



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 24, 2008

Addendum No. 1

RE: Contract ID: C201818

WBS# 34461.3.GV1

F. A. No. NHS-70(106)

Wayne County (R-2554BA)

US-70 (Goldsboro Bypass) From East of SR-1300
(Salem Church Road) To East of SR-1556
(Wayne Memorial Drive)

August 19, 2008 Letting

To Whom It May Concern:

Reference is made to the proposal form recently furnished to you on this project.

The following revisions have been made to the proposal form:

On Page No.6, one sentence was deleted from the fifth paragraph of the project special provision entitled "Intermediate Contract Time Number 8 Incentive Payment and Liquidated Damages (RR Flaggers)". Please void Page No.6 in your proposal and staple the revised Page No.6 thereto.

On Page No.34 the project special provision entitled "Delay In Right of Entry" has been added. Please void Page No.34 in your proposal and staple the revised Page No.34 thereto.

On Page Nos.118 and 119 the project special provision entitled "Seeding and Mulching" has been revised to make some corrections to the seed rates and to eliminate "Centipede" as a substitute for "Bahigrass". Please void Page Nos.118 and 119 in your proposal and staple the revised Page Nos.118 and 119 thereto.

On Page No.275, the first paragraph of the project special provision entitled "Permits" has been revised. Also new Page Nos.276 thru 482 have been added to include the required 404 and 401 permits. Please void Page No.275 in your proposal and staple the revised Page No.275 and new Page Nos.276 thru 482 thereto.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
CONTRACTS & PROPOSALS
1591 MAIL SERVICE CENTER
RALEIGH NC 27699-1591

TELEPHONE: 919-250-4124
FAX: 919-250-4127

WEBSITE: WWW.NCDOT.ORG

LOCATION:
CENTURY CENTER COMPLEX
BUILDING B - ENTRANCE B15
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610

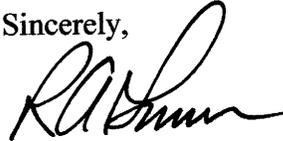
Page 2

RE: Contract ID: C201818

Wayne County (R-2554BA)

The first page of the Table of Contents has been revised to reflect the above noted changes. Please void the first page of the Table of Contents in your proposal and staple the revised page thereto.

Sincerely,



R. A. Garris, PE
Contract Officer

RAG/jag/ljs
Attachments

Cc: Mr. W. S. Varnedoe, PE
Mr. E. C. Powell, PE
Mr. R. E. Greene, PE
Ms. D.M. Barbour, PE
Mr. Art McMillan, PE
Mr. J. V. Barbour, PE
Mr. Mark Staley (2)
Mr. Robert Memory
Mr. R. E. Davenport, Jr., PE
Ms. Norma Smith
Ms. Marsha Sample
Mr. Ronnie Higgins
Mr. Larry Strickland
Ms. Lori Strickland
Project File (2)

TABLE OF CONTENTS

**COVER SHEET
PROPOSAL SHEETS**

<u>PROJECT SPECIAL PROVISIONS</u> (GREEN SHEETS)	<i>PAGE No.</i>
Contract Time and Liquidated Damages.....	1
Intermediate Contract Time No. 1	1
Substantial Completion.....	2
Intermediate Contract Time Nos. 2-7.....	2-6
Intermediate Contract Time No. 8, Incentive Payment and Liquidated Damages (RR Flaggers)	6-7
Construction Moratorium.....	7
Major Contract Items.....	7
Specialty Items.....	7
Fuel Price Adjustment (Metric).....	7-8
Schedule of Estimated Completion Progress.....	8
Disadvantaged Business Enterprises.....	9-19
Progress Schedule.....	19-20
Certification for Federal-Aid Contracts.....	20-21
Contractor Licenses Requirements.....	21
Submission of Bids – Alternates.....	21
U. S. Department of Transportation Hotline.....	22
Subsurface Information.....	22
Portable Concrete Barrier (Partial Payments for Materials).....	22
Maintenance of the Project.....	22-23
Bid Documentation.....	23-26
Twelve Month Guarantee.....	26
Outsourcing Outside U.S.A.....	27
Act of God.....	27
Erosion & Sediment Control / Storm Water Certification.....	27-32
Procedure for Monitoring Borrow Pit Discharge.....	32-34
Note to Contractor.....	34
Delay In Right of Entry	34
Roadway.....	35-90
Signing.....	91-107
Traffic Control.....	108-114
Utility Construction.....	115
Utilities By Others.....	116-117
Erosion Control.....	118-150
Signals and Intelligent Transportation Systems.....	151-179
Project Special Provisions Structure / Culverts.....	180-262
Railroad Special Provisions	263-274
<u>PERMITS</u> (WHITE SHEETS).....	275-482

INTERMEDIATE CONTRACT TIME NUMBER 7 AND LIQUIDATED DAMAGES:

(2-20-07)

MI G14 F

The Contractor shall complete the work required of **Area IV, Step 5** as shown on Sheet **TCP-26** and shall place and maintain traffic on same.

The time of availability for this intermediate contract time will be the **Friday at 7:00 P.M.** that the Contractor elects to begin the work.

The completion time for this intermediate contract time will be the following **Monday at 7:00 A.M.** after the time of availability.

The liquidated damages are **Five Hundred Dollars (\$ 500.00)** per hour.

INTERMEDIATE CONTRACT TIME NUMBER 8**INCENTIVE PAYMENT AND LIQUIDATED DAMAGES (RR FLAGGERS):**

(8-19-08)

SPI 1-1A

The Contractor shall complete all work included in this contract which requires a railroad flagger within an aggregate total of **Two Hundred Sixty (260)** days of flagger use.

The day of availability for this intermediate contract time will be the first day on which a railroad flagger is used.

The work requiring a railroad flagger is hereinafter referred to as "intermediate contract work".

It is mutually agreed that time is of the essence in completing all of this "intermediate contract work". It is further mutually agreed a delay in completing this work will result in damage due to increased engineering and flagger costs to the Department of Transportation.

By reason of the necessity of completing this "intermediate contract work", it is mutually agreed the Contractor will receive an incentive payment of **Six Hundred Seventy-Five Dollars (\$675.00)** per flagger day fewer than an aggregate total of **two hundred sixty (260) flagger** days that this "intermediate contract work" is completed. Incentive payment determined to be due the Contractor will be paid by the Department within forty-five (45) calendar days after completion of all of this "intermediate contract work". No incentive payment will be allowed if the contract is terminated under the provisions of Article 108-13.

Liquidated damages of **Six Hundred Seventy-Five Dollars (\$675.00)** per **flagger** day will be assessed the Contractor for each **flagger** day the "intermediate contract work" exceeds an aggregate total of **two hundred sixty (260) flagger** days.

The Engineer will withhold the liquidated damages as they accrue from the amount of monies due on work performed in the contract.

Upon apparent satisfactory completion of this "intermediate contract work", a final inspection will be held on this "intermediate contract work" in accordance with Article 105-17 and upon acceptance, the State will assume responsibility for the costs of other railroad flagging.

grams of soil may indicate a high potential for turbidity and should be avoided when dewatering into surface water is proposed.

No additional compensation for monitoring borrow pit discharge will be paid.

NOTES TO CONTRACTOR:

1. Extra Handling of Unclassified Excavation

Aerate and dry any unclassified excavation material containing moisture content in excess of what is required to achieve embankment stability and specified density.

2. Lateral Ditches

Excavate lateral ditches to full depth and designated outlets. Allow drainage to function for 30 days or an adequate time designed by the Engineer prior to undercutting or any embankment construction.

3. Subsurface Drainage Underdrain

Perforated, 6-inch diameter underdrain is to be installed 6 feet below subgrade, or as deep as outfall will allow.

Excavate and install underdrain to full depth and to designated outlets. Allow drainage to function for 30 days or an adequate time designated by the Engineer prior to undercutting or any embankment construction.

4. Erosion Control

The Contractor's attention is directed the Special Provision entitled "**Contractor Requirements for Stream Relocations, Restorations and Enhancements**", located in the Erosion Control Project Special Provisions.

DELAY IN RIGHT OF ENTRY:

(7-1-95)

SPI G22

The Contractor will not be allowed right of entry to the parcels listed below before **September 1, 2008** unless otherwise permitted by the Engineer.

<u>Parcel No.</u>	<u>Property Owner</u>
11	Velma Edwards
038	Nora Smith et al

R-2554BA

**Project Special Provisions
Erosion Control**

Wayne County

SEEDING AND MULCHING:

(East)

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in kilograms per hectare.

All Roadway Areas

March 1 - August 31

55kg	Tall Fescue
28kg	Bermudagrass (hulled)
560kg	Fertilizer
4500kg	Limestone

September 1 - February 28

55kg	Tall Fescue
40kg	Bermudagrass (unhulled)
560kg	Fertilizer
4500kg	Limestone

Waste and Borrow Locations

March 1 - August 31

85kg	Tall Fescue
28kg	Bermudagrass (hulled)
560kg	Fertilizer
4500kg	Limestone

September 1 - February 28

85kg	Tall Fescue
40kg	Bermudagrass (unhulled)
560kg	Fertilizer
4500kg	Limestone

Note: 55kg of Bahiagrass may be substituted for Bermudagrass only upon Engineer's request.

Approved Tall Fescue Cultivars

2 nd Millennium	Duster	Magellan	Rendition
Avenger	Endeavor	Masterpiece	Scorpion
Barlexas	Escalade	Matador	Shelby
Barlexas II	Falcon II, III, IV & V	Matador GT	Signia
Barrera	Fidelity	Millennium	Silverstar
Barrington	Finesse II	Montauk	Southern Choice II
Biltmore	Firebird	Mustang 3	Stetson
Bingo	Focus	Olympic Gold	Tarheel
Bravo	Grande II	Padre	Titan Ltd
Cayenne	Greenkeeper	Paraiso	Titanium
Chapel Hill	Greystone	Picasso	Tomahawk
Chesapeake	Inferno	Piedmont	Tacer
Constitution	Justice	Pure Gold	Trooper
Chipper	Jaguar 3	Prospect	Turbo
Coronado	Kalahari	Quest	Ultimate
Coyote	Kentucky 31	Rebel Exeda	Watchdog

Davinci	Kitty Hawk	Rebel Sentry	Wolfpack
Dynasty	Kitty Hawk 2000	Regiment II	
Dominion	Lexington	Rembrandt	

On cut and fill slopes 2:1 or steeper add 23kg of Sericea Lespedeza from January 1 - December 31.

Fertilizer shall be 10-20-20 analysis. A different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis and as directed.

Native Grass Seeding and Mulching

Bermuda

Native Grass Seeding and Mulching shall be performed on the disturbed areas of wetlands, and adjacent to Stream Relocation construction within a 16 meter zone on both sides of the stream or depression, measured from top of stream bank or center of depression. The stream bank of the stream relocation shall be seeded by a method that does not alter the typical cross section of the stream bank. Native Grass Seeding and Mulching shall also be performed in the permanent soil reinforcement mat section of preformed scour holes, and in other areas as directed.

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined. All rates are in kilograms per hectare.

March 1 - August 31		September 1 - February 28	
28kg	Bermudagrass (hulled)	40kg	Bermudagrass (unhulled)
7kg	Indiangrass	7kg	Indiangrass
9kg	Little Bluestem	9kg	Little Bluestem
5kg	Switchgrass	5kg	Switchgrass
28kg	Browntop Millet	39kg	Rye Grain
560kg	Fertilizer	560kg	Fertilizer
4500kg	Limestone	4500kg	Limestone

Fertilizer shall be 10-20-20 analysis. Upon written approval of the Engineer, a different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

Native Grass Seeding and Mulching shall be performed in accordance with Section 1660 of the *Standard Specifications* and vegetative cover sufficient to restrain erosion shall be installed immediately following grade establishment.

Measurement and Payment

Native Grass *Seeding and Mulching* will be measured and paid for in accordance with Article 1660-8 of the *Standard Specifications*.

275

PROJECT SPECIAL PROVISION

(10-18-95)

Z-1

PERMITS

The Contractor's attention is directed to the following permits, which have been issued to the Department of Transportation by the authority granting the permit.

<u>PERMIT</u>	<u>AUTHORITY GRANTING THE PERMIT</u>
Dredge and Fill and/or Work in Navigable Waters (404)	U. S. Army Corps of Engineers
Water Quality (401)	Division of Environmental Management, DENR State of North Carolina
Buffer Certification	Division of Environmental Management, DENR State of North Carolina

The Contractor shall comply with all applicable permit conditions during construction of this project. Those conditions marked by * are the responsibility of the department and the Contractor has no responsibility in accomplishing those conditions.

Agents of the permitting authority will periodically inspect the project for adherence to the permits.

The Contractor's attention is also directed to Articles 107-10 and 107-14 of the *Standard Specifications* and the following:

Should the Contractor propose to utilize construction methods (such as temporary structures or fill in waters and/or wetlands for haul roads, work platforms, cofferdams, etc.) not specifically identified in the permit (individual, general, or nationwide) authorizing the project it shall be the Contractor's responsibility to coordinate with the Engineer to determine what, if any, additional permit action is required. The Contractor shall also be responsible for initiating the request for the authorization of such construction method by the permitting agency. The request shall be submitted through the Engineer. The Contractor shall not utilize the construction method until it is approved by the permitting agency. The request normally takes approximately 60 days to process; however, no extensions of time or additional compensation will be granted for delays resulting from the Contractor's request for approval of construction methods not specifically identified in the permit.

Where construction moratoriums are contained in a permit condition which restricts the Contractor's activities to certain times of the year, those moratoriums will apply only to the portions of the work taking place in the waters or wetlands provided that activities outside those areas is done in such a manner as to not affect the waters or wetlands.

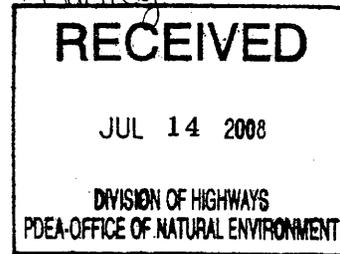
276



IN REPLY REFER TO

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
Washington Regulatory Field Office
Post Office Box 1000
Washington, North Carolina 27889-1000

July 10, 2008



Regulatory Division

Action ID. SAW 2008-00252

Gregory J. Thorpe, Ph.D.
Environmental Manager Director
Project Development and Environmental Analysis Branch
N.C. Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1548

Dear Dr. Thorpe,

In accordance with your written request of January 6, 2008, and the ensuing administrative record, enclosed are two copies of a permit to relocate and widen approximately 20 miles of US Highway 70 Goldsboro Bypass (TIP R-2554), starting from Aulander Road (NCSR 1381) west of Goldsboro, in Wayne County and ending east of Promise Land Road (NCSR 1323) southwest of LaGrange, in Lenoir County, North Carolina.

You should acknowledge that you accept the terms and conditions of the enclosed permit by signing and dating each copy in the spaces provided ("Permittee" on page 3). Your signature, as permittee, indicates that, as consideration for the issuance of this permit, you voluntarily accept and agree to comply with all of the terms and conditions of this permit. All pages of both copies of the signed permit with drawings should then be returned to this office for final authorization. A self-addressed envelope is enclosed for your convenience.

This correspondence contains an initial proffered permit for the above described activity. If you object to this decision or the enclosed special conditions you may request that the District Commander reconsider his decision. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and request for appeal (RFA) form. If you request to appeal this decision you must submit a completed RFA form to the District Commander, Wilmington District Corps of Engineers at the following address:

Col. John E. Pulliam, Jr., District Commander
US Army Corps of Engineers, Wilmington District
Post Office Box 1890
Wilmington, NC 28402-1890

277

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete and that it has been received by the District Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by September 8, 2008.

It is not necessary to submit an RFA form to the District Office if you do not object to the decision in contained in this correspondence.

After the permit is authorized in this office, the original copy will be returned to you; the duplicate copy will be permanently retained in this office. If you have questions, please contact William Wescott at the Washington Regulatory Field Office, telephone 252-975-1616 ext. 31.

Sincerely,

A handwritten signature in black ink, appearing to read "David M. Lekson". The signature is fluid and cursive, with a long horizontal stroke at the end.

David M. Lekson, P.W.S.
Chief, Washington Regulatory Field Office

Enclosures

Perform work in or affecting navigable waters of the United States, upon recommendation of the Chief of Engineers, pursuant to SECTION 10 of the Rivers and Harbor Act of March 3, 1899

Discharge dredged or fill material into waters of the United States upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 404 of the Clean Water Act

Transport dredged material for the purpose of dumping it into ocean waters upon the issuance of a permit from the Secretary of the Army acting through the Chief of Engineers pursuant to Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972

DEPARTMENT OF THE ARMY PERMIT

Permittee **North Carolina Department of Transportation, Gregory J. Thorpe, Ph.D.**

Permit No. **SAW 2008-00252**

Issuing Office **CESAW-RG-W**

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: The proposed T.I.P. project R-2554 involves constructing a divided multi-lane, full control of access freeway, interchanges at locations with major traffic movements, and grade separations at minor crossroads and railroads. The project is approximately 20 miles long and proposes to construct on new location US Highway 70 north of Goldsboro. The T.I.P. R-2554 project would permanently impact 27.62 acres of jurisdictional wetlands and 13,153 linear feet of stream. The project would temporarily impact 0.24 acres of jurisdictional wetlands and 488 linear feet of stream.

Project Location: This project involves the construction of a new US Highway 70 Goldsboro Bypass starting from Aulander Road (NCSR 1381) west of Goldsboro, in Wayne County and ending east of Promise Land Road (NCSR 1323) southwest of LaGrange, in Lenoir County, North Carolina .

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **December 31, 2013**. 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:
 - (X) 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.

SPECIAL CONDITIONS (Action ID. SAW 2008-00252; NCDOT/TIP R-2554)**COMPLIANCE WITH PLANS**

- a) This authorization is only for R-2554 section BA. Construction on R-2554 sections A, BB and C shall not commence until final designs have been completed and plans have been approved by the District Engineer.
- b) All work must be performed in strict compliance with the attached plans, which are a part of this permit. Any modification to the permit plans must be approved by the USACE prior to implementation.

ACTIVITIES NOT AUTHORIZED

- c) Except as authorized by this permit or any USACE 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, nor shall any activities take place that cause the degradation of waters or wetlands. 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.

This permit does not authorize temporary placement or double handling of excavated or fill material within jurisdictional waters, including wetlands, outside the permitted area. Additionally, no construction materials or equipment will be placed or stored within jurisdictional waters, including wetlands.

CONSTRUCTION PLANS

- d) The Permittee will ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Written verification shall be provided that the final construction drawings comply with the attached permit drawings prior to any active construction in waters of the United States, including wetlands. Any deviation in the construction design plans will be brought to the attention of the Corps of Engineers, Washington Regulatory Field Office prior to any active construction in waters or wetlands.
- e) Prior to commencing construction within jurisdictional waters of the United States for any portion of the proposed project, the Permittee shall forward the latest version of project construction drawings to the Corps of Engineers, Washington Regulatory Field Office NCDOT Regulatory Project Manager. Half-size drawings will be acceptable.

POLLUTION SPILLS

- f) All mechanized equipment will be regularly inspected and maintained to prevent contamination of waters and wetlands from fuels, lubricants, hydraulic fluids, or other toxic materials. No equipment staging or storage of construction material will occur in wetlands. Hydro-seeding equipment will not be discharged or washed out into any surface waters or wetlands. 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) 733-5083 or (800) 662-7956 and provisions of the North Carolina Oil Pollution and Hazardous Substances Control Act will be followed.

NOTIFICATION

283

g) The Permittee shall advise the Corps in writing at least two weeks prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

CLEAN FILL MATERIAL

h) Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source and will be clean and free of any pollutants except in trace quantities. Metal products, organic materials (including debris from land clearing activities), or unsightly debris will not be used.

CONTRACTOR COMPLIANCE

i) 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, and any authorized modifications. A copy of this permit, and any authorized modifications, including all conditions, shall be available at the project site during construction and maintenance of this project.

SEDIMENTATION AND EROSION CONTROL MEASURES

j) 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 assure compliance with the appropriate turbidity water quality standard. 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 assure compliance with the appropriate turbidity water quality standards. Additionally, the project must 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 must be implemented prior to any ground disturbing activities to minimize impacts to aquatic resources. These measures must be inspected and maintained regularly, especially following rainfall events. All fill material must be adequately stabilized at the earliest practicable date to prevent sediment from entering into adjacent waters or wetlands.

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

No fill or excavation for the purposes of sedimentation and erosion control shall occur within jurisdictional waters, including wetlands, unless it is included on the plan drawings and specifically authorized by this permit.

REPORTING OF VIOLATIONS

k) The Permittee will report any violation of these conditions or violations of Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act in writing to the Corps of Engineers, Washington Regulatory Field Office NCDOT Regulatory Project Manager, within 24 hours of the Permittee's discovery of the violation.

COMPLIANCE WITH SPECIAL CONDITIONS

l) Failure to institute and carry out the details of these special conditions, will result in a directive to cease all ongoing and permitted work within waters and/or wetlands associated with the permitted project, or such other remedies and/or fines as the District Engineer or his authorized representatives may seek.

PRECONSTRUCTION MEETING

- * m) The Permittee shall schedule a preconstruction meeting between its representatives, the contractor's representatives, and the Corps of Engineers, Washington Regulatory Field Office, NCDOT Regulatory Project Manager, prior to any work within jurisdictional waters and wetlands to ensure that there is a mutual understanding of all of the terms and conditions contained within this Department of the Army Permit. The Permittee shall provide the Corps of Engineers, Washington Regulatory Field Office, NCDOT Regulatory Project Manager, with a copy of the final plans at least two weeks prior to the preconstruction meeting along with a description of any changes that have been made to the project's design, construction methodology or construction timeframe. The Permittee shall schedule the preconstruction meeting for a time when the Corps of Engineers and North Carolina Division of Water Quality (NCDWQ) Project Managers can attend. The Permittee shall invite the Corps and NCDWQ 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.

BORROW AND WASTE

n) To ensure that all borrow and waste activities occur on high ground and do not result in the degradation of adjacent wetlands and streams, except as authorized by this permit, the Permittee shall require its contractors and/or agents to identify all areas to be used to borrow material, or to dispose of dredged, fill, or waste material. The Permittee shall provide the Corps of Engineers with appropriate maps indicating the locations of proposed borrow or waste sites as soon as the Permittee has that information. The Permittee will coordinate with the Corps of Engineers before approving any borrow or waste sites that are within 400 feet of any streams or wetlands. All jurisdictional wetland boundaries on borrow and waste sites shall be verified by the Corps of Engineers and shown on the approved reclamation plans. The Permittee shall ensure that all such areas comply with Special Condition b) of this permit, and shall require and maintain documentation of the location and characteristics of all borrow and disposal sites associated with this project. This information will include data regarding soils, vegetation and hydrology sufficient to clearly demonstrate compliance with the Special Condition b). All information will be available to the Corps of Engineers upon request. NCDOT shall require its contractors to complete and execute reclamation plans for each waste and borrow site and provide written documentation that the reclamation plans have been implemented and all work is completed. This documentation will be provided to the Corps of Engineers within 30 days of the completion of the reclamation work.

MITIGATION

o) Compensatory mitigation for the unavoidable impacts to 27.62 acres of wetlands and 13,153 linear feet of streams associated with the proposed project shall be provided as outlined in the permit application and drawings with the following modifications.

- R-2554 C directly impacts Bear Creek-Mill Branch Mitigation Bank (Bank). The mitigation banking instrument, conservation easement and available credits for the Bank shall be modified to reflect the impacts resulting from R-2554 C prior to the authorization of Sections A, BB or C.
- Stream mitigation sites and wetland mitigation sites shall be monitored annually for five years or until

success criteria are satisfied, whichever is longer.

- Vegetation success shall be achieved by documenting the survival of 320, 3-year old planted stems/acre at year three (3) and 260, 5-year old planted stems/acre at year five (5).
- For wetland mitigation Site 8, hydrologic success shall be achieved by documenting the inundation or saturation of the soils within 12 inches of the ground surface for at least 12.5 percent of the growing season.



286

Michael F. Easley, Governor
William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Coleen Sullins, Director
Division of Water Quality

Manley

RECEIVED

May 16, 2008

MAY 22 2008

DIVISION OF HIGHWAYS
PDEA-OFFICE OF NATURAL ENVIRONMENT

Dr. Greg Thorpe, PhD., Manager
Planning and Environmental Branch
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina, 27699-1548

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and NEUSE BUFFER RULES, with ADDITIONAL CONDITIONS for Proposed construction of US 70 Goldsboro Bypass in Wayne and Lenoir Counties, Federal Aid Project No. F-56-2(28), State Project No. 8.T330801, TIP No. R-2554, DWQ Project No. 20080570.

Dear Dr. Thorpe:

Attached hereto is a copy of Certification No. 3740 issued to The North Carolina Department of Transportation dated May 16, 2008.

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

Sincerely,

Coleen Sullins,
Director

Attachments

cc: William Wescott, US Army Corps of Engineers, Washington Field Office
Chris Manley, NCDOT NEU
Chad Coggins, Division 4 Environmental Officer
Jay Johnson, Division 2 Environmental Officer
Kathy Matthews, Environmental Protection Agency
Travis Wilson, NC Wildlife Resources Commission
Beth Harmon, Ecosystem Enhancement Program
DWQ Washington Regional Office
File Copy



401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act and NEUSE BUFFER RULES, 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 Quality (DWQ) Regulations in 15 NCAC 2H .0500 and 15A NCAC 2B.0233. This certification authorizes the NCDOT to impact 31.42 acres of jurisdictional wetlands, 13,640 linear feet of jurisdictional streams and 1,622,079 square feet of protected riparian buffers in Wayne and Lenoir Counties. The project shall be constructed pursuant to the application dated received March 28, 2008. The authorized impacts are as described below:

Section BA Stream Impacts in the Neuse River Basin

Site	Permanent Fill in Intermittent Stream (linear ft)	Temporary Fill in Intermittent Stream (linear ft)	Permanent Fill in Perennial Stream (linear ft)	Temporary Fill in Perennial Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation (linear ft)
1	0	0	142	22	164	142
2	0	0	24	22	46	24
3	0	0	1048	31	1079	1048
4	115	0	1058	84	1257	1058
5	0	0	541	34	575	541
8	0	0	0	30	30	0
11	0	0	831	20	851	831
14	0	0	128	11	139	128
Total	115	0	3772	254	4141	3772

Total Stream Impact for Section BA: 4,141 linear feet

Preliminary Section A Stream Impacts in the Neuse River Basin*

Site	Permanent Fill in (Perennial)* Stream (linear ft)	Temporary Fill in (Perennial)* Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation* (linear ft)
1	246	0	246	246
3	276	0	276	276
4	204	0	204	204
5	223	0	223	223
Total	949	0	949	949

Total Preliminary Stream Impact for Section A: 949 linear feet

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section. For purposes of these preliminary impact calculations, all stream impacts will be assumed to be Perennial and cumulative, and thus require mitigation by DWQ, until applicant specifies otherwise in the final calculations for the modification.*



Preliminary Section BB Stream Impacts in the Neuse River Basin*

Site	Permanent Fill in (Perennial)* Stream (linear ft)	Temporary Fill in (Perennial)* Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation* (linear ft)
3	1149	55	1204	1149
4	952	48	1000	952
9	1556	90	1646	1556
10	19	10	29	19
12	133	20	153	133
13	92	10	102	92
Total	3901	233	4134	3901

Total Preliminary Stream Impact for Section BB: 4,134 linear feet

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section. For purposes of these preliminary impact calculations, all stream impacts will be assumed to be Perennial and cumulative, and thus require mitigation by DWQ, until applicant specifies otherwise in the final calculations for the modification.*

Preliminary Section C Stream Impacts in the Neuse River Basin*

Site	Permanent Fill in (Perennial)* Stream (linear ft)	Temporary Fill in (Perennial)* Stream (linear ft)	Total Stream Impact (linear ft)	Stream Impacts Requiring Mitigation* (linear ft)
1	1395	0	1395	1395
3	660	0	660	660
4	378	0	378	378
5	328	0	328	328
10	338	0	338	338
11	427	0	427	427
12	483	0	483	483
14	407	0	407	407
Total	4416	0	4416	4416

Total Preliminary Stream Impact for Section C: 4,416 linear feet

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section. For purposes of these preliminary impact calculations, all stream impacts will be assumed to be Perennial and cumulative, and thus require mitigation by DWQ, until applicant specifies otherwise in the final calculations for the modification.*

Section BA Wetland Impacts in the Neuse River Basin

Site	Fill (ac)	Fill (temporary) (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)	Wetland Impacts Requiring Mitigation (ac)
3	1.57	0	0.07	0	1.64	1.64
5	0.06	0	0.01	0	0.07	0.07
6	0	0	0.03	0	0.03	0.03
7	0	0	0.01	0.72	0.73	0.01
8	0	0	0	0.04	0.04	0
9	0.12	0	0.03	1.42	1.57	0.15
10	2.65	0	0.31	0	2.96	2.96
11	0.10	0	0.03	0	0.13	0.13
12	0.75	0	0.04	0	0.79	0.79
Total	5.25	0	0.53	2.18	7.96	5.78

Total Wetland Impact for Section BA: 7.96 acres.



Preliminary Section A Wetland Impacts in the Neuse River Basin *

Site	Fill (ac)	Fill (temporary) (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)	Wetland Impacts Requiring Mitigation (ac)
1	0.85	0	0.10	0	0.95	0.95
2	0.14	0	0.04	0	0.18	0.18
3	0.10	0	0.02	0	0.12	0.12
4	0.62	0	0.04	0	0.66	0.66
5	0.18	0	0.02	0	0.20	0.20
6	0	0	0	0.95	0.95	0
7	0.04	0	0.04	0	0.08	0.08
8	0	0.24	0.06	0	0.30	0.06
Total	1.93	0.24	0.32	0.95	3.44	2.25

Total Preliminary Wetland Impact for Section A: 3.44 acres.

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section.*

Preliminary Section BB Wetland Impacts in the Neuse River Basin *

Site	Fill (ac)	Fill (temporary) (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)	Wetland Impacts Requiring Mitigation (ac)
1	0	0	0	0.44	0.44	0
6	0.16	0	0	0	0.16	0.16
7	0.20	0	0.06	0	0.26	0.26
10	0	0	0.02	0	0.02	0.02
Total	0.36	0	0.08	0.44	0.88	0.44

Total Preliminary Wetland Impact for Section BB: 0.88 acres.

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section.*

Preliminary Section C Wetland Impacts in the Neuse River Basin *

Site	Fill (ac)	Fill (temporary) (ac)	Excavation (ac)	Mechanized Clearing (ac)	Total Wetland Impact (ac)	Wetland Impacts Requiring Mitigation (ac)
4	0.30	0	0	0	0.30	0.30
6	1.71	0	0	0.10	1.81	1.81
7	3.09	0	0	0.25	3.34	3.34
8	0.22	0	0.01	0.06	0.29	0.29
9	1.97	0	0	0.13	2.10	2.10
10	1.09	0	0	0.14	1.23	1.23
11	1.66	0	0	0.18	1.84	1.84
12	4.65	0	0	0.55	5.20	5.20
13	0.62	0	0	0.22	0.84	0.84
14	2.03	0	0	0.16	2.19	2.19
Total	17.34	0	0.01	1.79	19.14	19.14

Total Preliminary Wetland Impact for Section C: 19.14 acres.

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section.*



Section BA 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 Impacts Requiring Mitigation (sq ft)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Impacts Requiring Mitigation (sq ft)
1	9909	0	9909	9909	5820	0	5820	5820
2	2671	0	2671	0	1639	0	1639	0
3	60642	37903	22739	22739	37274	15780	21494	21494
4	68271	0	68271	68271	42177	0	42177	42177
5	131027	2569	128458	128458	89077	539	88538	88538
7	9396	6745	2651	0	7149	1392	5757	0
8	1929	706	1223	0	555	250	305	0
9	8763	5785	2978	0	5887	2796	3091	0
11	51025	2398	48627	48627	32871	1224	31647	31647
13	5490	0	5490	5490	4512	0	4512	4512
14	7383	0	7383	0	4875	0	4875	0
Totals	356506	56106	300400	283494	231836	21981	209855	194188

Total Buffer Impact for Section BA: 588,342 square feet.

Section BA Neuse Buffer Onsite Restoration

Site	Zone 1 Restoration (sq ft)	Zone 2 Restoration (sq ft)	Total Buffer Restoration (sq ft)
4	59609	35530	95139
5	34199	21760	55959
8	4459	3333	7792
Totals	98267	60623	158890

Section BA Remaining Buffer Mitigation Requirements

Zone	Buffer Impacts Requiring Mitigation (sq ft)	Minus Onsite Buffer Restoration (sq ft)	= Buffer Impacts Using Offsite Mitigation (sq ft)	Times Multiplier	= Offsite Buffer Mitigation Requirements (sq ft)
1	283494	98267	185227	3	555681
2	194188	60623	133565	1.5	200348
Total	477682	158890	318792		756029



Preliminary Section A 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 Impacts Requiring Mitigation (sq ft)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Impacts Requiring Mitigation (sq ft)
1	15048	9690	5358	5358	9871	4973	4898	4898
2	9160	5468	3692	3692	6146	1281	4865	4865
3	12335	7987	4348	4348	7955	4036	3919	3919
4	10054	0	10054	0	6631	0	6631	0
5	10613	0	10613	0	3746	0	3746	0
Totals	57210	23145	34065	13398	34349	10290	24059	13682

Total Preliminary Buffer Impact for Section A: 91,559 square feet.

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section.*

Preliminary Section A Buffer Mitigation Requirements*

Zone	Buffer Impacts Requiring Mitigation (sq ft)	Minus Onsite Buffer Restoration (sq ft)	= Buffer Impacts Using Offsite Mitigation (sq ft)	Times Multiplier	= Offsite Buffer Mitigation Requirements (sq ft)
1	13398	0	13398	3	40194
2	13682	0	13682	1.5	20523
Total	27080	0	27080		60714

Preliminary Section BB 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 Impacts Requiring Mitigation (sq ft)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Impacts Requiring Mitigation (sq ft)
1	10728	0	10728	0	7354	0	7354	0
2	16252	0	16252	16252	10102	0	10102	10102
3	70928	0	70928	70928	48382	0	48382	48382
4	53102	0	53102	53102	30716	0	30716	30716
5	7000	0	7000	0	4409	0	4409	0
8	29446	0	29446	29446	20993	0	20993	20993
9	74010	0	74010	74010	50947	0	50947	50947
10	18562	805	17757	17757	13332	0	13332	13332
11	1381	0	1381	0	901	0	901	0
12	8966	0	8966	8966	5054	0	5054	5054
13	5892	0	5892	0	3597	0	3597	0
Totals	296267	805	295462	270461	195787	0	195787	179526

Total Preliminary Buffer Impact for Section BB: 492,054 square feet.

**Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section.*



Section BB Neuse Buffer Onsite Restoration*

Site	Zone 1 Restoration (sq ft)	Zone 2 Restoration (sq ft)	Total Buffer Restoration (sq ft)
9	74108	46713	120821
Totals	74108	46713	120821

Preliminary Section BB Remaining Buffer Mitigation Requirements*

Zone	Buffer Impacts Requiring Mitigation (sq ft)	Minus Onsite Buffer Restoration (sq ft)	= Buffer Impacts Using Offsite Mitigation (sq ft)	Times Multiplier	= Offsite Buffer Mitigation Requirements (sq ft)
1	270461	74108	196353	3	589059
2	179526	46713	132813	1.5	199220
Total	449987	120821	329166		788279

Preliminary Section C 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 Impacts Requiring Mitigation (sq ft)	Zone 2 Impact (sq ft)	minus Wetlands in Zone 2 (sq ft)	= Zone 2 Buffers (not wetlands) (sq ft)	Zone 2 Buffer Impacts Requiring Mitigation (sq ft)
1	85786	0	85786	85786	34248	0	34248	34248
2	40922	0	40922	40922	26910	0	26910	26910
3	37580	6129	31451	14635	26288	0	26288	13770
4	21036	0	21036	21036	12116	0	12116	12116
5	20328	20328	0	0	12951	12360	591	591
6	25438	12401	13037	13037	17377	8424	8953	8953
7	29006	7158	21848	21848	18411	4429	13982	13982
8	27808	23507	4301	4301	13919	11729	2190	2190
Totals	287904	69523	218381	201565	162220	36942	125278	112760

Total Preliminary Buffer Impact for Section C: 450,124 square feet.

*Phased Project: impacts for this section are preliminary and will be modified (including possible temporary impacts and mitigation adjustments) in future certifications prior to construction of this section.

Section C Neuse Buffer Onsite Restoration

Site	Zone 1 Restoration (sq ft)	Zone 2 Restoration (sq ft)	Total Buffer Restoration (sq ft)
3	73181	48787	121968
Totals	73181	48787	121968

Preliminary Section C Remaining Buffer Mitigation Requirements*

Zone	Buffer Impacts Requiring Mitigation (sq ft)	Minus Onsite Buffer Restoration (sq ft)	= Buffer Impacts Using Offsite Mitigation (sq ft)	Times Multiplier	= Offsite Buffer Mitigation Requirements (sq ft)
1	201565	73181	128384	3	385152
2	112760	48787	63973	1.5	95960
Total	314325	121968	192357		481112



The application provides adequate assurance that the discharge of fill material into the waters of the Neuse River Basin 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 received March 28, 2008. Should your project change, you are required to notify the DWQ 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). 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. When final design plans are completed for R-2554 Sections A, BB, and C, a modification to the 401 Water Quality Certification and the Neuse River Riparian Buffer Authorization shall be submitted with applicable fees to the NC Division of Water Quality. Final designs shall reflect all appropriate avoidance, minimization, and mitigation for impacts to wetlands, streams, surface waters, and buffers. No construction activities that impact any wetlands, streams, surface waters, or buffers located in R-2554 Sections A, BB, and C shall begin until after the permittee applies for, and receives a written modification of the 401 Water Quality Certification and the Neuse River Riparian Buffer Authorization from the NC Division of Water Quality.
2. Compensatory mitigation for impacts to 13,038 linear feet of streams is required. As stated in your application, compensatory mitigation for impacts to jurisdictional streams shall be provided by 12,900 linear feet of onsite stream restorations plus 691 feet of onsite stream preservation. The stream mitigations will occur as follows:

Section	Site	Restoration (linear feet)	Preservation (linear feet)
A	Claridge Nursery	8716	0
BA	4	1083	0
BA	5	561	0
BA	8	61	691
BB	9	1236	0
C	UT West Bear Creek	1243	0
Totals	-	12,900	691

The onsite stream relocations shall be constructed in accordance with the design submitted in your March 28, 2008 application. Please be reminded that as-builts for the completed streams shall be submitted to the North Carolina Division of Water Quality 401 Wetlands Unit with the as-builts for the rest of the project. If the parameters of this condition are not met, then the permittee shall supply additional stream mitigation for these impacts. All channel relocations will be constructed in a dry work area, will be completed and stabilized, and must be approved on site by DWQ staff, prior to diverting water into the new channel. Whenever possible, channel relocations shall be allowed to stabilize for an entire growing season. All stream relocations and restorations shall have a 50-foot wide native wooded buffer planted on both sides of the stream unless otherwise authorized by this Certification. A transitional phase incorporating rolled erosion control product (RECP) and appropriate temporary ground cover is allowable.



3. The stream mitigation site shall be monitored annually for five years or until success criteria are satisfied. Monitoring protocols shall follow the Monitoring Level I outlined in the Stream Mitigation Guidelines, April 2003.
4. Compensatory mitigation for impacts to 27.61 acres of wetlands is required. As stated in your application, compensatory mitigation for these wetlands shall be provided by 27.17 acres of onsite wetland restoration plus 2.37 acres of onsite wetland preservation. The wetland mitigations will occur as follows:
 - a.) Section BA: 0.37 acres of wetland restoration at Site 8; and 2.37 acres of wetland preservation at Site 8.
 - b.) Section C: 26.84 acres of wetland restoration at Site 12.The permittee shall comply with the on-site wetland mitigation plan submitted with the application on March 28, 2008.
5. For the onsite wetland mitigation sites, the permittee shall plant 680 stems/acre. Vegetation success shall be measured by survivability over a 5-year monitoring period. Survivability will be based on 320 stems/acre after three (3) years and 260 stems after five (5) years. A survey of vegetation during the growing season shall be conducted annually over the five-year monitoring period and submitted to the NC Division of Water Quality. If the surviving vegetation densities are below the required thresholds after the five-year monitoring period, the site may still be declared successful at the discretion of and with written approval from the NC Division of Water Quality.
6. For the onsite wetland mitigation sites, hydrologic success of the sites will be attained by restoration of a hydrologic regime that results in inundation or saturation of the soils within 12 inches of the ground surface for at least 12.5 percent of the growing season. The hydrologic monitoring shall persist for a total of five (5) years. After the five-year monitoring period, if the monitoring requirements are not met, the site may still be declared successful at the discretion of and with written approval from the NC Division of Water Quality.
7. Compensatory mitigation for impacts to 768,918 square feet of protected riparian buffers in Zone 1 and 500,156 square feet of protected riparian buffers in Zone 2 shall be required. As stated in your applications compensatory mitigation for these riparian buffers shall be provided partially by onsite buffer restorations listed in the impact tables above. These onsite restorations will mitigate for 245,556 square feet of Zone 1 and 156,123 square feet of Zone 2 impacts. In accordance with 15A NCAC 02B.0242(9) riparian vegetation reestablishment shall include a minimum of at least 2 native hardwood tree species planted at a density sufficient to provide 320 trees per acre at maturity. The mitigation area shall be placed under a perpetual conservation easement that will provide for protection of the property's nutrient removal efficiencies.
8. Using a 3:1 ratio for Zone 1 Buffer impacts and a 1.5:1 ration for Zone 2 Buffer impacts, the remaining mitigation requirements for this project is 2,086,134 square feet of Neuse Riparian Buffer. As stated in your application, 1,393,920 square feet of buffer restoration will be used from the Claridge Nursery Stream Mitigation Site.
9. For the remaining 692,214 square feet of Neuse Buffer Mitigation required, we understand that you have chosen use of the North Carolina Ecosystem Enhancement Program (EEP). Mitigation for unavoidable impacts to Neuse Riparian Buffers shall be provided in the Neuse River Basin and done in accordance with 15A NCAC 2B.0233. EEP has indicated in a letter dated April 9, 2008 that they will assume responsibility for satisfying the compensatory mitigation requirements for the above-referenced project, in accordance with the Tri-Party MOA signed on July 22, 2003 and the Dual-Party MOA signed on April 12, 2004.
10. For the onsite buffer mitigation sites, the permittee shall monitor the sites. An annual report shall be submitted to the DWQ for a period of 5 years showing monitoring results, survival rate/ success of tree and vegetation establishment, and that diffuse flow through the riparian buffer has been maintained. The first annual report shall be submitted within one year of final planting. Failure to achieve a buffer density of 320 trees per acre after 5 years will require the annual report to provide appropriate remedial actions to be implemented and a schedule for implementation. Approval of the final annual report, and a formal "close out" of the mitigation site by the DWQ is required.



- * 11. A copy of the final construction drawings shall be furnished to NCDWQ 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 dated March 28, 2008. Any deviations from the approved drawings are not authorized unless approved by the NC Division of Water Quality.
12. 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.
13. 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. Please refer to the most current version of *Stormwater Best Management Practices*.
14. Placement of culverts and other structures in waters, streams, and wetlands 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 DWQ. If this condition is unable to be met due to bedrock or other limiting features encountered during construction, please contact the NC DWQ for guidance on how to proceed and to determine whether or not a permit modification will be required.
15. 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.
16. 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.
17. 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.
18. All stormwater runoff shall be directed as sheetflow through stream buffers at nonerosive velocities, unless otherwise approved by this certification.
19. 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 DOT 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.
20. Pursuant to NCAC15A 2B.0233(6), sediment and erosion control devices shall not be placed in Zone 1 of any Neuse Buffer without prior approval by the NCDWQ. At this time, the NCDWQ 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.
21. 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.



22. 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.
23. 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.
24. 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.
- * 25. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval.
26. 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.
27. 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.
28. 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.
29. No rock, sand or other materials shall be dredged from the stream channel except where authorized by this certification.
30. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited.
31. 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 DWQ 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, DWQ may reevaluate and modify this certification.
32. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification..
33. A copy of this Water Quality Certification shall be maintained on site at 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.
34. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization 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.
35. 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.
36. The Permittee shall report any violations of this certification to the Division of Water Quality within 24 hours of discovery.



- * 37. Upon completion of the project (including any impacts at associated borrow or waste site), the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify DWQ when all work included in the 401 Certification has been completed.
38. Native woody riparian vegetation (i.e., trees and shrubs native to your geographic region) must be reestablished within the construction limits of the project by the end of the growing season following completion of construction.
39. 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.
40. 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:
- 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.
41. Sediment and erosion control measures shall not be placed in wetlands or waters unless otherwise approved by this Certification.
42. The onsite project manager shall schedule regular review meetings, at least once per two months, once construction on impact areas begins. These meetings will be scheduled with DWQ and other interested resource agencies (USCOE, WRC, USFWS, NCDOT, etc). At the agencies' discretion, these meetings may be more or less frequent as needed based on impact activities and/or project progression.

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.



William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Coleen Sullins, Director
Division of Water Quality

298

If this Certification is unacceptable to you have the right to an adjudicatory hearing upon written request within sixty (60) days following receipt of this Certification. This request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, N.C. 27699-6714. If modifications are made to an original Certification, you have the right to an adjudicatory hearing on the modifications upon written request within sixty (60) days following receipt of the Certification. Unless such demands are made, this Certification shall be final and binding.

This the 16th day of May 2008

DIVISION OF WATER QUALITY

Coleen Sullins
Director

WQC No. 3740



DWQ 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 Quality, 1650 Mail Service Center, Raleigh, NC, 27699-1650. This form may be returned to DWQ 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 _____



April 9, 2008

Mr. Brian Wrenn
N. C. Division of Water Quality
Mail Service Center 1650
Raleigh, North Carolina 27699-1650

Dear Mr. Wrenn:

Subject: EEP Mitigation Acceptance Letter:

**R-2554BB and C, US 70 (Goldsboro Bypass), Wayne County,
Neuse River Basin (Cataloging Unit 03020202)**

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the buffer mitigation required for the subject project. The buffer impacts associated with this project are located in Cataloging Unit 03020202 of the Neuse River Basin. As indicated in the NCDOT's mitigation request dated February 13, 2008, the project will impact buffers only. The buffer impacts are 417,339 square feet in Zone 1 and 377,770 square feet in Zone 2. If the buffer impacts or the amount of mitigation required from EEP increases or decreases for this project, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required. All buffer mitigation requests and approvals are administrated through the Riparian Restoration Buffer Fund (Fund 2982).

The NCDOT will be responsible to ensure that the appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWQ's Buffer Authorization Certification, EEP will transfer funds from Fund 2984 (Tri-Party MOA Account) into Fund 2982 and commit to provide the appropriate buffer mitigation to offset the impacts associated with this project.

Restoring... Enhancing... Protecting Our State

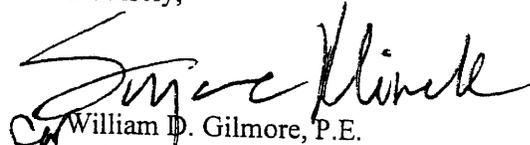
North Carolina Ecosystem Enhancement Program, 1652 Mail Service Center, Raleigh, NC 27699-1652 / 919-715-0476 / www.nceep.net



301

If you have any questions or need additional information, please contact Ms. Beth Harmon at (919) 715-1929.

Sincerely,


William D. Gilmore, P.E.
EEP Director

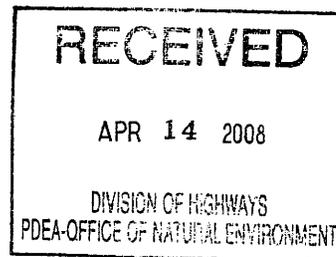
cc: Mr. Gregory J. Thorpe, P.E., PDEA, NCDOT
Mr. William Wescott, USACE – Washington
File: R-2554



302

April 9, 2008

Mr. Gregory J. Thorpe, Ph.D.
Environmental Management Director
Project Development and Environmental Analysis Branch
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1548



Dear Dr. Thorpe:

Subject: EEP Mitigation Acceptance Letter:

R-2554BB and C, US 70 (Goldsboro Bypass), Wayne County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the buffer mitigation for the subject project. Based on the information supplied by you on February 13, 2008, the impacts are located in CU 03020202 of the Neuse River Basin in the Northern Inner Coastal Plain (NICP) Eco-Region, and are as follows:

Buffer Zone 1:	417,339 square feet
Buffer Zone 2:	377,770 square feet

All buffer mitigation requests and approvals are administrated through the Riparian Restoration Buffer Fund. The NCDOT will be responsible to ensure that appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWQ's Buffer Authorization Certification, EEP will transfer funds from Tri-Party MOA Fund into the Riparian Restoration Buffer Fund. Upon completion of transfer payment, NCDOT will have completed its riparian buffer mitigation responsibility for TIP R-2554. Subsequently, EEP will conduct a review of current MOA mitigation projects in the river basin to determine if available buffer mitigation credits exist. If there are buffer mitigation credits available, then the Riparian Restoration Buffer Fund will purchase the appropriate amount of buffer mitigation credits from Tri-Party MOA Fund.

Restoring... Enhancing... Protecting Our State

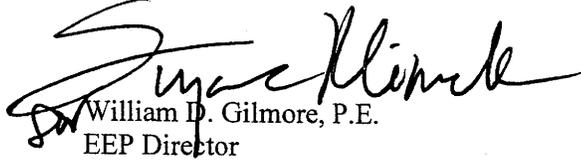
North Carolina Ecosystem Enhancement Program, 1652 Mail Service Center, Raleigh, NC 27699-1652 / 919-715-0476 / www.nceep.net



303

If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-715-1929.

Sincerely,

A handwritten signature in black ink, appearing to read "W.D. Gilmore". The signature is written in a cursive style with a large initial "W".

William D. Gilmore, P.E.
EEP Director

cc: Mr. William Wescott, USACE – Washington
Mr. Brian Wrenn, Division of Water Quality, Wetlands/401 Unit
File: R-2554

Draft Technical Memorandum

Project: Claridge Nursery On-site Mitigation **Prepared By:** Baker Engineering
Subject: Mitigation Summary **Prepared For:** NCDOT
Date: December 18, 2007 (revision 1)

The purpose of this document is to describe the proposed design approach for the Claridge Nursery On-Site Stream Mitigation Project. The project is located in Wayne County, near Goldsboro, in DWQ sub-basin 03-04-06 and within HU 03020201, on land that is owned by the North Carolina Division of Forest Resources. The purpose of the project is to provide on-site stream mitigation for TIP R-2554 (US 70, Goldsboro Bypass).

The site contains an unnamed main stem reach (M1) and two unnamed tributaries (UT1 and UT2) that empty into the main stem (see Exhibit 1). All stream reaches have been channelized and straightened in the past to reduce flooding and provide drainage for the adjacent fields. Land use within the watershed is primarily agriculture and forestry. Existing stream lengths, drainage areas, and jurisdictional status are summarized in Table 1.

Table 1. Summary of Existing Stream Lengths and Drainage Areas.

Stream Reach	Existing Length (LF)	Drainage Area (sq mi)	Intermittent/Perennial Status
M1	6,400	1.80	NCDWQ Form Score = > 30 Stream reach already considered perennial by agencies during impact assessments. Status = <u>Perennial</u>
UT1	740	0.13	NCDWQ Form Score = 19.75 Stream is shown as intermittent on USGS map. Stream is not shown on County soils, but hydric soils indicate the presence of a channel. Status = <u>Intermittent</u>
UT2	2,530	0.25	NCDWQ Form Score = 24.75 Stream is shown as intermittent on USGS map. Stream is shown on County soils. Status = <u>Intermittent</u>

Stream Restoration (Braided Channel) - UT1 and UT2

A braided channel restoration approach is proposed for the two smaller tributaries (UT1 and UT2) due to the small drainage areas of the two streams and their low slopes. It is likely that in their undisturbed condition, these two systems existed as headwater wetland/stream complexes, exhibiting diffuse flows and wetland plant communities within a narrow valley of hydric soils. Lumbee sandy loam soils are mapped along the corridors of the proposed stream restoration reaches. Lumbee soils are hydric soils mapped along shallow drainage ways, were formed in stream sediments, and are commonly found along stream channels in the area surrounding Goldsboro.

Restoration of these systems will follow the guidance provided by the US Army Corps of Engineers (USACE) in "*Information Regarding Stream Restoration with Emphasis on the Coastal Plain - April 4, 2007*". Project reaches UT1 and UT2 will be designed as "riparian headwater systems", as described in the guidance. For the proposed reaches, watershed sizes are 85 and 160 acres, respectively. Soils, topography, and morphology data indicate that these reaches once supported a headwater wetland system. Restoration will seek to restore hydrology and connection of surface flows to a defined floodplain, thereby restoring diffuse surface flows and wetland hydrology. The stream type for this design approach is best described as a Rosgen "DA" stream channel.

Specific restoration techniques for reaches UT1 and UT2 will involve the grading and widening of a floodplain at the approximate elevation of the existing channel bottoms. Floodplain widths will generally range from 30 to 40 feet, and the valleys will be graded to support diffuse flow toward reach M1. The microtopography of the floodplain will be left rough, to promote diffuse flows and a diversity of riparian wetland vegetation.

Stream Restoration (Single-Thread Channel) – Reach M1

The main stem through the site, reach M1, will be restored using natural channel design approaches to restore a single-thread channel. Reference reach data and past project experience support the design of a single-thread channel for M1, due to its watershed size, slope, and sediment transport competency (stream power). The design will involve a Rosgen Priority Level II approach in which a new meandering single-thread channel (E stream type) will be constructed through a floodplain excavated at a lower elevation. Channel dimensions and pattern are based on regional curve relationships, reference reach information, and past project experience. In-stream structures (not shown at this concept level) will consist of log and wooden structures. The stream banks and adjacent floodplain wetland areas will be planted with native vegetation that are moderately to highly tolerant of flooded conditions.

The vegetation plan for the site will include the planting of bare-root trees in riparian buffer areas adjacent to all three restored streams. A minimum buffer width of 50 feet will be maintained on all restored streams with wider buffers in most areas. Tree species planted across the site will include a mixture of no less than six native species adapted to site conditions, such as river birch (*Betula nigra*), sugarberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), sycamore (*Platanus occidentalis*), overcup oak (*Quercus lyrata*), swamp chestnut oak (*Quercus michauxii*), and bald cypress (*Taxodium distichum*).

Site Considerations

Several existing culverted road crossings will be incorporated into the restoration designs for the three stream reaches. In some locations, existing culverts will need to be replaced to provide increased capacity, promote connection with the restored floodplain, and set culvert inverts to appropriate elevations. An existing irrigation line crosses the proposed design for M1 at approximate station 49+00; this crossing will not be placed in an easement in case future maintenance is required for the irrigation line. An existing water line that crosses M1 near station 19+00 will be relocated to cross at the upstream culverted road crossing.

Table 2. Restoration Approaches and Proposed Mitigation Amounts.

Mitigation Area	Size	Potential Credits	Restoration Approach
Stream Reach M1	7,600 LF*	7,600 (1:1 ratio)	Restoration will consist of a Rosgen Priority Level II approach. A new floodplain will be excavated at a lower elevation, and a stable meandering channel restored through the new floodplain. (E stream type)
Stream Reach UT1	690 LF*	690 (1:1 ratio)	Restoration will consist of grading a floodplain and promoting diffuse surface flows toward M1. The system will be allowed to form on its own as a braided channel headwater stream. (DA stream type)
Stream Reach UT2	2,430 LF*	2,430 (1:1 ratio)	Restoration will consist of grading a floodplain and promoting diffuse surface flows toward M1. The system will be allowed to form on its own as a braided channel headwater stream. (DA stream type)
Riparian Buffer Restoration	32 acres	32 (1:1 ratio)	Restoration will include the planting of 50 foot riparian buffers on both sides of the restored stream segments.
Totals	10,720 LF 32 acres	10,720 (stream) 32 (buffer)	

* Stream lengths exclude the sections of channel which will flow through culverted crossings or lie outside of the protected right-of-way boundaries.



Legend

- Proposed Streams
- Existing Streams
- Riparian Buffer Restoration
- Culvert Crossing
- Proposed Nursery Road

Baker

Baker Engineering NY, Inc.
8000 Regency Parkway
Suite 200
Cary, North Carolina 27518
Phone: 919.463.5418
Fax: 919.463.5490

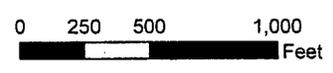


Exhibit 1
Mitigation Concept
Claridge Nursery Site

Appendix A.

Geomorphology Tables

Typical Design Cross-sections (Reaches M1, UT1, and UT2)

Design Profile (Reach M1)

NCDWQ Stream Identification Forms (Reaches UT1 and UT2)

MORPHOLOGICAL MEASUREMENTS TABLE

Claridge Nursery On-Site Mitigation Project - Reach M1

Variables	Existing Channel	Proposed Design	Notes
1. stream type	G5c	E5	design stream type based on reference reach information and past project experience
2. drainage area (sq. mi)	1.80	1.80	
3. bankfull width (ft)	mean: 17.6 range: 14.4 - 20.4	mean: 11.0 range: ---- - ----	design width = A / design depth
4. bankfull mean depth (ft)	mean: 1.88 range: 1.25 - 2.34	mean: 1.10 range: ---- - ----	design depth = (A/(W/D)) ^{1.5}
5. width/depth ratio	mean: 9.7 range: 6.6 - 12.9	mean: 10 range: ---- - ----	design (W/D) selected based on past project experience.
6. bankfull cross-sectional area (sq. ft)	mean: 33.3 range: 20.4 - 42.9	mean: 12 range: ---- - ----	existing XSEC area enlarged due to past dredging. design area (A) selected from regional curve since no apparent bankfull indicators.
7. bankfull mean velocity (ft/sec)	mean: 0.9 range: ---- - ----	mean: 0.9 range: ---- - ----	estimated from Manning's equation.
8. bankfull discharge (cfs)	mean: 11.1 range: ---- - ----	mean: 11.1 range: ---- - ----	estimated from Manning's equation.
9. bankfull max depth (ft)	mean: 2.77 range: 1.78 - 3.43	mean: 1.53 range: ---- - ----	design max depth based on typical reference reach ratios
10. width of floodprone area (ft)	mean: 25.8 range: 19.5 - 41.3	mean: 62 range: ---- - ----	design value based on width of floodplain to be excavated.
11. entrenchment ratio	mean: 1.5 range: 1.3 - 2.3	mean: 5.7 range: -	design value based on width of floodplain to be excavated.
12. meander length (ft)	mean: NA range: ---- - ----	mean: 110 range: 88 - 131	existing channel displays no natural stream pattern.
13. ratio of meander length to bankfull width	mean: NA range: ---- - ----	mean: 10 range: 8 - 12	design based on reference reach information and past projects.
14. radius of curvature (ft)	mean: NA range: ---- - ----	mean: 33 range: 27 - 38	existing channel displays no natural stream pattern.
15. ratio of radius of curvature to bankfull width	mean: NA range: ---- - ----	mean: 3 range: 2.5 - 3.5	design based on reference reach information and past projects.
16. belt width (ft)	mean: NA range: ---- - ----	mean: 44 range: 33 - 55	existing channel displays no natural stream pattern.
17. meander width ratio	mean: NA range: ---- - ----	mean: 4 range: 3 - 5	design based on reference reach information and past projects.
18. sinuosity (stream length/valley length)	mean: 1.23 range: ---- - ----	mean: 1.41 range: ---- - ----	
19. valley slope (ft/ft)	mean: 0.0009 range: ---- - ----	mean: 0.0008 range: ---- - ----	
20. average slope (ft/ft)	mean: 0.0007 range: ---- - ----	mean: 0.0006 range: ---- - ----	
21. Pool slope (ft/ft)	mean: 0 range: ---- - ----	mean: 0 range: ---- - ----	pool slope not measurable due to low overall slope.
22. Ratio of pool slope to average slope	mean: NA range: ---- - ----	mean: NA range: ---- - ----	
23. maximum pool depth (ft)	mean: 3 range: ---- - ----	mean: 2.7 range: ---- - ----	
24. ratio of pool depth to average bankfull depth	mean: 1.60 range: ---- - ----	mean: 2.5 range: ---- - ----	design based on reference reach information and past projects.
25. pool width (ft)	mean: 18 range: ---- - ----	mean: 16.4 range: ---- - ----	
26. ratio of pool width to bankfull width	mean: 1.0 range: ---- - ----	mean: 1.5 range: ---- - ----	design based on reference reach information and past projects.
27. pool to pool spacing (ft) *	mean: NM range: ---- - ----	mean: 55 range: 44 - 66	
28. ratio of pool to pool spacing to bankfull width *	mean: NM range: ---- - ----	mean: 5 range: 4 - 6	pool-pool spacing based on 1/2 meander wavelength.
29. ratio of lowest bank height to bankfull height (or max bankfull depth)	mean: 2.2 range: 1.6 - 3.4	mean: 1.00 range: 1.00 - 1.20	design should achieve BHR of approximately 1.0.

NA = not applicable NM = not measured

Note: Sections of the stream reach experience backwater from culvert crossings and past dredging. Bankfull parameters were calculated by adding bankfull areas predicted from the regional curve to the area backwatered at baseflow conditions. Stream system is highly modified, therefore, existing geomorphic parameters may be misleading.

