STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

August 29, 2005

U. S. Army Corps of Engineers
Regulatory Field Office
151 Patton Avenue, Room 208
Asheville, NC 28801-5006

ATTN: Ms. Angie Pennock
NCDOT Coordinator

SUBJECT: **Nationwide Permit Application 14 (Linear Transportation Crossings)** and Section 401 Water Quality Certification for the I-40 Asheville Improvements in Buncombe County; NCDOT Division 13. State Project No. 801845081, Federal Aid No. NHIMF-40-1(142)46; TIP No. I-4401. WBS Element No. 34233.1.1

Dear Ms. Pennock:

The North Carolina Department of Transportation (NCDOT) proposes to improve Interstate 40 (I-40), specifically in the area of the I-40/US 19/23 (Smoky Park Highway) interchange. The length of the proposed project is approximately 2.2 miles, extending from the intersection of Monte Vista Road (SR 1224) and I-40 eastward along I-40 to Sand Hill Road (SR 3412). The proposed project includes widening the existing I-40 route from a four-lane facility to a six-lane facility, with deceleration and acceleration lane improvements at the US 19/23 exit. The purpose of the project is to upgrade the existing I-40 facility to increase traffic capacity, facilitate traffic flow, and decrease accidents and traffic slow-downs.

Summary of Impacts

The jurisdictional delineation effort for the proposed I-40 improvements identified eight jurisdictional stream channels with associated wetland areas. The stream channels include Ragsdale Creek and seven of its unnamed tributaries. Potential impacts originally proposed by NCDOT included 0.11 acre of jurisdictional wetland and 300 linear feet of jurisdictional stream channel, including Ragsdale Creek. The project will utilize reinforced fills and combination noise/retaining walls, which will minimize the impacts to 0.038 acre of jurisdictional wetland (including 0.024 acre of mechanized clearing and 0.014 acre of permanent fill) and 156.3 linear feet of jurisdictional stream channel on four stream channels, avoiding the remaining wetlands and streams. Each impact is described below:

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.NCDOT.ORG

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

The first impact area, located at Station 166+00-L-Lt includes extension of a 48" reinforced concrete pipe (RCP), resulting in an impact of 77.8 linear feet to an unnamed tributary to Ragsdale Creek. This perennial channel has an average width of 9.5 feet with a silt/sand substrate. Impact to this area will include mechanical clearing of 0.010 acre of jurisdictional wetland area.

The second impact area, located at Station 184+22-L-RT, includes construction of a 48" RCP inlet, which will extend the existing pipe resulting in an impact of 19.2 linear feet to an unnamed tributary to Ragsdale Creek. This perennial stream channel has an average width of 13.6 feet with a silt/sand/gravel bottom.

The third impact area, located at Station 10+50-I40WBL-Lt, includes extension of an existing 48"/30" RCP, resulting in an impact of 47.1 linear feet of impact to an unnamed tributary to Ragsdale Creek and 0.028 acre of associated riparian wetland. This perennial stream channel has an average width of 7.3 feet with a sand/gravel substrate. The riparian wetland system is a palustrine, forested wetland (PFO), as described by Cowardin. Vegetation includes small tree-sized American sycamore (*Platanus occidentalis*) and red maple (*Acer rubrum*).

The fourth impact area, located at Station 12+41-I40EBL-Rt, includes construction of a 30" inlet, resulting in 12.2 linear feet of impact to an unnamed tributary to Ragsdale Creek. This intermittent stream channel has an average width of 7.1 feet with a silt/sand substrate.

Summary of Mitigation

The project crosses one jurisdictional riparian wetland, three perennial, unnamed tributaries to Ragsdale Creek, and one intermittent, unnamed tributary to Ragsdale Creek. Complete avoidance of these jurisdictional areas is not possible for the project. Compensatory mitigation for these proposed impacts has been procured through the Ecosystem Enhancement Program (EEP).

NEPA DOCUMENT STATUS

An Environmental Assessment (EA) was prepared by NCDOT in compliance with the National Environmental Policy Act. The EA was approved on 31 March 2004. A Finding of No Significant Impact (FONSI) was approved by the Federal Highway Administration (FHWA) on November 3, 2004. The EA explains the purpose and need for the project, provides a complete description of the alternatives considered, and characterizes the social, economic, and environmental effects. After the EA was approved, it was circulated to federal and local agencies. Copies of the EA and FONSI were provided to regulatory agencies involved in the approval process. Additional copies will be provided upon request.

The I-40 improvement project in Buncombe County, TIP No. I-4401, is in compliance with 23 CFR Part 771.111(f), which lists the FHWA characteristics of independent utility of a project:

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

RESOURCE STATUS

Wetland Delineations:
The presence of "Waters of the United States", in the form of wetlands and surface waters, were investigated within the referenced project limits. Potential wetland communities were investigated pursuant to the 1987 *Corps of Engineers Wetland Delineation Manual.* All jurisdictional "Waters of the United States" were verified by Steve Lund of the U.S. Army Corps of Engineers (USACE) (USACE letter dated December 11, 2003; Action ID 200430253). Based on the jurisdictional wetland delineation performed for the project, jurisdictional wetlands are present within the project limits. The proposed will impact 0.023 acre of jurisdictional wetlands.

Surface Waters:
The project crosses eight perennial surface waters, including Ragsdale Creek (North Carolina Department of Environment and Natural Resources [NCDENR] – Division of Water Quality [DWQ] Index No. 6-76-11), which has a Best Usage Classification of **C**. Ragsdale Creek is located in the French Broad DWQ Subbasin 04-03-02 of the French Broad River Basin 06010105. The project does not cross any streams designated as "trout waters" by the North Carolina Wildlife Resources Commission (NCWRC).

Wild and Scenic Rivers:
There are no wild or scenic rivers within the project limits.

THREATENED AND ENDANGERED SPECIES

Plants and animals with federal classification of Endangered, Threatened, Proposed Endangered, and Proposed Threatened are protected under provisions of Section 7 and Section 9 of the Endangered Species Act of 1973, as amended. As of January 29, 2003, the United States Fish and Wildlife Service (USFWS) listed eleven federally protected species for Buncombe County (see Table 1 below). Species characteristics, distribution, and habitat details, along with survey and biological conclusion information were reported in the previously referenced EA.

Table 1. Federally Protected Species for Buncombe County

Scientific Name	Common Name	Status	Biological Conclusion
Clemmys Muhlenbergii	Bog turtle	T (S/A)	N/A
Glaucomys sabrinus coloratus	Carolina northern flying squirrel	E	No Effect
Erimonax monachus	Spotfin chub	T	No Effect

Myotis grisescens	Gray bat	E	No Effect
Puma concolor couguar	Eastern cougar	E*	No Effect
Invertebrates			
Alasmidonta raveneliana	Appalachian elktoe	E	No Effect
Epioblasma capsaeformis	Oyster mussel	E	No Effect
Vascular Plants			
Geum radiatum	Spreading avens	E	No Effect
Sagittaria fasciculata	Bunched Arrowhead	E*	No Effect
Sarracenia jonesii	Mountain sweet pitcher plant	E*	No Effect
Spiraea virginiana	Virginia spiraea	T	No Effect
Nonvascular Plants			
Gymnoderma lineare	Rock gnome lichen	E	No Effect

Notes:

T (S/A) Threatened due to similarity of appearance.

T Threatened denotes any native or once native species that is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a Threatened species pursuant to the Endangered Species Act.

E Endangered denotes a species in danger of extinction throughout all or a significant portion of its range.

* Historic record; the species was last observed in the county more than 50 years ago.

MITIGATION OPTIONS

The USACE has adopted, through the Council of Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the "Waters of the United States". Mitigation of wetland and surface water impacts has been defined by the CEQ to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time and compensating for impacts (40 CFR 1508.20). Executive Order 11990 (Protection of Wetlands) emphasizes protection of the functions and values provided by wetlands. These directives require that new construction in wetlands be avoided as much as possible and that all practicable measures be taken to minimize or mitigate impacts to wetlands.

Avoidance:

Complete avoidance of Ragsdale Creek and its tributaries is not possible for the project. Because the project involves improvements to existing roadways, no fragmentation of plant communities is expected.

Minimization:

The construction of this project has minimized the extent of the built-upon area by using the existing alignment for the improvements. The project will utilize reinforced fills and combination noise/retaining walls, which has minimized the impacts to jurisdictional areas. NCDOT will implement best management practices for the protection of surface waters in accordance with the most recent version of the "North Carolina Sediment and Erosion Control Planning and Design Manual" during design and construction phases of the project.

Compensation:

Based upon the agreements stipulated in the "Memorandum of Agreement Among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U.S. Army Corps of Engineers, Wilmington District" (MOA), it is understood that the North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program (EEP), will assume responsibility for satisfying the federal Clean Water Act compensatory mitigation requirements for NCDOT projects.

The necessary compensatory mitigation to offset unavoidable impacts to waters that are jurisdictional under the federal Clean Water Act will be provided by the EEP. The offsetting mitigation will derive from an inventory of assets already in existence within the same 8-digit cataloguing unit. The Department has avoided and minimized impacts to jurisdictional resources to the greatest extent possible as described above. A copy of the acceptance letter is attached.

FHWA STEP DOWN COMPLIANCE

All compensatory mitigation must be in compliance with 23 CFR Part 77.9 "Mitigation of Impacts" that describes the actions that should be followed to qualify for federal-aid highway funding. This process is known as the FHWA "Step Down" procedures:

1. Consideration must be given to mitigation within the right-of-way and should include the enhancement of existing wetlands and the creation of new wetlands in the highway median, borrow pit areas, interchange areas, and along the roadside.
2. Where mitigation within the right-of-way does not fully offset wetland losses, compensatory mitigation may be conducted outside the right-of-way including enhancement, creation, and preservation.

Compensatory mitigation within the project right-of-way was not considered satisfactory. Therefore, off-site mitigation has been procured through use of the EEP.

REGULATORY APPROVALS

Section 404 Permit: Attached for your information is a copy of the Preconstruction Notification (PCN), roadway design plans, and permit drawings for the project. Application is hereby made for Department of Army Section 404 Nationwide Permit 14 (Linear Transportation Crossings).

Section 401 Certification: We anticipate 401 General Certification number 3404 will apply to this project. In accordance with 15A NCAC 2H .0501(a) we are providing seven copies of this application to the North Carolina Department of Environmental and Natural Resources, Division of Water Quality, for their records. In compliance with Section 143-215.3D(e) of the NCAC, WBS Element 34233.2.1will be debited in the amount of $200.00 to act as payment for processing the Section 401 permit application.

We also anticipate that comments from the NCWRC will be required prior to authorization by the USACE. By copy of this letter and attachment, NCDOT hereby requests that NCWRC forward their comments to the USACE.

A copy of this permit application will be posted on the DOT website at: http://www.doh.dot.state.nc.us/preconstruct/pe/neu/permit.html. If you have any questions or need additional information, please contact Chris Manley at cdmanley@dot.state.nc.us or (919) 715-1487.

Sincerely,

Gregory J. Thorpe, Ph.D. Environmental Management Director,
Project Development and Environmental Analysis Branch

W/attachment

Mr. John Hennessy, NCDWQ (7 Copies)
Ms. Marella Buncick, USFWS
Ms. Marla Chambers, NCWRC
Mr. Harold Draper, TVA
Dr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Mark Staley, Roadside Environmental
Mr. J.J. Swain, P.E., Division 13 Engineer
Mr. Roger Bryan, Division 13 Environmental Officer

W/o attachment

Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Scott McLendon, USACE, Wilmington
Ms. Beth Harmon, EEP
Mr. Todd Jones, NCDOT External Audit Branch
Mr. Drew Joyner, P.E., PDEA

Office Use Only: Form Version March 05

USACE Action ID No. _____ **DWQ No.** _____

(If any particular item is not applicable to this project, please enter "Not Applicable" or "N/A".)

I. Processing

1. Check all of the approval(s) requested for this project:
   - ☒ Section 404 Permit
   - ☐ Section 10 Permit
   - ☒ 401 Water Quality Certification
   - ☐ Riparian or Watershed Buffer Rules
   - ☐ Isolated Wetland Permit from DWQ
   - ☐ Express 401 Water Quality Certification

2. Nationwide, Regional or General Permit Number(s) Requested: NWP 14

3. If this notification is solely a courtesy copy because written approval for the 401 Certification is not required, check here: ☐

4. If payment into the North Carolina Ecosystem Enhancement Program (NCEEP) is proposed for mitigation of impacts, attach the acceptance letter from NCEEP, complete section VIII, and check here: ☒

5. If your project is located in any of North Carolina's twenty coastal counties (listed on page 4), and the project is within a North Carolina Division of Coastal Management Area of Environmental Concern (see the top of page 2 for further details), check here: ☐

II. Applicant Information

1. Owner/Applicant Information

   Name: Project Development and Environmental Analysis Branch, NCDOT

   Mailing Address: Gregory J. Thorpe, Ph.D., Director
   1548 Mail Service Center
   Raleigh, NC 27699-1548

   Telephone Number: 919-733-3141 Fax Number: _____

   E-mail Address: _____

2. Agent/Consultant Information (A signed and dated copy of the Agent Authorization letter must be attached if the Agent has signatory authority for the owner/applicant.)

   Name: _____

   Company Affiliation: _____

   Mailing Address: _____

   _____

   _____

   _____

   Telephone Number: _____ Fax Number: _____

   E-mail Address: _____

III. Project Information

Attach a **vicinity map** clearly showing the location of the property with respect to local landmarks such as towns, rivers, and roads. Also provide a detailed **site plan** showing property boundaries and development plans in relation to surrounding properties. Both the vicinity map and site plan must include a scale and north arrow. The specific footprints of all buildings, impervious surfaces, or other facilities must be included. If possible, the maps and plans should include the appropriate USGS Topographic Quad Map and NRCS Soil Survey with the property boundaries outlined. Plan drawings, or other maps may be included at the applicant's discretion, so long as the property is clearly defined. For administrative and distribution purposes, the USACE requires information to be submitted on sheets no larger than 11 by 17-inch format; however, DWQ may accept paperwork of any size. DWQ prefers full-size construction drawings rather than a sequential sheet version of the full-size plans. If full-size plans are reduced to a small scale such that the final version is illegible, the applicant will be informed that the project has been placed on hold until decipherable maps are provided.

1. Name of project: I-40 Improvements

2. T.I.P. Project Number or State Project Number (NCDOT Only): I-4401

3. Property Identification Number (Tax PIN): _____

4. Location
   County: Buncombe Nearest Town: Asheville
   Subdivision name (include phase/lot number): _____
   Directions to site (include road numbers/names, landmarks, etc.): The Project is located on Interstate 40, from west of US 19/23, extending east to east of its intersection with I-26/I-240

5. Site coordinates (For linear projects, such as a road or utility line, attach a sheet that separately lists the coordinates for each crossing of a distinct waterbody.)
   Decimal Degrees (6 digits minimum): 35.5588°N, 82.6339°W

6. Property size (acres): _____

7. Name of nearest receiving body of water: Ragsdale Creek

8. River Basin: French Broad River
   (Note – this must be one of North Carolina's seventeen designated major river basins. The River Basin map is available at http://h2o.enr.state.nc.us/admin/maps/.)

9. Describe the existing conditions on the site and general land use in the vicinity of the project at the time of this application: The proposed project involves improvements to the existing I-40 facility. Surrounding land use for this project includes a combination of private residences and urban development.

10. Describe the overall project in detail, including the type of equipment to be used: The project will upgrade the existing I-40 facility from 4 lanes to 6 lanes, as well as upgrading the acceleration and deceleration lanes at I-240/I-26 and US 19/23. Heavy equipment typically used for highway construction projects, including large bulldozers, graders, and dump trucks will be used.

11. Explain the purpose of the proposed work: To upgrade the existing I-40 facility to increase traffic capacity, facilitate flow, and decrease accidents and traffic slow-downs.

IV. Prior Project History

If jurisdictional determinations and/or permits have been requested and/or obtained for this project (including all prior phases of the same subdivision) in the past, please explain. Include the USACE Action ID Number, DWQ Project Number, application date, and date permits and certifications were issued or withdrawn. Provide photocopies of previously issued permits, certifications or other useful information. Describe previously approved wetland, stream and buffer impacts, along with associated mitigation (where applicable). If this is a NCDOT project, list and describe permits issued for prior segments of the same T.I.P. project, along with construction schedules. I-4401 is a full and complete project, with no other permits applied for or anticipated.

V. Future Project Plans

Are any future permit requests anticipated for this project? If so, describe the anticipated work, and provide justification for the exclusion of this work from the current application.
N/A

VI. Proposed Impacts to Waters of the United States/Waters of the State

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to wetlands, open water, and stream channels associated with the project. Each impact must be listed separately in the tables below (e.g., culvert installation should be listed separately from riprap dissipater pads). Be sure to indicate if an impact is temporary. All proposed impacts, permanent and temporary, must be listed, and must be labeled and clearly identifiable on an accompanying site plan. All wetlands and waters, and all streams (intermittent and perennial) should be shown on a delineation map, whether or not impacts are proposed to these systems. Wetland and stream evaluation and delineation forms should be included as appropriate. Photographs may be included at the applicant's discretion. If this proposed impact is strictly for wetland or stream mitigation, list and describe the impact in Section VIII below. If additional space is needed for listing or description, please attach a separate sheet.

1. Provide a written description of the proposed impacts: The proposed project will include extending four (4) existing reinforced concrete pipes, resulting in unavoidable impacts to 0.038 acre of jurisdictional wetlands and 156.3 linear feet of stream channel. For additional details, see attached Narrative.

2. Individually list wetland impacts. Types of impacts include, but are not limited to mechanized clearing, grading, fill, excavation, flooding, ditching/drainage, etc. For dams, separately list impacts due to both structure and flooding.

