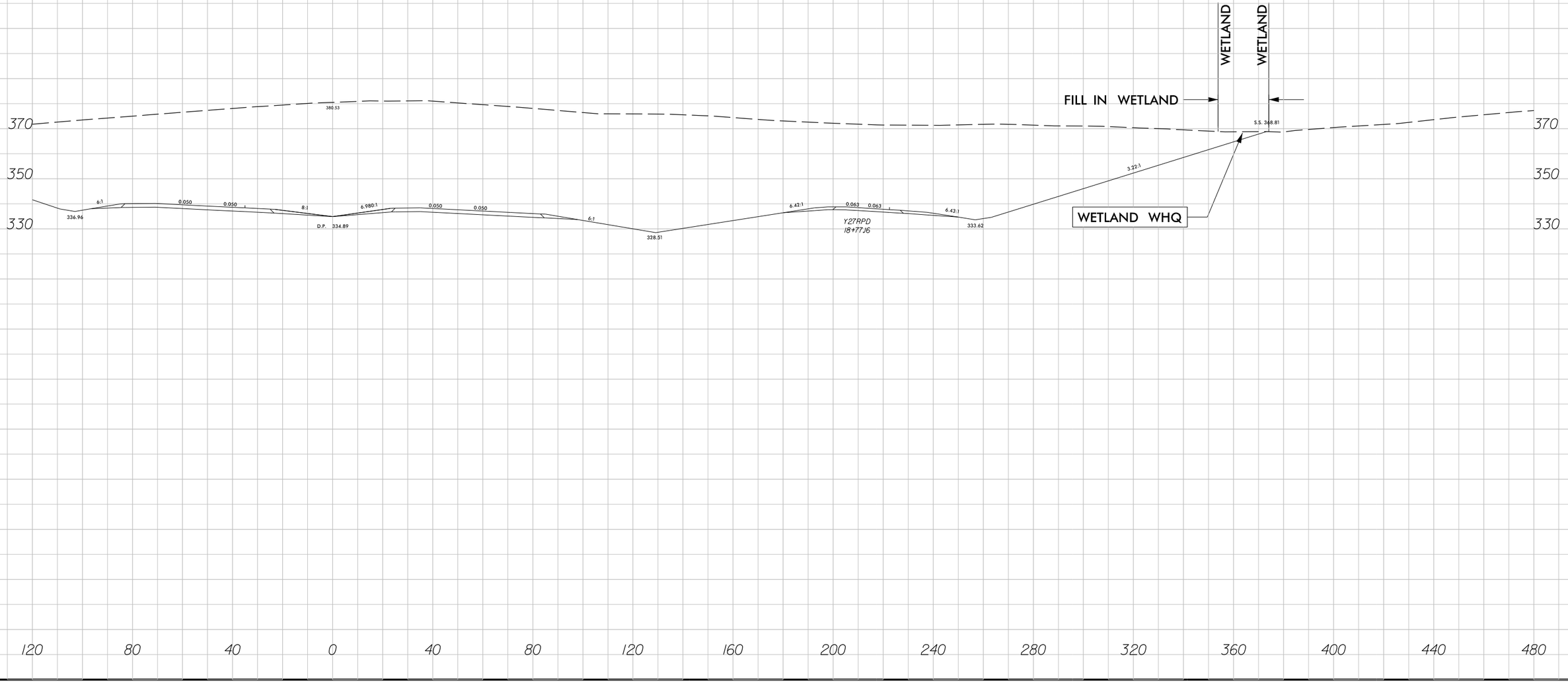
7/30/2018
R2829_hyd_prm_wet_psh_19b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 46 OF 108

CROSS SECTION
SITE 31, WETLAND WHQ
STATION 1215+00 –L–



7/30/2018
R2829_hyd_prm_wet_psh_19c_xpl.dgn
jharvey

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 47 OF 108

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

SITE 32

WETLAND WHP

STREAM SGK

-L- TS Sta. 1243+41.83

-L- CS Sta. 1236+90.81

-L- ST Sta. 1240+05.81

N 55° 16' 30.9" E

1235+00 1240+00 1245+00

RUINS

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_21.dgn
jhunter

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

SITE 32

WETLAND WHP

STREAM SGK

-L- CS Sta. 1243+41.83

-L- CS Sta. 1236+90.81

-L- ST Sta. 1240+05.81

1235+00

1240+00

1245+00

N 55° 16' 30.9" E

50' 25' 0 50' 100'

SCALE: 1" = 100'

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	21

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 48 OF 108

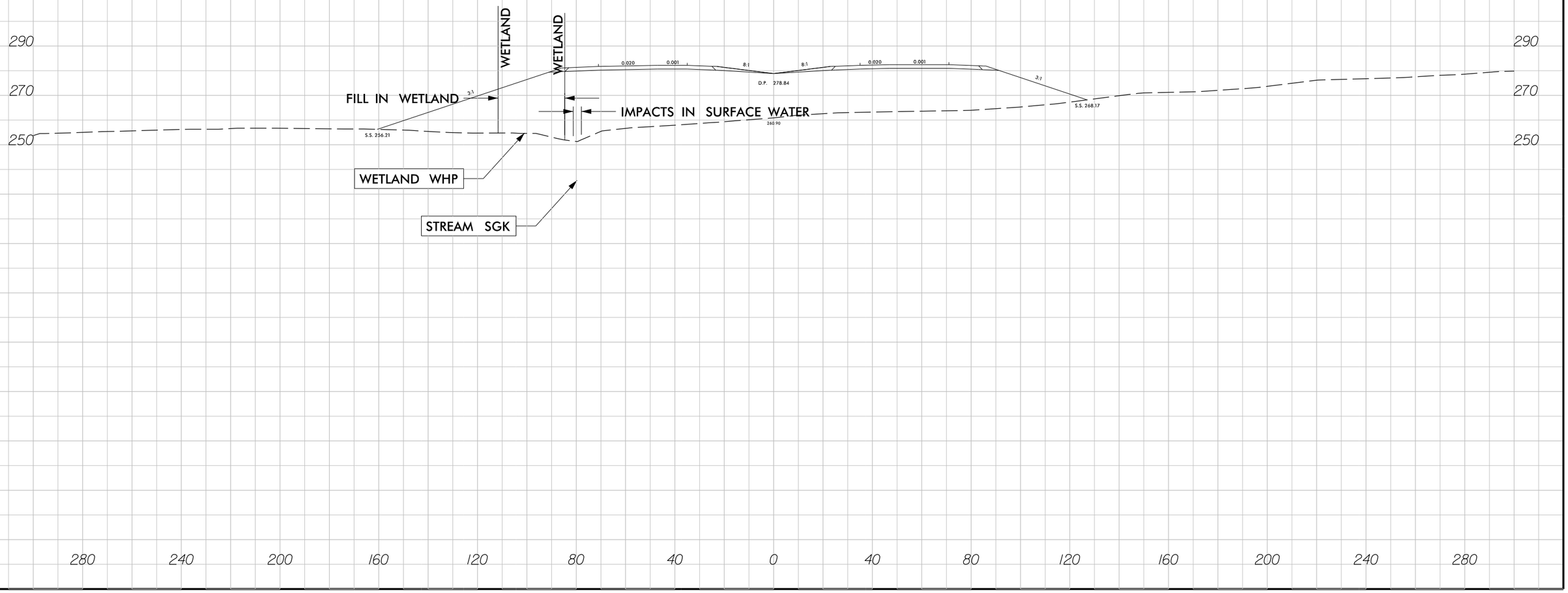
7/30/2018
R2829_hyd_prm_wet_psh_21a.dgn
jhardey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 49 OF 108

CROSS SECTION
SITE 23, WETLAND WHP
STATION 1243+50 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_21b_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	23

R/W SHEET NO.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 50 OF 108

1+61.97

-L- ST Sta. 1264+76.97

-L- POT Sta. 1276+05.27=
-Y28- POC Sta. 33+47.93
Δ=63° 12' 45.3"

SITE 33

WETLAND WIC

STREAM SGO

UNION B&T CO

LONG FARM BRANCH LLC

1265+00

1270+00

1275

SOIL

ISFD

RAS, GEORGE L

BANK OF HAMPTON ROADS THE

PAVEMENT REMOVAL
PAVED SHOULDER

7302018
R2829_Hyd_prm_wet_pth_23.dgn
jlpovey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 51 OF 108

1+61.97

-L- ST Sta. 1264+76.97

-L- POT Sta. 1276+05.27=
-Y28- POC Sta. 33+47.93
Δ=63° 12' 45.3"

SITE 33

WETLAND WIC

STREAM SGO

UNION B&T CO

LONG BRANCH FARM LLC

1265+00

1270+00

1275

ISFD

ISFD

RAS, GEORGE L

BANK OF HAMPTON ROADS THE

PAVEMENT REMOVAL
PAVED SHOULDER

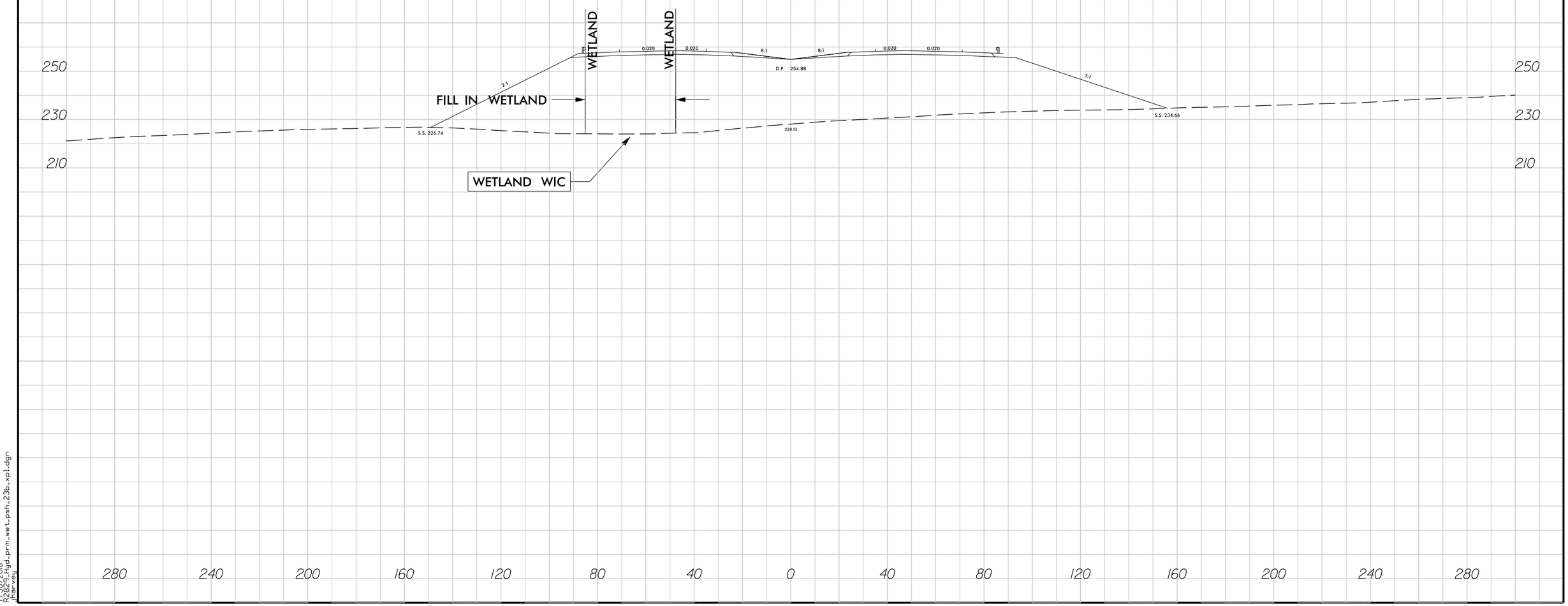
730208
R2829_hyd_prm_wet_psh_23a.dgn
lhorvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 52 OF 108

CROSS SECTION
SITE 33, WETLAND WIC
STATION 1269+00 -L-



7/30/2018
R2829_hyd_prm_wet_psh_23b_xpl.dgn
jharvey

51499

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 53 OF 108

1-7'X10' OVAL CMP

-Y28- PC Sta. 28+81.75

30+00 -Y28-

1280+00

N 34° 37' 28.0" E

1285+00

35+00 -Y28-

LONG BRANCH FARM LLC

WETLAND WIH

SITE 34

STREAM SGJ

SITE 35

SR 2552

-Y28- PCC Sta. 37+98.76

40+00 -Y28-

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL

PAVED SHOULDER

7/30/2018
R2829_hyd_prm_wet_psh_24.dgn
lhorvatz

51499

50′ 25′ 0 50′ 100′

SCALE: 1″ = 100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	24

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 54 OF 108

-Y28- PC Sta. 28+81.75

1-7'X3' OVAL CMP

30+00 -Y28-

1280+00

W 34° 37' 28.0" E

1285+00

LONG BRANCH FARM LLC

35+00 -Y28-

WETLAND WIH

SITE 34

STREAM SGJ

SITE 35

SR 2552

-Y28- PCC Sta. 37+98.76

40+00 -Y28-

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL

PAVED SHOULDER

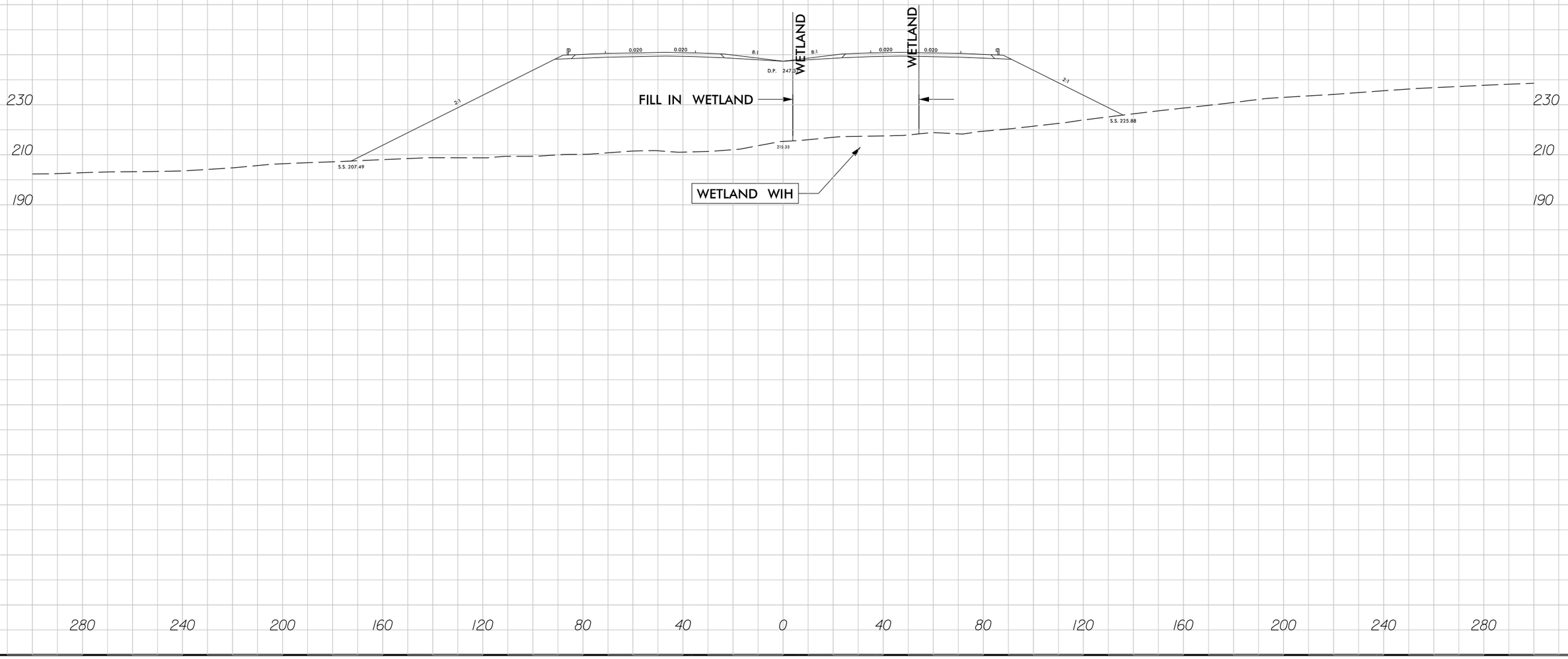
7/30/2018
R2829_hyd_prm_wet_psh_24x36.dgn
jhorvay

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 55 OF 108

CROSS SECTION
SITE 34, WETLAND WIH
STATION 1277+00 -L-



7/30/2018
R2829_Hyd_prm_wet_psh_24b_xpl.dgn
jharvey

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 56 OF 108

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

SITE 36
WETLAND WIP
STREAM SGR
WETLAND WIQ
SITE 38
WETLAND WIR
STREAM SGT
SITE 38A
SITE 37

-Y28A- PRC Sta. 14+31.54
-Y28A- PC Sta. 15+48.82
-Y28A- PC Sta. 17+46.64
-Y28A- PC Sta. 22+30.24
-Y28A- PT Sta. 19+08.15
S 12° 50' 42.0" W
1320+00
1325+00
25+00 -Y28A-
20+00 -Y28A-
NEUSE RIVER

PAVEMENT REMOVAL
PAVED SHOULDER

7302018
R2829_Hyd_pmt_wet_pth_27.dgn
jlgoyer

51499

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 57 OF 108

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

SITE 36

WETLAND WIP

STREAM SGR

WETLAND WIQ

SITE 38

WETLAND WIR

STREAM SGT

SITE 38A

SITE 37

-Y28A- PRC Sta. 14+31.54

-Y28A- PC Sta. 15+48.82

-Y28A- PC Sta. 17+46.64

-Y28A- PC Sta. 22+30.24

-Y28A- PT Sta. 19+08.15

S 12° 50' 42.0" W

NEUSE RIVER

15+00 -Y28A-

1320+00

1325+00

25+00 -Y28A-

20+00 -Y28A-

PAVEMENT REMOVAL
PAVED SHOULDER

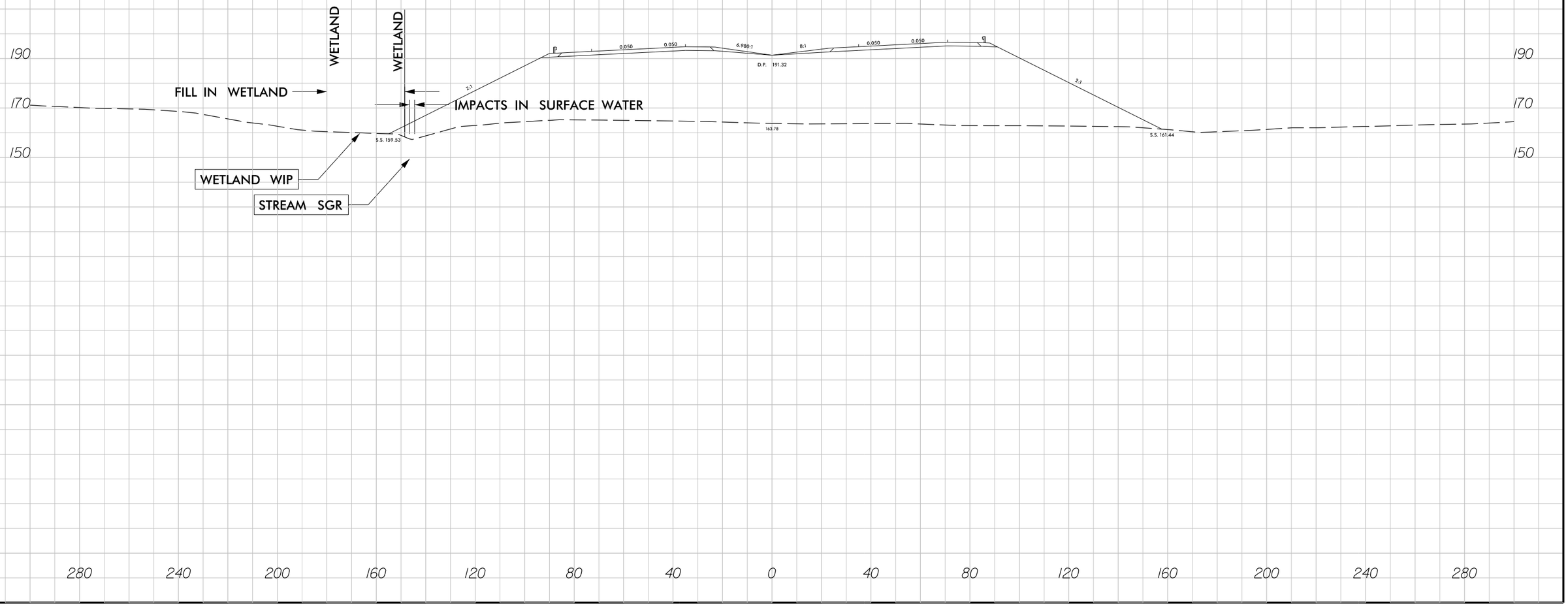
7302018
R2829_hyd_prm_wet_psh_27a.dgn
jlpovey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 58 OF 108