MORPHOLOGICAL MEASUREMENTS TABLE
Claridge Nursery On-Site Mitigation Project - Reach UT1

Variables	Existing Channel	Proposed Design	Notes
1. stream type	F5/G5c	DA	design stream type based on reference reach information and past project experience
2. drainage area (sq. mi)	0.13	0.13	
3. bankfull width (ft)	mean: 7.9 range: 6.3 - 9.4	mean: 10.2 range: ---- - ----	design width = A / design depth
4. bankfull mean depth (ft)	mean: 0.55 range: 0.46 - 0.65	mean: 0.41 range: ---- - ----	design depth = (A/(WD))^0.5
5. width/depth ratio	mean: 15.2 range: 9.8 - 20.6	mean: 25 range: ---- - ----	design (WD) approximated based on reference reach information.
6. bankfull cross-sectional area (sq. ft)	mean: 4.2 range: ---- - ----	mean: 4.2 range: ---- - ----	existing area based on regional curves since no bankfull indicators. design area (A) selected from regional curve since no apparent bankfull indicators.
7. bankfull mean velocity (ft/sec)	mean: 1.9 range: ---- - ----	mean: 0.5 range: ---- - ----	estimated from Manning's equation.
8. bankfull discharge (cfs)	mean: 8.1 range: ---- - ----	mean: 8.1 range: ---- - ----	estimated from Manning's equation.
9. bankfull max depth (ft)	mean: 0.85 range: 0.77 - 0.92	mean: 0.57 range: ---- - ----	design max depth based on typical reference reach ratios
10. width of floodprone area (ft)	mean: 10.0 range: 8.2 - 11.8	mean: 36 range: ---- - ----	design value based on width of floodplain to be excavated.
11. entrenchment ratio	mean: 1.3 range: 1.3 - 1.3	mean: 3.5 range: -	design value based on width of floodplain to be excavated.
12. meander length (ft)	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
13. ratio of meander length to bankfull width	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
14. radius of curvature (ft)	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
15. ratio of radius of curvature to bankfull width	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
16. belt width (ft)	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
17. meander width ratio	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
18. sinuosity (stream length/valley length)	mean: 1.00 range: ---- - ----	mean: 1.00 range: ---- - ----	sinuosity is measured straight along the fall of the valley.
19. valley slope (ft/ft)	mean: 0.0061 range: ---- - ----	mean: 0.003 range: ---- - ----	slope will be lowered to promote diffuse flow conditions and reduce stream power.
20. average slope (ft/ft)	mean: 0.0061 range: ---- - ----	mean: 0.003 range: ---- - ----	slope will be lowered to promote diffuse flow conditions and reduce stream power.
21. Pool slope (ft/ft)	mean: 0 range: ---- - ----	mean: 0 range: ---- - ----	pool slope not measurable due to low overall slope.
22. Ratio of pool slope to average slope	mean: NA range: ---- - ----	mean: NA range: ---- - ----	
23. maximum pool depth (ft)	mean: 0.8 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
24. ratio of pool depth to average bankfull depth	mean: 1.45 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
25. pool width (ft)	mean: 8 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
26. ratio of pool width to bankfull width	mean: 1.0 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
27. pool to pool spacing (ft) *	mean: NM range: ---- - ----	mean: NA range: 41 - 61	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
28. ratio of pool to pool spacing to bankfull width *	mean: NM range: ---- - ----	mean: 5 range: 4 - 6	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
29. ratio of lowest bank height to bankfull height (or max bankfull depth)	mean: 5.5 range: 5.5 - 5.5	mean: 1.00 range: 1.00 - 1.20	design should achieve BHR of approximately 1.0.

NA = not applicable NM = not measured

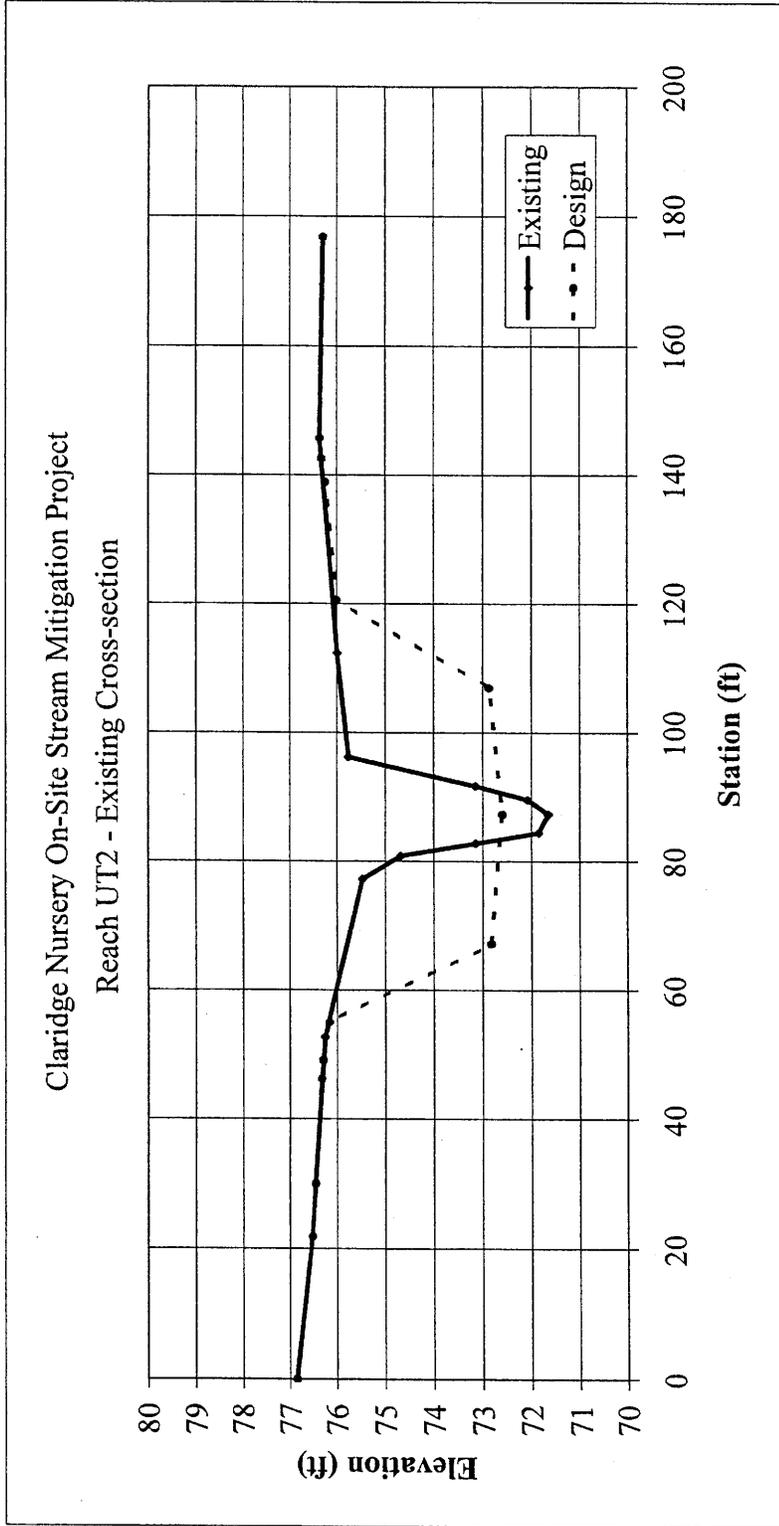
MORPHOLOGICAL MEASUREMENTS TABLE
Claridge Nursery On-Site Mitigation Project - Reach UT2

Variables	Existing Channel	Proposed Design	Notes
1. stream type	G5c	DA	design stream type based on reference reach information and past project experience
2. drainage area (sq. mi)	0.25	0.25	
3. bankfull width (ft)	mean: 8.9 range: 8.2 - 9.6	mean: 12.2 range: ---- - ----	design width = A / design depth
4. bankfull mean depth (ft)	mean: 1.0 range: 0.8 - 1.2	mean: 0.49 range: ---- - ----	design depth = (A/(W/D))^0.5
5. width/depth ratio	mean: 9.0 range: 6.6 - 12.0	mean: 25 range: ---- - ----	design (W/D) approximated based on reference reach information.
6. bankfull cross-sectional area (sq. ft)	mean: 8.9 range: 7.6 - 10.1	mean: 6 range: ---- - ----	existing XSEC area enlarged due to past dredging. design area (A) selected from regional curve since no apparent bankfull indicators.
7. bankfull mean velocity (ft/sec)	mean: 0.4 range: ---- - ----	mean: 0.2 range: ---- - ----	estimated from Manning's equation.
8. bankfull discharge (cfs)	mean: 2.4 range: ---- - ----	mean: 2.4 range: ---- - ----	estimated from Manning's equation.
9. bankfull max depth (ft)	mean: 1.5 range: 1.1 - 2	mean: 0.69 range: ---- - ----	design max depth based on typical reference reach ratios
10. width of floodprone area (ft)	mean: 14 range: 13 - 15	mean: 45 range: ---- - ----	design value based on width of floodplain to be excavated.
11. entrenchment ratio	mean: 1.6 range: 1.5 - 1.9	mean: 3.7 range: ---- - ----	design value based on width of floodplain to be excavated.
12. meander length (ft)	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
13. ratio of meander length to bankfull width	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
14. radius of curvature (ft)	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
15. ratio of radius of curvature to bankfull width	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
16. belt width (ft)	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
17. meander width ratio	mean: NA range: ---- - ----	mean: NA range: ---- - ----	existing channel displays no natural stream pattern. pattern will be allowed to form on its own.
18. sinuosity (stream length/valley length)	mean: 1.09 range: ---- - ----	mean: 1.09 range: ---- - ----	sinuosity is measured straight along the fall of the valley.
19. valley slope (ft/ft)	mean: 0.0003 range: ---- - ----	mean: 0.0003 range: ---- - ----	
20. average slope (ft/ft)	mean: 0.0002 range: ---- - ----	mean: 0.0002 range: ---- - ----	
21. Pool slope (ft/ft)	mean: 0 range: ---- - ----	mean: 0 range: ---- - ----	pool slope not measurable due to low overall slope.
22. Ratio of pool slope to average slope	mean: NA range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
23. maximum pool depth (ft)	mean: 2.4 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
24. ratio of pool depth to average bankfull depth	mean: 2.40 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
25. pool width (ft)	mean: 8.9 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
26. ratio of pool width to bankfull width	mean: 1.0 range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
27. pool to pool spacing (ft) *	mean: NM range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
28. ratio of pool to pool spacing to bankfull width *	mean: NM range: ---- - ----	mean: NA range: ---- - ----	pools will not be designed but allowed to form naturally as a function of debris and local scour. Pools are not common for DA systems.
29. ratio of lowest bank height to bankfull height (or max bankfull depth)	mean: 2.4 range: 2.1 - 2.6	mean: 1.00 range: 1.00 - 1.20	design should achieve BHR of approximately 1.0.

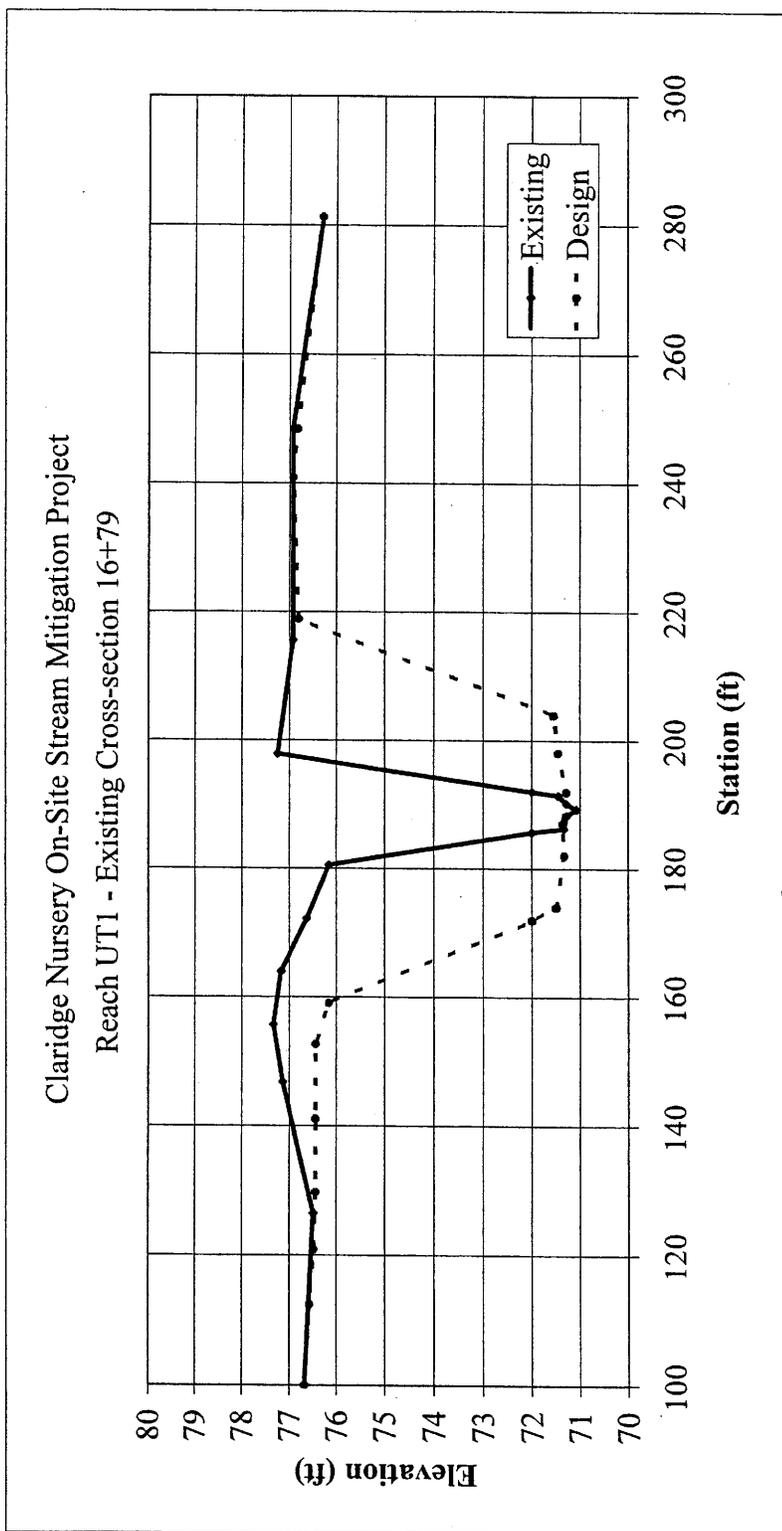
NA = not applicable NM = not measured

Note: Entire stream reach experiences backwater from culvert crossings and past dredging. Bankfull parameters were calculated by adding bankfull areas predicted from the regional curve to the area backwatered at baseflow conditions. Stream system is highly modified, therefore, existing geomorphic parameters may be misleading.

15+21	Feature	Type	Wfpa	LBKF	RBKF	ELbkf	Wbkf	Dbkf	W/D	Abkf	Dmax	ER	BHR
Existing	Pool	G5c	13.5	82.8	91.7	73.15	8.8	1.0	8.6	9.1	1.5	1.5	2.6
Design	Run	DA	45	81.0	94.0	73.00	12.2	0.5	25.0	6.0	0.7	3.7	1.0

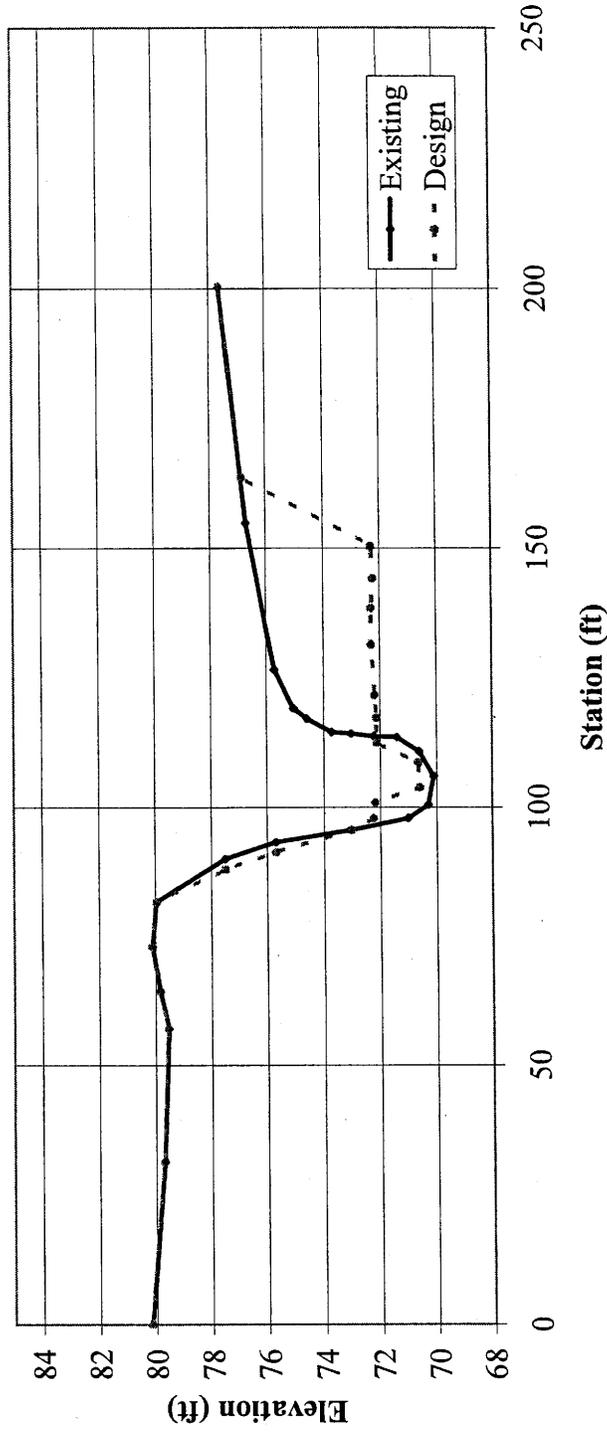


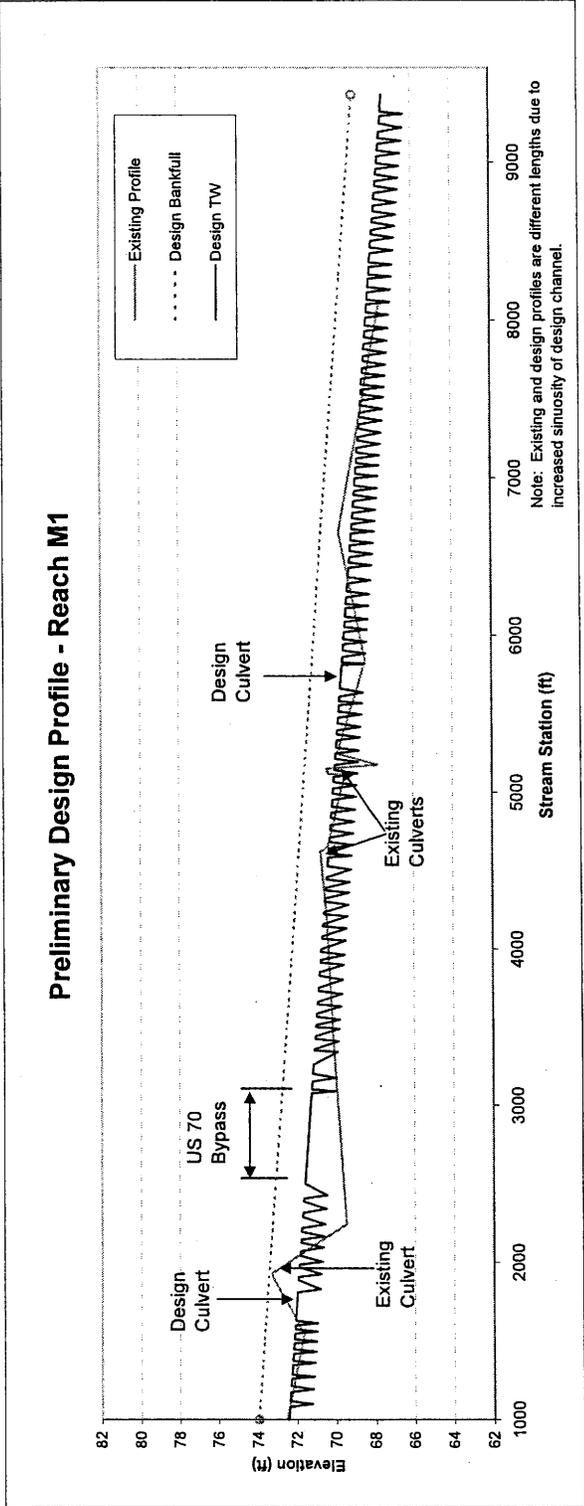
16+79	Feature	Type	Wfpa	LBKF	RBKF	ELbkf	Wbkf	Dbkf	W/D	Abkf	Dmax	ER	BHR
Existing	Run	G5c	8.2	185.7	192.0	72.00	6.3	0.6	9.8	4.1	0.9	1.3	5.5
Design	Run	DA	36	172.0	204.0	71.50	10.2	0.4	25.0	4.1	0.5	3.5	1.0



33+93	Feature	Type	Wfpa	LBKF	RBKF	ELbkf	Wbkf	Dbkf	W/D	Abkf	Dmax	ER	BHR
Existing	Run	E	41.3	95.6	114.2	73.05	18.3	2.3	7.8	42.9	2.9	2.3	1.7
Design	Run	E	62	100.9	112.7	72.15	11.0	1.1	10.0	12.4	1.5	5.6	3.4

Claridge Nursery On-Site Stream Mitigation Project
 Reach M1 - Existing Cross-section





North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 7-26-07	Project: Claridge Nursery	Latitude:
Evaluator: Tweedy	Site: UTI - short small trib	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	19.75	County: Wayne
		Other e.g. Quad Name:

A. Geomorphology (Subtotal = 6.5)

	Absent	Weak	Moderate	Strong
1 ^a . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 ^a . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

^a Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 7)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 6.25)

20 ^b . Fibrous roots in channel	3	2	1	0
21 ^b . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macroinvertebrates (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 ^b . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; OBL = 1.5; SAV = 2.0; Other = 0			

^b Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

assessment done during dry conditions.
Stream is shown on USGS, but not soils, but hydric
soils indicate a valley.
LIDAR indicates valley.

North Carolina Division of Water Quality – Stream Identification Form; Version 3.1

Date: 7-26-07	Project: Claridge Nursery	Latitude:
Evaluator: Tuxedy	Site: UTZ- large + tributary	Longitude:
Total Points: Stream is at least intermittent if ≥ 19 or perennial if ≥ 30	24.75	County: Wayne
		Other e.g. Quad Name:

A. Geomorphology (Subtotal = 7)

	Absent	Weak	Moderate	Strong
1 ^a . Continuous bed and bank	0	1	2	3
2. Sinuosity	0	1	2	3
3. In-channel structure: riffle-pool sequence	0	1	2	3
4. Soil texture or stream substrate sorting	0	1	2	3
5. Active/relic floodplain	0	1	2	3
6. Depositional bars or benches	0	1	2	3
7. Braided channel	0	1	2	3
8. Recent alluvial deposits	0	1	2	3
9 ^a . Natural levees	0	1	2	3
10. Headcuts	0	1	2	3
11. Grade controls	0	0.5	1	1.5
12. Natural valley or drainageway	0	0.5	1	1.5
13. Second or greater order channel on existing USGS or NRCS map or other documented evidence.	No = 0		Yes = 3	

^a Man-made ditches are not rated; see discussions in manual

B. Hydrology (Subtotal = 8.5)

14. Groundwater flow/discharge	0	1	2	3
15. Water in channel and > 48 hrs since rain, or Water in channel -- dry or growing season	0	1	2	3
16. Leaf litter	1.5	1	0.5	0
17. Sediment on plants or debris	0	0.5	1	1.5
18. Organic debris lines or piles (Wrack lines)	0	0.5	1	1.5
19. Hydric soils (redoximorphic features) present?	No = 0		Yes = 1.5	

C. Biology (Subtotal = 9.25)

20 ^b . Fibrous roots in channel	3	2	1	0
21 ^b . Rooted plants in channel	3	2	1	0
22. Crayfish	0	0.5	1	1.5
23. Bivalves	0	1	2	3
24. Fish	0	0.5	1	1.5
25. Amphibians	0	0.5	1	1.5
26. Macrobenthos (note diversity and abundance)	0	0.5	1	1.5
27. Filamentous algae; periphyton	0	1	2	3
28. Iron oxidizing bacteria/fungus.	0	0.5	1	1.5
29 ^b . Wetland plants in streambed	FAC = 0.5; FACW = 0.75; DBL = 1.5 SAV = 2.0; Other = 0			

^a Items 20 and 21 focus on the presence of upland plants, Item 29 focuses on the presence of aquatic or wetland plants.

Notes: (use back side of this form for additional notes.)

Sketch:

assessment done during dry conditions.
 Stream is shown on USGS map and on soil map.
 LIDAR indicates valley

**UT West Bear Creek Mitigation Plan
Wayne County**

**R-2554C
WBS Element: 34461.1**

December 20, 2007

NCDOT will perform on-site mitigation to offset unavoidable stream and wetland impacts associated with Transportation Improvement Program (TIP) R-2554C. The mitigation is located within the NCDOT right-of-way within NCDWQ sub-basin 03-04-05 and within HU 03020202. The site totals 19.36 acres and contains approximately 600 ft of an unnamed tributary to West Bear Creek as well as approximately 800 ft of West Bear Creek. It is located on the La Grange USGS quad map and on sheets 11-13 of the preliminary plans from Sta. 250+60 to Sta. 256.

At this site, both the unnamed tributary as well as West Bear Creek will be impacted by R-2554C (Site 4). The proposed mitigation involves relocating these stream channels into an adjacent agricultural field within the NCDOT right-of-way. NCDOT proposes to restore approximately 1243 linear feet of stream and 2.8 acres of riparian buffer at a ratio of 1:1.

Existing Conditions

West Bear Creek is a tributary to Bear Creek. Bear Creek runs just west of La Grange and is a tributary to the Neuse River. The UT to West Bear Creek begins, within this site, at the outfall of a large residential pond. The outfall pipe is perched and a large scour hole has formed at this location. The UT flows from here in a southwesterly direction along the edge of an agricultural field. The riparian buffer is sparse and ranges from approximately 0-10 ft. The channel is incised with high, unstable banks for the majority of its length within the site. The confluence with West Bear Creek occurs at a 90-degree angle at the corner of the agricultural field. From this point, West Bear Creek flows in an easterly direction along the field. It continues to have a sparse riparian buffer and exhibits evidence of past straightening.

Proposed Conditions

NCDOT proposes to restore 1243 linear feet of UT West Bear Creek by re-establishing the correct pattern, profile and dimensions of the channel within the adjacent farm field. A riparian buffer of at least 50 ft will be planted along each bank of the new channel with a mix of bare root saplings at a rate of 680 trees per acre. (Table 2) Final stream design plans will be submitted with final roadway plans for Section C of the TIP R-2554.

Success Criteria and Monitoring Plan

The following monitoring will be performed each year of the 3-year monitoring period on the restoration areas: reference photos, plant survival (i.e., identify specific problems areas (missing, stressed, damaged or dead plantings), estimated causes and proposed/required remedial action), visual inspection of channel stability. Physical measurements of channel stability/morphology will not be performed. A monitoring report will be submitted within sixty (60) days after completing the monitoring.

Type	Quantity	Credits
Stream Restoration	1243 ft	1243 ft
Buffer Restoration	121968 sq. ft	121968 sq ft

Common Name	Scientific Name	Percent Planted by Species
Type II Streambank Reforestation – Bare Root Plantings		
River Birch	<i>Betula nigra</i>	30%
Sycamore	<i>Platanus occidentalis</i>	30%
Overcup Oak	<i>Quercus lyrata</i>	20%
Swamp Chestnut Oak	<i>Quercus michauxii</i>	20%
Type I Streambank Reforestation - Live Stakes		
Black willow	<i>Salix nigra</i>	50%
Silky Dogwood	<i>Cornus amomum</i>	50%

**Tommy's Road Mitigation Plan
Wayne County**

R-2554BA

WBS Element: 34461.1.1

December 3, 2007

NCDOT will perform on-site mitigation to offset unavoidable stream and wetland impacts associated with Transportation Improvement Program (TIP) R-2554BA. The mitigation is located within the NCDOT right-of-way and an NCDOT conservation easement area adjacent to this TIP within NCDWQ sub-basin 03-04-05 and within HU 03020202. This site contains 3.91 acres of which 2.79 acres is NCDOT right-of-way and 1.12 acres is a NCDOT conservation easement along Howell's Branch. Tommy's Road currently bisects the site.

At this site, the proposed mitigation will include stream and wetland preservation as well as wetland and buffer restoration. NCDOT proposes to preserve 691 linear feet of Howell's Branch as well as 2.37 acres of adjacent riverine wetlands. This will be used as onsite mitigation at a ratio of 5:1. As part of the R-2554BA project, NCDOT also plans to remove a section of Tommy's Road and the culvert for Howell's Branch between Sta. 21+20 and Sta. 21+80 as shown on plan sheet 10 at Site 8. This will enhance the existing riverine and wetland system as well as provide 61 ft of stream restoration, 0.33 acres of riverine wetland restoration and 7792 sq. feet of buffer restoration. NCDOT plans to use this as onsite mitigation at a ratio of 1:1. (See Table 1)

Existing Conditions

Howell's Branch is a tributary to Stoney Creek. The Stoney Creek watershed drains approximately 30 square miles from the Goldsboro/Wayne Airport to the Neuse River. Howell Branch flows through the site in a north to south direction for 752 linear ft. Existing wetlands adjacent to the stream on the eastern side, north of Tommy's Road, total 1.12 acres. Existing wetlands along the western side of the stream, north of Tommy's Rd. total 0.48 acres. There is also a 0.2 acre pond along the western side that NCDOT has acquired as a Permanent Drainage Easement (PDE) within its conservation easement area. The site is bisected by Tommy's Rd. which is a two lane paved road with a 2400 mm culvert through which Howell Branch currently flows. An area south of Tommy's Rd. has also been acquired as NCDOT right-of-way and has 0.77 acres total of wetlands associated with Howell Branch.

Proposed Conditions

NCDOT plans to restore 61 linear ft of Howell Branch, 0.33 acre of riverine wetlands and 7792 square ft. of riparian buffer through removal of the existing pavement and fill material associated with Tommy's Rd as well as removal of the 2400 mm culvert that

Howell Branch currently flows through. NCDOT will excavate the existing roadbed to the existing wetland elevation and match the base width of the existing culvert (See Detail V, sheet 2-T and Sheets x-242 & x-243). These restored areas will be planted with a mix of bare root saplings as described in Table 2 at a rate of 680 trees per acre. This area will be protected through fencing of the entire site.

Success Criteria and Monitoring Plan

The following monitoring will be performed each year of the 3-year monitoring period on the restoration areas: reference photos, plant survival (i.e., identify specific problems areas (missing, stressed, damaged or dead plantings), estimated causes and proposed/required remedial action), visual inspection of channel stability. Physical measurements of channel stability/morphology will not be performed. A monitoring report will be submitted within sixty (60) days after completing the monitoring.

Type	Quantity	Credits
Stream Preservation	691 ft	138.2 ft
Stream Restoration	61 ft	61 ft.
Wetland Preservation	2.37 ac	0.47 ac
Wetland Restoration	0.33 ac	0.33 ac
Buffer Restoration	7792 sq. ft	7792 sq. ft

Common Name	Scientific Name	Percent Planted by Species
Type II Streambank Reforestation – Bare Root Plantings		
River Birch	<i>Betula nigra</i>	30%
Sycamore	<i>Platanus occidentalis</i>	30%
Overcup Oak	<i>Quercus lyrata</i>	20%
Swamp Chestnut Oak	<i>Quercus michauxii</i>	20%
Type I Streambank Reforestation - Live Stakes		
Black willow	<i>Salix nigra</i>	50%
Silky Dogwood	<i>Cornus amomum</i>	50%

323

ANNUAL WETLAND MONITORING REPORT
YEAR 2005 (YEAR 4)

BEAR CREEK - MILL BRANCH WETLAND MITIGATION BANK
LENOIR COUNTY, NORTH CAROLINA



Natural Resources
Restoration & Conservation

RESTORATION SYSTEMS, LLC
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Raleigh, North Carolina 27604
restorationsystems.com
(919) 755-9490

October 2005

EXECUTIVE SUMMARY

Restoration Systems, a private sector mitigation company, has established the Bear Creek-Mill Branch mitigation site (Site) approximately 5 miles from confluence with the Neuse River, in western Lenoir County. The Site is composed of approximately 145 acres within the floodplain of Bear Creek, and supports stream flows from Mill Branch and two unnamed tributaries at confluence with the river. This Site offers opportunities for riverine (stream-side) wetland restoration, Neuse River basin riparian buffer establishment, and Neuse River nitrogen reduction.

This mitigation plan details restoration and enhancement procedures for riverine wetland restoration. The Site historically serviced a watershed of approximately 54 square miles. The objective of this plan is to restore watershed functions associated with water quality and to restore a regional wildlife corridor extending from the Neuse River. The Site will be coupled with approximately 300 acres of riverine wetland preservation within the watershed to ensure that a viable wetland refuge is established in the region.

Under existing conditions, the river floodplain has been ditched, leveled, and drained to support agricultural and silvicultural activities. Streams and the river have been dredged, straightened, and levees constructed to further impede surface water impacts to alternative land uses. Based on surface water models, river flooding onto the former floodplain has been effectively reduced to a 100-year return interval due to constructed levees. This plan includes removal of a section of the river levee; consequently, flooding from the river may be restored to a 5-year return interval, a 95-year increase in return interval relative to existing conditions.

Under existing conditions, nitrogen loading into the Neuse River from the Bear Creek and Mill Branch watersheds is projected to total 2,575,000 pounds per year, representing a seven-fold increase in nutrient loads discharged into the River due to land uses in the watershed. River dredging and levee construction throughout the Bear Creek watershed has most likely exacerbated the water quality problems. Nutrient recycling functions associated with riverine wetlands and floodplains is expected to be diminished or negated throughout the region. Therefore, wetland restoration plans have been designed specifically to maximize nutrient cycling functions at this Site. The effort includes: 1) restoration of overbank flooding from the river as described above; 2) maximizing the amount of groundwater recharge across the floodplain from auxiliary watersheds; 3) establishment of backwater sloughs, cypress-tupelo swamps, and bottomland hardwood forests in flow pathways; and 4) diversion of treated stream flows back into historic channels, located approximately 3000 feet down-valley from the existing ditch outlets. Based on preliminary studies, this wetland restoration project exhibits potential to provide up to a 5 percent reduction in nitrogen loads for the 54-square mile Bear Creek region, or an 80 percent reduction in nitrogen loads for the 3-square mile, Mill Branch watershed.

Site alterations to restore groundwater, surface flow dynamics, and wetland function include: 1) ditch backfilling; 2) ditch outlet plugs; 3) river levee removal; 4) embankment construction; 5) Mill Branch channel repair; 6) wetland surface scarification; 7) seasonal pool construction; 8) woody debris deposition; and 9) tree planting. The alterations will serve to: 1) establish a backwater cypress-tupelo swamp; 2) provide a perennial source for groundwater recharge

through restored bottomland hardwood forest; 3) allow diversion of Mill Branch back into the historic stream channel; and 4) facilitate nutrient reduction goals in the Neuse River basin. The wetland design has been prepared to mimic riverine wetland attributes measured in regional reference wetlands (carbon copy method for wetland restoration). A total of 34,750 characteristic trees will be planted within the restored wetland systems.

Mill Branch will be diverted from inter-field ditches into exiting forested areas. In the forested area, the stream will be allowed to re-develop primarily through passive processes. Braiding, ponding, and anastomosed conditions will occur, mimicking reference streams in the region. Reference streams often exhibit braided (alluvial fan), backwater, or anastomosed features at the confluence with large river floodplains. The outlet for Mill Branch will be established approximately 3000 feet down-valley from the existing outfall, providing approximately 1710 feet in additional valley length relative to existing, straightened conditions (restored sinuosity not included). The increased length of stream corridor will allow for the restoration and maintenance of in-stream aquatic habitat relative to existing conditions. In addition, nutrient reduction in surface water flows will be maximized.

A Monitoring Plan has been prepared that consists of a comparison between regional reference wetlands along with evaluation of jurisdictional wetland criteria. Monitoring will entail analysis of wetland hydrology, soil, and vegetation for 5 years or until success criteria are fulfilled.

Restoration Systems intends to immediately transfer the land deed and conservation easements for the Site and regional wetland preservation areas to the North Carolina Wildlife Habitat Foundation (Eddie C. Bridges, Executive Director). Immediate transfer to the conservation organization will ensure that the 445-acre land area remains protected and managed as a regional wetland refuge in perpetuity.

Restoration plans will re-introduce surface water flood hydrodynamics from a 54 square mile watershed. The plan includes establishment of an array of riverine communities, including levee forest, bottomland hardwood forests, riverine swamp forests, and backwater cypress-gum swamps. Therefore, riverine hydrodynamic and biogeochemical functions will be restored, including pollutant removal, organic carbon export, sediment retention, nutrient cycling, flood storage, and energy dissipation. Physical wetland functions typically associated with water quality will be replaced within the Neuse River basin.

Biological functions associated with the riverine system will also be restored including in-stream aquatic habitat, structural floodplain habitat, and interspersed and connectivity between the restored stream, floodplain, and adjacent uplands.

Based on restoration plans, the area includes approximately 88 acres of riverine wetland restoration, 34 acres of wetland enhancement, 300 acres of wetland preservation, and 23 acres of upland buffer restoration. Based on Environmental Protection Agency guidelines, the plan provides 88 wetland mitigation credits for bottomland hardwood and swamp forest wetlands on riverine floodplains (5th order streams or less). In addition, the Site provides for 3390 linear feet of riparian buffer credit and a conservative estimate of 100,000 pounds per year of nitrogen removal in the Neuse River Basin. The project is scheduled for completion in December, 2000.

3.0 CONCLUSIONS AND SUMMARY OF RESULTS FOR YEARS 1 THROUGH 5

The restoration site exhibits hydrological characteristics that are very similar to the reference wetlands. Community patterns continue to develop in a clumped distribution, with a variety of tree seedlings surviving in local niches along the hydrology gradient. Areas that are characterized primarily by shrub/emergent assemblages contain an abundance of young, swamp forest species including water tupelo (*Nyssa aquatica*), swamp tupelo (*Nyssa biflora*), and bald cypress (*Taxodium distichum*). As these trees/forests mature throughout the years and the canopy closes, the emergent species are expected to be shaded out as the cypress-tupelo swamp develops with interspersed pockets of permanent inundation similar to that of other swamp forests throughout the region.

Several beaver dams were observed and removed within the site between 2004 and 2006. Beaver are present and active within reference wetland areas and have become a part of bottomland hardwood and swamp forest ecosystems throughout the Neuse River watershed. In addition, river otter (*Lutra canadensis*) populations that are likely present within the site and adjacent areas may be threatened by beaver removal programs.

Chinese privet (*Ligustrum sinense*) is present along mature forest edges and within established bottomland hardwoods located in the southeast portion of the site. The density of Chinese privet stems has decreased within bottomland hardwoods from 229 stems per acre in year 4 (2005) to 86 stems per acre in year 5 (2006). This is likely due to increased saturation/inundation of the site and an intolerance of this species to endure prolonged periods of saturation/inundation. Drier conditions during earlier monitoring years may have encouraged proliferation of this species within the site. During field investigation in late July and early August of 2006, many of the more mature, established stems of Chinese privet were dead or dying, most likely resulting from continual saturation/inundation. In addition, Chinese privet was present within the reference forest used to design this site and the species has become naturalized within bottomland hardwood and swamp forests throughout the Neuse River watershed. It is not recommended that measures to control this species should be taken. This species is extremely difficult to control due to propagation from root and stump sprouts, production of numerous fruits that are easily dispersed by area wildlife (mostly birds) and moving water, and tolerance of drought conditions.

In summary, the restoration site achieved success criteria for hydrology and vegetation in the Fifth Monitoring Year. In addition, the site is highly successful having achieved success criteria for hydrology and vegetation over the entire 5-year monitoring period. Tables 5 and 6 below summarize hydrology and vegetation data gathered each of the five monitoring years.

Table 5. Summary of Groundwater Gauge Results for Years 1 through 5

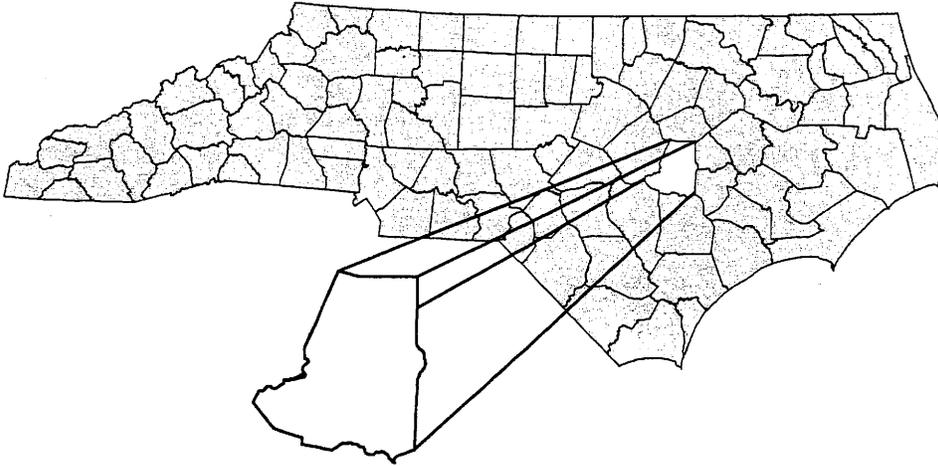
Gauge	Success Criteria Achieved (Max Consecutive Days Saturated During Growing Season)				
	Year 1 (2002)	Year 2 (2003)	Year 3 (2004)	Year 4 (2005)	Year 5 (2006)
BH1	Yes (27 days)	Yes (135 days)	Yes (217 days)	Yes (119 days)	Yes (249 days)
BH2	Yes (49 days)	Yes (136 days)	Yes (207 days)	Yes (100 days)*	Yes (167 days)
BH3	Yes (59 days)	Yes (249 days)	Yes (249 days)	Yes (114 days)*	Yes (167 days)
BH4	Yes (59 days)	Yes (249 days)	Yes (249 days)	Yes (102 days)	Yes (196 days)
BH5	Yes (152 days)	Yes (249 days)	Yes (249 days)	Yes (225 days)*	Yes (249 days)
BH6	Yes (154 days)	Yes (249 days)	Yes (249 days)	Yes (157 days)*	Yes (249 days)
Ref BH100	Yes (64 days)	Yes (249 days)	Yes (166 days)	malfunctioned	Yes (86 days)
SF1	Yes (43 days)	Yes (249 days)	Yes (249 days)	Yes (249 days)	Yes (133 days)
SF2	Yes (249 days)	Yes (249 days)	Yes (249 days)	Yes (177 days)	Yes (249 days)
SF3	Yes (56 days)	Yes (249 days)	Yes (249 days)	Yes (103 days)*	Yes (247 days)
SF4	Yes (249 days)	Yes (249 days)	Yes (249 days)	Yes (130 days)*	Yes (249 days)
SF5	Yes (220 days)	Yes (249 days)	Yes (249 days)	Yes (249 days)	Yes (249 days)
Ref SF100	Yes (130 days)	Yes (249 days)	Yes (249 days)	Yes (249 days)	Yes (249 days)

* Gauge malfunctioned for a portion of the growing season.

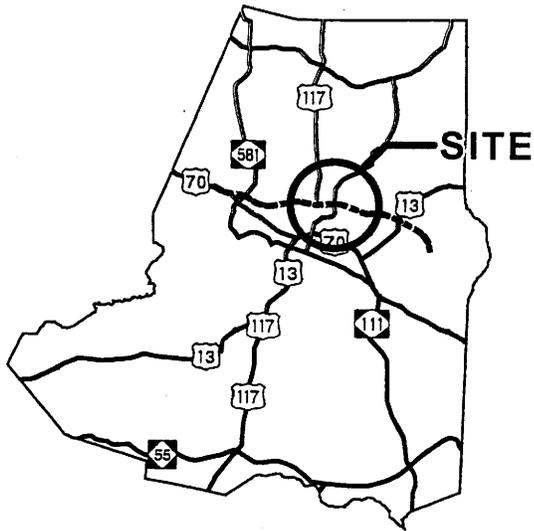
Table 6. Summary of Vegetation Plot Results for Years 1 through 5

Community	Total Stems/Acre Counting Toward Success Criteria				
	Year 1 (2002)	Year 2 (2003)	Year 3 (2004)	Year 4 (2005)	Year 5 (2006)
Bottomland Hardwood	361	842	904	1554	1128
Riverine Swamp Forest	490	876	1028	1534	1282

NORTH CAROLINA



WAYNE



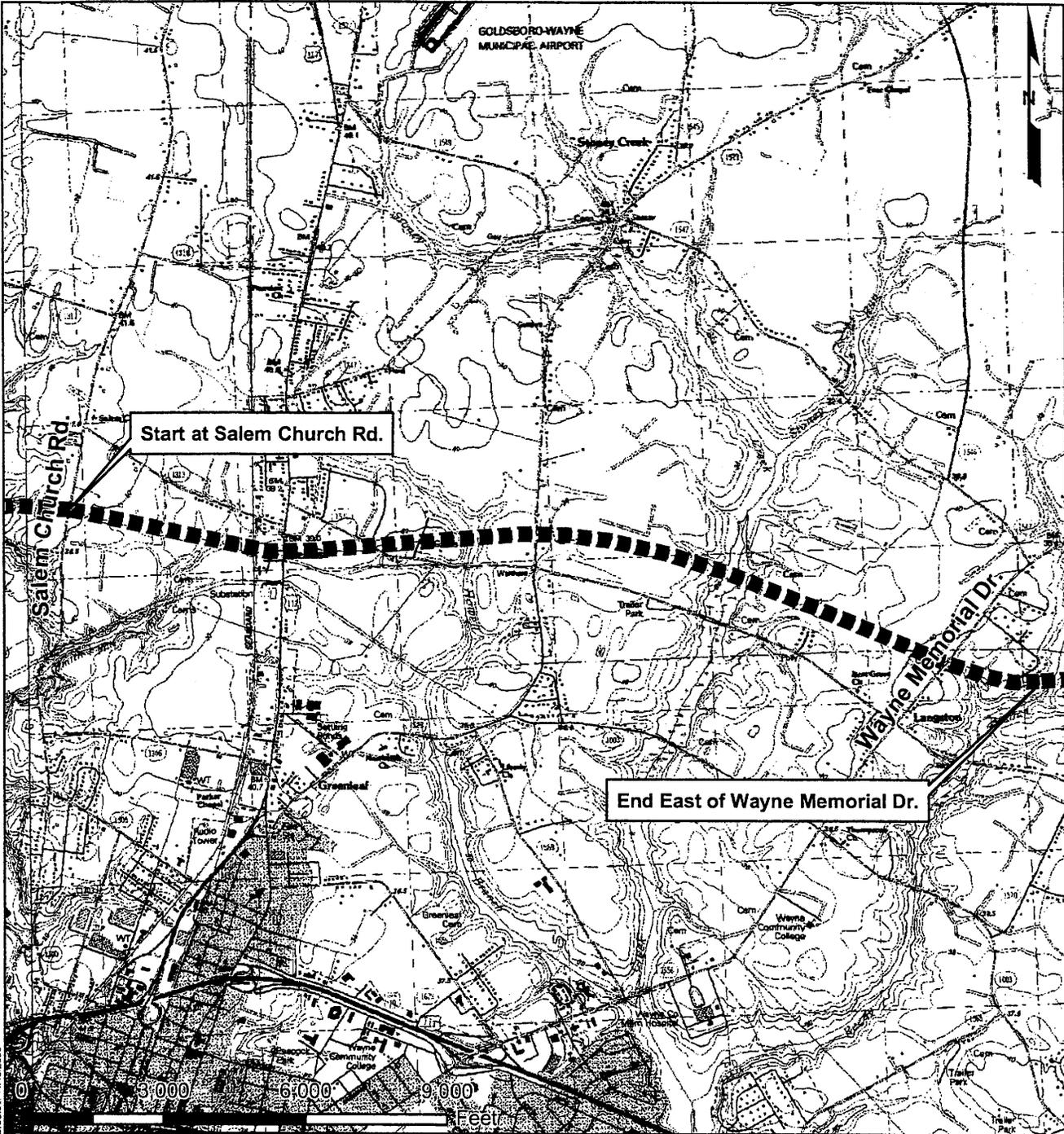
VICINITY MAPS

NCDOT

DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT: 34461.1.3 (R-2554BA)
US 70 BYPASS

Permit Drawing
Sheet 1 of 111

10/17/07



Start at Salem Church Rd.

End East of Wayne Memorial Dr.

1 inch equals 3,000 feet

LOCATION

NCDOT

DIVISION OF HIGHWAYS
 WAYNE COUNTY
 PROJECT: 34461.13 (R-2554BA)
 US 70 BYPASS

Permit Drawing
 Sheet 2 of 111

10/17/07

Source: USGS 7.5 Minute Quadrangle, NE Goldsboro, NC

D:\out-21\BridDCE_Maps\13-510\BridgRP-2510_USGS.mxd Created: 11/10/2005

WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS							
			Permanent Fill in Wetlands (ha)	Temp. Fill in Wetlands (ha)	Excavation in Wetlands (ha)	Mechanized Clearing in Wetlands (ha)	Hand Clearing in Wetlands (ha)	Permanent SW impacts (ha)	Temp. SW impacts (ha)	Existing Channel Impacts Permanent (m)	Existing Channel Impacts Temp. (m)	Natural Stream Design (m)			
1	-L2RPBD- 4+25 +/-	Roadway									0.005	0.001	43.4	6.7	
2	-L2- 92+00 +/-	Roadway									0.001	0.001	7.3	6.7	
3	-L- 94+40 +/-	Roadway	0.636			0.028					0.040	0.001	319.1	9.4	
4	-L- 98+60 +/-	Roadway									0.078	0.011	357.2	25.7	329.8
5	-L- 102+64 - 109+19 +/-	Roadway	0.024			0.005					0.142	0.001	164.8	10.3	170.9
6	-SR5- 17+60 +/-	Roadway				0.012									
7	-L- 114+80 +/-	Bridge	0.002			0.004		0.292			0.001				
8	-SR5- 21+60 +/-	Roadway			0.008	0.021									
9	-L- 132+00 +/-	Bridge	0.047			0.012		0.573							
10	-L- 141+00 +/-	Roadway	1.073			0.125									
11	-L- 148+60 +/-	Roadway	0.041			0.013					0.132	0.002	253.1	6.2	
12	-L- 153+00 +/-	Bridge	0.305			0.015									
14	-Y2- 12+60 +/-	Roadway									0.006	0.001	38.9	3.2	
TOTALS:			2.128	0.000	0.008	0.235	0.865	0.405	0.018	1183.8	68.2	500.7			

Impacts due to piers in wetlands and streams at Site 7= 11sqm
 Impacts due to piers in wetlands and streams at Site 9= 22sqm

Proposed wetland restoration due to existing road removal (Site 6)= 0.129ha

Permit Drawing
Sheet 3 of 11

NC DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

WAYNE COUNTY
 WBS - 34461.1.3 (R-2554BA)

10/17/2007

WETLAND PERMIT IMPACT SUMMARY															
Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS								
			Permanent Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation in Wetlands (ha)	Mechanized Clearing in Wetlands (ha)	Hand Clearing in Wetlands (ha)	Permanent SW impacts (ha)	Temp. SW impacts (ha)	Existing Channel Impacts (m)	Existing Channel Impacts Temp. (m)	Natural Stream Design (m)			
1	-L2RPBD- 4+25 +/-	Roadway									0.005	0.001	43.4	6.7	
2	-L- 92+00 +/-	Roadway									0.001	0.001	7.3	6.7	
3	-L- 94+40 +/-	Roadway	0.636			0.028					0.040	0.001	319.1	9.4	
4	-L- 98+60 +/-	Roadway									0.078	0.011	357.2	25.7	329.8
5	-L- 102+64 - 109+19 +/-	Roadway	0.024			0.005					0.142	0.001	164.8	10.3	170.9
6	-SR5- 17+60 +/-	Roadway				0.012									
7	-L- 114+80 +/-	Bridge	0.002			0.004				0.292	0.001				
8	-SR5- 21+60 +/-	Roadway								0.018		* 0.002		* 9.1	* 18.6
9	-L- 132+00 +/-	Bridge	0.047			0.012				0.573					
10	-L- 141+00 +/-	Roadway	1.073			0.125									
11	-L- 148+60 +/-	Roadway	0.041			0.013					0.132	0.002	253.1	6.2	
12	-L- 153+00 +/-	Bridge	0.305			0.015									
14	-Y2- 12+60 +/-	Roadway									0.006	0.001	38.9	3.2	
TOTALS:			2.128	0.000	0.000	0.214	0.883	0.405	0.020	1183.8	77.3	519.7			

Impacts due to piers in wetlands and streams at Site 7= 11sqm
 Impacts due to piers in wetlands and streams at Site 9= 22sqm

Proposed wetland restoration due to existing road removal (Site 8)= 0.135ha
 * Impacts due to removal of existing culvert on Tommy's Road. See Mitigation Plans.

NC DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS

WAYNE COUNTY
 WPS - 34461.1.3 (R-2554BA)

Permit Drawing
 Sheet 5 of 111

12/4/2007

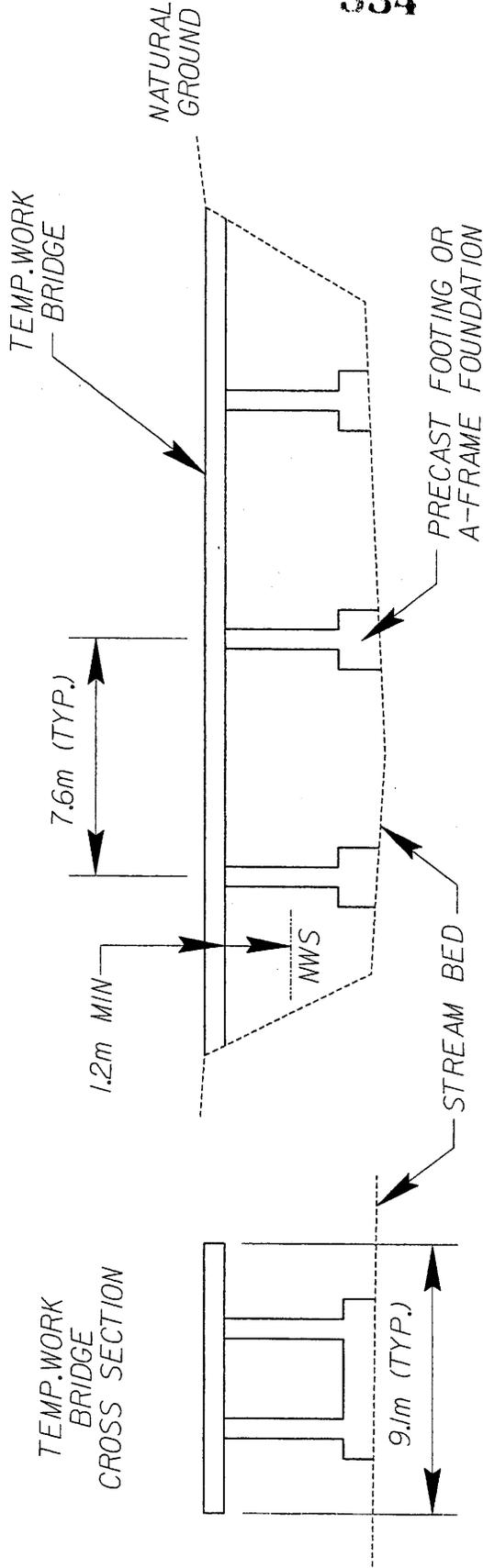
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1A	NCDOT (PREVIOUSLY LANE FARMS, INC.)	
1	DAN R. CASEY	DB 350 PG. 13 DB 335 PG 397 DB 350 PG. 54 DB 1541 PG 198
2	NORFAM, LLC	
9	EMILY W. PRIVOTT	DB 1486 PG 432
14	HELEN R. GODWIN	DB 439 PG 320
16	ANDREWS FARMS OF WAYNE CO. INC	DB 1037 PG 181 DB 1193 PG 737
17	WILLIAM WHITE	UNKNOWN
20	JOHN M. MERRITT	E 03E PG 667
26	JAMES W. HUBBLE	DB 1171 PG 405
26A	CAROLYN B. MORRIS, W. THOMAS BARDIN	ESTATE FILE 02E-245
27	PATRICIA GABRIEL	WB 1930 PG 169
28	CAREY R. HAM	DB 1621 PG 708
30	NCDOT	DB 1744 PG 533
31	HUBERT C. MATHEWS	DB 582 PG 536
32	SHERMAN E. BEST	DB 1534 PG 253
35	GEORGE MEADE BEST	DB 854 PG 681
36	KENNETH L. WIGGINS	DB 648 PG 95
38	NORA F. SMITH	DB 1424 PG 773
41	DAVID KENNEDY	DB 823 PG 873
43	MALCOLM E. GURLEY	DB 648 PG 416 DB 937 PG 807
43A	JETHO H. HARE	DB 1044 PG 849
47	ROBERT R. EARNEST	DB 728 PG 105
901	NCDOT	DB 834 PG 484 DB 1472 PG 411

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAYNE COUNTY
PROJECT: 34461.1.3 (R-2554BA)

10/17/2007

334



WORK BRIDGE LAYOUT IS ESTIMATED.
ACTUAL LAYOUT MAY VARY
ACCORDING TO CONTRACTOR.

NOT TO SCALE

TEMPORARY WORK BRIDGE DETAIL

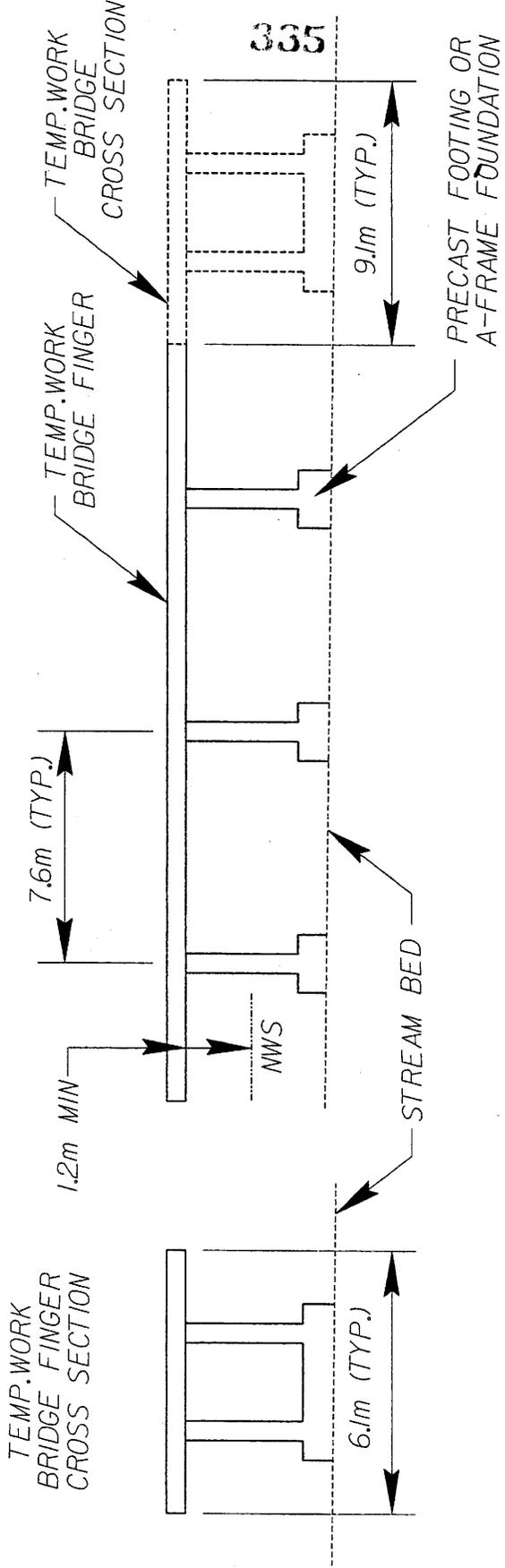
(FOR PROP. BRIDGE CONSTRUCTION)

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAYNE COUNTY
PROJECT 34461.1.3 (R-3554BA)

Permit Drawing
Sheet 2 of 11

10 / 17 / 07



WORK BRIDGE FINGER LAYOUT IS ESTIMATED. ACTUAL LAYOUT MAY VARY ACCORDING TO CONTRACTOR.