Wetland Impact Site Number (indicate on map)	Type of Impact	Type of Wetland (e.g., forested, marsh, herbaceous, bog, etc.)	Located within 100-year Floodplain (yes/no)	Distance to Nearest Stream (linear feet)	Area of Impact (acres)
1	Mechanized clearing	Forested	N	adjacent	0.010
2	Fill/pipe extension	Forested	No	adjacent	0.028
Total Wetland Impact (acres)					0.038

3. List the total acreage (estimated) of all existing wetlands on the property: 2.79 acres

4. Individually list all intermittent and perennial stream impacts. Be sure to identify temporary impacts. Stream impacts include, but are not limited to placement of fill or culverts, dam construction, flooding, relocation, stabilization activities (e.g., cement walls, rip-rap, crib walls, gabions, etc.), excavation, ditching/straightening, etc. If stream relocation is proposed, plans and profiles showing the linear footprint for both the original and relocated streams must be included. To calculate acreage, multiply length X width, then divide by 43,560.

Stream Impact Number (indicate on map)	Stream Name	Type of Impact	Perennial or Intermittent?	Average Stream Width Before Impact	Impact Length (linear feet)	Area of Impact (acres)
1		Fill/ pipe extension	P	9.5	77.8	0.017
2		Fill/ pipe extension	P	13.6	19.2	0.006
2		Fill/ pipe extension	P	7.3	47.1	0.008
2		Fill/ pipe extension	P	7.1	12.2	0.002
Total Stream Impact (by length and acreage)					156.3	0.033

5. Individually list all open water impacts (including lakes, ponds, estuaries, sounds, Atlantic Ocean and any other water of the U.S.). Open water impacts include, but are not limited to fill, excavation, dredging, flooding, drainage, bulkheads, etc.

Open Water Impact Site Number (indicate on map)	Name of Waterbody (if applicable)	Type of Impact	Type of Waterbody (lake, pond, estuary, sound, bay, ocean, etc.)	Area of Impact (acres)
Total Open Water Impact (acres)				0

6. List the cumulative impact to all Waters of the U.S. resulting from the project:

Stream Impact (acres):	0.033
Wetland Impact (acres):	0.038
Open Water Impact (acres):	0
Total Impact to Waters of the U.S. (acres)	0.071
Total Stream Impact (linear feet):	156.3

7. Isolated Waters
   Do any isolated waters exist on the property? ☐ Yes ☒ No
   Describe all impacts to isolated waters, and include the type of water (wetland or stream) and the size of the proposed impact (acres or linear feet). Please note that this section only applies to waters that have specifically been determined to be isolated by the USACE.

   _____

   _____

8. Pond Creation
   If construction of a pond is proposed, associated wetland and stream impacts should be included above in the wetland and stream impact sections. Also, the proposed pond should be described here and illustrated on any maps included with this application.
   Pond to be created in (check all that apply): ☐ uplands ☐ stream ☐ wetlands
   Describe the method of construction (e.g., dam/embankment, excavation, installation of draw-down valve or spillway, etc.):_____
   Proposed use or purpose of pond (e.g., livestock watering, irrigation, aesthetic, trout pond, local stormwater requirement, etc.):_____
   Current land use in the vicinity of the pond:_____
   Size of watershed draining to pond:_____ Expected pond surface area:_____

VII. Impact Justification (Avoidance and Minimization)

Specifically describe measures taken to avoid the proposed impacts. It may be useful to provide information related to site constraints such as topography, building ordinances, accessibility, and financial viability of the project. The applicant may attach drawings of alternative, lower-impact site layouts, and explain why these design options were not feasible. Also discuss how impacts were minimized once the desired site plan was developed. If applicable, discuss construction techniques to be followed during construction to reduce impacts. Impacts associated with the propose project have been minimized by using innovative engineering techniques. The proposed project has reduced proposed impacts from 300 linear feet of stream channel and 0.12 acre of riparian wetlands to 156.3 linear feet of stream channel and 0.038 acre of riparian wetlands.

VIII. Mitigation

DWQ - In accordance with 15A NCAC 2H .0500, mitigation may be required by the NC Division of Water Quality for projects involving greater than or equal to one acre of impacts to freshwater wetlands or greater than or equal to 150 linear feet of total impacts to perennial streams.

USACE – In accordance with the Final Notice of Issuance and Modification of Nationwide Permits, published in the Federal Register on January 15, 2002, mitigation will be required when necessary to ensure that adverse effects to the aquatic environment are minimal. Factors including size and type of proposed impact and function and relative value of the impacted aquatic resource will be considered in determining acceptability of appropriate and practicable mitigation as proposed. Examples of mitigation that may be appropriate and practicable include, but are not limited to: reducing the size of the project; establishing and maintaining wetland and/or upland vegetated buffers to protect open waters such as streams; and replacing losses of aquatic resource functions and values by creating, restoring, enhancing, or preserving similar functions and values, preferable in the same watershed.

If mitigation is required for this project, a copy of the mitigation plan must be attached in order for USACE or DWQ to consider the application complete for processing. Any application lacking a required mitigation plan or NCEEP concurrence shall be placed on hold as incomplete. An applicant may also choose to review the current guidelines for stream restoration in DWQ's Draft Technical Guide for Stream Work in North Carolina, available at http://h2o.enr.state.nc.us/ncwetlands/strmgide.html.

1. Provide a brief description of the proposed mitigation plan. The description should provide as much information as possible, including, but not limited to: site location (attach directions and/or map, if offsite), affected stream and river basin, type and amount (acreage/linear feet) of mitigation proposed (restoration, enhancement, creation, or preservation), a plan view, preservation mechanism (e.g., deed restrictions, conservation easement, etc.), and a description of the current site conditions and proposed method of construction. Please attach a separate sheet if more space is needed.
   Mitigation for unavoidable impacts associated with this project has been procured by NCDOT through the Ecosystem Enhancement Program.

2. Mitigation may also be made by payment into the North Carolina Ecosystem Enhancement Program (NCEEP). Please note it is the applicant's responsibility to contact the NCEEP at (919) 715-0476 to determine availability, and written approval from the NCEEP indicating that they are will to accept payment for the mitigation must be attached to this form. For additional information regarding the application process for the NCEEP, check the NCEEP website at http://h2o.enr.state.nc.us/wrp/index.htm. If use of the NCEEP is proposed, please check the appropriate box on page five and provide the following information:

   Amount of stream mitigation requested (linear feet): 156.3
   Amount of buffer mitigation requested (square feet): 0
   Amount of Riparian wetland mitigation requested (acres): 0.038
   Amount of Non-riparian wetland mitigation requested (acres): 0
   Amount of Coastal wetland mitigation requested (acres): 0

IX. Environmental Documentation (required by DWQ)

1. Does the project involve an expenditure of public (federal/state/local) funds or the use of public (federal/state) land? Yes ☒ No ☐

2. If yes, does the project require preparation of an environmental document pursuant to the requirements of the National or North Carolina Environmental Policy Act (NEPA/SEPA)? Note: If you are not sure whether a NEPA/SEPA document is required, call the SEPA coordinator at (919) 733-5083 to review current thresholds for environmental documentation. Yes ☐ No ☒

3. If yes, has the document review been finalized by the State Clearinghouse? If so, please attach a copy of the NEPA or SEPA final approval letter. Yes ☐ No ☐

X. Proposed Impacts on Riparian and Watershed Buffers (required by DWQ)

It is the applicant's (or agent's) responsibility to determine, delineate and map all impacts to required state and local buffers associated with the project. The applicant must also provide justification for these impacts in Section VII above. All proposed impacts must be listed herein, and must be clearly identifiable on the accompanying site plan. All buffers must be shown on a map, whether or not impacts are proposed to the buffers. Correspondence from the DWQ Regional Office may be included as appropriate. Photographs may also be included at the applicant's discretion.

1. Will the project impact protected riparian buffers identified within 15A NCAC 2B .0233 (Neuse), 15A NCAC 2B .0259 (Tar-Pamlico), 15A NCAC 02B .0243 (Catawba) 15A NCAC 2B .0250 (Randleman Rules and Water Supply Buffer Requirements), or other (please identify_____)? Yes ☐ No ☒

2. If "yes", identify the square feet and acreage of impact to each zone of the riparian buffers. If buffer mitigation is required calculate the required amount of mitigation by applying the buffer multipliers.

Zone*	Impact (square feet)	Multiplier	Required Mitigation
1		3 (2 for Catawba)	
2		1.5	
Total			

* Zone 1 extends out 30 feet perpendicular from the top of the near bank of channel; Zone 2 extends an additional 20 feet from the edge of Zone 1.

3. If buffer mitigation is required, please discuss what type of mitigation is proposed (i.e., Donation of Property, Riparian Buffer Restoration / Enhancement, or Payment into the Riparian Buffer Restoration Fund). Please attach all appropriate information as identified within 15A NCAC 2B .0242 or .0244, or .0260. _____

_____

XI. Stormwater (required by DWQ)

Describe impervious acreage (existing and proposed) versus total acreage on the site. Discuss stormwater controls proposed in order to protect surface waters and wetlands downstream from the property. If percent impervious surface exceeds 20%, please provide calculations demonstrating total proposed impervious level. Impervious surfaces will be constructed as part of this project. Pre-construction, approximately 26.2 acres of impervious surface exists. An additional 4.1 acres of impervious surface is proposed. The total impervious surface constructed will be less than 20% of the total project study area reviewed. Stormwater for this project will be discharged into pre-formed scour holes to disperse and dissipate energy before entering any stream or wetland area, with the exception of the 30" crosspipe at Site#2. Because of the steepness of this area, a pre-formed scour hole would be ineffective. To accommodate the discharge, structure No. 127 and 131 will flow into a junction box on the 30" crosspipe to dissipate energy. A sediment and erosion control plan will be submitted for this project.

XII. Sewage Disposal (required by DWQ)

Clearly detail the ultimate treatment methods and disposition (non-discharge or discharge) of wastewater generated from the proposed project, or available capacity of the subject facility.
N/A

XIII. Violations (required by DWQ)

Is this site in violation of DWQ Wetland Rules (15A NCAC 2H .0500) or any Buffer Rules?
Yes ☐ No ☒

Is this an after-the-fact permit application? Yes ☐ No ☒

XIV. Cumulative Impacts (required by DWQ)

Will this project (based on past and reasonably anticipated future impacts) result in additional development, which could impact nearby downstream water quality? Yes ☐ No ☒
If yes, please submit a qualitative or quantitative cumulative impact analysis in accordance with the most recent North Carolina Division of Water Quality policy posted on our website at http://h2o.enr.state.nc.us/ncwetlands. If no, please provide a short narrative description:

XV. Other Circumstances (Optional):

It is the applicant's responsibility to submit the application sufficiently in advance of desired construction dates to allow processing time for these permits. However, an applicant may choose to list constraints associated with construction or sequencing that may impose limits on work schedules (e.g., draw-down schedules for lakes, dates associated with Endangered and Threatened Species, accessibility problems, or other issues outside of the applicant's control).

8/29/05

Applicant/Agent's Signature **Date**
(Agent's signature is valid only if an authorization letter from the applicant is provided.)

Manley

U.S. ARMY CORPS OF ENGINEERS
Wilmington District

Action ID: 200430253 County: **Buncombe**

Notification of Jurisdictional Determination

Property Owner: NCDOT
Address: Gregory J. Thorpe, Project Development and Environmental Analysis
1548 Mail Service Center
Raleigh, NC 27699-1548
Telephone: 919-733-3141

Authorized Agent: EcoScience Corporation
Attn: Alexander P. Smith
Address: 1101 Haynes Street
Suite 101, Raleigh, NC 27604
Telephone:919-828-3433

Size and Location of Property (waterbody, Highway name/number, town, etc.):
TIP No. I-4401, Construction of Auxiliary Lanes on I-40 from west of US 19/23 (Smoky Park Highway) to the I-240/I-26 Interchange at Asheville, crossing Hominy Creek, Ragsdale Creek, Trent Branch and unnamed tributaries, all tributaries of the French Broad River

Basis for Determination: Delineation Maps and GPS surveys dated November and December, 2003 with accompanying Wetland Data Forms and Stream Assessment Worksheets from October 2003 identifying hydric soil, wetland hydrology, hydrophytic vegetation, stream flow, an ordinary high waterline and surface hydrologic connections to the French Broad River System.

Indicate Which of the Following apply:

◊ The wetlands and surface waters on this project have been delineated and the limits of the Corps jurisdiction have been explained to you. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

Placement of dredged or fill material in streams and wetlands on this property without a Department of the Army permit is in most cases a violation of Section 301 of the Clean Water Act (33 USC 1311). A permit is not required for work on the property restricted entirely to existing high ground. If you have any questions regarding the Corps of Engineers regulatory program, please contact
Steven W. Lund **at** 828-271-7980 x 223.

Project Manager Signature Steven W. Lund
Date: December 11, 2003 **Expiration Date: December 11, 2008**

SURVEY PLAT OR FIELD SKETCH OF DESCRIBED PROPERTY AND THE WETLAND DELINEATION FORM MUST BE ATTACHED TO THIS FORM.

Ecosystem Enhancement PROGRAM

February 7, 2005

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:

I-4401, I-40 Widening, Buncombe County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide riverine wetland and stream mitigation for the subject project. Based on the information supplied by you in a letter dated December 21, 2004, the impacts are located in CU 06010105 of the French Broad River Basin in the Southern Mountains (SM) Eco-Region, and are as follows:

Riverine Wetland Impacts:	0.12 acre
Stream Impacts:	300 feet

The subject project is not listed in Exhibit 2 of the Memorandum of Agreement among the North Carolina Department of Environment and Natural Resources, the North Carolina Department of Transportation, and the U. S. Army Corps of Engineers, Wilmington District dated July 22, 2003. The EEP is only committed to provide the mitigation needs for projects listed on Exhibit 2 during the first two years of the program; however Amendment 1 details how non-Exhibit 2 projects may be swapped for an appropriate project included on the Exhibit 2 list. Specifically, Amendment 1 states that:

> "Exhibit 2 may be modified if requested jointly by NCDENR and NCDOT, and approved in writing by the USACE. In no event may the total projected impacts of projects per cataloging unit on Exhibit 2 exceed the total projected impacts of projects per cataloging unit on Exhibit 2 as it existed at the time of the original execution of the MOA, July, 2003."

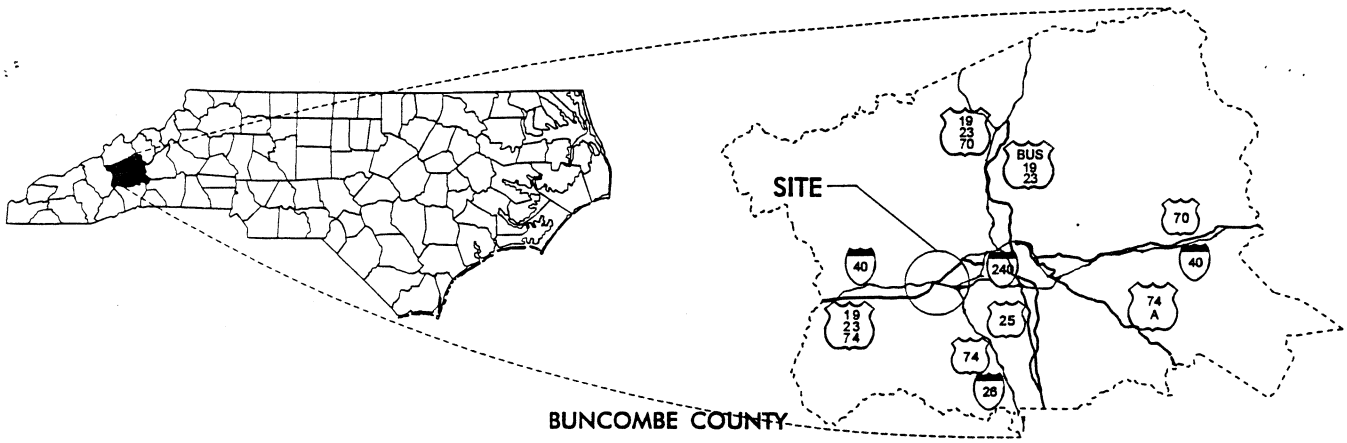
In this case, the NCDOT has not proposed to swap this project for an appropriate project included on the Exhibit 2 list. However, EEP currently has surplus riverine wetland and stream mitigation with sufficient assets to cover this years projected mitigation requirements plus the mitigation for the above referenced project. Therefore, the EEP agrees to accept this project and will provide compensatory riverine wetland and stream mitigation up to a 2:1 ratio in Cataloging Unit 06010105 of the French Broad River Basin.