CROSS SECTION
SITE 36, WETLAND WIP
STATION 1315+50 –L–



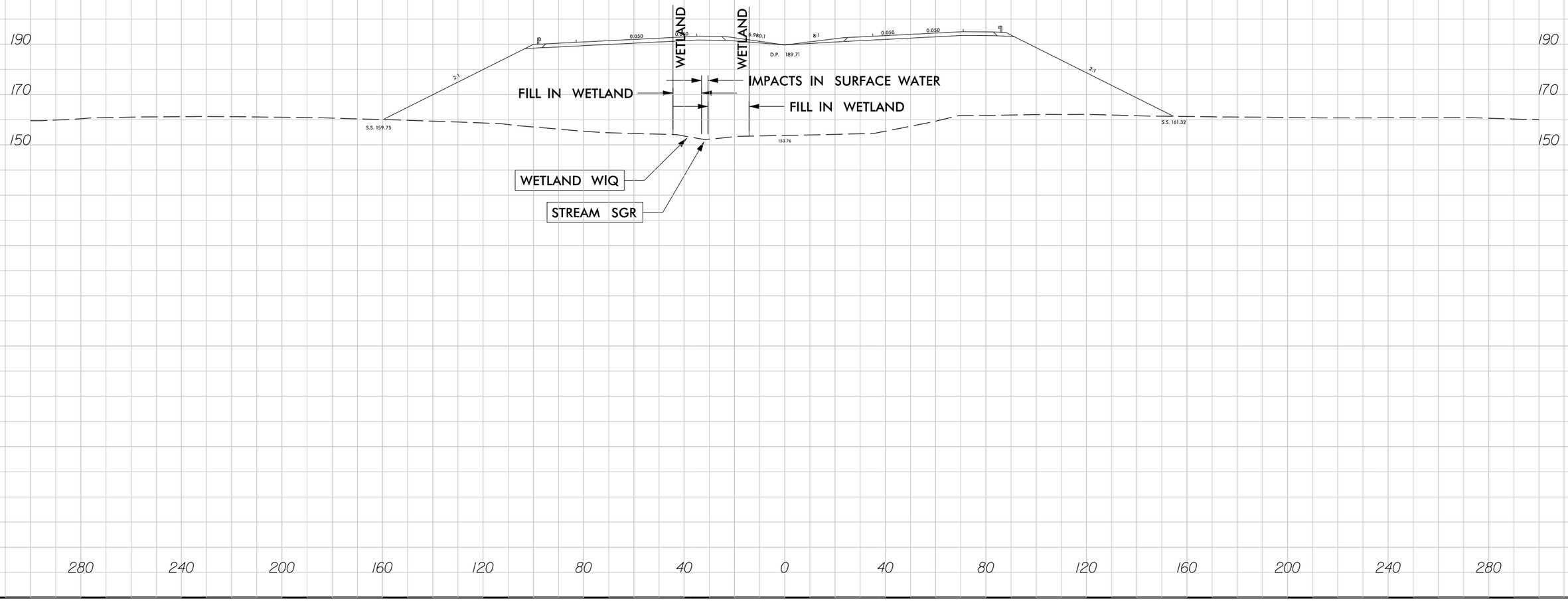
7/30/2018
R2829_Hyd_prm_wet_psh_27b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 59 OF 108

CROSS SECTION
SITE 37, WETLAND WIQ
STATION 1318+50 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_27c_xpl.dgn
jharvey

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
7600 ROLEX ROAD, SUITE 202
RALEIGH, NC 27615
NC License Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 60 OF 108

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER

SITE 41
SITE 42
SITE 39
SITE 40

WETLAND WIU
WETLAND WIV
WETLAND WIW
WETLAND WIX

STREAM SGU
STREAM SGV

-Y29RPA- SC Sta. 26+08.08
-Y29RPA- SRS Sta. 24+08.08
-Y29RPA- CS Sta. 22+08.08
-Y29RPA- TS Sta. 16+00.00
-Y29RPA- TS Sta. 14+00.00
-Y29- POT Sta. 26+61.59=
-Y29RPA- POT Sta. 30+08.72
-Y29- POT Sta. 26+91.59=
-Y29LPA- POT Sta. 21+03.14
-Y29LPA- CS Sta. 17+26.06
-Y29LPA- SRS Sta. 19+76.06
-Y29LPA- TS Sta. 10+00.00
-Y29LPA- SC Sta. 12+50.00
-L- CS Sta. 1333+02.30
-L- POT Sta. 1338+72.59=
-L- POT Sta. 1339+14.19=
-Y29LPD- TS Sta. 10+00.00
-L- POT Sta. 1337+67.43=
-Y29- POT Sta. 32+41.75
△=87° 20' 14.8"
-Y29- PC Sta. 35+24.07
-Y29- PT Sta. 37+09.67
-Y29- POT Sta. 38+51.06=
-Y29LPD- POT Sta. 20+47.32
-Y29- POT Sta. 38+81.10=
-Y29RPD- POT Sta. 29+37.87
-Y29B- POT Sta. 10+00.00
-Y29RPD- SC Sta. 25+82.82
-Y29RPD- PT Sta. 27+84.07
-Y29RPD- CS Sta. 21+82.82
-Y29RPD- SRS Sta. 23+82.82
-Y29RPD- SC Sta. 12

S 8° 33' 50.7" E
S 79° 36' 39.3" E
N 7° 41' 35.4" E
S 3° 34' 35.4" E
S 20° 07' 97.3" E
S 20° 07' 17.3" E

GLOVER, WALLACE EDWARD JR
BAKER, TED PRESTON
BAKER, GERALDINE C
BAILEY, BARRY BAILEY, SUE
BILLY ADAMS FARMS INC
BURCHETTE, ARBARA JR
RAYNOR, BOBBY C
MARGARET

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
7600 RALEIGH PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 61 OF 108

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

SITE 41
SITE 42
SITE 39
SITE 40

WETLAND WIU
WETLAND WIV
WETLAND WIW
WETLAND WIX

STREAM SGU
STREAM SGV

-Y29RPA- SC Sta. 26+08.08
-Y29RPA- SRS Sta. 24+08.08
-Y29RPA- CS Sta. 22+08.08
-Y29RPA- TS Sta. 16+00.00
-Y29RPA- TS Sta. 14+00.00

-Y29- POT Sta. 26+61.58=
-Y29RPA- POT Sta. 30+08.72

-Y29- POT Sta. 26+91.59=
-Y29LPA- POT Sta. 21+03.14

-Y29LPA- CS Sta. 19+76.06
-Y29LPA- CS Sta. 17+26.06
-Y29LPA- SC Sta. 12+50.00
-Y29LPA- TS Sta. 10+00.00
-Y29- POT Sta. 1338+72.59=

-L- CS Sta. 1333+02.30

-L- POT Sta. 1339+14.19=
-Y29LPD- TS Sta. 10+00.00
71.00' Rt.

-L- POT Sta. 1337+67.43=
-Y29- POT Sta. 32+41.75
Δ=81° 20' 14.8"
-Y29- PC Sta. 35+24.07

-Y29LPD- SC Sta. 12+50.00
-Y29LPD- CS Sta. 16+72.88
-Y29LPD- SRS Sta. 19+22.88

-Y29RPD- CS Sta. 21+82.82
-Y29RPD- SRS Sta. 23+82.82
-Y29RPD- SC Sta. 25+82.82
-Y29RPD- PT Sta. 27+84.07

-Y29- PT Sta. 37+09.67
-Y29- POT Sta. 38+51.06=
-Y29LPD- POT Sta. 20+47.32
-Y29- POT Sta. 38+81.10=
-Y29RPD- POT Sta. 29+37.87
-Y29B- POT Sta. 10+00.00

S 8° 33' 50.7" E
S 20° 07' 13" E
S 20° 07' 37.3" E
N 7° 41' 35.4" E
S 3° 34' 35.4" E

GLOVER WALLACE EDWARDS JR
BAKER, TED PRESTON BAKER, GENERAL DUKE C
BAILEY, BARRY BAILEY, SUE
RAYNOR, BOBBY C RAYNOR, MARGARET
BILLY ADAMS FARMS INC
BIRCHFIELD, BARBARA
BURCHE

1330+00 1335+00 1340+00 1345+00 1350+00 1355+00

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

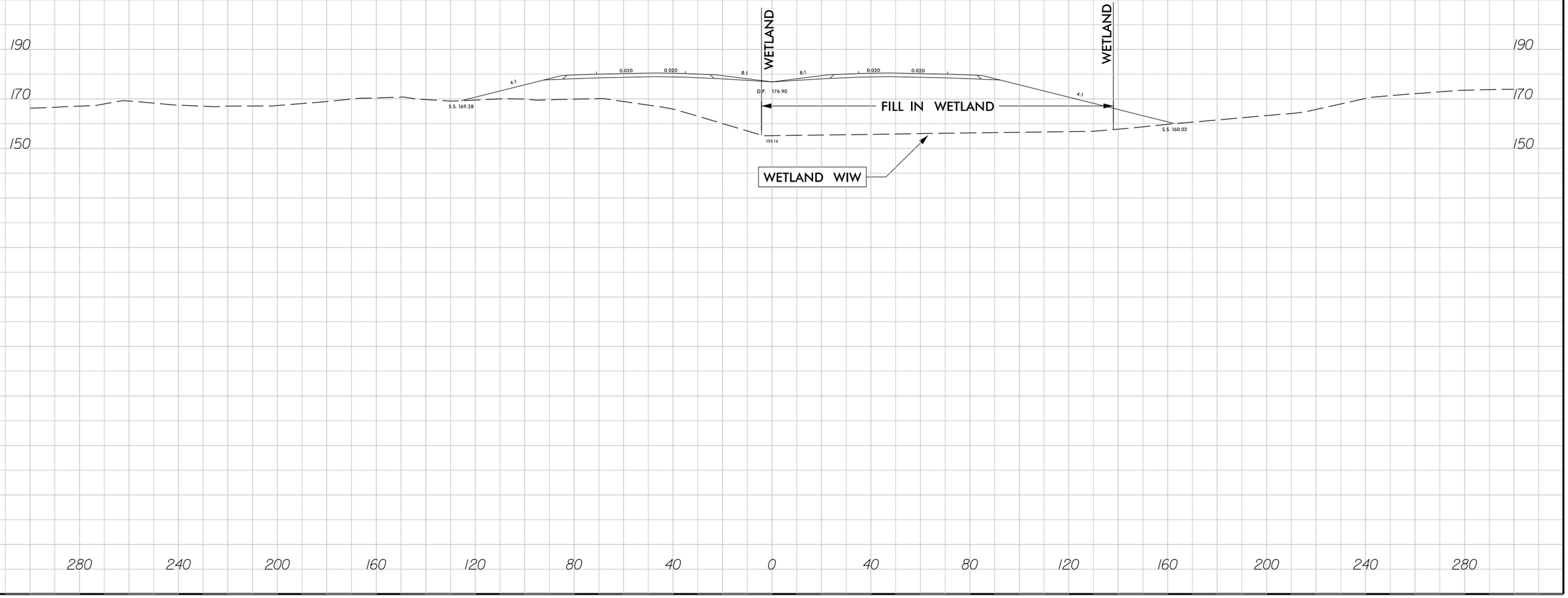
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 62 OF 108

CROSS SECTION
SITE 39, WETLAND WIW
STATION 1345+00 –L–



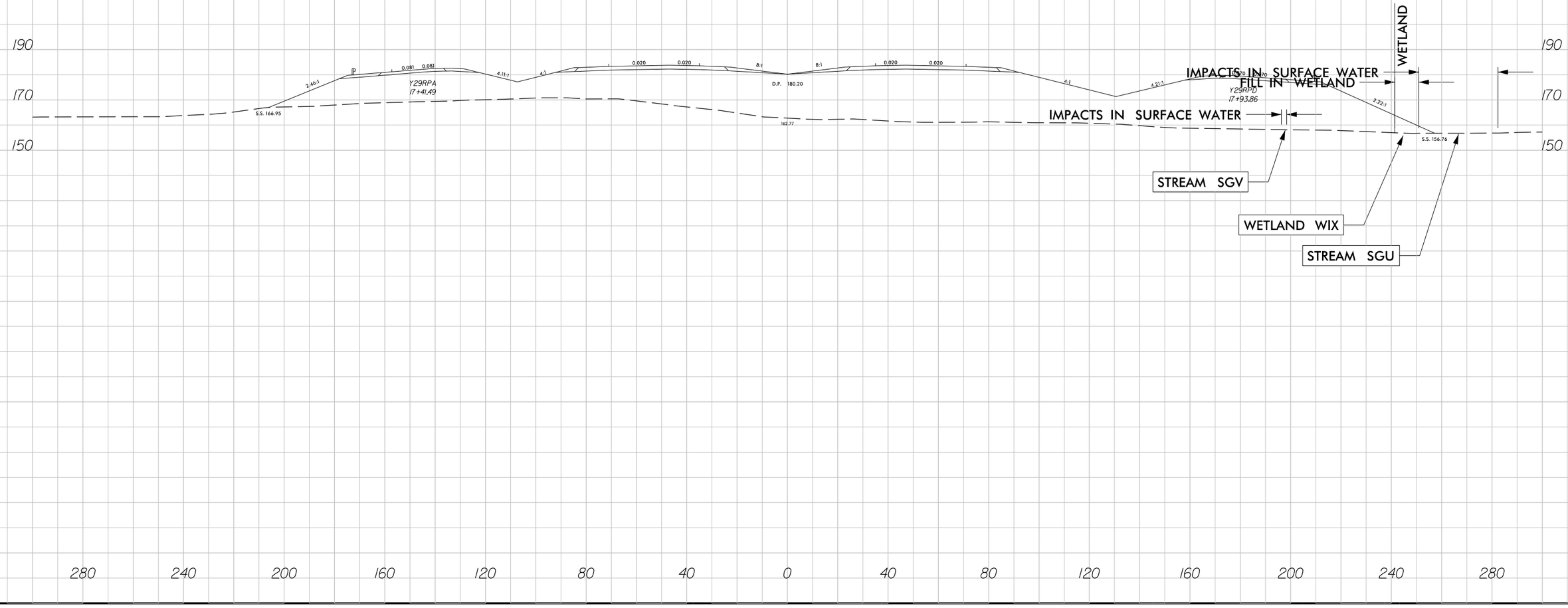
7/30/2018
R2829_Grd_prm_wet_psh_28b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 63 OF 108

CROSS SECTION
SITE 40, WETLAND WIX
STATION 1349+00 –L–



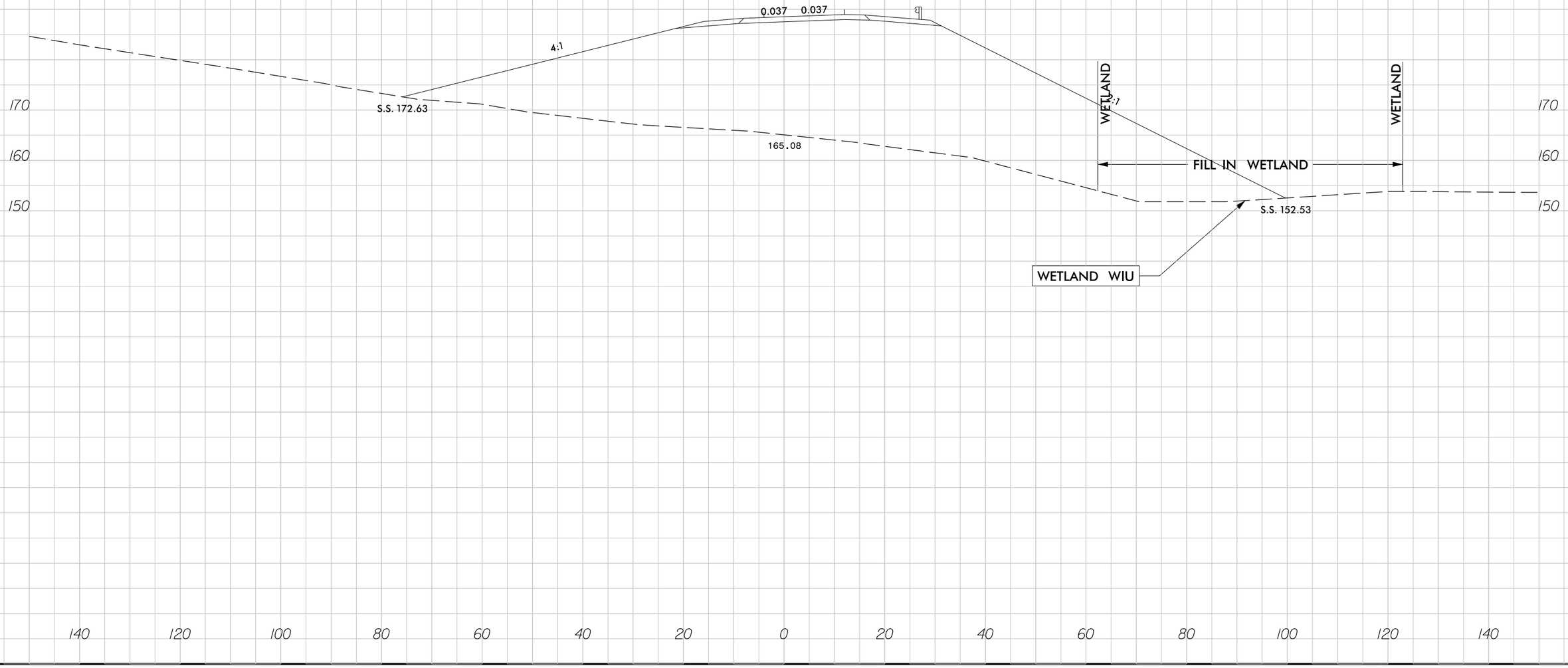
7/30/2018
R2829_hyd_prm_wet_psh_28c_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 64 OF 108

CROSS SECTION
SITE 41, WETLAND WIU
STATION 25+00 –Y29RPA–



7/30/2018
R2829_Hyd_prm_wet_psh_28d_xpl.dgn
jharvey

51499

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	30
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 65 OF 108

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

WETLAND WJA

SITE 44

STREAM SGY

WETLAND WIZ

POND PAI

WETLAND WIY

SITE 43

-Y29D- PC Sta. 13+17.88

-Y29D- PT Sta. 14+97.14

15+00 -Y29D-

1375+00

1380+00

N 82° 18' 24.6" E

N 7° 41' 35.4" W

-Y29E- POT Sta. 16+87.49=
-Y29D- POT Sta. 19+10.37

20+00 -Y29E-

-Y29E- PC

POWELL, JACOB L
POWELL, ANTHONY C

CRENSHAW, JOHN C
CRENSHAW, LAURIE L

PAVEMENT REMOVAL
PAVED SHOULDER

7302018
R2829_Hyd_prm_wet_psh_30.dgn
lhopez

51499

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	30

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 66 OF 108

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

-Y29D- PC Sta. 13+17.88

-Y29D- PT Sta. 14+97.14

15+00 -Y29D-

WETLAND WJA

SITE 44

STREAM SGY

WETLAND WIZ

1375+00

1380+00

N 7°41' 35.4" W

N 82°18' 24.6" E

-Y29E-

-Y29E- POT Sta. 16+87.49=
-Y29D- POT Sta. 19+10.37

WETLAND WIY

SITE 43

20+00
-Y29E-

POWELL, JACOB L
POWELL, ANTHONY C

CRENSHAW, JOHN
CRENSHAW, LAURIE L

POND PAI

-Y29E- PC

PAVEMENT REMOVAL
PAVED SHOULDER

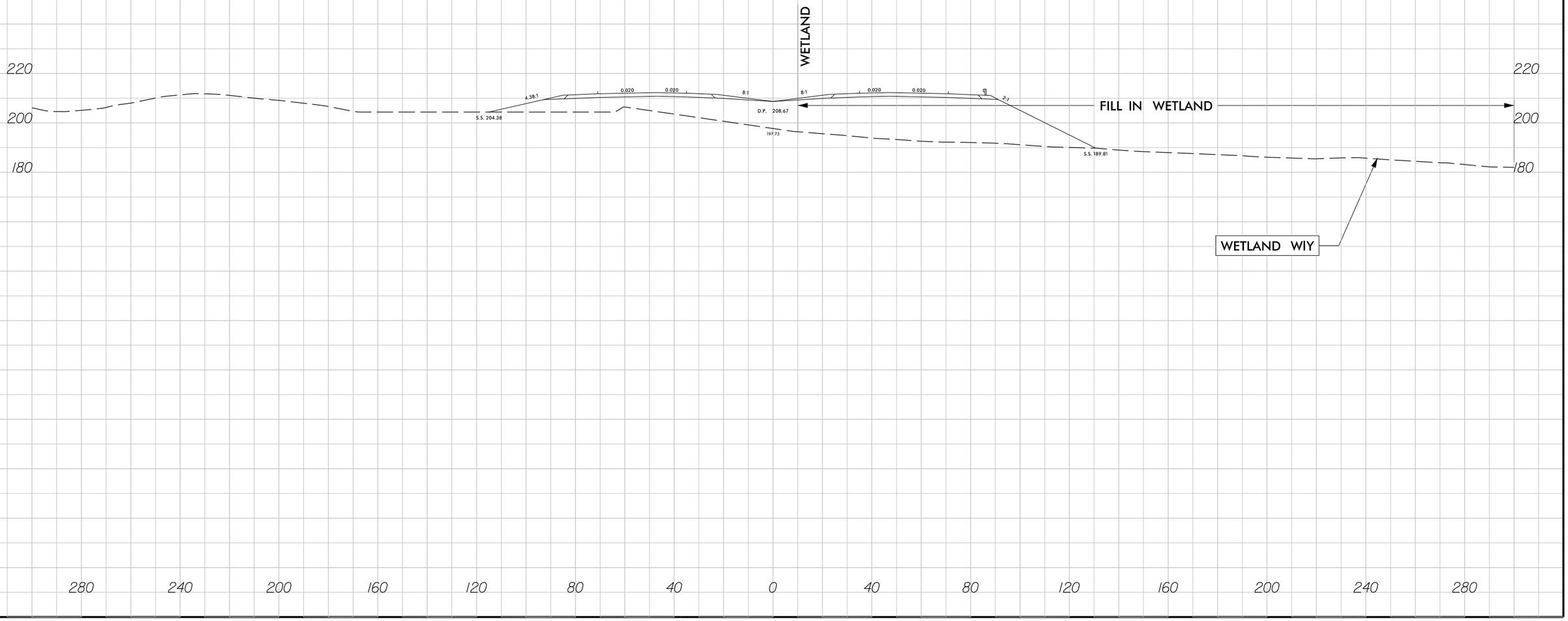
730208
R2829_hyd_prm_wet_psh_30a.dgn
lhopper