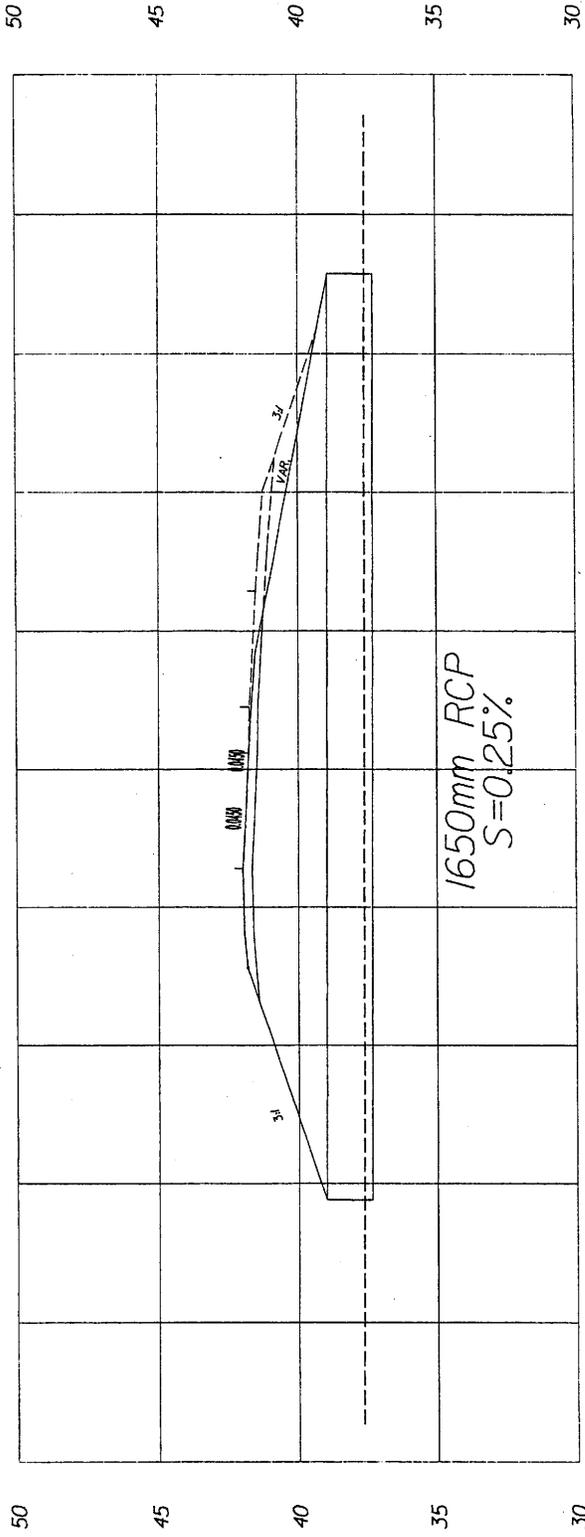
NOT TO SCALE

**TEMPORARY WORK BRIDGE
FINGER DETAIL
(FOR PROP. BRIDGE CONSTRUCTION)**

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

WAYNE COUNTY
PROJECT 34461.13 (R-2554BA)

Permit Drawing
Sheet 2 of 11 10/17/07



336

Permit Drawing
Sheet 9 of 111

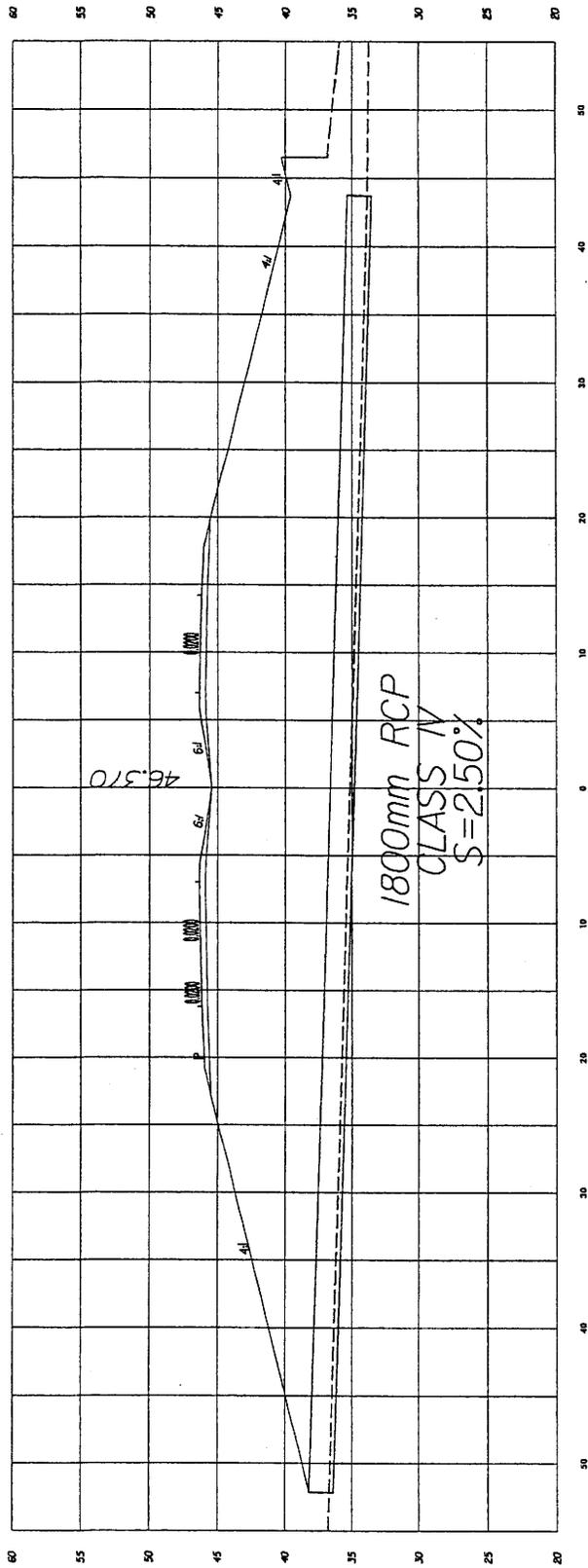
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT 344611.3 (R-2554BA)

US 70 BYPASS 10/17/07

SITE 1
-L2RPPBD- STA. 4 + 24



337



Permit Drawing
Sheet 12 of 111

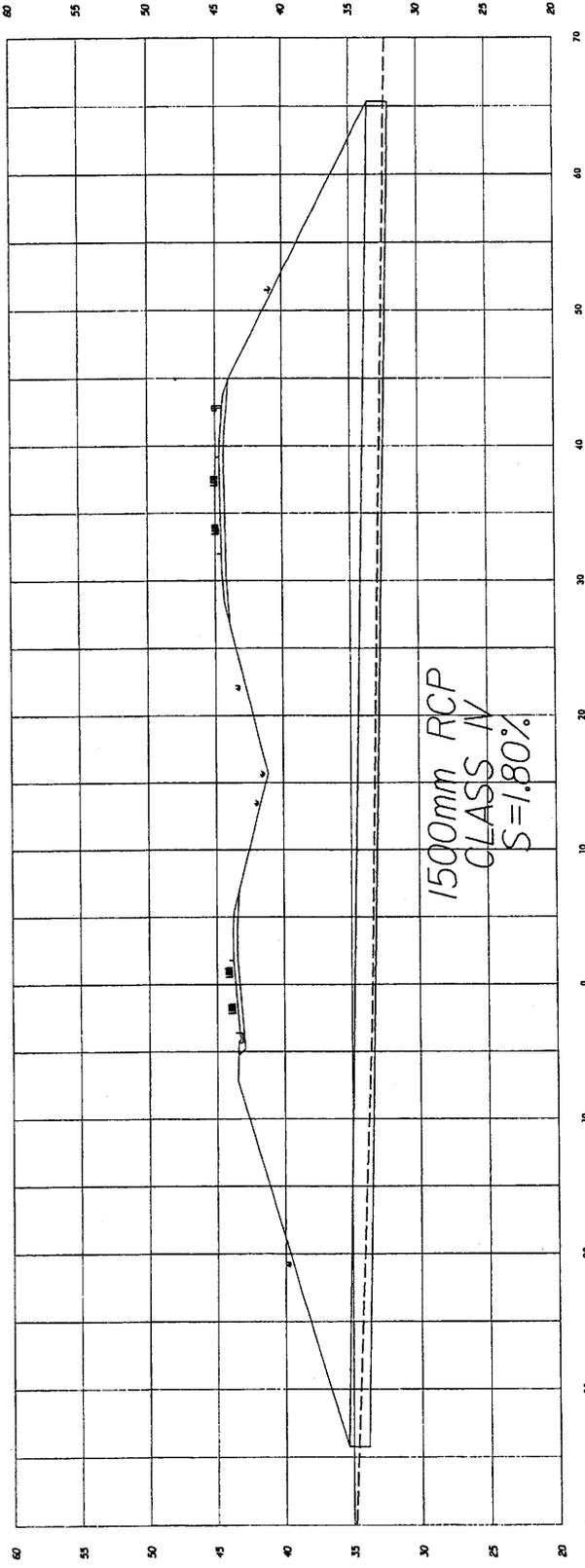
N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

PROJECT 3446LL13 (R-2554BA)

US 70 BYPASS 10/17/07

SITE 3
=L= STA. 94+73





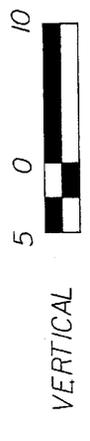
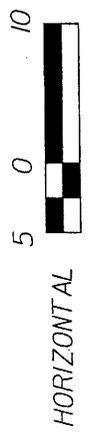
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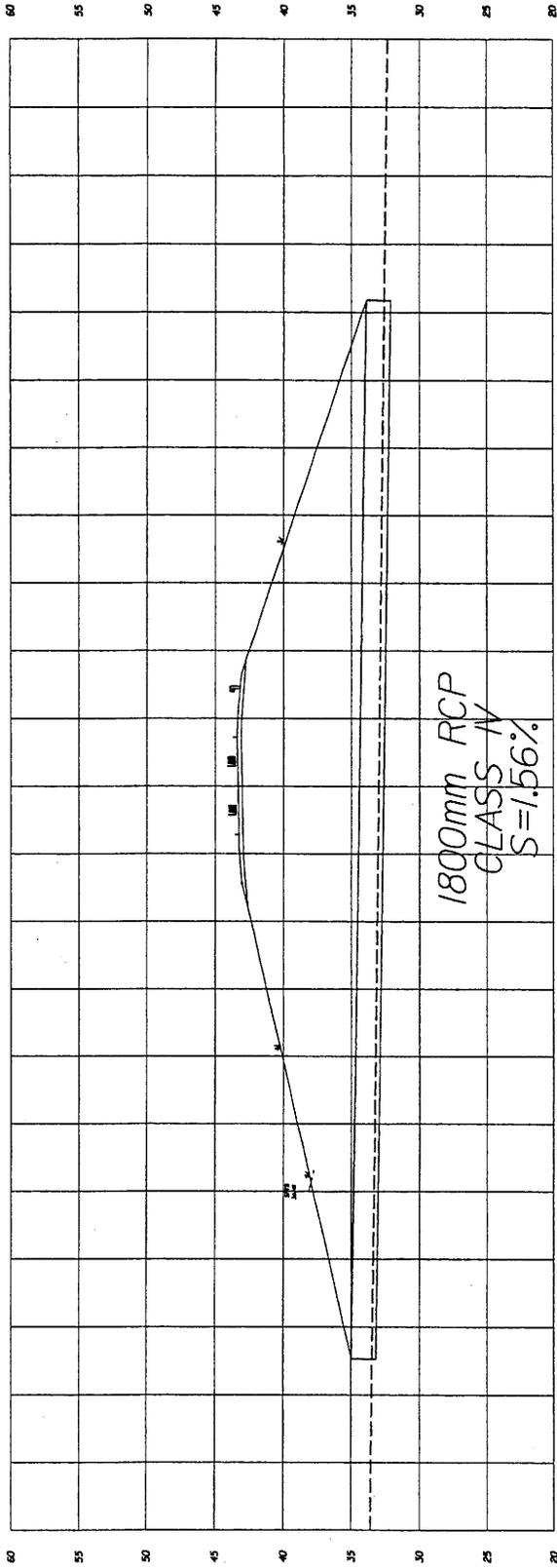
Permit Drawing
Sheet 14 of 111

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT 34461.13 (R-2554BA)

US 70 BYPASS 10/17/07

SITE 3
-L2LPD- STA. 2 + 20





339

Permit Drawing
Sheet 12 of 111

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

PROJECT 34461.1.3 (R-2554BA)

US 70 BYPASS 10/17/07

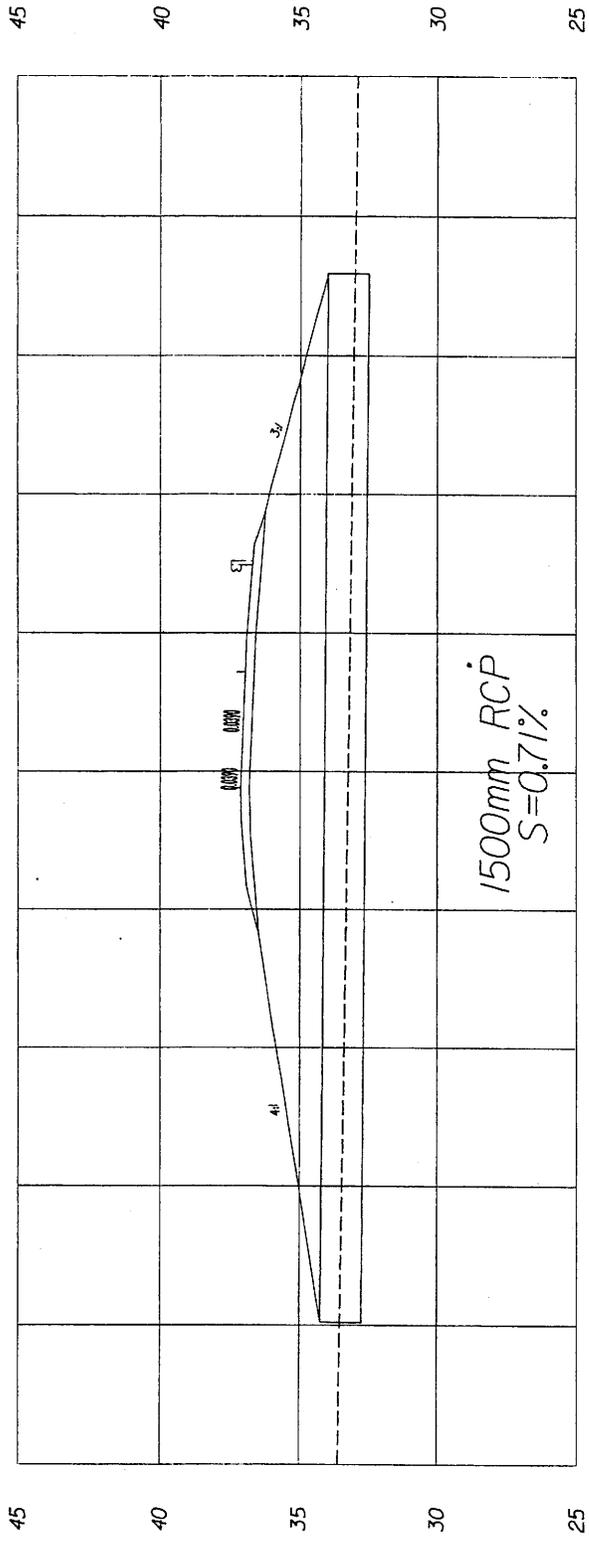
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HORIZONTAL



VERTICAL



340

Permit Drawing
Sheet 12 of 111

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

PROJECT 34461.1.3 (R-2554BA)

US 70 BYPASS 10/17/07

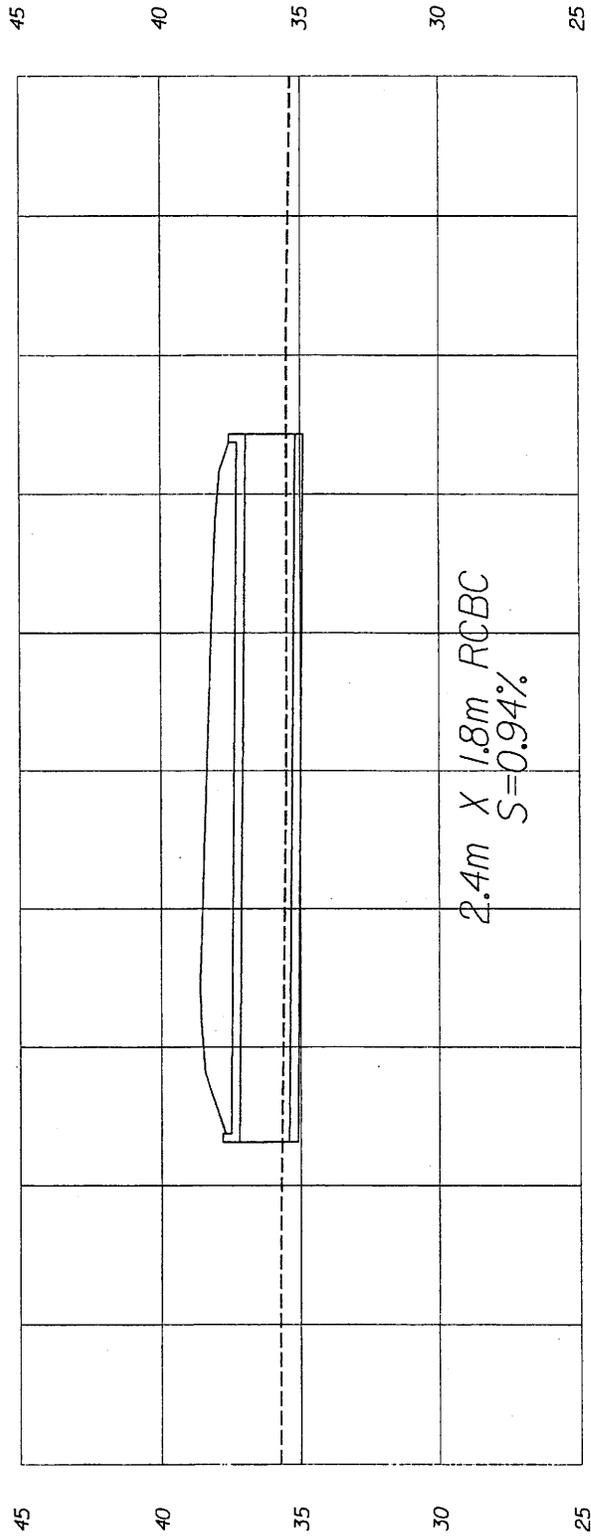
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HORIZONTAL



VERTICAL



Permit Drawing
Sheet 14 of 111

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

PROJECT 34461.13 (R-2554BA)

US 70 BYPASS 10/17/07

SITE 14
-Y2- STA. 12+60



HORIZONTAL



VERTICAL

PROJECT #: R-2554BA

COUNTY: Wayne

DESCRIPTION: Construction of US Highway 70 in Goldsboro, NC

STREAM: Unnamed tributary to Smith Mill Run

NATURAL CHANNEL DESIGN: SITE 3

Sta 97+21.286 to 99+66.856 -L- (RT)

(Rev. October 10th, 2007)

The construction of the US Highway 70 bypass in northern Goldsboro, NC will result in numerous impacts to stream channels and other waters of the United States. In order to mitigate some of these impacts, on behalf of the North Carolina Department of Transportation (NCDOT), Rummel, Klepper, and Kahl (RK&K), LLP proposes stream restoration at Site 3, located immediately south of the Highway 70 right-of-way, south of SR 1313 (Belfast Road) in Goldsboro, NC.

Portions of two tributaries will be restored: a longer, southwest-flowing reach and a shorter tributary that flows into the longer reach from the north. The impacted stream channels are unnamed tributaries to the Smith Mill Run, which is in the Neuse River Basin, and are subject to the Neuse River Riparian Buffer Rules (15A NCAC 2B.0233). The channels are located in the upper coastal plain physiographic province. Land use within the channels' watershed is primarily agricultural, forested, and low-density residential.

In their existing conditions, both channels have been conspicuously channelized (i.e. straightened and dredged). The channel flowing from the north has incised considerably within its banks and represents a G-type channel (per Rosgen). The channels intersect just north of the proposed US 70 bypass footprint. Downstream of the confluence of the two channels, beaver activity has caused water to pond within the banks of the existing channel. The deepness of the water in ponded areas within the channel rendered existing conditions survey work infeasible. However, the Rosgen classification of the channel in this area is likely an F-type channel due to its very high width-to-depth ratio and high degree of incision.

In each of the streams, channel substrate consists of fine to very coarse sands. Along the channel flowing coming from the north, which flows through an agricultural field, the riparian corridor has been mowed and maintained and consists of fescue (*Festuca* spp.) and other grasses. Along the channel flowing towards the southwest and downstream of the confluence of the two channels, a well-developed riparian corridor is present, though relatively narrow (30-50 ft. off both the right and left banks of the channel). Vegetation consists mainly of loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), blackberry (*Rubus* spp.), yellow-poplar (*Liriodendron tulipifera*), devil's walking stick (*Aralia spinosa*), and greenbrier (*Smilax rotundifolia*).

Using existing stream channel conditions survey information (where possible), general site survey information, North Carolina Stream Restoration Institute bankfull hydraulic relationship data for the coastal plain (Doll et al., unpublished), and reference reach data, the natural channel design process (per Rosgen) was used to design a stable C-type stream channel with a narrow bankfull width-to-depth ratio at Site 3. It has been suggested by Rosgen (via personal correspondence) that in order to restore a channel to an E-type classification, it is best to design a C-type channel with the narrowest possible width-to-depth ratio as to not compromise stream bank stability. The reference reach used to guide the design of the proposed channel's pattern, profile, and dimension is an E5-type channel in Craven County, NC (see Table 1 for reference reach morphological variables). Proposed channel morphological variables are displayed in Table 1. The existing channels will be conveyed under US 70 and its associated filled slopes through 1350-mm diameter RCP culverts. The longer, main channel will start immediately below the culvert's outlet protection and flow towards the west for approximately 930 linear feet until its confluence with its existing downstream reach that will not be impacted by construction (see attached plan sheets). The smaller tributary to the north will flow for approximately 155 linear feet until its confluence with the longer stream to the south.

Due to the existing land grade and other constraints in the vicinity of the culvert outlets of both channels, a priority one restoration (per Rosgen), in which the restored channel's bankfull elevation is consistent with the existing floodplain elevation, is not possible. Thus, a priority two restoration is proposed, in which a bankfull bench is excavated adjacent to both banks of the restored channel. The bench's minimum width will be 23 ft. The bench should be planted with appropriate native tree and shrub species.

Furthermore, the 50-ft. Neuse River Buffer will be re-established adjacent to both sides of the restored bankfull channel and will be contained within the proposed right-of-way for the US 70 project. The re-established buffer areas should be replanted in accordance with North Carolina Ecosystem Enhancement Program (EEP, formerly WRP) buffer restoration guidelines.

Due to the relatively high difference in elevations between the proposed culvert's outfall and the existing stream channel thalweg, and the limited amount of space to route the designed stream channel to gradually dissipate slope, rock cross-vane grade control structures will be used to step the proposed channel's elevation down to its confluence with the existing channel. In order to ensure vertical channel stability and prevent creating a barrier to potential fish migration upstream, cross-vanes will result in no more than one-foot difference between the channel thalweg elevations upstream and downstream of the structure. Rock vanes will be placed on the outside of proposed meander bends to provide additional stream bank stability. Restored stream banks should be matted with coir matting (CF-7 or other similar material) and live staked with black willow (*Salix nigra*) and silky dogwood (*Cornus amomum*) to enhance bank stability. Refer to the attached plan sheets for cross-vane, coir matting, and rock vane details.

Channel substrate consists of fine to very coarse sands. Shear stresses and sediment transport analyses of the reference reach and the proposed restoration reaches were compared to ensure, to the maximum extent possible, that the restored stream will function properly. The shear stresses were calculated based on the velocity and flow depth results of the HEC-RAS analysis of the proposed restoration and the velocity and flow depth of the reference reach. These results were compared to the maximum permissible velocities in HDS-3 Table 2 and permissible shear stress for non-cohesive soils in HEC-15 Chart 1. The Shields Diagram was used to determine the particle size moved by each stream. The comparison of the proposed restoration reach data to the reference reach data indicates the restoration design is within acceptable velocity, shear stress and particle entrainment limits that will allow proper sediment transport under bankfull conditions.

Table 1. Rosgen Stream Channel Parameters

Parameter	Reference Reach	Proposed Upper Channel	Proposed Lower Channel
Rosgen channel type	E5	C5	C5
Drainage area (mi. ²)	0.38	0.084	0.15
Bankfull discharge, Q_{BKF} (cfs)	8.3	2.8	4.2
Bankfull cross-sectional area, riffle $A_{BKF} - \text{riffle}$ (ft. ²)	6.5	3.0	5.6
Bankfull cross-sectional area, pool $A_{BKF} - \text{pool}$ (ft. ²)	6.2-11.3	6.8	11.6
Bankfull width, W_{BKF} (ft.)	7.1-12.0	6.0	8.0
Bankfull mean depth, d_{BKF} (ft.)	0.9	0.5	0.7
Maximum bankfull depth, d_{max} riffle (ft.)	1.0-1.6	0.65	1.0
Ratio of max. riffle bankfull depth to mean bankfull depth, $d_{max} \text{ riffle}/d_{bkf}$	1.1-1.8	1.3	1.7
Maximum bankfull depth, pool $d_{max} \text{ pool}$ (ft.)	1.7-2.0	1.5	2.0
Ratio of max. pool bankfull depth to mean bankfull depth, $d_{max} \text{ pool}/d_{bkf}$	1.9-2.2	3.0*	2.9*
Average bankfull slope, S	0.0012	0.0017	0.0017
Bankfull width-to-depth ratio	7.9	12.0	11.4
Hydraulic radius, R (ft.)	0.73	0.43	0.60
Average bankfull velocity, u (ft./s)	1.28	0.93	0.75
D_{50} (mm)	0.25	0.5 (estimated)	0.5 (estimated)
Shear Stress (lbs/ft. ²)	0.055	0.046	0.064
Particle size entrained by shear stress per Shields diagram (mm)	4.0	3.6	4.5
Stream Power (lbs/ft. ³ ·s)	0.07	0.043	0.048
Entrenchment ratio (W_{fpa}/W_{BKF})	14	14.8-16.8	7.9-11.9
Width of flood-prone area, W_{fpa} (ft.)	102	89-101	62-95
Bank Height Ratio, TOB (top of bank elevation)/ d_{max}	1.0	1.0	1.0
Pool-to-pool spacing (ft.)	42-90	35.4-45	47-60
Ratio of pool-to-pool spacing to W_{bkf}	5.9-7.5	5.9-7.5	5.9-7.5
Meander length, L_m (ft.)	75-120	60	80
Ratio of meander length to W_{bkf}	10-10.6	10	10
Sinuosity, K	1.6	1.15	1.16
Radius of curvature, R_c (ft.)	3.8-35.8	≥15	≥20
R_c ratio (radius of curvature/ W_{BKF})	0.5-3.0	≥2.5	≥2.5

*The North Carolina Stream Restoration Institute (NCSRI) has recommended that pools be excavated slightly deeper than indicated by reference reach data because they have a tendency to partially fill in with fine sediment immediately following channel construction. Thus, the ratio of maximum pool depth to average bankfull depth of the proposed channel is higher than that of the reference reach.

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Permit Drawing
Sheet 18 of 111

PROJECT #: R-2554BA

COUNTY: Wayne

DESCRIPTION: Construction of US Highway 70 in Goldsboro, NC

STREAM: Unnamed tributary to Howell Branch

NATURAL CHANNEL DESIGN: SITE 5

Sta. 13+73.949 -SR5- (Rt.) to Sta. 15+26.859 -SR5- (Rt.)

(Rev. October 10th 2007)

The construction of the US Highway 70 bypass in northern Goldsboro, NC will result in numerous impacts to stream channels and other waters of the United States. In order to mitigate some of these impacts, on behalf of the North Carolina Department of Transportation (NCDOT), Rummel, Klepper, and Kahl (RK&K), LLP proposes stream restoration at Site 5, located immediately south of SR 1571 (Tommys Road) in Goldsboro, NC.

The impacted stream channel is an unnamed tributary to the Howell Branch, which is in the Neuse River Basin, and is subject to the Neuse River Riparian Buffer Rules (15A NCAC 2B.0233). The channel is located in the upper coastal plain physiographic province. Land use within the channel's watershed is primarily agricultural, forested, and low-density residential.

In its existing condition, the channel appears to have been straightened and modified. Channel bed form is generally poor with few riffle/pool sequences present. Cross-sectional surveys were performed at two riffles, yielding bankfull cross-sectional areas of 5.9-6.5 ft.². Channel substrate consists of medium to coarse sands. The Rosgen classification of the existing channel is F5. Prior to past disturbance, the channel was probably classified as a C or E channel type in its natural state. As the channel was straightened, its slope was increased, resulting in higher shear stress. The higher shear stress caused the channel to incise within its bed, which confined bankfull (channel-forming) and other high volume flows within its banks. The increased stress on the

stream banks induced by bankfull and greater volume flows caused bank erosion, which cause the channel to widen to its present unstable dimensions.

The riparian corridor along the channel is highly variable in width, ranging from less than 10 ft. (generally in areas further upstream) to greater than 50 ft. on the channel's north side midway through the reach to be restored. Vegetation consists mainly of loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), blackberry (*Rubus* spp.), green ash (*Fraxinus pennsylvanica*), and greenbrier (*Smilax rotundifolia*).

Using existing stream channel conditions survey information (where possible), general site survey information, North Carolina Stream Restoration Institute bankfull hydraulic relationship data for the coastal plain (Doll et al., unpublished), and reference reach data, the natural channel design process (per Rosgen) was used to design a stable C-type stream channel with a narrow bankfull width-to-depth ratio at Site 5. It has been suggested by Rosgen (via personal correspondence) that in order to restore a channel to an E-type classification, it is best to design a C-type channel with the narrowest possible with-to-depth ratio as to not compromise stream bank stability. The reference reach used to guide the design of the proposed channel's pattern, profile, and dimension is an E5-type channel in Craven County, NC (see Table 1 for reference reach morphological variables). Proposed channel morphological variables are displayed in Table 1. The proposed channel will be conveyed under Tommys Road through a single RCP culvert and flow to the east for approximately 560 linear feet until its confluence with its existing downstream reach that will not be impacted by construction (see attached plan sheets).

Due to the existing land grade and other constraints, a priority one restoration (per Rosgen), in which the restored channel's bankfull elevation is consistent with the existing floodplain elevation, is not possible. Thus, a priority two restoration is proposed, in which a bankfull bench is excavated adjacent to both banks of the restored channel. The bench's minimum width will be 23 ft. The bench will be planted with appropriate native tree and shrub species. Furthermore, the 50-ft. Neuse River Buffer will be re-established adjacent to both sides of the restored bankfull channel and will be contained within the proposed right-of-way for the US 70 project. The re-established buffer areas will be replanted in accordance with North Carolina Ecosystem Enhancement Program (EEP, formerly WRP) buffer restoration guidelines.

Due to the relatively high difference in elevations between the proposed culvert's outfall and the existing stream channel thalweg, and the limited amount of space to route the designed stream channel to gradually dissipate slope, rock cross-vane grade control structures will be used to step the proposed channel's elevation down to its confluence with the existing channel. In order to ensure vertical channel stability and prevent creating a barrier to potential fish migration upstream, cross-vanes will result in no more than one-foot difference between the channel thalweg elevations upstream and downstream of the structure. Rock vanes will be placed on the outside of proposed meander bends to provide additional stream bank stability. Restored stream banks will be matted with coir matting (CF-7 or other similar material) and live staked with black willow (*Salix nigra*) and silky dogwood (*Cornus amomum*) to enhance bank stability. Refer to the attached plan sheets for cross-vane, coir matting, and rock vane details.

Channel substrate consists of fine to very coarse sands. Shear stresses and sediment transport analyses of the reference reach and the proposed restoration reaches were compared to ensure, to the maximum extent possible, that the restored stream will function properly. The shear stresses were calculated based on the velocity and flow depth results of the HEC-RAS analysis of the proposed restoration and the velocity and flow depth of the reference reach. These results were compared to the maximum permissible velocities in HDS-3 Table 2 and permissible shear stress for non-cohesive soils in HEC-15 Chart 1. The Shields Diagram was used to determine the particle size moved by each stream. The comparison of the proposed restoration reach data to the reference reach data indicates the restoration design is within acceptable velocity, shear stress and particle entrainment limits that will allow proper sediment transport under bankfull conditions.

Table 1. Rosgen Stream Channel Parameters

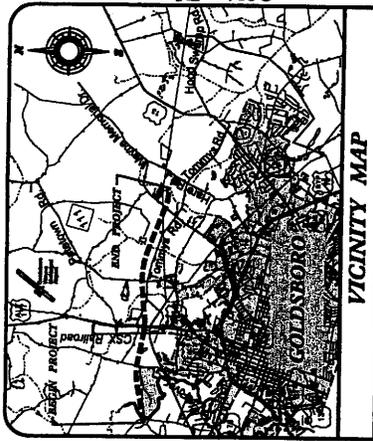
Parameter	Reference Reach	Proposed Channel
Rosgen channel type	E5	C5
Drainage area (mi. ²)	0.38	0.17
Bankfull discharge, Q_{BKF} (cfs)	8.3	4.6
Bankfull cross-sectional area, riffle $A_{BKF} - \text{riffle}$ (ft. ²)	6.5	6.3
Bankfull cross-sectional area, $A_{BKF} - \text{pool}$ (ft. ²)	6.2-11.3	13.9
Bankfull width, W_{BKF} (ft.)	7.1-12.0	9.0
Bankfull mean depth, d_{BKF} (ft.)	0.9	0.7
Maximum bankfull depth, d_{max} riffle (ft.)	1.0-1.6	1.0
Ratio of max. riffle bankfull depth to mean bankfull depth, d_{max} riffle/ d_{bkf}	1.1-1.8	1.8
Maximum bankfull depth, pool d_{max} pool (ft.)	1.7-2.0	2.0
Ratio of max. pool bankfull depth to mean bankfull depth, d_{max} pool/ d_{bkf}	1.9-2.2	2.9*
Average bankfull slope, S	0.0012	0.0017
Bankfull width-to-depth ratio	7.9	12.9
Hydraulic radius, R (ft.)	0.73	0.68
Average bankfull velocity, u (ft./s)	1.28	0.64
D_{50} (mm)	0.25	0.5 (estimated)
Shear Stress (lbs/ft. ²)	0.055	0.072
Particle size entrained by shear stress per Shields diagram (mm)	4.0	4.8
Stream Power (lbs/ft.-s)	0.07	0.046
Entrenchment ratio (W_{fpa}/W_{BKF})	14	9.0-17.2
Width of flood-prone area, W_{fpa} (ft.)	102	72-155
Bank Height Ratio, TOB (top of bank elevation)/ d_{max}	1.0	1.0
Pool-to-pool spacing (ft.)	42-90	53-68
Ratio of pool-to-pool spacing to W_{bkf}	5.9-7.5	5.9-7.5
Meander length, L_m (ft.)	75-120	90
Ratio of meander length to W_{bkf}	10-10.6	10
Sinuosity, K	1.6	1.24
Radius of curvature, R_c (ft.)	3.8-35.8	≥ 22.5
R_c ratio (radius of curvature/ W_{BKF})	0.5-3.0	≥ 2.5

*The North Carolina Stream Restoration Institute (NCSRI) has recommended that pools be excavated slightly deeper than indicated by reference reach data because they have a tendency to partially fill in with fine sediment immediately following channel construction. Thus, the ratio of maximum pool depth to average bankfull depth of the proposed channel is higher than that of the reference reach.

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Permit Drawing
Sheet 22 of 111

CONTRACT: C201818 T.I.P. PROJ: R-2554BA



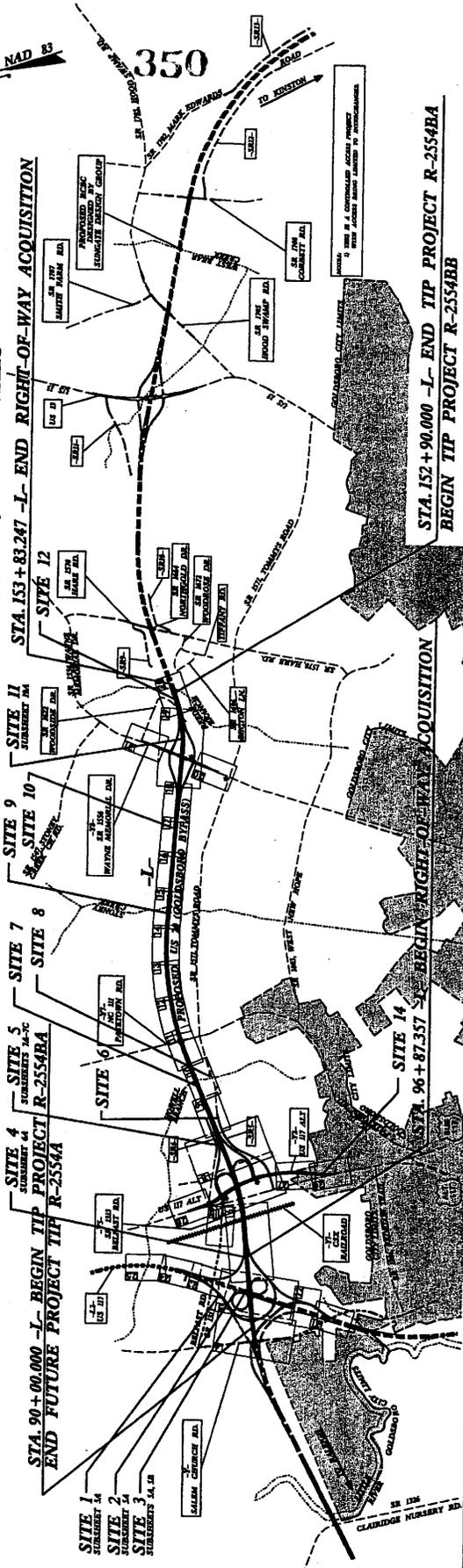
STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS WAYNE COUNTY

**LOCATION: US 70 (GOLDSBORO BYPASS)
FROM EAST OF SR 1300 (SALEM CHURCH ROAD)
TO EAST OF SR 1556 (WAYNE MEMORIAL DRIVE)**

**TYPE OF WORK: GRADING, PAVING, DRAINAGE,
STRUCTURES, CULVERTS, SIGNING, AND SIGNALS**

PROJECT NO.	R-2554BA
PERMITS	I
DATE	
DESIGNER	NHE-70100
CONTRACTOR	BW & UTIL
DATE	
DATE	
DATE	

METRIC
ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE SHOWN



DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA	PERMIT NO. 23 of 111
HYDRAULICS ENGINEER	STATE DESIGN ENGINEER
ROADWAY DESIGN	FEDERAL HIGHWAY ADMINISTRATION

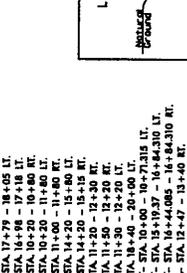
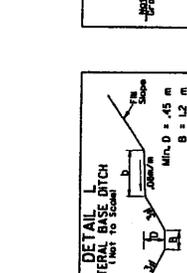
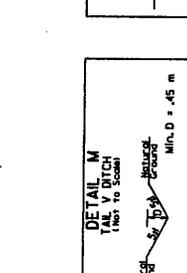
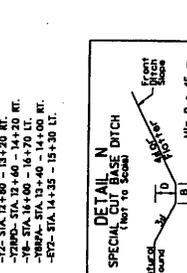
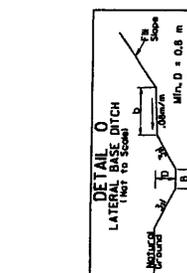
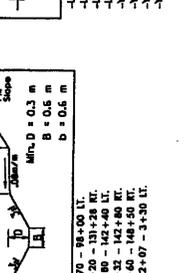
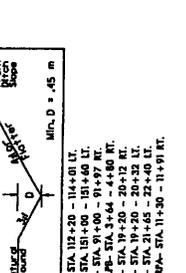
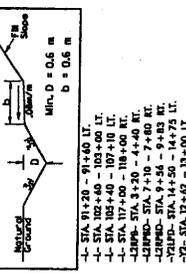
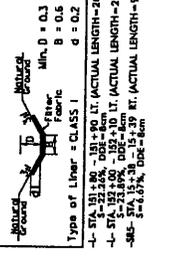
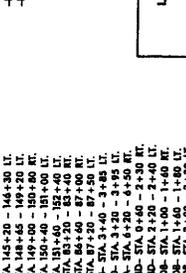
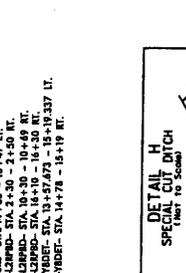
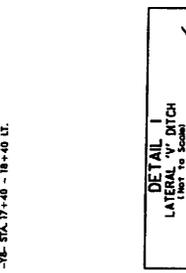
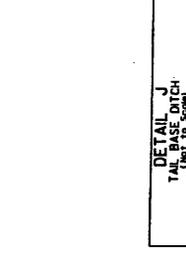
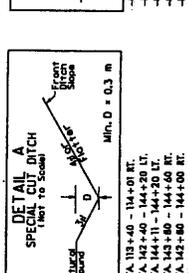
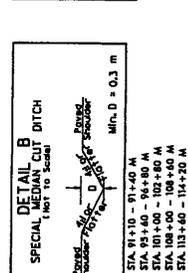
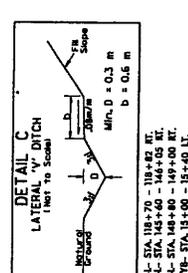
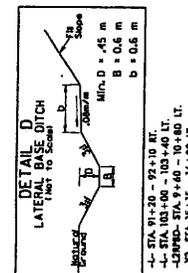
PLANS PREPARED BY: HUNTERLIPPER & KIM, L.P. 200 RALEIGH AVENUE, SUITE 200 RALEIGH, NC 27601 PHONE 919-876-3500	PROJECT ENGINEER B. KEITH SKINNER, P.E.
RIGHT OF WAY DATE: MAY 18, 2005	PROJECT DESIGN ENGINEER MICHAEL T. MERRITT, P.E.
LETTING DATE: APRIL 15, 2008	PROJECT DESIGN ENGINEER Scott Blasius, P.E.
NC DOT CONTRACT: Engineering Coordinator - Roadway Design	

PROJECT LENGTH Length Roadway TIP Project R-2445BA 5.602 km *Length Structures TIP Project R-2445BA 0.489 km	TOTAL LENGTH TIP Project R-2445BA 6.290 km (3.91 MILES)
*USED EBL -L- STATIONS FOR STRUCTURE LENGTHS	

DESIGN DATA ADT 2008 = 20,728 ADT 2028 = 29,048 DHW = 10 % D = 55 % T = 10 % V = 110 km/h	FUNCTIONAL CLASSIFICATION: FREEWAY * TST 6% DUAL 4%
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GRAPHIC SCALE PLANS: 1" = 10' PROFILE (HORIZONTAL): 1" = 10' PROFILE (VERTICAL): 1" = 10'
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PROJECT REFERENCE NO. **R-25342A**
 SHEET NO. **2-5**
 ROADWAY DESIGN ENGINEER
 METRIC
 CONST. DIV.
 A/W REV.



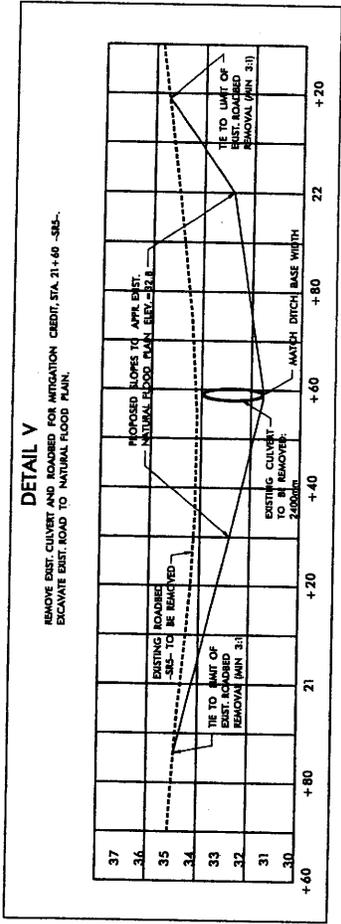
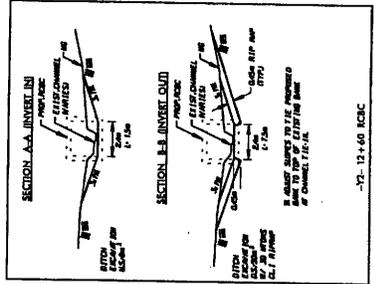
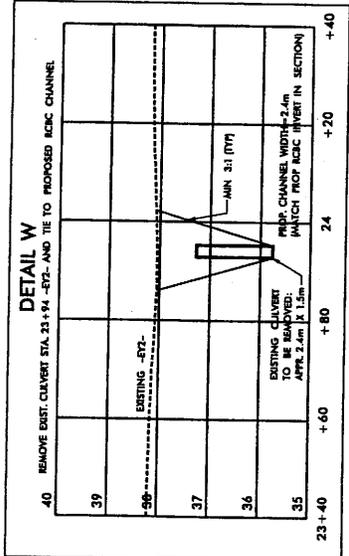
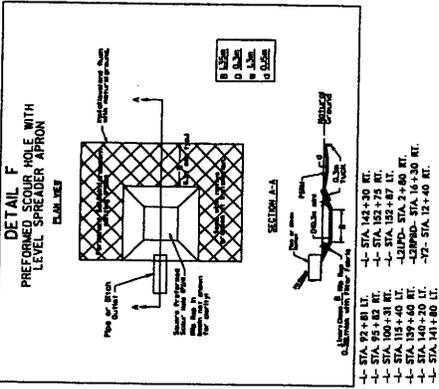
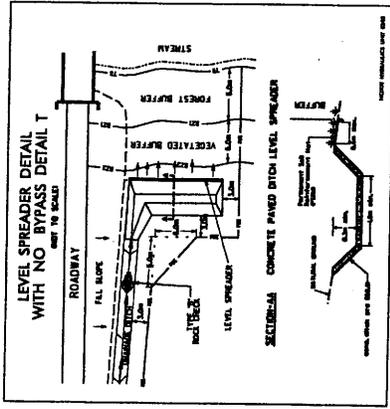
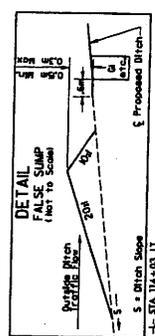
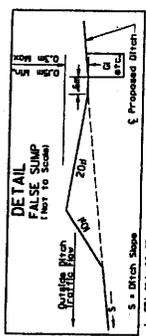
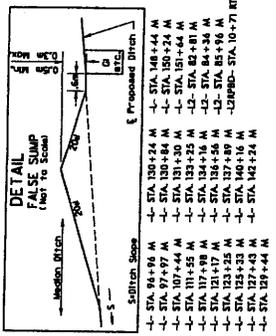
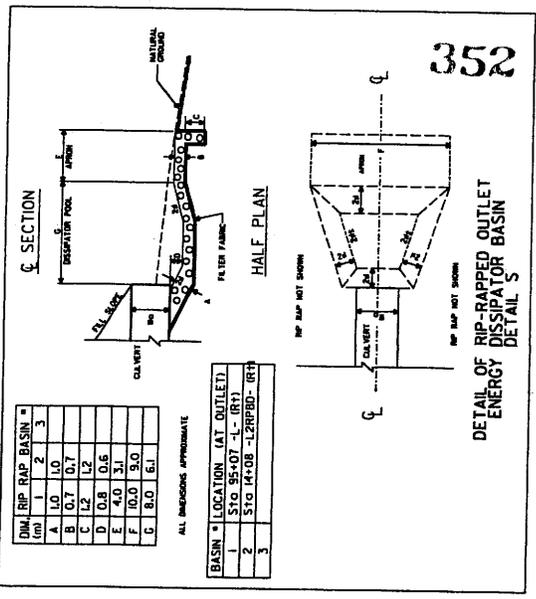
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PLANS PREPARED BY:
 RUMMEL & KLEPPER & KAHL, LLP
 300 CONVENT ROAD, SUITE 200
 FALCON, NORTH CAROLINA 27627-2900
 919.878.0800
 DIVISION OF HIGHWAYS

Permit Drawing
 Sheet 24 of 111

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- L- STA. 142+60 - 142+80 LT.
- L- STA. 142+80 - 143+00 RT.
- L- STA. 143+00 - 143+20 LT.
- L- STA. 143+20 - 143+40 RT.
- L- STA. 143+40 - 143+60 LT.
- L- STA. 143+60 - 143+80 RT.
- L- STA. 143+80 - 144+00 LT.
- L- STA. 144+00 - 144+20 RT.
- L- STA. 144+20 - 144+40 LT.
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- L- STA. 144+60 - 144+80 LT.
- L- STA. 144+80 - 145+00 RT.
- L- STA. 145+00 - 145+20 LT.
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- L- STA. 145+40 - 145+60 LT.
- L- STA. 145+60 - 145+80 RT.
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- L- STA. 146+40 - 146+60 RT.
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- L- STA. 146+80 - 147+00 RT.
- L- STA. 147+00 - 147+20 LT.
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- L- STA. 147+40 - 147+60 LT.
- L- STA. 147+60 - 147+80 RT.
- L- STA. 147+80 - 148+00 LT.
- L- STA. 148+00 - 148+20 RT.
- L- STA. 148+20 - 148+40 LT.
- L- STA. 148+40 - 148+60 RT.
- L- STA. 148+60 - 148+80 LT.
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- L- STA. 149+20 - 149+40 RT.
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- L- STA. 149+60 - 149+80 RT.
- L- STA. 149+80 - 150+00 LT.
- L- STA. 150+00 - 150+20 RT.
- L- STA. 150+20 - 150+40 LT.
- L- STA. 150+40 - 150+60 RT.
- L- STA. 150+60 - 150+80 LT.
- L- STA. 150+80 - 151+00 RT.
- L- STA. 151+00 - 151+20 LT.
- L- STA. 151+20 - 151+40 RT.
- L- STA. 151+40 - 151+60 LT.
- L- STA. 151+60 - 151+80 RT.
- L- STA. 151+80 - 152+00 LT.
- L- STA. 152+00 - 152+20 RT.
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- L- STA. 152+40 - 152+60 RT.
- L- STA. 152+60 - 152+80 LT.
- L- STA. 152+80 - 153+00 RT.
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- L- STA. 153+40 - 153+60 LT.
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- L- STA. 153+80 - 154+00 LT.
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- L- STA. 178+80 - 179+00 RT.
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- L- STA. 179+20 - 179+40 RT.
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- L- STA. 180+80 - 181+00 RT.
- L- STA. 181+00 - 181+20 LT.
- L- STA. 181+20 - 181+40 RT.
- L- STA. 181+40 - 181+60 LT.
- L- STA. 181+60 - 181+80 RT.
- L- STA. 181+

PROJECT REFERENCE NO. R-25548A
 SHEET NO. 2-1
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER
 CONSTANTRY.
 P/W REV.



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DIVISION OF HIGHWAYS

PROJECT REFERENCE NO. R-25546A SHEET 2
 ROADWAY DESIGN ENGINEER R/W SHEET NO. 2
 HYDRAULIC ENGINEER




CONSTR. BY
 R/W REV.

355

MORPHOLOGICAL MEASUREMENTS TABLE

US 70 (GOLDBORO BYPASS)
 -STRM03- (LOWER) Sta. 10+00.000 to Sta. 11+29.346
 -STRM03- (UPPER) Sta. 11+29.346 to Sta. 12+83.130

Variables	Existing Channel	Proposed Upper Reach	Proposed Lower Reach	Reference Reach
1. Stream Type	F	C5	C5	E5
2. Drainage area (sq.mi.)	0.15	0.084	0.15	0.38
3. Bankfull width (ft)	11.5	6.0	8.0	7.1-12.0
4. Bankfull mean depth (ft)	0.4	0.5	0.7	0.9
5. Width/depth ratio	26.0	12.0	11.4	7.9
6. Bankfull cross-sectional area (sq.ft)	5.6	3.0	5.6	6.5
7. Bankfull mean velocity (ft/s)	*	0.93	0.75	1.28
8. Bankfull discharge (cfs)	*	2.8	4.2	8.3
9. Bankfull max depth (ft)	*	0.65	1.0	1.0-1.6
10. Width of floodprone area (ft)	*	88-101	62-95	102
11. Entrenchment ratio	*	14.8-16.8	7.9-11.9	14
12. Meander length (ft) (average)	*	60	80	75-120
13. Ratio of meander length to bankfull width	*	10	10	10.0-10.6
14. Radius of curvature (ft)	*	>15	>20	3.8-35.8
15. Ratio of radius of curvature to bankfull width	*	>2.5	>2.5	0.5-3.0
16. Belt width (ft)	43	37	40	*
17. Meander width ratio	3.7	6.2	5.0	*
18. Sinuosity (stream length/valley length)	1.14	1.15	1.16	1.6
19. Valley slope (ft/ft)	*	0.0085	.0020	*
20. Average slope (ft/ft)	*	0.0017	.0017	0.0012
21. Pool slope (ft/ft)	*	0.0	0.0	*
22. Ratio of pool slope to average slope	*	0.0	0.0	*
23. Maximum pool depth (ft)	*	1.5	2.0	1.7-2.0
24. Ratio of pool depth to average bankfull depth	*	3.0	2.9	1.9-2.2
25. Pool width (ft)	*	2.0	1.6	*
26. Ratio of pool width to bankfull width	*	0.33	0.2	*
27. Pool to pool spacing (ft) (average)	*	35.4-45.0	47-60	42-90
28. Ratio of pool to pool spacing to bankfull width	*	5.9-7.5	5.9-7.5	5.9-7.5
29. Ratio of lowest bank height to bankfull height (or max bankfull depth)	*	1.0	1.0	1.0

* = NOT MEASURED

NOTE: ENGLISH UNITS WERE USED FOR ALL VARIABLES IN THE MORPHOLOGICAL MEASUREMENTS TABLE.

PLANS PREPARED BY:

 RUMMEL - KLEPPER & KAHILL
 Consulting Engineers
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 FOR
 DIVISION OF HIGHWAYS

Permit Drawing
 Sheet 23 of 11

PROJECT REFERENCE NO. SHEET
 R-245-424 2
 R/W SHEET NO. HYDRAULIC ENGINEER
 ROADWAY DESIGN ENGINEER



CONST. REV.
 R/W REV.

STRM03 (LOWER)									
STATIONS	TANGENT/ CHORD CURVE NO.	POINT DESCRIPTION	NORTHING	EASTING	TANGENT / CHORD BEARING	TANGENT / CHORD LENGTH	CURVE LENGTH	DELTA ANGLE	RADIUS
10+00.000	T1	PC	18638.414	70150.092	N 81° 59' 50.98" E	5.000m	N/A	N/A	N/A
10+08.600	C1	CC	18637.24	70155.631	S 64° 00' 15.47" E	11.88m	12.65m	88° 57' 47.91" right	10.500m
10+18.238	T2	PT	18632.03	70146.317	S 25° 31' 21.51" E*	5.200m	N/A	N/A	N/A
10+23.438	C2	CC	18637.605	70154.688	S 66° 19' 36.96" E	11.36m	12.26m	75° 36' 30.91" left	9.500m
10+35.643	T3	PT	18637.934	70156.304	N 78° 52' 7.58" E	5.200m	N/A	N/A	N/A
10+40.843	C3	CC	18637.416	70164.388	S 63° 34' 38.78" E	11.46m	12.42m	79° 08' 27.77" right	9.000m
10+53.269	T4	PT	18636.013	70157.633	S 24° 01' 25.15" E	5.200m	N/A	N/A	N/A
10+58.469	C4	CC	18634.266	70157.675	S 72° 16' 18.05" E	14.17m	16.00m	86° 29' 47.87" left	9.500m
10+74.469	T5	PT	18635.948	70156.292	N 59° 28' 47.02" E	5.400m	N/A	N/A	N/A
10+78.889	C5	CC	18635.662	70156.804	S 76° 39' 56.15" E	12.47m	13.77m	87° 42' 33.70" right	9.000m
10+83.649	T6	PT	18635.815	70167.039	S 32° 45' 33.28" E	5.000m	N/A	N/A	N/A
10+98.849	C6	CC	18635.813	70168.748	S 78° 29' 2.43" E	11.02m	12.18m	87° 08' 48.30" left	8.000m
11+10.814	T7	PT	18633.017	70160.469	N 60° 02' 34.42" E	5.900m	N/A	N/A	N/A
11+16.314	C7	CC	18635.763	70162.232	S 78° 28' 32.89" E	11.92m	13.05m	82° 57' 45.30" right	9.000m
11+23.346	T8	PT	18633.381	70158.914	S 32° 45' 33.28" E	5.000m	N/A	N/A	N/A
11+25.346	T9	PT	18633.381	70158.914	S 32° 45' 33.28" E	5.000m	N/A	N/A	N/A
11+34.346	C8	CC	18633.625	70163.625	S 68° 35' 31.74" E	10.47m	11.03m	85° 11' 42.92" left	10.000m
11+45.376	T9	PT	18635.853	70164.679	N 78° 48' 36.80" E	5.000m	N/A	N/A	N/A
11+50.376	C8	CC	18636.448	70165.618	S 65° 34' 4.30" E	9.413m	9.97m	67° 14' 37.81" right	8.500m
11+60.381	T10	PT	18634.704	70163.297	S 32° 56' 45.40" E	5.200m	N/A	N/A	N/A
11+65.551	C10	CC	18633.341	70166.065	S 79° 51' 24.77" E	12.25m	13.48m	86° 49' 18.76" left	9.000m
11+70.032	T11	PT	18633.341	70167.817	N 61° 13' 55.85" E	5.800m	N/A	N/A	N/A
11+84.632	C11	CC	18637.845	70162.682	S 82° 08' 42.72" E	12.32m	13.42m	73° 14' 42.87" right	10.500m
11+87.655	T12	PT	18635.233	70166.062	S 49° 31' 21.26" E	5.000m	N/A	N/A	N/A
12+02.655	C12	CC	18632.73	70166.06	S 89° 59' 36.88" E	12.29m	13.36m	80° 37' 47.21" left	9.500m
12+16.224	T13	PT	18631.857	70170.52	N 53° 59' 51.51" E	5.200m	N/A	N/A	N/A
12+21.624	C13	CC	18634.605	70175.118	S 86° 59' 50.00" E	10.44m	11.76m	79° 16' 38.98" right	8.500m
12+33.185	T14	PT	18633.028	70172.993	S 49° 52' 31.51" E	5.000m	N/A	N/A	N/A
12+38.185	C14	CC	18633.388	70176.745	S 89° 59' 36.88" E	10.05m	10.67m	87° 56' 15.34" left	9.000m
12+48.857	T15	PT	18632.227	70176.522	N 69° 11' 12.15" E	5.200m	N/A	N/A	N/A
12+54.857	C15	CC	18631.41	70174.243	N 84° 36' 5.00" E	6.615m	8.742m	58° 37' 45.71" right	10.000m
12+60.759	T16	PT	18632.043	70176.827	S 78° 11' 2.14" E	5.200m	N/A	N/A	N/A
12+65.959	C16	CC	18633.802	70175.676	N 79° 05' 16.30" E	10.70m	11.31m	55° 27' 22.85" left	11.500m
12+77.139	T17	PT	18633.375	70176.264	N 49° 21' 34.80" E	6.00m	N/A	N/A	N/A
12+83.139	T17	PT	18633.381	70170.748	N 49° 21' 34.80" E	6.00m	N/A	N/A	N/A

STRM03 (UPPER)									
STATIONS	TANGENT/ CHORD CURVE NO.	POINT DESCRIPTION	NORTHING	EASTING	TANGENT / CHORD BEARING	TANGENT / CHORD LENGTH	CURVE LENGTH	DELTA ANGLE	RADIUS
10+00.000	C17	CC	18635.218	701845.037	S 77° 47' 28.29" E	13.08m	14.24m	81° 39' 36.01" left	10.000m
10+14.241	T18	PT	18635.437	701848.822	N 61° 24' 43.71" E	8.647m	N/A	N/A	N/A
10+20.888	C18	CC	18635.618	701856.659	N 82° 42' 5.24" E	9.89m	7.06m	42° 34' 45.08" right	9.500m
10+27.948	T19	PT	18634.465	701852.302	S 78° 09' 31.22" E	5.000m	N/A	N/A	N/A
10+32.948	C19	CC	18633.248	701847.353	N 80° 47' 45.12" E	7.48m	7.68m	48° 23' 27.32" left	9.500m
10+40.840	T20	PT	18634.463	701874.74	N 57° 36' 1.47" E	8.000m	N/A	N/A	N/A
10+48.840	C20	CC	18635.698	701878.808	N 82° 42' 5.24" E	9.89m	7.06m	42° 34' 45.08" right	9.500m

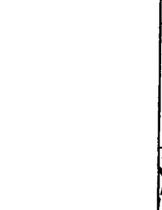
356

PLANS PREPARED BY:
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 603-883-1100
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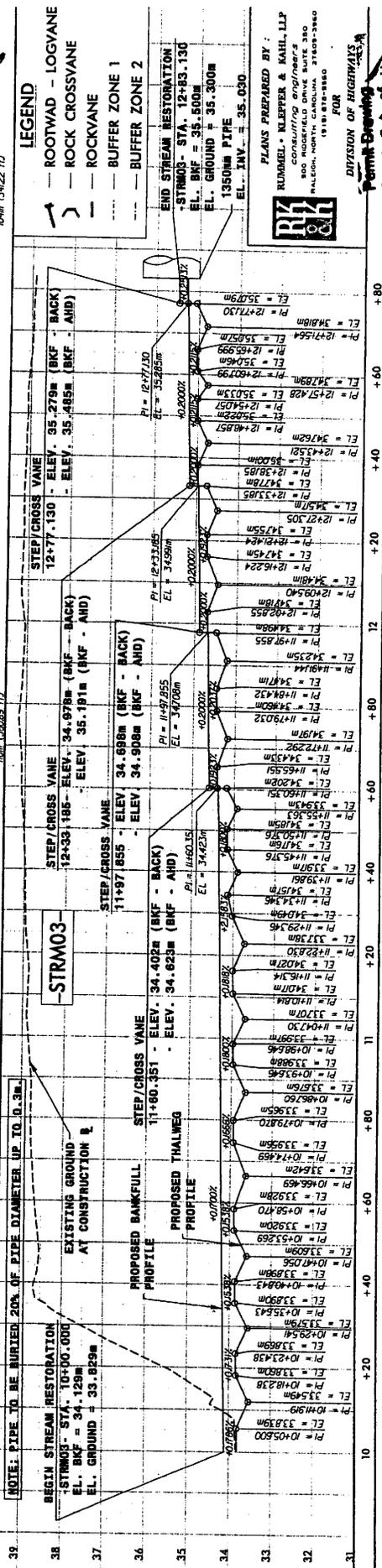
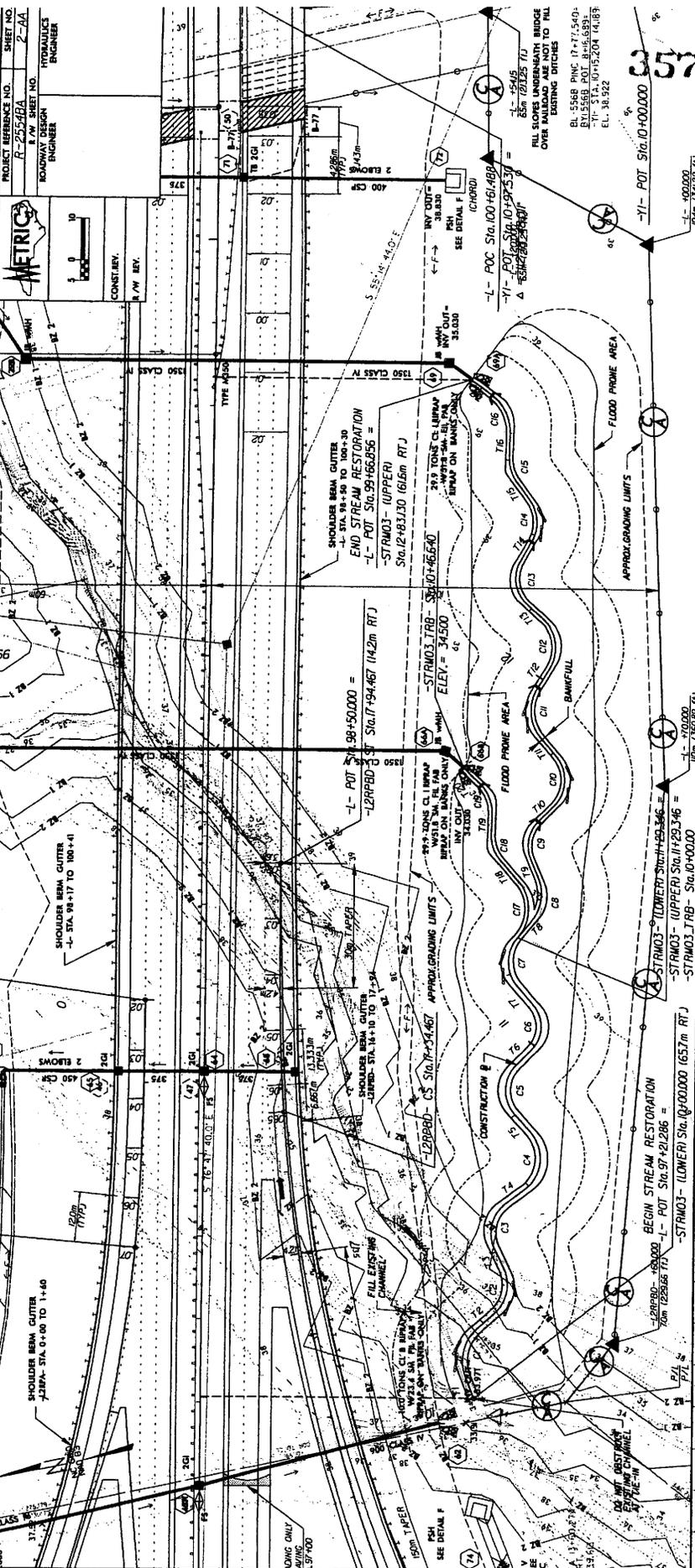


DIVISION OF HIGHWAYS

Permit Drawing
 Sheet 21 of 21



CONST. BY: [Signature]
 IN V. BY: [Signature]



LEGEND
 --- ROOTWAD - LOGVANE
 --- ROCK CROSSVANE
 --- ROCKVANE
 --- BUFFER ZONE 1
 --- BUFFER ZONE 2

END STREAM RESTORATION
 -STRM03- STA. 12+83.130
 EL. BKF = 35.500M
 EL. GROUND = 35.300M
 1350MM PIPE

STEP/CROSS VANE
 12+77.130 - ELEV. 35.279m (BKF - BACK)
 - ELEV. 35.488m (BKF - AHD)

STEP/CROSS VANE
 12+33.186 - ELEV. 34.878m (BKF - BACK)
 - ELEV. 35.181m (BKF - AHD)

STEP/CROSS VANE
 11+97.855 - ELEV. 34.698m (BKF - BACK)
 - ELEV. 34.908m (BKF - AHD)

STEP/CROSS VANE
 11+60.351 - ELEV. 34.402m (BKF - BACK)
 - ELEV. 34.823m (BKF - AHD)

STEP/CROSS VANE
 11+24.028 - ELEV. 34.208m (BKF - BACK)
 - ELEV. 34.428m (BKF - AHD)

STEP/CROSS VANE
 10+87.200 - ELEV. 33.956m (BKF - BACK)
 - ELEV. 34.176m (BKF - AHD)

STEP/CROSS VANE
 10+50.500 - ELEV. 33.704m (BKF - BACK)
 - ELEV. 33.974m (BKF - AHD)

STEP/CROSS VANE
 10+13.800 - ELEV. 33.452m (BKF - BACK)
 - ELEV. 33.722m (BKF - AHD)

STEP/CROSS VANE
 9+77.100 - ELEV. 33.200m (BKF - BACK)
 - ELEV. 33.470m (BKF - AHD)

STEP/CROSS VANE
 9+40.400 - ELEV. 32.948m (BKF - BACK)
 - ELEV. 33.218m (BKF - AHD)

STEP/CROSS VANE
 9+03.700 - ELEV. 32.696m (BKF - BACK)
 - ELEV. 32.944m (BKF - AHD)

STEP/CROSS VANE
 8+67.000 - ELEV. 32.444m (BKF - BACK)
 - ELEV. 32.692m (BKF - AHD)

STEP/CROSS VANE
 8+30.300 - ELEV. 32.192m (BKF - BACK)
 - ELEV. 32.440m (BKF - AHD)

STEP/CROSS VANE
 7+93.600 - ELEV. 31.940m (BKF - BACK)
 - ELEV. 32.188m (BKF - AHD)

STEP/CROSS VANE
 7+56.900 - ELEV. 31.688m (BKF - BACK)
 - ELEV. 31.936m (BKF - AHD)

STEP/CROSS VANE
 7+20.200 - ELEV. 31.436m (BKF - BACK)
 - ELEV. 31.684m (BKF - AHD)

STEP/CROSS VANE
 6+83.500 - ELEV. 31.184m (BKF - BACK)
 - ELEV. 31.432m (BKF - AHD)

PLANS PREPARED BY:
 RUMMEL, KLEPPER & KAHL, LLP
 CONSULTING ENGINEERS
 1000 W. 15TH AVENUE, SUITE 200
 DENVER, COLORADO 80202-3840
 TEL: 303.733.8888



DIVISION OF HIGHWAYS
 Permit Drawing

Sheet 2-A of 11

PROJECT REFERENCE NO. **P-23-56A** SHEET NO. **2-40**
ROADWAY DESIGNER **PROJANALYST**
ENGINEER



CONSTR. BY: _____
R/W BY: _____

358

MORPHOLOGICAL MEASUREMENTS TABLE

US 70 (GOLDBORO BYPASS)
-STRM05- Sta. 10+00.000 to Sta. 15+26.859

Variables	Existing Channel	Proposed Reach	Reference Reach
1. Stream type	F5	C5	E5
2. Drainage area (sq.mi.)	0.17	0.38	0.38
3. Bankfull width (ft)	*	9.0	7.1-12.0
4. Bankfull mean depth (ft)	0.5	0.7	0.9
5. Width/depth ratio	21.6	12.9	7.9
6. Bankfull cross-sectional area (sq.ft)	6.3	6.3	6.5
7. Bankfull mean velocity (ft/s)	*	0.64	1.28
8. Bankfull discharge (cfs)	*	4.6	8.3
9. Bankfull max depth (ft)	*	1.0	1.0-1.6
10. Width of floodprone area (ft)	*	72-155	102
11. Entrenchment ratio	*	9.0-17.2	14
12. Meander length (ft) (average)	*	90	75-120
13. Ratio of meander length to bankfull width	*	10	10.0-10.6
14. Radius of curvature (ft)	*	>22.5	3.8-35.8
15. Ratio of radius of curvature to bankfull width	*	>2.5	0.5-3.0
16. Belt width (ft)	*	45	*
17. Meander width ratio	*	5	*
18. Sinuosity (stream length/valley length)	1.0	1.2	1.6
19. Valley slope (ft/ft)	0.000	0.0035	*
20. Average slope (ft/ft)	*	0.0017	0.0012
21. Pool slope (ft/ft)	*	0.0	*
22. Ratio of pool slope to average slope	*	0.0	*
23. Maximum pool depth (ft)	*	2.0	1.7-2.0
24. Ratio of pool depth to average bankfull depth	*	2.9	1.9-2.2
25. Pool width (ft)	*	3.1	*
26. Ratio of pool width to bankfull width	*	0.34	*
27. Pool to pool spacing (ft) (average)	*	53-68	42-90
28. Ratio of pool to pool spacing to bankfull width	*	5.9-7.5	5.9-7.5
29. Ratio of lowest bank height to bankfull height (or max bankfull depth)	0.9	1.0	1.0

* = NOT MEASURED

NOTE: ENGLISH UNITS WERE USED FOR ALL VARIABLES IN THE MORPHOLOGICAL MEASUREMENTS TABLE.