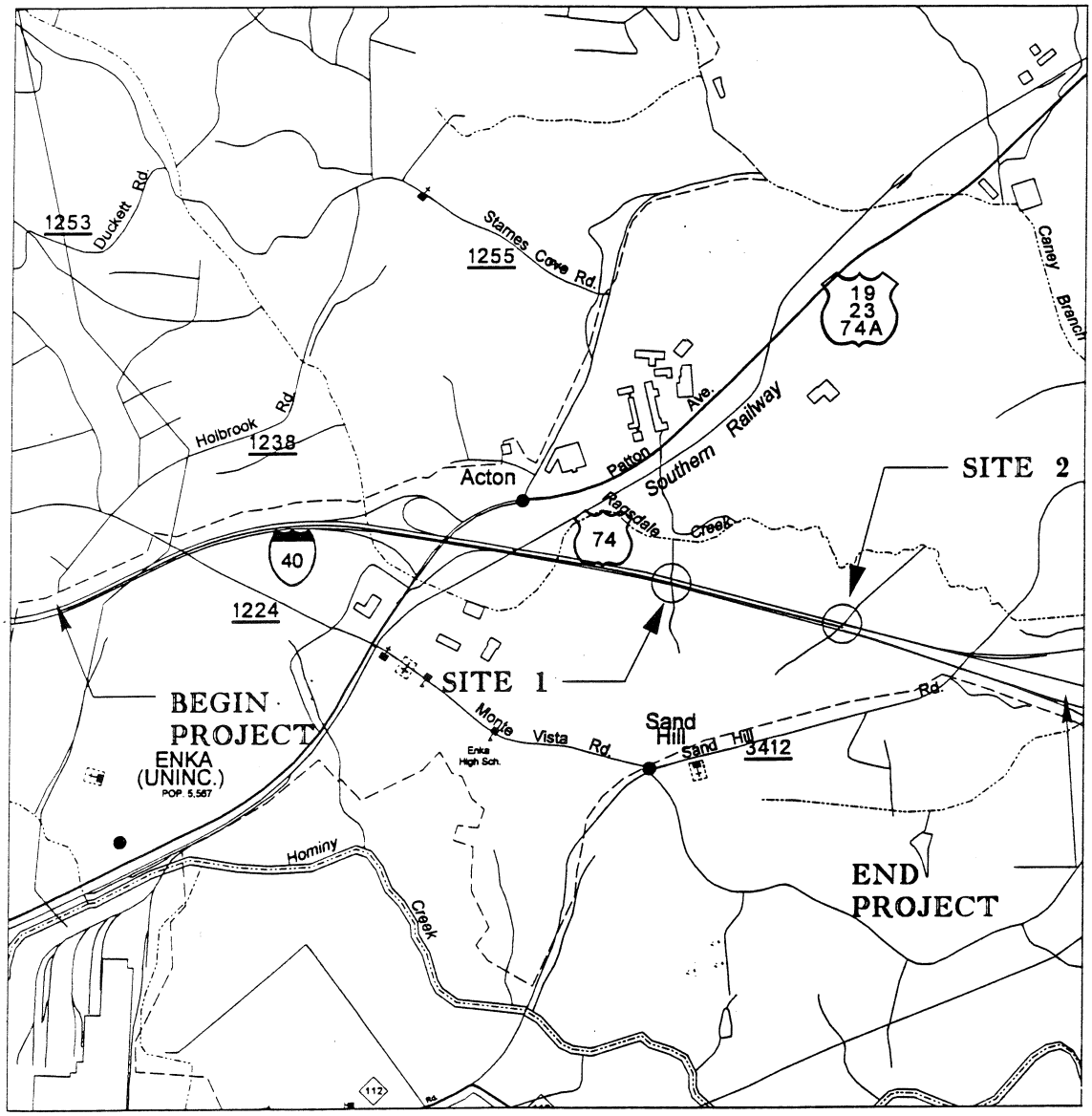
If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-715-1929.

Sincerely,

William D. Gilmore, P.E.
Director

cc: Ms. Angie Pennock, USACE-Asheville
Mr. John Hennessy, Division of Water Quality, Wetlands/401 Unit
File: I-4401





N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

I-40 AUXILIARY LANES FROM WEST OF US 19-23 (SMOKEY PARK HIGHWAY) TO THE I-240 / I-26 INTERCHANGE

SHEET ____ OF ____ 8 / 18 / 05

WETLAND LEGEND

WLB — WETLAND BOUNDARY

WETLAND

DENOTES FILL IN WETLAND

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN SURFACE WATER (POND)

DENOTES TEMPORARY FILL IN WETLAND

DENOTES EXCAVATION IN WETLAND

DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

COIR FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE

LEVEL SPREADER (LS)

DITCH / GRASS SWALE

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

I-40 AUXILIARY LANES FROM WEST OF US 19-23 (SMOKEY PARK HIGHWAY) TO THE I-240 / I-26 INTERCHANGE

SHEET **OF** **7/18/05**

PROPERTY OWNERS

NAMES AND ADDRESSES

PARCEL NO.	NAMES	ADDRESSES
5	LEONARD B. IRELAN	60 SELWYN RD. ASHEVILLE, NC 28806
8	LEON YOUNG ET AL C/O GAIL DOWNS	16226 WOOLWINE RD. CHARLOTTE, NC 28278
10	RENEE M. BARGER	PO BOX 1854 ENKA, NC 28728

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

I-40 AUXILIARY LANES FROM WEST OF US 19-23 (SMOKEY PARK HIGHWAY) TO THE I-240/I-26 INTERCHANGE

SHEET OF 7/18/05

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	166+00 -L- Lt.	48" RCP				0.010		0.017		77.8		
2	184+22 -L- RT.	48" RCP (INLET)						0.006		19.2		
2	10+50 -I40WBL- Lt.	48" RCP/30" RCP	0.014			0.014		0.008		47.1		
2	12+41 -I40EBL- Rt.	30" (INLET)						0.002		12.2		
TOTALS:			0.014			0.024		0.033		156.3		

Impacts reflect any necessary clearing and grubbing and the placement of rip rap.

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY
WBS - 34233.1.1 (I-4401)

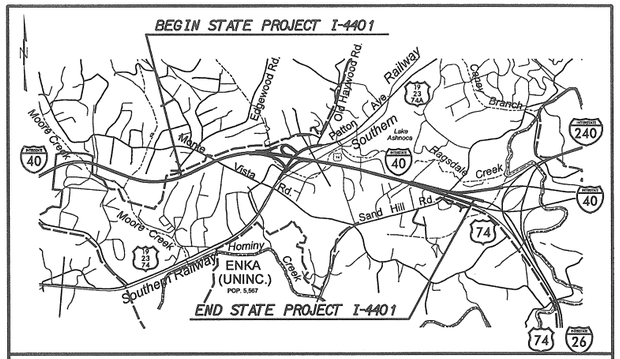
SHEET 8/29/2005

ATN Revised 3/31/05

TIP PROJECT: I-4401

CONTRACT: 34233.2.1

See Sheet 1-A For Index of Sheets



VINICITY MAP OF I-4401

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

ENGLISH

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-4401	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
34233.2.1	NHIMF-40-1(142)46		

LOCATION: I-40 AUXILIARY LANES FROM WEST OF US 19-23 (SMOKY PARK HIGHWAY) TO THE I-240 /I-26 INTERCHANGE

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

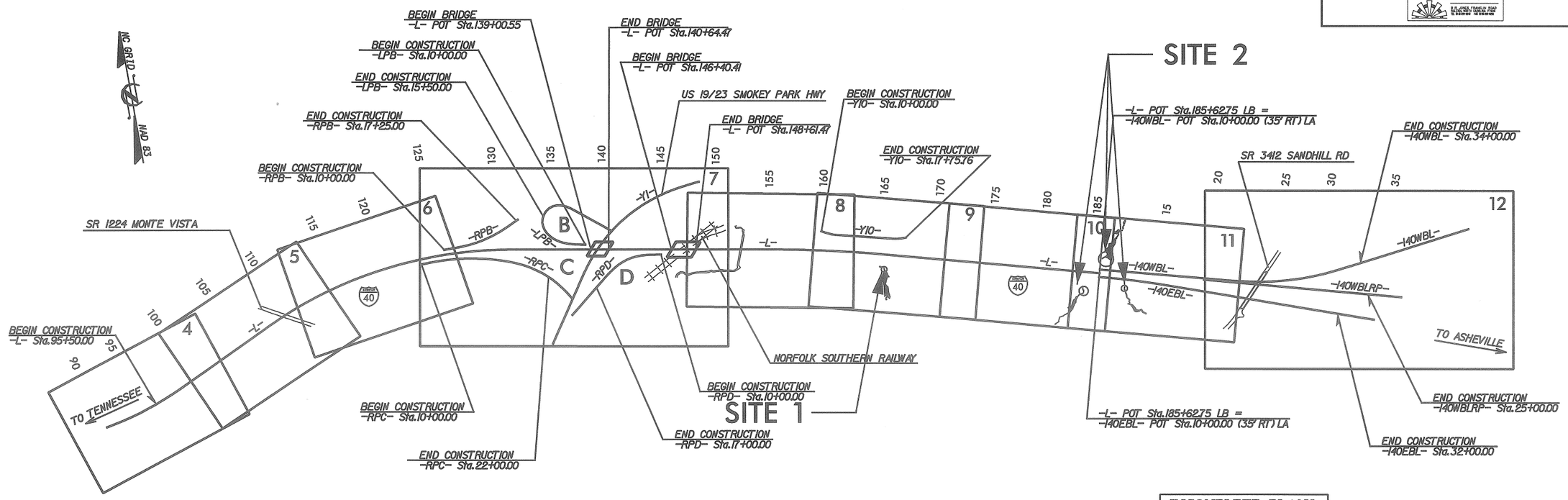
TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

RALPH WHITEHEAD ASSOCIATES, INC.
Consulting Engineers
1000 W. Morehead, Suite 200 - Charlotte, N.C. 28208

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606

SUNGATE DESIGN GROUP, P.A.



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.
THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

GRAPHIC SCALES

PLANS

PROFILE (HORIZONTAL)

PROFILE (VERTICAL)

DESIGN DATA

ADT (2005) = 85,180
ADT (2025) = 146,200
DHV = 10 %
D = 60 %
T = 19 % *
V = 60 MPH

* TTST DUAL

PROJECT LENGTH

LENGTH ROADWAY T.I.P. PROJECT I-4401	=	*2.089 mi.*
LENGTH STRUCTURES T.I.P. PROJECT I-4401	=	*0.073 mi.*
TOTAL LENGTH T.I.P. PROJECT I-4401	=	*2.162 mi.*

Prepared for:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR *DATE*

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08/24/2005
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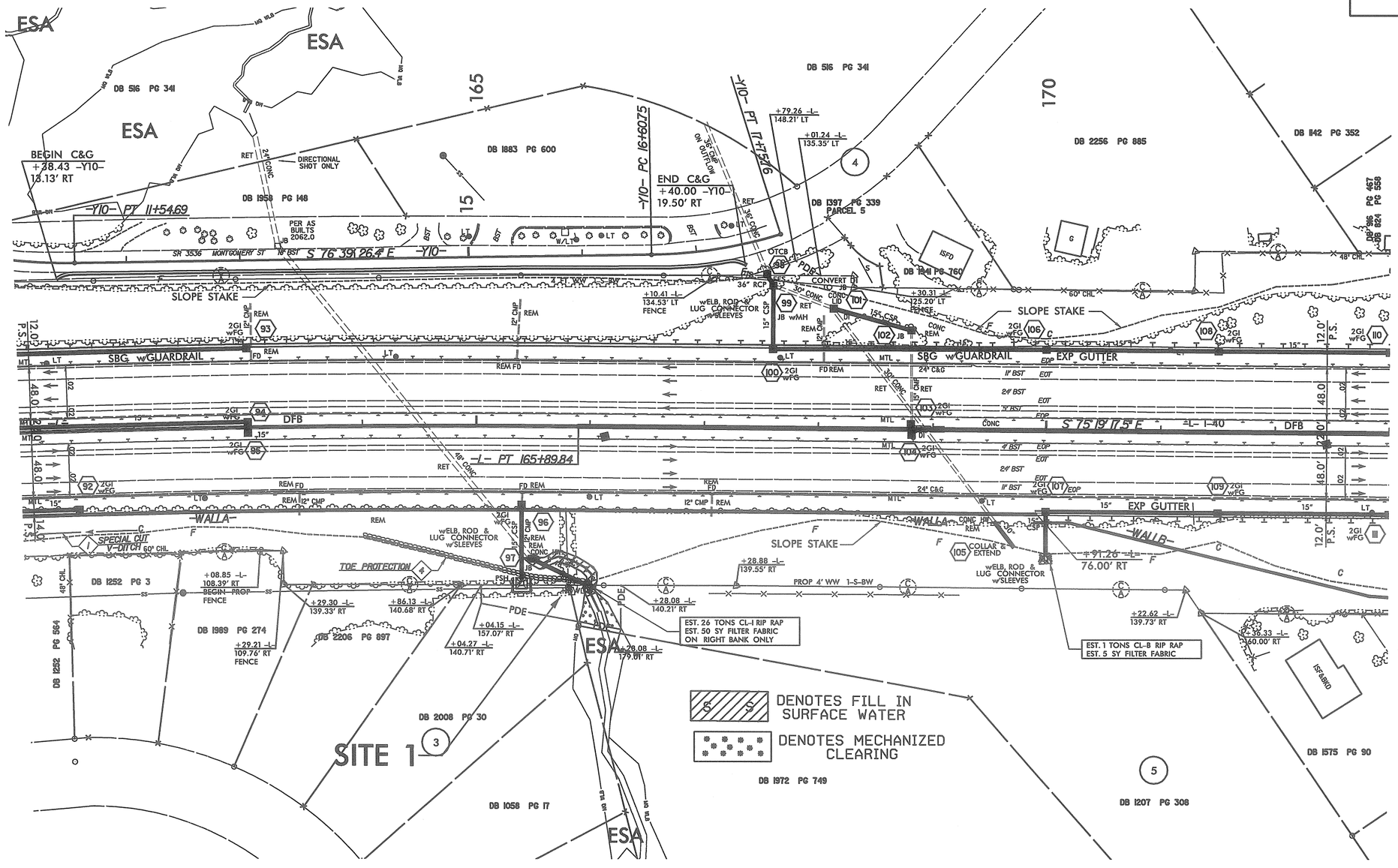
PROJECT REFERENCE NO.	SHEET NO.
I-4401	9
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

ENGLISH



CURVE DATA FOR -L-

PI Sta 160+67.66
Δ = 4° 59' 22.6" (RT)
D = 0° 28' 38.9"
L = 1,045.02'
T = 522.84'
R = 12,000.00'
Se = NC

CURVE DATA FOR -Y10-

PI Sta 10+78.12	PI Sta 17+18.65
Δ = 19° 41' 45.9" (LT)	Δ = 16° 28' 27.7" (LT)
D = 12° 43' 56.6"	D = 14° 19' 26.2"
L = 154.69'	L = 115.01'
T = 78.12'	T = 57.91'
R = 450.00'	R = 400.00'
Se = EXIST.	Se = EXIST.

SEE SHEETS 18 & 19 FOR -L- PROFILE

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08/24/2005
09:06:43 AM

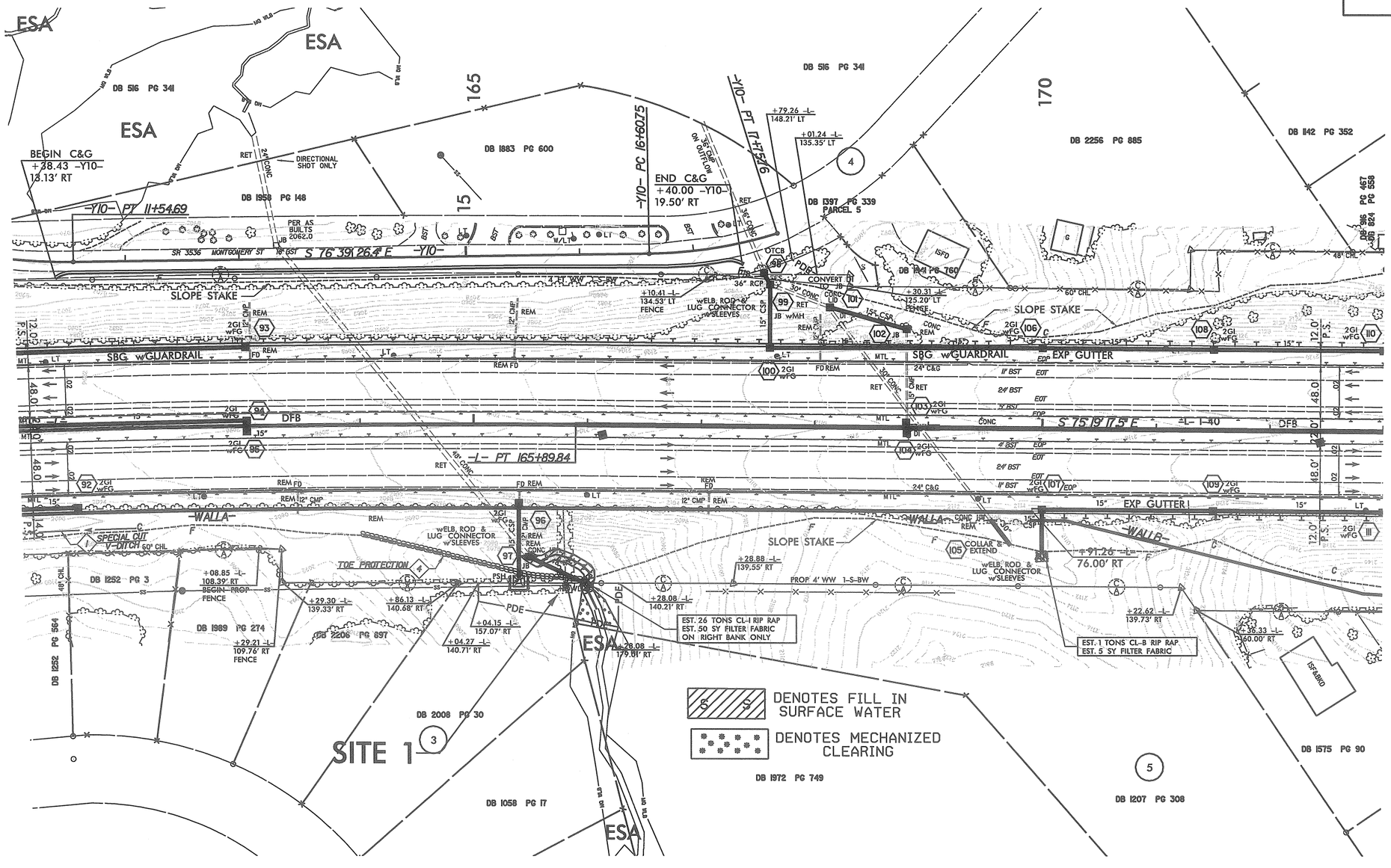
PROJECT REFERENCE NO.	SHEET NO.
I-4401	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4029 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



CURVE DATA FOR -L-

PI Sta 160+67.66
Δ = 4° 59' 22.6" (RT)
D = 0° 28' 38.9"
L = 1,045.02'
T = 522.84'
R = 12,000.00'
Se = NC

CURVE DATA FOR -Y10-

PI Sta 10+78.12	PI Sta 17+18.65
Δ = 19° 41' 45.9" (LT)	Δ = 16° 28' 27.7" (LT)
D = 12° 43' 56.6"	D = 14° 19' 26.2"
L = 154.69'	L = 115.01'
T = 78.12'	T = 57.91'
R = 450.00'	R = 400.00'
Se = EXIST.	Se = EXIST.