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 67 OF 108

CROSS SECTION
SITE 43, WETLAND WIY
STATION 1374+00 -L-



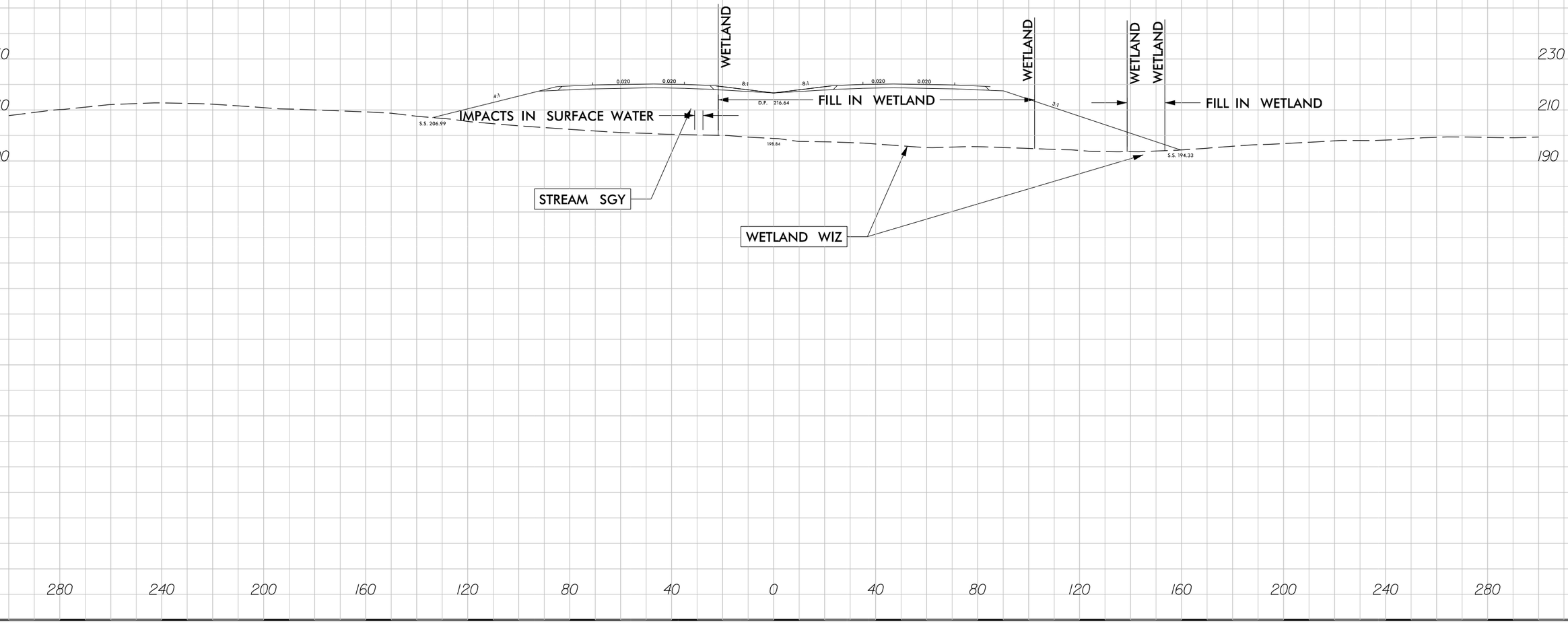
7/30/2018
R2829_hyd_prm_wet_psh_30b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 68 OF 108

CROSS SECTION
SITE 44, WETLAND WIZ
STATION 1381+00 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_30c_xpl.dgn
jharvey

51499

P P DENOTES IMPACTS IN SURFACE WATER (POND)

50′ 25′ 0 50′ 100′

SCALE: 1" = 100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 69 OF 108

POND PAK

SITE 45

7105.8

1385+00

1390+00

1395+00

HODGE ROAD LLC

)T Sta. 27+47.22

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_31.dgn
lbarzay

51499

P P DENOTES IMPACTS IN SURFACE WATER (POND)

50' 25' 0 50' 100'
SCALE: 1" = 100'

POND PAK

SITE 45

710' 8

1385+00 1390+00 1395+00

F C F C F C

HODGE ROAD L4C

)T Sta. 27+47.22

PAVEMENT REMOVAL
PAVED SHOULDER

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	31
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 70 OF 108

7/3/2018
R-2829_Hyd_prm_wet_psh_31a.dgn
jhorney

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

SCALE: 1" = 100'

PROJECT REFERENCE NO.	SHEET NO.
R-2829	32
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 71 OF 108

WETLAND WJD

SITE 46

STREAM SHA

-L- POT Sta. 1408+80.00 =
-Y30RPB- TS Sta. 10+00.00
74.00' LT

-L- POT Sta. 1406+67.38 =
-Y30RPC- POT Sta. 10+00.00
71.00' RT

-Y30RPC- PC Sta. 15+03.50

N 3° 35' 35.9" W

1400+00 1405+00 1410+00

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_hyd_prm_wet_psh_32.dgn
jhorney

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

SCALE: 1" = 100'

PROJECT REFERENCE NO.	SHEET NO.
R-2829	32
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 72 OF 108

WETLAND WJD

SITE 46

STREAM SHA

-L- POT Sta. 1408+80.00 =
-Y30RPB- TS Sta. 10+00.00
71.00' LT

-L- POT Sta. 1406+67.38 =
-Y30RPC- POT Sta. 10+00.00
71.00' RT

-Y30RPC- PC Sta. 15+03.50

1400+00

1405+00

1410+00

BRANCH PARK DR

SHALLOW WATER DR

20' BST

ALLEY WOODS MHP

10' GR

25FD

ISFD

HTR

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

PAVEMENT REMOVAL
PAVED SHOULDER

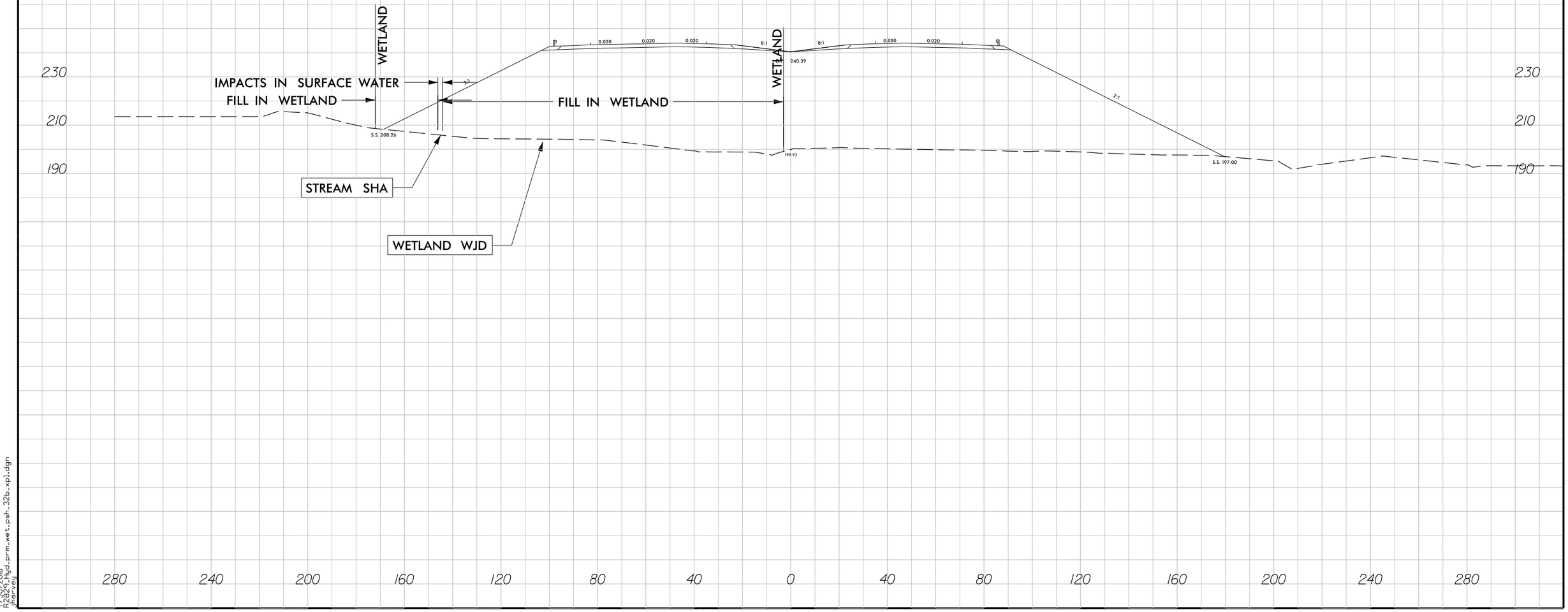
7302018
R2829_hyd_prm_wet_psh_32a.dgn
lhurvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 73 OF 108

CROSS SECTION
SITE 46, WETLAND WJD
STATION 1405+00 -L-



7/30/2018
R2829_Hyd_prm_wet_psh_32b_xpl.dgn
jharvey

REVISIONS

PERMIT DRAWING
SHEET 74 OF 108

LOCHNER
H. W. LOCHNER, INC.
7644 FALLS POINTE, SUITE 202
RALEIGH, NC 27612
NC License Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F F DENOTES FILL IN WETLAND
S S DENOTES IMPACTS IN SURFACE WATER
P P DENOTES IMPACTS IN SURFACE WATER (POND)

STREAM SHD
-Y30RPB- PT Sta. 29+53.06
-Y30RPB- SC Sta. 26+23.45
-Y30RPB- SRS Sta. 24+23.45
-Y30RPB- CS Sta. 22+23.45
-Y30RPB- 25+00
-Y30RPB- 20+00
-Y30RPB- 30+00
-Y30RPB- 15+00
SC Sta. 12+00.00
DONALD, MARY DWIGHT HEIRS
N 15° 21' 58.4" E
N 14° 40' 02.2" E
-Y30LPB- CS Sta. 20+45.14
-Y30LPB- ST Sta. 22+95.14
-Y30LPB- SRS Sta. 12+50.00
-Y30LPB- SC Sta. 15+00.00
-Y30LPB- 20+00
-Y30LPB- 15+00
SITE 49
B
-Y30- PT Sta. 24+60.04
-Y30- POT Sta. 24+33.88= -Y30RPB- POT Sta. 31+42.32
-Y30- POT Sta. 24+69.88= -Y30LPB- POT Sta. 23+49.05
-Y30- 25+00
-Y30- PC Sta. 26+52.17
-L- POC Sta. 1429+06.51= -Y30LPB- Sta. 10+06.00
71.00' LT
-L- SC Sta. 1423+38.40= -Y30- CS Sta. 29+41.63
Δ=101°40' 18.0"
-Y30- 30+00
-Y30- PT Sta. 30+38.14
WETLAND WJH
WETLAND WJI
SITE 48
SITE 47
-L- SC Sta. 1424+92.95
-L- TS Sta. 1421+27.95
STREAM SHD
N 3° 49' 50.0" W
S 3° 49' 50.9" E
WETLAND WJF
WETLAND WJG
-Y30RPC- PRC Sta. 23+36.34
-Y30RPC- PT Sta. 28+32.52
-Y30RPC- 20+00
-Y30RPC- 25+00
C
SITE 50
-Y30- POT Sta. 32+06.60= -Y30RPC- POT Sta. 30+04.65= -Y30RPD- POT Sta. 27+34.92
STREAM SHC
-Y30RPD- PT Sta. 25+84.92
-Y30RPD- SC Sta. 20+73.83
-Y30RPD- CS Sta. 18+73.83
-Y30RPD- 25+00
-Y30RPD- 20+00
-Y30RPD- 35+00
-Y30RPD- 15+00
D
SITE 51
STREAM SHC
OLD STONES MILL RD
SOUTHERN MANS DR
MINNANTS CREEK DR
PARADISE VALLEY
OLD FARM ST
ROCKY LN
BRODIE, ANDREW
RALEIGH RUGBY FOOTBALL CLUB INC
RUGBY FIELD
RUINS
DAM
CAN
HTR
SFD
BST
GR
RIPRAP
1420+00
1425+00
1430+00
1435+00
1440

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1"=100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

PERMIT DRAWING
SHEET 75 OF 108

LOCHNER
H. W. LOCHNER, INC.
7600 PEAKS TRACE, SUITE 202
RALEIGH, NC 27612
NC License Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

F / F DENOTES FILL IN WETLAND
S / S DENOTES IMPACTS IN SURFACE WATER
P / P DENOTES IMPACTS IN SURFACE WATER (POND)

STREAM SHD
-Y30RPB- PT Sta. 29+53.06
-Y30RPB- SC Sta. 26+23.45
-Y30RPB- SRS Sta. 24+23.45
-Y30RPB- CS Sta. 22+23.45
-Y30LPB- CS Sta. 20+45.14
-Y30LPB- ST Sta. 22+95.14
-Y30LPB- SRS Sta. 12+50.00
-Y30LPB- SC Sta. 15+00.00
SC Sta. 12+00.00
N 15° 27' 58" E
S 74° 02' 2" E
-Y30- PT Sta. 24+18.04
-Y30- POT Sta. 24+33.88=
-Y30RPB- POT Sta. 31+12.32
-Y30- POT Sta. 24+69.88=
-Y30LPB- POT Sta. 23+49.05
-Y30- PC Sta. 26+52.17
-Y30LPB- SRS Sta. 10+00.00
-Y30- SC Sta. 1427+38.40=
-Y30- CS Sta. 29+41.63
Δ=10° 40' 18.0"
-Y30- PT Sta. 30+38.14
-Y30RPD- PT Sta. 25+84.92
-Y30RPD- SC Sta. 20+73.83
-Y30RPD- CS Sta. 18+73.83
-Y30RPC- PRC Sta. 23+36.34
-Y30RPC- PT Sta. 28+32.52
-Y30- POT Sta. 32+06.60=
-Y30RPC- POT Sta. 30+04.65=
-Y30RPD- POT Sta. 27+34.92

SITE 47
SITE 48
SITE 49
SITE 50
SITE 51

WETLAND WJF
WETLAND WJG
WETLAND WJH
WETLAND WJI

STREAM SHD
STREAM SHC
STREAM SHC

B
C
D

PARADISE VALLEY RD
ROCK WALL
STONES MILL RD
MINNANTS CREEK DR
SOUTHERN LIVING DR
BRODIE ANDREW
RALEIGH RUGBY FOOTBALL CLUB INC
RUGBY FIELD
RUINS
RIPRAP
CAN
HTR
SPD
BST
GR
OHW

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

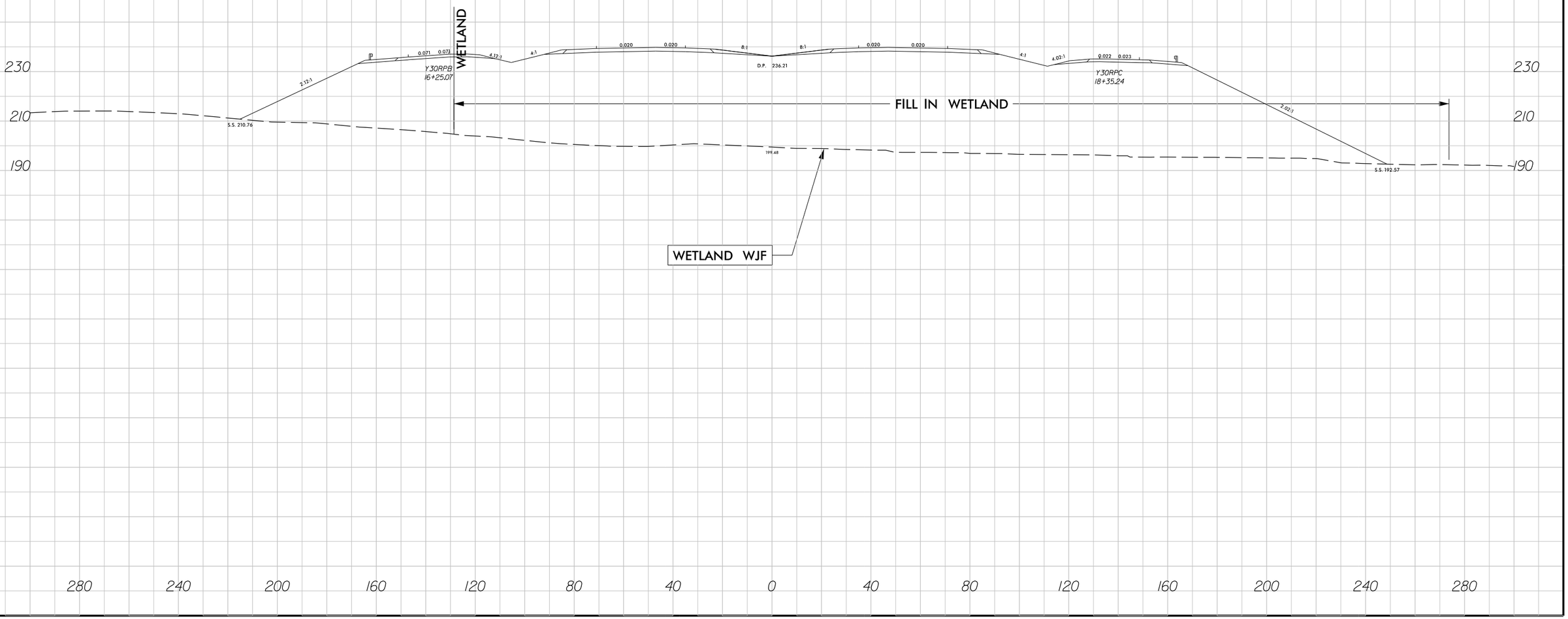
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 76 OF 108

CROSS SECTION
SITE 47, WETLAND WJF
STATION 1415+00 –L–



WETLAND WJF

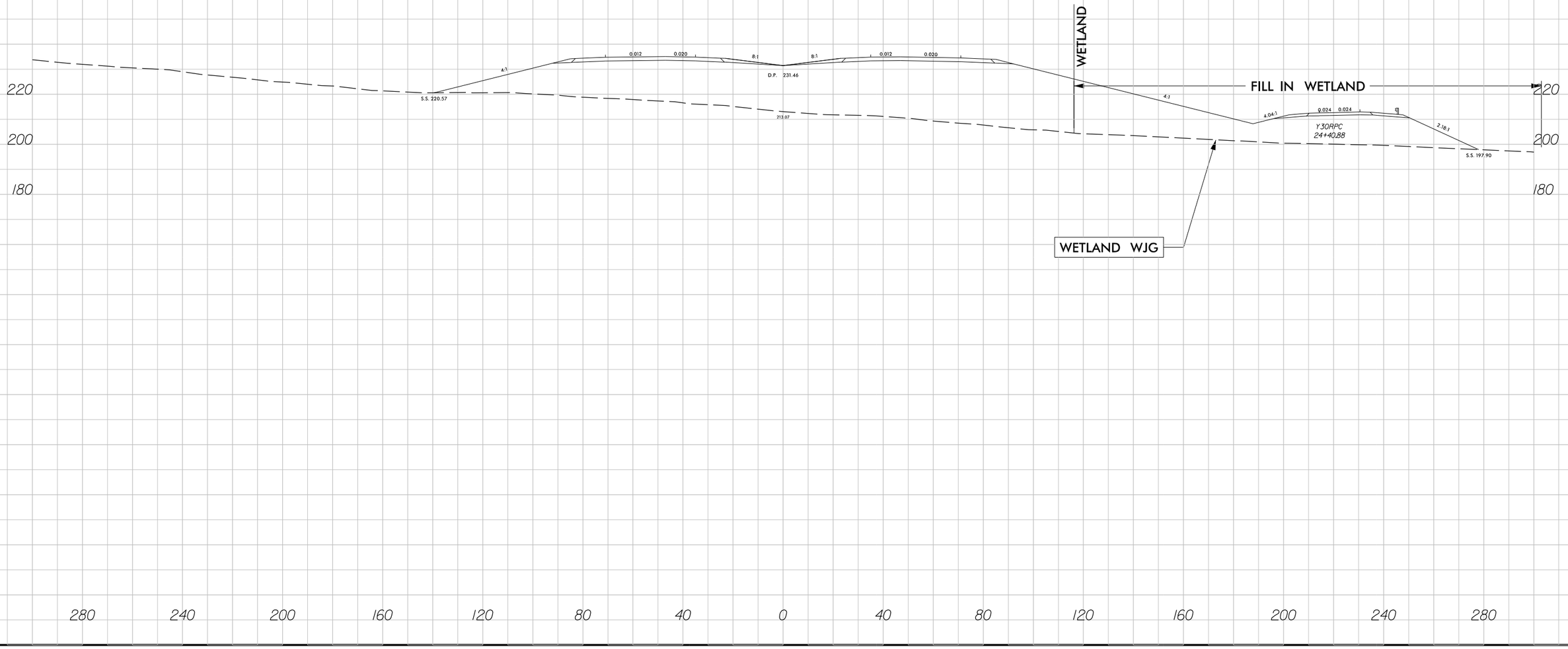
7/30/2018
R2829_hyd_prm_wet_psh_33b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 77 OF 108