Permit Drawing
Sheet 21 of 31



PLANS PREPARED BY:
RUMMEL - KLEPPER & KAIL, LLP
1500 W. WASHINGTON AVENUE
100 WOODFORD DRIVE, SUITE 200
RALEIGH, NORTH CAROLINA 27603-3960
(919) 878-8800
FOR
DIVISION OF HIGHWAYS

PROJECT REFERENCE NO. SHEET NO.
 R-25524A 2-26
 E/W SHEET NO.
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER



CONVERTER:
 E/W REV.

359

STRM05

STATIONS	TANGENT/ CURVE NO.	POINT DESCRIPTOR	NORTHING	EASTING	TANGENT / CHORD BEARING	TANGENT / CHORD LENGTH	CURVE LENGTH	DELTA ANGLE	RADIUS
10+00.000	T1	PT	186,202.353	702,515.476	S 75° 13' 22.10" E	6.100m	N/A	N/A	N/A
10+06.100	C1	PC	186,200.797	702,521.374	N 75° 56' 2.31" E	10.131m	10.572m	57° 41' 11.18" left	10,500m
10+16.672	T2	PT	186,203.280	702,531.201	N 47° 05' 26.73" E	5.400m	N/A	N/A	N/A
10+22.072	C2	CC	186,200.344	702,541.284	N 78° 28' 32.64" E	9.641m	10.174m	64° 46' 11.83" right	9,000m
10+32.246	T3	PT	186,208.697	702,544.635	S 68° 08' 21.44" E	5.200m	N/A	N/A	N/A
10+37.446	C3	CC	186,206.761	702,549.461	N 70° 00' 55.53" E	10.674m	11.885m	83° 41' 26.05" left	8,000m
10+49.131	T4	PT	186,210.409	702,559.492	N 28° 10' 12.51" E	5.000m	N/A	N/A	N/A
10+54.131	C4	CC	186,214.817	702,561.853	N 71° 17' 50.15" E	11.622m	12.796m	88° 15' 15.28" right	8,500m
10+66.927	T5	PT	186,218.543	702,572.861	S 65° 34' 32.21" E	4.800m	N/A	N/A	N/A
10+71.727	C5	CC	186,216.558	702,577.231	N 63° 37' 24.03" E	11.624m	13.300m	101° 36' 7.51" left	7,500m
10+85.027	T5	PT	186,223.387	702,580.332	N 12° 49' 20.28" E	4.800m	N/A	N/A	N/A
10+89.827	C6	CC	186,224.517	702,596.998	N 52° 39' 16.48" E	10.889m	11.816m	79° 39' 52.40" right	8,500m
11+01.645	T6	PT	186,233.008	702,597.367	S 87° 30' 47.33" E	5.300m	N/A	N/A	N/A
11+06.945	C7	CC	186,232.779	702,602.662	N 45° 28' 45.86" E	13.166m	14.768m	94° 00' 53.62" left	9,000m
11+21.713	T7	PT	186,242.010	702,612.050	N 01° 31' 40.95" W	5.000m	N/A	N/A	N/A
11+26.713	C8	CC	186,247.008	702,611.916	N 45° 49' 40.48" E	13.976m	15.704m	94° 42' 42.85" right	9,500m
11+42.417	T8	PT	186,256.747	702,621.940	S 86° 48' 58.10" E	5.300m	N/A	N/A	N/A
11+47.717	C9	CC	186,256.453	702,627.232	N 55° 40' 35.34" E	9.742m	10.474m	75° 00' 53.11" left	8,000m
11+56.191	T9	PT	186,261.946	702,635.278	N 18° 10' 8.79" E	5.300m	N/A	N/A	N/A
11+63.491	C10	CC	186,266.982	702,636.930	N 44° 00' 18.48" E	7.191m	7.440m	51° 40' 19.39" right	8,250m
11+70.831	PT	PT	186,272.154	702,641.926					

Permit Drawing
 Sheet 32 of 111

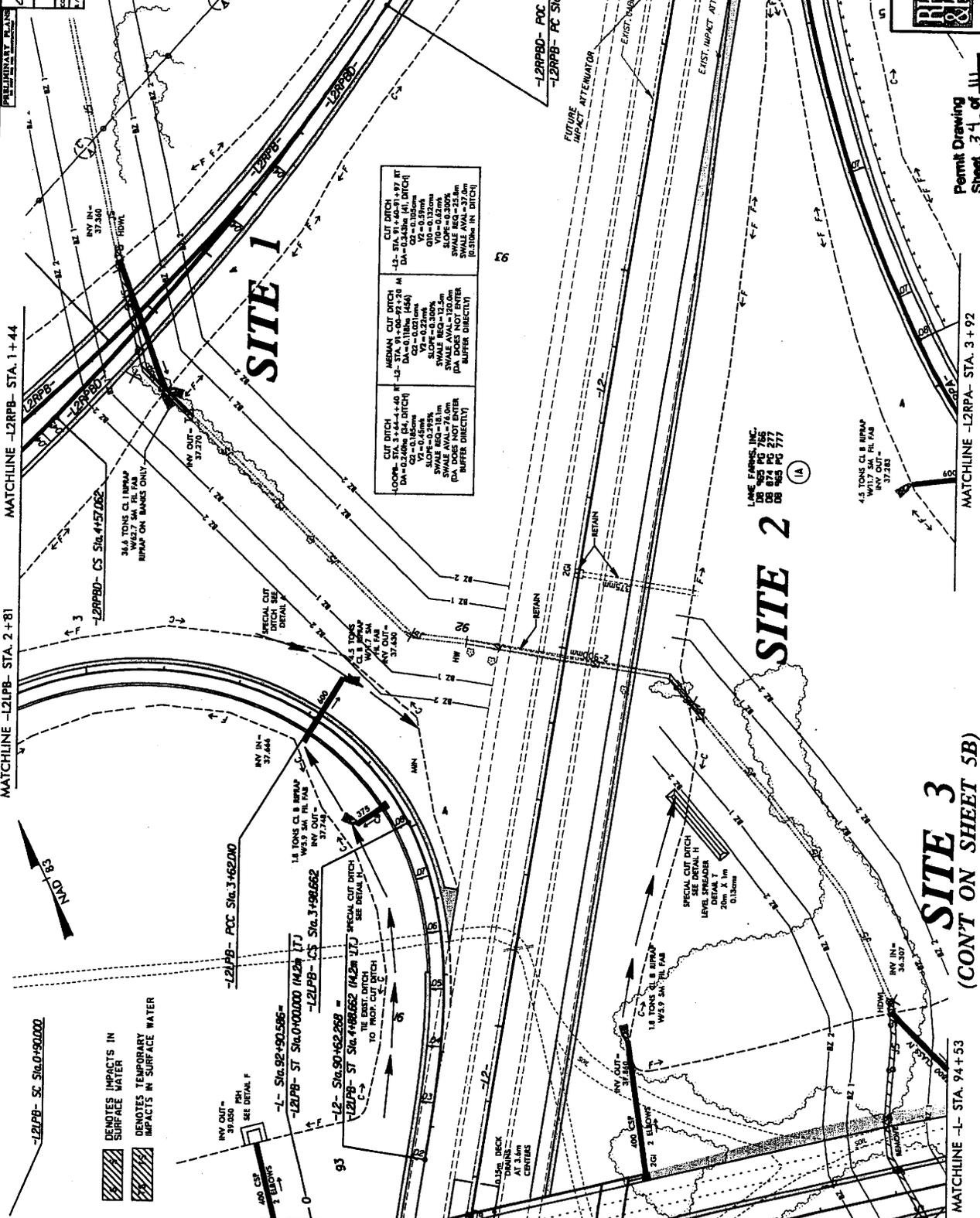
PLANS PREPARED BY:
 RUMBLE, KLEPPER & KASSEL, LLC
 CONSULTING ENGINEERS
 800 HERSHFIELD DRIVE SUITE 200
 MILLBURN, NJ 07041-2000
 TEL: 908.375.2600 FAX: 908.375.2602



FOR
 DIVISION OF HIGHWAYS

PRELIMINARY PLANS

DATE: 11/15/00
 DRAWN BY: J. W. BRYAN
 CHECKED BY: J. W. BRYAN
 PROJECT NO.: 12-STA. 94+15



CUT DITCH LOOKS STA. 3+44+40 TO 3+44+40 SW=0.150m CO=0.150m V=0.150m SLOPE=0.300% SWALE AVAL=100.0m (DIA DOES NOT ENTER BUFFER DIRECTLY)	MEDIAN CUT DITCH LOOKS STA. 3+44+40 TO 3+44+40 SW=0.150m CO=0.150m V=0.150m SLOPE=0.300% SWALE AVAL=100.0m (DIA DOES NOT ENTER BUFFER DIRECTLY)	CUT DITCH LOOKS STA. 3+44+40 TO 3+44+40 SW=0.150m CO=0.150m V=0.150m SLOPE=0.300% SWALE AVAL=100.0m (DIA DOES NOT ENTER BUFFER DIRECTLY)
--	---	--

LANE FORMS, INC.
 108 08 074 PG 277
 108 08 065 PG 777

PLANS PREPARED BY:
 RUMBLE - KLEPPER & HAMIL LLP
 1000 FARMHOUSE PLACE, SUITE 100
 BALDWIN, NORTH CAROLINA 27607-3960
 FOR 1918 878-9900

DIVISION OF HIGHWAYS

Permit Drawing
 Sheet 34 of 111

SITE 3
 (CONT'N ON SHEET 5B)

-L2LPB- SC Sta. 0+90.000

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE -L2- STA. 90+48

MATCHLINE -L2RPA- STA. 5+48

MATCHLINE -L2RPA- STA. 94+15

MATCHLINE -L2RPA- STA. 3+92

MATCHLINE -L2LPB- STA. 2+81

MATCHLINE -L2RPB- STA. 1+44

MATCHLINE -L- STA. 94+53

REVISIONS

REVISIONS

NO.	DATE	DESCRIPTION
1	11/17/83	ISSUED FOR PERMIT
2	11/17/83	ISSUED FOR PERMIT

PROJECT DATA

PROJECT NO. 111-111-111
 CONTRACT NO. 111-111-111
 DRAWING NO. 111-111-111

SCALE

1" = 40'

PERMIT DRAWING

Sheet 40 of 111

PLANS PREPARED BY:
 RUNNELL, KLEPPER & KAHN, LLP
 CONSULTING ENGINEERS
 6600 Westchester Place, Suite 100
 Houston, Texas 77057-1800
 FOR: DIVISION OF HIGHWAYS

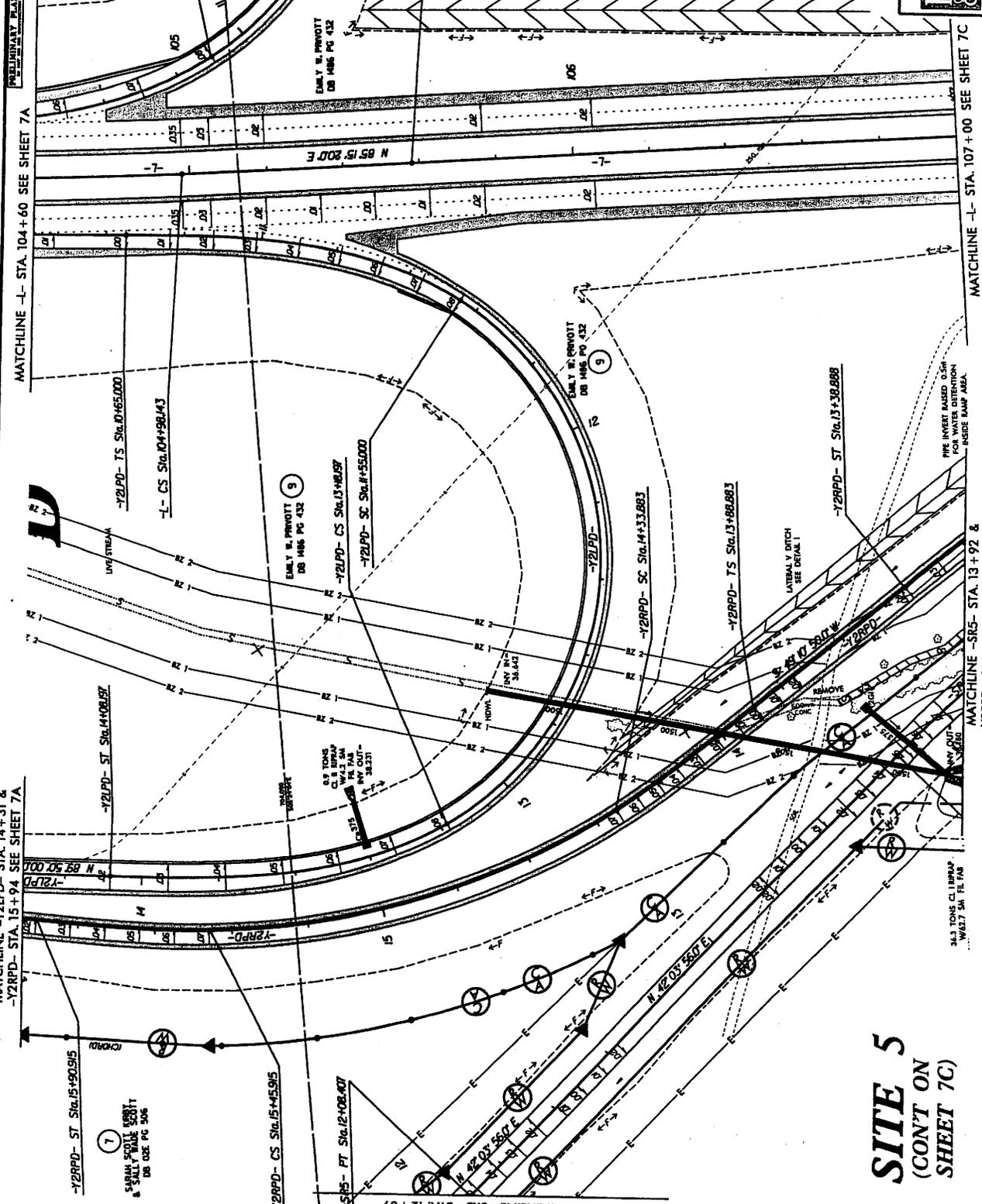
NAD 83
 REMOTES IMPACTS IN
 SURFACE WATER

367

LATERAL V DITCH
 SEE DETAIL 1

U.S. TONS C.L. 111
 111-111-111

U.S. TONS C.L. 111
 111-111-111



SITE 5
 (CONT ON
 SHEET 7C)

MATCHLINE -L- STA. 104+60 SEE SHEET 7A

MATCHLINE -L- STA. 107+00 SEE SHEET 7C

MATCHLINE -SR5- STA. 14+31 & -Y2RPD- STA. 15+94 SEE SHEET 7A

MATCHLINE -SR5- STA. 13+92 & -Y2RPD- STA. 13+19 SEE SHEET 7C

MATCHLINE -SR5- STA. 12+09

MATCHLINE -Y2LPA- STA. 11+66

MATCHLINE -SR5- STA. 15+94

MATCHLINE -SR5- STA. 14+31

MATCHLINE -SR5- STA. 13+92

MATCHLINE -SR5- STA. 12+09

MATCHLINE -SR5- STA. 11+66

MATCHLINE -SR5- STA. 10+00

MATCHLINE -SR5- STA. 9+00

MATCHLINE -SR5- STA. 8+00

MATCHLINE -SR5- STA. 7+00

MATCHLINE -SR5- STA. 6+00

MATCHLINE -SR5- STA. 5+00

MATCHLINE -SR5- STA. 4+00

MATCHLINE -SR5- STA. 3+00

MATCHLINE -SR5- STA. 2+00

MATCHLINE -SR5- STA. 1+00

MATCHLINE -SR5- STA. 0+00

MATCHLINE -SR5- STA. 100+00

MATCHLINE -SR5- STA. 101+00

MATCHLINE -SR5- STA. 102+00

MATCHLINE -SR5- STA. 103+00

MATCHLINE -SR5- STA. 104+00

MATCHLINE -SR5- STA. 105+00

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MATCHLINE -SR5- STA. 196+00

MATCHLINE -SR5- STA. 197+00

MATCHLINE -SR5- STA. 198+00

MATCHLINE -SR5- STA. 199+00

MATCHLINE -SR5- STA. 200+00

PROJECT REFERENCE NO. SHEET NO.
 P-2546A 9
 ROADWAY DESIGN ENGINEER
 METRIC ENGINEERS
 1000 W. 10th St. Suite 100
 Lincoln, NE 68502
 PRELIMINARY PLANS
 FOR THE PROPOSED
 INTERCHANGE CURVE DATA

CONST. REV.
 R/W REV.
 METRIC ENGINEERS
 1000 W. 10th St. Suite 100
 Lincoln, NE 68502

371

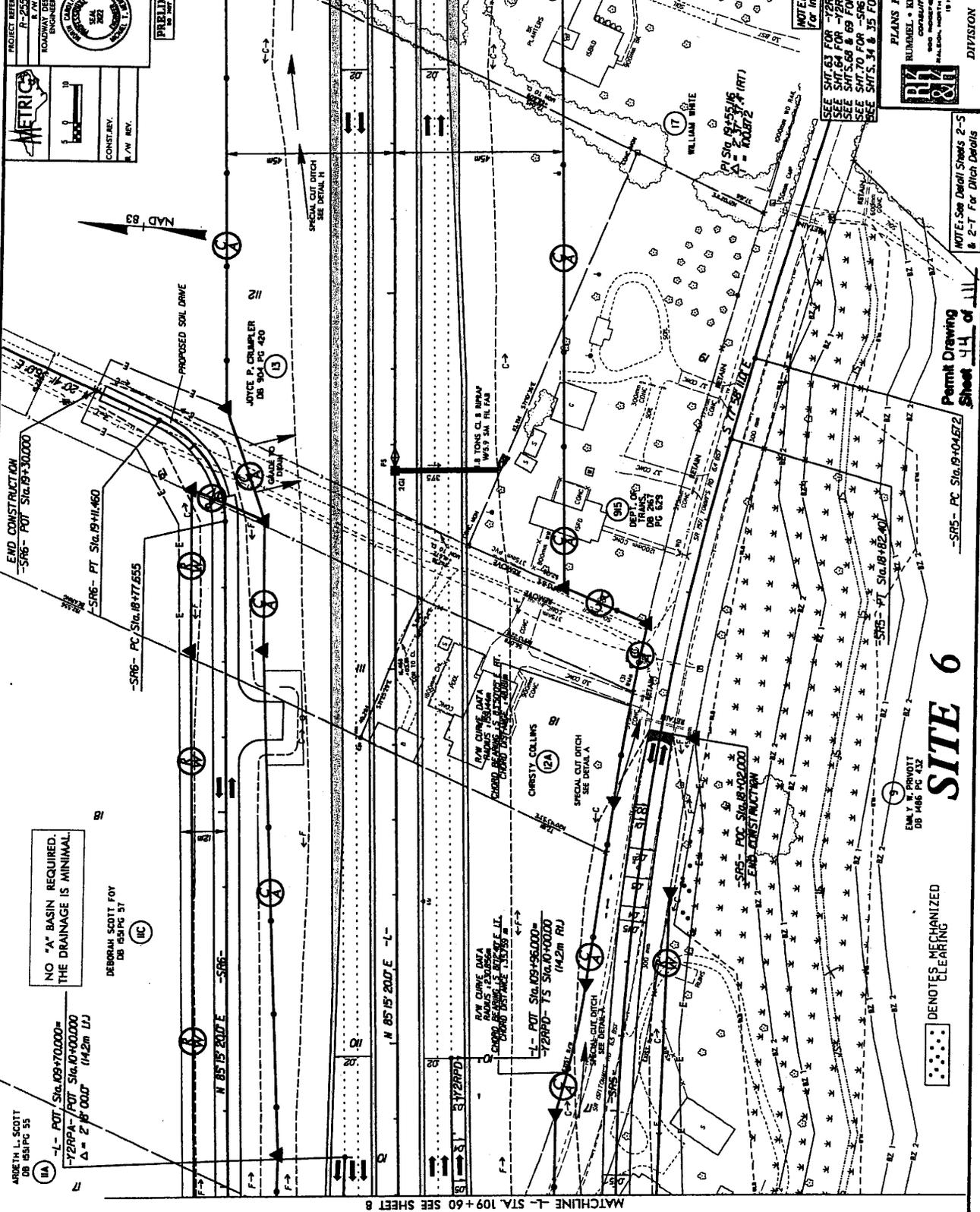
MATCHLINE L- STA. 112+80 SEE SHEET 10

NOTE: See Detail Sheet 2-5
 for Interchange Curve Data.
 SEE SHEET 63 FOR -22RPA- PROFILE
 SEE SHEET 64 FOR -22RD- PROFILE
 SEE SHEETS 68 & 69 FOR -SRS- PROFILE
 SEE SHEET 70 FOR -SRS- PROFILE
 SEE SHEETS 34 & 35 FOR -L- PROFILE

PLANS PREPARED BY:
 RUMMEL, KLEPPER & KARL, L.P.
 CONSULTING ENGINEERS
 1000 W. 10th St. Suite 100
 Lincoln, NE 68502
 FOR
 DIVISION OF HIGHWAYS

PERMIT DRAWING
 SHEET 44 OF 111

NOTE: See Detail Sheets 2-5
 & 2-T For Ditch Details



NO "A" BASIN REQUIRED.
 THE DRAINAGE IS MINIMAL.

ARLETH L. SCOTT
 DB 65 PG 55
 -L- POT Sta. 109+70.000=
 -22RPA- POT Sta. 10+000.000
 $\Delta = 2' 00'' (14.2m L)$

DEBORAH SCOTT FOY
 DB 65 PG 57

RAW CURVE DATA
 RADIUS 25000
 CHORD BEARING 113.52°
 CHORD LENGTH 142.2m
 -L- POT Sta. 109+96.000=
 -22RPA- POT Sta. 10+000.000
 (14.2m RJ)

RAW CURVE DATA
 RADIUS 25000
 CHORD BEARING 113.52°
 CHORD LENGTH 142.2m
 -SRS- POT Sta. 108+02.000
 END CONSTRUCTION

EMILY W. PRIVOTT
 DB 1466 PG 132

SITE 6

PERMIT DRAWING
 SHEET 44 OF 111

-SRS- POT Sta. 109+04.000

REVISIONS
 R/W REVISION W/1/06 CHANGED PROPOSED R/W FOR PARCELS IC AND IR ADJACENT TO -SRS-
 R/W REVISION W/2/06 REVISIONS TO R/W FOR PARCELS IC AND IR ADJACENT TO -SRS-
 R/W REVISION W/7/06 REVISIONS TO R/W FOR PARCELS IC AND IR ADJACENT TO -SRS-
 CHANGES MADE PER INITIAL CONTACTS.

PROJECT REFERENCE NO. R-25242A
 S. W. SHEET NO. 75
 ROADWAY DESIGN ENGINEER
 HYDRAULICS ENGINEER

PRELIMINARY PLANS
 FOR THE
 CONSTRUCTION OF
 THE
 BRIDGE OVER
 STONEY CREEK

METRICS
 CONSTRUCTION
 S.W. REV.

NOTE: See Detail Sheets 2-5 & 2-7 For Ditch Details
 NOTE: See Detail Sheet 2-7 For Bridge Approach Slabing Parameters Relocation To Bridge Width

PLANS PREPARED BY:
 RUMMEL & KLEBER & SAHL, LLP
 CONSULTING ENGINEERS
 100 WINDFIELD DRIVE SUITE 200
 BALENS, INDIANA 46033
 19101000
 19101000

SEE SHEETS 31 & 30 FOR 1-1 PROFILE
 SHERMAN E. BEST
 DB 034 PG 253

PERMIT DRAWING
 Sheet 48 of 111

REVISIONS

REVISIONS

REVISIONS

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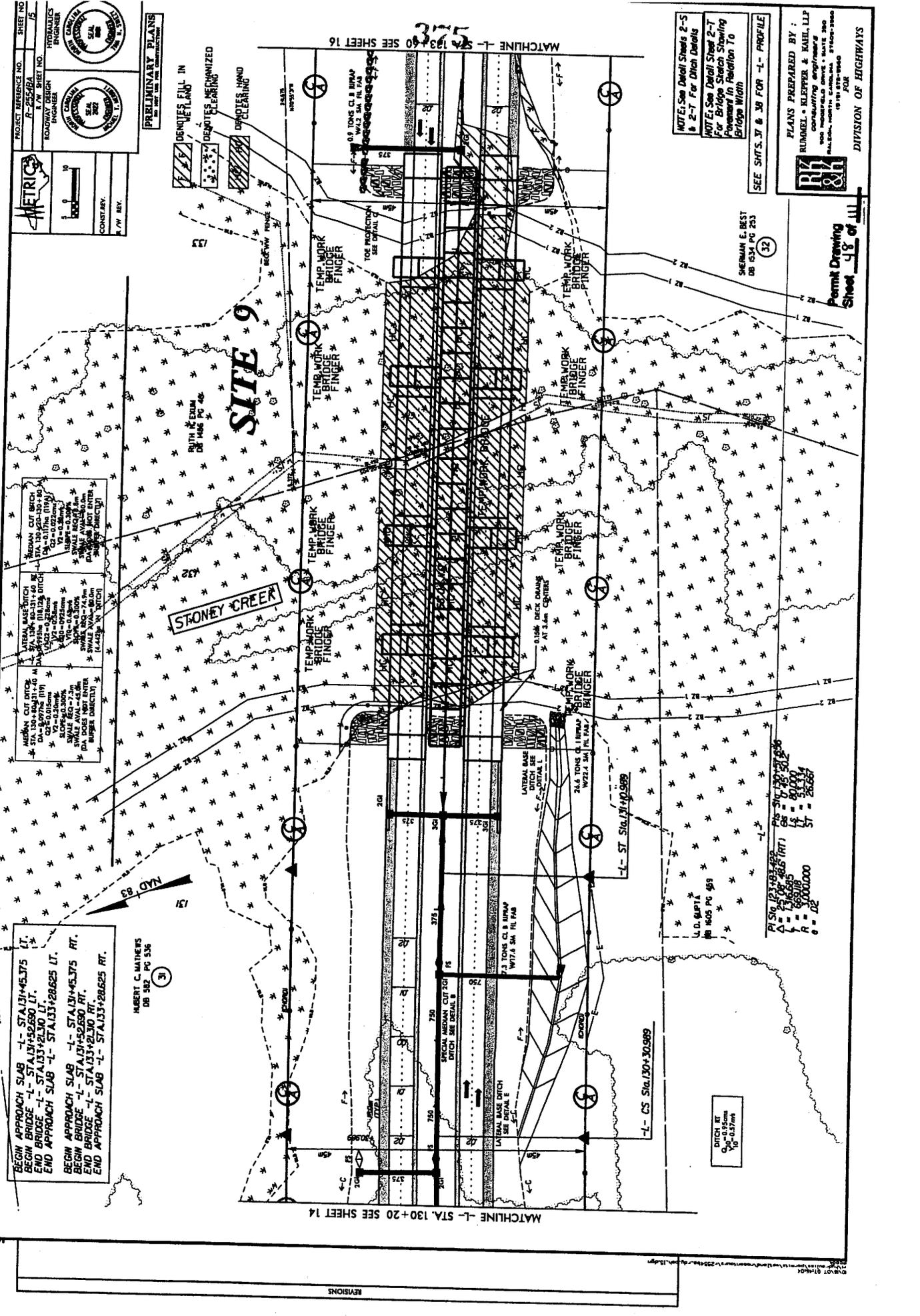
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REVISIONS

PROJECT REFERENCE NO. SHEET NO.
 F-255-67A 17

ROADWAY DESIGN ENGINEER
 CONSULTING ENGINEER

CONTRACT NO. 255-67A
 SHEET NO. 17

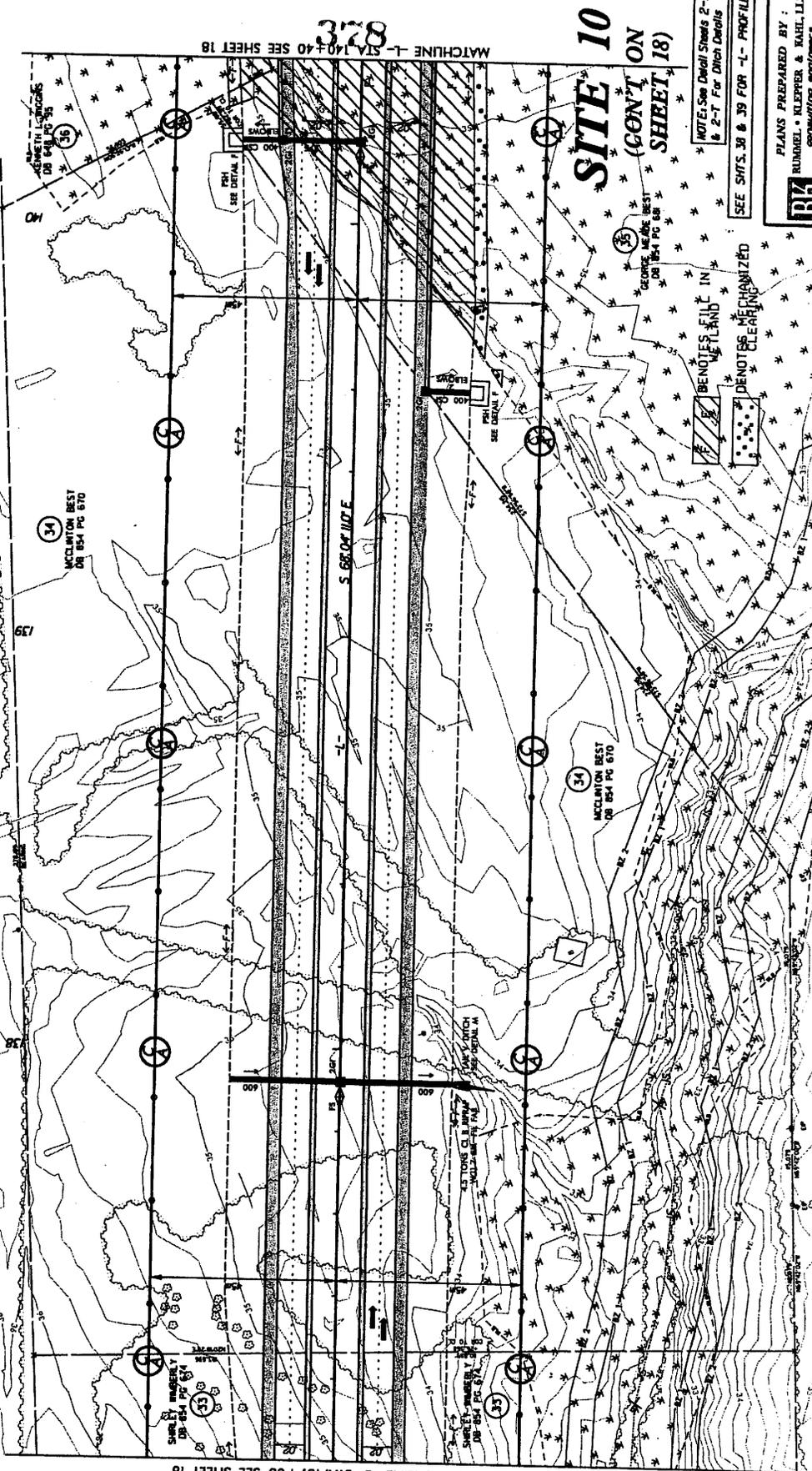
CONTRACT NO. 255-67A
 SHEET NO. 17

CONST. BY
 S/W B.V.

NO "A" BASIN REQUIRED.
 THE DRAINAGE IS MINIMAL.



PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION



SITE 10
 (CONT. ON SHEET 18)

NOTE: See Detail Sheets 2-5 & 2-7 For Ditch Details
 SEE SH'S. 38 & 39 FOR "L" PROFILE

PLANS PREPARED BY:
 RUNNEL, KLEPPER & KAHLLIP
 CONSULTING ENGINEERS
 400 HARRISON ST. SUITE 200
 MILWAUKEE, WIS. 53202-1800
 PHONE: 414-381-1800
 FAX: 414-381-1840

DIVISION OF HIGHWAYS

Penny Drawing
 Sheet 5.1 of 11

REVISIONS

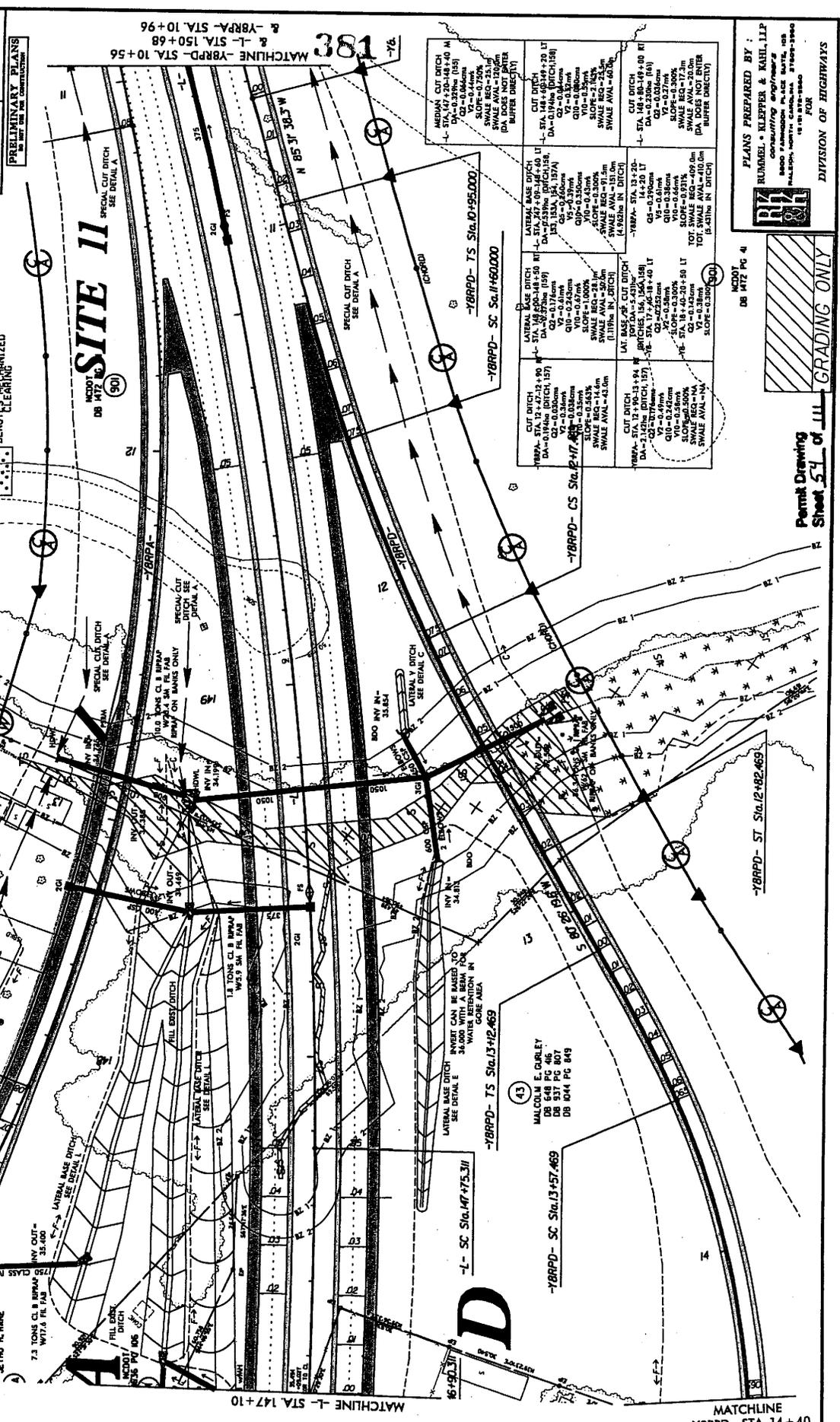
PROJECT REFERENCE NO. R-255/26A
 SHEET NO. 5A
 ROADWAY PLAN SHEET NO. 5A
 CONSULTING ENGINEER'S SEAL
 CONSULTING ENGINEER'S SEAL
 PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION

AMERICAN ROAD & BUILDING BUILDERS ASSOCIATION
 CONSTRUCTION ENGINEER'S SEAL
 CONSTRUCTION ENGINEER'S SEAL
 ANY REV.

DENOTES IMPACTS IN SURFACE WATER
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER
 DENOTES FILL IN WETLAND
 DENOTES MECHANIZED CLEANING

MATCHLINE -YBRPD- STA. 14+50
 MATCHLINE -YBRPD- STA. 14+40

MATCHLINE -YBRPD- STA. 14+56
 MATCHLINE -YBRPD- STA. 10+96
 MATCHLINE -YBRPD- STA. 10+56



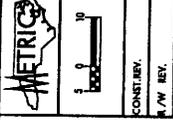
MATCHLINE -YBRPD- STA. 14+40
 MATCHLINE -YBRPD- STA. 10+56
 MATCHLINE -YBRPD- STA. 10+96

REVISIONS

PERMIT DRAWING
 SHEET 51 of 111
 GRADING ONLY

PLANS PREPARED BY:
 RUNNELL, KLEPPER & KIEHL, LLP
 CONSULTING ENGINEERS
 1000 N. W. 10th St., Suite 200
 MIAMI, FL 33136
 (305) 576-8800

PROJECT REFERENCE NO. SHEET NO.
R-2554BA 40
HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER



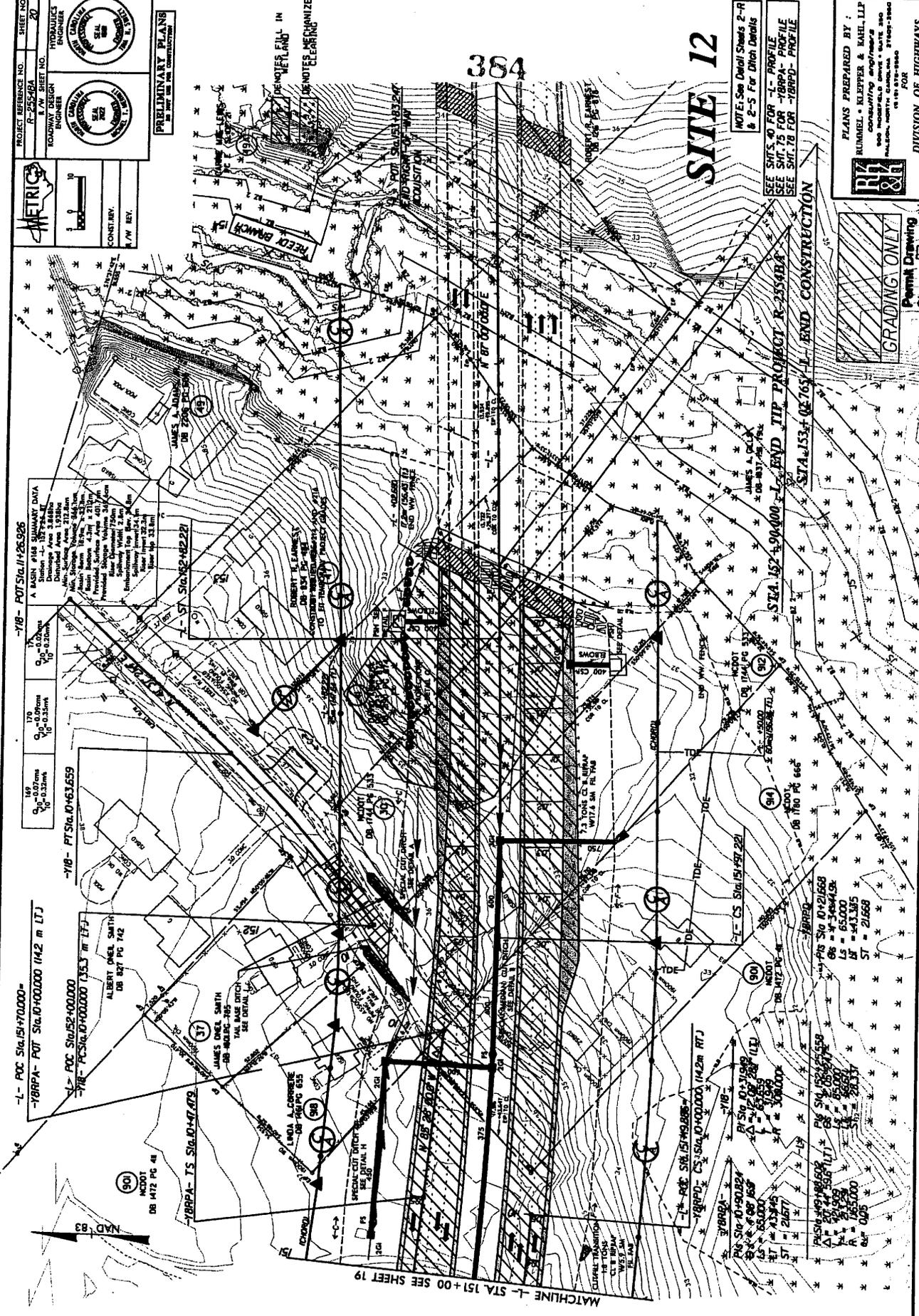
PRELIMINARY PLANS
AS SHOWN ON THE CONSTRUCTION

WETLAND IN
REMOVES FILL IN
WETLANDS
DO NOT RECONSTRUCT

SITE 12

NOTE: See Detail Sheets 2-R
& 2-S For Ditch Details
SEE SHT. 40 FOR -C- PROFILE
SEE SHT. 78 FOR -B8PA- PROFILE
SEE SHT. 79 FOR -B8PD- PROFILE

PLANS PREPARED BY:
RUMMEL & KEEFER & BANEL LLP
1000 HIGHLAND AVENUE, SUITE 200
RALEIGH, NORTH CAROLINA 27603-1800
FOR P&H
DIVISION OF HIGHWAYS



-1- POC Sta. 154+70.000 -
-7B8PA- POC Sta. 154+00.000 (142 m [7.7])
-7B- POC Sta. 152+00.000 (153.3 m [7.7])
-7B- PTS Sta. 10+63.659
-7B- POT Sta. 11+28.926

ALBERT OWEN SMITH
DB 827 PG 142
JAMES OWEN SMITH
DB 827 PG 142
LINDA A. CORRIE
DB 827 PG 142

ST. STA. 152+482.221
ST. STA. 152+482.221

CS Sta. 154+00.000 (142m RTJ)
CS Sta. 154+00.000 (142m RTJ)

PTS Sta. 10+21.668
CS Sta. 154+00.000 (142m RTJ)

REVISIONS
R/W REVISION
REVISED DEED REFERENCE ON PARCEL 49
CHANGES MADE PER INITIAL CONTACTS

GRADING ONLY
Permit Drawing
Sheet 12 of 11

PROJECT REFERENCE NO. SHEET NO. 26
 R-255-48A 8" W/ SHEET NO. 26

ROADWAY DESIGN

HYDRAULICK ENGINEER

CONTRACTOR

CONSTRY. R/W REV.

PRELIMINARY PLANS
 AS PER THE ILL. DEPT. OF TRANSPORTATION

DEMOTES IMPACTS IN SURFACE WATER
 DEMOTES TEMPORARY IMPACTS IN SURFACE WATER



SCALE
 1" = 50'

CONSTRY. R/W REV.

CUT DITCH
 ST. STA. 12+40.00 TO 12+45.00
 D1 = 0.025%
 Q2 = 0.025%
 V10 = 0.25%
 SLOPE = 2.00%
 SWALE W/A = 1.00'
 SWALE W/VL = 2.00'

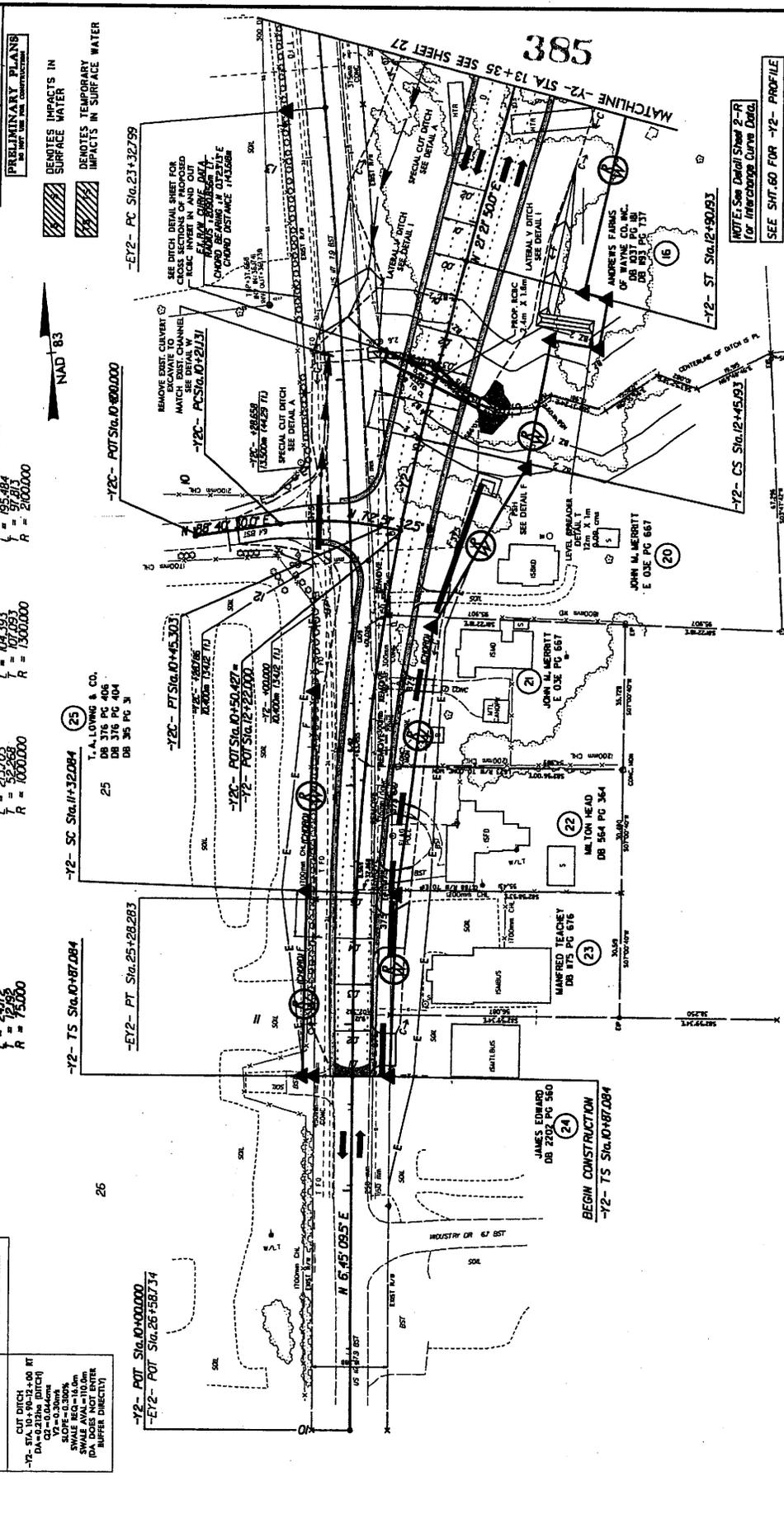
LATERAL V DITCH
 ST. STA. 12+45.00 TO 12+50.00
 D1 = 0.025%
 Q2 = 0.025%
 V10 = 0.25%
 SLOPE = 2.00%
 SWALE W/A = 1.00'
 SWALE W/VL = 2.00'

CUT DITCH AS RT
 ST. STA. 12+50.00 TO 12+55.00
 D1 = 0.025%
 Q2 = 0.025%
 V10 = 0.25%
 SLOPE = 2.00%
 SWALE W/A = 1.00'
 SWALE W/VL = 2.00'

-Y2- TS Sta. 12+58.734
 -Y2- POT Sta. 10+00.000
 -EY2- PT Sta. 25+28.283

-Y2- TS Sta. 10+87.084
 -Y2- SC Sta. 11+32.084

-Y2- TS Sta. 10+90.000
 -Y2- POT Sta. 10+00.000



PLANS PREPARED BY:
 RUMMEL, KLEPPER & KAHN, LLP
 consulting engineers
 1400 MADISON DRIVE • SUITE 280
 N. WILSON, ILL. 61401-2800
 FOR

DIVISION OF HIGHWAYS

SITE 14

Permit Drawing
 Sheet 5 of 11

NOTE: See Detail Sheets 2-5 & 2-T For Ditch Details

NOTE: See Detail Sheet 2-R for Interchange Curve Data
 SEE SHT. 60 FOR -Y2- PROFILE

NOTE: All Proposed Drive Pipes are 37.5 mm
 NOTE: E: 2-40m Uniform Transition -Y2- Sta. 10+90 (2) Issues to Sta. 13+30 (5) Issues

NOTE: See Detail Sheet 2-S for Interchange Curve Data

REVISIONS
 1. ADDED R/W CURVE DATA REVISD EASEMENT FOR PARCELS 21.22.23 & 24
 2. CHANGES MADE PER INITIAL COMMENTS
 3. PARCELS 20 AND 21 NAMES CHANGED TO JOHN M. MERRITT

R/W REVISION
 R/W REVISION
 R/W REVISION

PROJECT REFERENCE NO. R-2546A
 SHEET NO. 26
 ROADWAY DESIGN ENGINEER
 CONSULTING ENGINEERS
 10000 W. 10th Ave., Suite 100
 Golden, CO 80401
 (303) 440-1000

CONST. REV.
 R/W REV.

PRELIMINARY PLANS
 IN ACCORDANCE WITH THE COLORADO DEPARTMENT OF TRANSPORTATION

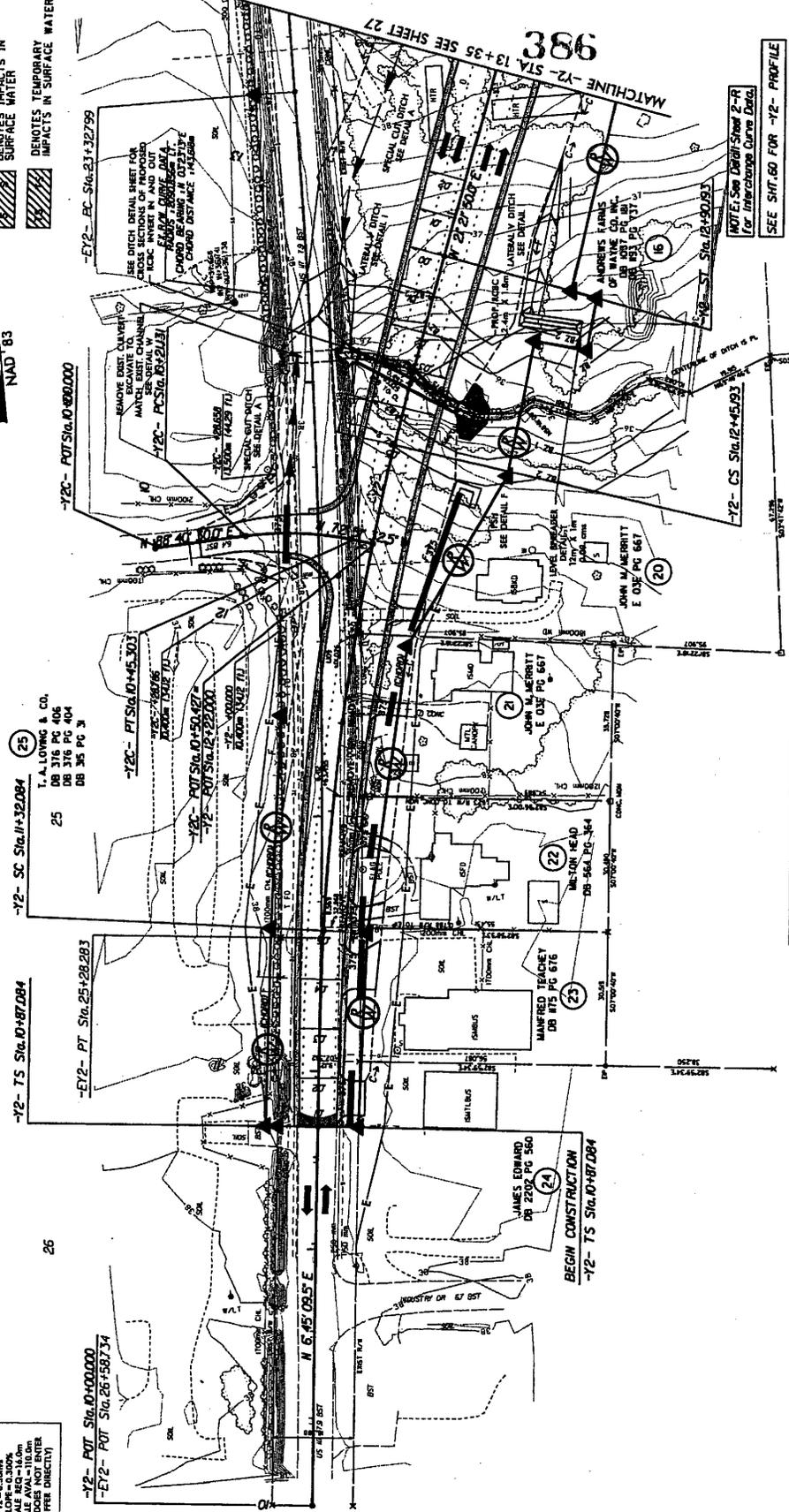
<p>CUT DITCH STA. 12+40.12+42 LT DA=0.25(10) DITCH V2=0.49ft SLOPE=4.000% SWALE REQ=2.0m SWALE AVAL=38.0m</p>	<p>LATERAL V DITCH STA. 12+40.12+42 LT DA=0.25(10) DITCH V2=0.49ft SLOPE=4.000% SWALE REQ=2.0m SWALE AVAL=38.0m</p>
<p>CUT DITCH STA. 12+40.12+42 LT DA=0.25(10) DITCH V2=0.49ft SLOPE=4.000% SWALE REQ=2.0m SWALE AVAL=38.0m</p>	<p>LATERAL V DITCH STA. 12+40.12+42 LT DA=0.25(10) DITCH V2=0.49ft SLOPE=4.000% SWALE REQ=2.0m SWALE AVAL=38.0m</p>

NO "A" BASIN REQUIRED.
 THE DRAINAGE IS MINIMAL.

DEMOTES IMPACTS IN SURFACE WATER
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER



-Y2- TS Sta. 0+187.084
 T.S. 25+28.283
 PT Sta. 10+50.427
 POT Sta. 12+22.000
 -Y2- POT Sta. 12+22.000
 -Y2- SC Sta. 11+32.084
 T.A. LOVING & CO.
 DB 316 PG 406
 DB 316 PG 404
 DB 36 PG 31



PLANS PREPARED BY:
 RUMMEL • KLEPPER & WASH, LLP
 10000 W. 10th Ave., Suite 100
 Golden, CO 80401
 (303) 440-1000

DIVISION OF HIGHWAYS

SITE 14

Permit Drawing Sheet 34 of 111

NOTE: See Detail Sheets 2-5 & 2-1 For Ditch Details

NOTE: 240m Uniform Transition -Y2- Sta. 0+90 (2 lanes) to Sta. 13+30 (5 lanes).

NOTE: All Proposed Drive Pipes are 375 mm.