SEE SHEETS 18 & 19 FOR -L- PROFILE

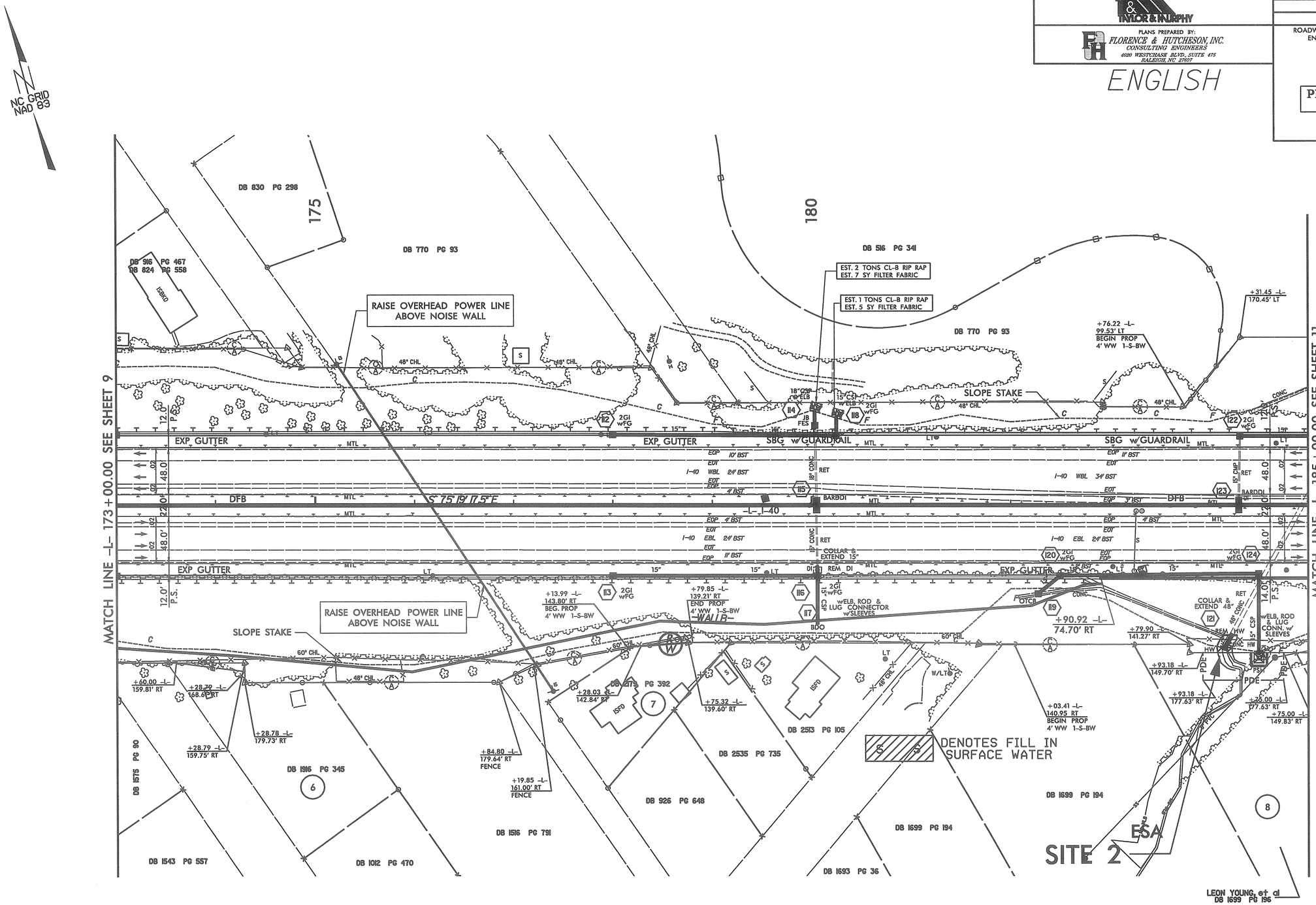
PROJECT REFERENCE NO.	SHEET NO.
I-4401	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



CURVE DATA FOR -L-
PI Sta 160+67.62
Δ = 4° 59' 23.0" (RT)
D = 0° 28' 38.9"
L = 1,045.04'
T = 522.85'
R = 12,000.00'
Se = NC

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ESA ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEETS 19 & 20 FOR -L- PROFILE

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PROJECT REFERENCE NO.	SHEET NO.
I-4401	10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

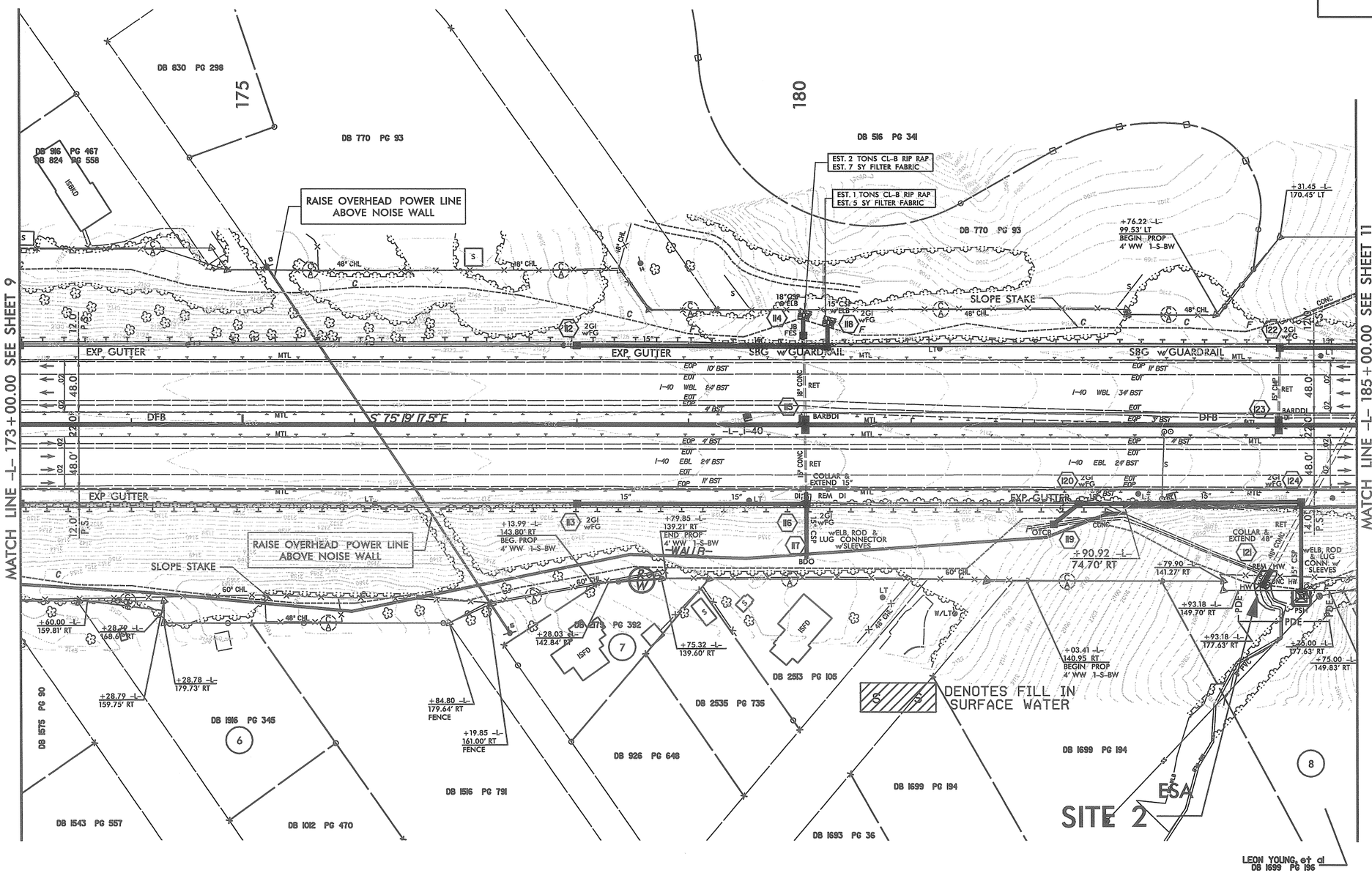
TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID NAD 83



CURVE DATA FOR -L-
PI Sta 160+67.62
Δ = 4° 59' 23.0" (RT)
D = 0° 28' 38.9"
L = 1,045.04'
T = 522.85'
R = 12,000.00'
Se = NC

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ESA ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEETS 19 & 20 FOR -L- PROFILE

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PROJECT REFERENCE NO.	SHEET NO.
I-4401	11
R/W SHEET NO.	

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITS 475
RALEIGH, NC 27607

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

ENGLISH

NC GRID NAD 83

-L- POT 185+62.75 LB =
-I40WBL- POT 10+00.00 (35' RT) LA

DENOTES FILL IN SURFACE WATER

DENOTES FILL IN WETLAND

DENOTES MECHANIZED CLEARING

ESA

EST. 26 TONS CL-I RIP RAP
EST. 50 SY FILTER FABRIC
ON BANKS ONLY

EST. 7 TONS CL-I RIP RAP
EST. 17 SY FILTER FABRIC

SITE 2

+29.20 -L-
170.15' LT

+31.45 -L-
170.45' LT
END PROP
4' WW 1-S-BW

END PROP
CONCRETE BARRIER
+26.48 -I40WBL-
34.41 RT

SLOPE STAKE
+00.00
END SBG

DB 516 PG 341
DB 803 PG 453
DB 1424 PG 305

EST. 5 TONS CL-B RIP RAP
EST. 16 SY FILTER FABRIC

SPECIAL CUT V-DITCH

-I40WBLRP- POT 19+52.00 =
-I40WBL POT 10+00.00 (112' RT)

-I40WBL- TS 19+95.37

COLLAR & EXTEND 30" FES

SBG
S 75° 19' 17.5" E -I40WBL-
S 75° 19' 17.5" E DFB
-I40EBL-
S 75° 19' 17.5" E

-I40WBL-
-I40WBLRP-
S 75° 15' 50.0" E

-WALLC-
SLOPE STAKE
TOE PROTECTION
40.00' (TYP.)
+86.37 -I40EBL-
91.37' RT

+25.00 -I40EBL-
79.92' RT
+25.00 -I40EBL-
93.41' RT
+25.00 -I40EBL-
115.00' RT

+85.00 -I40EBL-
80.12' RT
+85.00 -I40EBL-
112.67' RT

+00.00 BEG EXP GUTTER
EXP GUTTER
+75.00 END EXP GUTTER

-L- POT 185+62.75 LB =
-I40EBL- POT 10+00.00 (35' RT) LA
-I40EBL- TS 10+12.77

-I40EBL- SC 11+32.77
+86.37 -I40EBL- (91.37' RT)

-I40EBL- CS 15+12.89

-I40EBL- ST 16+32.89

+66.38
80.99 RT
BEGIN PROP
4' WW 1-S-BW

+66.19 -L-
158.99 RT

+45.35 -L-
148.47 RT
END PROP
4' WW 1-S-BW

4' WW 1-S-BW

ISBLKBUS

ISFBKD

DB 1327 PG 133
DB 1423 PG 348
DB 1978 PG 373
DB 1956 PG 20
DB 2642 PG 25
DB 1482 PG 382
DB 2931 PG 82
DB 1914 PG 5
DB 1418 PG 121

SLOPE STAKE

250.00'
SHLD TAPER

MATCH LINE -L- 185+00.00 SEE SHEET 10

MATCH LINE -I40WBL- 21+00.00 SEE SHEET 12

CURVE DATA FOR -I40EBL-

PIs Sta 10+92.77	PI Sta 13+22.89	PIs Sta 15+52.89
Θs = 0° 32' 13.7"	Δ = 3° 24' 10.8" (RT)	Θs = 0° 32' 13.7"
Ls = 120.00'	D = 0° 53' 42.9"	Ls = 120.00'
LT = 80.00'	L = 380.12	LT = 80.00'
ST = 40.00'	T = 190.12'	ST = 40.00'
	R = 6,400.00'	
	Se = 0.03	

CURVE DATA FOR -I40WBL-

PIs Sta 23+28.89	PI Sta 27+82.81	PIs Sta 31+47.55
Θs = 5° 58' 05.9"	Δ = 13° 39' 33.8" (LT)	Θs = 2° 51' 53.2"
Ls = 500.00'	D = 2° 23' 14.4"	Ls = 240.00'
LT = 333.52'	L = 572.16	LT = 160.02'
ST = 166.84'	T = 287.44'	ST = 80.02'
	R = 2,400.00'	
	Se = 0.06	

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ESA ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEET 20 FOR -L- PROFILE
SEE SHEETS 20 & 21 FOR -I40EBL- PROFILE
SEE SHEETS 20 & 21 FOR -I40WBL- PROFILE
SEE SHEET 25 FOR -I40WBLRP- PROFILE

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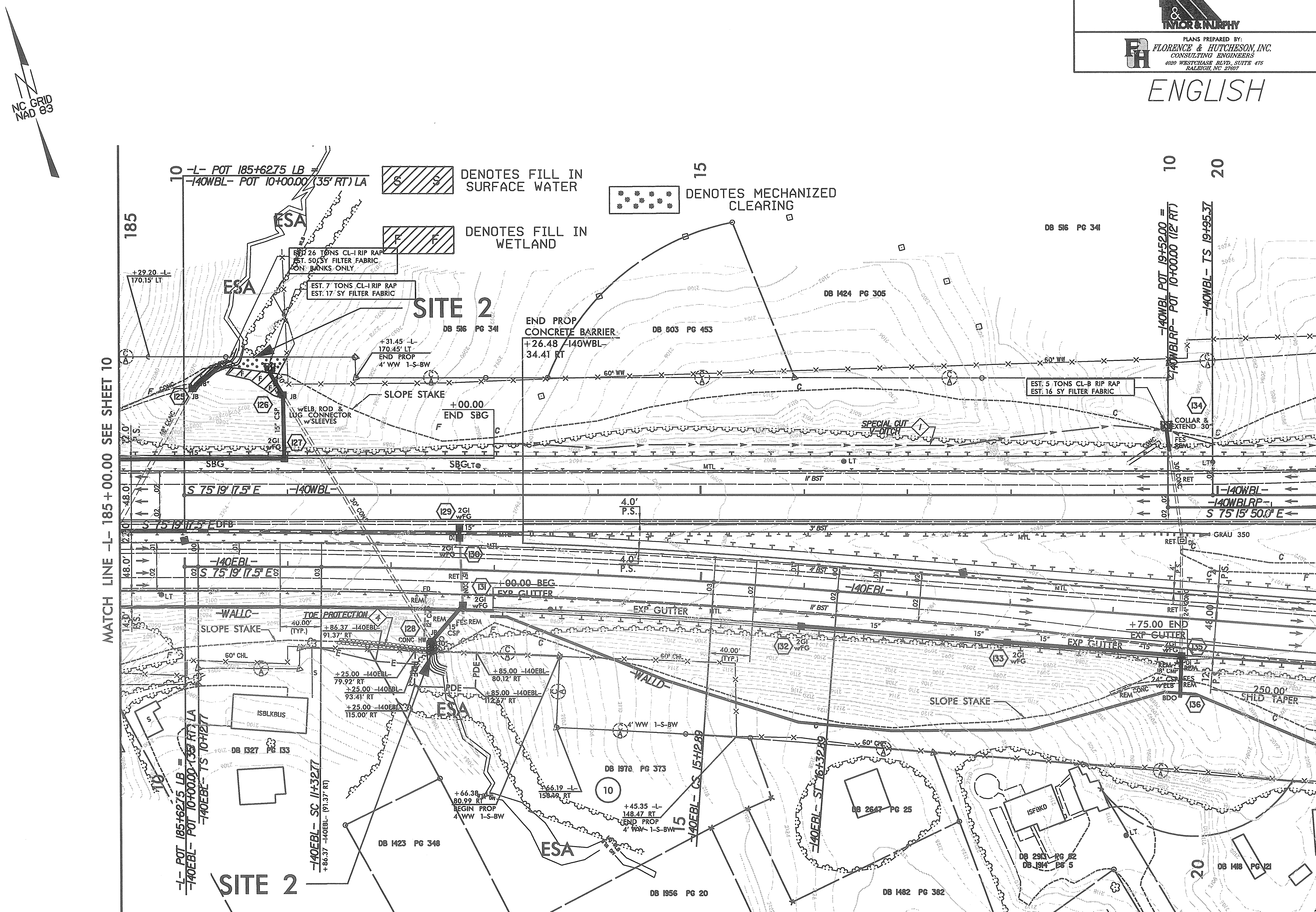
PROJECT REFERENCE NO.	SHEET NO.
I-4401	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