CROSS SECTION
SITE 48, WETLAND WJG
STATION 1421+00 –L–



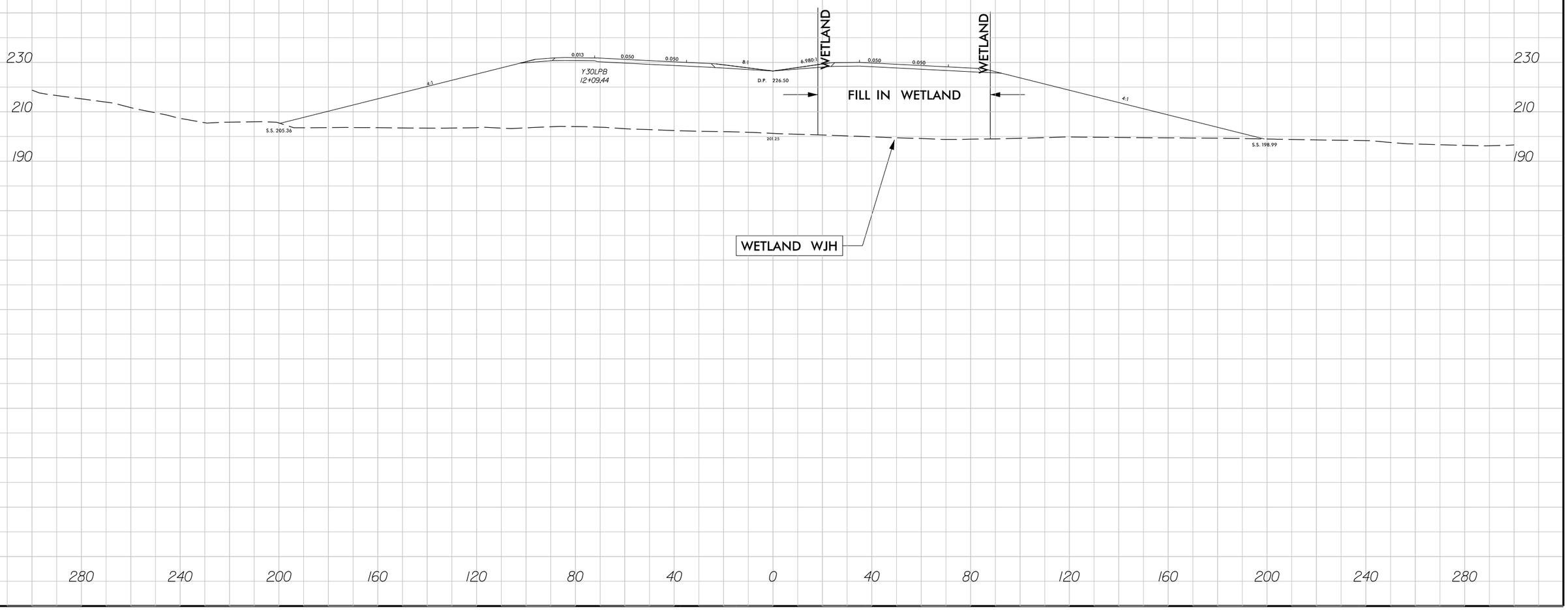
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R2829_Hyd_prm_wet_psh_33c_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 78 OF 108

CROSS SECTION
SITE 49, WETLAND WJH
STATION 1427+00 –L–



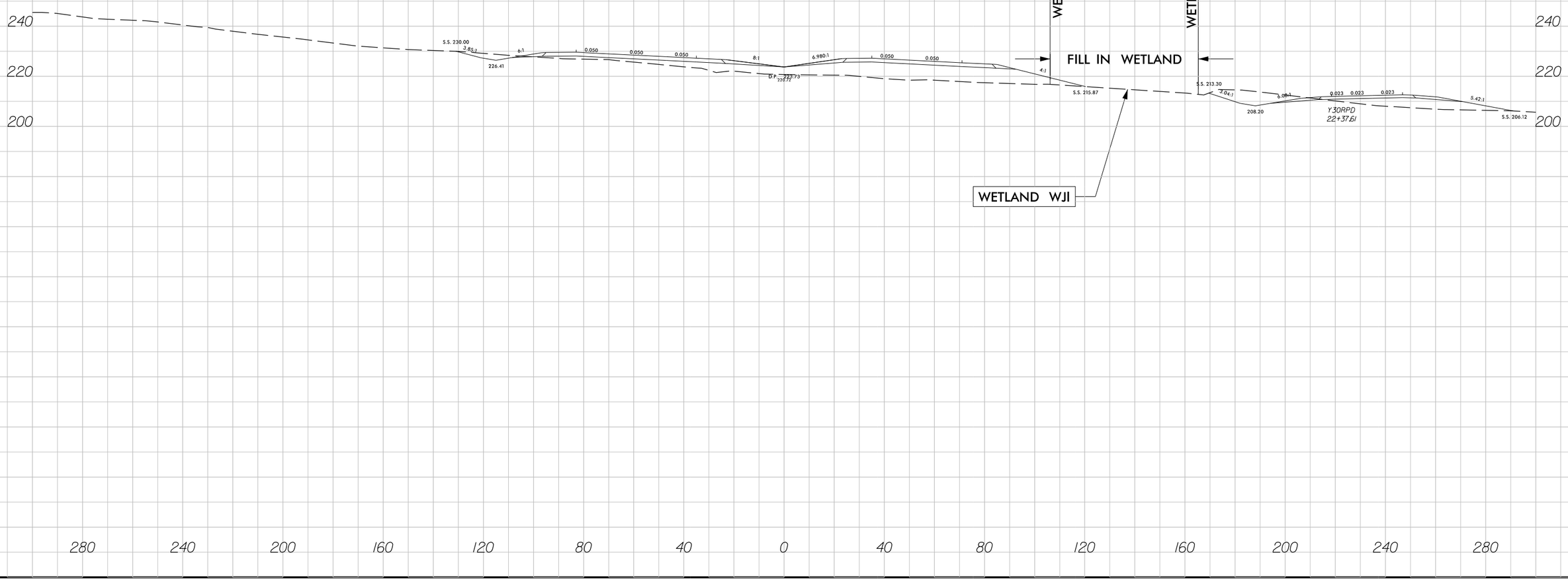
7/30/2018
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jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 79 OF 108

CROSS SECTION
SITE 51, WETLAND WJI
STATION 1432+00 –L–



7/30/2018
R2829_Hyd_prm_wet_psh_33e_xpl.dgn
jharvey

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROZZ, PLACE, SUITE 202
RALEIGH, NC 27613
NC License Number P-0750

PROJECT REFERENCE NO.	SHEET NO.
R-2829	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 80 OF 108

SITE 54
STREAM SHH
WETLAND WJJ(1)
SITE 53
WETLAND WJK
SITE 52
WETLAND WJJ(1)
SITE 55
WETLAND WJJ(2)
STREAM SHH
WETLAND WJJ(1)
STREAM SHC
DOGWOOD OWNER LLC
B
C
-Y3IRPDB- PT Sta. 19+80.76
-Y3IRPDB- POT Sta. 64+50.85
-Y3IRPDB- CS Sta. 59+18.33
-Y3IRPDB- SC Sta. 61+16.33
-Y3IRPDB- ST Sta. 63+15.76
-Y3IRPDB- POT Sta. 10+00.00
-Y3IRPDB- PC Sta. 11+95.99
-Y3IRPDB- PT Sta. 14+40.28
-Y3IRPDB- PC Sta. 15+96.74
-Y3IRPDB- PT Sta. 22+90.23
-Y3IRPDB- CS Sta. 32+93.06
-Y3IRPDB- SC Sta. 35+00.00
-Y3IRPDB- ST Sta. 36+15.76
-Y3IRPDB- PC Sta. 55+00.00
-Y3IRPDB- PT Sta. 60+00.00
-Y3IRPDB- PC Sta. 80+00.00
-Y3IRPDB- PT Sta. 85+00.00
-Y3IRPDB- PC Sta. 150+00.00
-Y3IRPDB- PT Sta. 153+00.00
-L- SC Sta. 1461+02.18
-L- CS Sta. 1452+62.18
-L- SRS Sta. 1456+22.18
-L- POC Sta. 1461+02.18=
-Y3IRPC- POT Sta. 10+00.00
65.53' RT
-Y3IRPC- CS Sta. 15+74.59
-Y3IRPC- SC Sta. 17+99.59
-Y3IRPC- PCC Sta. 147+59.
1540 EBL
N 6° 08' 21.3" E
N 24° 09' 34.4" E
S 68° 14' 43" E
S 17° 20' 25.8" W
N 20° 46' 22.6" E
1460+00
1465+00
1470+00
1475+00
1480+00
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
PAVED SHOULDER
PAVEMENT REMOVAL
GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROZZ, PLACE, SUITE 202
RALEIGH, NC 27613
NC License Number P-0750

PROJECT REFERENCE NO.	SHEET NO.
R-2829	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 81 OF 108

SITE 54
STREAM SHH
WETLAND WJJ(1)
SITE 53
WETLAND WJK
SITE 52
WETLAND WJJ(1)
SITE 55
WETLAND WJJ(2)
STREAM SHH
WETLAND WJJ(1)
STREAM SHC
DOGWOOD OWNER LLC
B
C
-Y3A- PC Sta. 11+00.00
-Y3A- PT Sta. 19+80.76
-Y3A- PC Sta. 11+95.99
-Y3A- PT Sta. 14+40.28
-Y3A- PC Sta. 15+26.34
-Y3A- PC Sta. 22+90.23
-Y3RPDB- POT Sta. 6+50.85
-Y3RPDB- CS Sta. 32+93.06
-Y3RPDB- Sta. 30+88.15
-Y3RPDB- Sta. 35+00.00
-Y3RPDB- Sta. 20+00.00
-Y3RPDB- Sta. 55+00.00
-Y3RPDB- Sta. 25+00.00
-Y3RPDB- Sta. 66+00.00
-Y3RPDB- Sta. 15+00.00
-Y3RPDB- Sta. 80+00.00
-Y3RPC- CS Sta. 59+18.33
-Y3RPC- Sta. 16.33
-Y3RPC- Sta. 15+74.59
-Y3RPC- Sta. 17+99.59
-L- SC Sta. 1461+02.18
-L- CS Sta. 1452+62.18
-L- SRS Sta. 1456+22.18
-L- POC Sta. 1461+02.18= -Y3RPC- POT Sta. 10+00.00
65.53' RT
-L- PC Sta. 1471+59.00
-L- Sta. 1460+00.00
-L- Sta. 1465+00
-L- Sta. 1470+00
1540 EBL
RUINS
HTR
ISFD
FLAGPOLE
N 6° 08' 21.3" E
S 17° 20' 25.8" W
N 24° 09' 34.4" E
S 68° 14' 14.2" E
N 20° 46' 22.6" E

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

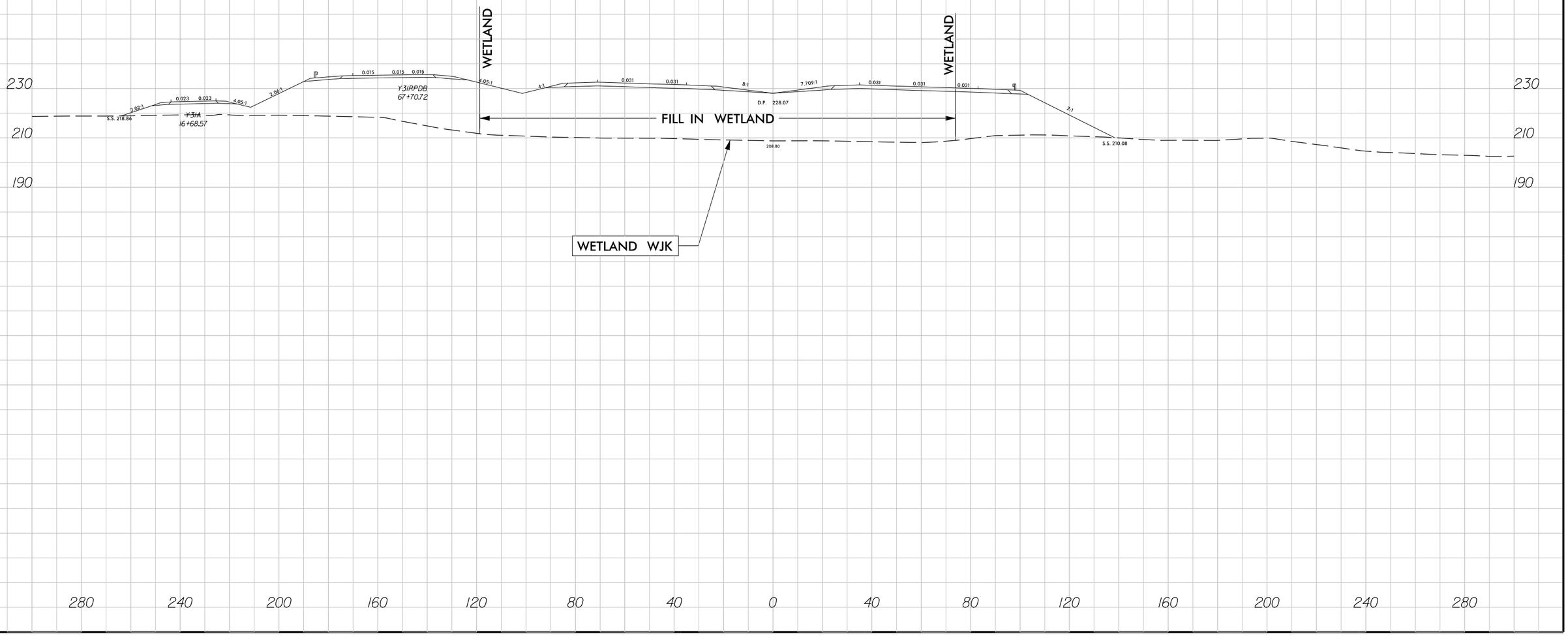
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 82 OF 108

CROSS SECTION
SITE 52, WETLAND WJK
STATION 1454+00 –L–



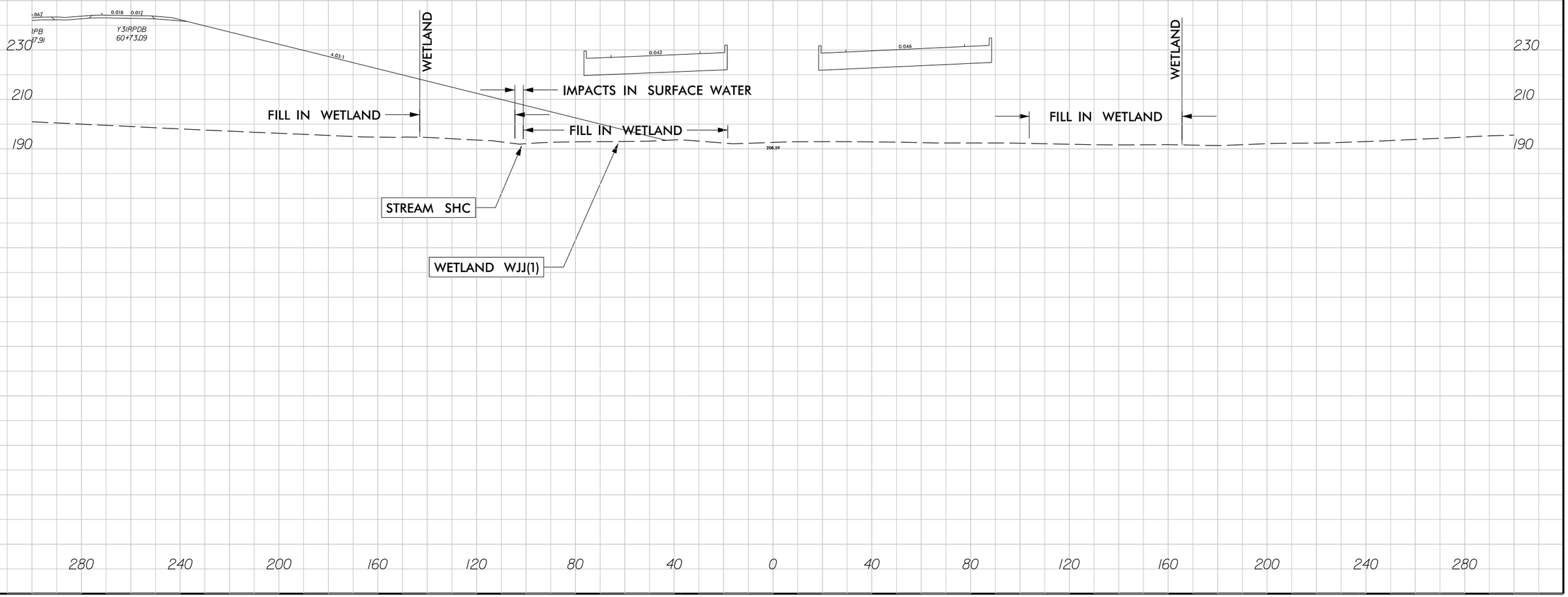
7/30/2018
R2829_Hyd_prm_wet_psh_35b_xpl.dgn
jharvey

6/23/16

PROJ. REFERENCE NO.	SHEET NO.
R-2829	

PERMIT DRAWING
SHEET 83 OF 108

CROSS SECTION
SITE 53, WETLAND WJJ(1)
STATION 1461+00 –L–



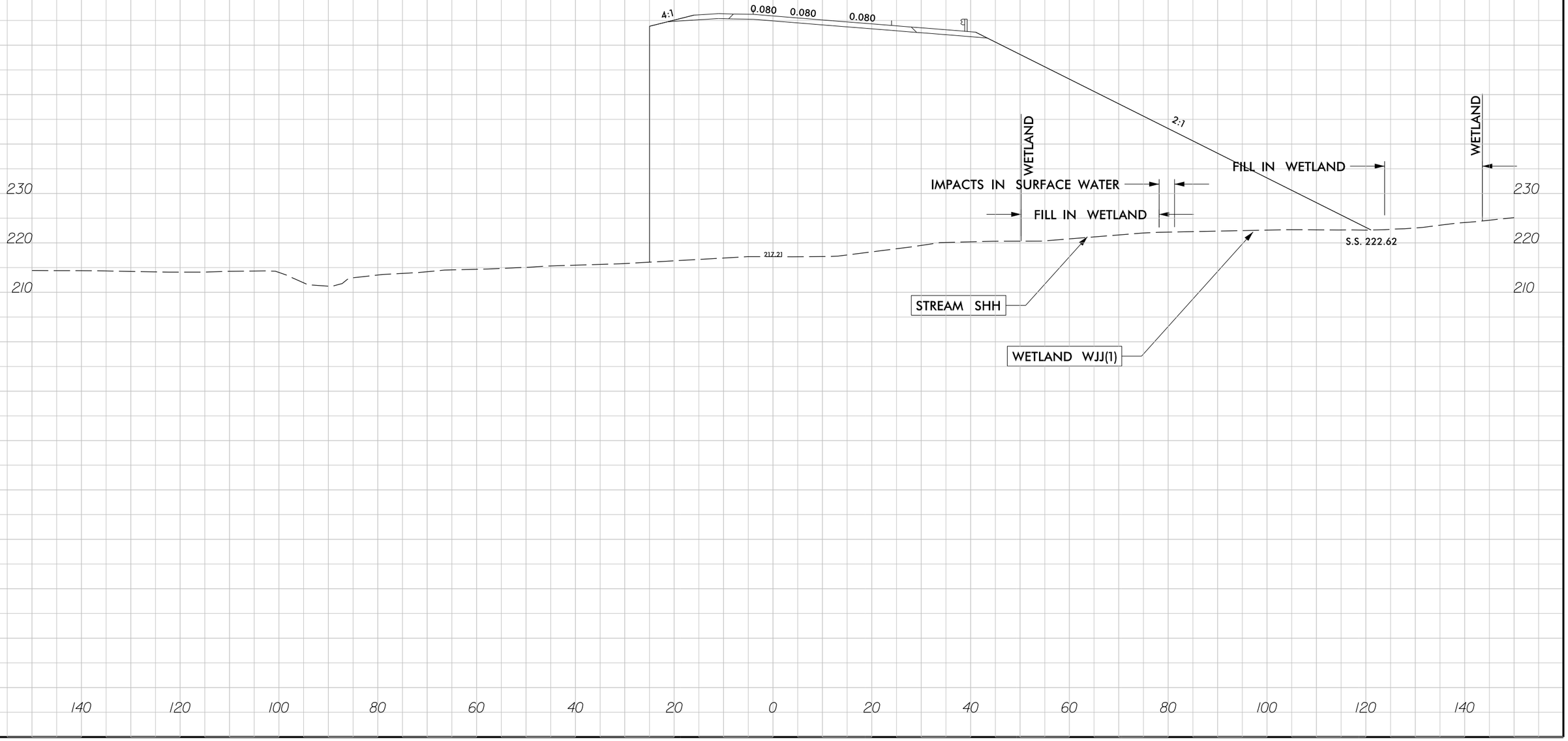
7/30/2018
R2829_hyd_prm_wet_psh_35c_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 84 OF 108

CROSS SECTION
SITE 54, WETLAND WJJ(1)
STATION 25+00 –Y31RPB–



7/30/2018
R2829_Hyd_prm_wet_psh_35d_xpl.dgn
jharvey

REVISIONS

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER (POND)

SITE 55

SITE 56

SITE 57

SITE 58

SITE 59

POND PAM

WETLAND WJJ(2)

WETLAND WJX

WETLAND WJU

STREAM SHM

WETLAND WJT

PAVED SHOULDER

PAVEMENT REMOVAL

GRAPHIC SCALE

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
7600 PEAK DRIVE, SUITE 202
RALEIGH, NC 27615