REVISIONS

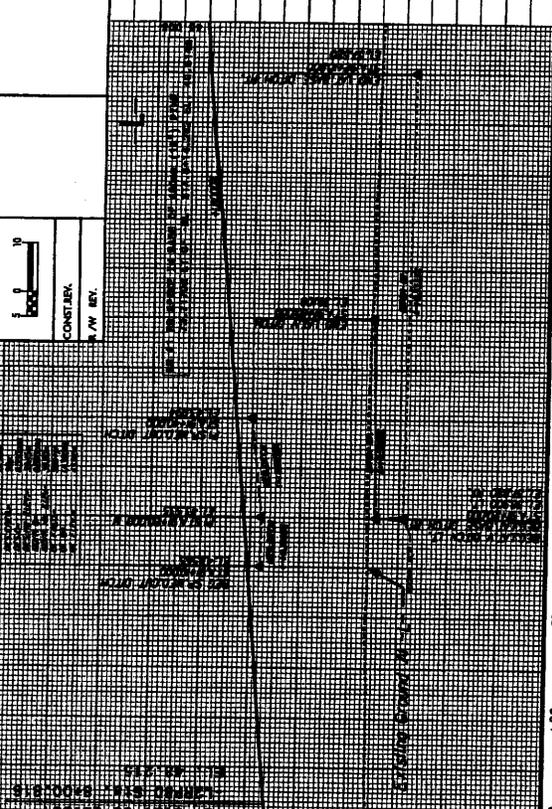
R/W REVISION
 R/W REVISION
 CHANGES MADE PER INITIAL COMMENT #15
 ADDED R/W CURVE DATA REVERSED EASEMENT FOR PARCELS B, 22, 23 & 24
 PARCELS 20 AND 21 NAMES CHANGED TO JOHN M. HERRITT

PROJECT REFERENCE NO. **A-2547A**
 ROADWAY DESIGN
 ENGINEER

METRIC
 1" = 40'

CONTRACT
 7/1/87

SHEET NO. **32**
 HYDRAULICS
 ENGINEER



BEGIN CONSTRUCTION STA. 80+00
 BEGIN TYP. PROJECT STATION
 STA. 80+00 TO STA. 81+00

STATION 80+00
 STATION 81+00

STATION 82+00
 STATION 83+00

STATION 84+00
 STATION 85+00

STATION 86+00
 STATION 87+00

STATION 88+00
 STATION 89+00

STATION 90+00
 STATION 91+00

STATION 92+00
 STATION 93+00

STATION 94+00
 STATION 95+00

STATION 96+00
 STATION 97+00

STATION 98+00
 STATION 99+00

STATION 100+00
 STATION 101+00

STATION 102+00
 STATION 103+00

STATION 104+00
 STATION 105+00

STATION 106+00
 STATION 107+00

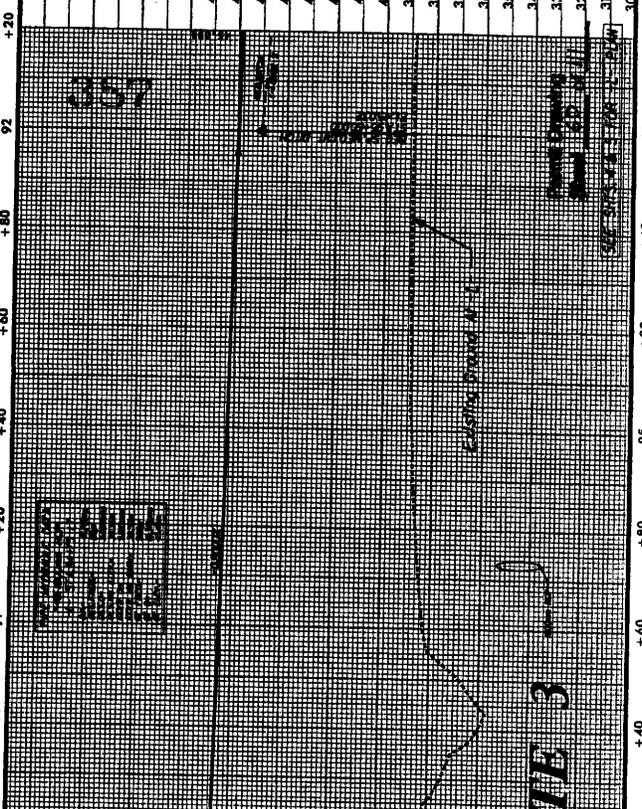
STATION 108+00
 STATION 109+00

STATION 110+00
 STATION 111+00

STATION 112+00
 STATION 113+00

STATION 114+00
 STATION 115+00

STATION 116+00
 STATION 117+00



CRUSTIC DRAINAGE

STATION 89+20
 STATION 90+00

STATION 91+00
 STATION 92+00

STATION 93+00
 STATION 94+00

STATION 95+00
 STATION 96+00

STATION 97+00
 STATION 98+00

STATION 99+00
 STATION 100+00

STATION 101+00
 STATION 102+00

STATION 103+00
 STATION 104+00

STATION 105+00
 STATION 106+00

STATION 107+00
 STATION 108+00

STATION 109+00
 STATION 110+00

STATION 111+00
 STATION 112+00

STATION 113+00
 STATION 114+00

STATION 115+00
 STATION 116+00

STATION 117+00
 STATION 118+00

STATION 119+00
 STATION 120+00

STATION 121+00
 STATION 122+00

STATION 123+00
 STATION 124+00

STATION 125+00
 STATION 126+00

SITE 3

PROJECT REFERENCE NO. SHEET NO.
 7-2580A 11
 ROADWAY
 MECHANICAL
 ENGINEER

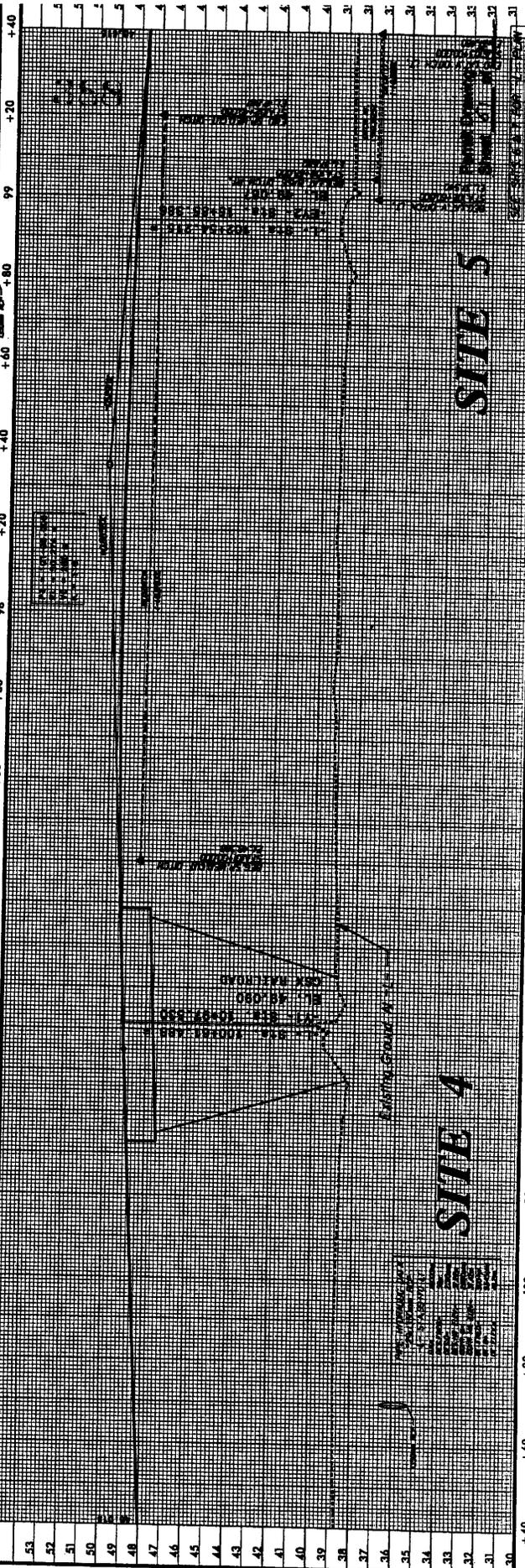
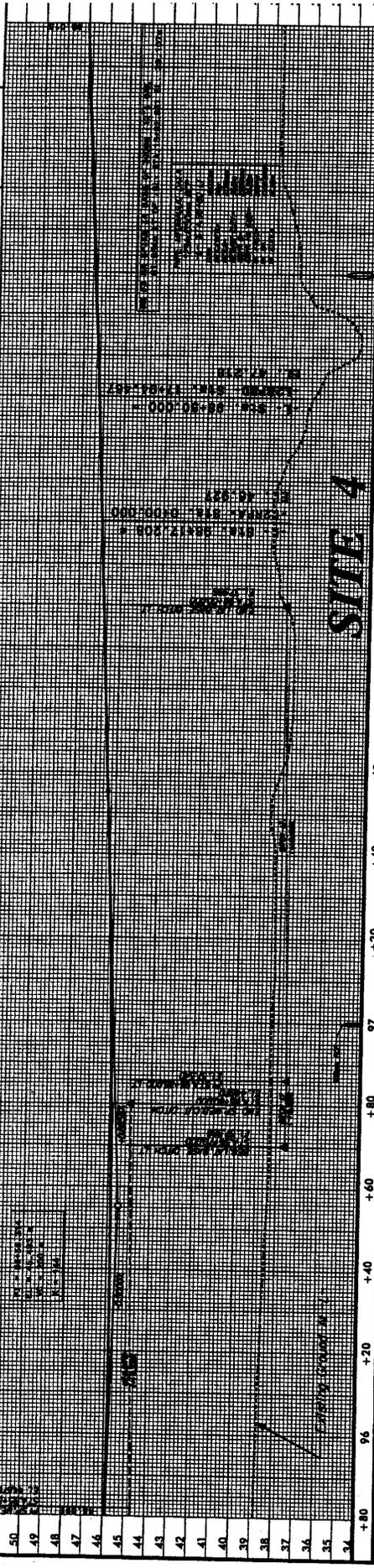


CONSTR. BY:
 L.W. BEV.

PROPERTY OF THE STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 SAN JOAQUIN COUNTY
 PROJECT NO. 7-2580A
 SHEET NO. 11

PROPERTY OF THE STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 SAN JOAQUIN COUNTY
 PROJECT NO. 7-2580A
 SHEET NO. 11

PROPERTY OF THE STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 SAN JOAQUIN COUNTY
 PROJECT NO. 7-2580A
 SHEET NO. 11



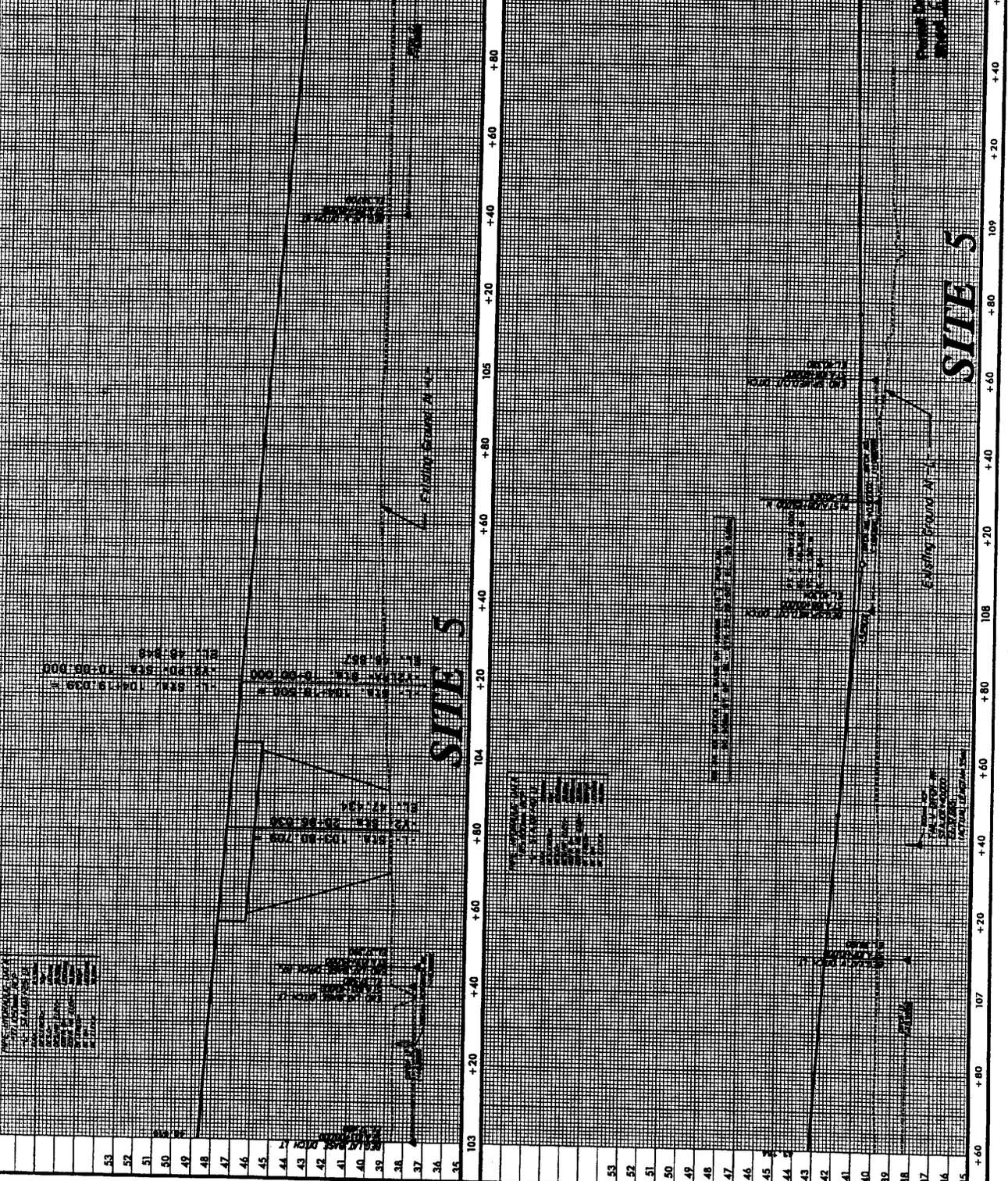
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ROADWAY DESIGN
 ENGINEER

HYDRAULICS
 ENGINEER

METRIC

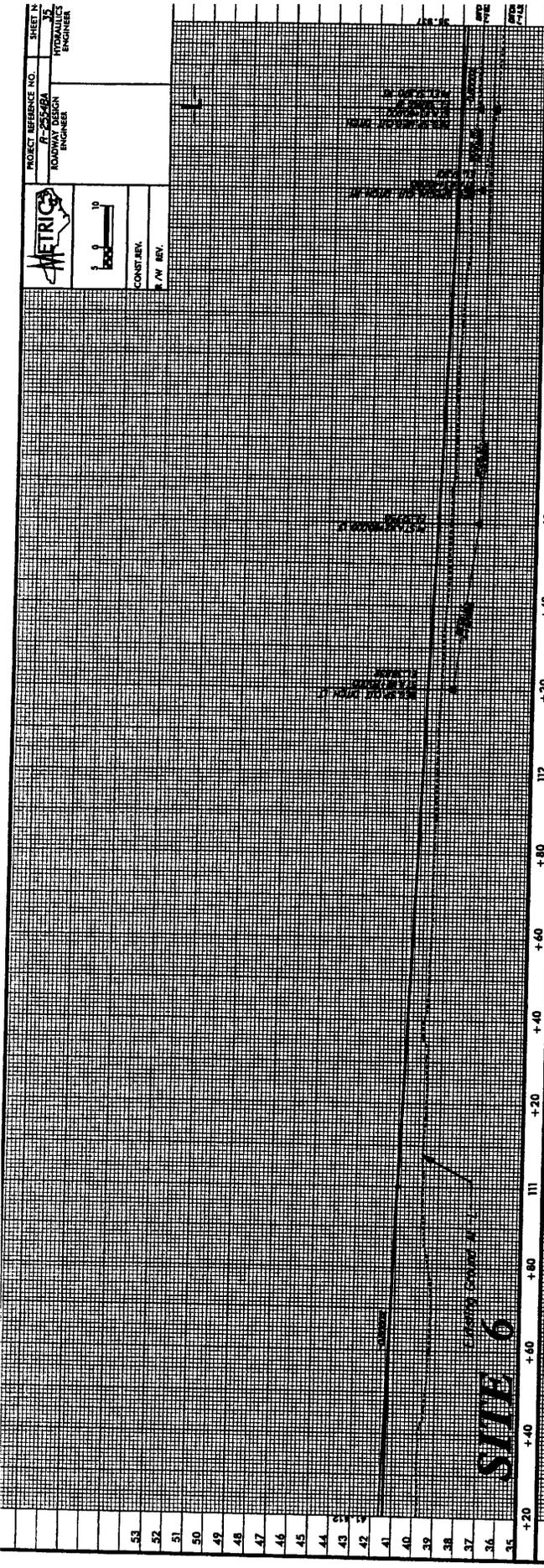
CONST. REV.
 1/17/10

1/17/10

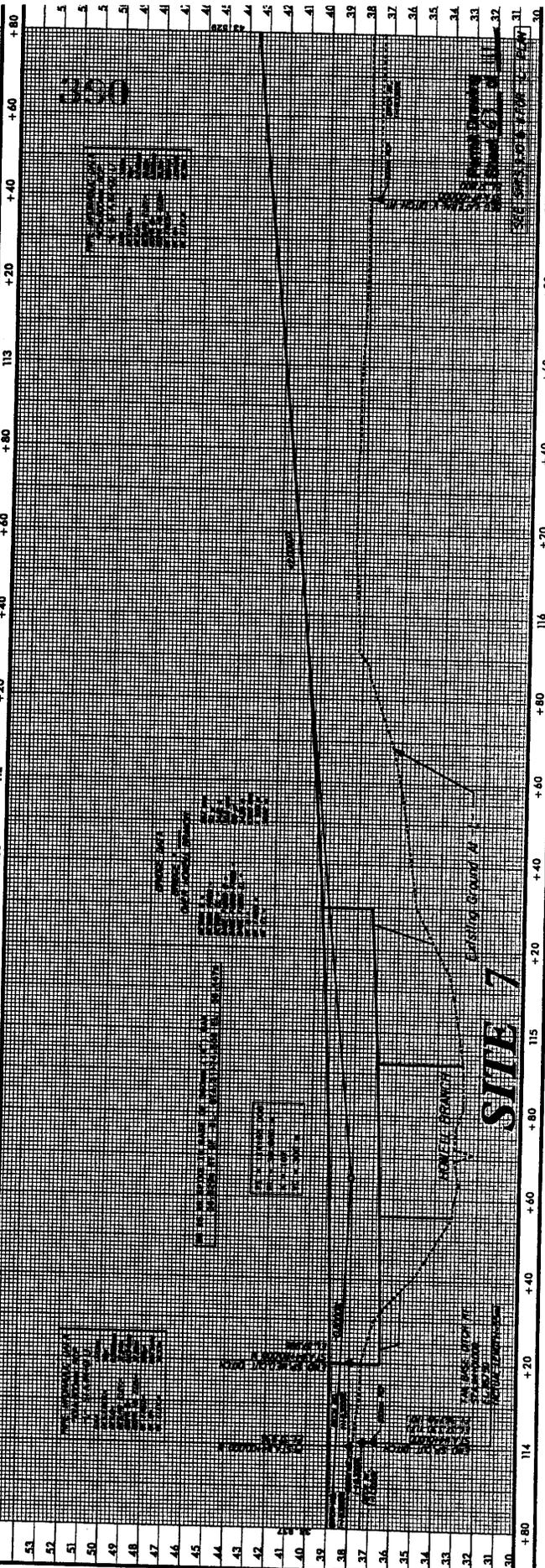


53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35
103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121

PROJECT REFERENCE NO. 255491 SHEET NO. 32
 ROADWAY DESIGN ENGINEER
 METRIC
 CONSTANT: 10
 1" = 10'



SITE 6

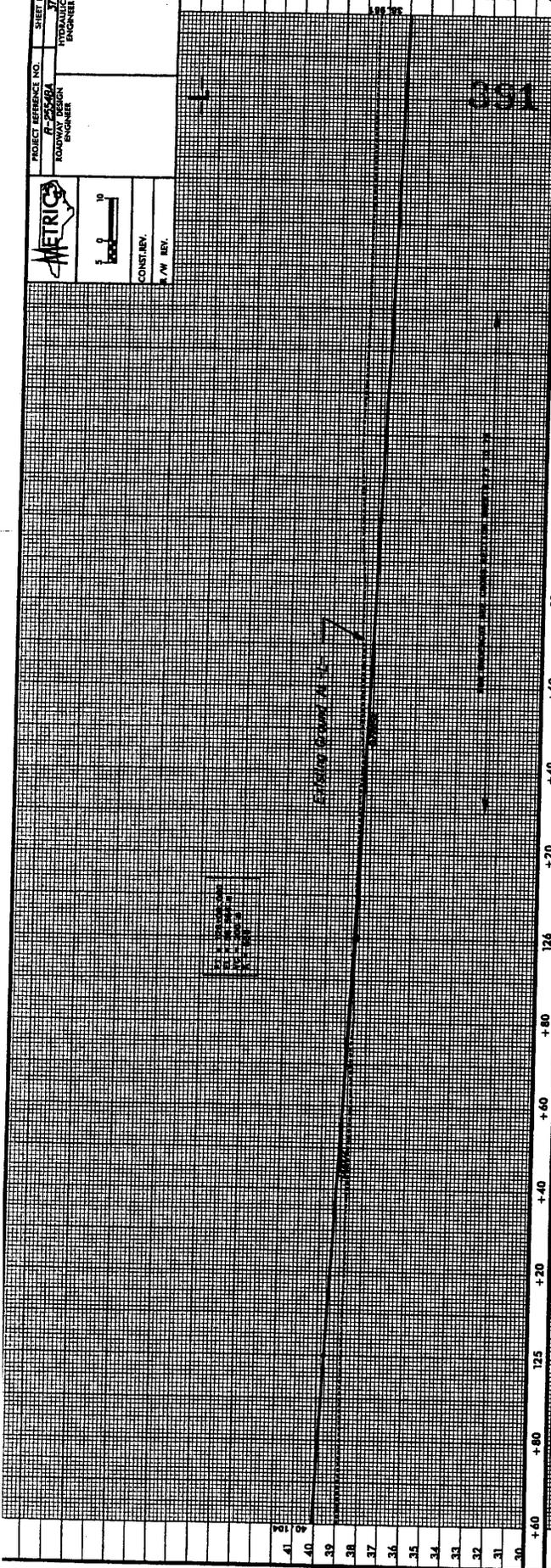


SITE 7

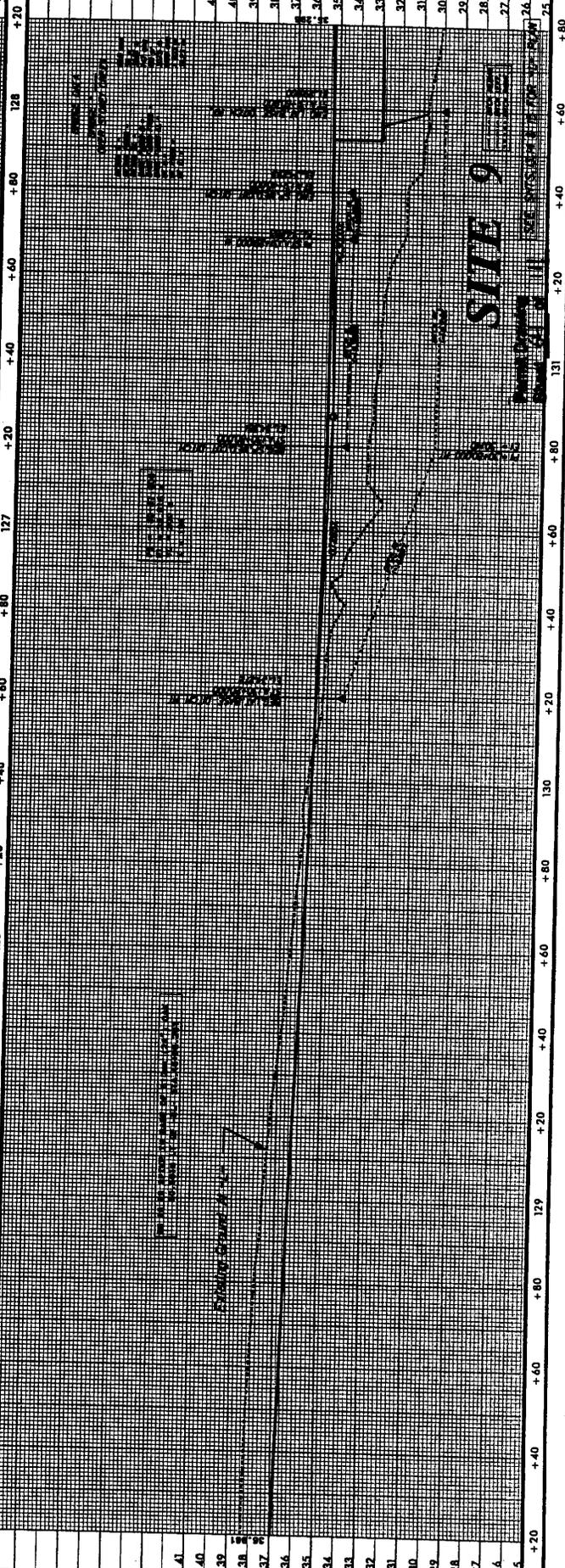
PROJECT REFERENCE NO. SHEET
 A-2558A 7
 ROADWAY DESIGN
 ENGINEER
 PROVAULT
 ENGINEER



CONST. REV.
 / AW REV.



41
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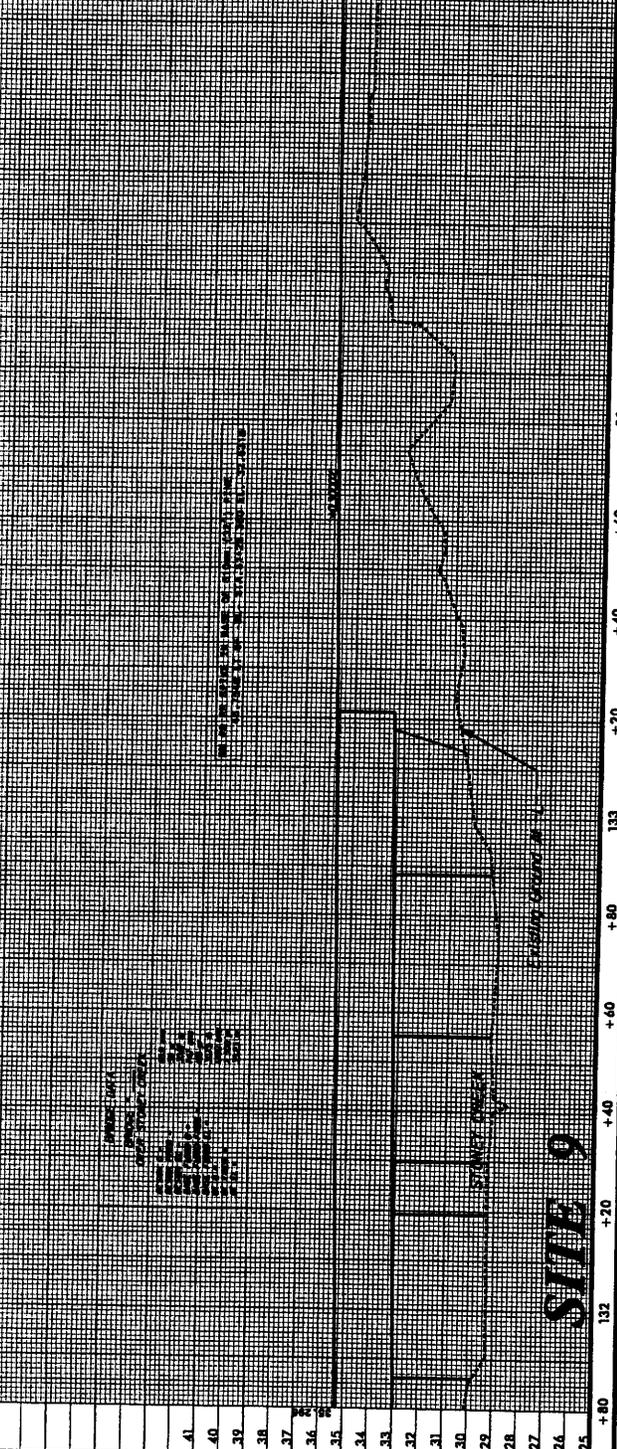


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PROJECT REFERENCE NO. **17-254-BA**
 SHEET **17**
 HYDRAULIC DESIGN ENGINEER

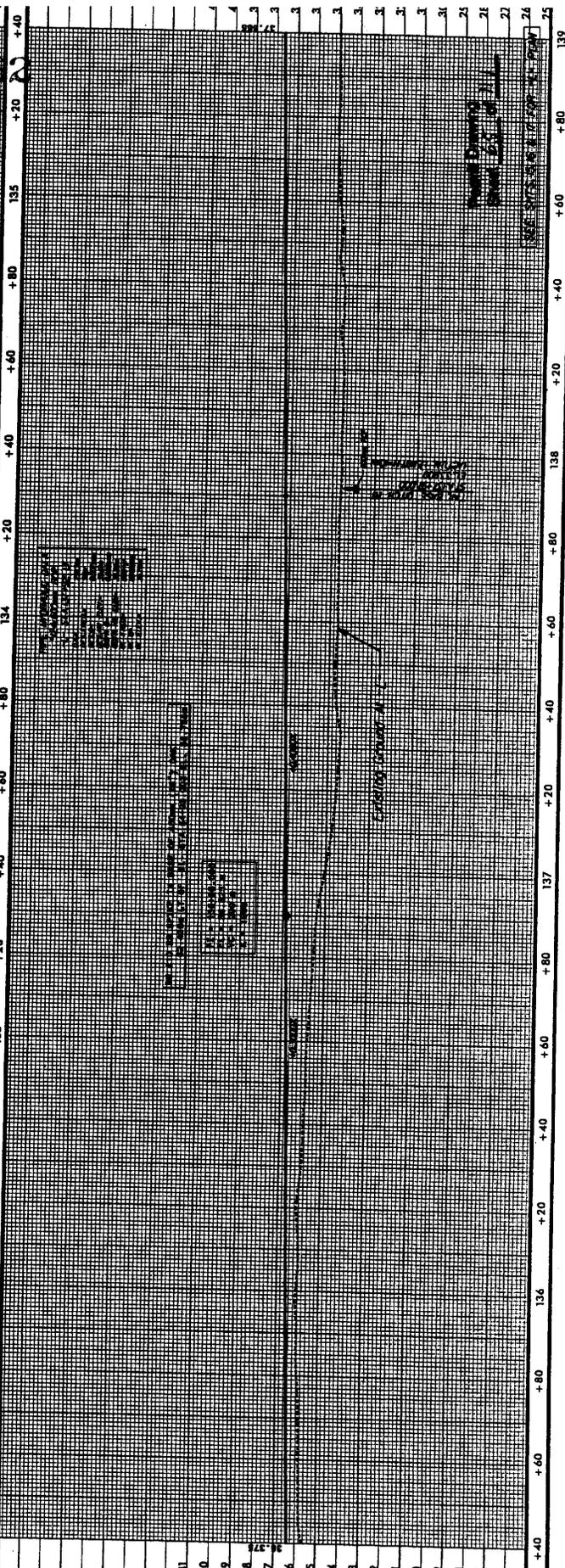


CONST. BY:
 P. W. BEV.



SITE 9

41	132.5
40	132.5
39	132.5
38	132.5
37	132.5
36	132.5
35	132.5
34	132.5
33	132.5
32	132.5
31	132.5
30	132.5
29	132.5
28	132.5
27	132.5
26	132.5
25	132.5



41	134.5
40	134.5
39	134.5
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37	134.5
36	134.5
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32	134.5
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30	134.5
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27	134.5
26	134.5
25	134.5

PROJECT REFERENCE NO. 1018107 035607
 ROADWAY DESIGN ENGINEER

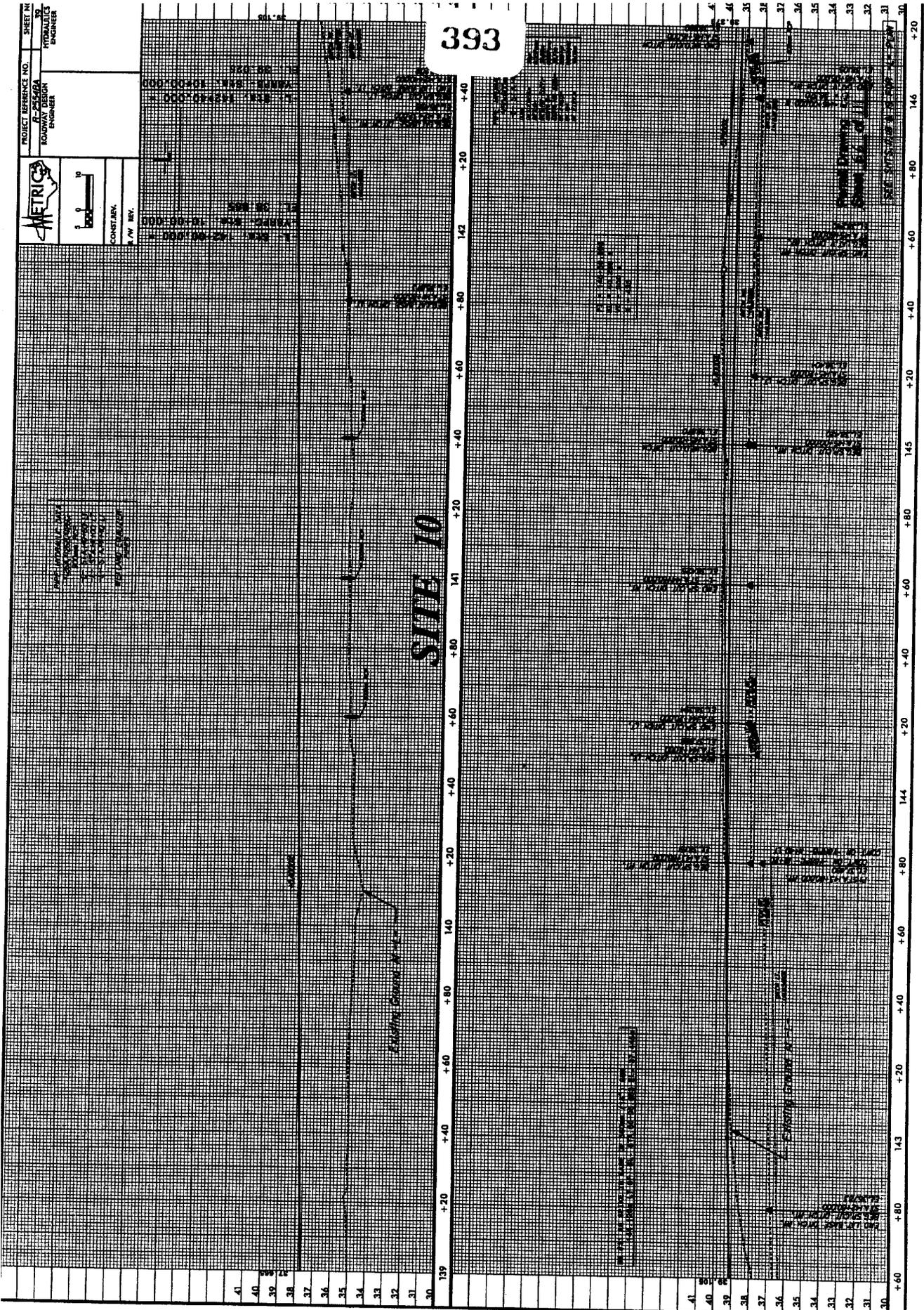


CONST. NO. 1018107 035607
 P/W REV. 1

PROPOSED ROADWAY
 10' WIDE
 10' HIGH
 10' DEEP
 10' WIDE

393

SUB 10



139 +20 +40 +60 +80 140 +20 +40 +60 +80 141 +20 +40 +60 +80 142 +20 +40 +60 +80 143 +20 +40 +60 +80 144 +20 +40 +60 +80 145 +20 +40 +60 +80 146 +20 +40 +60 +80 147 +20 +40 +60 +80 148 +20 +40 +60 +80 149 +20 +40 +60 +80 150 +20 +40 +60 +80 151 +20 +40 +60 +80 152 +20 +40 +60 +80 153 +20 +40 +60 +80 154 +20 +40 +60 +80 155 +20 +40 +60 +80 156 +20 +40 +60 +80 157 +20 +40 +60 +80 158 +20 +40 +60 +80 159 +20 +40 +60 +80 160 +20 +40 +60 +80 161 +20 +40 +60 +80 162 +20 +40 +60 +80 163 +20 +40 +60 +80 164 +20 +40 +60 +80 165 +20 +40 +60 +80 166 +20 +40 +60 +80 167 +20 +40 +60 +80 168 +20 +40 +60 +80 169 +20 +40 +60 +80 170 +20 +40 +60 +80 171 +20 +40 +60 +80 172 +20 +40 +60 +80 173 +20 +40 +60 +80 174 +20 +40 +60 +80 175 +20 +40 +60 +80 176 +20 +40 +60 +80 177 +20 +40 +60 +80 178 +20 +40 +60 +80 179 +20 +40 +60 +80 180 +20 +40 +60 +80 181 +20 +40 +60 +80 182 +20 +40 +60 +80 183 +20 +40 +60 +80 184 +20 +40 +60 +80 185 +20 +40 +60 +80 186 +20 +40 +60 +80 187 +20 +40 +60 +80 188 +20 +40 +60 +80 189 +20 +40 +60 +80 190 +20 +40 +60 +80 191 +20 +40 +60 +80 192 +20 +40 +60 +80 193 +20 +40 +60 +80 194 +20 +40 +60 +80 195 +20 +40 +60 +80 196 +20 +40 +60 +80 197 +20 +40 +60 +80 198 +20 +40 +60 +80 199 +20 +40 +60 +80 200 +20 +40 +60 +80

PROJECT REFERENCE NO. SHEET
METRIC
RAILWAY DESIGN
ENGINEER



CONST. BY
A. W. BEV.

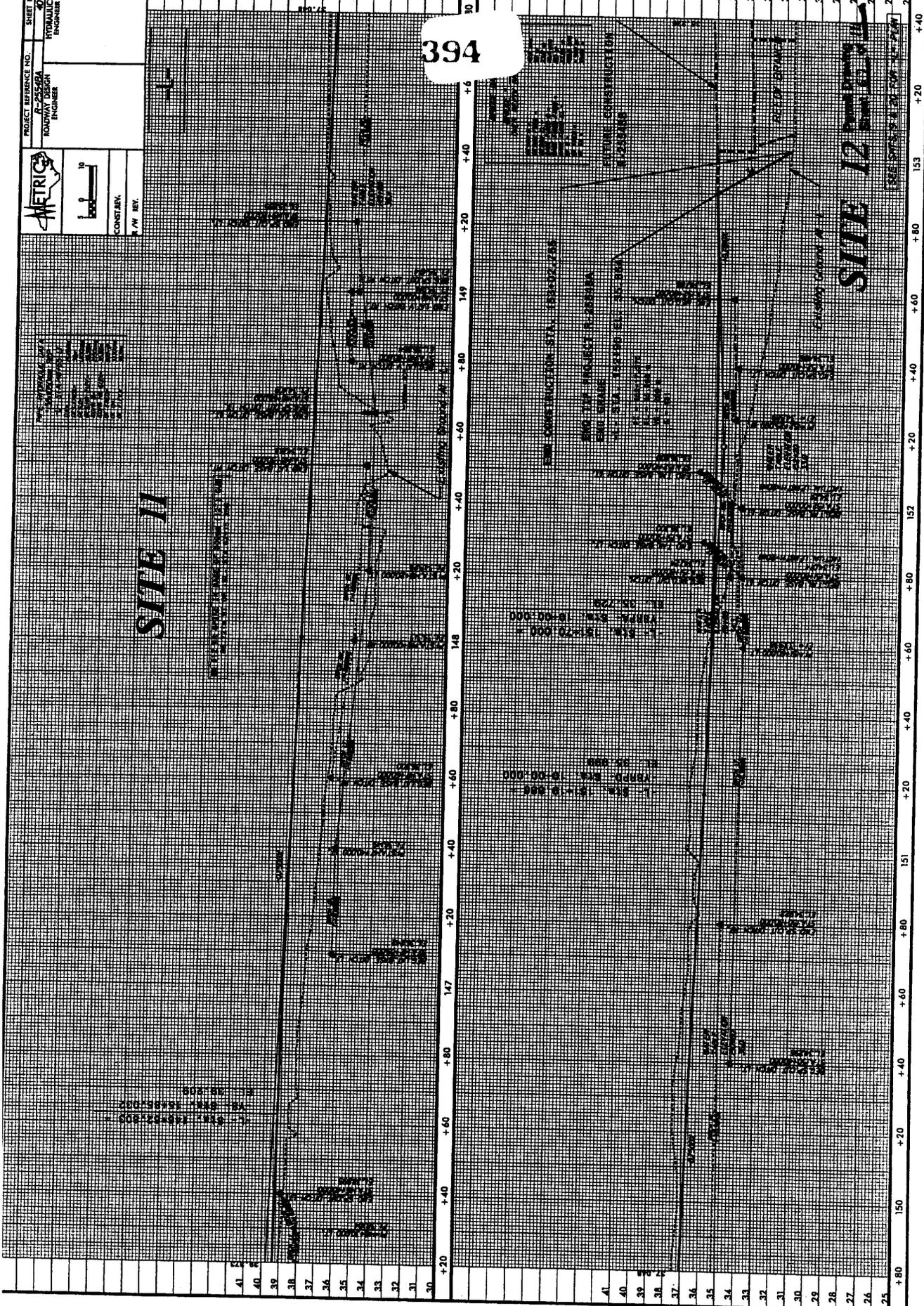
SITE 11

PROPOSED TRACK
EXISTING TRACK
EXISTING ROAD
EXISTING FENCE
EXISTING UTILITY

394

SITE 12

PROPOSED TRACK
EXISTING TRACK
EXISTING ROAD
EXISTING FENCE
EXISTING UTILITY



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+20 +40 +60 +80 +100 +120 +140 +160 +180 +200 +220 +240 +260 +280 +300 +320 +340 +360 +380 +400 +420 +440 +460 +480 +500 +520 +540 +560 +580 +600

147 148 149 150 151 152 153

meack

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01/18/07 13:57:08

PROJECT REFERENCE NO. SHEET NO.
 R-2548A 41
 METRIC
 RAILWAY DESIGN
 ENGINEER

CONST. BY:
 P.W. BRY.

SCALE:
 5 0 10

L2
 US 117 BYPASS
 T.I.P. R-1030AB
 UNDER CONST.

395

SITE 2

SITE 2

US 117 BYPASS
 T.I.P. R-1030AB
 UNDER CONST.

L21 SSKY 90+07.00
 20.00 40.00 1.49

L20 SSKY 90+00.00
 20.00 40.00 1.49

L19 SSKY 89+93.00
 20.00 40.00 1.49

L18 SSKY 89+86.00
 20.00 40.00 1.49

L17 SSKY 89+79.00
 20.00 40.00 1.49

L16 SSKY 89+72.00
 20.00 40.00 1.49

L15 SSKY 89+65.00
 20.00 40.00 1.49

L14 SSKY 89+58.00
 20.00 40.00 1.49

L13 SSKY 89+51.00
 20.00 40.00 1.49

L12 SSKY 89+44.00
 20.00 40.00 1.49

L11 SSKY 89+37.00
 20.00 40.00 1.49

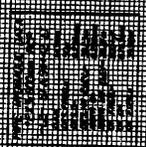
L10 SSKY 89+30.00
 20.00 40.00 1.49

L9 SSKY 89+23.00
 20.00 40.00 1.49

L8 SSKY 89+16.00
 20.00 40.00 1.49

L7 SSKY 89+09.00
 20.00 40.00 1.49

L6 SSKY 89+02.00
 20.00 40.00 1.49



43	+40
42	+60
41	+80
40	+100
39	+120
38	+140
37	+160
36	+180
35	+200
34	+220
33	+240
32	+260
31	+280
30	+300

92	+40
93	+60
94	+80
95	+100
96	+120
97	+140
98	+160
99	+180
100	+200
101	+220
102	+240
103	+260
104	+280
105	+300

PROJECT REFERENCE NO. 6-2542A
 HYDRAULIC DESIGN ENGINEER



CONST. REV.
 1 0 10

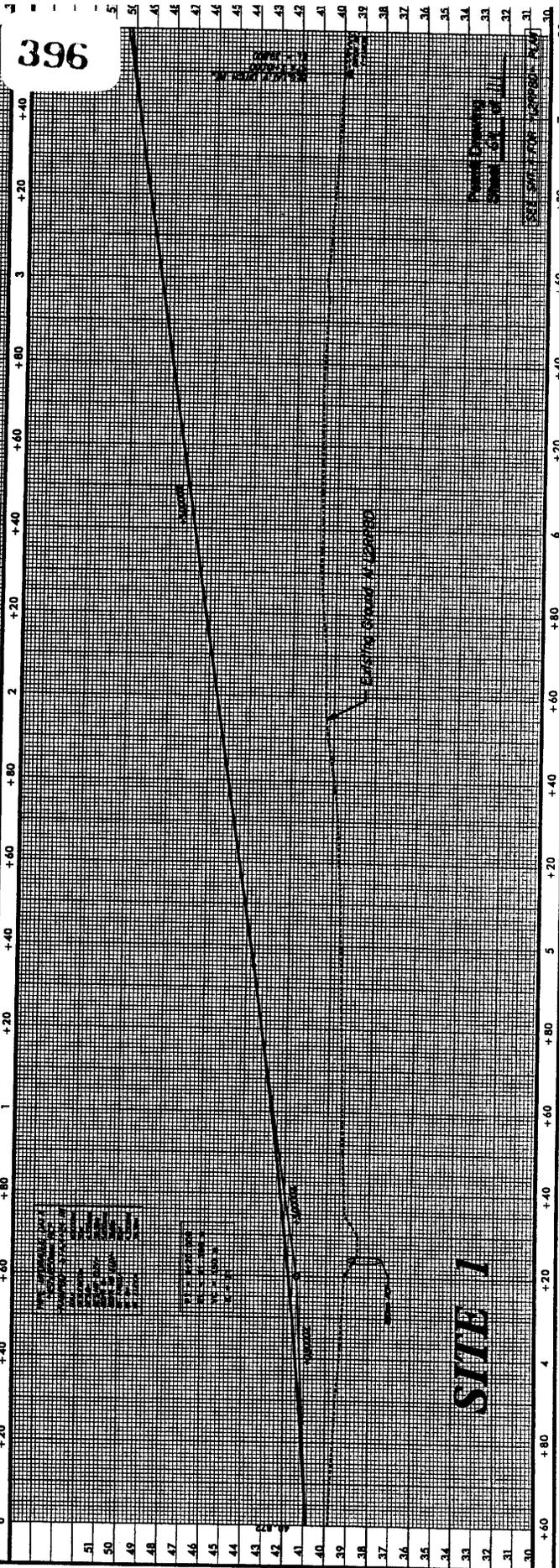
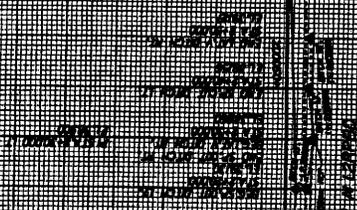
1 1/4" = 10'

LRPBD

REV. NO. 1
 DATE 10/1/00
 BY J. W. BRYAN
 CHECKED BY J. W. BRYAN

396

PROPOSED 10' WIDE
 SIDEWALK
 10' WIDE
 SIDEWALK
 10' WIDE
 SIDEWALK



SITE 1

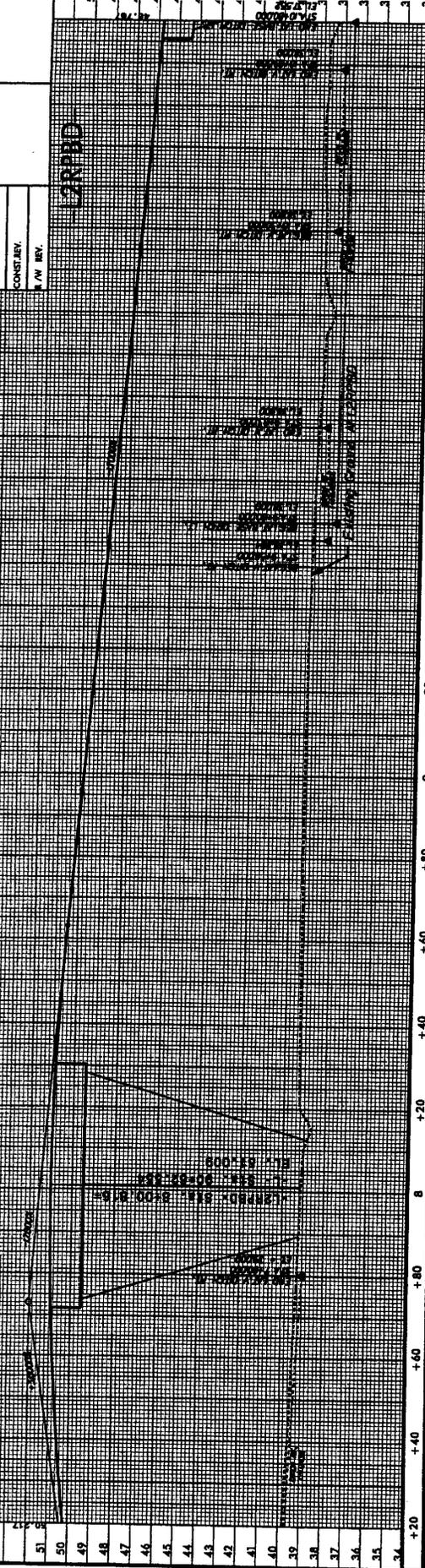
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 35 34 33 32 31 30

30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
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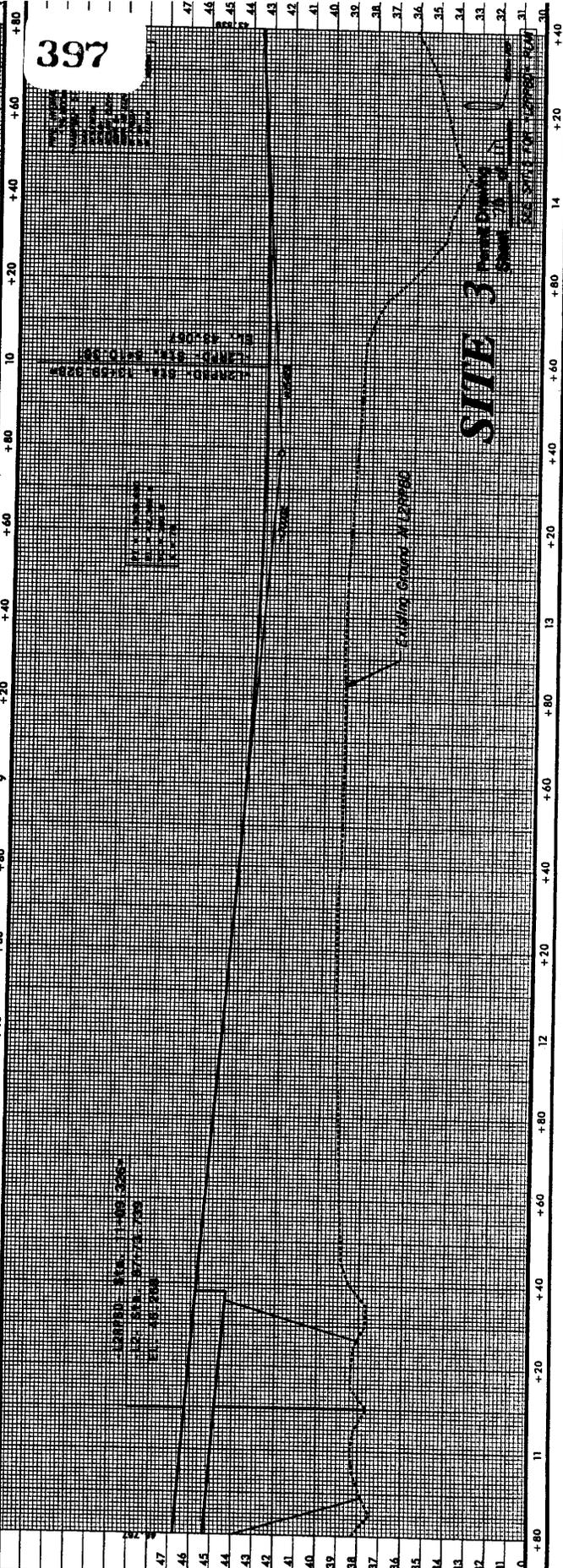
R:\Hyd\ulica\2542a_hyd\perm\l.pldgn
 10/1/00



CONST. BY:
 A.W. BRY.



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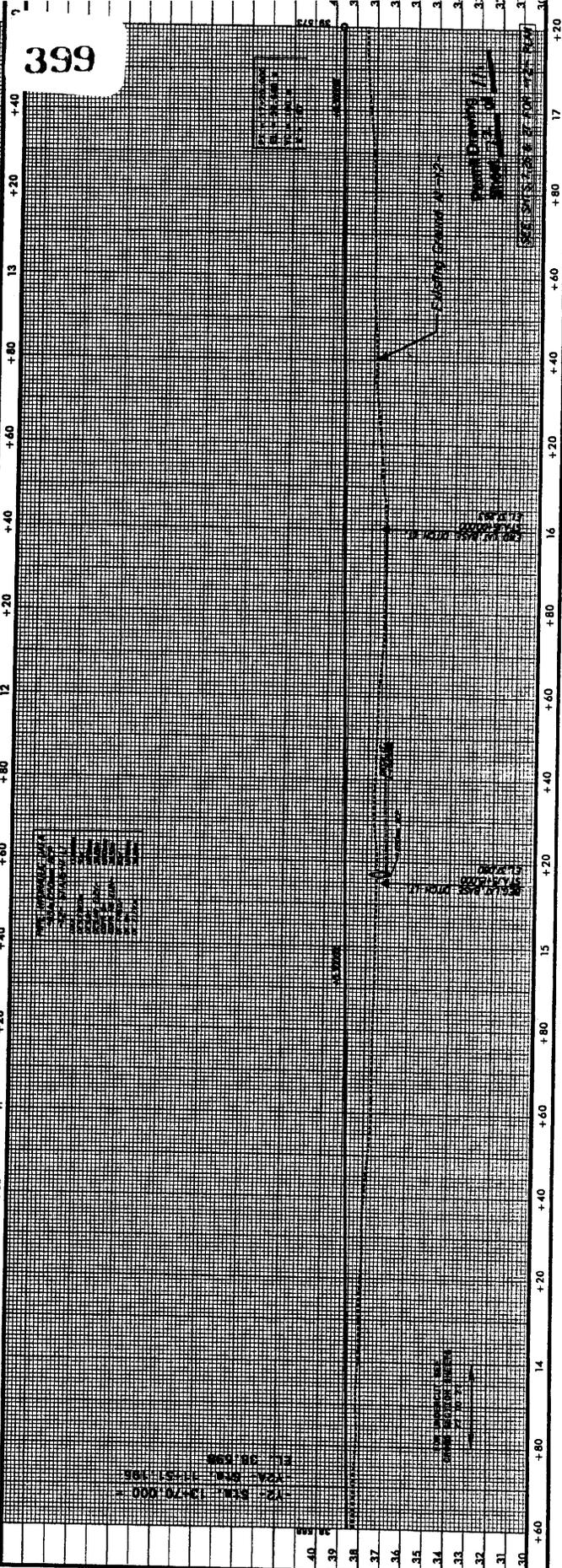
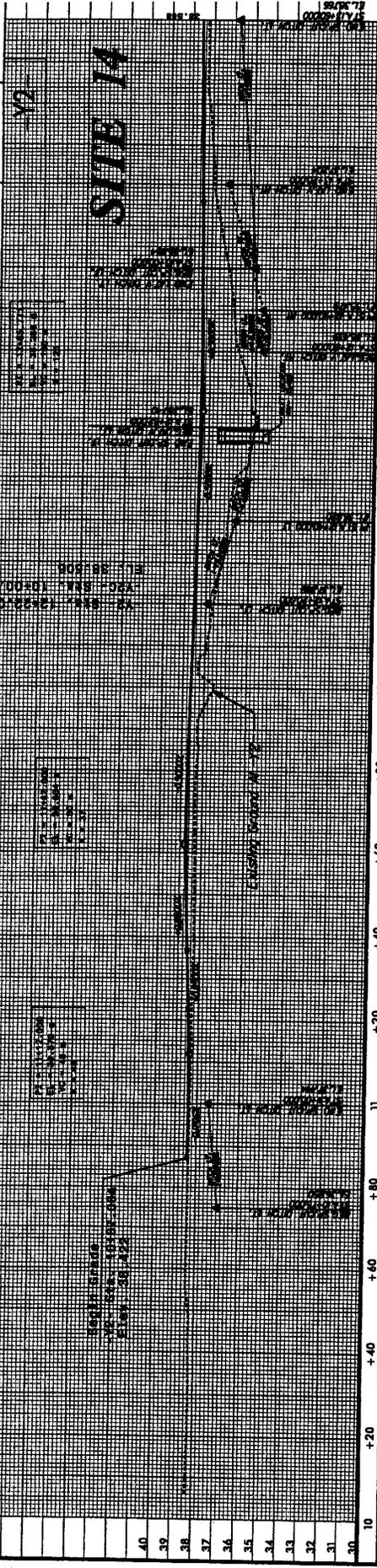
SITE 3

PROPOSED GRADE
 EXISTING GRADE

PROJECT REFERENCE NO. SHEET NO.
 0205000000 00
 MADHAVI CONSULTANT ENGINEER



CONSTR. REV.
 P/W REV.



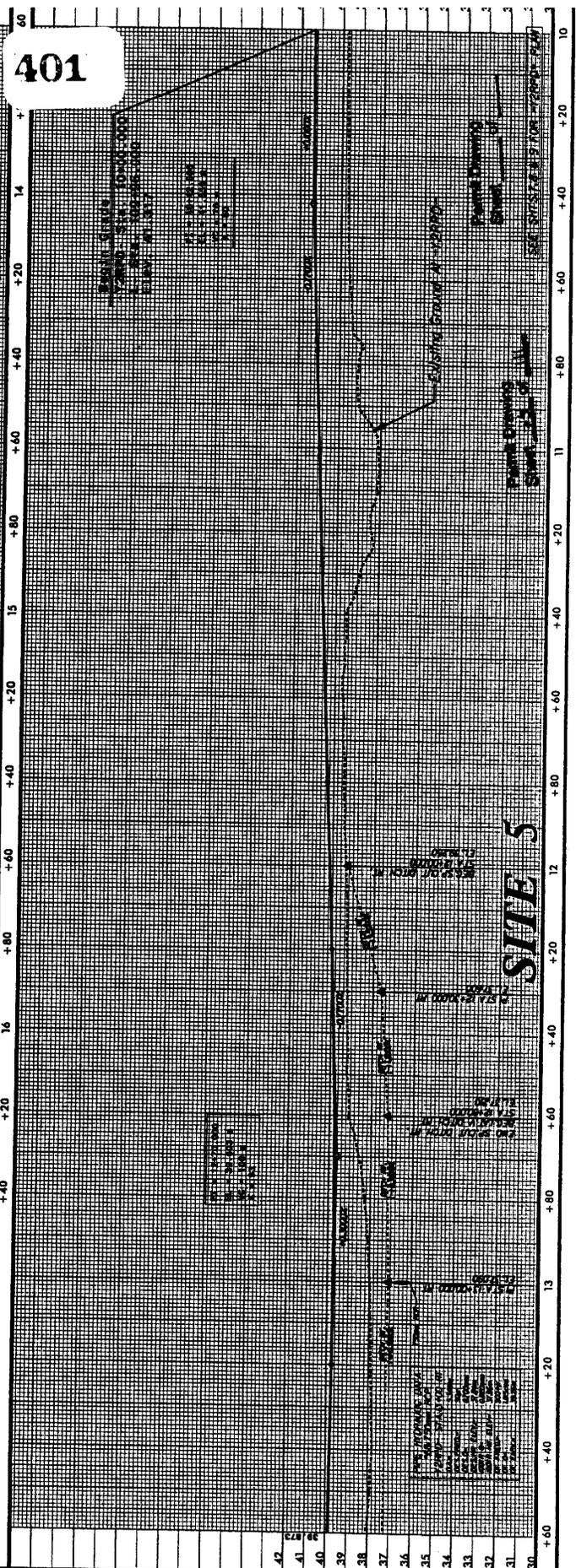
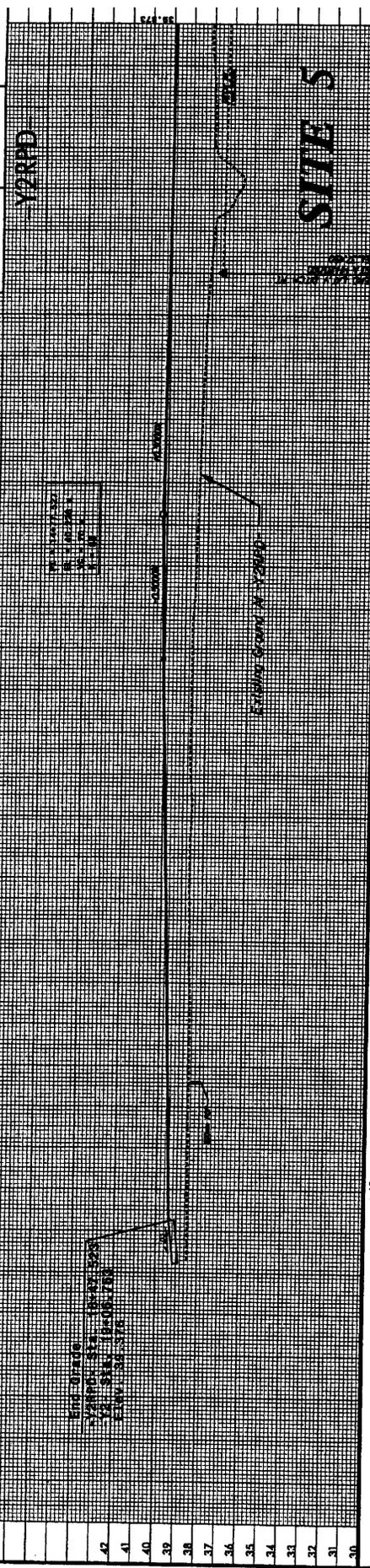
PROJECT REFERENCE NO. **6-25546A**
 ROADWAY DESIGN ENGINEER

AFRICO

CONST. BY
 P. W. BY.