ENGLISH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NC GRID NAD 83
DENOTES FILL IN SURFACE WATER
DENOTES FILL IN WETLAND
DENOTES MECHANIZED CLEARING
SITE 2
ESA
MATCH LINE -L- 185+00.00 SEE SHEET 10
MATCH LINE -I40WBL- 21+00.00 SEE SHEET 12
-L- POT 185+62.75 LB = -I40WBL- POT 10+00.00 (35' RT) LA
EST. 26 TONS CL-I RIP RAP
EST. 50 SY FILTER FABRIC
ON BANKS ONLY
EST. 7 TONS CL-I RIP RAP
EST. 17 SY FILTER FABRIC
EST. 5 TONS CL-B RIP RAP
EST. 16 SY FILTER FABRIC
END PROP CONCRETE BARRIER +26.48 -I40WBL- 34.41 RT
SLOPE STAKE
END SBG
SPECIAL CUT V-DITCH
S 75°19' 17.5" E
S 75°15' 50.0" E
-I40WBL-
-I40EBL-
-I40WBLRP-
EXP. GUTTER
+75.00 END EXP. GUTTER
TOE PROTECTION
-WALLC-
-WALLD-
250.00' SHLD TAPER

CURVE DATA FOR -I40EBL-

PIs Sta 10+92.77	PI Sta 13+22.89	PIs Sta 15+52.89
θs = 0°32' 13.7"	Δ = 3°24' 10.8" (RT)	θs = 0°32' 13.7"
Ls = 120.00'	D = 0°53' 42.9"	Ls = 120.00'
LT = 80.00'	L = 380.12	LT = 80.00'
ST = 40.00'	T = 190.12'	ST = 40.00'
	R = 6,400.00'	
	Se = 0.03	

CURVE DATA FOR -I40WBL-

PIs Sta 23+28.89	PI Sta 27+82.81	PIs Sta 31+47.55
θs = 5°58' 05.9"	Δ = 13°39' 33.8" (LT)	θs = 2°51' 53.2"
Ls = 500.00'	D = 2°23' 14.4"	Ls = 240.00'
LT = 333.52'	L = 572.16	LT = 160.02'
ST = 166.84'	T = 287.44'	ST = 80.02'
	R = 2,400.00'	
	Se = 0.06	

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ESA — ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEET 20 FOR -L- PROFILE
SEE SHEETS 20 & 21 FOR -I40EBL- PROFILE
SEE SHEETS 20 & 21 FOR -I40WBL- PROFILE
SEE SHEET 25 FOR -I40WBLRP- PROFILE

t:\I-4401\Hydraulics\PERMITS\i-4401_hyd_prm_wet_psh11.dgn
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0 5 10	PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
	I-4401	X-1	155

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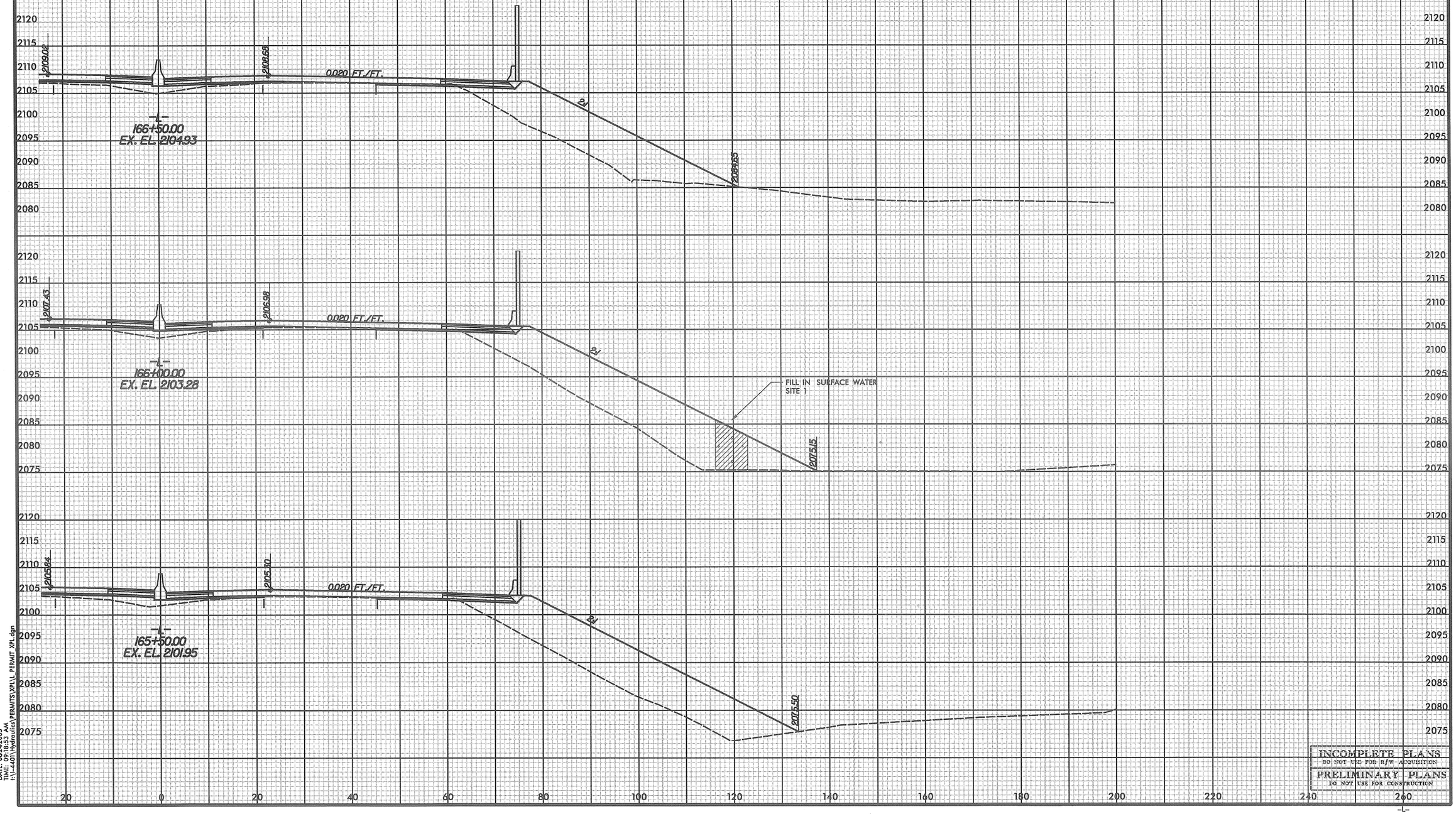

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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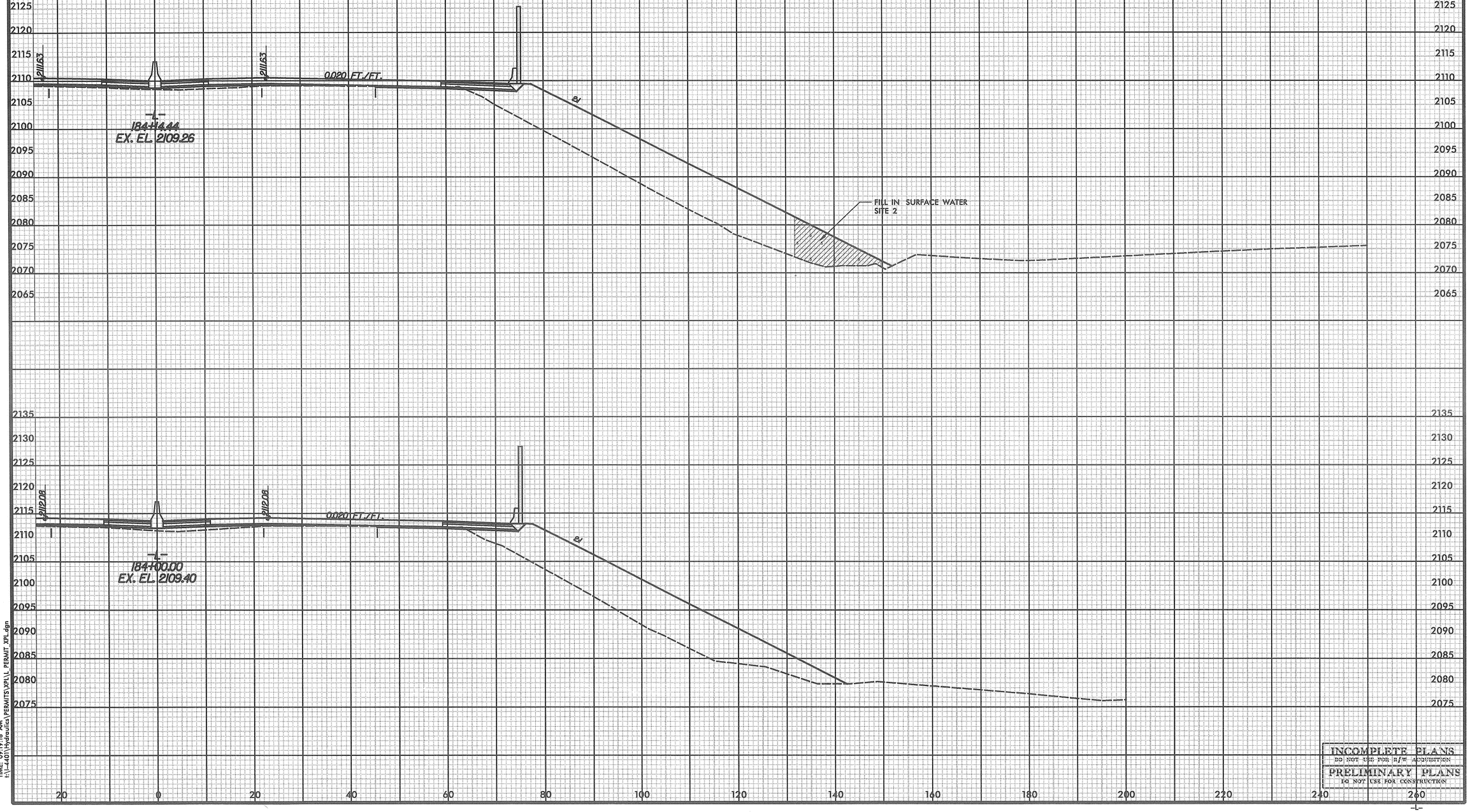

INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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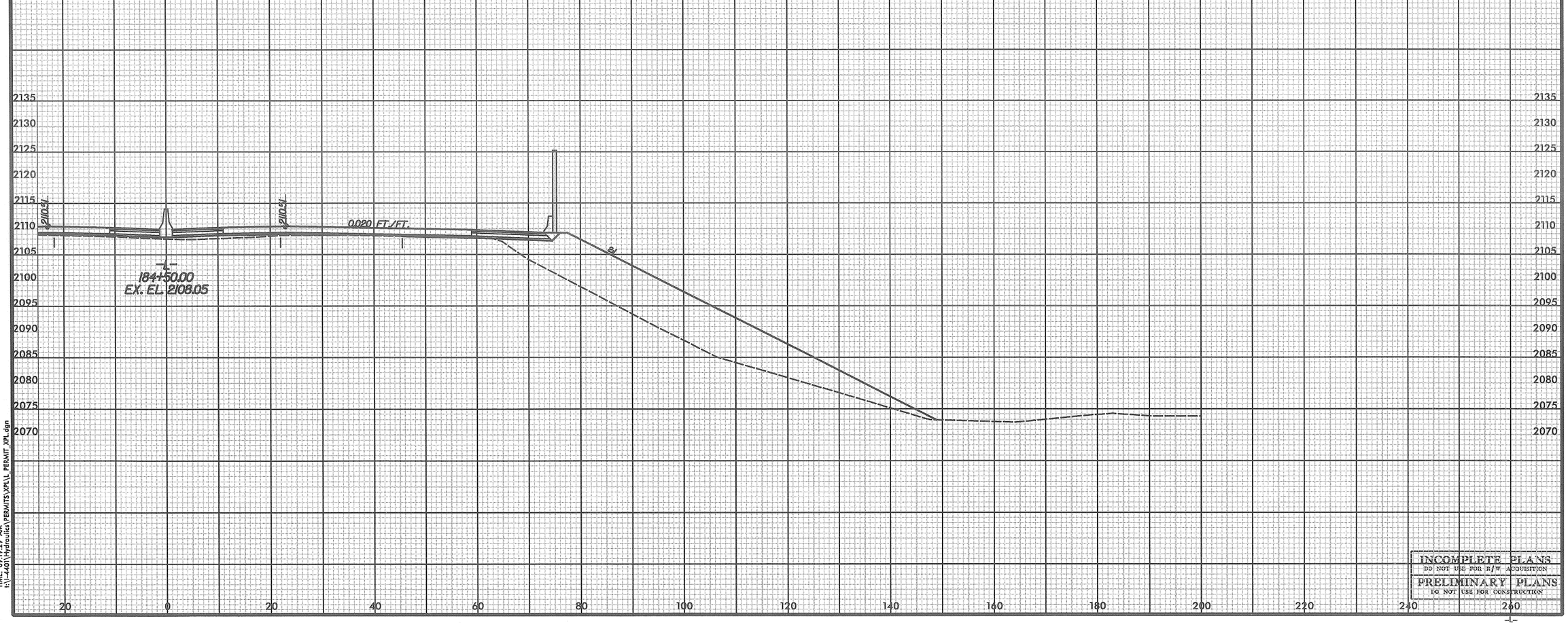

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INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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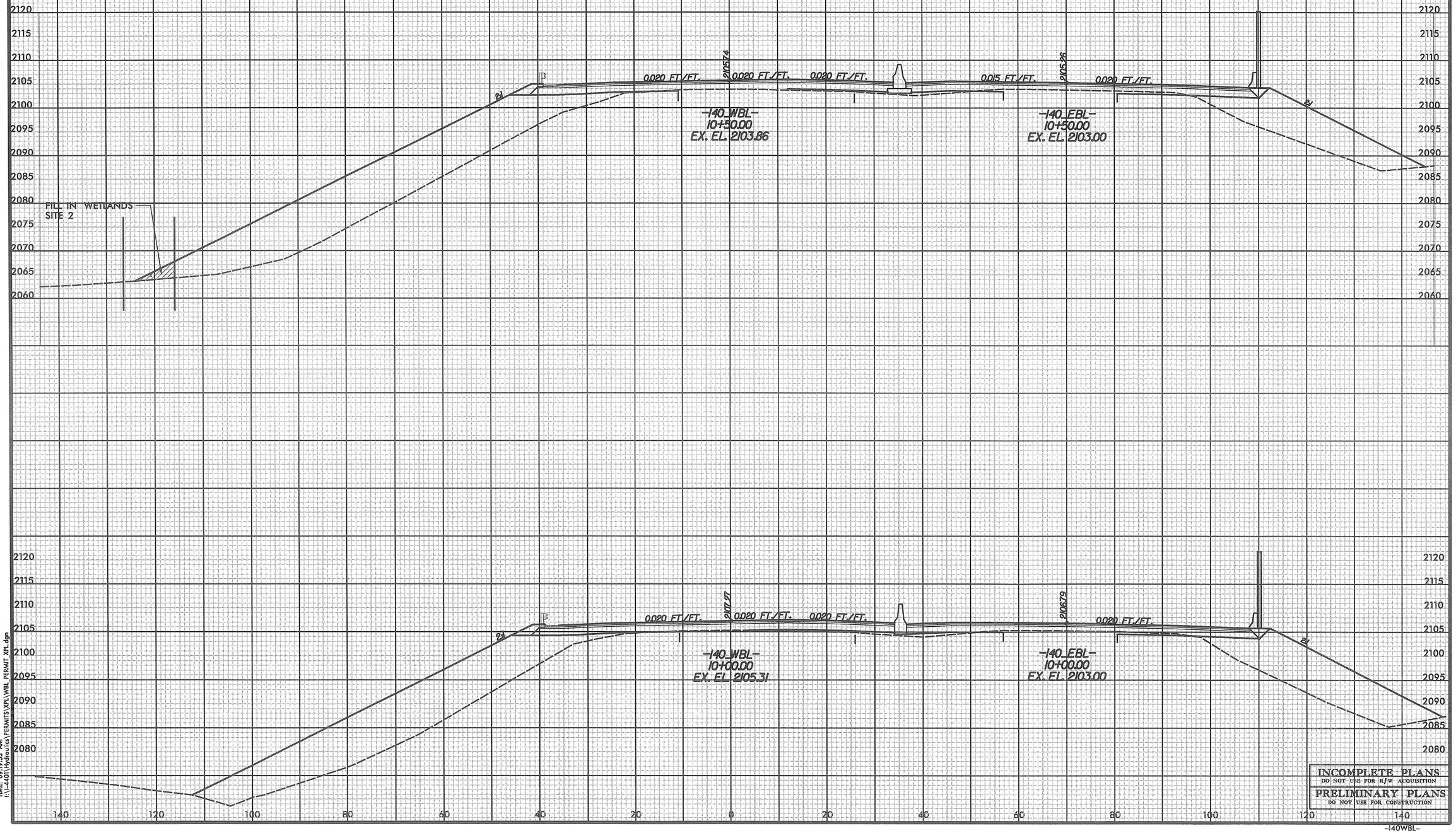
	I-4401	X-4	