NC license Number P-0559

PROJECT REFERENCE NO.	SHEET NO.
R-2721	36

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 85 OF 108

LOCATION:

TIP NO.: COUNTY:

DESIGNED BY:

CHECKED BY: DATE:

REVISIONS

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

P P DENOTES IMPACTS IN SURFACE WATER (POND)

SITE 55

SITE 56

SITE 57

SITE 58

SITE 59

POND PAM

WETLAND WJJ(2)

WETLAND WJX

WETLAND WJU

STREAM SHM

WETLAND WJT

WALL-VICKIE

GOWER, JO ANN
GOWER, JERRY

DREAM VALLEY DR

WALL, CHAD DOUGLAS

HALL, LINDA WALL TRUSTEE OF THE HALL, LINDA WALL FAMILY TRUST

SR 2515 OLD FAISON RD

OLD FAISON RD

US 64 WB

I 495 NBL US 64 WB 264 EBL 62' CONC

I 540 EBL 64' CONC

I 540 EBL 60' CONC

N 46° 39' 03" E

N 21° 48' 01" W

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1"=100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

LOCHNER
H. W. LOCHNER, INC.
7600 RALEIGH PLACE, SUITE 202
RALEIGH, NC 27612
NC license Number P-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2721	36
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

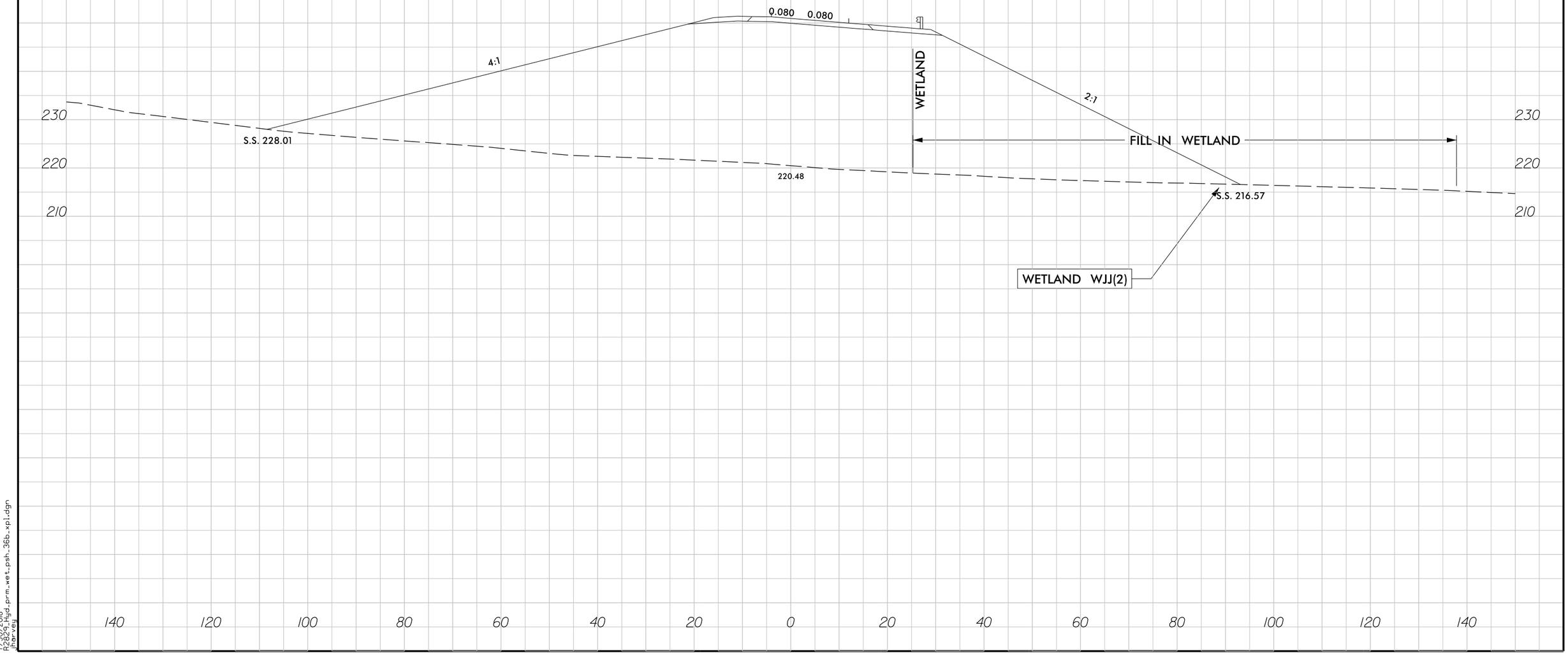
PERMIT DRAWING
SHEET 86 OF 108

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 87 OF 108

CROSS SECTION
SITE 55, WETLAND WJJ(2)
STATION 25+00 –Y31RPC–



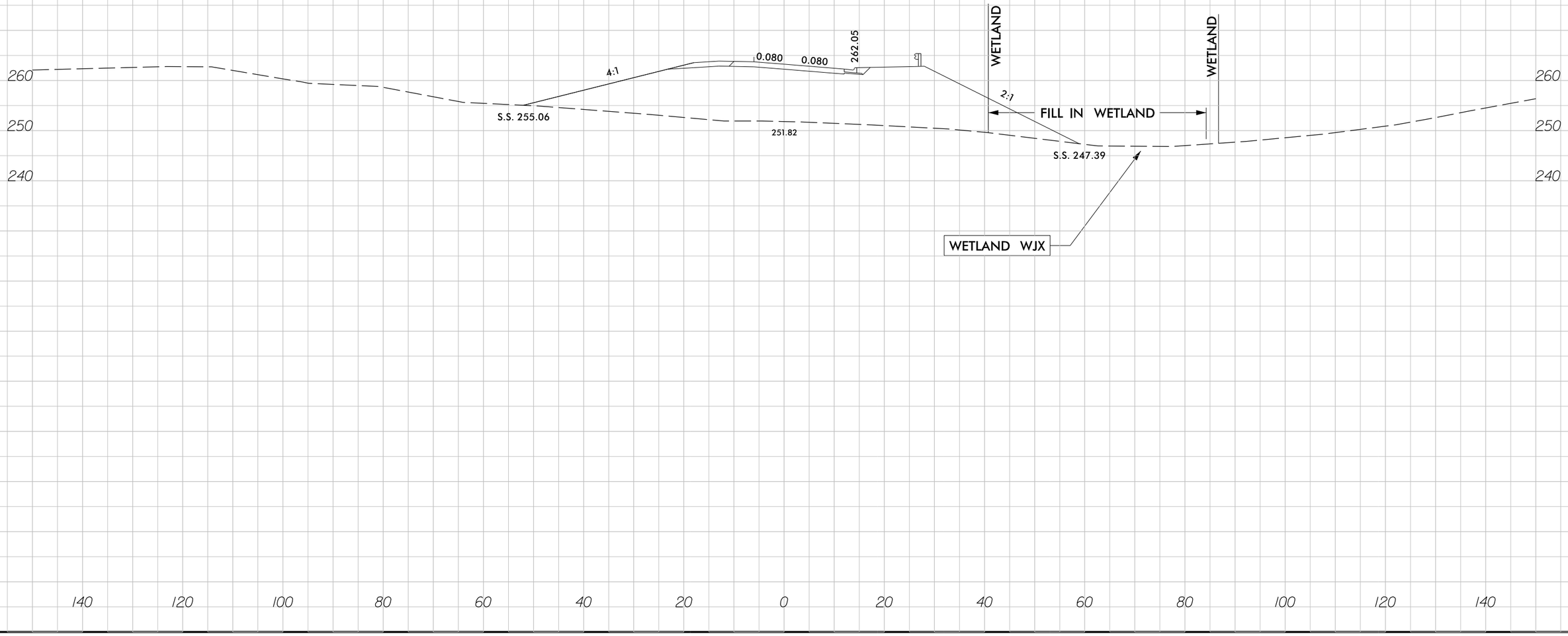
7/30/2018
R2829_lgd_prm_wet_psh_36b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 88 OF 108

CROSS SECTION
SITE 57, WETLAND WJX
STATION 19+50 –Y31LPD–



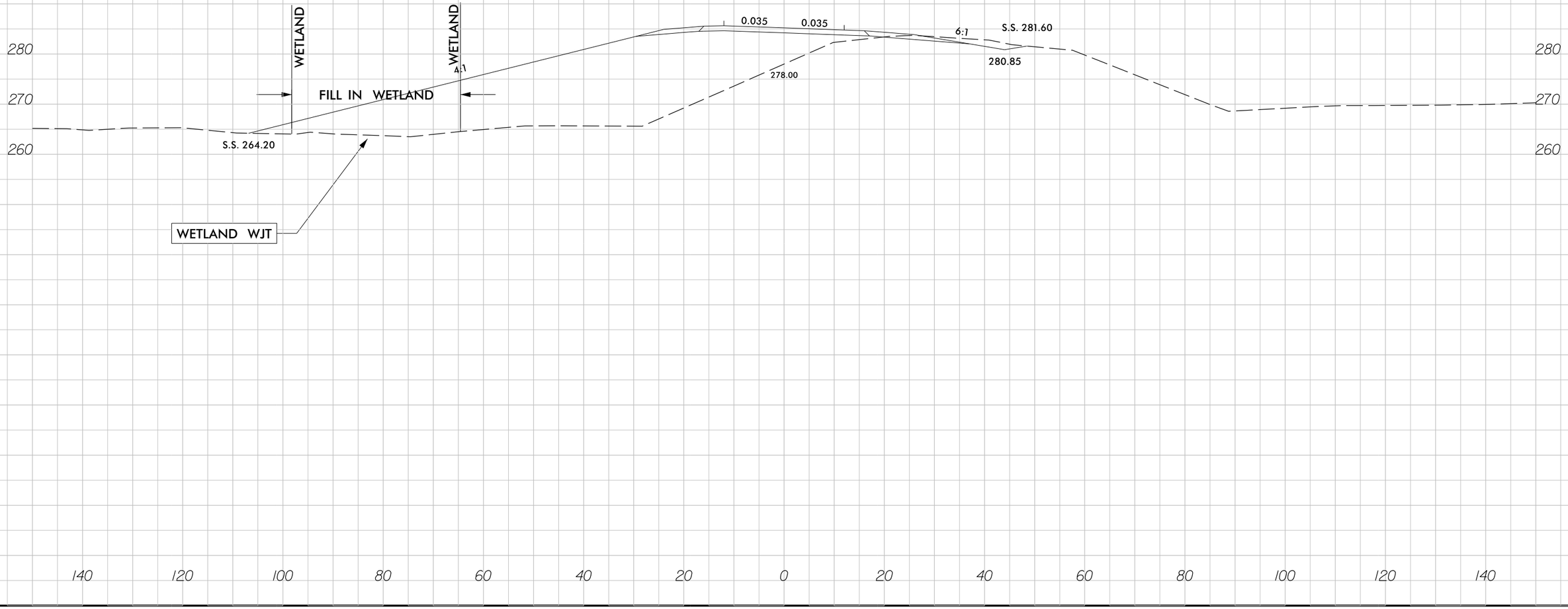
7/30/2018
R2829_hgd_prm_wet_psh_36c_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 89 OF 108

CROSS SECTION
SITE 59, WETLAND WJT
STATION 18+50 –Y31RPD–



7/30/2018
R2829_Hyd_prm_wet_psh_36d_xpl.dgn
jharvey

51499

F F DENOTES FILL IN WETLAND

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	38
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 90 OF 108

-L- ST Sta. 1511+09.41

JOYNER MINGO CREEK LLC

BST

1540 EBL 59' CONC

1515+00

1520+00 BST

SITE 60

-L- POT Sta. 1512+55.03=
-Y31RPBD- PT Sta. 72+06.75
77.53 RT

WETLAND WWG

COMMUNITY ASSN INC

RIPRAP

CHURCHILL SUBDIVISON

SMARTY JONES DR 25' BST

KINGMAN DR

2SFD FD 2S ISFD

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_38.dgn
jhorney

51499

F F DENOTES FILL IN WETLAND

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	38
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 91 OF 108

-L- ST Sta. 1511+09.41

JOYNER MINGO CREEK LLC

BST

1540 EBL 59' CONC

00+5151

00+1520 BST

SITE 60

-L- POT Sta. 1512+55.03=
-Y3IRPBD- PT Sta. 22+06.75
77.53 RT

WETLAND WWG

RIPRAP

CHURCHILL SUBDIVISON

COMMUNITY ASSN INC

SMARTY JONES DR

KINGMAN DR

25' BSL

PAVEMENT REMOVAL
PAVED SHOULDER

7302018
R2829_Hyd_prm_wet_psh_38a.dgn
jhoover

51499

PERMIT DRAWING
SHEET 92 OF 108

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 25' 0 50' 100'
SCALE: 1" = 100'

10' SOIL
8' SOIL
SR 2700 WHITE OAK
-Y23- 30+00
-Y23- 5+00
-Y23D- POT Sta. 10+00.00
-Y23- POT Sta. 31+79.82
N 0° 24' 28.1" E
N 82° 53' 25.5" E
Sta. 29+52.78
BURNETTE, R GARLAND
-Y23- PC Sta. 32+73.72
-Y23D- PC Sta. 11+68.91
-Y23D- 15+00
-Y23D- 20+00
-Y23D- PT Sta. 19+00.02
68° 40' 16.5" E
16.5' F
-Y23RPC- POT Sta. 51+
DONALD KAY M
-Y23D-
-Y23D- 25+00
ISFD
CAVINESS JOHN M
DAM
N 10° 11' 53.4" W
BST
G

S S DENOTES IMPACTS IN SURFACE WATER

STREAM SHT

SITE 61

PAVEMENT REMOVAL
PAVED SHOULDER

7302018
R2829_Hyd_prm_wet_psht_46.dgn
lhopper

51499

PERMIT DRAWING
SHEET 93 OF 108

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

50' 25' 0 50' 100'
SCALE: 1"=100'

PROJECT REFERENCE NO.	SHEET NO.
R-2829	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

10' SOIL
8' SOIL
SR 2700 WHITE OAK
-Y23- POT Sta. 31+79.82
-Y23D- POT Sta. 10+00.00
5+00 -Y23-
30+00 -Y23-
N 10° 24' 28.1" E
N 82° 53' 25.5" E
Sta. 29+52.78
-Y23- PC Sta. 32+73.72
-Y23D- PC Sta. 11+68.91
15+00 -Y23D-
20+00 -Y23D-
-Y23D- PT Sta. 19+00.02
60' 40' 16.5" E
16.5' R
-Y23RPC- POT Sta. DONALD KAY M
-Y23D-
35' FOO -Y23D- ISFD
-Y23D-
CAMINESS JOHN M
N 10° 11' 53.4" W
GARLAND, R
BURNETTE,

S S DENOTES IMPACTS IN SURFACE WATER

STREAM SHT

SITE 61

PAVEMENT REMOVAL
PAVED SHOULDER

730208
R2829_hyd_prm_vet_psh_46a.dgn
lhoover

51499

DENOTES IMPACTS IN SURFACE WATER

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PERMIT DRAWING SHEET 94 OF 108

PROJECT REFERENCE NO.	SHEET NO.
R-2829	47
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SITE 62

STREAM SFJ

N 65° 10′ 50.9″ W

N 2° 39′ 52.8″ E

3° 08′ 37.3″ E

SR 2700 WHITE OAK RD

MT HERMAN CHRISTIAN CH

ISBKCH

CLEMENTS, RUBY CLEMENTS, ET AL

-Y23- POT Sta. 19+02.97

-Y23- PC Sta. 62+84.75

-Y23- POT Sta. 68+31.41

-Y23- POT Sta. 10+00.00

-Y23- PT Sta. 68+19.13

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_psh_47.dgn
jhorney

51499

DENOTES IMPACTS IN SURFACE WATER

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PERMIT DRAWING
SHEET 95 OF 108

PROJECT REFERENCE NO.	SHEET NO.
R-2829	47
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SITE 62

STREAM SFJ

PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_hyd_prm_wet_psh_47a.dgn
jhervey

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

STREAM SFZ(1)

WETLAND WGV(1)

STREAM SFY

-Y24- POT Sta. 10+00.00

SITE 63

-Y24A- PC Sta. 10+74.90

-Y24B- PC Sta. 10+58.05

-Y24B- RT Sta. 11+09.87

-Y24B- POT Sta. 12+00.33

US 70 BUS EBL 32' BST

PA BST

PA GR

ISBKBUS

HTR

DAM

BURNETTE, CARLAND

HAWLEY, DAVID M

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	52
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 96 OF 108

PAVEMENT REMOVAL
PAVED SHOULDER

7302018
r2829_hyd_prm_wet_psh_52.dgn
jhopper

51499

F F DENOTES FILL IN WETLAND

S S DENOTES IMPACTS IN SURFACE WATER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	52
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 97 OF 108

50' 25' 0 50' 100'
SCALE: 1" = 100'

STREAM SFZ(1)

WETLAND WGV(1)

STREAM SFY

-Y24- POT Sta. 10+00.00

SITE 63

-Y24A- PC Sta. 10+74.90

-Y24B- PC Sta. 10+58.05

-Y24B- PT Sta. 11+09.87

-Y24B- POT Sta. 12+00.33

US 70 BUS EBL 32' BST

PA BST

ISBKBUS

PA GR

HAWLEY, DAVID M

BURNETTE, CARLAND

PAVEMENT REMOVAL
PAVED SHOULDER

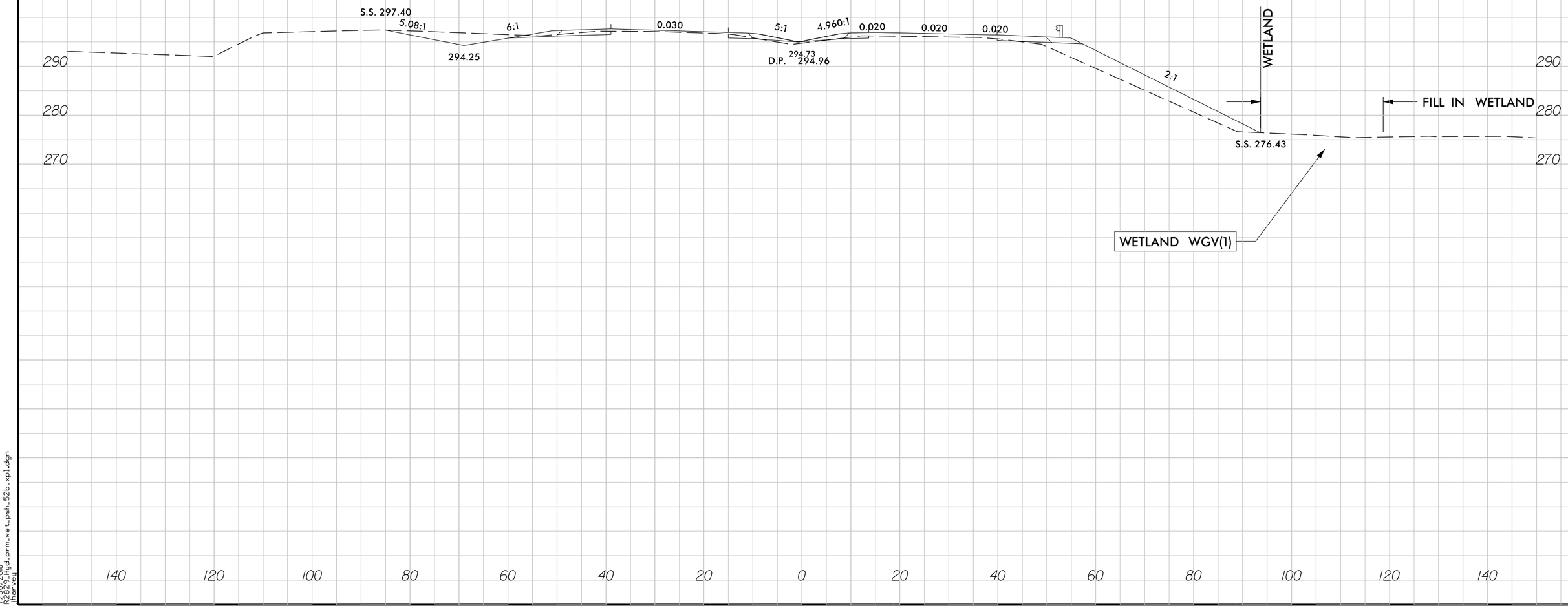
7/30/2018
R2829_hyd_prm_wet_psh_52a.dgn
jhervey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 98 OF 108

CROSS SECTION
SITE 63, WETLAND WGV(1)
STATION 11+00 –Y24–



7/30/2018
R2829_Hyd_prm_wet_psh_52b_xpl.dgn
jharvey

51499

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	53
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 99 OF 108

JOHNSON, WILLIAM F
JOHNSON, BETTY H
PARTLO GARNER LLC
BUFFALOE ENTERPRISE LLC
WIDDLIN, THELMA R
25+00 -Y24-
20+02 -Y24-
15+00
ISBKD
ISFD
HTR
RIPRAP
CAN
ISFBUS
PA BST
PA GR
12' BST
25' BST
32' BST
WALNUT DR
-Y24- POT Sta. 14+89.38
-Y24A- POT Sta. 10+00.00
-Y24A- POC Sta. 11+58.00
-Y24B- POT Sta. 10+00.00
-Y24A- PRC Sta. 12+66.99
-Y24A- 00+51
-Y24RPA- PT Sta. 30+25.60
-Y24RPA- 30+00
-Y24A- PT Sta. 17+57.12
BEGIN WALL STA. 17+25.00, 100.00 LT.
END WALL STA. 20+75.00, 100.00 LT.
S 68° 27' 50.8" E
US 70 BUS WBL
TO EAST RV AND MH PARK
N 12°0" W 7.55' 42.3
E 00° 27' 00" E
SITE 64
SITE 21
STREAM SGA
WETLAND WGX(2)
PAVEMENT REMOVAL
PAVED SHOULDER

7/30/2018
R2829_Hyd_prm_wet_pth_53.dgn
jhoover

51499

DENOTES FILL IN WETLAND

DENOTES IMPACTS IN SURFACE WATER

F F

S S

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	53
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING SHEET 100 OF 108

50' 25' 0 50' 100'
SCALE: 1" = 100'

JOHNSON, WILLIAM & BETTY H

PARTLO GARNER LLC

25+00 -Y24-

20+00 -Y24-

ISBKD

9 BST

8 WEDLIN THELMA R

10+51

-Y24- POT Sta. 14+89.38=
-Y24A- POT Sta. 10+00.00

S 68° 27' 50.8" E

US 70 BUS WBL 32' BST

END WALL
STA. 20+75.00, 100.00 LT.