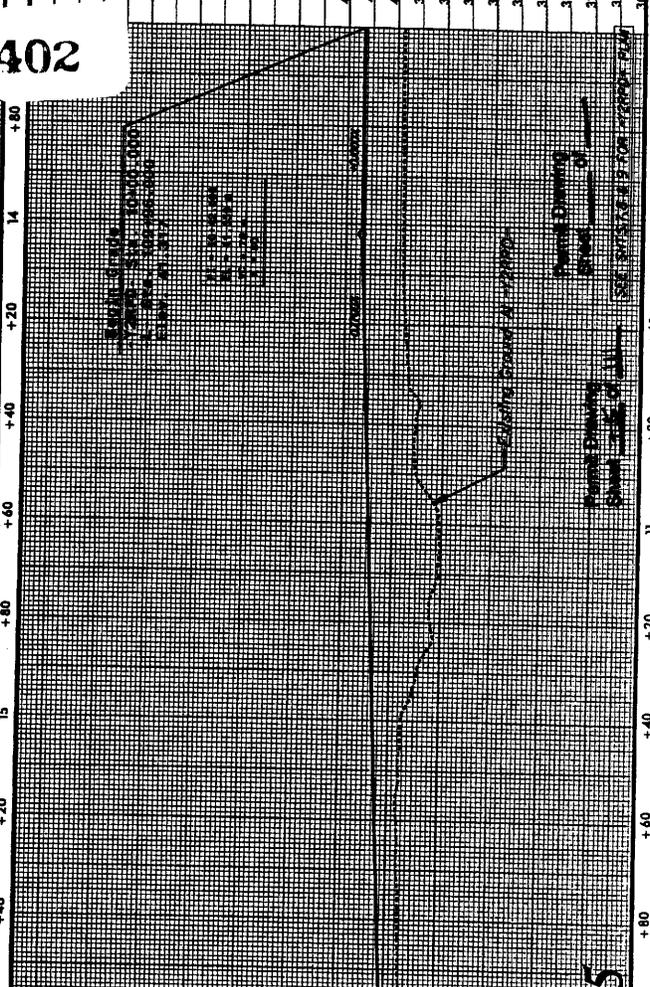
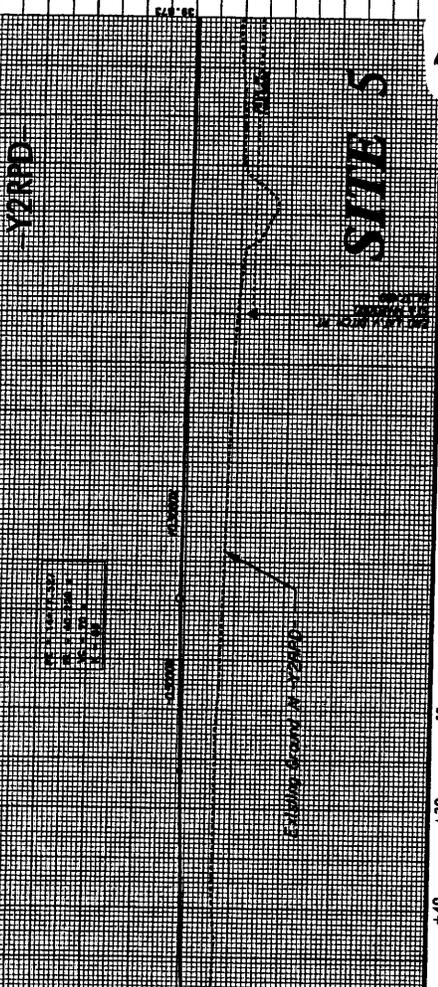
SCALE
 1" = 10'

PROPOSED PAVEMENT
 1. 12" ASPHALT CONCRETE
 2. 6" ASPHALT CONCRETE
 3. 4" ASPHALT CONCRETE
 4. 4" ASPHALT CONCRETE
 5. 4" ASPHALT CONCRETE
 6. 4" ASPHALT CONCRETE
 7. 4" ASPHALT CONCRETE
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 37. 4" ASPHALT CONCRETE
 38. 4" ASPHALT CONCRETE
 39. 4" ASPHALT CONCRETE
 40. 4" ASPHALT CONCRETE
 41. 4" ASPHALT CONCRETE
 42. 4" ASPHALT CONCRETE



401

PROJECT REFERENCE NO. SHEET
 A-2500A 4
 CONSULTING ENGINEER
 METRIC
 1" = 10'
 CONSTRUCTION
 1/2" = 10' REV.



402

1. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 5. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.

END OF SITE
 120' x 120'
 120' x 120'
 120' x 120'

1. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
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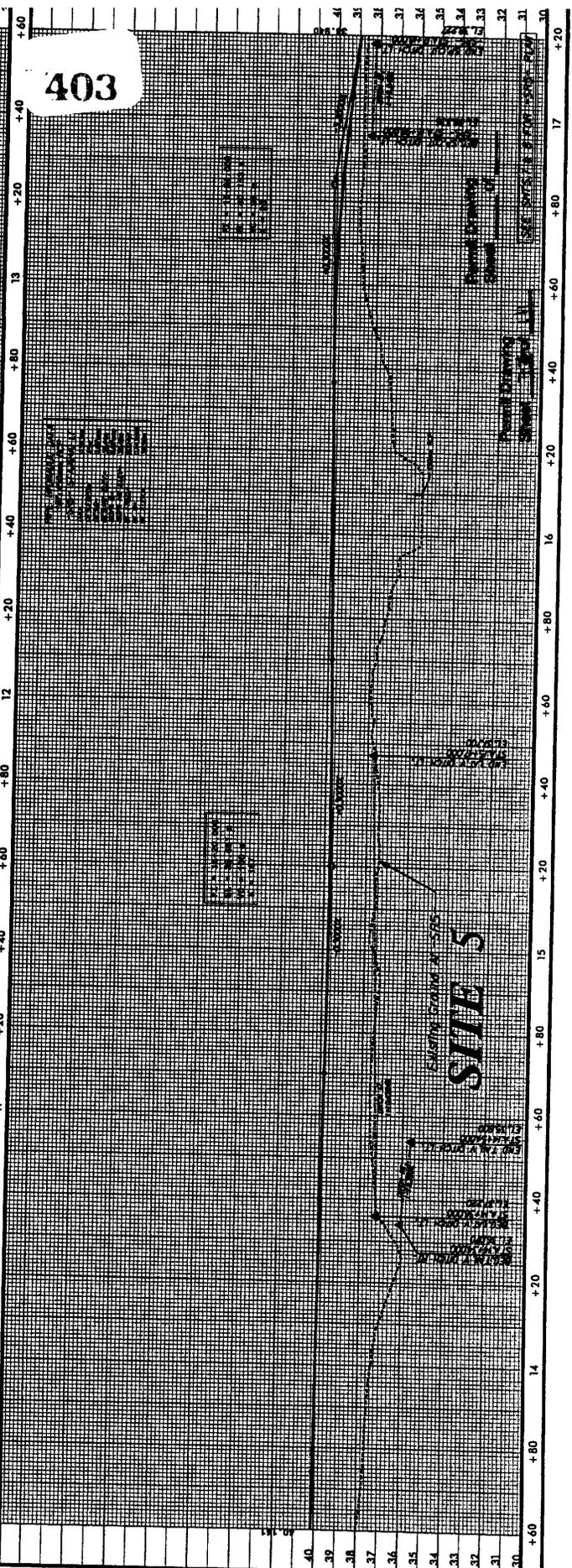
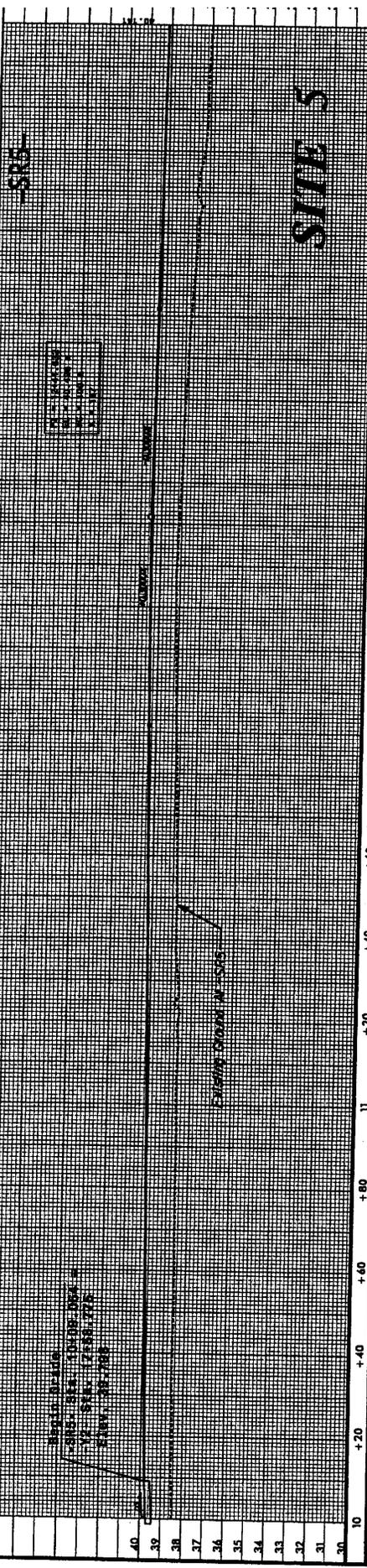
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PROJECT REFERENCE NO. SHEET NO.
 ROADWAY DESIGNER
 ENGINEER

AMTRIC

CONST. BY
 P/W REV.

1" = 10'



10VN07 D564
 R:\vgd\autocad\25546\hyd\permits\p1.dgn
 10/20/2011 10:54 AM

PROJECT REFERENCE NO. **0-2554A** SHEET **66**
 HYDRAULIC DESIGN ENGINEER



CONST. BY: _____
 P. AND REV. _____

SCALE: 1" = 10'

404

STATIONING
 100+00 TO 100+50
 100+50 TO 100+60
 100+60 TO 100+70
 100+70 TO 100+80

100+20

SITE 5

END GRADE
 100+00 TO 100+100
 100+100 TO 100+200
 100+200 TO 100+300
 100+300 TO 100+400

EXISTING GRADE

EXISTING GRADE
 100+400 TO 100+500
 100+500 TO 100+600
 100+600 TO 100+700

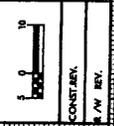
EXISTING GRADE

PROPOSED GRADE
 100+400 TO 100+500
 100+500 TO 100+600
 100+600 TO 100+700

47
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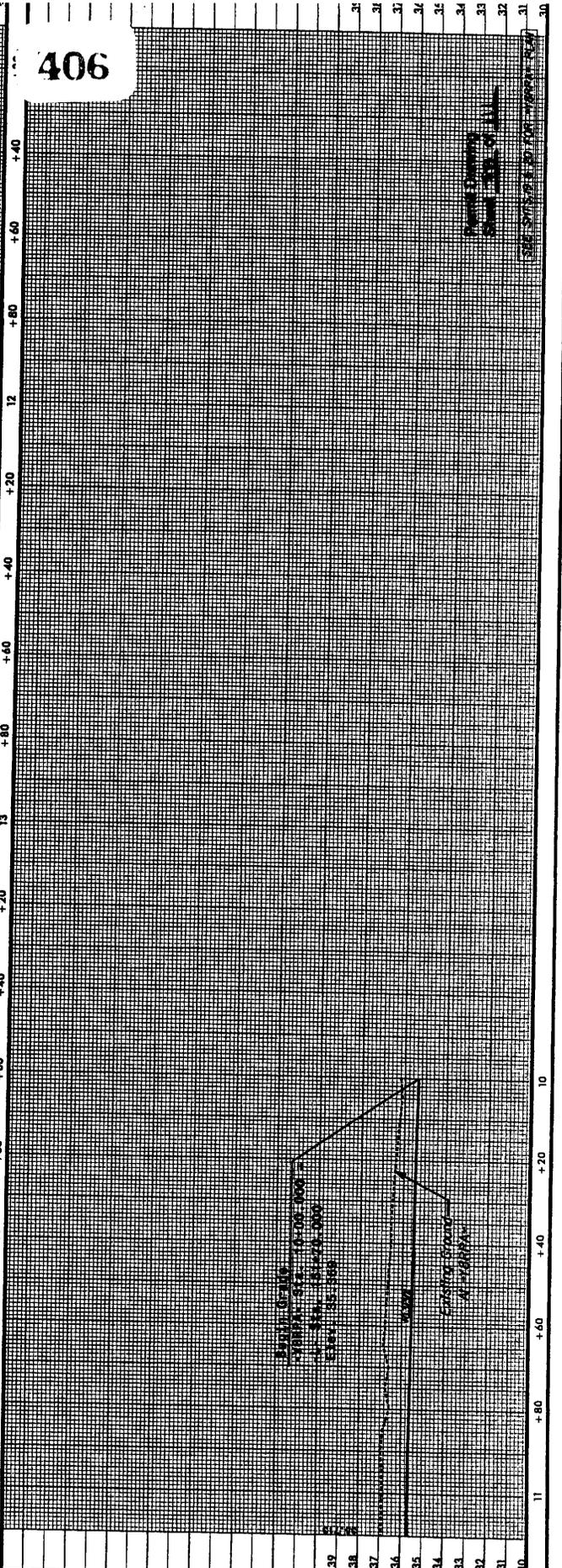
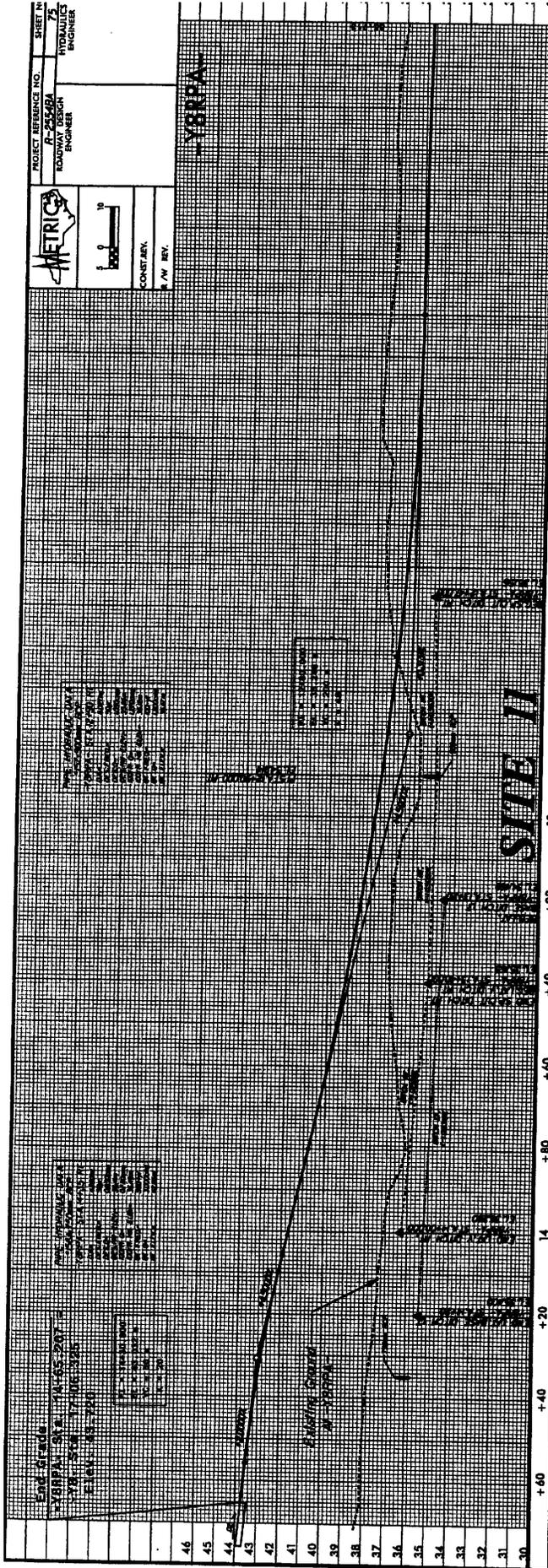
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PROJECT REFERENCE NO. SHEET NO.
 A-25502A 7
 HYDRAULICS
 DESIGN
 ENGINEER



CONST. BY:
 P. W. BRY.

YBRPA



406

Proposed Drawing
 Sheet 205 of 211

SEE SHEET 204 FOR YBRPA 204



CONST. MEN.
 P.W. DIV.

YARD

EXISTING GRADE
 PROPOSED GRADE
 FINISHED GRADE
 PROPOSED GRADE
 FINISHED GRADE

EXISTING GRADE
 PROPOSED GRADE
 FINISHED GRADE

SITE II

407

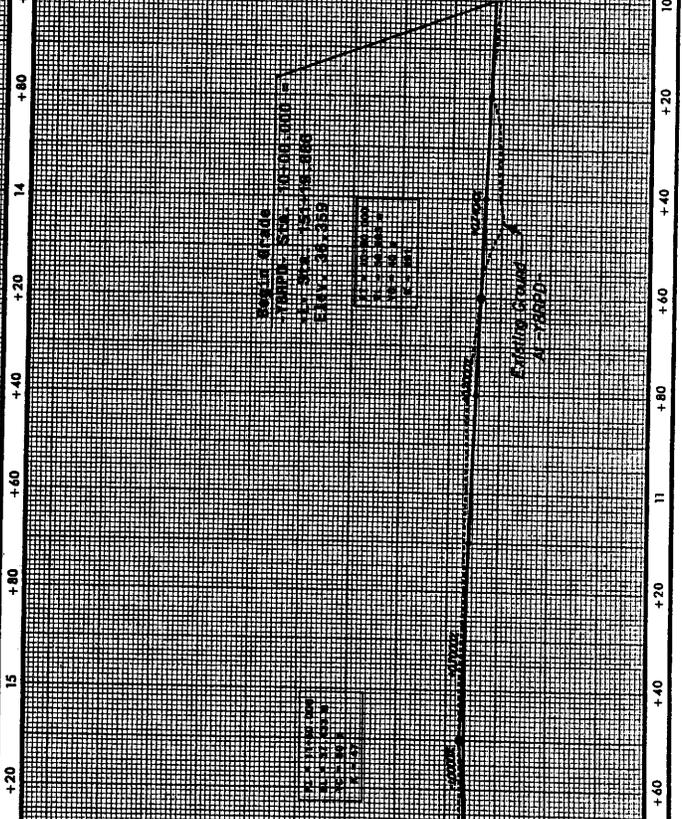
PROPOSED GRADE
 FINISHED GRADE

EXISTING GRADE
 PROPOSED GRADE
 FINISHED GRADE

EXISTING GRADE
 PROPOSED GRADE
 FINISHED GRADE

EXISTING GRADE
 PROPOSED GRADE
 FINISHED GRADE

- 47
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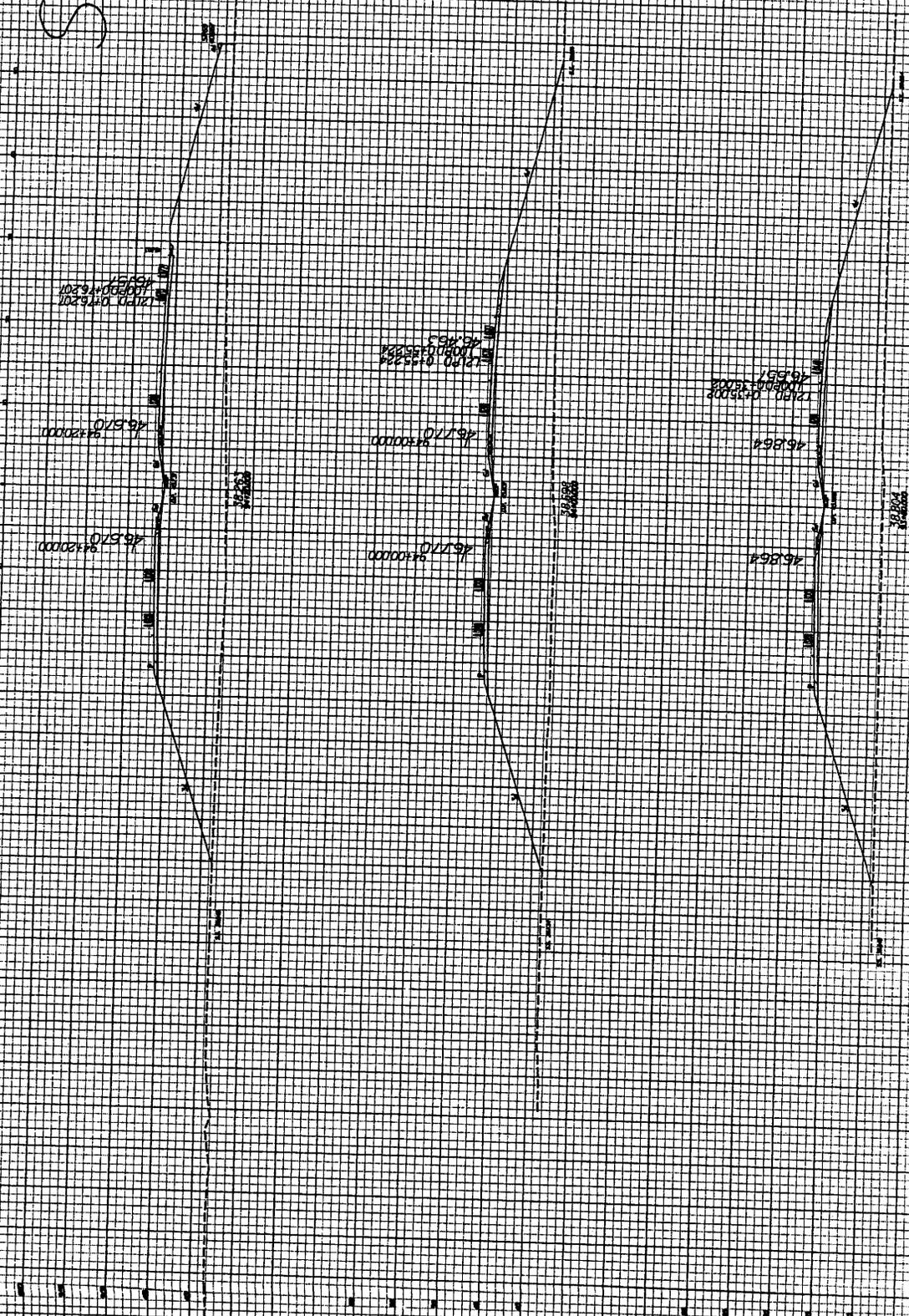
PROJECT REFERENCE NO. 2-281414 SHEET 3



SITE 3

408

Permit Drawing
Sheet 3 of 11



Small text at the bottom right corner, likely a copyright or scale note.



PROJECT REFERENCE NO. P-2554M
 SHEET 112

SITE 4

112

SEE SHEET P-2-M AND P-2-M FOR STREAM CHANNEL TYPICAL AND DETAILS.

SEE SHEET P-2-M AND P-2-M FOR STREAM CHANNEL TYPICAL AND DETAILS.

SEE SHEET P-2-M AND P-2-M FOR STREAM CHANNEL TYPICAL AND DETAILS.

46884

47129

47129

47460

46952

46952

46952

47460

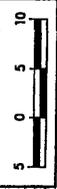
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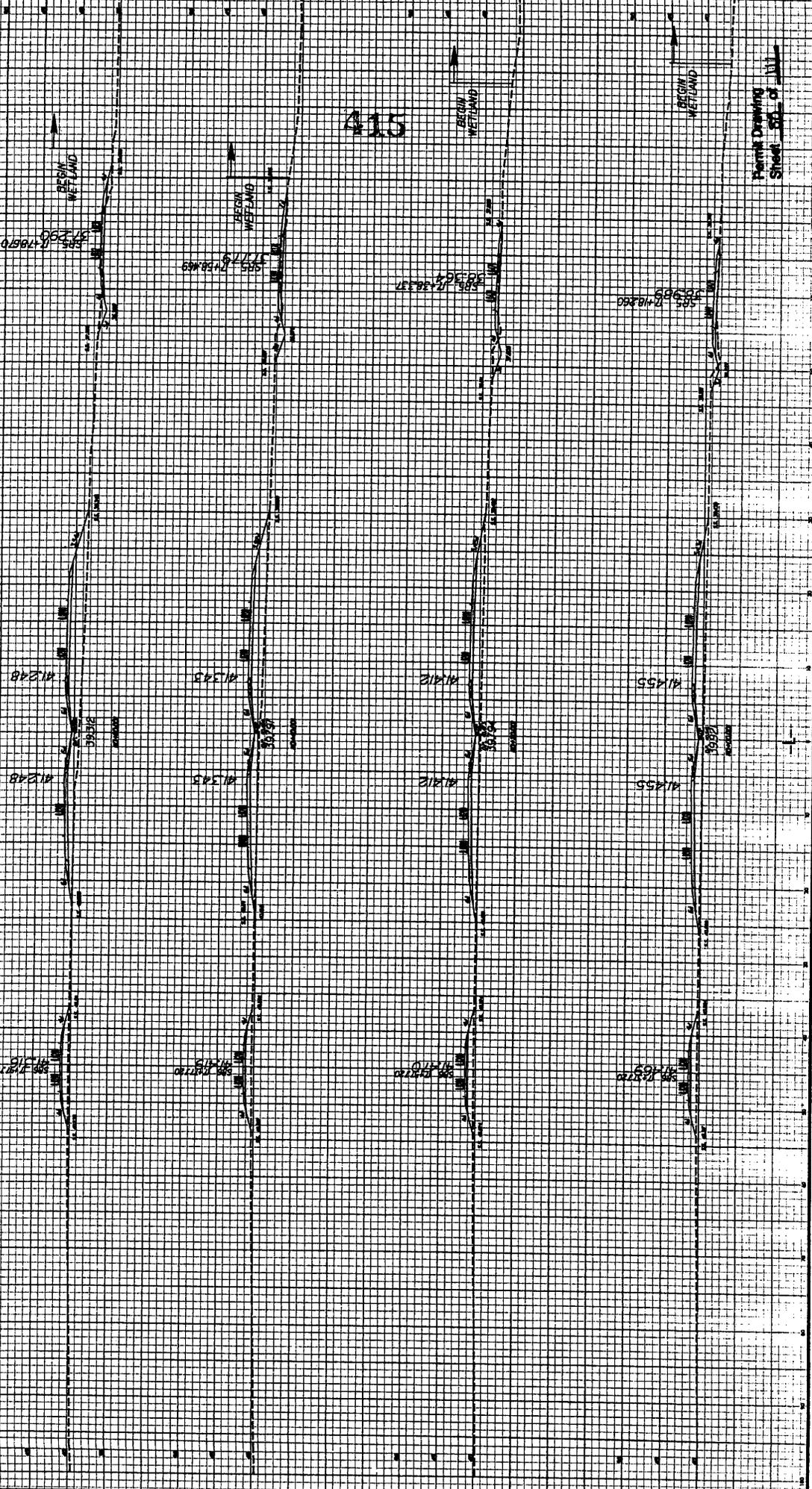
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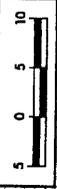
Permit Drawing
 Sheet 112 of 112



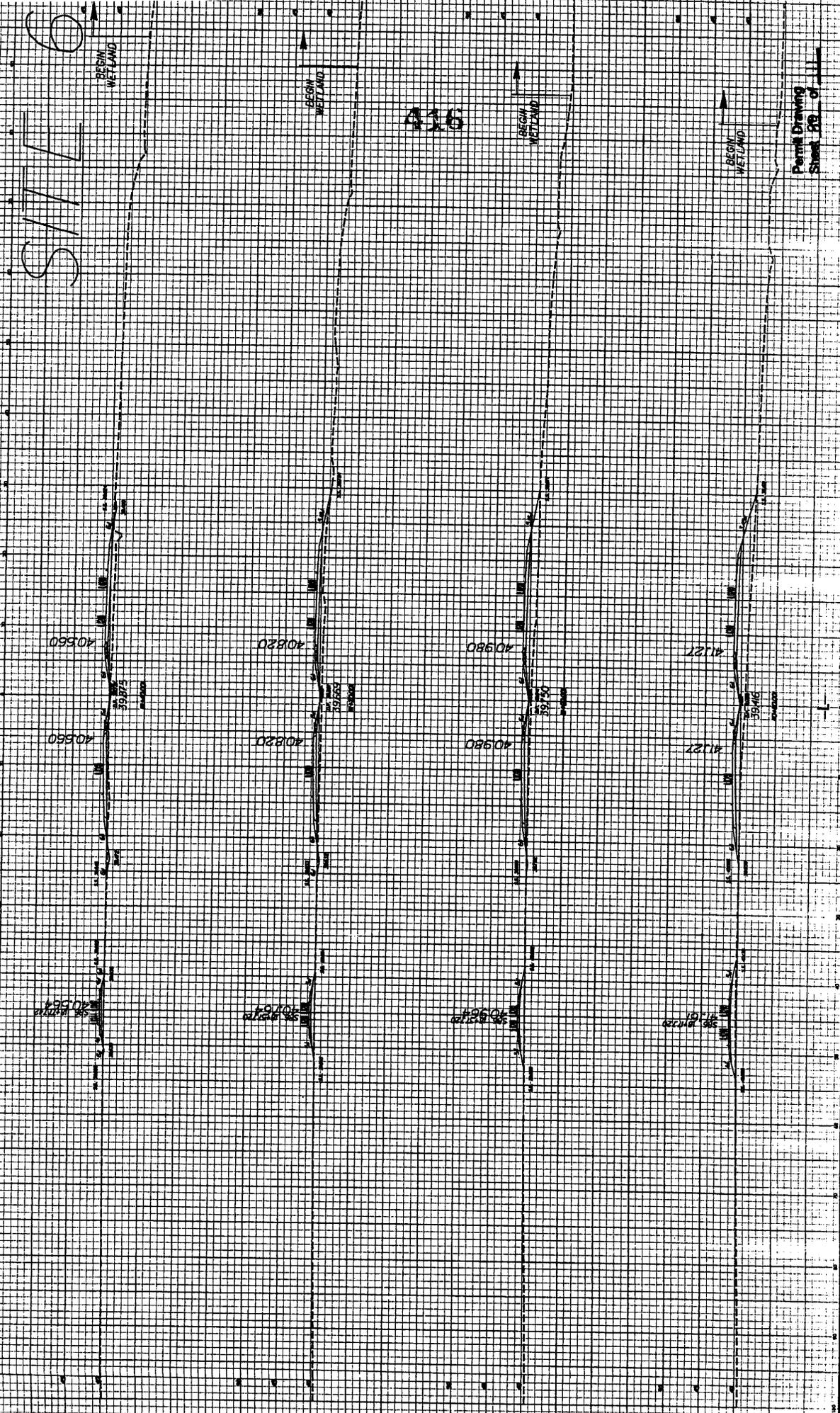
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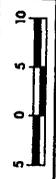




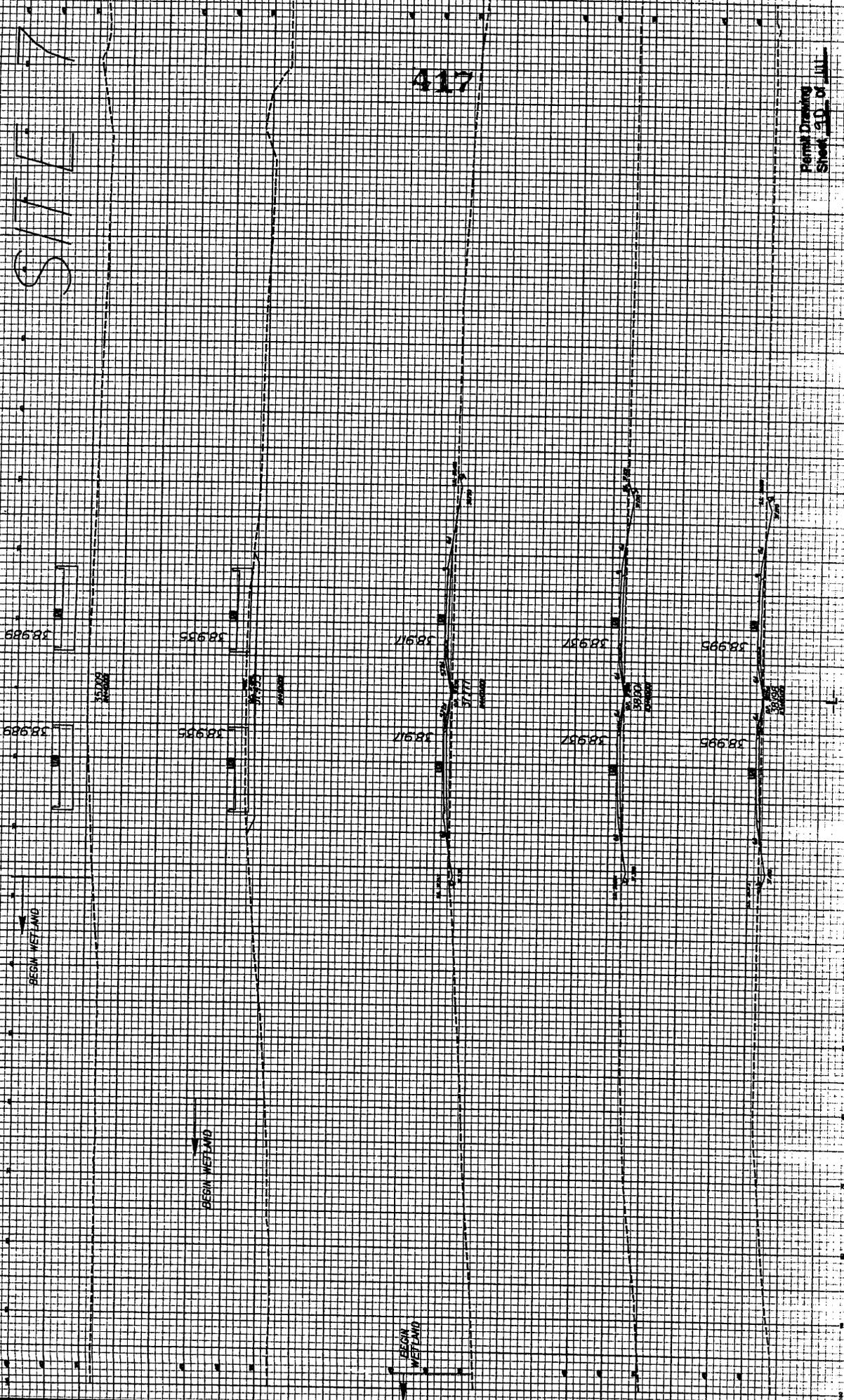
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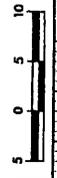
Permit Drawing
Sheet 28 of 111



SITE 7



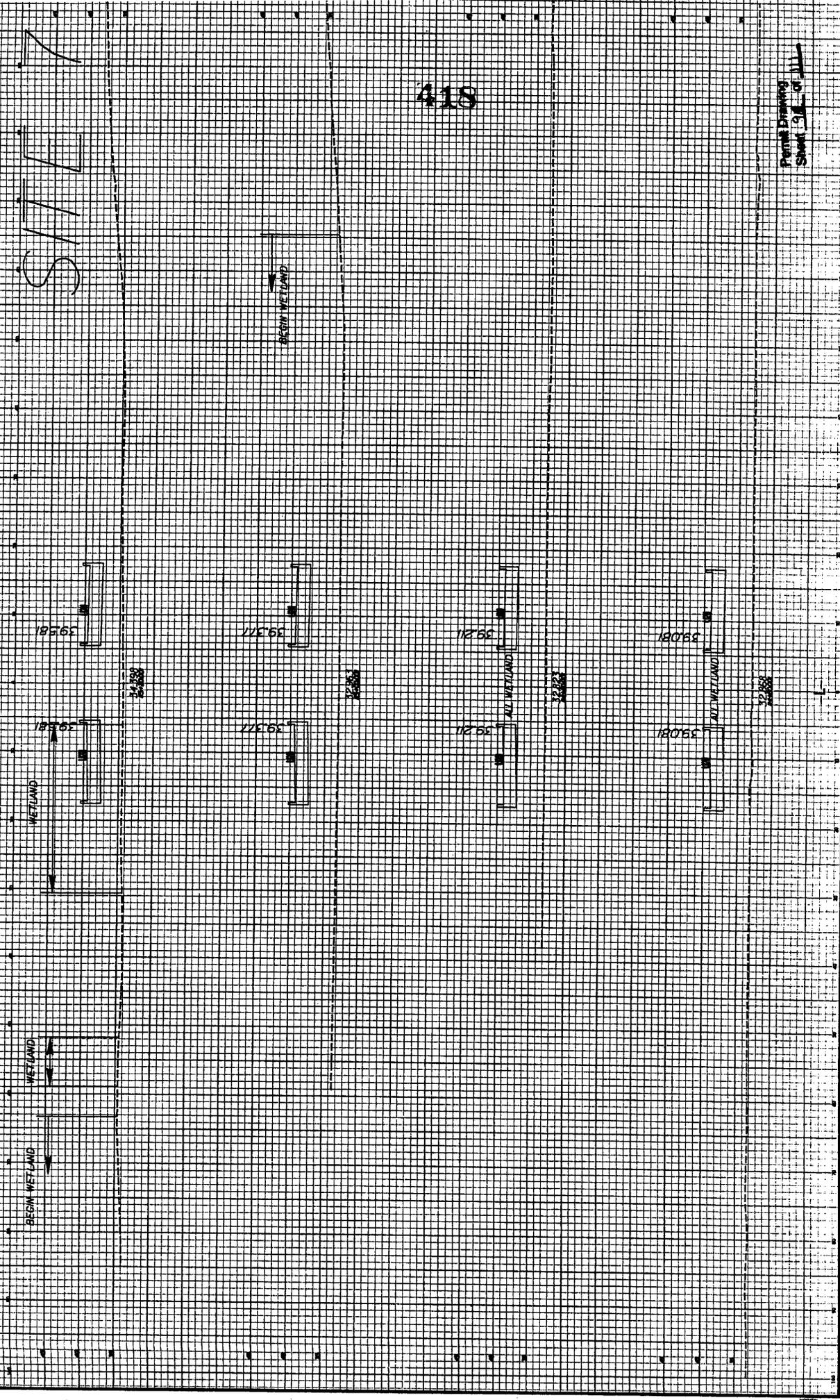
PROJECT REFERENCE NO. L-2344A
SHEET # 2-31



SITE 7

418

Permit Drawing
Sheet 2 of 11





BEGIN WETLAND

35.254

35.254

BEGIN WETLAND

SITE 9

30.620
30.620

35.252

35.252

BEGIN WETLAND

31.655
31.655

BEGIN WETLAND

BEGIN WETLAND

BEGIN WETLAND

35.230

35.230

WETLAND

BEGIN WETLAND

BEGIN WETLAND

419

35.250

35.250

WETLAND

32.800
32.800

BEGIN WETLAND

35.289

35.289

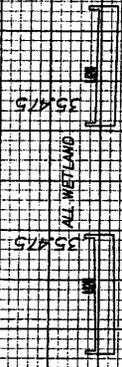
WETLAND

33.337
33.337



SITE G

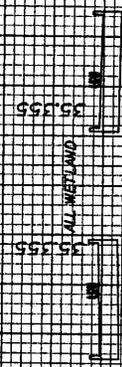
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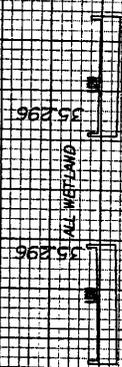
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2836
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2837
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2838
2838



STARS

421

360.5
360.5

255.279

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359.55

358.95
358.95

358.35
358.35

357.75
357.75

302.55

BEGIN
WETLAND

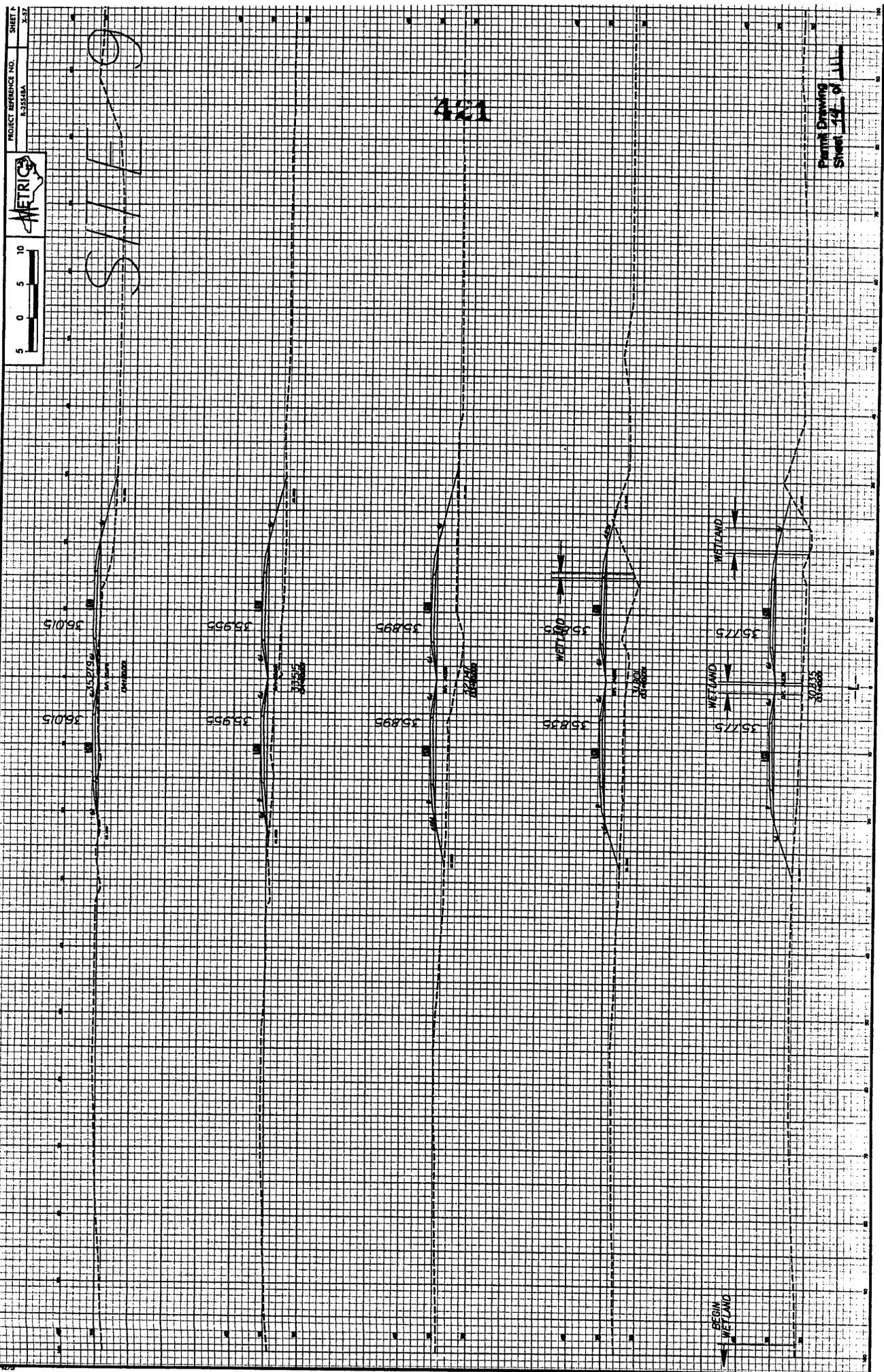
WETLAND

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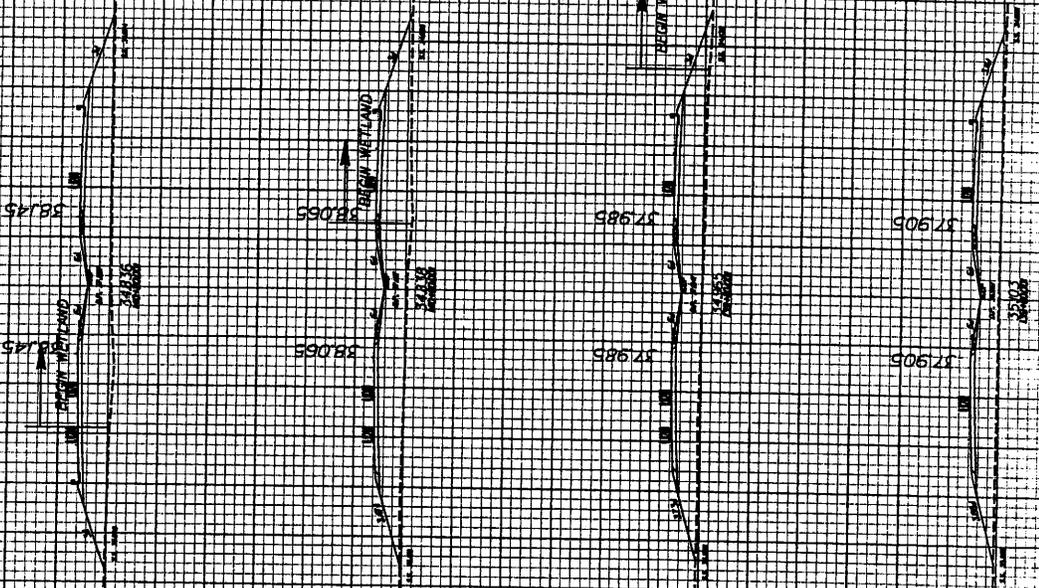
WETLAND





SITE 10

422





SITE II

36876
36875
36874

37548
37548
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37998
37998
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37948
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38098
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38098

BEDROCK WETLAND

WETLAND

324

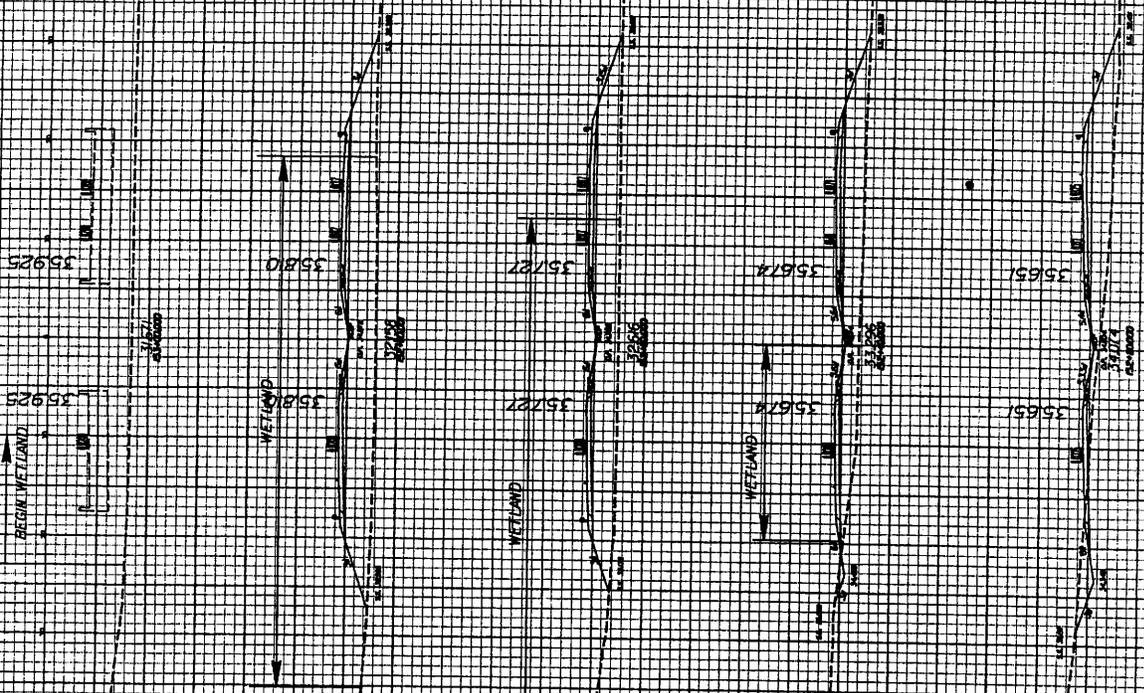
FORM DRAWING
SHEET ONE OF THREE

PROJECT REFERENCE NO. 14-15544A SHEET 272



SITE 12

425



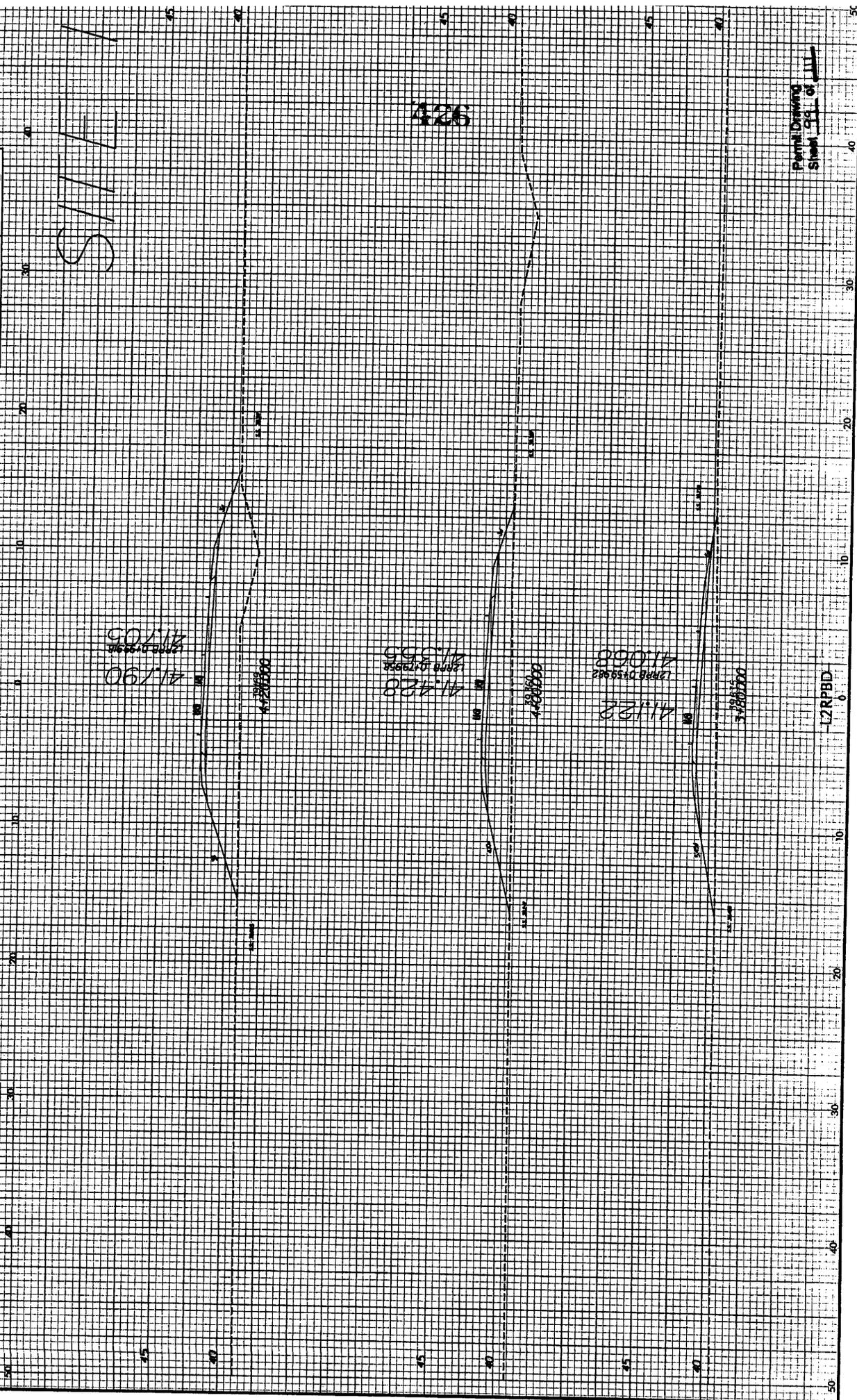
Permit Drawing
Sheet 272 of 272

PROJECT REFERENCE NO. SHEET
E-3348A 21



2.5 0 2.5 5

SITE 1



Permit Drawing
Sheet 20 of 111

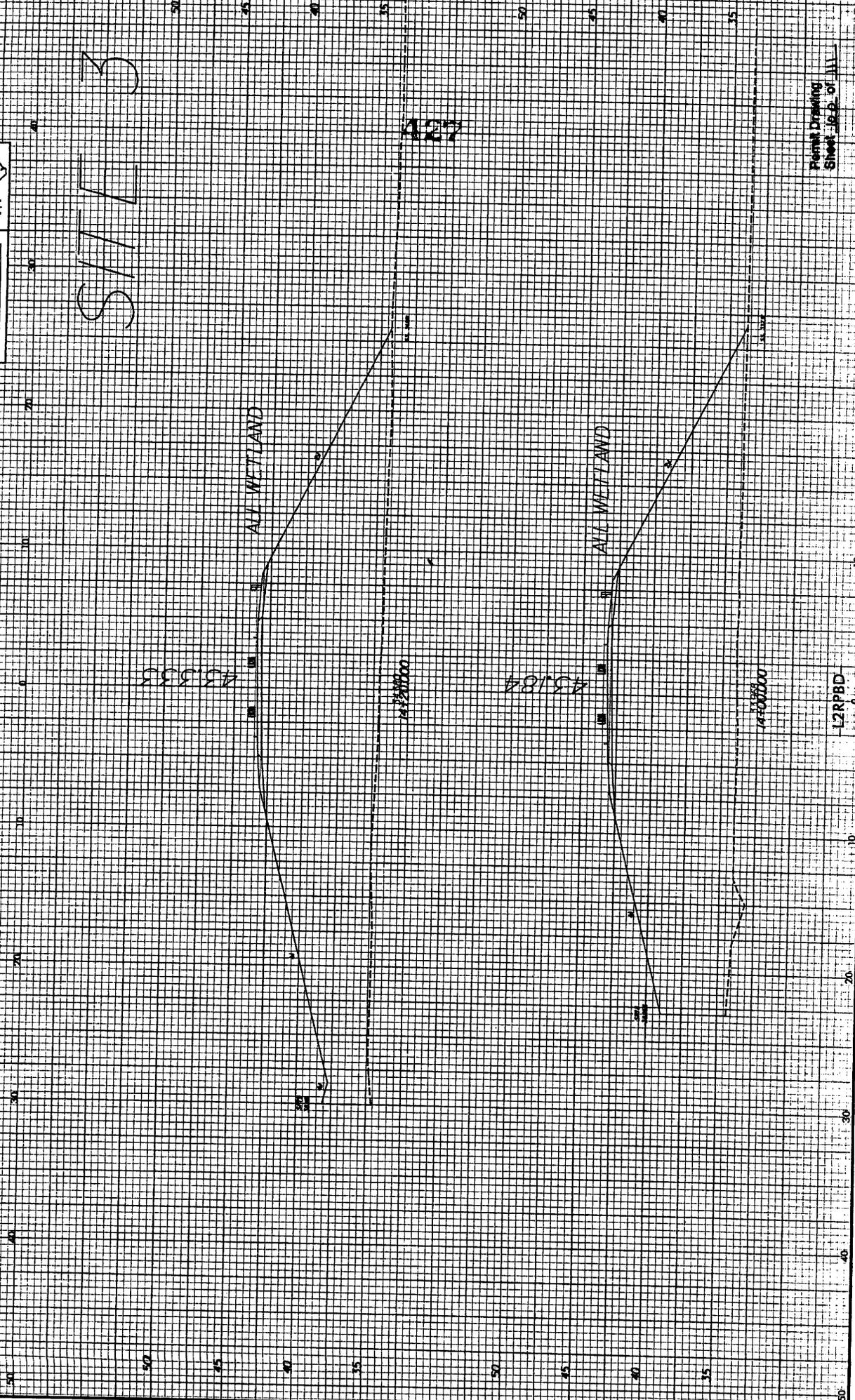
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R-21848A



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1:1

SITE 3



Print Drawing
Sheet 16.5 of 111

12RBD

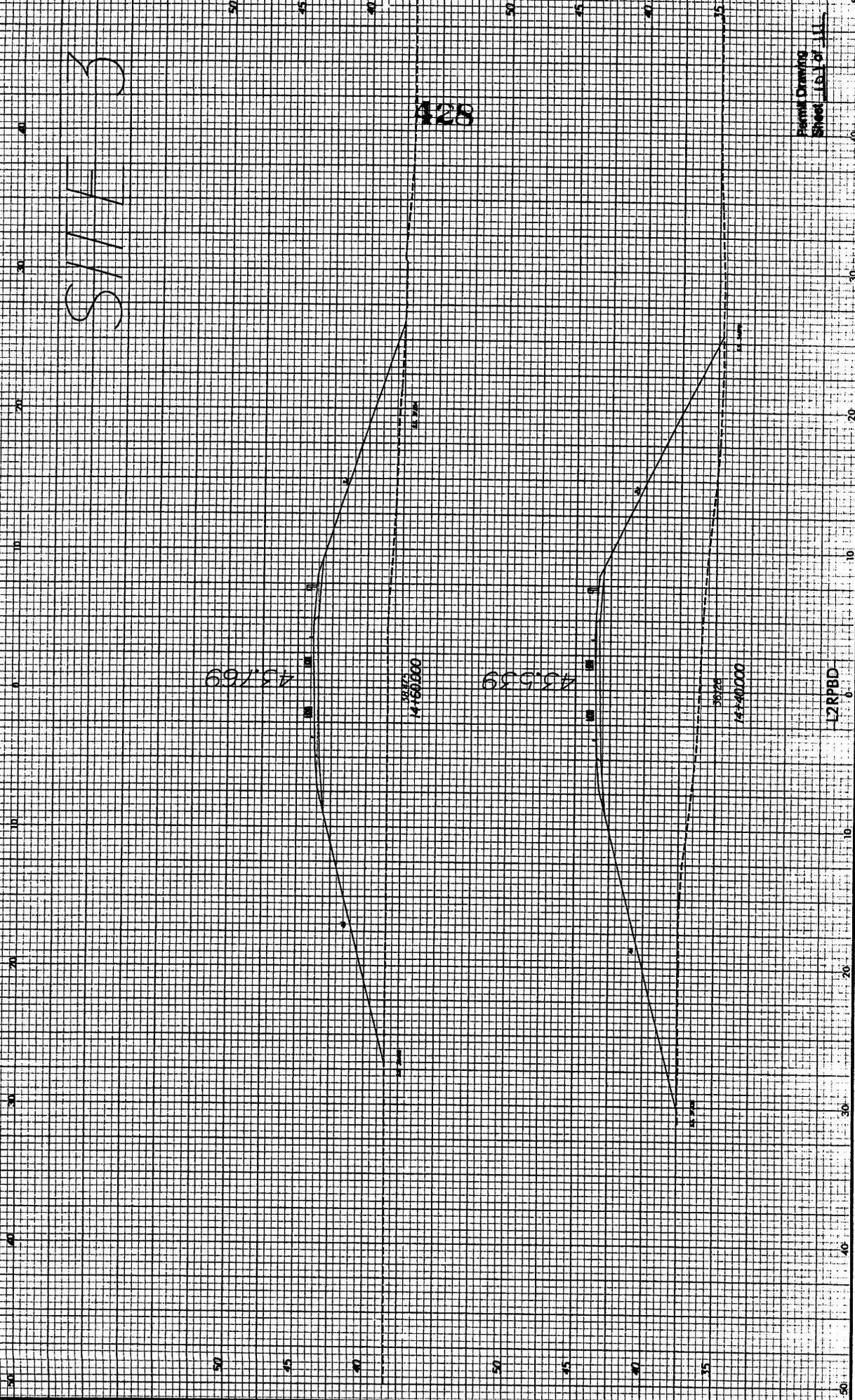
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PROJECT REFERENCE NO.
E-23548A