SITE 2



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INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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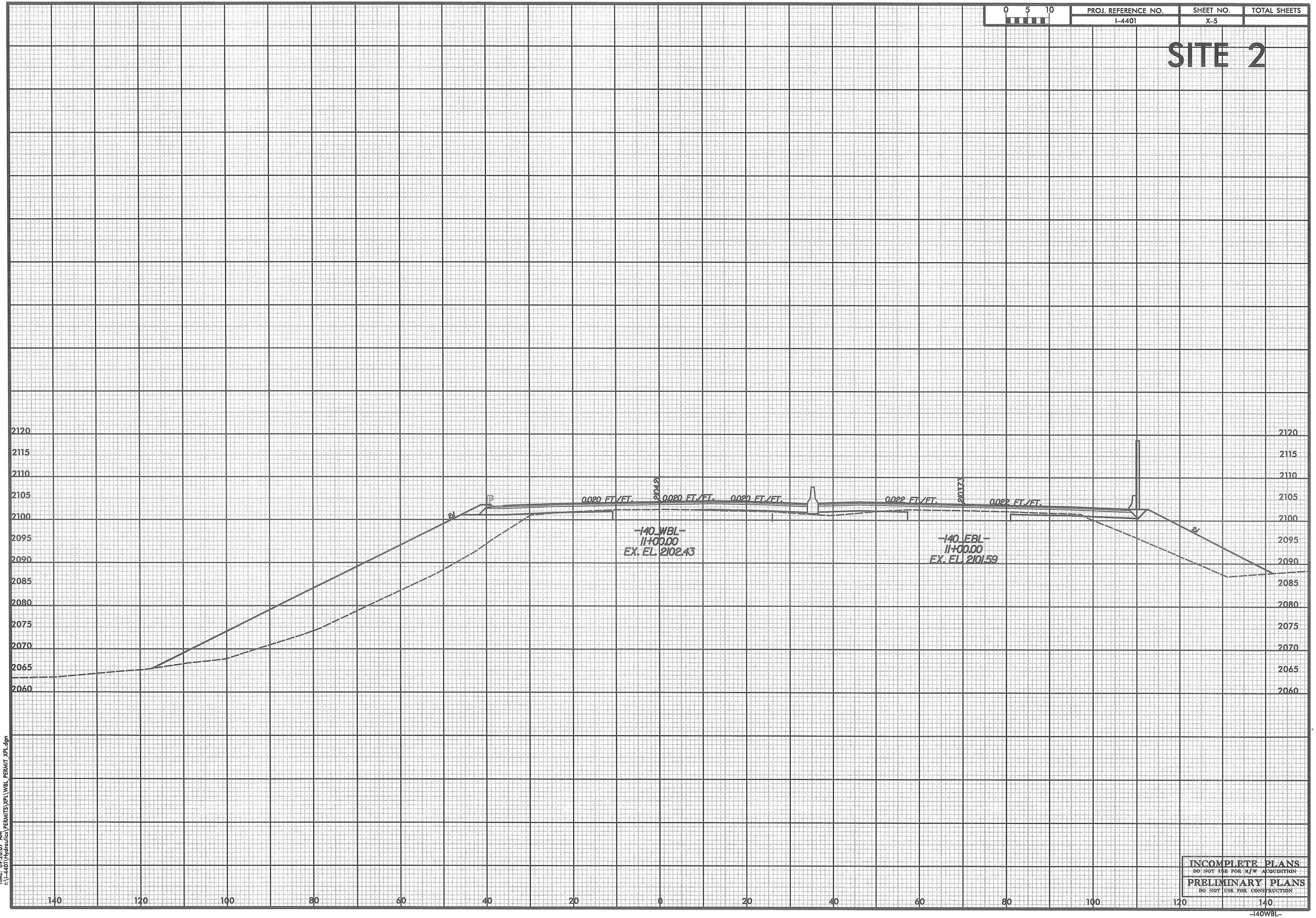
	I-4401	X-5	

SITE 2



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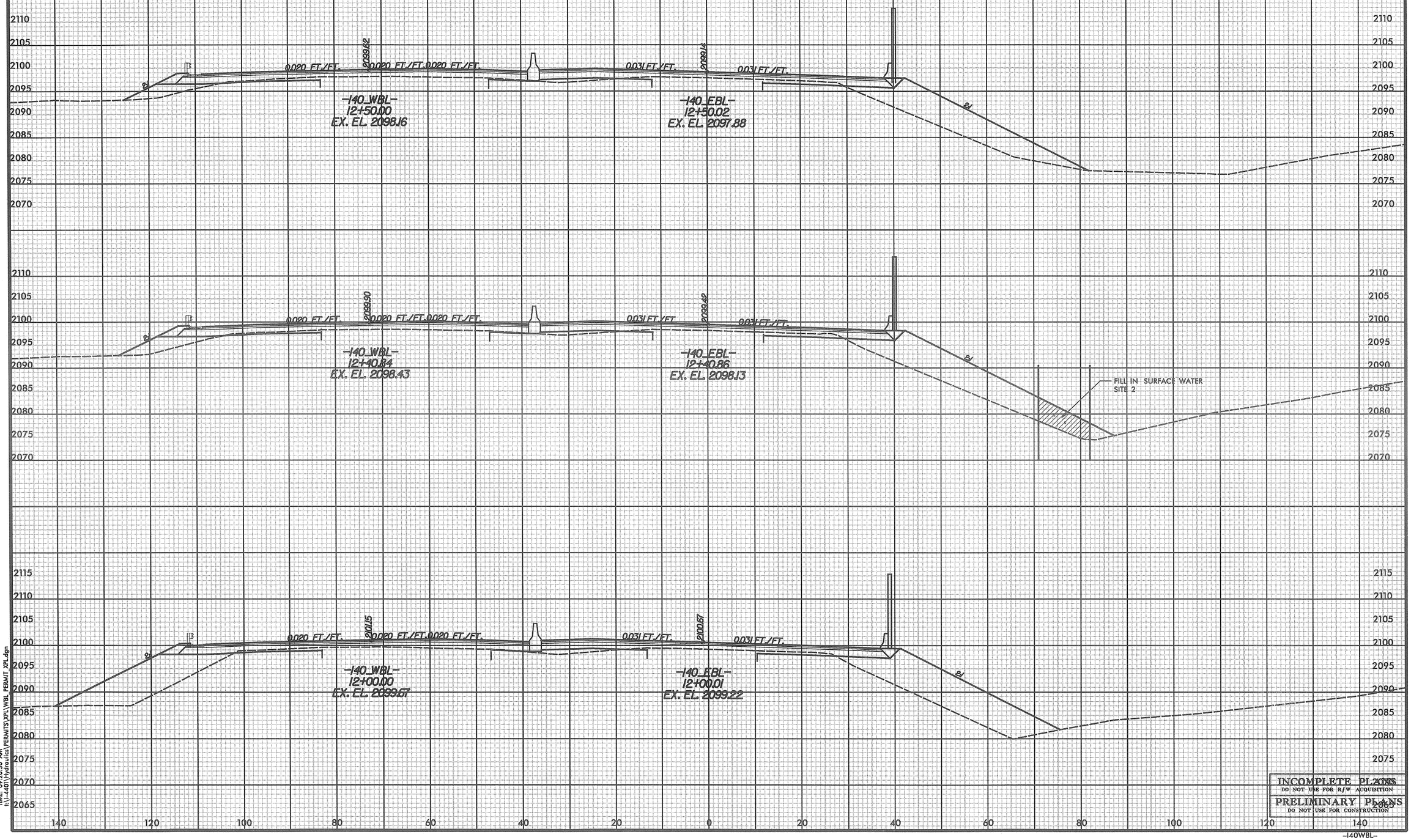
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

0 5 10	PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
	I-4401	X-6	

SITE 2



INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DATE: 08242005
TIME: 09:20:30 AM
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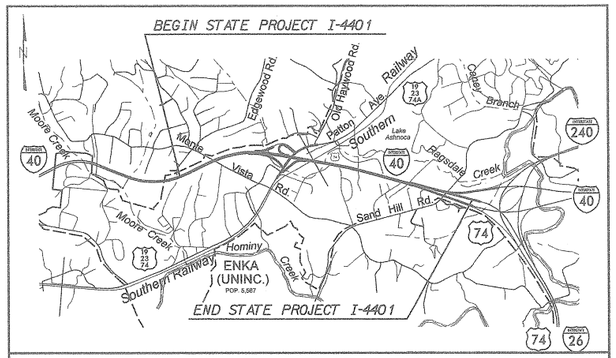
TIP PROJECT: I-4401

CONTRACT: C201277

See Sheet 1-A For Index of Sheets



VINICITY MAP OF I-4401

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-4401	1	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
8.1845801	NHIMF-40-1(142)46	

LOCATION: I-40 AUXILIARY LANES FROM WEST OF US 19-23 (SMOKY PARK HIGHWAY) TO THE I-240 /I-26 INTERCHANGE

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

TAYLOR & MURPHY

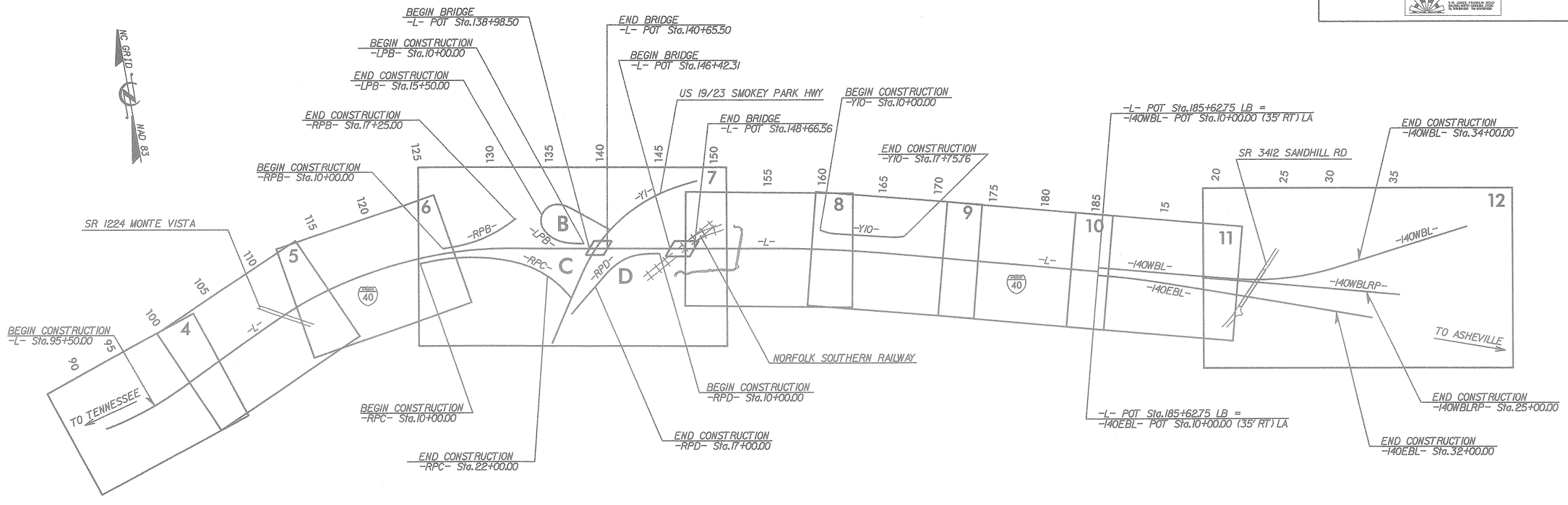
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

RALPH WHITEHEAD ASSOCIATES, INC.
Consulting Engineers
1000 W. Morehead, Suite 200 · Charlotte, N.C. 28208

Plans prepared by:
KO & ASSOCIATES, P.C.
Consulting Engineers
1011 SCHAUB DR., SUITE #202
RALEIGH, N.C. 27606

SUNGATE DESIGN GROUP, P.A.

RIGHT OF WAY PLANS



PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.
THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

GRAPHIC SCALES

PLANS

PROFILE (HORIZONTAL)

PROFILE (VERTICAL)

DESIGN DATA

ADT (2005) = 85,180
ADT (2025) = 146,200
DHV = 10 %
D = 60 %
T = 24 % *
V = 60 MPH

* TTST 19% DUAL 5%

PROJECT LENGTH

LENGTH ROADWAY T.I.P. PROJECT I-4401	=	2.087 mi.
LENGTH STRUCTURES T.I.P. PROJECT I-4401	=	0.074 mi.
TOTAL LENGTH T.I.P. PROJECT I-4401	=	2.161 mi.

NOTE: WESTBOUND LANES USED TO CALCULATE LENGTH OF PROJECT

Prepared for:
DIVISION OF HIGHWAYS
1000 Birch Ridge Dr., Raleigh NC, 27610

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

2002 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:

PROJECT ENGINEER

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

P.E.
STATE DESIGN ENGINEER

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED
DIVISION ADMINISTRATOR DATE

$FILE$
$DATE$
$TIME$

Note: Not to Scale

**S.U.E. = Subsurface Utility Engineering*

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

PROJECT REFERENCE NO.	SHEET NO.
I-4401	1-B

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

BOUNDARIES AND PROPERTY:

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing High Quality Wetland Boundary — HQ WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

- Stream or Body of Water
- Hydro, Pool or Reservoir
- River Basin Buffer — RBB
- Flow Arrow
- Disappearing Stream
- Spring
- Swamp Marsh
- Proposed Lateral, Tail, Head Ditch — FLOW
- False Sump

RAILROADS:

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

RIGHT OF WAY:

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite Marker — RW
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Utility Easement — PUE

ROADS AND RELATED FEATURES:

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Wheel Chair Ramp — WCR
- Curb Cut for Future Wheel Chair Ramp — CCFR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equaility Symbol
- Pavement Removal

VEGETATION:

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

EXISTING STRUCTURES:

MAJOR:

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

MINOR:

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

UTILITIES:

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole — HH
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

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

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

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

PAVEMENT SCHEDULE

ITEM	DESCRIPTION
A1	14" Portland Cement Concrete Pavement Through Lanes (With Dowels)
A2	14" Portland Cement Concrete Pavement Through Lanes (W/O Dowels)
C	Prop. Approx 1.5" Asphalt Concrete Surface Course, Type S9.5B, at an Average Rate of 168 lbs. Per sq. yard.
C1	Prop. Approx 3.0" Asphalt Concrete Surface Course, Type S9.5C, at an Average Rate of 168 lbs. Per sq. yard in each of two layers.
C2	Prop. Approx 2.0" Asphalt Concrete Surface Course, Type S12.5D, at an Average Rate of 224 lbs. Per sq. yard.
C3	Prop. Approx 4.0" Asphalt Concrete Surface Course, Type S12.5D, at an Average Rate of 224 lbs. Per sq. yard in each of two layers.
C4	Prop. Var. Depth Asphalt Concrete Surface Course, Type S9.5, at an Average Rate of 112 lbs. Per sq. yard Per 1" Depth, to be placed in layers not to exceed 1.5" in depth.
C5	Prop. Var. Depth Asphalt Concrete Surface Course, Type S12.5, at an Average Rate of 112 lbs. Per sq. yard Per 1" Depth, to be placed in layers not to exceed 2.25" in depth.
D	Prop. Approx 4.0" Asphalt Concrete Intermediate Course, Type I19.0C, at an Average Rate of 456 lbs. Per sq. yard.
D1	Prop. Approx 4.0" Asphalt Concrete Intermediate Course, Type I19.0D, at an Average Rate of 456 lbs. Per sq. yard.
D2	Prop. Var. Depth Asphalt Concrete Intermediate Course, Type I19.0, at an Average Rate of 114 lbs. Per sq. yard Per 1" Depth, to be placed in layers not less than 2.25" or greater than 4.0" in depth.
E	Prop. Approx 3.0" Asphalt Concrete Base Course, Type B25.0B, at an Average Rate of 342 lbs. Per sq. yard.
E1	Prop. Approx 7.0" Asphalt Concrete Base Course, Type B25.0B, at an Average Rate of 399 lbs. Per sq. yard in each of two layers.
E2	Prop. Approx 12.0" Asphalt Concrete Base Course, Type B25.0C, at an Average Rate of 456 lbs. Per sq. yard in each of three layers.
E3	Prop. Approx 16.5" Asphalt Concrete Base Course, Type B25.0C, at an Average Rate of 627 lbs. Per sq. yard in each of three layers.
E4	Prop. Var. Depth Asphalt Concrete Base Course, Type B25.0, at an Average Rate of 114 lbs. Per sq. yard Per 1" Depth, to be placed in layers not less than 3" or greater than 5.5" in depth.
J	Prop. Var. Depth Aggregate Base Course
R1	Double Face Conc. Barrier (NCDOT Std. 854.02)
R2	Shoulder Berm Gutter
R3	Expressway Gutter
R4	2'-6" Concrete Curb & Gutter
R5	Single Face Conc. Barrier
T	Earth Material
U	Existing Pavement
V	MSE Retaining Wall
W	Var. Depth Asphalt Pavement
W1	Var. Depth Asphalt Pavement
W2	Var. Depth Asphalt Pavement
Y	3.0" Milling
Y1	4.5" Milling

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

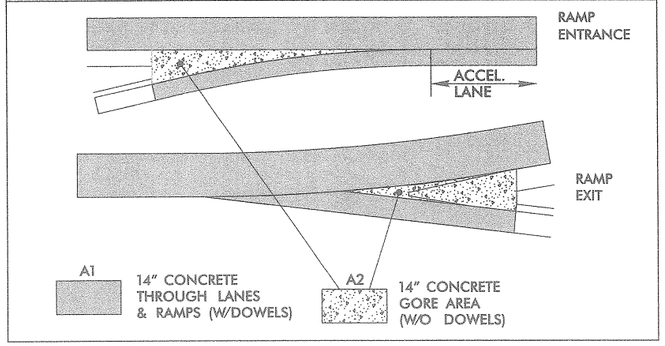
PROJECT REFERENCE NO.	SHEET NO.
I-4401	2
R/W SHEET NO.	