BEGIN WALL
STA. 17+25.00, 100.00 LT.

30+00 -Y24RPA-

-Y24A- PT Sta. 17+57.12

-Y24A- POC Sta. 11+58.00=
-Y24B- POT Sta. 10+00.00
-Y24A- PRC Sta. 12+66.99

-Y24A- 30+25.60

STREAM SGA

SITE 64

SITE 21

WETLAND WGX(2)

RIPRAP

HTR

ISFD

ISFBUS

PA BST

CAN

PA GR

WALNUT DR

17' BST

25' BST

12' BST

TO EAST RV AND MH PARK

BUFFALOE ENTERPRISE LLC

PAVEMENT REMOVAL
PAVED SHOULDER

7302016
R2829_hyd_prm_wet_pth_53a.dgn
lburney

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROSS ROAD, SUITE 202
RALEIGH, NC 27612
NC License Number P-0519

PROJECT REFERENCE NO.	SHEET NO.
R-2829	70
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 101 OF 108

50' 25' 0 50' 100'
SCALE: 1"=100'

W
8" GR
-Y3IRPD- 0+00
-Y3IRPD- CS Sta. 27+15.68
LILES, JOYCE C
S
B
-Y3IRPD- 25+00
-Y3IRPD- 20+00
-Y3IRPD- 35+00
HTR
LILES, JOYCE C
SR 2601 CLIFTON RD
-Y3IRPD- SC Sta. 15+74.57
20' BST
-Y3IRPD- 30+00
-Y3IRPD- 15+00
-Y3IRPD- TS Sta. 15+74.57
-Y3IRPD- SC Sta. 21+73.56
STREAM SHL
SITE 65
-Y3IRPD- 25+00
-Y3IRPD- PI Sta. 25+76.56=
-Y3IRPD- TS Sta. 0+00.00
12.00' RT
-Y3IRPD- ST Sta. 23+35.56
FERRELL, TERRY LANCE
FERRELL, RANDALL HUTCHINS
WETLAND WJJ(1)
-Y3IRPD- CS Sta. 20+83.56
-Y3IRPD- SC Sta. 18+52.00
-Y3IRPD- 20+00
-Y3IRPD- TS Sta. 16+00.00
-Y3IRPD- 15+00
24" CONC
BST
N 80°06'18"W
F
C
WBT 58' CONC
N 89°59'59.9" E
S 264 EBL 53' CONC
WETLAND WJJ(2)
WLB
-Y3IRPC- ST Sta. 35+52.02
-Y3- POT Sta. 75+21.30=
SITE 66
8' SOIL

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
0
PLANS

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROLES TRACE, SUITE 202
RALEIGH, NC 27612
NC license Number P-0519

PROJECT REFERENCE NO.	SHEET NO.
R-2829	70
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 102 OF 108

50' 25' 0 50' 100'
SCALE: 1"=100'

W
8" GR
-Y3IRPD- 30+00
-Y3IRPD- CS Sta. 27+15.68
LILES, JOYCE C
S
B
25+00 -Y3IRPD-
-Y3IRPD- SC Sta. 15+74.52
-Y3IRPD- TS Sta. 15+74.52
-Y3IRPD- SC Sta. 27+73.56
STREAM SHL
SITE 65
HTR
LILES, JOYCE C
SR 2601 CLIFFORD RD
20' BST
35+00 -Y3IRPDB-
20+00 -Y3IRPD-
30+00 -Y3IRPDB-
-Y3IRPD- SC Sta. 15+74.52
-Y3IRPD- TS Sta. 25+76.56=
-Y3IRPD- POT Sta. 0+00.00
12.00' RT
-Y3IRPDB- ST Sta. 23+35.56
-Y3IRPDB- CS Sta. 20+83.56
FERRELL, TERRY LANCE
FERRELL, RANDALL HUTCHINS
WETLAND WJJ(1)
-Y3IRPDB- 22+00
-Y3IRPDB- SC Sta. 18+52.00
-Y3IRPDB- TS Sta. 16+00.00
15+00 -Y3IRPDB-
20+00 -Y3IRPDB-
BST
F
C
WB1 58' CONC
N 89°59'59.9" E
S 264 EBL 53' CONC
WETLAND WJJ(2)
SITE 66
-Y3- POT Sta. 75+21.30=
-Y3IRPC- ST Sta. 35+52.02
WLB
8' SOIL

DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
0
PLANS

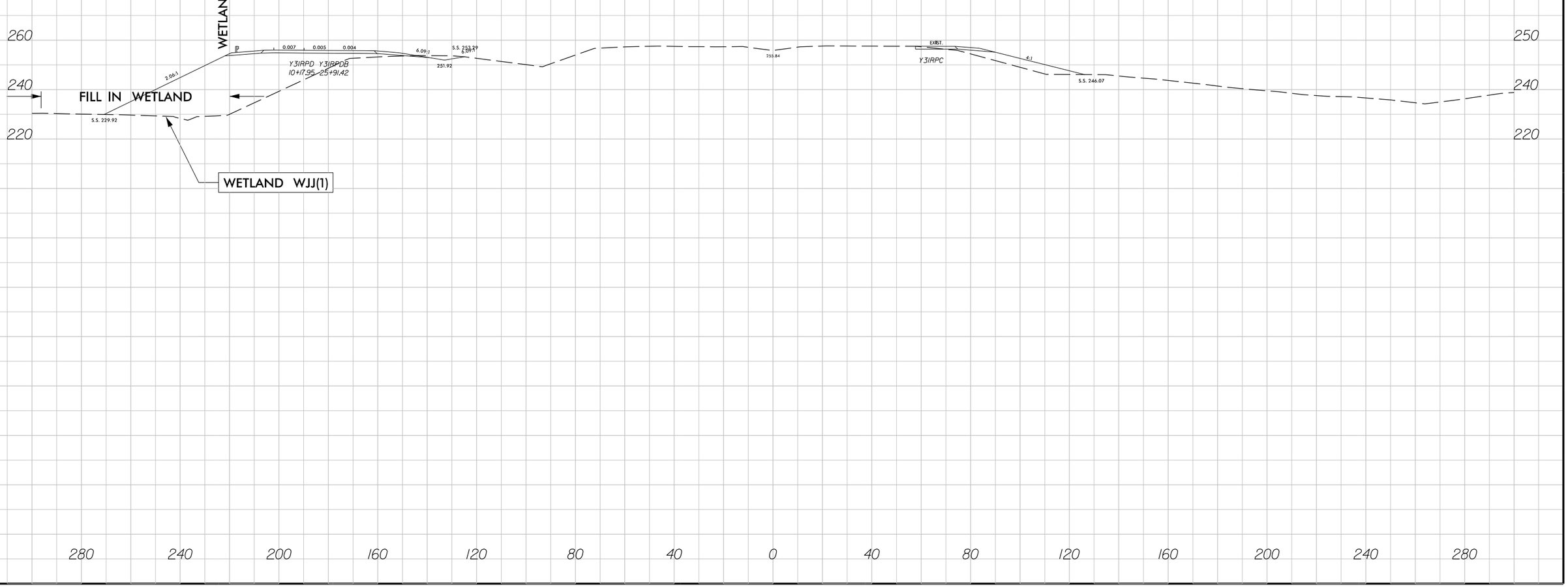
LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 103 OF 108

CROSS SECTION
SITE 65, WETLAND WJJ(1)
STATION 81+50 –Y31–



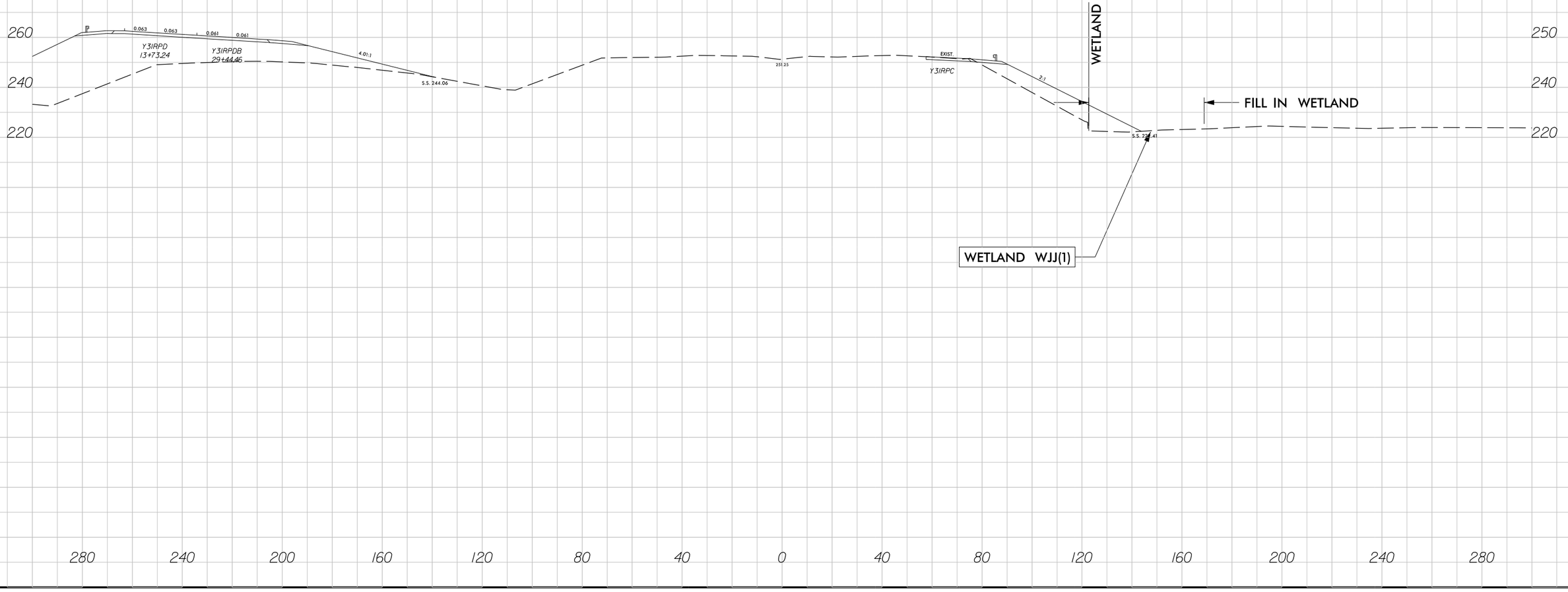
7/30/2018
R2829_Hyd_prm_wet_psh_70b_xpl.dgn
jharvey

6/23/16

0	PROJ. REFERENCE NO.	SHEET NO.
	R-2829	

PERMIT DRAWING
SHEET 104 OF 108

CROSS SECTION
SITE 66, WETLAND WJJ(2)
STATION 78+00 –Y31–



7/30/2018
R2829_Hyd_prm_wet_psh_70c_xpl.dgn
jharvey

WETLAND AND SURACE WATER IMPACTS 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)
1	52+07 to 52+83-Y22RPAFLY-LT	ROADWAY FILL	0.02									
2	967+25 to 968+60-L-LT	ROADWAY FILL	0.09									
3	972+15 to 979+51-L-	ROADWAY FILL	0.84					0.03		542		
4	1001+22 to 1004+47-L-	ROADWAY FILL	0.47									
5	1008+45 to 1008+98-L-	ROADWAY FILL						0.02		413		
6	1012+45 to 1014+87-L-	ROADWAY FILL						0.02		469		
7	1013+88 to 1018+45	ROADWAY FILL	0.14					0.03		612		
8	1022+78 to 1024+65-L-	ROADWAY FILL	0.03					0.02		322		
9	1035+69 to 1037+54-L-	ROADWAY FILL	0.16					0.02		326		
		ROADWAY FILL (POND)						0.03				
10	27+43 to 27+71-Y23RPB-LT	ROADWAY FILL	< 0.01									
11	31+20 to 31+54-Y23D-	ROADWAY FILL						< 0.01		155		
12	1060+50 to 1063+96-L-	ROADWAY FILL	0.02					0.02		468		
13	1062+24 to 1062+74-L-	ROADWAY FILL	< 0.01					0.01		227		
14	45+51 to 47+42-Y23D-	ROADWAY FILL	0.05									
15	1098+65 to 1105+15 -L-	ROADWAY FILL	1.38					< 0.01		155		
16	1109+60 to 1116+95 -L-	ROADWAY FILL	2.10					0.06		1191		
17	1113+04 to 1114+64 -L-RT	ROADWAY FILL	0.27									
18	1115+69 to 1116+20 -L-RT	ROADWAY FILL	0.03									
19	1123+94 to 1126+50 -L-	ROADWAY FILL	0.26					0.03		534		
20	1137+79 to 1142+13-L-	ROADWAY FILL						0.04		794		
21	26+25 to 28+85-Y24RPA-RT	ROADWAY FILL	0.21									
TOTALS*:			6.08					0.32		6208	0	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
07/30/2018
WAKE COUNTY
R-2829

WETLAND AND SURACE WATER IMPACTS 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)
22	1148+23 to 1149+33-L-	ROADWAY FILL	0.21									
23	25+14 to 25+99-Y24RPD-	ROADWAY FILL	0.10									
24	1151+15 to 1154+48-L-	ROADWAY FILL	1.29					0.03		681		
25	11+51 to 11+73-Y24RPD-	ROADWAY FILL						0.01		293		
26	1169+32 to 1172+25-L-	ROADWAY FILL	0.56					0.02		492		
27	1173+86 to 1178+33-L-LT	ROADWAY FILL	0.29					0.03		513		
28	1171+26 to 1178+65-L-	ROADWAY FILL						0.04		798		
29	1197+22 to 1198+69-L-	ROADWAY FILL	0.14									
30	17+07 to 18+65-Y27RPA-LT	ROADWAY FILL (POND)						0.03				
31	16+34 to 20+18 -Y27RPD-LT	ROADWAY FILL	0.18					< 0.01		164		
32	1241+99 to 1244+54-L-	ROADWAY FILL	0.03					0.02		500		
33	1268+92 to 1269+72-L-	ROADWAY FILL	0.05					0.01		227		
34	1276+60 to 1277+19-L-RT	ROADWAY FILL	0.05									
35	1287+71 to 1288+33-L-	ROADWAY FILL						0.02		500		
36	1315+08 to 1316+47-L-LT	ROADWAY FILL	0.06					< 0.01		156		
37	1317+02 to 1320+29-L-	ROADWAY FILL	0.06					0.02		448		
38	1323+04 to 1323+50-L-LT	BRIDGE	0.05									
38A	1324+16 to 1325+00L-LRT	ROADWAY FILL						< 0.01		99		
39	1343+98 to 1346+17 -L-	ROADWAY FILL	0.78									
40	1347+59 to 1354+79-L-	ROADWAY FILL						0.04		970		
41	24+36 to 25+45-Y29RPA-RT	ROADWAY FILL	0.11									
42	1345+70 to 1350+04-L-	ROADWAY FILL	0.16					0.52		970		
TOTALS*:			4.12					0.82		6811	0	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
07/30/2018
WAKE COUNTY
R-2829

WETLAND AND SURACE WATER IMPACTS 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)
43	18+10 to 18+94-Y29E-	ROADWAY FILL	0.31									
44	1377+57 to 1382+39-L-	ROADWAY FILL	0.18					0.01		289		
		ROADWAY FILL (POND)						1.79				
45	1388+72 to 1394+94-L-	ROADWAY FILL (POND)						4.85				
46	1404+33 to 1405+98-L-	ROADWAY FILL	0.43					0.02		428		
47	1412+68 to 1415+70-L-	ROADWAY FILL	1.29									
48	24+16 to 24+98-Y30RPC-	ROADWAY FILL	0.17									
49	21+94 to 34+46-Y30-RT	ROADWAY FILL	0.20					0.05		1096		
50	34+82 to 35+20-Y30-	ROADWAY FILL						0.01		212		
51	1431+44 to 1432+43-L-RT	ROADWAY FILL	0.11									
52	1453+37 to 1455+18-L-	ROADWAY FILL	0.61									
53	1454+97 to 1469+92-L-	ROADWAY FILL	3.12					0.07		1417		
54	23+91 to 26+31-Y31RPB-RT	ROADWAY FILL	0.33					< 0.01		202		
55	21+93 to 25+21-Y31RPC-RT	ROADWAY FILL	0.45									
56	19+77 to 20+82-Y31LPD-L5	ROADWAY FILL	0.05									
57	20+85 to 21+38-Y31LPD-LT	ROADWAY FILL	0.03									
58	26+28 to 28+11-Y31RPD-LT	ROADWAY FILL (POND)						0.87				
59	28+11 to 29+12-Y31RPD-LT	ROADWAY FILL	0.05					< 0.01		94		
60	1516+50 to 1516+78-L-RT	ROADWAY FILL	0.01									
61	21+30 to 22+07-Y23D-	ROADWAY FILL						0.01		214		
62	64+61 to 64+85-Y23-LT	ROADWAY FILL						< 0.01		94		
63	9+96 to 11+89-Y24-RT	ROADWAY FILL	0.10					< 0.01		31		
64	24+62 -Y24-LT	ROADWAY FILL						0.01		197		
TOTALS*:			7.45					7.70		4274	0	0

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
07/30/2018
WAKE COUNTY
R-2829

WETLAND AND SURACE WATER IMPACTS 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)
65	24+58 to 28+44-Y31RPDB-RT	ROADWAY FILL	0.55					< 0.01		94		
66	27+46 to 31+02-Y31RPDB-LT	ROADWAY FILL	0.21									
	SHEET 77 TOTALS		0.75					< 0.01		94		
	SHEET 74 TOTALS		6.08					0.32		6208		
	SHEET 75 TOTALS		4.12					0.82		6811		
	SHEET 76 TOTALS		7.45					7.70		4274		
TOTALS*:			18.40					8.85		17387	0	0

*Rounded totals are sum of actual impacts

NOTES:

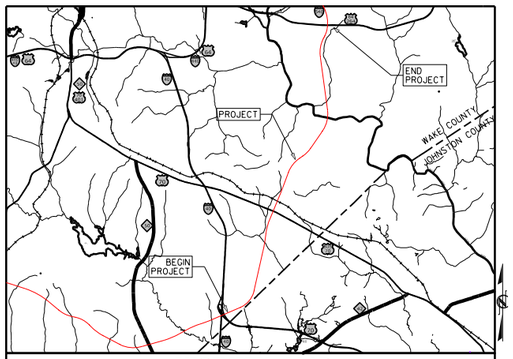
NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
07/30/2018
WAKE COUNTY
R-2829

09/08/99

TIP PROJECT: R-2829

CONTRACT:

See Sheet 1A For Index of Sheets



VICINITY MAP NTS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

WAKE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-2829	1	

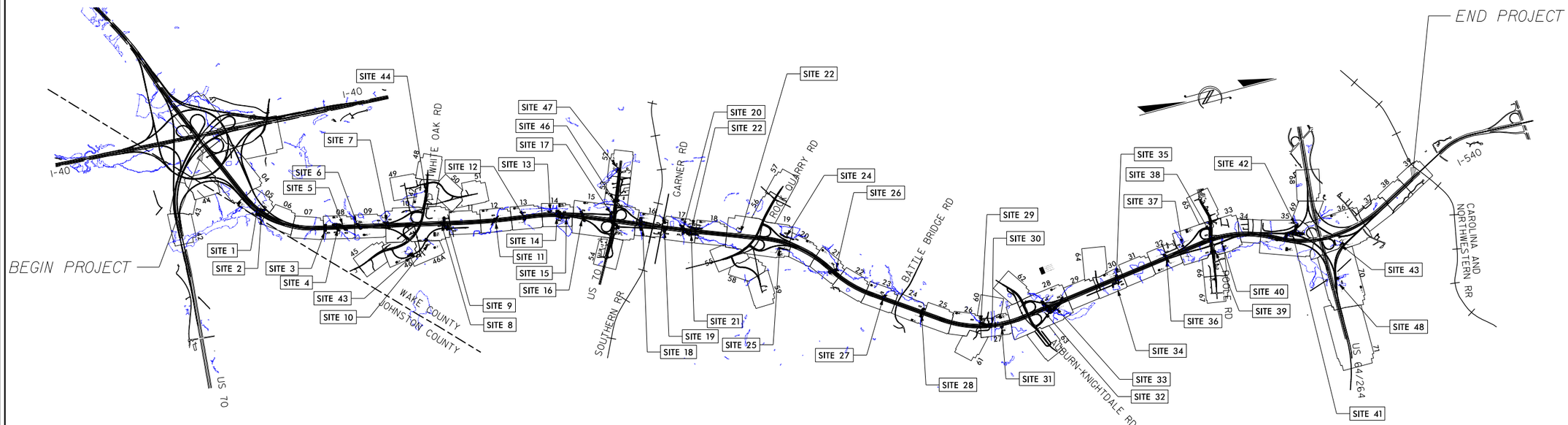
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION

BUFFER DRAWING
SHEET 1 OF 37

LOCATION: COMPLETE 540 – EAST OF I-40 TO SOUTH OF US 64 /264

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STURCTURES

BUFFER IMPACTS PERMIT



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

100 50 0 100 200
PLANS

PROJECT LENGTH

Prepared In the Office of:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

6/7/2018
R2829_Hyd_prm_buf_psh_01.dgn
jharvey

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

50' 25' 0 50' 100'
SCALE: 1"=100'

PAVEMENT REMOVAL
PAVED SHOULDER

BUFFER DRAWING SHEET 2 OF 37

WETLAND WFN(1)

SITE 1

STREAM SEW

SITE 2

STREAM SEY

-L- SC Sta. 969+20.46

970+00

975+00

980+00

-Y22RPAFLY-

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

6 7/2018
R2829_Hyd_prm_buf_psh_05.dgn
lburney

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 3 OF 37

BURNETTE, R GARLAND

STREAM SFE

SITE 3

STREAM SFH

SITE 4

STREAM SFF

SITE 5

GAS LINE 60' R/W

1010+00

1015+00

1020+00

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_08.dgn
lhopper

51499

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 4 OF 37

WETLAND WGD

SITE 6

WETLAND WGC

STREAM SFB

SITE 7

WETLAND WGB

-L- POT Sta. 1033+09.61=
-Y23RPB- ST Sta. 10+00.00
71.00' LT

-L- POT Sta. 1030+20.79=
-Y23RPC- ST Sta. 10+00.00
71.00' RT

N 16° 47' 39.6" E

-Y23RPC- TS Sta. 13+68.78

1025+00 1030+00 1035+00

15+00
-Y23RPC-

BURNETTE, R GARLAND

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL
PAVED SHOULDER

672018
R2829_Hyd_prm_buf_psh_09.dgn
lhorvay

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROAD, PLACE, SUITE 202
RALEIGH, NC 27613
NC License Number P-0755

PROJECT REFERENCE NO.	SHEET NO.
R-2829	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 5 OF 37

SC Sta. 12+00.00
-Y23RPB-
-Y23RPB- SRS Sta. 24+01.92
-Y23RPB- CS Sta. 22+01.92
-Y23RPB- SC Sta. 20+01.76
-Y23RPB- PT Sta. 29+53.40
-Y23LPB- CS Sta. 17+59.71
-Y23LPB- ST Sta. 20+09.71
-Y23LPB- SC Sta. 12+50.00
-Y23LPB- ST Sta. 10+00.00
-Y23- POT Sta. 55+10.10=
-Y23RPB- POT Sta. 31+23.40
-Y23- POT Sta. 54+78.10=
-Y23LPB- POT Sta. 21+79.47
-Y23E- PT Sta. 14+22.13
-Y23E- PC Sta. 11+18.89
-Y23E- POT Sta. 10+00.00
-Y23- POT Sta. 1051+12.67=
-Y23LPB- ST Sta. 10+00.00
-Y23- PT Sta. 52+17.00
-Y23LPC- SC Sta. 12+50.00
-Y23LPC- ST Sta. 10+00.00
-Y23- POT Sta. 1047+48.32=
-Y23LPC- CS Sta. 15+29.91
-Y23LPC- ST Sta. 17+79.91
-Y23- POT Sta. 1051+79.01=
-Y23- POC Sta. 49+55.38
△=69° 17' 56.5"
-Y23- POC Sta. 40+68.22=
-Y23LPC- POT Sta. 19+59.64
-Y23RPC- SC Sta. 15+93.78
-Y23RPC- PT Sta. 25+37.17
-Y23D- PT Sta. 40+51.05
-Y23D- PC Sta. 32+42.60

SITE 7
SITE 8
SITE 9
SITE 10

WETLAND WGG
WETLAND WGN
STREAM SFA
STREAM SFC
STREAM SFX

OLD CASCADE DR
SR 3815
MEADOWBROOK ESTATES SUBDIVISION
HIDDEN ACRES TRL
FOSTER PARK LLC
DEANDONALD RAY DRAIN
BURNETTE R G JR
COWBOY FARM RD

ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

51499

MITIGABLE IMPACTS ZONE 2

50' 25' 0 50' 100'
SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 6 OF 37

-L- PC Sta. 1071+35.79

HIDDEN ACRES TRL

8' SOIL

ISFD

ELMO T WILLIAMS TRUST

WILLIAMS, ALICE H

EARLY SARA RAY

1070+00

DAM

1075+00

9' SOIL

N 12° 40' 39.6" E

WLB

SITE 8

8' BST

-Y23D- POT Sta. 52+87.60

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
6/8/2018
lhorzay

51499

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

SITE 11

STREAM SFV

WHITEOAK CR

SFV

CAPITAL CITIES COMMUNICATIONS INC

-L- PT Sta. 1

1080+00

1085+00

1090+00

F

FF

SF

BZ

Z

WLB

PAVEMENT REMOVAL

PAVED SHOULDER

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	12
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 7 OF 37

672008
R-2829
jhoover

I_Hyd_prm_buf_psh_12.dgn

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 8 OF 37

SITE 12

STREAM SFR

-L- PC Sta. 1102+48.60

091+66.25

1095+00

1100+00

1105+00

N 8° 01' 27.1" E

NC DEPARTMENT OF TRANSPORTATION

CAPITOL BROADCASTING CO INC

WLB

SF

BZ 1

BZ 2

PAVEMENT REMOVAL

PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_13.dgn
lhorvay

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	14
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 9 OF 37

WETLAND WGR

SITE 13

SITE 15

SITE 14

STREAM SFN

STREAM SFQ

-L- POT Sta. 1115+20.79=
-Y24RPB- POT Sta. 10+00.00
71.00' LT

-L- POT Sta. 1119+78.61=
-Y24RPC- ST Sta. 10+00.00
71.00' RT

-Y24RPC- SC Sta. 12

1110+00

1115+00

1120+00

N 16° 07' 23

Center of Anchor
30.970 ft. from EOP
39.158 ft. from EOT

Nearest Fence Corner
15.791 ft. from EOP
23.808 ft. from EOT

ANTENNA ANCHOR

ANTENNA ANCHOR

PAVEMENT REMOVAL

PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_14.dgn
jhancock

REVISIONS

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

LOCHNER
H. W. LOCHNER, INC.
3840 ROZZ, PLAZA, SUITE 202
RALEIGH, NC 27613
NC License Number P-0750

PROJECT REFERENCE NO.	SHEET NO.
R-2829	15
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 10 OF 37

WETLAND WGR

SITE 16

SITE 17

STREAM SFS

STREAM SFT

STREAM SFT

-Y24RPB- PT Sta. 23+79.08

-Y24RPB- PC Sta. 21+37.16

-Y24- POT Sta. 27+25.00=
-Y24RPB- POT Sta. 31+34.92
57.00' RT

-Y24- POT Sta. 27+83.64=
-Y24RPA- POT Sta. 32+51.60

-Y24RPB- PT

-Y24RPB- PC Sta. 32+00.28

-Y24- PC Sta. 32+09.24

-L- PT Sta. 1125+37.47

-Y24RPC- PCC Sta. 18+32.61

-Y24RPC- CS Sta. 21+54.98

-Y24RPC- SRS Sta. 23+59.98

-Y24LPC- SC Sta. 12+50.00

-L- POT Sta. 1137+95.17=
-Y24LPC- ST Sta. 10+00.00
71.00' LT

-Y24- POC Sta. 35+94.49=
-Y24LPC- ST Sta. 28+27.85
51.00' RT

-Y24LPC- CS Sta. 20+17.85

-Y24LPA- CS Sta. 20+85.53

-Y24LPA- SRS Sta. 23+35.53

-Y24LPA- SC Sta. 12+50.00

-L- POT Sta. 1141+33.67=
-Y24LPA- ST Sta. 10+00.00
71.00' LT

-L- POT Sta. 1139+67.12=
-Y24- POC Sta. 33+99.03
Δ=89° 53' 21.0"

-Y24- POC Sta. 34+62.17=
-Y24LPA- ST Sta. 25+85.53
51.00' LT

-Y24RPD- PC Sta. 32+35.86

-Y24RPD- PT Sta. 35+44.88

-Y24C- POT Sta. 24+30.68

-Y24C- PT Sta. 23+63.27

-Y24C- PC Sta. 21+95.84

POC Sta. 40+80.85=

N 17° 11' 51.6" E

N 25° 15' 37.7" E

N 22° 35' 44.1" E

S 21° 32' 08.2" W

S 64° 06' 22.9" E

N 30° 01' 30.4" W

1125+00 1130+00 1135+00 1140+00 1145+00 1150

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1"=100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

BUFFER DRAWING
SHEET 11 OF 37

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	16
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

STREAM SGC
WETLAND WHB

SITE 18

SITE 19

STREAM SGD

-Y24RPA- SC Sta. 17+86.75

-Y24RPA- PT Sta. 19+12.73

-L- POT Sta. 1160+85.79=
-Y24RPA- POT Sta. 10+00.00
71.00' LT

-L- POT Sta. 1157+44.69=
-Y25- POT Sta. 18+03.43
Δ=97° 17' 56.1"

-L- POT Sta. 1161+69.62=
-Y26- POT Sta. 25+52.90
Δ=93° 20' 53.1"

S 17° 06' 46.9" W

S 26° 35' 44.1" W

NORFOLK SOUTHERN RR

NC RAILROAD COMPANY

SR 1004 (GRAY ROAD)

SR 1227 (OLD BEAVER DAM ROAD)

50' 25' 0 50' 100'
SCALE: 1"=100'

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R-2829_Hyd_prm_buf_psh_16.dgn
jhuxley

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

STREAM SGF
WETLAND WHD(2)
SITE 22

BUFFER DRAWING
SHEET 12 OF 37

WETLAND WHD

STREAM SGG

SITE 21

SITE 20

STREAM SGE

SITE 19

Sta. 1164+80.68

1165+00

1170+00

1175+00

DAM

POOL

ISFD

8' GR

CAN

WL - POC Sta. 1164+45.61=
=Y24RPD- PC Sta. 10+00.00
-41.00' RT

LAURA L WATTS, BARBARA B

MCINTYRE, JOHN BAPTIST

30+00 -Y26-

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_17.dgn
jhancock

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

SITE 22

STREAM SGF

STREAM SGG

SITE 21

℄ – PT Sta. 1182+53.04

EDGE OF AUBURN

1180+00

1185+00

1190+00

BZ 1

BZ 2

Sf

WLB

F C

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

PROJECT REFERENCE NO.	SHEET NO.
R-2829	18
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 13 OF 37

6/7/2018
R-2829
jhopper

I_Hyd_prm_buf_pth_18.dgn

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROZZ PLACE, SUITE 202
RALEIGH, NC 27613
NC License Number P-0750

PROJECT REFERENCE NO.	SHEET NO.
R-2829	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 14 OF 37

STREAM SGH
SITE 23

STREAM SGK
SITE 24

SITE 25

WETLAND WHQ

A

D

-Y27- PC Sta. 41+69.05
-Y27- POT STA 41+55.33=
-Y27RPA- POT Sta. 30+20.34
-Y27- POT STA 41+23.24=
-Y27LPA- POT Sta. 22+86.27
-Y27- PT Sta. 37+91.89
-L- POT Sta. 1204+09.01=
-Y27- POC Sta. 34+52.93
Δ=63° 12' 45.3"
N 20° 36' 59.9" E
-Y27LPA- PT Sta. 28+67.04
S 34° 53' 01.0" W
-Y27LPA- SC Sta. 26+10.88
-Y27RPA- SRS Sta. 24+10.88
-Y27RPA- CS Sta. 21+85.88
-Y27LPA- ST Sta. 21+14.46
-Y27LPA- CS Sta. 18+64.46
-Y27LPA- SC Sta. 14+61.21
-L- POT Sta. 1205+10.03=
-Y27LPA- TS Sta. 10+00.00
7.00' LT
-Y27LPA- TS Sta. 12+11.21
-Y27RPA- SC Sta. 18+25.00
-Y27RPA-
-L- SC Sta. 1209+51.03
-L- TS Sta. 1206+36.03
-L- POT Sta. 1204+96.04=
-Y27LPD- TS Sta. 10+00.00
7.00' RT
-Y27LPD- SC Sta. 12+50.00
-Y27LPD- CS Sta. 18+34.39
-Y27LPD- ST Sta. 20+84.39
S 48° 28' 21.5" W
S 58° 28' 21.5" W
-Y27RPD- PT Sta. 30+58.83
-Y27RPD- SC Sta. 26+11.50
-Y27RPD- SRS Sta. 24+11.50
-Y27RPD- CS Sta. 21+86.50
-Y27RPD- SC Sta. 18+11.12
-Y27RPA-
-Y27RPD-
-Y27- POC Sta. 30+31.95=
-Y27LPD- POT Sta. 23+28.35
-Y27- POC Sta. 30+00.37=
-Y27RPD- POT Sta. 32+96.62
-Y27- PC Sta. 35+00.00
-Y27- PT Sta. 30+00.00
-Y27- PC Sta. 25+00.00
-Y27- PT Sta. 20+00.00
1195+00
1200+00
1205+00
1210+00
1215+00
1220
1225
1230
1235
1240
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1395
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1405
1410
1415

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	20
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 15 OF 37

51499
6/7/2018
R-2829_Hyd_prm_buf_psh_20.dgn
lhancox

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

SITE 26

WETLAND WHP

STREAM SGK

-L- CS Sta. 1243+41.83

-L- CS Sta. 1236+90.81

-L- ST Sta. 1240+05.81

N 55° 16' 30.9" E

1235+00

1240+00

1245+00

50' 25' 0 50' 100'

SCALE: 1" = 100'

RUINS

PAVEMENT REMOVAL

PAVED SHOULDER

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	21

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 16 OF 37

6/7/2018
R2829_Hyd_prm_buf_psh_21.dgn
lhorvay

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

1+61.97

-L- ST Sta. 1264+76.97

SITE 27

WETLAND WIC

STREAM SGO

-L- POT Sta. 1276+05.27=
-Y28- POC Sta. 33+47.93
Δ=63° 12' 45.3"

UNION B&T CO

LONG FARM LLC

1265+00

1270+00

1275

SOIL

ISFD

RAS, GEORGE L

BANK OF HAMPTON ROADS THE

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	23

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 17 OF 37

PAVEMENT REMOVAL
PAVED SHOULDER

67208
R2829_Hyd_prm_buf_pth_23.dgn
jhorsley

51499

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License
Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	24
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 18 OF 37

SITE 28

STREAM SGJ

1-7'X3' OVAL CMP

-Y28- PC Sta. 28+81.75

30+00 -Y28-

1280+00

N 34° 37' 28.0" E

1285+00

LONG BRANCH FARM LLC

35+00 -Y28-

SR 2552

-Y28- PCC Sta. 37+98.76

40+00 -Y28-

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL

PAVED SHOULDER

6/7/2018
R-2829
jhopper
_Hyd_prm_buf_psh_24.dgn

51499

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

50′ 25′ 0 50′ 100′

SCALE: 1″ = 100′

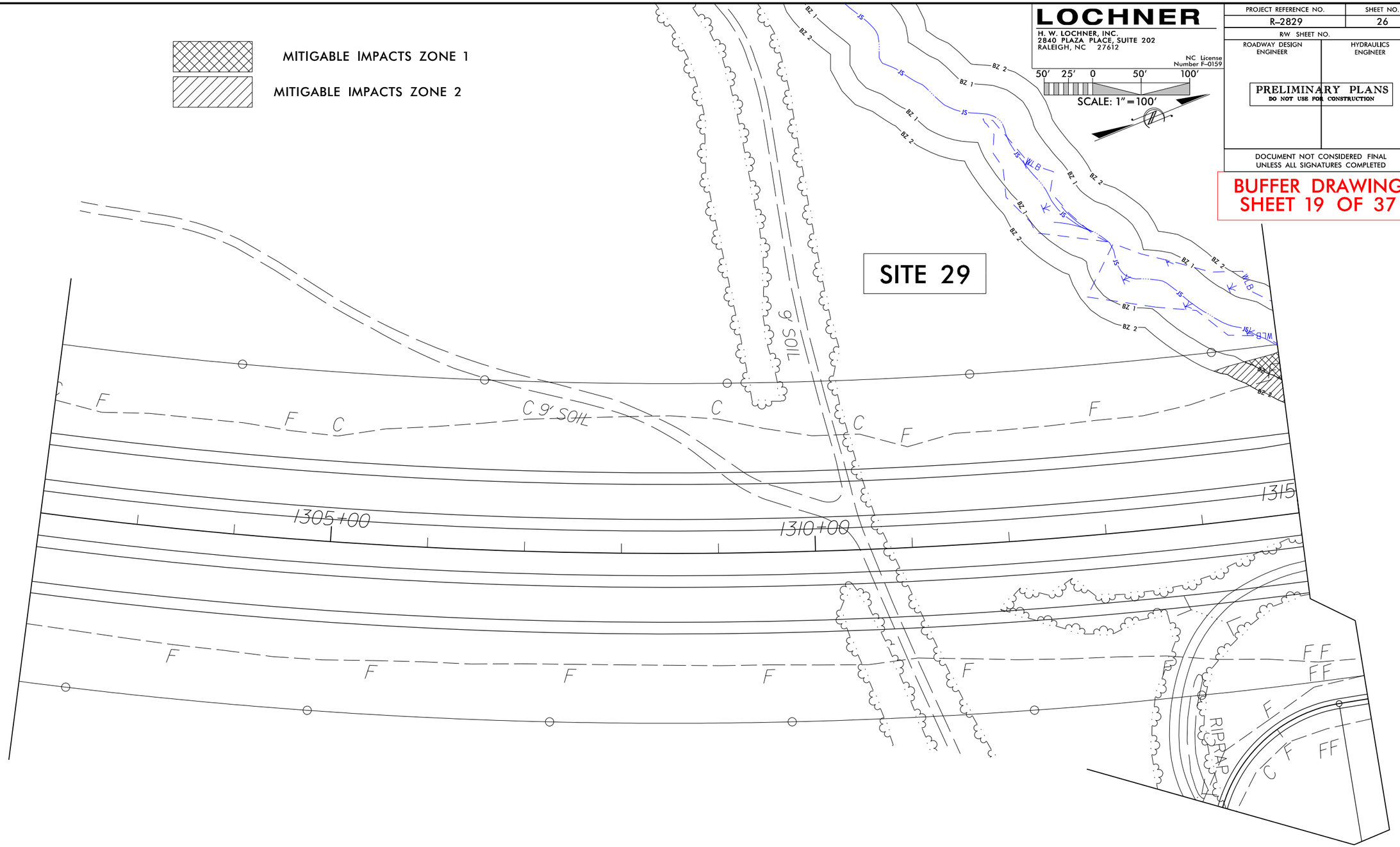
PROJECT REFERENCE NO.	SHEET NO.
R-2829	26
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 19 OF 37

SITE 29



PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_26.dgn
jhanzez

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	27
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 20 OF 37

ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

SITE 29
WETLAND WIP
STREAM SGR
WETLAND WIQ
SITE 30
STREAM SGT
SITE 31
NEUSE RIVER
-Y28A- PRC Sta. 14+31.54
-Y28A- PT Sta. 15+48.82
-Y28A- PC Sta. 17+46.64
-Y28A- PC Sta. 22+30.24
-Y28A- PT Sta. 19+08.15
S 12° 50' 42.0" W
15+00 -Y28A-
13+00 -Y28A-
20+00 -Y28A-
25+00 -Y28A-
1325+00

PAVEMENT REMOVAL
PAVED SHOULDER

672008
R2829_Hyd_prm_buf_pth_27.dgn
jlowrey

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROJO, FLR, SUITE 202
RALEIGH, NC 27603
NC License Number P-0755

PROJECT REFERENCE NO.	SHEET NO.
R-2829	28
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 21 OF 37

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

-Y29- POT Sta. 26+61.59=
-Y29RPA- POT Sta. 30+08.72

-Y29- POT Sta. 26+91.59=
-Y29LPA- POT Sta. 21+03.14

-Y29LPA- SC Sta. 19+76.06

-Y29LPA- CS Sta. 17+26.06

-Y29RPA- SC Sta. 26+06.08

-Y29RPA- SRS Sta. 24+08.08

-Y29RPA- CS Sta. 22+08.08

STREAM SGU

WETLAND WIV

SITE 32

-Y29RPA- TS Sta. 16+00.00

STREAM SGV

SITE 33

-Y29RPA- TS Sta. 14+00.00

-Y29LPA- POT Sta. 1338+72.59=
-Y29LPA- TS Sta. 10+00.00
71.00' LT

-Y29LPA- SC Sta. 12+50.00

WETLAND WIW

A

D

-L- POT Sta. 1338+14.19=
-Y29LPD- TS Sta. 10+00.00
71.00' Rt

-Y29LPD- SC Sta. 12+50.00

WETLAND WIX

-L- POT Sta. 1337+67.43=
-Y29- POT Sta. 32+41.75
Δ=87° 20' 14.8"