SHEET
2-1

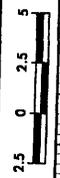
STIFF 3



Permit Drawing
Sheet 16 of 11

L2RPBD

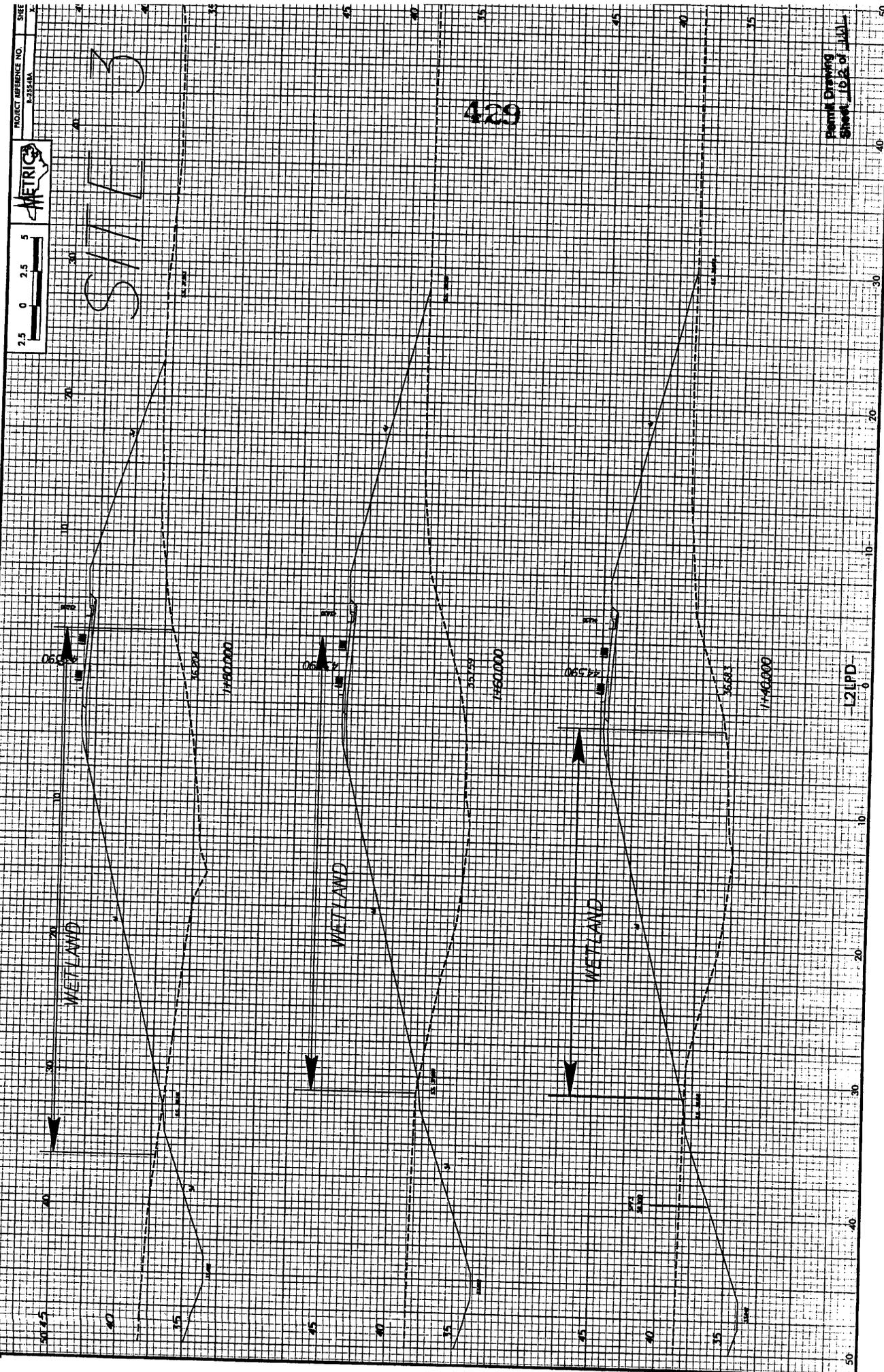
PROJECT REFERENCE NO. 5
DATE 1-15-14



SITE 3

429

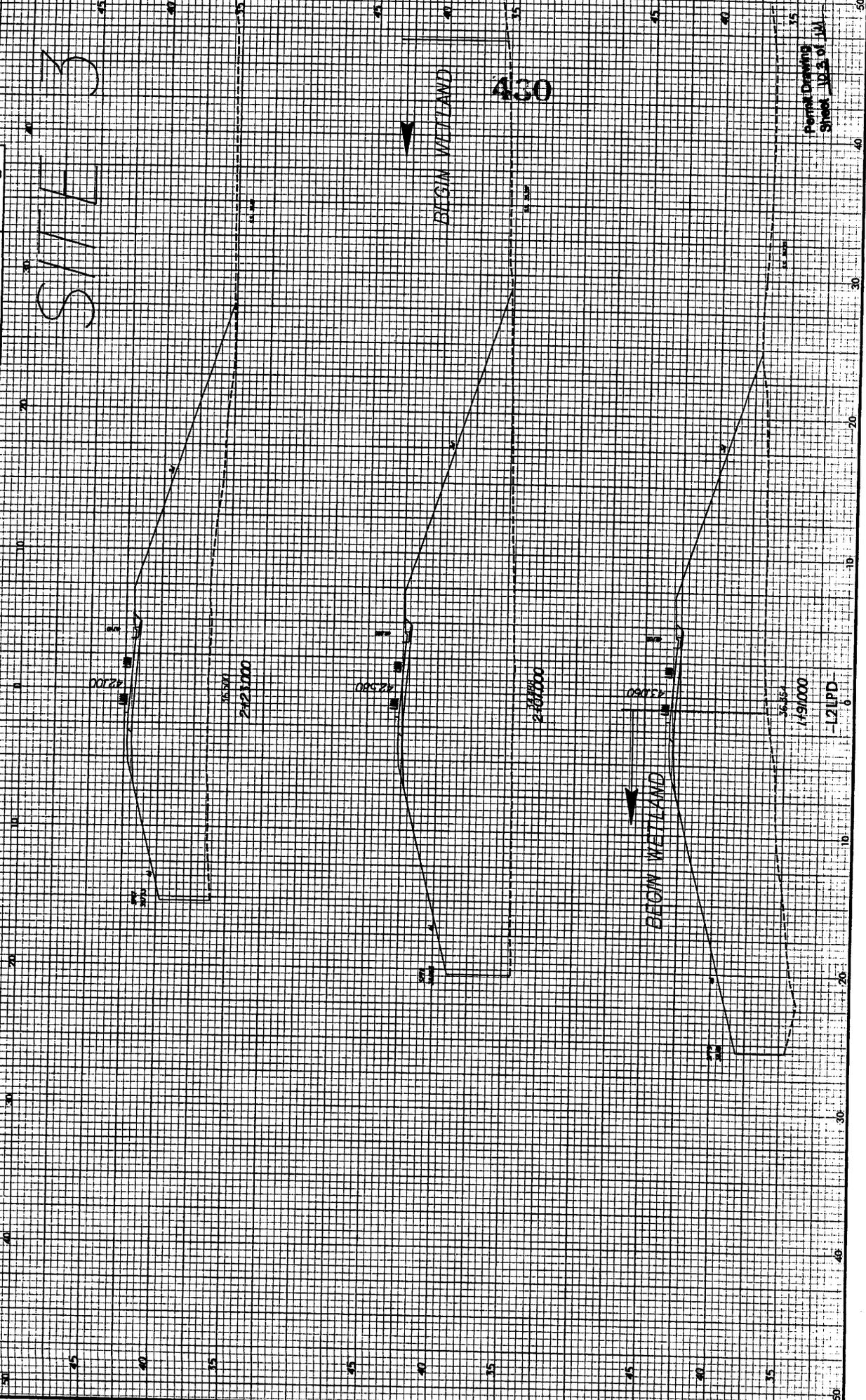
Final Drawing
Sheet 102 of 110



L2LFD

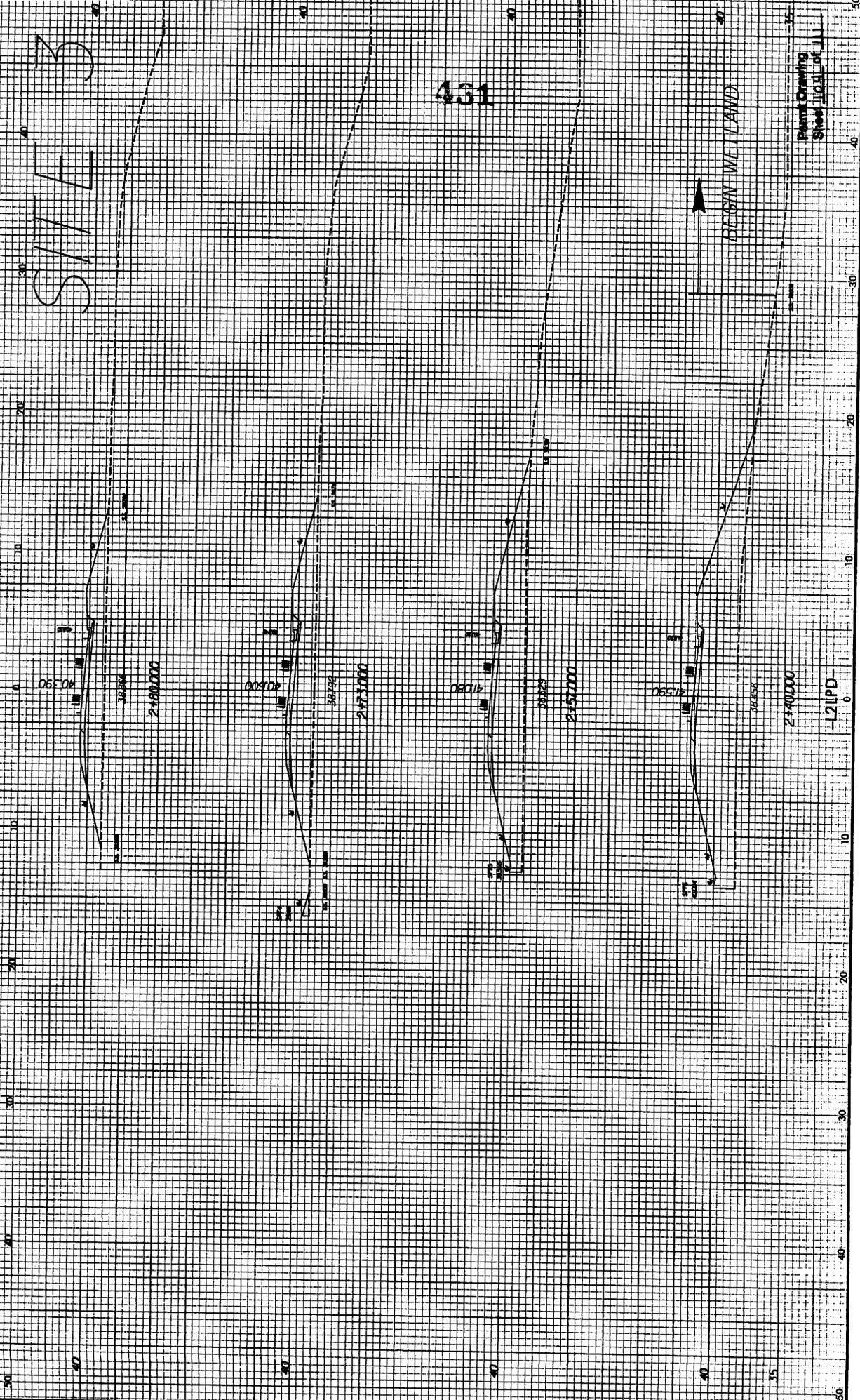


SITE 3





SITE 3

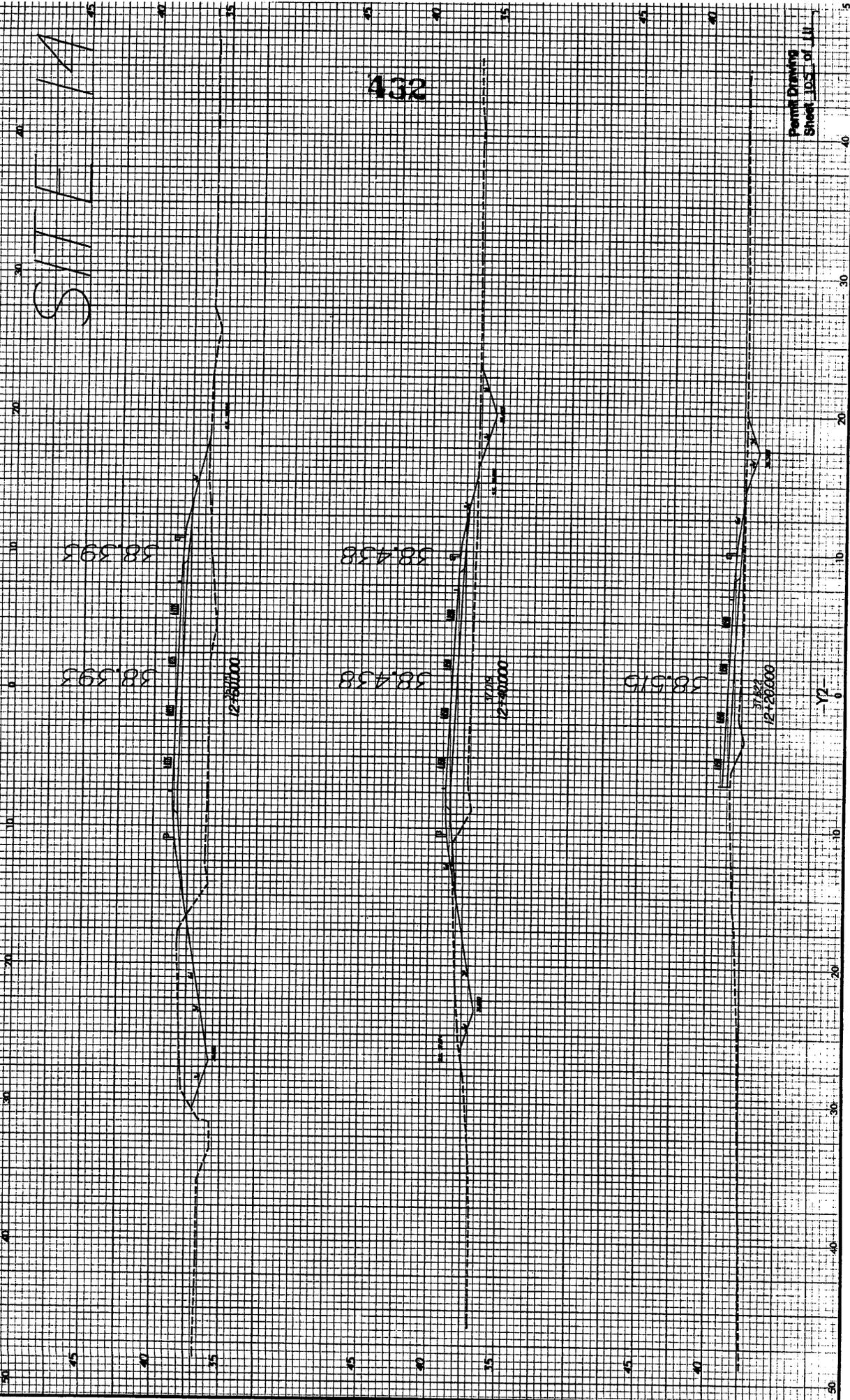


-L21PD-



SITE 1A

132





SITE 5

434



Y2RPD

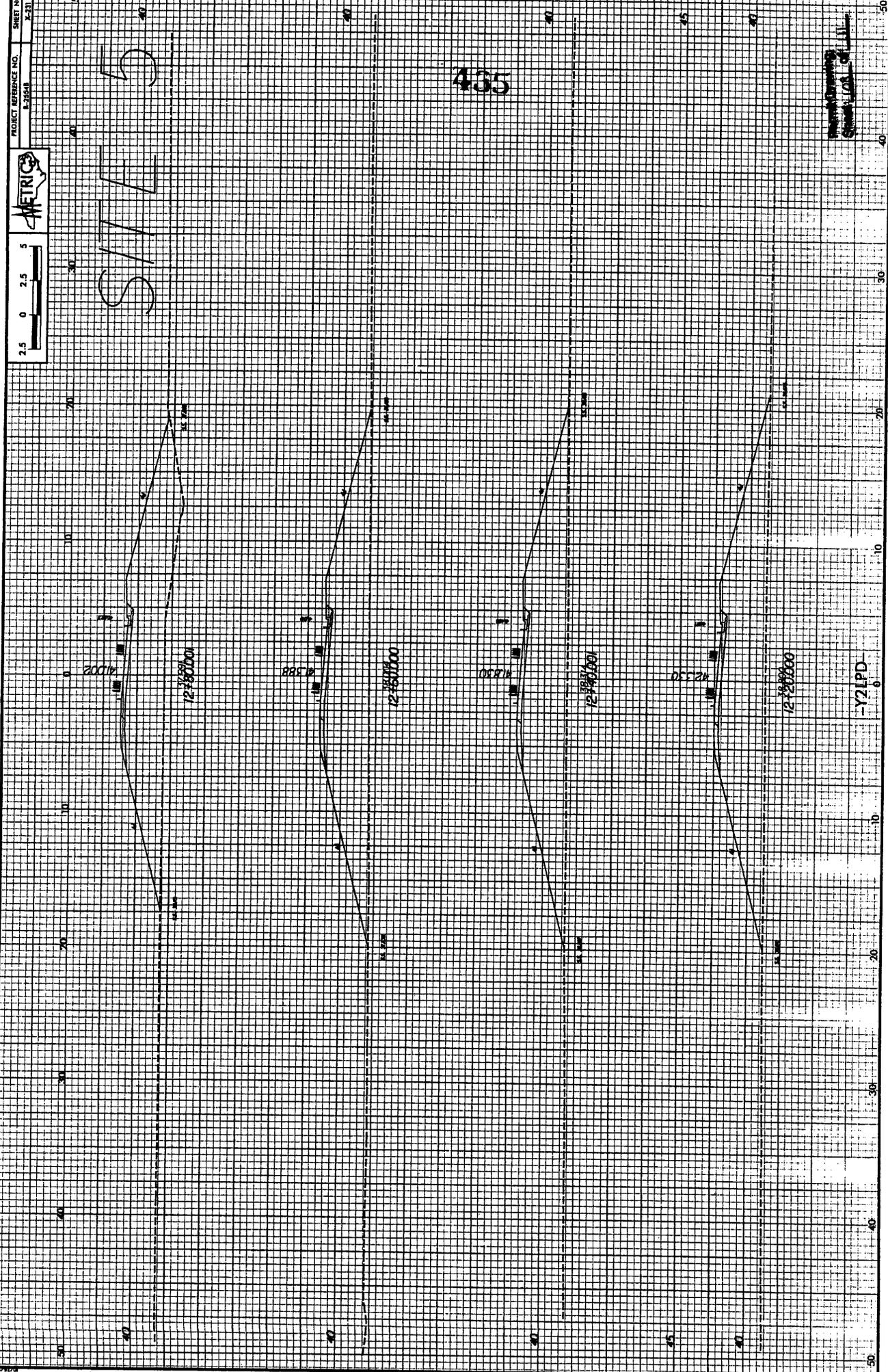
PROJECT REFERENCE NO. 2-2354
SHEET NO. 1-272

PROJECT REFERENCE NO. E-254B
SHEET NO. 2-31



SITE 5

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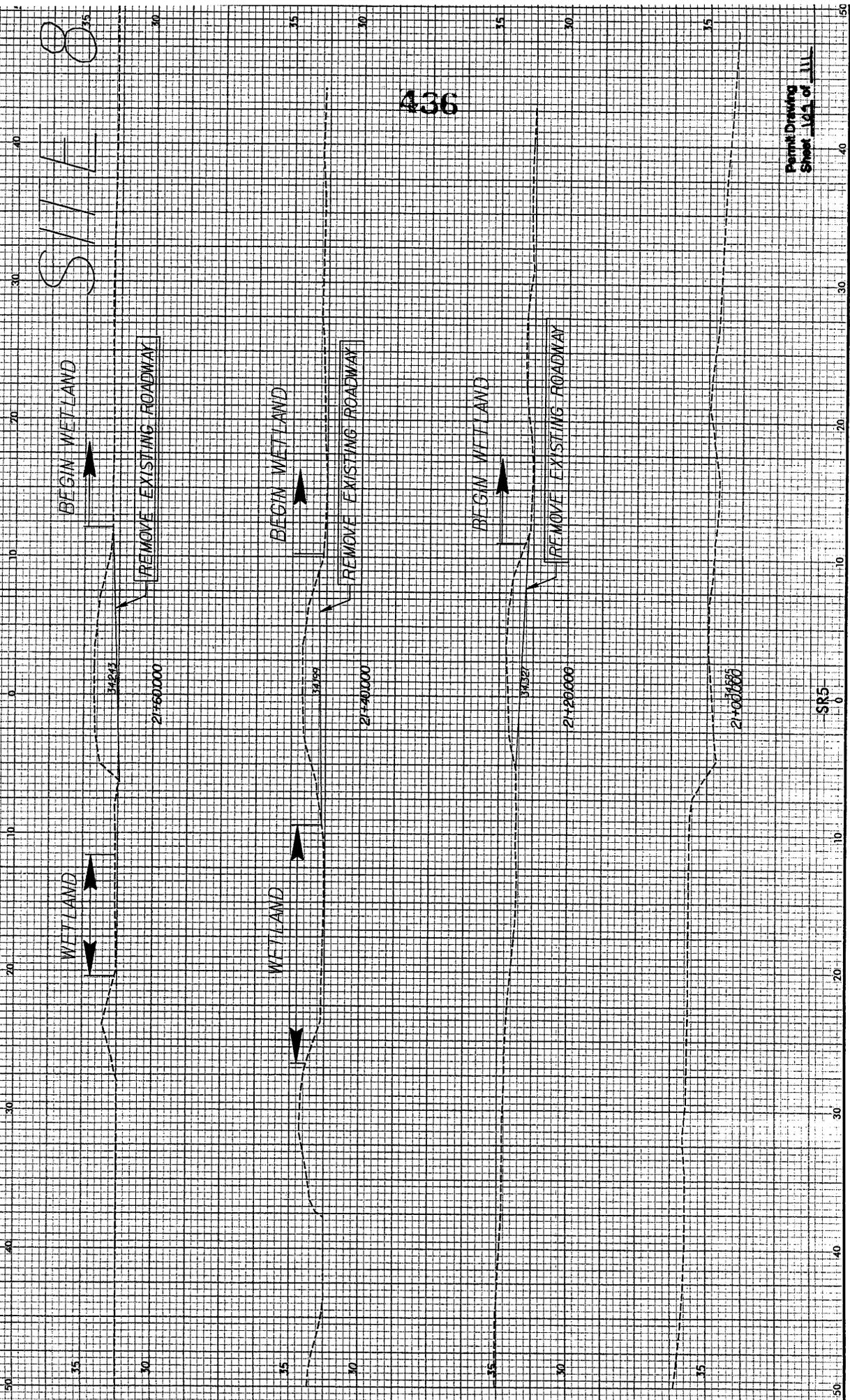


Scale 1:1000

-Y2LPD

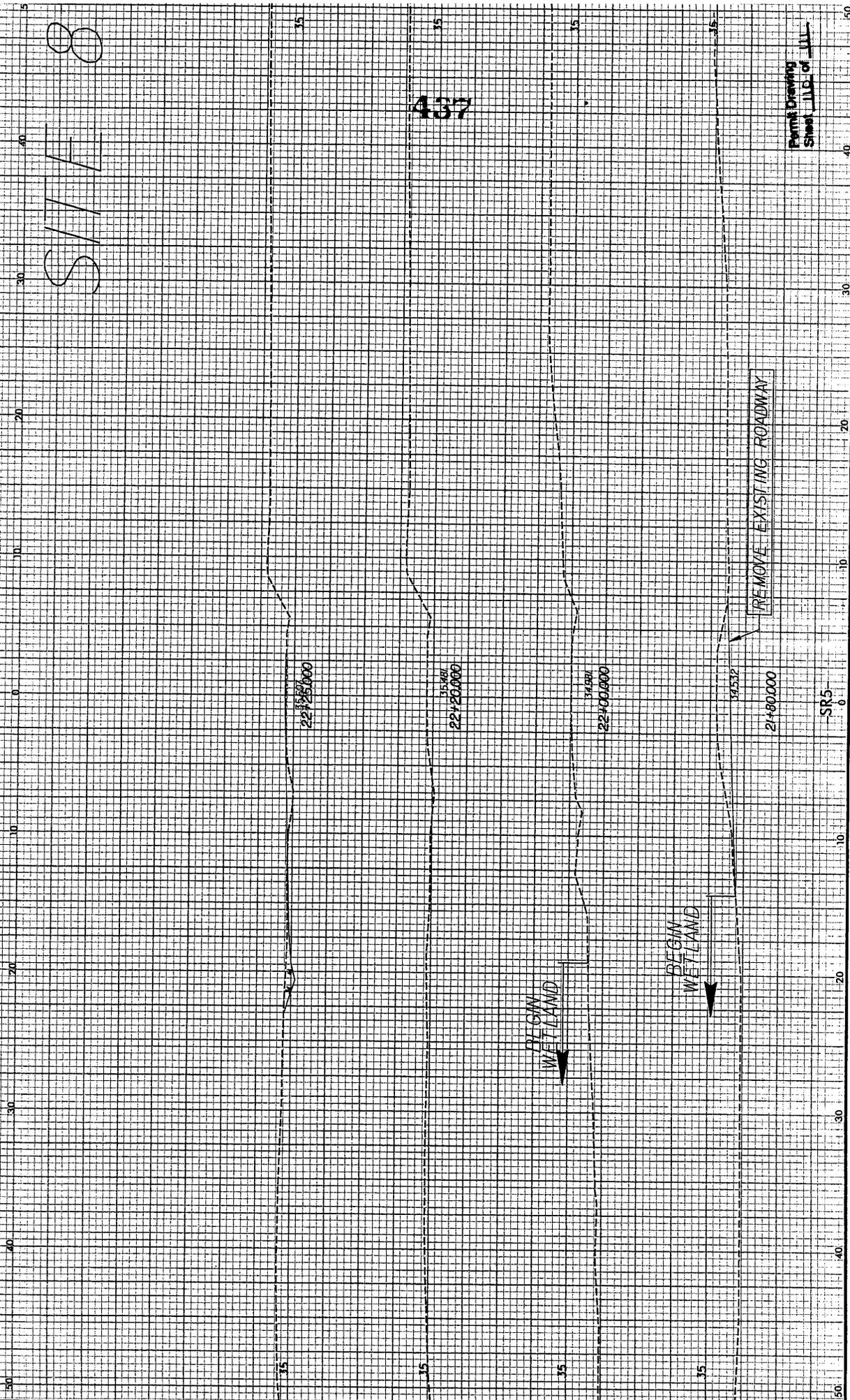


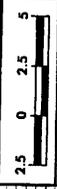
SITE 8





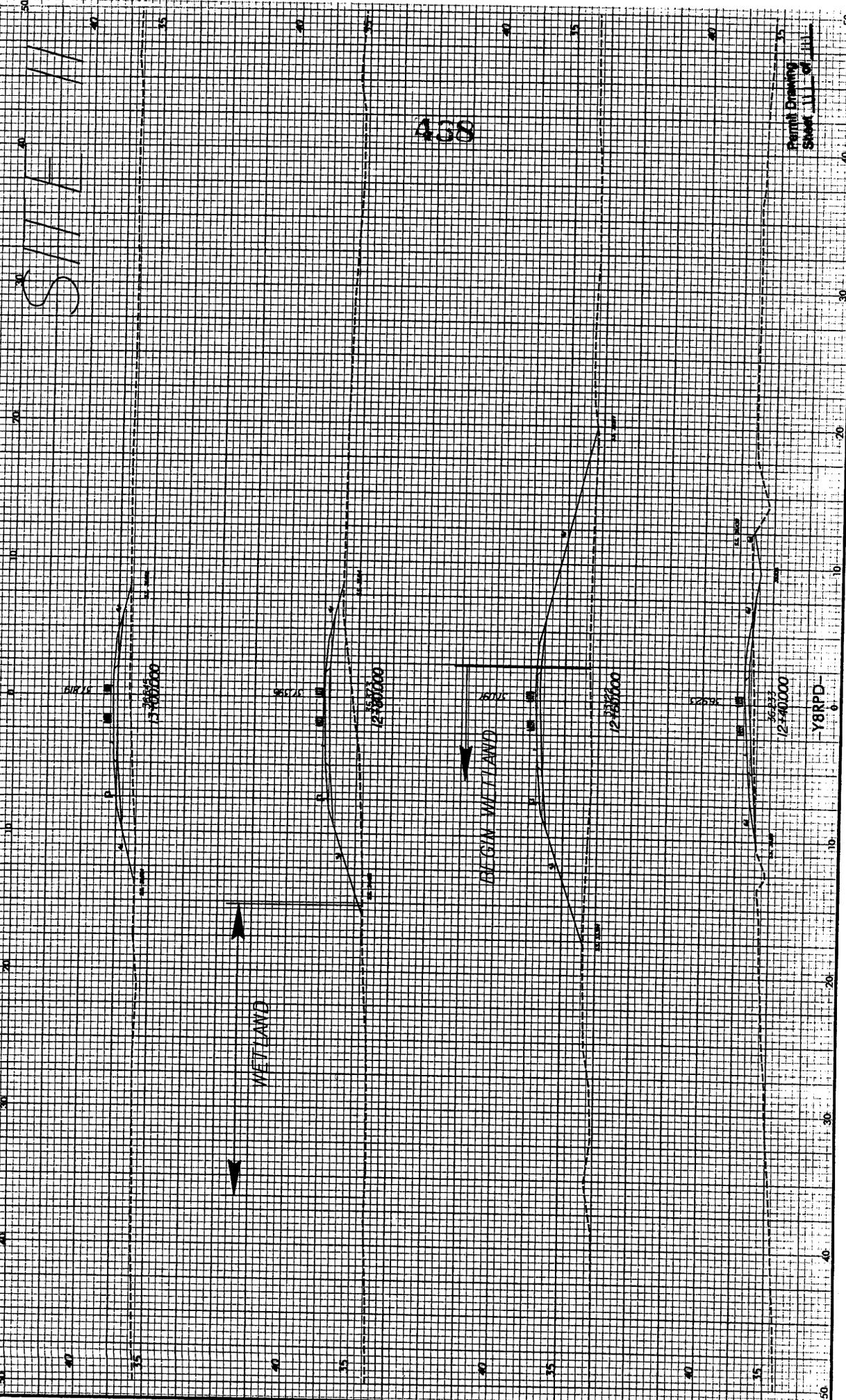
SITE 8





S/11A //

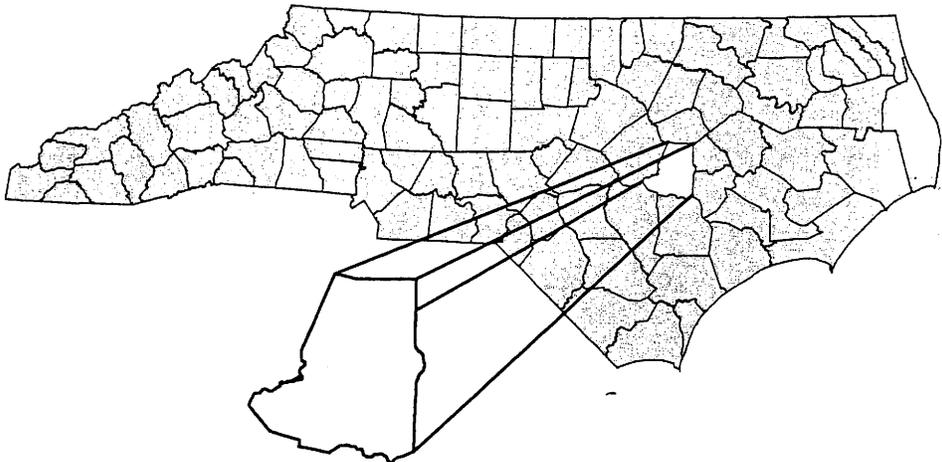
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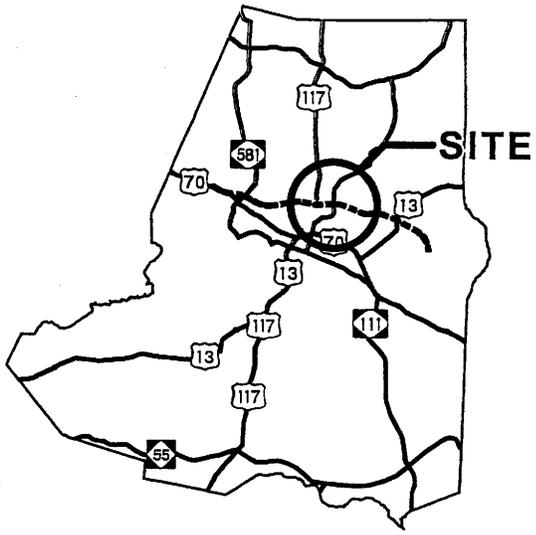
Permit Drawing
Sheet 11 of 11

Y8RPD

NORTH CAROLINA



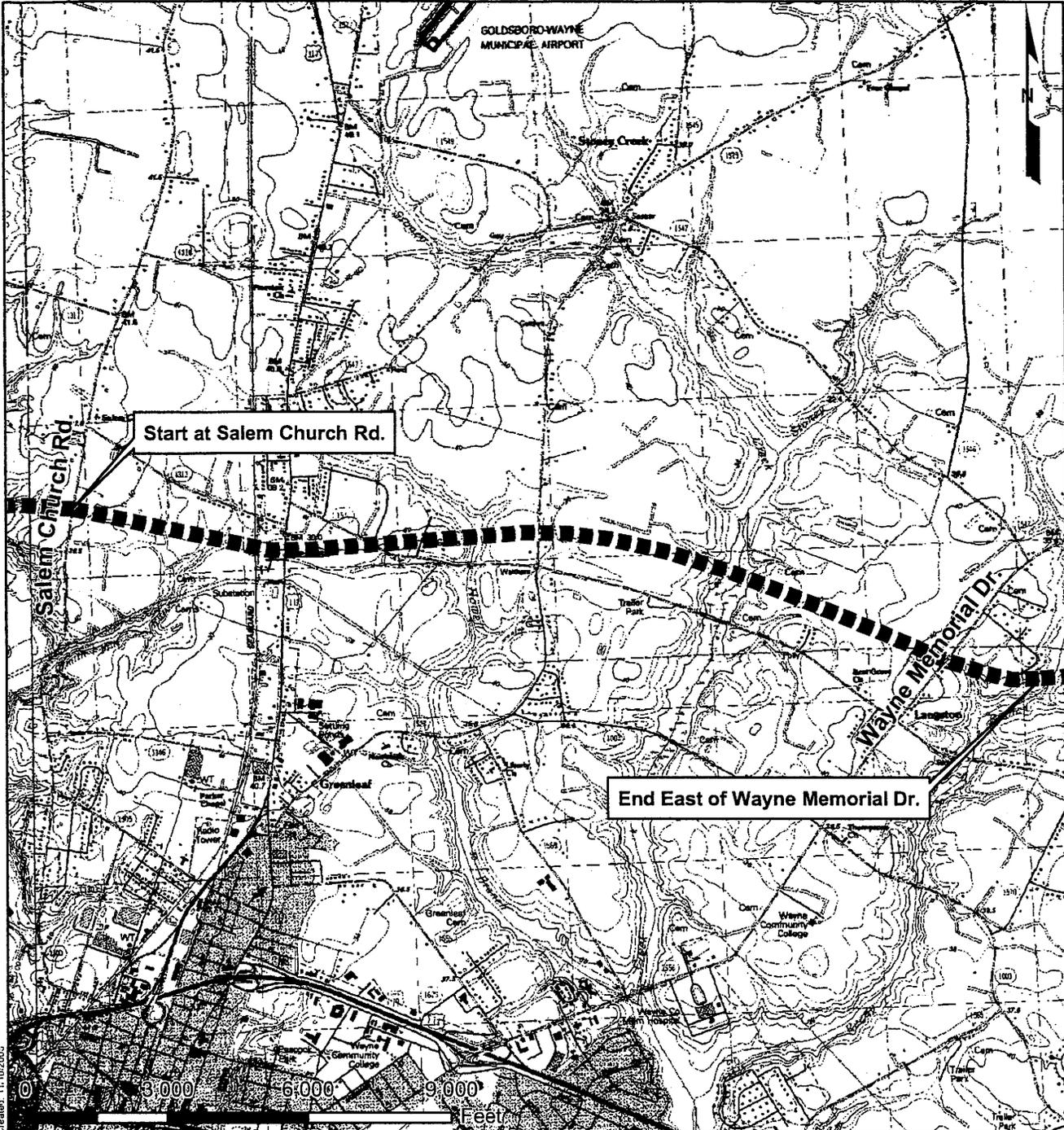
WAYNE



Buffer Drawing
Sheet 1 of 44

VICINITY MAPS

NCDOT
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT: 34461.1.3 (R-2554BA)
US 70 BYPASS



1 inch equals 3,000 feet

LOCATION

NCDOT

DIVISION OF HIGHWAYS
 WAYNE COUNTY
 PROJECT: 34461.1.3 (R-2554BA)
 US 70 BYPASS

Buffer Drawing
 Sheet 2 of 114

10/17/07

BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT						BUFFER REPLACEMENT				
			TYPE		ALLOWABLE		MITIGABLE		ZONE 1 (ft²)	ZONE 2 (ft²)			
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (ft²)	ZONE 2 (ft²)	TOTAL (ft²)			ZONE 1 (ft²)	ZONE 2 (ft²)	
1	Roadway	L-2RPBD- 4+25 +/-	X					9909	5820	15729			
2	Roadway	L-2- 92+00 +/-	X			2671	1639	4310					
3	Roadway	L- 94+40 +/-	X					60642	37274	97916			
4	Roadway	L- 98+60 +/-	X					68271	42177	110448	59609	35530	
5	Roadway	L- 102+64 - 109+19 +/-	X					131027	89077	220104	34199	21760	
7	Roadway	L- 114+20 +/-	X			598	401	1000					
	Bridge	L- 114+80 +/-		X				8798	6748	15546			
8	Roadway	-SR5- 21+60 +/-	X			1929	555	2484			4459	3333	
9	Bridge	L- 132+00 +/-		X		8763	5887	14650					
11	Roadway	L- 148+60 +/-	X					51025	32871	83896			
13	Roadway	L-2- 101+40 +/-			X			5490	4512	10002			
14	Roadway	-Y2- 12+60 +/-	X			7383	4875	12258					
TOTAL:						21344	13358	34701	335162	218479	553642	98268	60622

Buffer Drawing
Sheet 2 of 44

N.C. DEPT. OF TRANSPORTATION
 DIVISION OF HIGHWAYS

WAYNE COUNTY
 PROJECT: 34461.1.3 (R-2554BA)

December-07

BUFFER IMPACTS SUMMARY

SITE NO.	STRUCTURE SIZE / TYPE	STATION (FROM/TO)	IMPACT										BUFFER REPLACEMENT		
			TYPE			ALLOWABLE		MITIGABLE			REPLACEMENT				
			ROAD CROSSING	BRIDGE	PARALLEL IMPACT	ZONE 1 (m ²)	ZONE 2 (m ²)	TOTAL (m ²)	ZONE 1 (m ²)	ZONE 2 (m ²)	TOTAL (m ²)	ZONE 1 (m ²)	ZONE 2 (m ²)		
1	Roadway	-L2RPBD-4+25 +/-	X						920.6	540.7	1461.3				
2	Roadway	-L2- 92+00 +/-	X				248.1	152.3	400.4						
3	Roadway	-L- 94+40 +/-	X						5633.8	3462.9	9096.7				
4	Roadway	-L- 98+60 +/-	X						6342.6	3918.4	10261.0			5537.9	3300.8
5	Roadway	-L- 102+64 - 109+19 +/-	X						12172.8	8275.5	20448.3			3177.2	2021.6
7	Roadway	-L- 114+20 +/-	X				55.6	37.3	92.9						
	Bridge	-L- 114+80 +/-		X					817.4	626.9	1444.3			414.3	309.6
8	Roadway	-SR5- 21+60 +/-	X				179.2	51.6	230.8						
9	Bridge	-L- 132+00 +/-		X			814.1	546.9	1361.0						
11	Roadway	-L- 148+60 +/-	X						4740.4	3053.8	7794.2				
13	Roadway	-L2- 101+40 +/-			X				510.0	419.2	929.2				
14	Roadway	-Y2- 12+60 +/-	X				686.9	452.9	1138.8						
TOTAL:							1982.9	1241.0	3223.9	31137.6	20297.4	51435.0	9129.4	5632.0	

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

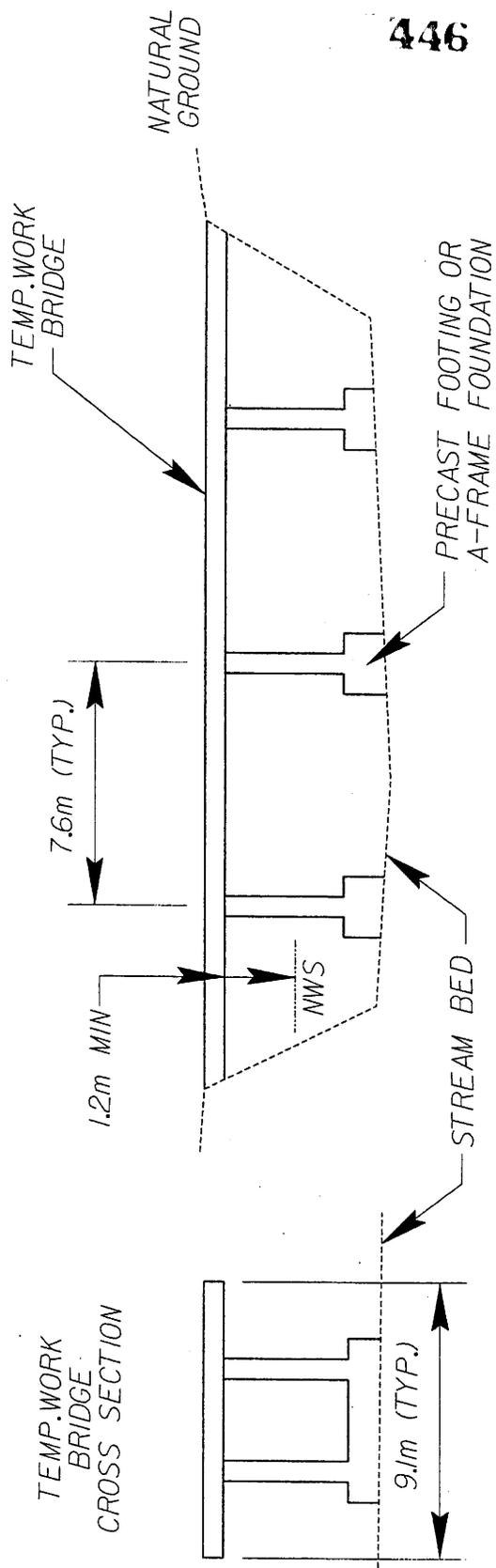
WAYNE COUNTY
PROJECT: 34461.1.3 (R-2554BA)

December-07

Buffer Drawing
Sheet 44 of 44

PROP. NO.	PROPERTY OWNER NAME	PROP. OWNER ADDRESS
1A 1	NCDOT (PREVIOUSLY LANE FARMS, INC.) DAN R. CASEY	DB 350 PG. 13 DB 335 PG 397 DB 350 PG. 54 DB 1541 PG 198 DB 02E PG 506 DB 1486 PG 432 DB 439 PG 320 DB 1037 PG 181 DB 1193 PG 737 UNKNOWN E 03E PG 667 DB 1171 PG 405
2 7 9 14 16	NORFAM, LLC SARAH SCOTT KIRBY & SALLY WADE SCOTT EMILY W. PRIVOTT HELEN R. GODWIN ANDREWS FARMS OF WAYNE CO. INC	WB 1930 PG 169 DB 1621 PG 708 DB 582 PG 536 DB 1534 PG 253 DB 648 PG 416 DB 937 PG 807 DB 1044 PG 849 DB 728 PG 105 DB 1472 PG 411
17 20 26 26A 27	WILLIAM WHITE JOHN M. MERRITT JAMES W. HUBBLE CAROLYN B. MORRIS, W. THOMAS BARDIN PATRICIA GABRIEL	ESTATE FILE 02E-245
28 31 32 43	CAREY R. HAM HUBERT C. MATHEWS SHERMAN E. BEST MALCOLM E. GURLEY	
43A 901	JETHO H. HARE NCDOT	

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT: 34461.1.3 (R-2554BA)
10/17/2007



446

Buffer Drawing
Sheet 8 of 44

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT 34461.13 (R-2554BA)

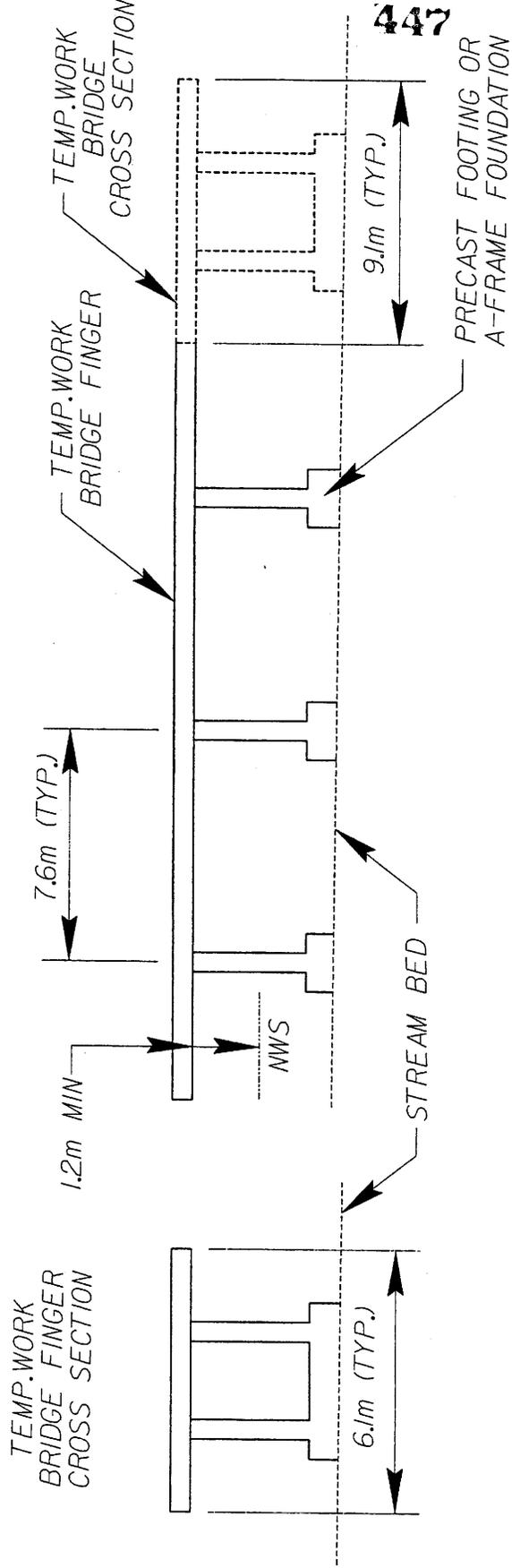
10/17/07

WORK BRIDGE LAYOUT IS ESTIMATED.
ACTUAL LAYOUT MAY VARY
ACCORDING TO CONTRACTOR.

NOT TO SCALE

TEMPORARY WORK BRIDGE
DETAIL

(FOR PROP. BRIDGE CONSTRUCTION)



WORK BRIDGE FINGER LAYOUT
IS ESTIMATED. ACTUAL LAYOUT
MAY VARY ACCORDING TO
CONTRACTOR.

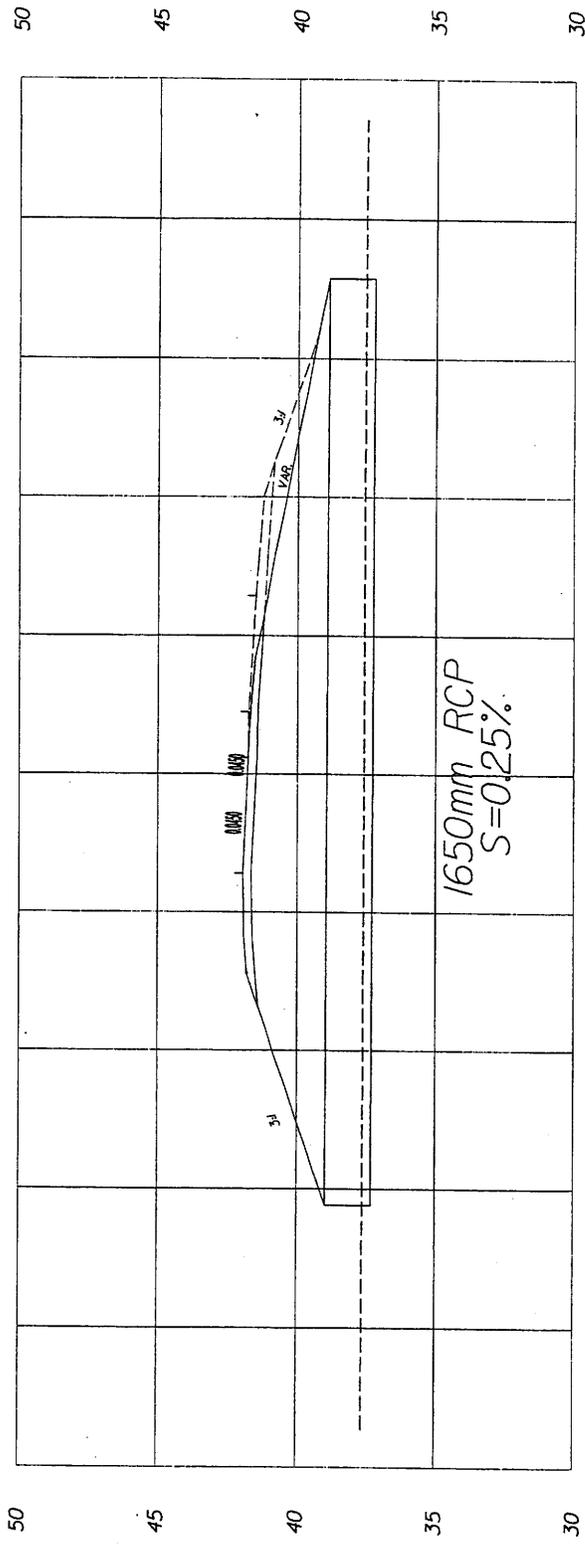
NOT TO SCALE

**TEMPORARY WORK BRIDGE
FINGER DETAIL
(FOR PROP. BRIDGE CONSTRUCTION)**

Buffer Drawing
Sheet 9 of 94

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT 3446L1.3 (R-2554BA)

10/17/07



Buffer Drawing
Sheet 10 of 41

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT 34461.1.3 (R-2554BA)

US 70 BYPASS 10/17/07

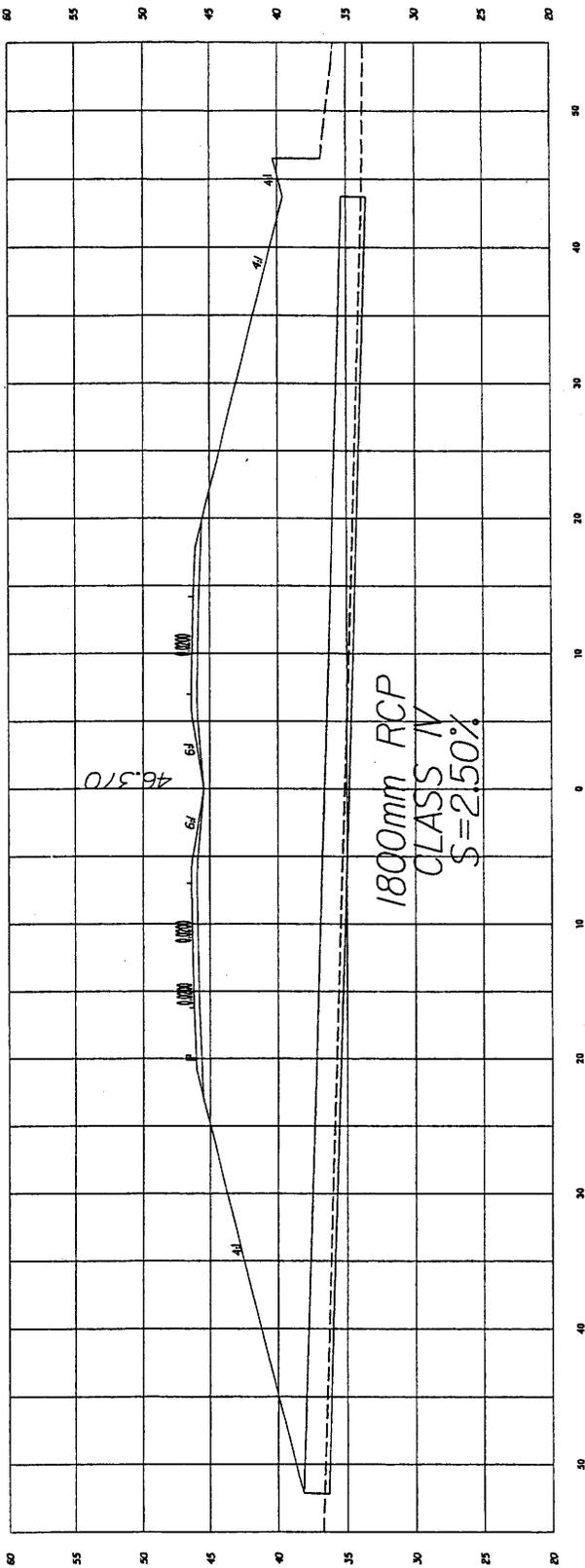
SITE 1
-L2RPPBD- STA. 4 + 24



HORIZONTAL



VERTICAL



Buffer Drawing
Sheet 11 of 44

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

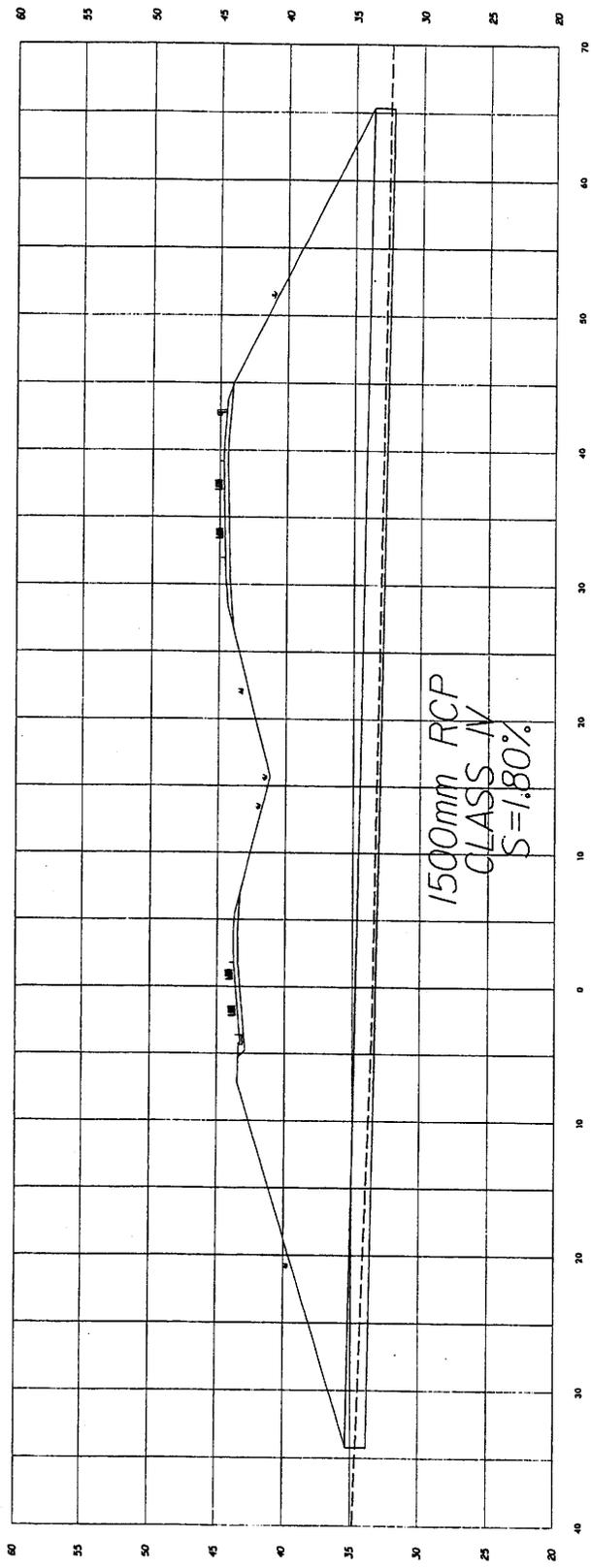
PROJECT 34461.1.3 (R-2554BA)

US 70 BYPASS

10/17/07

SITE 3
-L- STA. 94+73



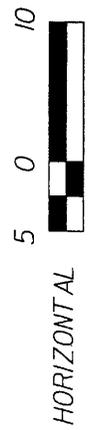


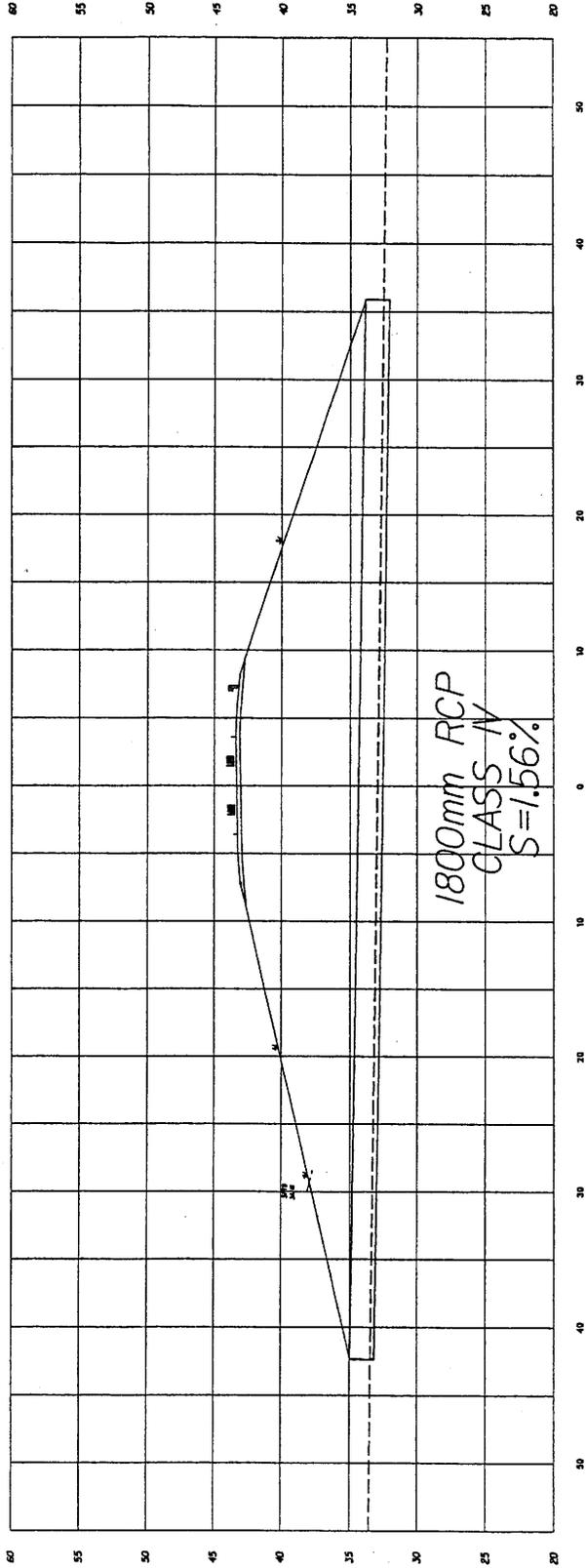
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Buffer Drawing
Sheet 12 of 44

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY
PROJECT 34461.1.3 (R-2554BA)
US 70 BYPASS 10/17/07

SITE 3
-L2LPD- STA. 2+20





Buffer Drawing
Sheet 3 of 44

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

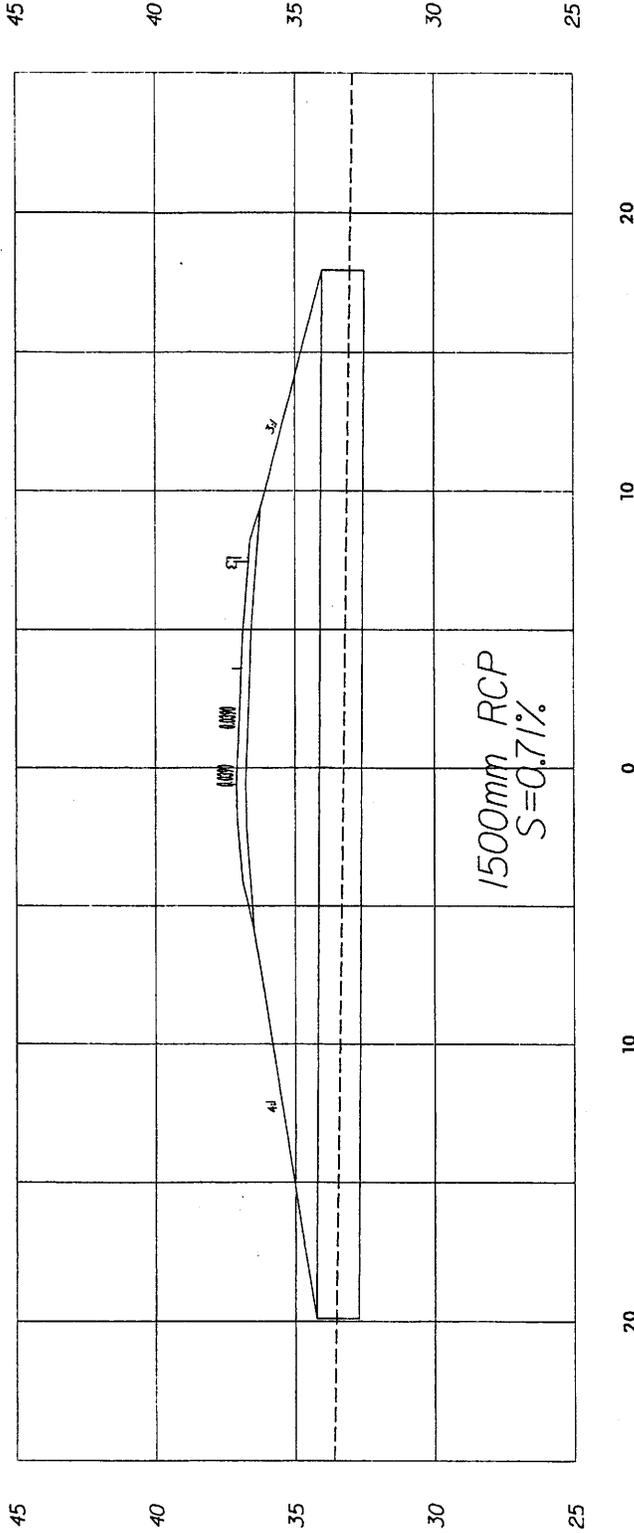
PROJECT 34461.13 (R-2554BA)

US 70 BYPASS 10/17/07

SITE 3
-L2RPBD- STA. 14 + 23



452



Buffer Drawing
Sheet 14 of 44

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

PROJECT 34461L3 (R-3554BA)

US 70 BYPASS 10/17/07

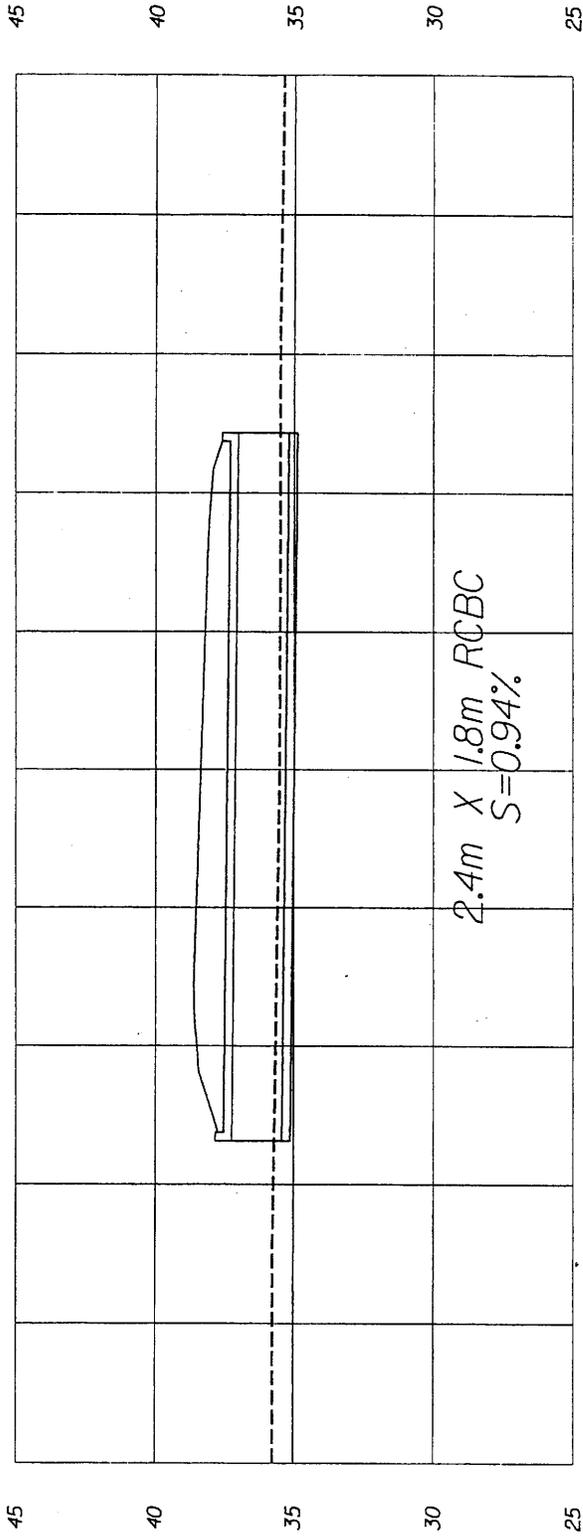
SITE 11
-Y8RPD- STA. 12+51



HORIZONTAL



VERTICAL



Buffer Drawing
Sheet 15 of 16

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
WAYNE COUNTY

PROJECT 34461.1.3 (R-255/BA)

US 70 BYPASS

10/17/07

SITE 14
-Y2- STA. 12+60

2.5 0 5



HORIZONTAL

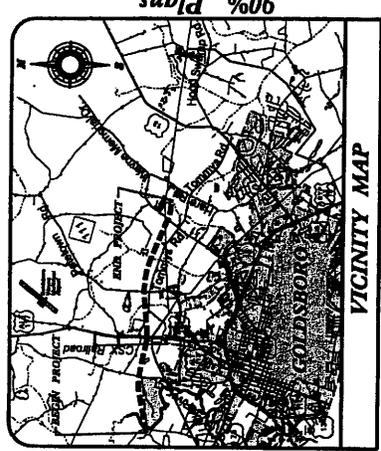
2.5 0 5



VERTICAL

CONTRACT: C201818 T.I.P. PROJ: R-2554BA

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



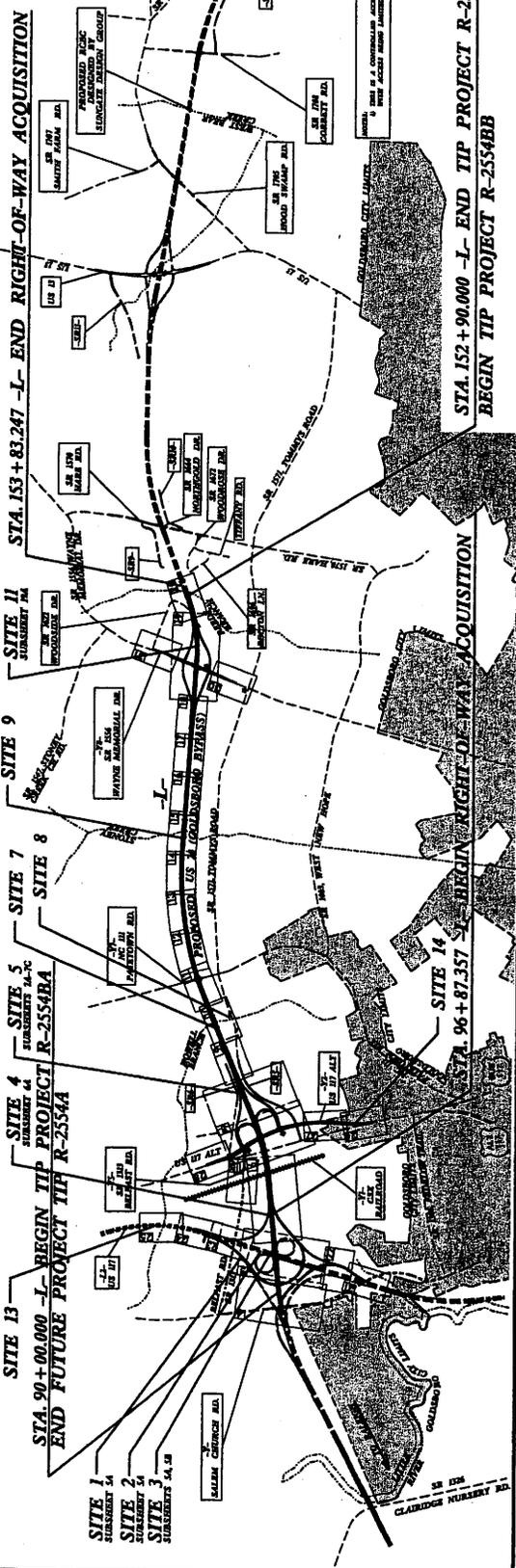
STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS WAYNE COUNTY

**LOCATION: US 70 (GOLDSBORO BYPASS)
FROM EAST OF SR 1300 (SALEM CHURCH ROAD)
TO EAST OF SR 1556 (WAYNE MEMORIAL DRIVE)**

**TYPE OF WORK: GRADING, PAVING, DRAINAGE,
STRUCTURES, CULVERTS, SIGNING, AND SIGNALS**

PROJECT NUMBER	R-2554BA
DATE	1
DESIGNER	FE
DATE	3/4/03
BY	BY & UTIL
DATE	3/4/03
CONTRACT	CONST.