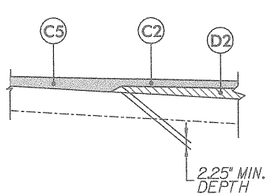
ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

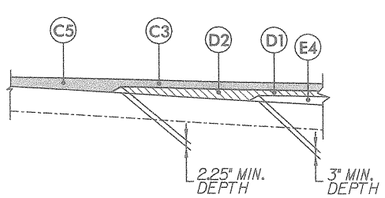
DETAIL OF CONCRETE PAVEMENT TYPE AT RAMP ENTRANCE AND EXIT





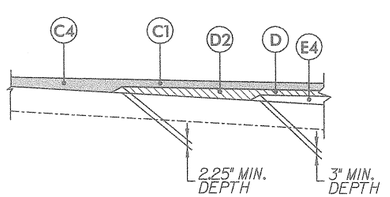
WEDGING DETAIL (W)

USE IN CONJUNCTION WITH TYPICAL SECTION No.1



WEDGING DETAIL (W1)

USE IN CONJUNCTION WITH TYPICAL SECTIONS No.4,5,6 & 7



WEDGING DETAIL (W2)

USE IN CONJUNCTION WITH TYPICAL SECTIONS No.10 & 12

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08/04/2005
08:24:25 AM

PAVEMENT SCHEDULE

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
A1	14" PCC w/Dowels	C4	Var. depth S9.5	E	3.0" B25.0B	J	Var. depth ABC	R5	Single Face Conc. Barrier	W	Var. Depth Asphalt Pavement	Y	3.0" Milling
C	1.5" S9.5B	C5	Var. depth S12.5	E1	7.0" B25.0B	R1	Double Face Conc. Barrier	T	Earth Material	W1	Var. Depth Asphalt Pavement	Y1	4.5" Milling
C1	3.0" S9.5C	D	4.0" I19.0C	E2	12.0" B25.0C	R2	Shoulder Berm Gutter	U	Existing Pavement	W2	Var. Depth Asphalt Pavement		
C2	2.0" S12.5D	D1	4.0" I19.0D	E3	16.5" B25.0C	R3	Expressway Gutter						
C3	4.0" S12.5D	D2	Var. depth I19.0	E4	Var. depth B25.0	R4	2'-6" Concrete Curb & Gutter						

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD. SUITE 475
RALEIGH, NC 27607

NOTES:

ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

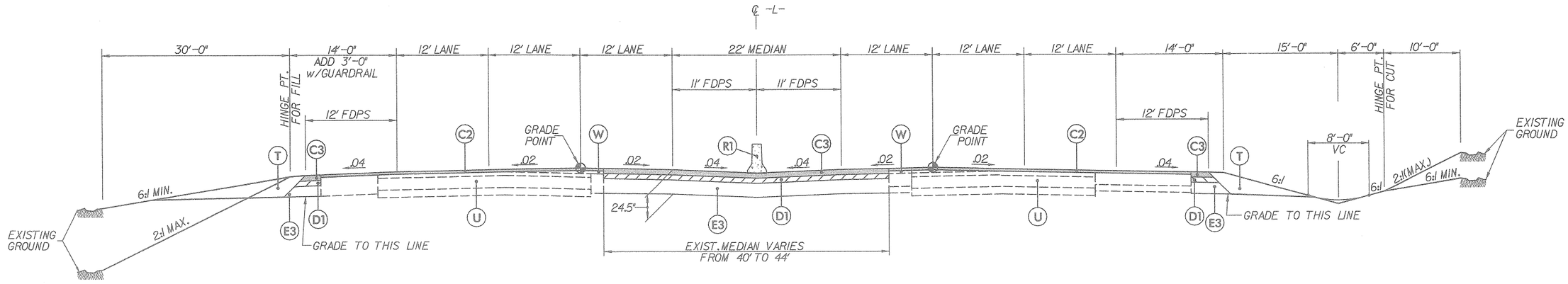
SHOULDER ROLLOVER NOT TO EXCEED 0.06 (TYP).

PROJECT REFERENCE NO.	SHEET NO.
I-4401	2-A
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

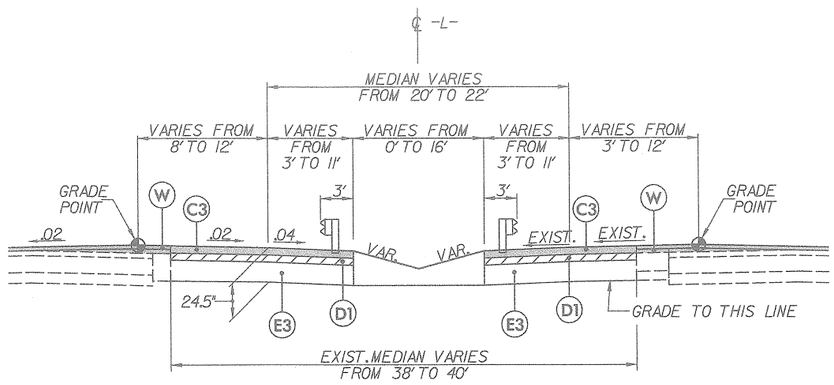


TYPICAL SECTION NO. 1

MEDIAN WIDTH VARIES FROM 95+50.00 TO 97+00.86
(SEE TYPICAL SECTION No. 1A)

WESTBOUND LANES
-L- 95+50.00 TO -L- 112+00.00

EASTBOUND LANES
-L- 95+50.00 TO -L- 112+00.00



TYPICAL SECTION NO. 1A

-L- 95+50.00 TO -L- 97+00.86
RESURFACING ONLY FROM -L- 95+50.00 TO -L- 96+00.00

R:\I-4401\Roadway\Proj\Typicals\I-4401_TYP_2-A.dgn
08/04/2005
08:17:55 AM

PAVEMENT SCHEDULE

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
A1	14" PCC w/Dowels	C4	Var. depth S9.5	E	3.0" B25.0B	J	Var. depth ABC	R5	Single Face Conc. Barrier	W	Var. Depth Asphalt Pavement	Y	3.0" Milling
C	1.5" S9.5B	C5	Var. depth S12.5	E1	7.0" B25.0B	R1	Double Face Conc. Barrier	T	Earth Material	W1	Var. Depth Asphalt Pavement	Y1	4.5" Milling
C1	3.0" S9.5C	D	4.0" I19.0C	E2	12.0" B25.0C	R2	Shoulder Berm Gutter	U	Existing Pavement	W2	Var. Depth Asphalt Pavement		
C2	2.0" S12.5D	D1	4.0" I19.0D	E3	16.5" B25.0C	R3	Expressway Gutter						
C3	4.0" S12.5D	D2	Var. depth I19.0	E4	Var. depth B25.0	R4	2'-6" Concrete Curb & Gutter						

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

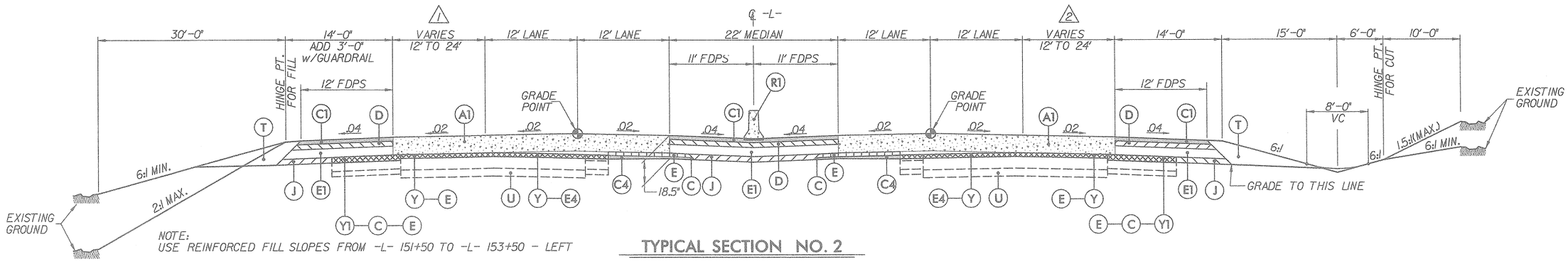
NOTES:

ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

SHOULDER ROLLOVER NOT TO EXCEED 0.06 (TYP).

PROJECT REFERENCE NO.	SHEET NO.
I-4401	2-B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION NO. 2

WESTBOUND LANES

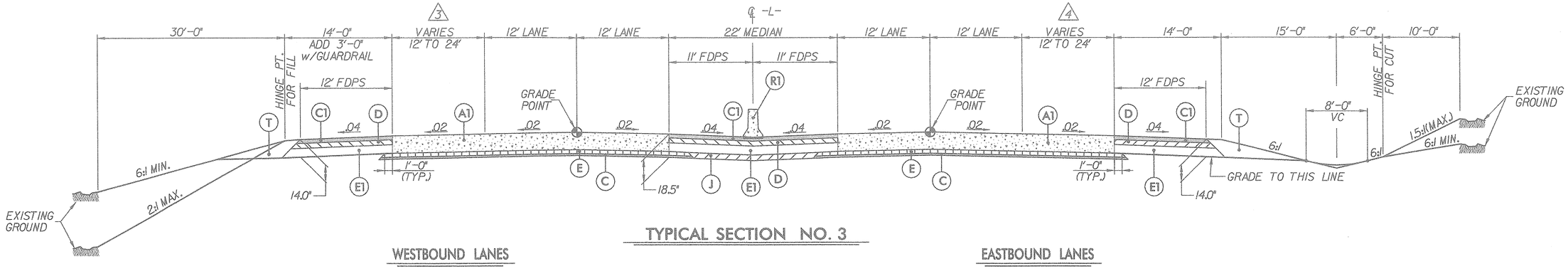
-L- 112+00.00 TO -L- 120+00.00
-L- 123+50.00 TO -L- 130+50.00
-L- 149+50.00 TO -L- 185+62.75

1 WESTBOUND AUXILLARY LANES
TAPER FROM 119+70.00 TO 122+70.00
AUXILLARY LANE FROM 122+70.00 TO 125+70.00
AUXILLARY LANE FROM 149+50.00 TO 185+62.75

EASTBOUND LANES

-L- 112+00.00 TO -L- 130+50.00
-L- 149+50.00 TO -L- 185+62.75

2 EASTBOUND AUXILLARY LANES
TAPER FROM 121+00.00 TO 123+32.62
AUXILLARY LANE FROM 123+32.62 TO 126+02.23
AUXILLARY LANE FROM 149+50.00 TO 185+62.75



TYPICAL SECTION NO. 3

WESTBOUND LANES

-L- 120+00.00 TO -L- 123+50.00
-L- 130+50.00 TO -L- 138+98.50 (BEGIN BRIDGE)
-L- 140+65.50 (END BRIDGE) TO -L- 146+42.31 (BEGIN BRIDGE)
-L- 148+66.56 (END BRIDGE) TO -L- 149+50.00

3 WESTBOUND AUXILLARY LANES
FROM 138+50.18 TO 149+50.00

EASTBOUND LANES

-L- 130+50.00 TO -L- 139+00.55 (BEGIN BRIDGE)
-L- 140+64.47 (END BRIDGE) TO 146+40.41 (BEGIN BRIDGE)
-L- 148+61.47 (END BRIDGE) TO L- 149+50.00

4 EASTBOUND AUXILLARY LANES
FROM 145+45.20 TO 149+50.00

USE MILLED RUMBLE STRIPS ON INSIDE & OUTSIDE SHOULDERS

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PAVEMENT SCHEDULE

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
A1	14" PCC w/Dowels	C4	Var. depth S9.5	E	3.0" B25.0B	J	Var. depth ABC	R5	Single Face Conc. Barrier	W	Var. Depth Asphalt Pavement	Y	3.0" Milling
C	1.5" S9.5B	C5	Var. depth S12.5	E1	7.0" B25.0B	R1	Double Face Conc. Barrier	T	Earth Material	W1	Var. Depth Asphalt Pavement	Y1	4.5" Milling
C1	3.0" S9.5C	D	4.0" I19.0C	E2	12.0" B25.0C	R2	Shoulder Berm Gutter	U	Existing Pavement	W2	Var. Depth Asphalt Pavement		
C2	2.0" S12.5D	D1	4.0" I19.0D	E3	16.5" B25.0C	R3	Expressway Gutter						
C3	4.0" S12.5D	D2	Var. depth I19.0	E4	Var. depth B25.0	R4	2'-6" Concrete Curb & Gutter						

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD. SUITE 475
RALEIGH, NC 27607

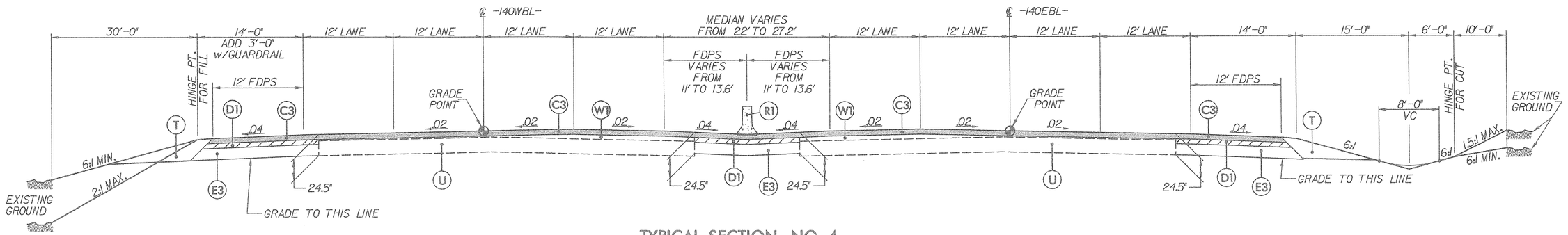
NOTES:

ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

SHOULDER ROLLOVER NOT TO EXCEED 0.06 (TYP).

PROJECT REFERENCE NO.	SHEET NO.
I-4401	2-C
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

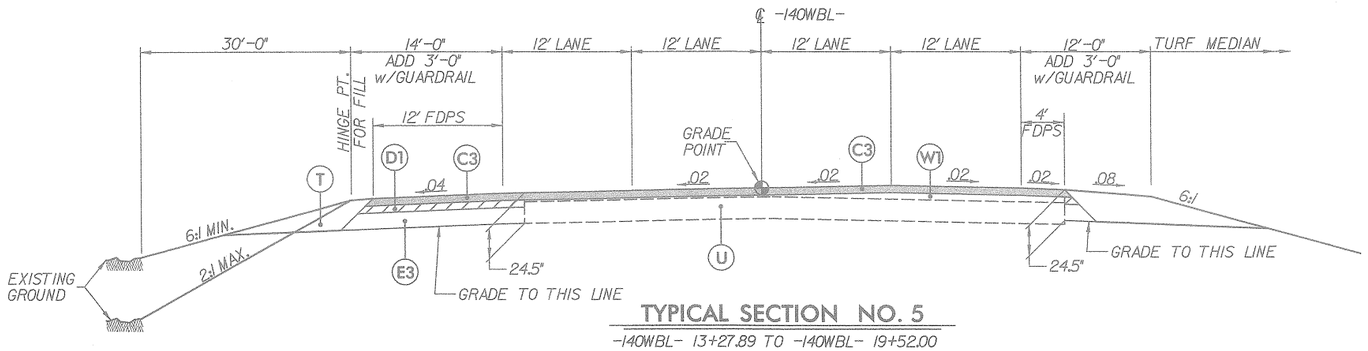
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



TYPICAL SECTION NO. 4

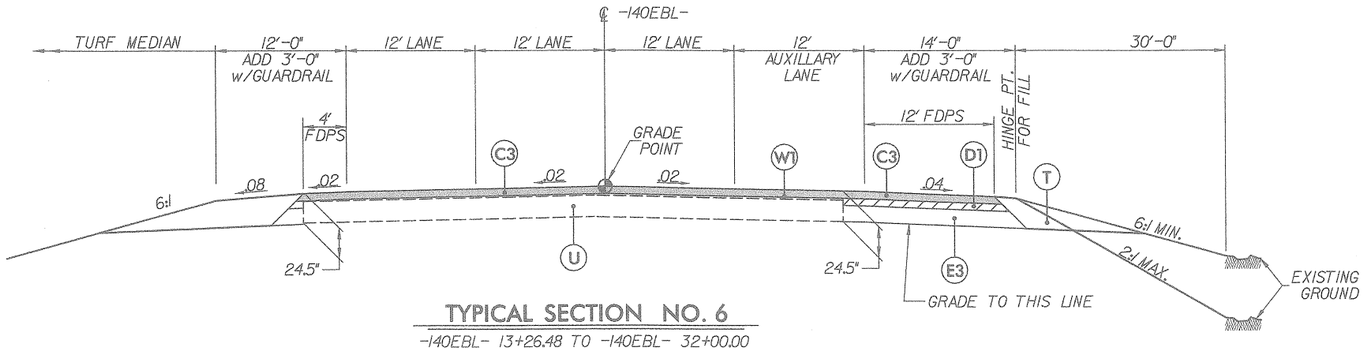
-I40WBL-
-I40WBL- 10+00.00 TO -I40WBL- 13+27.89

-I40EBL-
-I40EBL- 10+00.00 TO -I40EBL- 13+26.48



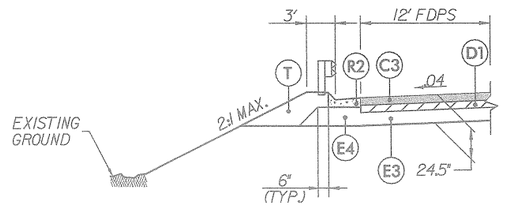
TYPICAL SECTION NO. 5

-I40WBL- 13+27.89 TO -I40WBL- 19+52.00



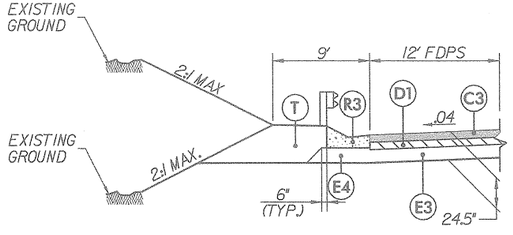
TYPICAL SECTION NO. 6

-I40EBL- 13+26.48 TO -I40EBL- 32+00.00



SHOULDER BERM GUTTER DETAIL

-I40WBL- 10+00.00 TO -I40WBL- 12+50.00
-I40WBL- 26+50.00 TO -I40WBL- 34+00.00



EXPRESSWAY GUTTER DETAIL

-I40EBL- 13+00.00 TO -I40EBL- 19+75.00
-I40WBL- 13+00.00 TO -I40WBL- 26+00.00

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PAVEMENT SCHEDULE

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
A1	14" PCC w/Dowels	C4	Var. depth S9.5	E	3.0" B25.0B	J	Var. depth ABC	R5	Single Face Conc. Barrier	W	Var. Depth Asphalt Pavement	Y	3.0" Milling
C	1.5" S9.5B	C5	Var. depth S12.5	E1	7.0" B25.0B	R1	Double Face Conc. Barrier	T	Earth Material	W1	Var. Depth Asphalt Pavement	Y1	4.5" Milling
C1	3.0" S9.5C	D	4.0" I19.0C	E2	12.0" B25.0C	R2	Shoulder Berm Gutter	U	Existing Pavement	W2	Var. Depth Asphalt Pavement		
C2	2.0" S12.5D	D1	4.0" I19.0D	E3	16.5" B25.0C	R3	Expressway Gutter						
C3	4.0" S12.5D	D2	Var. depth I19.0	E4	Var. depth B25.0	R4	2'-6" Concrete Curb & Gutter						