-Y29- PC Sta. 35+24.07

-Y29- PT Sta. 37+09.67

-Y29- POT Sta. 38+51.06=
-Y29LPD- POT Sta. 20+47.32

-Y29- POT Sta. 38+81.10=
-Y29RPD- POT Sta. 29+37.87

-Y29B- POT Sta. 10+00.00

-Y29RPD- CS Sta. 21+82.82

-Y29RPD- SRS Sta. 23+82.82

-Y29RPD- SC Sta. 25+82.82

-Y29RPD- PT Sta. 27+84.07

BILLY ADAMS FARMS INC

GLOVER, WALLACE EDWARD JR

BAKER, TED PRESTON BAKER, GERALDINE G

BALLEY, BARRY BAILEY, SUE

RAYNOR, BOBBY C RAYNOR, MARGARET T

BURCHETTE, BARBARA JR

S 8° 33' 50.7" E

N 79° 38' 39.3" E

N 7° 41' 35.4" W

S 54° 35.4" E

S 20° 07' 13" E

S 20° 07' 13" E

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

51499

50' 25' 0 50' 100'

SCALE: 1"=100'

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	30

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 22 OF 37

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

WETLAND WJA

STREAM SGY

WETLAND WIZ

SITE 35

SITE 34

-Y29D- PC Sta. 13+17.88

-Y29D- PT Sta. 14+97.14

15+00 -Y29D-

1375+00

1380+00

N 7° 41' 35.4" W

N 82° 18' 24.6" E

-Y29E- POT Sta. 16+87.49=
-Y29D- POT Sta. 19+10.37

20+00 -Y29E-

25+00 -Y29E-

-Y29E- PC

POWELL, JACOB L
POWELL, ANTHONY C

CRENSHAW, JOHN C III
CRENSHAW, LAURIE L

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_30.dgn
lhagney

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	32
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 23 OF 37

SCALE: 1" = 100'

WETLAND WJD

STREAM SHA

SITE 36

-L- POT Sta. 1408+80.00 =
-Y30RPB- TS Sta. 10+00.00
74.00' LT

-L- POT Sta. 1406+67.38 =
-Y30RPC- POT Sta. 10+00.00
71.00' RT

-Y30RPC- PC Sta. 15+03.50

N 3° 35' 35.9" W

1400+00

1405+00

1410+00

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL

PAVED SHOULDER

07/2018
R-2829_Hyd_prm_buf_psh_32.dgn
jhoover

REVISIONS

ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

STREAM SHB
STREAM SHD
STREAM SHE
STREAM SHC
WETLAND WJF
WETLAND WJH

SITE 37
SITE 38
SITE 39
SITE 40

-Y30RPB- PT Sta. 29+53.06
-Y30RPB- SC Sta. 26+23.45
-Y30RPB- SRS Sta. 24+23.45
-Y30RPB- CS Sta. 22+23.45
-Y30LPB- CS Sta. 20+45.14
-Y30LPB- ST Sta. 22+95.14
-Y30LPB- SC Sta. 15+00.00
-L- TS Sta. 1421+77.95
-L- SC Sta. 1424+92.95
-Y30RPC- PRC Sta. 23+36.34
-Y30RPC- PT Sta. 28+32.52
-Y30RPD- PT Sta. 25+84.92
-Y30RPD- SC Sta. 20+73.83
-Y30RPD- CS Sta. 18+73.83
-Y30- PT Sta. 24+80.04
-Y30- POT Sta. 24+33.88=
-Y30- POT Sta. 31+42.32
-Y30- POT Sta. 24+33.88=
-Y30- POT Sta. 24+49.05
-Y30- PC Sta. 26+52.17
-L- POC Sta. 1429+06.51=
-Y30LPB-US Sta. 10+00.00
-L- SC Sta. 1427+38.40=
-Y30- CS Sta. 29+41.63
-Y30- PT Sta. 30+38.14

N 3° 49' 50.0" W
S 3° 49' 50.9" E
S 74° 10' 22" E 1022.7'

B
C
D

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCHNER
H. W. LOCHNER, INC.
3840 ROZZ, PLACE, SUITE 202
RALEIGH, NC 27613
NC License Number P-0700

PROJECT REFERENCE NO.	SHEET NO.
R-2829	33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 24 OF 37

LOCATION:
TIP NO.: COUNTY:
DESIGNED BY:
CHECKED BY: DATE:

REVISIONS

LOCHNER
H. W. LOCHNER, INC.
3840 ROZZ, PLAZ, SUITE 202
RALEIGH, NC 27613
NC License Number P-0750

PROJECT REFERENCE NO.	SHEET NO.
R-2829	35
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 25 OF 37

STREAM SHH
SITE 42
WETLAND WJJ(1)
STREAM SHH
WETLAND WJJ(1)
STREAM SHC
SITE 41
WETLAND WJJ(1)
DOGWOOD OWNER LLC

B
C

-L- PC Sta. 11+95.99
-Y3IA- PT Sta. 14+40.28
-Y3IA- PC Sta. 15+96.24
-Y3IA- PT Sta. 19+80.76
-Y3IA- PC Sta. 22+90.23
-Y3IRPDB- POT Sta. 64+50.85
-Y3IRPDB- ST Sta. 3+15.26
-Y3IRPDB- CS Sta. 32+93.06
-Y3IRPDB- CS Sta. 59+18.33
-L- BL Sta. 61+16.33
-L- SC Sta. 146+02.18
-L- SRS Sta. 1456+22.18
-L- CSR Sta. 1462+62.18
-L- PCC Sta. 1461+02.18= -Y3IRPC- POT Sta. 10+00.00 65.53' RT
-Y3IRPC- TS Sta. 15+74.59
-Y3IRPC- SC Sta. 17+99.59
-Y3IRPC- PCC Sta. 1471+59.
-Y3IRPC- 15+00
-Y3IRPC- 20+00
-Y3IRPC- 25+00
-Y3IRPC- 30+00
-Y3IRPC- 35+00
-Y3IRPC- 40+00
-Y3IRPC- 45+00
-Y3IRPC- 50+00
-Y3IRPC- 55+00
-Y3IRPC- 60+00
-Y3IRPC- 65+00

S 68° 14' 43" E
N 20° 46' 22.6" E
N 6° 08' 21.3" E
S 17° 20' 25.8" W
N 24° 09' 34.4" E

ALLOWABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

PAVED SHOULDER
PAVEMENT REMOVAL

GRAPHIC SCALE
50' 25' 0 50' 100'
SCALE: 1" = 100'

LOCATION:	
TIP NO.	COUNTY:
DESIGNED BY:	
CHECKED BY:	DATE:

REVISIONS

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

SITE 43

POND PAM

STREAM SHM

WETLAND WJT

PAVED SHOULDER

PAVEMENT REMOVAL

GRAPHIC SCALE

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
3840 ROZZ PLACE, SUITE 202
RALEIGH, NC 27613

NC License Number P-0750

PROJECT REFERENCE NO.	SHEET NO.
R-2721	36

RW SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 26 OF 37

LOCATION:

TIP NO.: COUNTY:

DESIGNED BY:

CHECKED BY: DATE:

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	46
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 27 OF 37

50' 25' 0 50' 100'
SCALE: 1"=100'

10' SOIL
8' SOIL
SR 2700 WHITE OAK
30+00 -Y23-
5+00 -Y23-
-Y23- POT Sta. 31+79.82
-Y23D- POT Sta. 10+00.00
N 0° 24' 28.1" E
N 82° 53' 25.5" E
Sta. 29+52.78
-Y23- PC Sta. 32+73.72
-Y23D- PC Sta. 11+68.91
BURNETTE, R GARLAND
15+00 -Y23D-
20+00 -Y23D-
POND PAO
-Y23D- PT Sta. 19+00.02
STREAM SHT
N 10° 11' 55.4" W
-Y23RPC- POT Sta. 51.
DONALD KAY M
-Y23D-
25+00 -Y23D-
ISFD
-Y23D-
CAVINESS JOHN M
16.5' F
60' 40' 16.5'

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL
PAVED SHOULDER

SITE 44

6/7/2018
R2829_Hyd_prm_buf_psh_46.dgn
jhopper

51499

50′ 25′ 0 50′ 100′
SCALE: 1″=100′

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	46A
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 28 OF 37

PT Sta. 27+94.90

PT Sta. 28+42.60

PC Sta. 23+37.57

N 48° 16' 16.4" W

SITE 10

STREAM SFX

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

PAVEMENT REMOVAL

PAVED SHOULDER

ISBKD

9' GR

ESCONDIDO FARM RD

MUSULIN, SAMUEL
MICHAEL MUSULIN
ANNETTE D

TRUELOVE, STEVEN
BRETT TRUELOVE
ANNE S

6/7/2018
R2829_Hyd_prm_buf_path_46A.dgn
jburney

51499

50′ 25′ 0 50′ 100′

SCALE: 1″=100′

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

BUFFER DRAWING SHEET 29 OF 37

PROJECT REFERENCE NO.	SHEET NO.
R-2829	47
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

SITE 45

N 65° 10′ 50.9″ W

N 2° 39′ 52.8″ E

N 3° 08′ 37.3″ E

SR 2700 WHITE OAK RD

MT HERMAN CHRISTIAN CH

ISBKCH

CLEMENTS, RUBY CLEMENTS, ET AL

-Y23- POT Sta. 19+02.97

-Y23- PC Sta. 62+84.75

-Y23- POT Sta. 68+31.41

-Y23- POT Sta. 10+00.00

-Y23- PT Sta. 68+19.13

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_47.dgn
jhorney

51499

LOCHNER
H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612
NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	52
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 30 OF 37

50' 25' 0 50' 100'
SCALE: 1" = 100'

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

STREAM SFZ(1)

STREAM SFY

-Y24- POT Sta. 10+00.00

SITE 47

WETLAND WGV(1)

-Y24A- PC Sta. 10+74.90

-Y24B- PC Sta. 10+58.05

-Y24B- PT Sta. 11+09.87

-Y24B- POT Sta. 12+00.33

BURNETTE, R CARL JR

HAWLEY, DAVID M

US 70 BUS EBL 32' BST

PA BST

PA GR

ISBKBUS

HTR

DAM

WLB

ST

BZ 1

BZ 2

PAVEMENT REMOVAL
PAVED SHOULDER

672008
R2829_Hyd_prm_buf_pth_52.dgn
jhorsley

51499

LOCHNER

H. W. LOCHNER, INC.
2840 PLAZA PLACE, SUITE 202
RALEIGH, NC 27612

NC License Number F-0159

PROJECT REFERENCE NO.	SHEET NO.
R-2829	53
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING SHEET 31 OF 37

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

STREAM SGA

SITE 46

50' 25' 0 50' 100'
SCALE: 1" = 100'

JOHNSON, WILLIAM F
JOHNSON, BETTY H
RARTLO GARNER LLC
BUFFALOE ENTERPRISE LLC
WIEDLIN, THELMA R
25+00 -Y24-
20+00 -Y24-
15+00
-Y24- POT Sta. 14+89.38
-Y24A- POT Sta. 10+00.00
-Y24A- POC Sta. 11+58.00
-Y24B- POT Sta. 10+00.00
-Y24A- PRC Sta. 12+66.99
-Y24RPA- PT Sta. 17+57.12
-Y24RPA- 30+00
-Y24RPA- 30+25.60
BEGIN WALL STA. 17+25.00, 100.00 LT.
END WALL STA. 20+75.00, 100.00 LT.
S 68° 27' 50.8" E
US 70 BUS WBL 32' BST
RV AND MH PARK
WALNUT DR
ISBKD
ISFD
ISFBUS
PA BST
PA GR
HTR
CAN
RIPRAP
CONCRETE PAVEMENT
WLB
JS
SI
BZ 1
BZ 2
ZB 1
ZB 2

PAVEMENT REMOVAL
PAVED SHOULDER

6/7/2018
R2829_Hyd_prm_buf_psh_53.dgn
jhorney

REVISIONS

ALLOWABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

50' 25' 0 50' 100'

SCALE: 1" = 100'

LOCHNER

H. W. LOCHNER, INC.
3840 ROAD, PLAZA, SUITE 202
RALEIGH, NC 27613

MC (Name)
Number PE0705

PROJECT REFERENCE NO.	SHEET NO.
R-2829	70
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

BUFFER DRAWING
SHEET 32 OF 37

LILES, JOYCE C

8' GR

-Y3IRPD- CS Sta. 27+15.68

-Y3IRPD- 25+00

-Y3IRPD- 20+00

-Y3IRPDB- 35+00

-Y3IRPD- 30+00

-Y3IRPDB- 25+00

-Y3IRPD- SC Sta. 27+73.56

-Y3IRPD- TS Sta. 25+74.57

-Y3IRPD- 28+00

-Y3IRPDB- 15+00

-Y3IRPDB- TS Sta. 25+76.56

-Y3IRPD- POT Sta. 10+00.00

12.00' RT

-Y3IRPDB- ST Sta. 23+35.56

-Y3IRPDB- CS Sta. 20+83.56

-Y3IRPDB- SC Sta. 18+52.00

-Y3IRPD- TS Sta. 16+00.00

-Y3IRPD- 22+00

-Y3IRPDB- 15+00

-Y3IRPD- POT Sta. 75+62.30

-Y3IRPC- ST Sta. 35+52.02

SR 2601 CLIFTON RD

20' BST

HTR

S

SITE 48

STREAM SHL

WETLAND WJJ(1)

FERRELL, TERRY LANCE
FERRELL, RANDALL HUTCHINS

N 89°59'59.9" E

S 264 EBL 53' CONC

58' CONC

8' SOIL

BST

PAVED SHOULDER

PAVEMENT REMOVAL

LOCATION:

TIP NO.: COUNTY:

DESIGNED BY:

CHECKED BY: DATE:

RIPARIAN BUFFER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
1	976+37 to 979+44-L-	BRIDGE	X	X		6659	5715	12374					
		ROADWAY FILL			X				15479	12011	27490		
2	976+58 to 979+89-L-LT	ROADWAY FILL	X						12293	8855	21148		
3	1007+96 to 1009+49-L-	ROADWAY FILL	X						22223	13708	35931		
4	1011+85 to 1015+53-L-	ROADWAY FILL	X						26398	16637	43035		
5	1012+66 to 1018+97-L-	ROADWAY FILL	X						35550	21959	57509		
6	1022+29 to 1025+15-L-	ROADWAY FILL	X						19783	14778	34561		
7	1034+65 to 1039+04-L-	ROADWAY FILL	X						24697	17560	42257		
8	1060+00 to 1065+86-L-	ROADWAY FILL	X						30738	23092	53830		
9	1061+97 to 1062+13-L-	ROADWAY FILL	X						19594	14426	34020		
10	30+57 to 31+03-Y23D-	ROADWAY FILL	X			6659	5715	12374	111943	73170	185113		
11	1084+02 to 1086+91-L-	BRIDGE		X		17803	14714	32517					
12	1098+19 to 1099+72-L-	ROADWAY FILL	X						10437	12987	23424		
13	1109+39 to 1111+59-L-LT	ROADWAY FILL			X	5618	5210	10828					
14	1112+95 to 1116+45-L-	ROADWAY FILL	X						33316	19625	52941		
15	1116+45 to 1119+60-L-	ROADWAY FILL	X						34055	20709	54764		
16	1123+16 to 1126+90-L-	ROADWAY FILL	X						29850	20197	50047		
17	1137+35 to 1142+62-L-	ROADWAY FILL	X						48646	36288	84934		
18	1151+14 to 1153+07-L-	ROADWAY FILL	X						37123	35817	72939		
19	1161+48 to 1163+46-L-	ROADWAY FILL	X						23785	19198	42983		
20	1169+36 to 1171+86-L-	ROADWAY FILL	X						27877	15152	43029		
21	1171+86 to 1177+50-L-	ROADWAY FILL	X						40587	24961	65548		
TOTALS*:						**36739**	**31354**	**68093**	**604374**	**421129**	**1025503**	**0**	**0**

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/31/2018
WAKE COUNTY
R-2829

Revised 2018 Feb

RIPARIAN BUFFER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
22	1172+84 to 1180+16-L-	ROADWAY FILL	X						29403	18439	47842		
23	1195+81 to 1197+53-L-	ROADWAY FILL			X		511	511					
24	16+56 to 21+00-Y27RPA-RT	ROADWAY FILL			X				10467	14498	24964		
25	12+84 to 19+06-Y27RPD-LT	ROADWAY FILL			X				12525	12156	24681		
26	1241+54 to 1425+30-L-	ROADWAY FILL	X						28071	17995	46066		
27	1268+71 to 1270+20-L-	ROADWAY FILL	X						14360	11002	25362		
28	1287+25 to 1288+82-L-	ROADWAY FILL	X						28554	18890	47444		
29	1314+30 to 1320+00-L-	ROADWAY FILL			X				21356	15373	36729		
				X		14229	6719	20948					
30	1320+00 to 1322+44-L-	BRIDGE		X		13439	7180	20619					
31	1324+06 to 1325+48-L-RT	ROADWAY FILL			X	0	511	511	94826	74089	168916		
32	1345+21 to 1350+58-L-	ROADWAY FILL	X						62578	32897	95475		
33	1347+13 to 1355+48-L-	ROADWAY FILL	X						59395	33366	92761		
34	1377+60 to 1381+40-L-RT	ROADWAY FILL			X				20238	13161	33398		
35	1380+19 to 1381+93-L-	ROADWAY FILL	X						15266	9586	24852		
36	1404+31 to 1405+98-L-	ROADWAY FILL	X						26039	17710	43749		
37	15+02 to 16+21-Y30RPB-LT	ROADWAY FILL			X	2533	3127	5660					
38	21+02 to 34+85-Y30-RT	ROADWAY FILL			X				77300	26249	103549		
39	34+32 to 35+90-Y30-	ROADWAY FILL	X						13102	6722	19824		
40	22+40 to 23+47-Y30RPD-LT	ROADWAY FILL			X	283	1974	2257					
41	1459+65 to 1469+99-L-	ROADWAY FILL			X				64807	38592	103400		
				X		21800	17616	39416					
TOTALS*:						**52285**	**37637**	**89922**	**578287**	**360725**	**939012**	**0**	**0**

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/31/2018
WAKE COUNTY
R-2829

RIPARIAN BUFFER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	IMPACTS									BUFFER REPLACEMENT	
			TYPE			ALLOWABLE			MITIGABLE				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)	TOTAL (ft^2)	ZONE 1 (ft^2)	ZONE 2 (ft^2)
42	24+14 to 23+70-Y31RPB-	ROADWAY FILL	X						21997	14586	36583		
43	17+44 to 19+54-Y321LPD-LT	ROADWAY FILL			X				11356	10814	22170		
44	19+53 to 22+56-Y23D-	ROADWAY FILL	X						15035	10767	25802		
45	61+10 to 65+35-Y23-	ROADWAY FILL	X			6855	6263	13118					
46	24+13 to 25+89-Y24-	ROADWAY FILL	X						13891	12178	26069		
47	9+87 to 12+45-Y24-RT	ROADWAY FILL			X	3283	5704	8987					
48	11+42 to 12+60-Y31RPD-	ROADWAY FILL	X			6758	6091	12849					
	TOTALS SHEET 35					**16896**	**18058**	**34954**	**62279**	**48345**	**110624**		
	TOTALS SHEET 33					**36739**	**31354**	**68093**	**604374**	**421129**	**1025503**		
	TOTALS SHEET 34					**52285**	**37637**	**89922**	**578287**	**360725**	**939012**		
TOTALS*:						**105920**	**87049**	**192969**	**1244940**	**830199**	**2075139**	**0**	**0**

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
7/31/2018
WAKE COUNTY
R-2829

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
1	976+37 to 979+44-L-		11301	2574
2	976+58 to 979+89-L-LT		6794	2923
5	1012+66 to 1018+97-L-		5835	38
6	1022+29 to 1025+15-L-		3684	919
7	1034+65 to 1039+04-L-		4484	1977
8	1060+00 to 1065+86-L-		916	
9	1061+97 to 1062+13-L-		937	
12	1098+19 to 1099+72-L-		8124	5398
13	1109+40 to 1111+59-L-LT		3934	1680
14	1112+95 to 1116+45-L-		17888	8918
15	1114+39 to 1119+60-L-		13745	9230
16	1123+16 to 1126+90-L-		10075	1256
18	1151+14 to 1153+07-L-		26681	9423
20	1169+36 to 1171+86-L-		16048	3862
21	1171+86 to 1177+50-L-		1674	
22	1172+84 to 1180+16-L-		12124	360
25	12+84 to 19+06-Y27RPD-LT		3948	851
26	1241+54 to 1425+30-L-		1114	146
27	1268+71 to 1270+20-L-		2148	16
TOTAL:			**151455**	**49570**

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
6/13/2018
WAKE COUNTY
R-2829

Revised 2018 Feb

WETLANDS IN BUFFER IMPACTS SUMMARY

SITE NO.	STATION (FROM/TO)		WETLANDS IN BUFFERS ZONE 1 (ft^2)	WETLANDS IN BUFFERS ZONE 2 (ft^2)
29	1314+30 to 1320+00-L-		4611	490
32	1345+21 to 1350+58-L-		6137	3805
34	1377+60 to 1381+40-L-RT		1791	1181
35	1380+19 to 1381+93-L-		2582	213
36	1404+31 to 1405+98-L-		11788	4780
37	15+02 to 16+21-Y30RPB-LT		2197	1937
38	21+02 to 34+85-Y30-RT		1621	4833
41	1459+65 to 1469+99-L-		62900	39991
42	24+14 to 23+70-Y31RPB-		16120	5897
43	17+44 to 19+54-Y321LPD-LT		772	493
47	9+87 to 12+45-Y24-RT		2393	1776
48	11+42 to 12+60-Y31RPD-		4556	2857
	TOTAL FROM THIS SHEET:		**117467**	**68253**
	TOTAL FROM SHEET 36:		**151455**	**49570**
TOTAL:			**268922**	**117823**

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
6/13/2018
WAKE COUNTY
R-2829

SHEET 37 OF 37

Revised 2018 Feb