ALL DIMENSIONS IN THESE PLANS ARE IN METERS UNLESS OTHERWISE SHOWN



DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
DIVISION OF HIGHWAYS	PLANS PREPARED BY: NAME: LALANER & ASS. LP 350 HAZELWOOD DRIVE, SUITE 350 RALEIGH, NC 27603 FOR: DIVISION OF HIGHWAYS
RIGHT OF WAY DATE:	MAY 18, 2005
LETTING DATE:	APRIL 15, 2008
PROJECT DESIGNER:	B. KEITH SKINNER, P.E. PROJECT ENGINEER
PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
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PROJECT DESIGNER:	B. KEITH SKINNER, P.E. PROJECT ENGINEER
PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

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PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
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PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
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DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

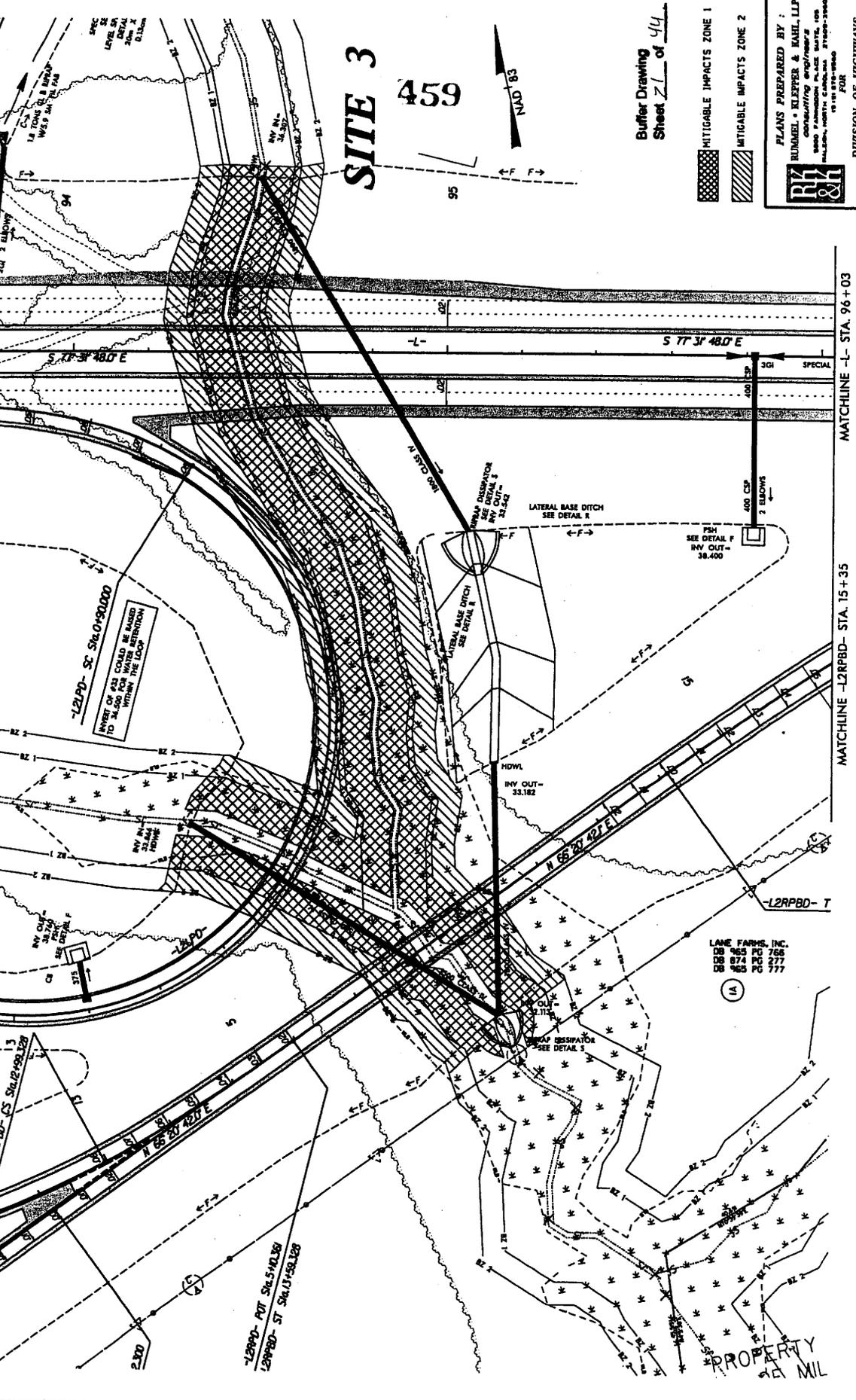
DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
DIVISION OF HIGHWAYS	PLANS PREPARED BY: NAME: LALANER & ASS. LP 350 HAZELWOOD DRIVE, SUITE 350 RALEIGH, NC 27603 FOR: DIVISION OF HIGHWAYS
RIGHT OF WAY DATE:	MAY 18, 2005
LETTING DATE:	APRIL 15, 2008
PROJECT DESIGNER:	B. KEITH SKINNER, P.E. PROJECT ENGINEER
PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
DIVISION OF HIGHWAYS	PLANS PREPARED BY: NAME: LALANER & ASS. LP 350 HAZELWOOD DRIVE, SUITE 350 RALEIGH, NC 27603 FOR: DIVISION OF HIGHWAYS
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LETTING DATE:	APRIL 15, 2008
PROJECT DESIGNER:	B. KEITH SKINNER, P.E. PROJECT ENGINEER
PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
DIVISION OF HIGHWAYS	PLANS PREPARED BY: NAME: LALANER & ASS. LP 350 HAZELWOOD DRIVE, SUITE 350 RALEIGH, NC 27603 FOR: DIVISION OF HIGHWAYS
RIGHT OF WAY DATE:	MAY 18, 2005
LETTING DATE:	APRIL 15, 2008
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PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

DESIGN DATA	ADT 2008 = 20,728 ADT 2028 = 29,048
DIVISION OF HIGHWAYS	PLANS PREPARED BY: NAME: LALANER & ASS. LP 350 HAZELWOOD DRIVE, SUITE 350 RALEIGH, NC 27603 FOR: DIVISION OF HIGHWAYS
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LETTING DATE:	APRIL 15, 2008
PROJECT DESIGNER:	B. KEITH SKINNER, P.E. PROJECT ENGINEER
PROJECT DESIGN ENGINEER:	MICHAEL T. MERRITT, P.E. PROJECT DESIGN ENGINEER
SCHEMATIC:	ROADWAY DESIGN
APPROVED:	HYDRAULICS ENGINEER
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2
APPROVED:	ROADWAY DESIGN
DATE:	2/2

CONTRACT NO. 100-1000-0000
 PROJECT NO. 100-1000-0000
 SHEET NO. 459
 DATE: 10/15/03
 DRAWN BY: [Signature]
 CHECKED BY: [Signature]
 APPROVED BY: [Signature]



SITE 3
459



Buffer Drawing
Sheet 21 of 44

MITIGABLE IMPACTS ZONE 1
 MITIGABLE IMPACTS ZONE 2

PLANS PREPARED BY:
RUNDEL • KLEPPER & KAHL LLP
 consulting engineers
 1000 PARRISH PLACE, SUITE 100
 WASHINGTON, DC 20004
 TEL: 202-462-2000 FAX: 202-462-2000
 FOR

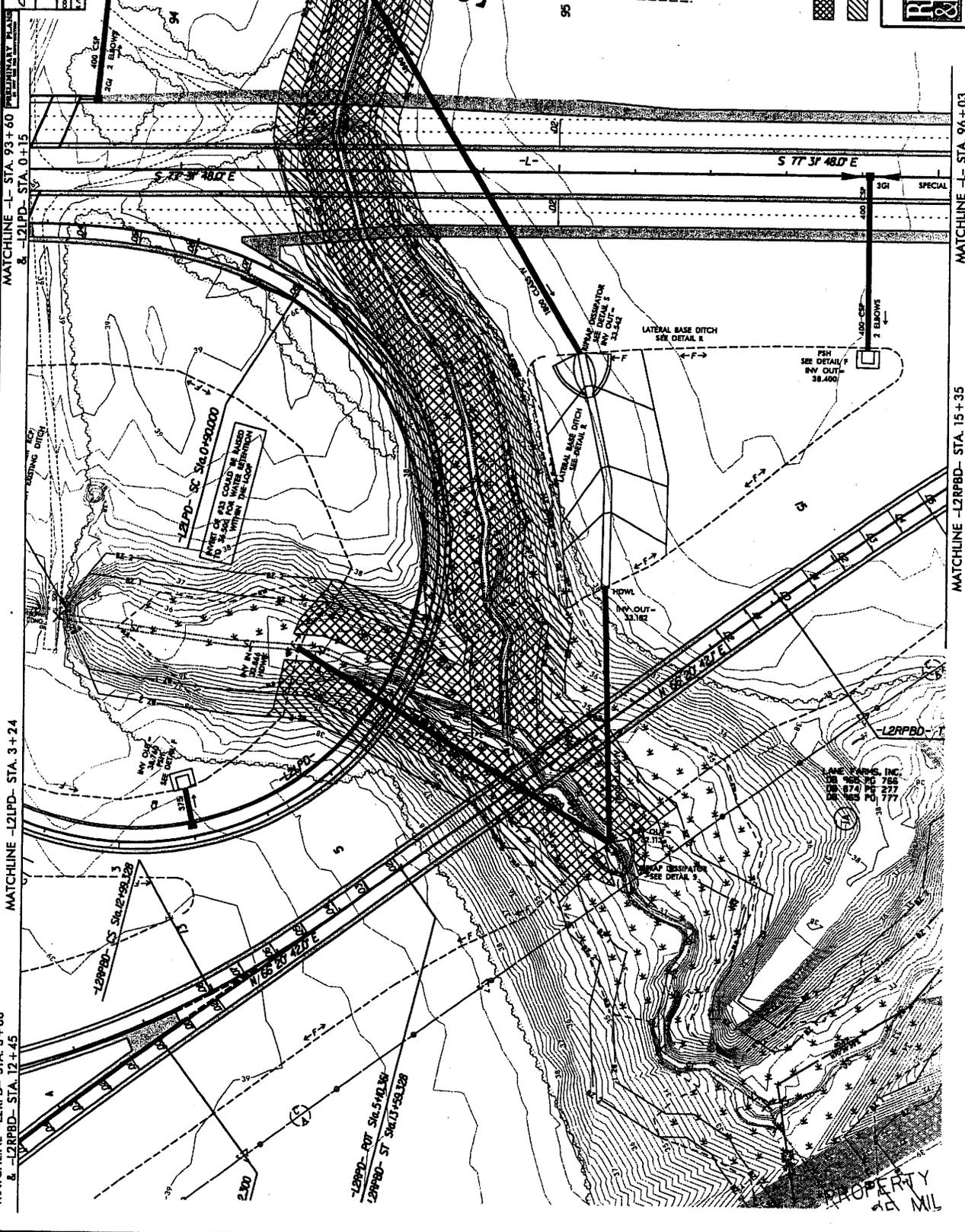
DIVISION OF HIGHWAYS

REVISIONS

NO.	DESCRIPTION

LANE FARMS, INC.
 DB 965 PG 766
 DB 874 PG 277
 DB 965 PG 777

PROPERTY
2.1 MIL



SITE 3
460

Buffer Drawing
 Sheet 22 of 44
 MITIGABLE IMPACTS ZONE 1
 MITIGABLE IMPACTS ZONE 2

PLANS PREPARED BY :

 RUMMEL-KLEPPER & KASH, LLP
 Consulting Engineers
 1000 ...
 DIVISION OF HIGHWAYS

MATCHLINE -L2RPD- STA. 3+86 & -L2RPD- STA. 12+45

MATCHLINE -L- STA. 93+60 & L2RPD- STA. 0+15

MATCHLINE -L- STA. 96+03

MATCHLINE -L2RPD- STA. 15+35

RUMMEL-KLEPPER & KASH, INC.
 1000 ...
 DIVISION OF HIGHWAYS

PROPERTY OF MIL

REVISIONS

MATCHLINE -L- STA. 100+40
 MATCHLINE -L- STA. 96+77
 MATCHLINE -L- STA. 16+18
 MATCHLINE -L- STA. 100+40

REVISIONS
 1. 11/14/2017
 2. 11/14/2017
 3. 11/14/2017
 4. 11/14/2017
 5. 11/14/2017

PROJECT INFORMATION
 PROJECT NO. 15-000000
 SHEET NO. 23 OF 44
 DATE: 11/14/2017
 DRAWN BY: [Name]
 CHECKED BY: [Name]

CLIENT INFORMATION
 NORFAM, LLC
 DB 1541 PG 148
 HELEN R. COOBY
 DB 439 PG 320

DESIGN NOTES
 1. LATERAL BASE DITCH
 DA = 0.250m (4')
 SLOPE = 0.300%
 SWALE BEG = 13.4m
 SWALE END = 13.4m
 PA DOES NOT ENTER BUFFER DIRECTLY

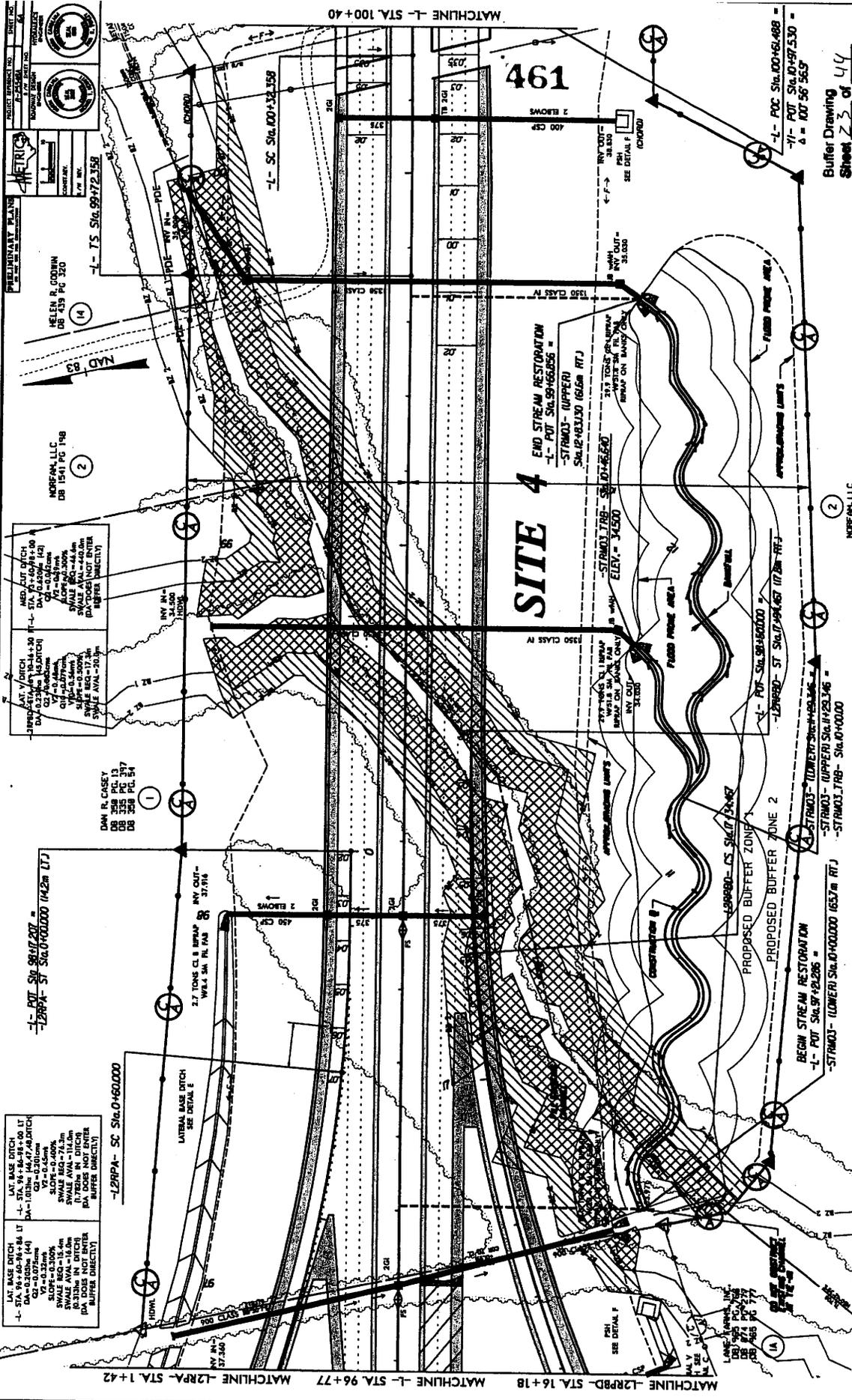
DESIGN NOTES
 2. LATERAL BASE DITCH
 DA = 0.250m (4')
 SLOPE = 0.300%
 SWALE BEG = 13.4m
 SWALE END = 13.4m
 PA DOES NOT ENTER BUFFER DIRECTLY

DESIGN NOTES
 3. LATERAL BASE DITCH
 DA = 0.250m (4')
 SLOPE = 0.300%
 SWALE BEG = 13.4m
 SWALE END = 13.4m
 PA DOES NOT ENTER BUFFER DIRECTLY

DESIGN NOTES
 4. LATERAL BASE DITCH
 DA = 0.250m (4')
 SLOPE = 0.300%
 SWALE BEG = 13.4m
 SWALE END = 13.4m
 PA DOES NOT ENTER BUFFER DIRECTLY

DESIGN NOTES
 5. LATERAL BASE DITCH
 DA = 0.250m (4')
 SLOPE = 0.300%
 SWALE BEG = 13.4m
 SWALE END = 13.4m
 PA DOES NOT ENTER BUFFER DIRECTLY

DESIGN NOTES
 6. LATERAL BASE DITCH
 DA = 0.250m (4')
 SLOPE = 0.300%
 SWALE BEG = 13.4m
 SWALE END = 13.4m
 PA DOES NOT ENTER BUFFER DIRECTLY



PLANS PREPARED BY:
 RUMMEL • KLEPPER & WAHL, LLP
 Consulting Engineers
 1000 N. 10th Street, Suite 200
 Waukegan, IL 60087
 Tel: 847-998-9800
 Fax: 847-998-9800

MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2

Buffer Drawing
 Sheet 23 of 44

NORFAM, LLC
 DB 1541 PG 148

LATERAL BASE DITCH
 SEE DETAIL E

2.7 TONS CLR BRPAP
 WALL SW. RL. FAB
 SEE DETAIL F

2 ELBOWS
 SEE DETAIL G

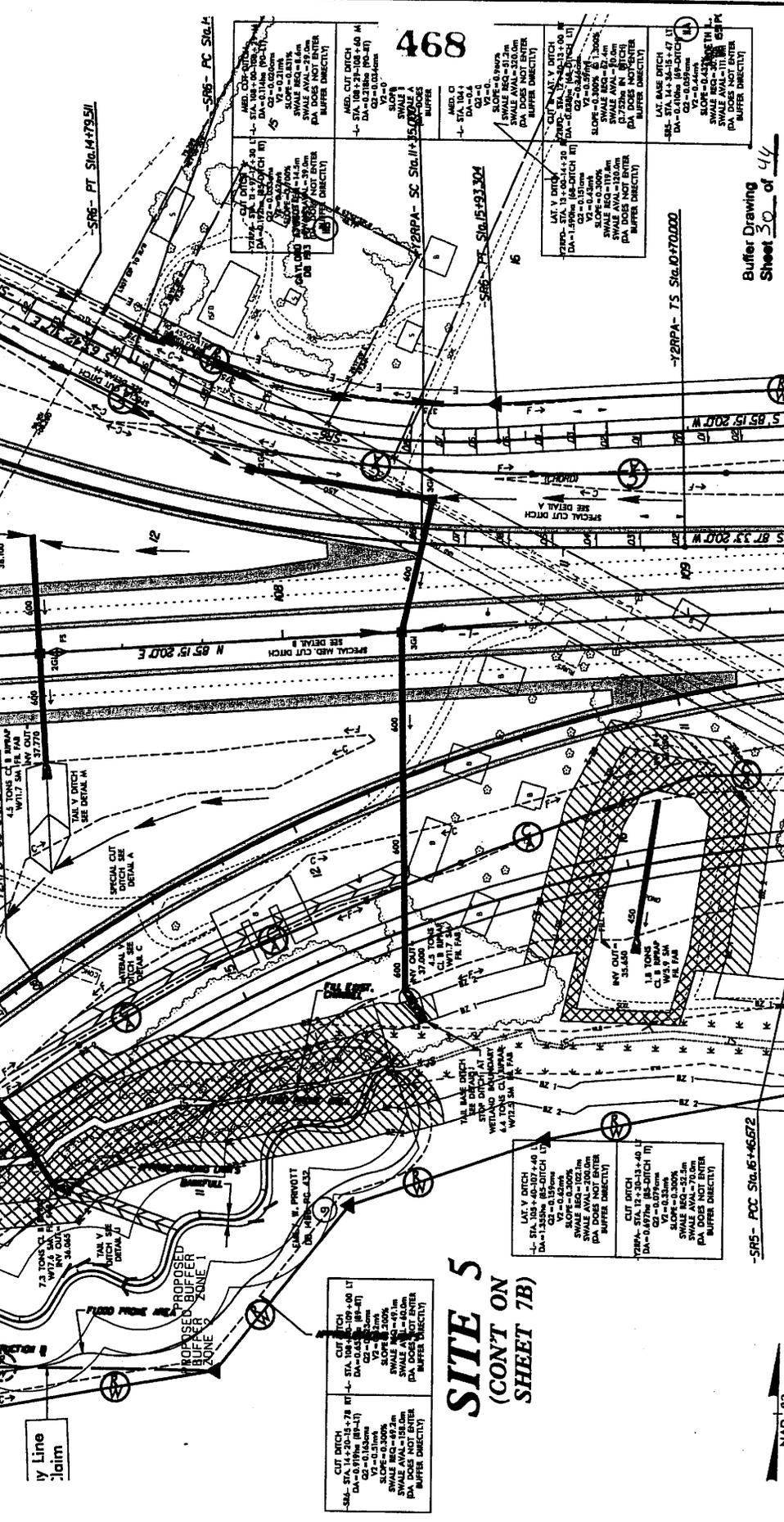
2 ELBOWS
 SEE DETAIL H

2 ELBOWS
 SEE DETAIL I

2 ELBOWS
 SEE DETAIL J

PROJECT NO. 13-1000000
 SHEET NO. 468
 DATE 12/15/10
 DRAWN BY J. W. BRYAN
 CHECKED BY J. W. BRYAN
 APPROVED BY J. W. BRYAN

BEGIN CONSTRUCTION
 -SR6- PC Sta. 14+36.928



468

PLANS PREPARED BY:
 RUMMEL, KLEPPER & KAHL, LLP
 CONSULTING ENGINEERS
 3800 FARMINGTON PLACE, SUITE 100
 WILLOW, NORTH CAROLINA 27580-3900
 919-850-0000
 FOR

DIVISION OF HIGHWAYS

Buffer Drawing
 Sheet 30 of 44

MATCHLINE -L- STA. 107+00 SEE SHEET 7B
 MATCHLINE -Y2LPD- STA. 14+31 &
 -Y2RPD- STA. 15+94 SEE SHEET 7A

MATCHLINE -Y2RPA- STA. 10+26
 & -SR6- STA. 16+82
 MATCHLINE -SR5- STA. 16+58
 MATCHLINE -Y2RPD- 10+53
 & -L- STA. 109+44

SITE 5
 (CONT ON
 SHEET 7B)

CUT DITCH
 STA. 108+40-107+40 LT
 DA=0.1500m
 V1=0.8300m
 V2=0.8300m
 SLOPE=0.3000m
 SWALE REQ=68.2m
 SWALE AVAL=102.0m
 SWALE AVAL=70.0m
 PA DOES NOT ENTER
 BUFFER DIRECTLY

LAT V DITCH
 STA. 108+40-107+40 LT
 DA=0.1500m
 V1=0.8300m
 V2=0.8300m
 SLOPE=0.3000m
 SWALE REQ=102.0m
 SWALE AVAL=200.0m
 SWALE AVAL=70.0m
 PA DOES NOT ENTER
 BUFFER DIRECTLY

-SR5- FCC Sta. 16+46.672

C Sta. 10+65.000

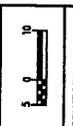
NAD 83



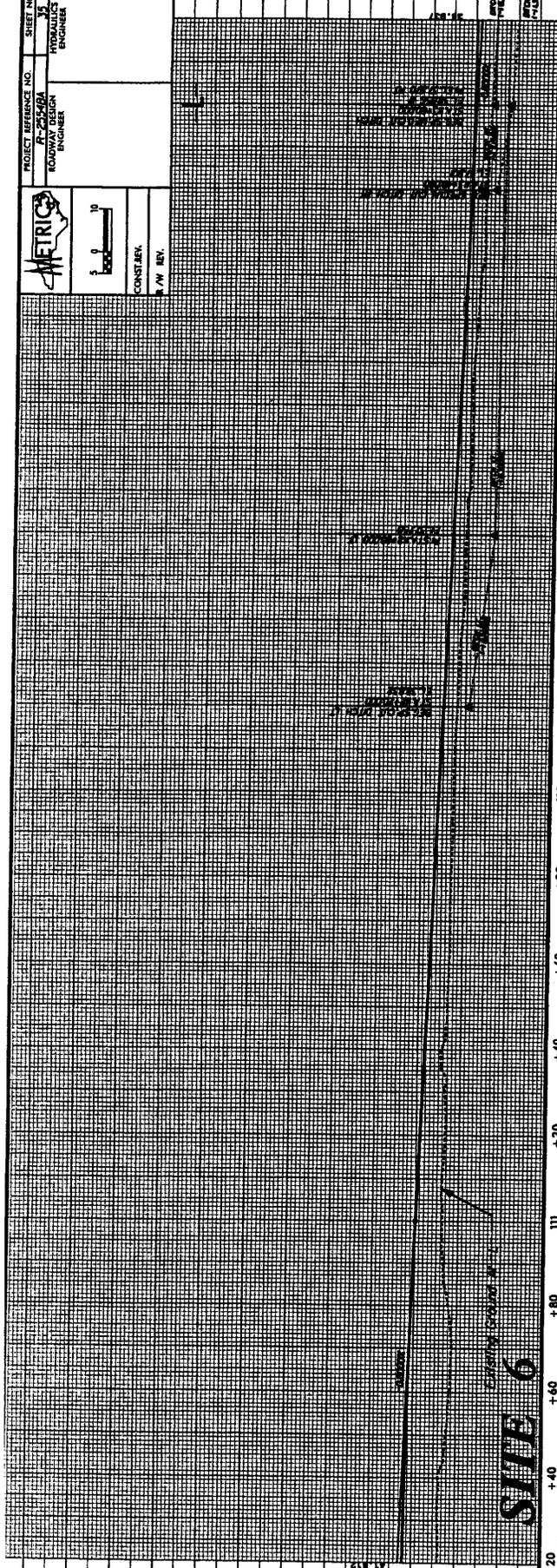
1/13/10
 1/13/10

REVISIONS

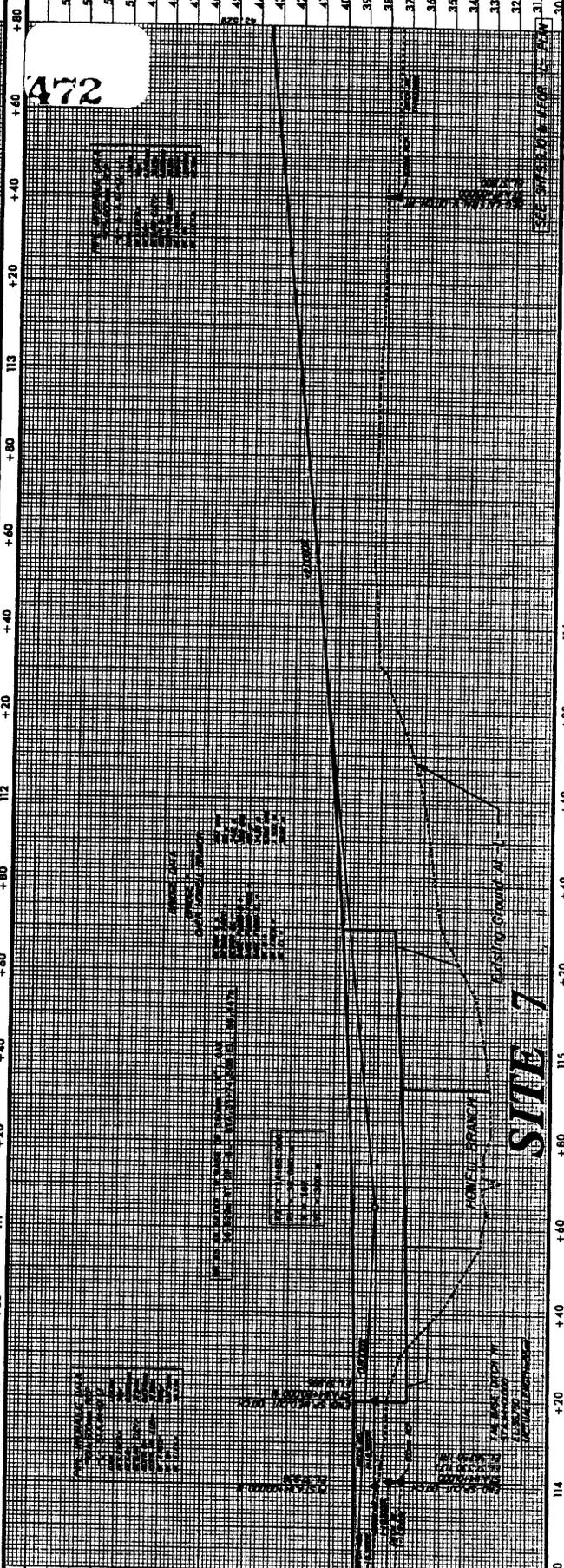
PROJECT REFERENCE NO. SHEET NO.
 RAILROAD DISTRICT ENGINEER
 RAILROAD DISTRICT ENGINEER



CONST. BY:
 P/W REV.



SITE 6



SITE 7

472

53
52
51
50
49
48
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38
37
36
35

114 +20 +40 +60 +80 115 +20 +40 +60 +80 116 +20 +40 +60 +80 117 +20 +40 +60 +80 118 +20 +40 +60 +80 119 +20 +40 +60 +80 120 +20 +40 +60 +80 121 +20 +40 +60 +80 122 +20 +40 +60 +80 123 +20 +40 +60 +80 124 +20 +40 +60 +80 125 +20 +40 +60 +80 126 +20 +40 +60 +80 127 +20 +40 +60 +80 128 +20 +40 +60 +80 129 +20 +40 +60 +80 130 +20 +40 +60 +80 131 +20 +40 +60 +80 132 +20 +40 +60 +80 133 +20 +40 +60 +80 134 +20 +40 +60 +80 135 +20 +40 +60 +80 136 +20 +40 +60 +80 137 +20 +40 +60 +80 138 +20 +40 +60 +80 139 +20 +40 +60 +80 140 +20 +40 +60 +80 141 +20 +40 +60 +80 142 +20 +40 +60 +80 143 +20 +40 +60 +80 144 +20 +40 +60 +80 145 +20 +40 +60 +80 146 +20 +40 +60 +80 147 +20 +40 +60 +80 148 +20 +40 +60 +80 149 +20 +40 +60 +80 150 +20 +40 +60 +80 151 +20 +40 +60 +80 152 +20 +40 +60 +80 153 +20 +40 +60 +80 154 +20 +40 +60 +80 155 +20 +40 +60 +80 156 +20 +40 +60 +80 157 +20 +40 +60 +80 158 +20 +40 +60 +80 159 +20 +40 +60 +80 160 +20 +40 +60 +80 161 +20 +40 +60 +80 162 +20 +40 +60 +80 163 +20 +40 +60 +80 164 +20 +40 +60 +80 165 +20 +40 +60 +80 166 +20 +40 +60 +80 167 +20 +40 +60 +80 168 +20 +40 +60 +80 169 +20 +40 +60 +80 170 +20 +40 +60 +80 171 +20 +40 +60 +80 172 +20 +40 +60 +80 173 +20 +40 +60 +80 174 +20 +40 +60 +80 175 +20 +40 +60 +80 176 +20 +40 +60 +80 177 +20 +40 +60 +80 178 +20 +40 +60 +80 179 +20 +40 +60 +80 180 +20 +40 +60 +80 181 +20 +40 +60 +80 182 +20 +40 +60 +80 183 +20 +40 +60 +80 184 +20 +40 +60 +80 185 +20 +40 +60 +80 186 +20 +40 +60 +80 187 +20 +40 +60 +80 188 +20 +40 +60 +80 189 +20 +40 +60 +80 190 +20 +40 +60 +80 191 +20 +40 +60 +80 192 +20 +40 +60 +80 193 +20 +40 +60 +80 194 +20 +40 +60 +80 195 +20 +40 +60 +80 196 +20 +40 +60 +80 197 +20 +40 +60 +80 198 +20 +40 +60 +80 199 +20 +40 +60 +80 200 +20 +40 +60 +80

R:\Hydro\135228\135228.dwg, hpd, permit, P1.dgn
 mcook

PROJECT REFERENCE NO. R-2548A
 SHEET NO. 15
 E. W. SHEET NO. HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER
 METRICS
 PRELIMINARY PLANS
 CONSTRUCTION

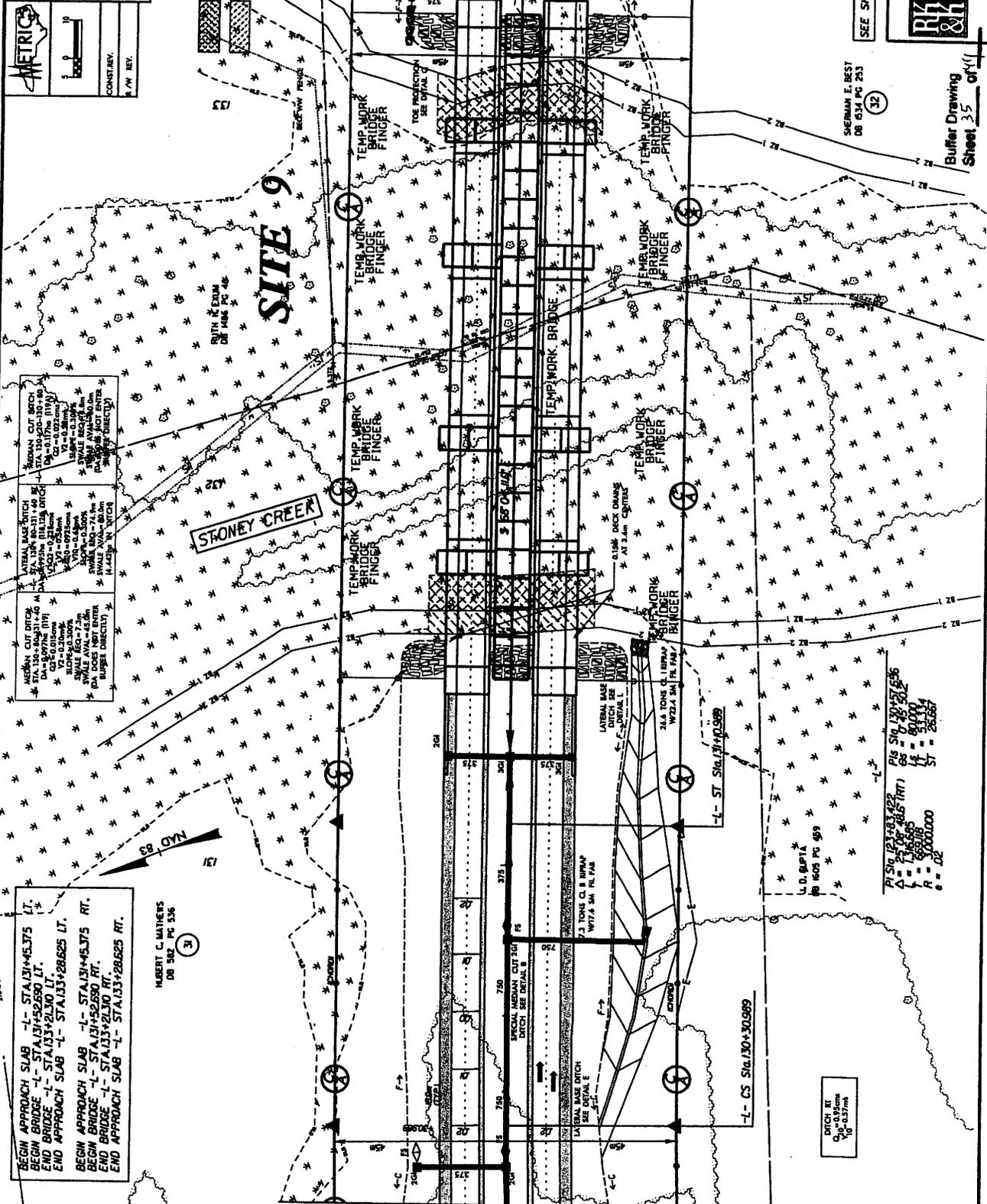
ALLOWABLE IMPACTS ZONE 1
 ALLOWABLE IMPACTS ZONE 2

MATCHLINE -L- STA. 133+60 SEE SHEET 16
 473

NOTE: See Detail Sheets 2-5 & 2-T For Ditch Details
 NOTE: See Detail Sheet 2-T For Bridge Slab, String, Straining, Protection, Reinforcement, Bridge Width
 SEE SHTS. 37 & 38 FOR -L- PROFILE
 SEMAN E. BEST DB 514 PG 213
 (32)

PLANS PREPARED BY:
 RUMBLE - KLEPPER & KATL, LLP
 100 HIGHLAND DRIVE • SUITE 200
 WASHINGTON, NORTH CAROLINA 27583-3940
 FOR DIVISION OF HIGHWAYS

Buffer Drawing
 Sheet 35 of 41



LATERAL BASE DITCH
 STA. 130+00 TO STA. 131+40
 V₁ = 0.25%
 V₂ = 0.25%
 SWALE WIDTH = 7.0 FT
 SWALE AREA = 14.0 SQ FT
 SWALE VOLUME = 14.0 CU FT
 SWALE SLOPE = 1:1 (VERTICAL TO HORIZONTAL)

MEDIAN CUT DITCH
 STA. 131+40 TO STA. 133+60
 V₁ = 0.25%
 V₂ = 0.25%
 SWALE WIDTH = 7.0 FT
 SWALE AREA = 14.0 SQ FT
 SWALE VOLUME = 14.0 CU FT
 SWALE SLOPE = 1:1 (VERTICAL TO HORIZONTAL)

BEGIN APPROACH SLAB -L- STA. 131+45.375 RT.
BEGIN BRIDGE -L- STA. 131+52.680 LT.
END APPROACH SLAB -L- STA. 133+28.625 LT.
BEGIN APPROACH SLAB -R- STA. 131+45.375 RT.
BEGIN BRIDGE -R- STA. 131+52.680 LT.
END APPROACH SLAB -R- STA. 133+28.625 RT.

MURBERT C. MATHERS
 DB 542 PG 516
 (3)

DITCH RT
 V₁ = 0.25%
 V₂ = 0.25%

L- ST. STA. 131+0.989
 STA. 131+0.989 TO STA. 131+27.636
 V₁ = 2.50% (RT)
 V₂ = 0.00%
 V₃ = 5.13%
 V₄ = 26.66%
 P = 0.000000
 E = 0.000000

L- CS STA. 130+90.989

MATCHLINE -L- STA. 130+20 SEE SHEET 14

REVISIONS

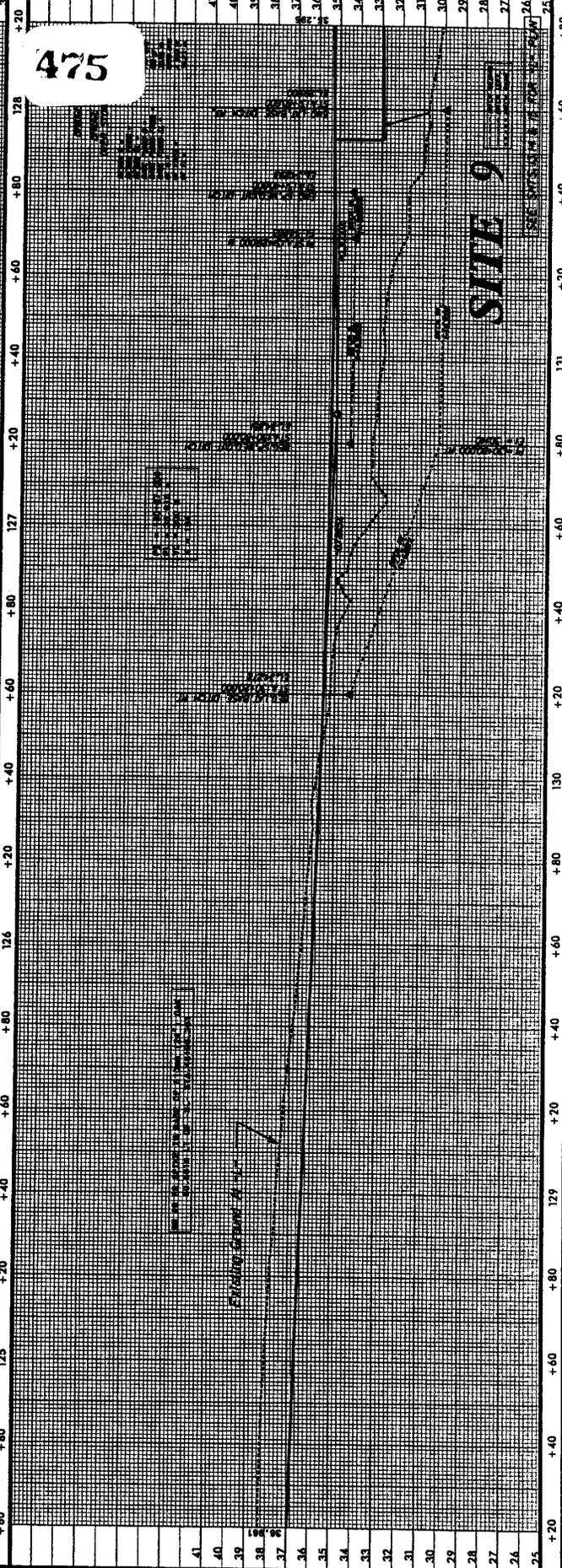
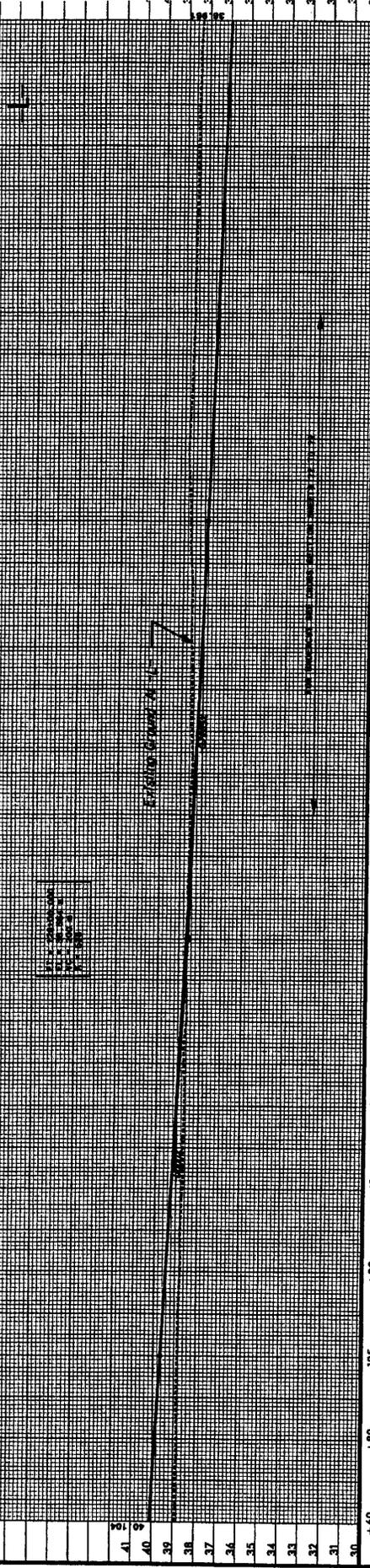
NO.	DESCRIPTION

PROJECT REFERENCE NO. SHEET NO.
 ROAD NO. 25545A PROJECT 37
 ROADWAY DESIGNER
 ENGINEER

METRICS

CONST. BY: [Signature]
 IN CHARGE: [Signature]

1" = 10'

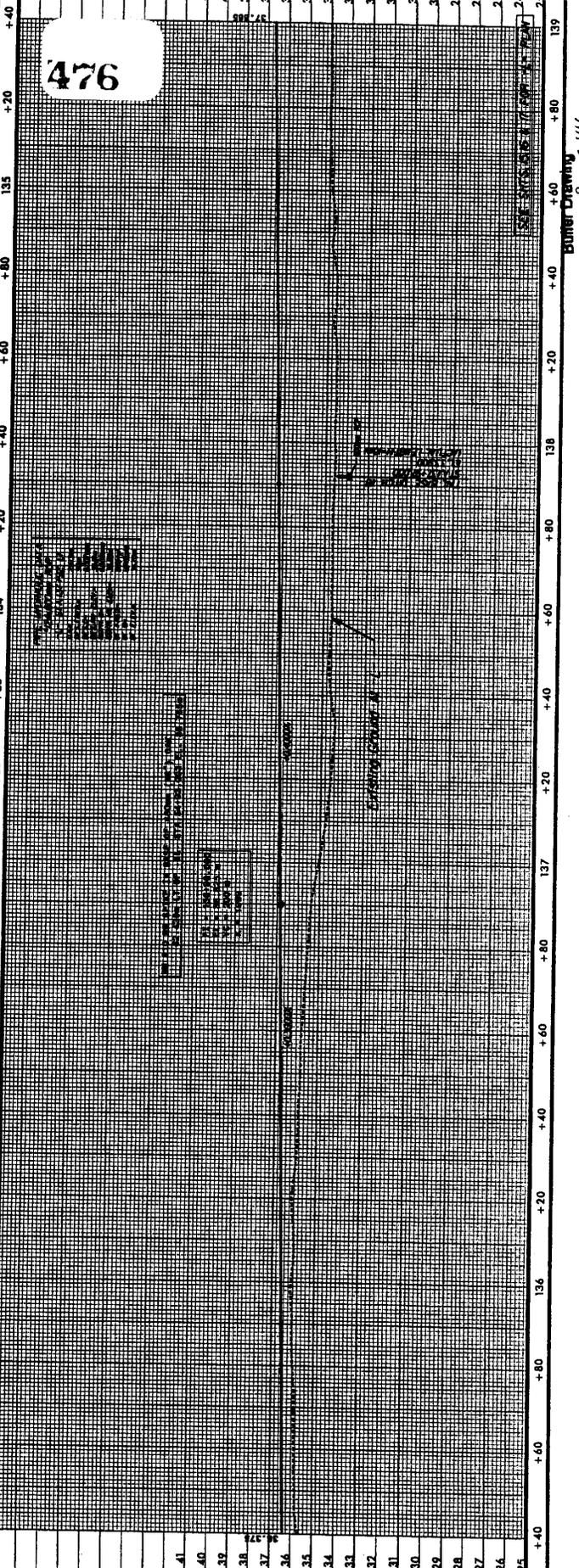
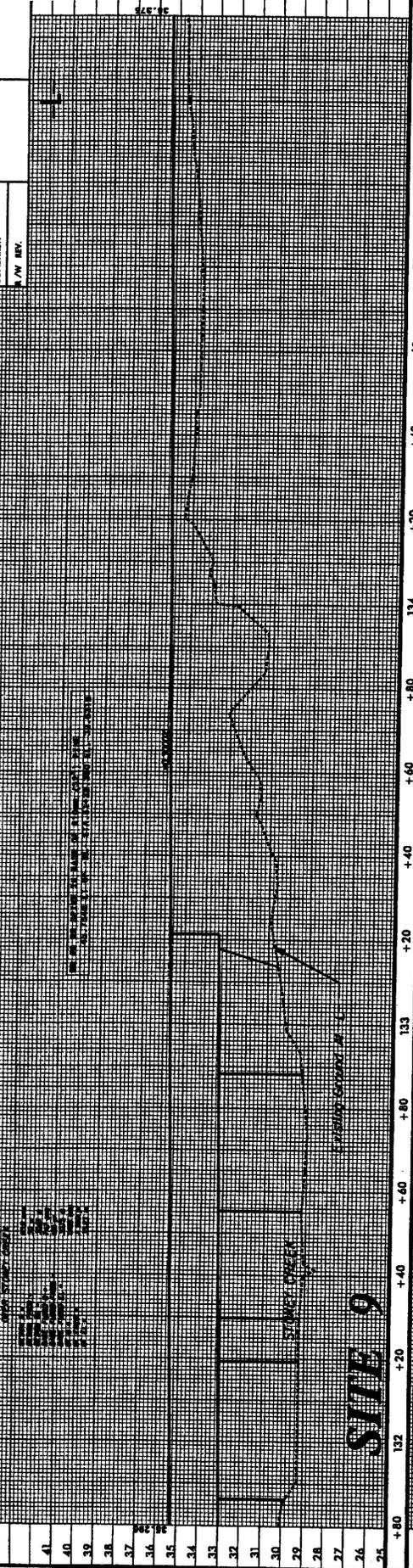


Other Drawing
 Sheet 37 of 44

PROJECT REFERENCE NO. 7-2540A
 ROADWAY DESIGN ENGINEER

AFRICA
 CONSTANT
 1/4" = 10'

SHEET 13
 HYDRAULIC ENGINEER



Sheet 13 of 14
 Bunter Drawing

PROJECT REFERENCE NO. **11-23062A** SHEET NO. **25**

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

CONST. REV. **R/W REV.**

PRELIMINARY PLANS
FOR THE
CONSTRUCTION

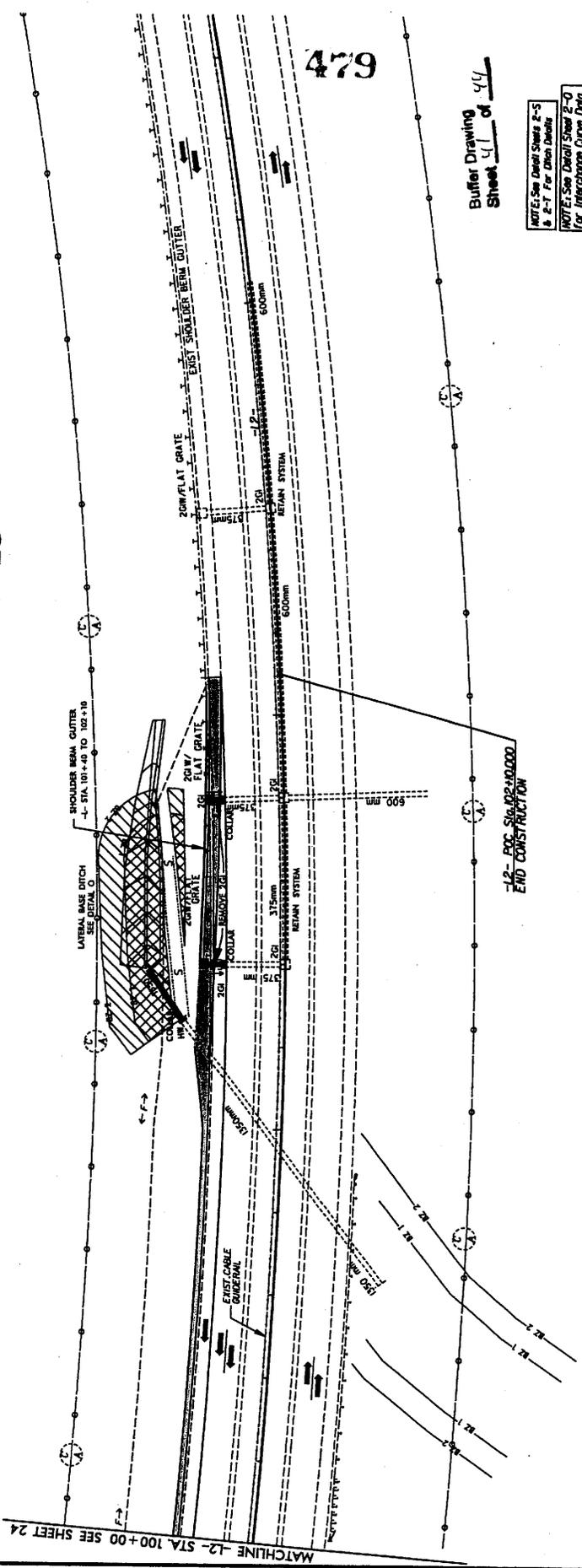
MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2

NO "A" BASIN REQUIRED.
THE DRAINAGE IS MINIMAL.



SITE 13



Buffer Drawing
Sheet 41 of 44

NOTE: See Detail Sheet 2-5
& 2-1 for Drain Details

NOTE: See Detail Sheet 2-0
for Interchange Curve Data.

SEE SHEET 46 FOR -12- PROFILE

PLANS PREPARED BY:

RUMMEL • KLEPPER & KAILILL

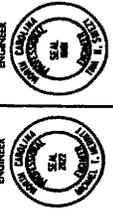
CONSULTING ENGINEERS

1000 UNIVERSITY AVENUE, SUITE 1000
PALM SPRING, CALIFORNIA 92560
TEL: 951-875-1990

FOR
DIVISION OF HIGHWAYS

REVISIONS

PROJECT REFERENCE NO. F-25634
 SHEET NO. 25
 L.A.W. SHEET NO.
 HYDRAULICS ENGINEER
 ROADWAY DESIGN ENGINEER



PRELIMINARY PLANS
 TO BE USED FOR CONSTRUCTION



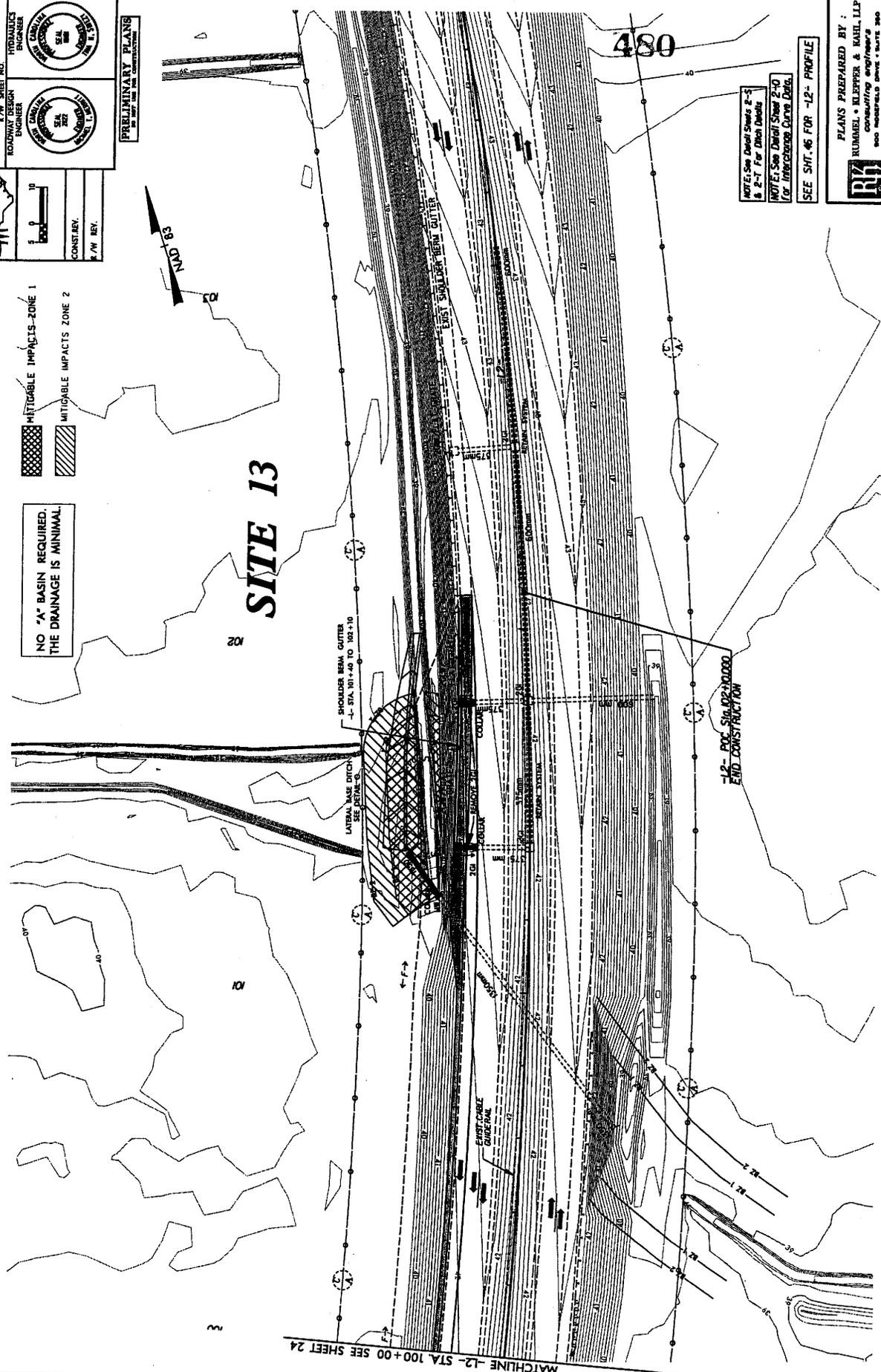
CONST. BY:
 & /W. REV.

MITIGABLE IMPACTS-ZONE 1
 MITIGABLE IMPACTS-ZONE 2

NO 'A' BASIN REQUIRED.
 THE DRAINAGE IS MINIMAL.



SITE 13



480

NOTE: See Detail Sheets P-5 & P-1 For Ditch Details
 NOTE: See Detail Sheet Z-10 For Interchange Curve Data
 SEE SHEET 46 FOR -12- PROFILE

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Buffer Drawing
 Sheet 07 of 11

MATCHLINE -12- STA. 100+00 SEE SHEET 24

-12- POC STA. 022+00.000
 END CONSTRUCTION

REVISIONS