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

NOTES:

ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

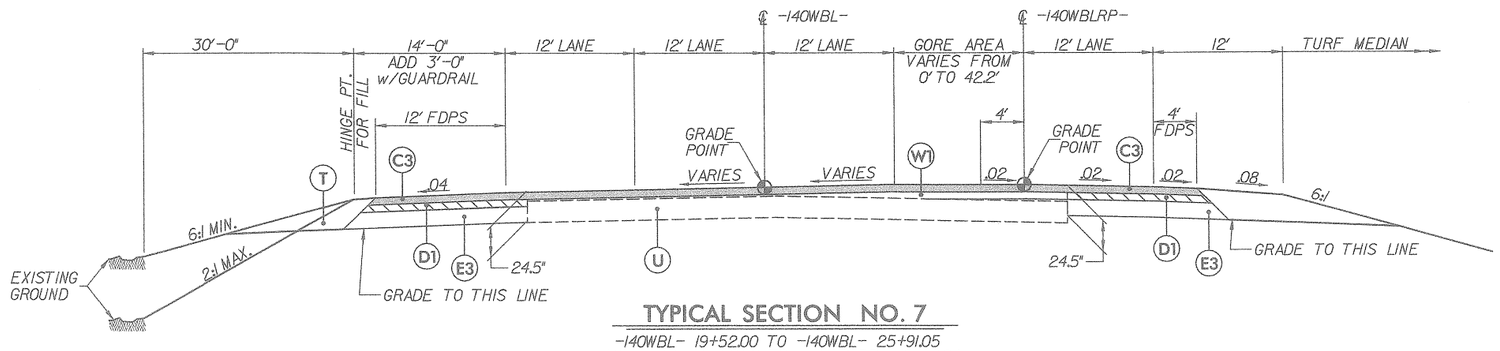
SHOULDER ROLLOVER NOT TO EXCEED 0.06 (TYP).

PROJECT REFERENCE NO.	SHEET NO.
I-4401	2-D
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

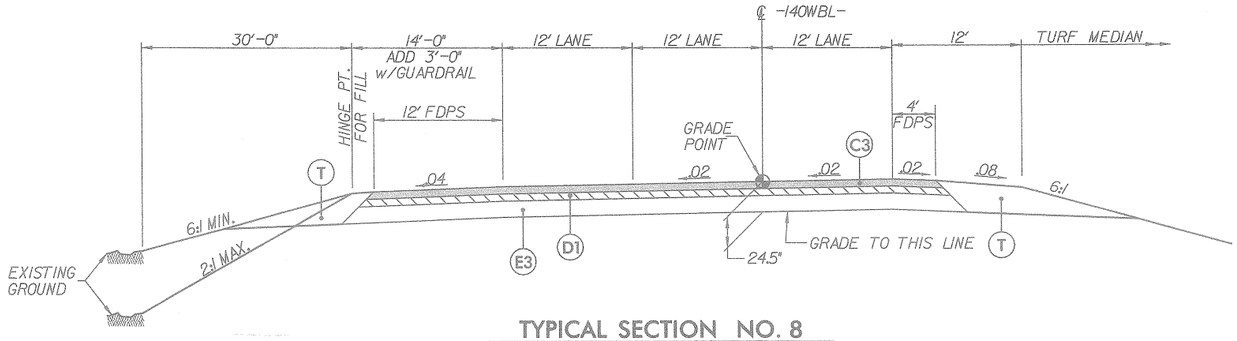
PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



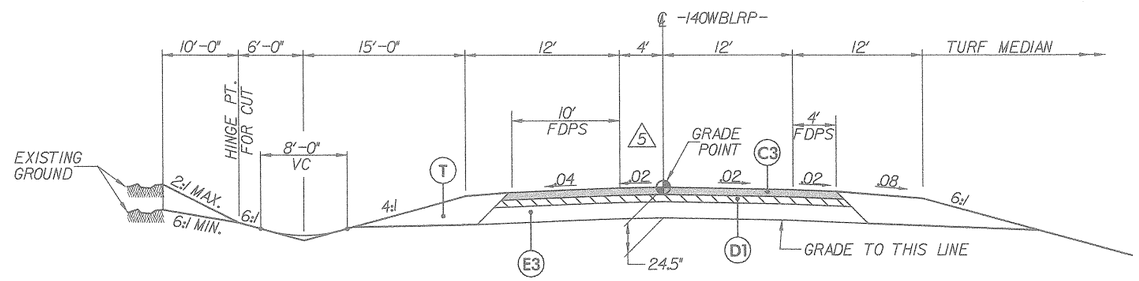
TYPICAL SECTION NO. 7

-I40WBL- 19+52.00 TO -I40WBL- 25+91.05
-I40WBLRP- 10+00.00 TO -I40WBLRP- 16+40.04



TYPICAL SECTION NO. 8

-I40WBL- 25+91.05 TO -I40WBL- 34+00.00



TYPICAL SECTION NO. 9

-I40WBLRP- 16+40.04 TO -I40WBLRP- 24+00.00

5 LANE TAPER
LANE VARIES FROM 24' TO 16' FROM 17+80.00 TO 24+00.00

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PAVEMENT SCHEDULE

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
A1	14" PCC w/Dowels	C4	Var. depth S9.5	E	3.0" B25.0B	J	Var. depth ABC	R5	Single Face Conc. Barrier	W	Var. Depth Asphalt Pavement	Y	3.0" Milling
C	1.5" S9.5B	C5	Var. depth S12.5	E1	7.0" B25.0B	R1	Double Face Conc. Barrier	T	Earth Material	W1	Var. Depth Asphalt Pavement	Y1	4.5" Milling
C1	3.0" S9.5C	D	4.0" I19.0C	E2	12.0" B25.0C	R2	Shoulder Berm Gutter	U	Existing Pavement	W2	Var. Depth Asphalt Pavement		
C2	2.0" S12.5D	D1	4.0" I19.0D	E3	16.5" B25.0C	R3	Expressway Gutter						
C3	4.0" S12.5D	D2	Var. depth I19.0	E4	Var. depth B25.0	R4	2'-6" Concrete Curb & Gutter						

TAYLOR & MURPHY

PROJECT REFERENCE NO.	SHEET NO.
I-4401	2-E
R/W SHEET NO.	

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

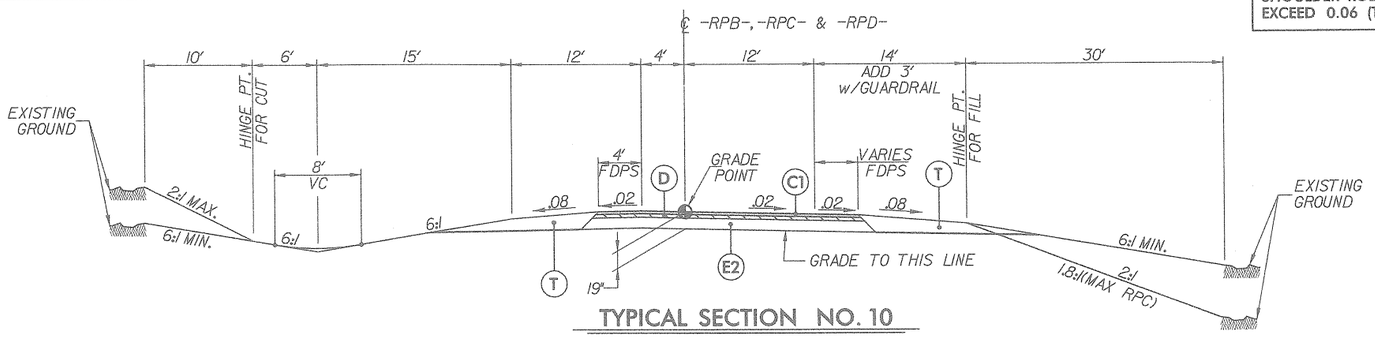
ROADWAY DESIGN ENGINEER	PAVEMENT DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTES:

ALL PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

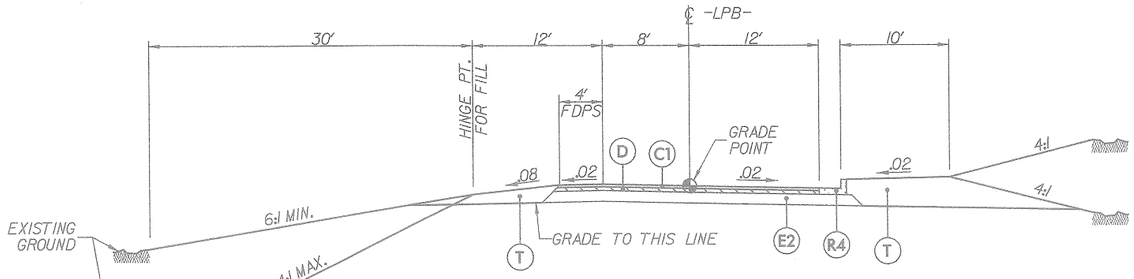
SHOULDER ROLLOVER NOT TO EXCEED 0.06 (TYP).



TYPICAL SECTION NO. 10

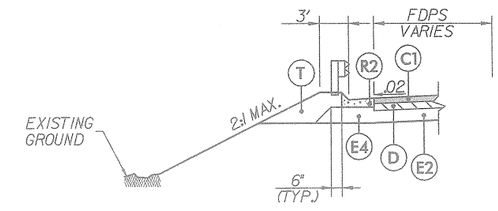
-RPB- 13+12.27 TO -RPB- 16+75.00
-RPC- 15+61.19 TO -RPC- 20+00.00
-RPD- 12+78.77 TO -RPD- 16+50.00
-RPB- 17+00.00 TO -RPB- 18+75.00 (RESURFACE ONLY)
-RPC- 20+00.00 TO -RPC- 21+75.00 (RESURFACE ONLY)
-RPD- 16+50.00 TO -RPD- 17+50.00 (RESURFACE ONLY)

NOTE:
USE REINFORCED FILL SLOPES FROM -RPC- 17+50 TO -RPC- 19+00 - RIGHT OUTSIDE PAVED SHOULDERS:
-RPB- VARIES FROM 12' FDPS TO 7' FDPS
-RPC- VARIES FROM 12' FDPS TO 8' FDPS
-RPD- 10' FDPS



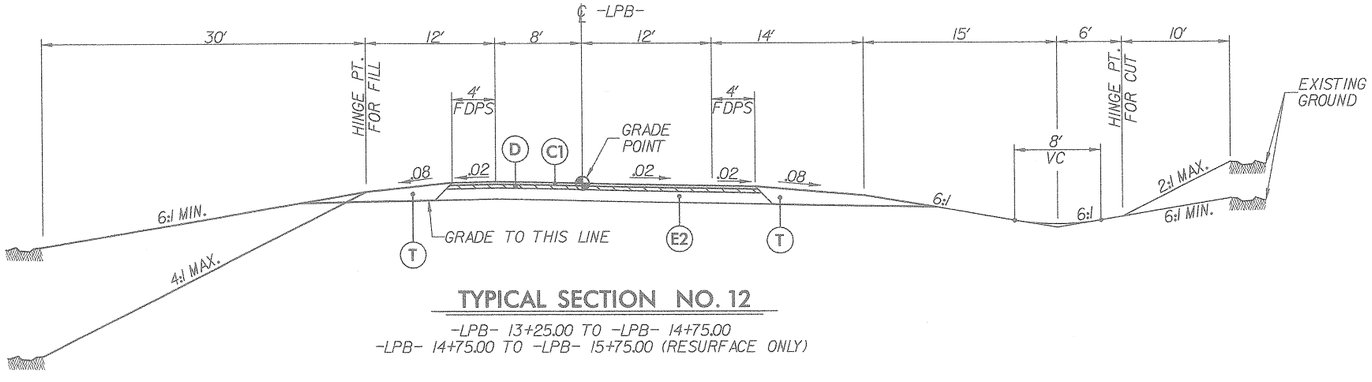
TYPICAL SECTION NO. 11

-LPB- 10+00.00 TO -LPB- 13+25.00



SHOULDER BERM GUTTER DETAIL

-RPB- 13+00.00 TO -RPB- 17+25.00
-RPC- 15+61.19 TO -RPC- 21+00.00
-RPD- 12+75.91 TO -RPD- 17+00.00
-RPB- 13+00.00 TO -RPB- 15+00.00 (FDPS TAPER FROM 12' TO 7' EXIST)
-RPC- 16+00.00 TO -RPC- 18+00.00 (FDPS TAPER FROM 12' TO 8' EXIST)
-RPD- FDPS VARIES FROM 10' TO 4'



TYPICAL SECTION NO. 12

-LPB- 13+25.00 TO -LPB- 14+75.00
-LPB- 14+75.00 TO -LPB- 15+75.00 (RESURFACE ONLY)

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TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

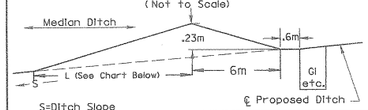
PROJECT REFERENCE NO.	SHEET NO.
I-4401	2-R
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DETAIL A
FALSE SUMP
(Not to Scale)

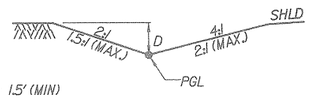


S=Ditch Slope

Ditch Grade		Ditch Grade	
0.0% To 2.0%	X	Over 4.0% To 6.0%	
Over 2.0% To 4.0%		Over 6.0%	

LEGEND ◁▷ FS

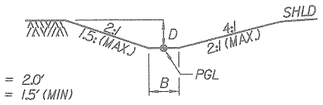
DETAIL 1
SPECIAL CUT V-DITCH



D = 1.5' (MIN)

STATION TO STATION
-L- 97+00 TO -L- 98+50 LT
-L- 105+50 TO -L- 108+00 LT
-L- 123+50 TO -L- 126+50 RT
-L- 158+00 TO -L- 162+00 RT
-140WBL- 13+00 TO -140WBL- 24+00 LT

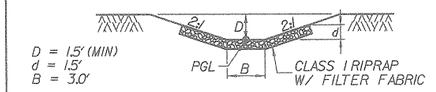
DETAIL 2
2.0' SPECIAL CUT BASE DITCH



B = 2.0'
D = 1.5' (MIN)

STATION TO STATION
-L- 112+00 TO -L- 120+60 RT

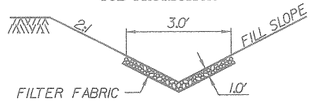
DETAIL 3
3.0' SPECIAL LATERAL BASE DITCH



D = 1.5' (MIN)
d = 1.5'
B = 3.0'

STATION TO STATION	CLASS I RIPRAP TONS	FILTER FABRIC SY	EST DDE CY
-L- 121+00 TO -L- 124+00 LT	320	575	100

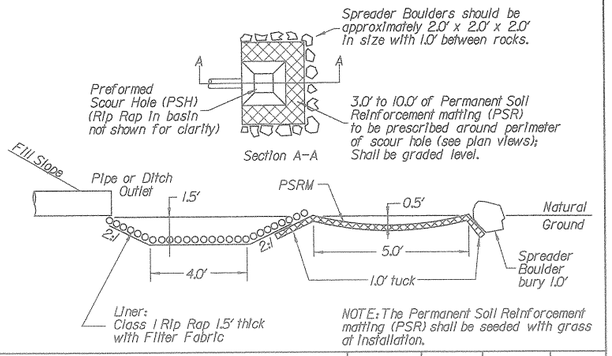
DETAIL 4
TOE PROTECTION



TYPE OF LINER = CLASS 'B' RIP RAP

STATION TO STATION	CLASS B RIPRAP TONS	FILTER FABRIC SY
-L- 147+15 TO -L- 147+60 LT	40	95
-L- 149+05 TO -L- 151+50 LT	200	500
-L- 156+50 TO -L- 157+50 RT	80	205
-L- 164+00 TO -L- 166+00 RT	160	410
-140EBL- 11+50 TO -140EBL- 12+40 RT	75	185

DETAIL 5
PREFORMED SCOUR HOLE WITH LEVEL SPREADER APRON



NOTE: The Permanent Soil Reinforcement matting (PSR) shall be seeded with grass at installation.

STATION	CLASS I RIPRAP TONS	DDE CY	FILTER FABRIC SY	PSRM SY
-RPB- 17+35 LT	12	7.0	20	28
-RPC- 20+50 RT	12	7.0	20	28
-L- 152+00 LT	12	7.0	20	28
-L- 154+00 LT	12	7.0	20	28
-L- 154+20 LT	12	7.0	20	28
-L- 156+25 RT	12	7.0	20	28
-L- 165+40 RT	12	7.0	20	28
-L- 184+50 RT	12	7.0	20	28
-140WBL- 32+50 LT	12	7.0	20	28

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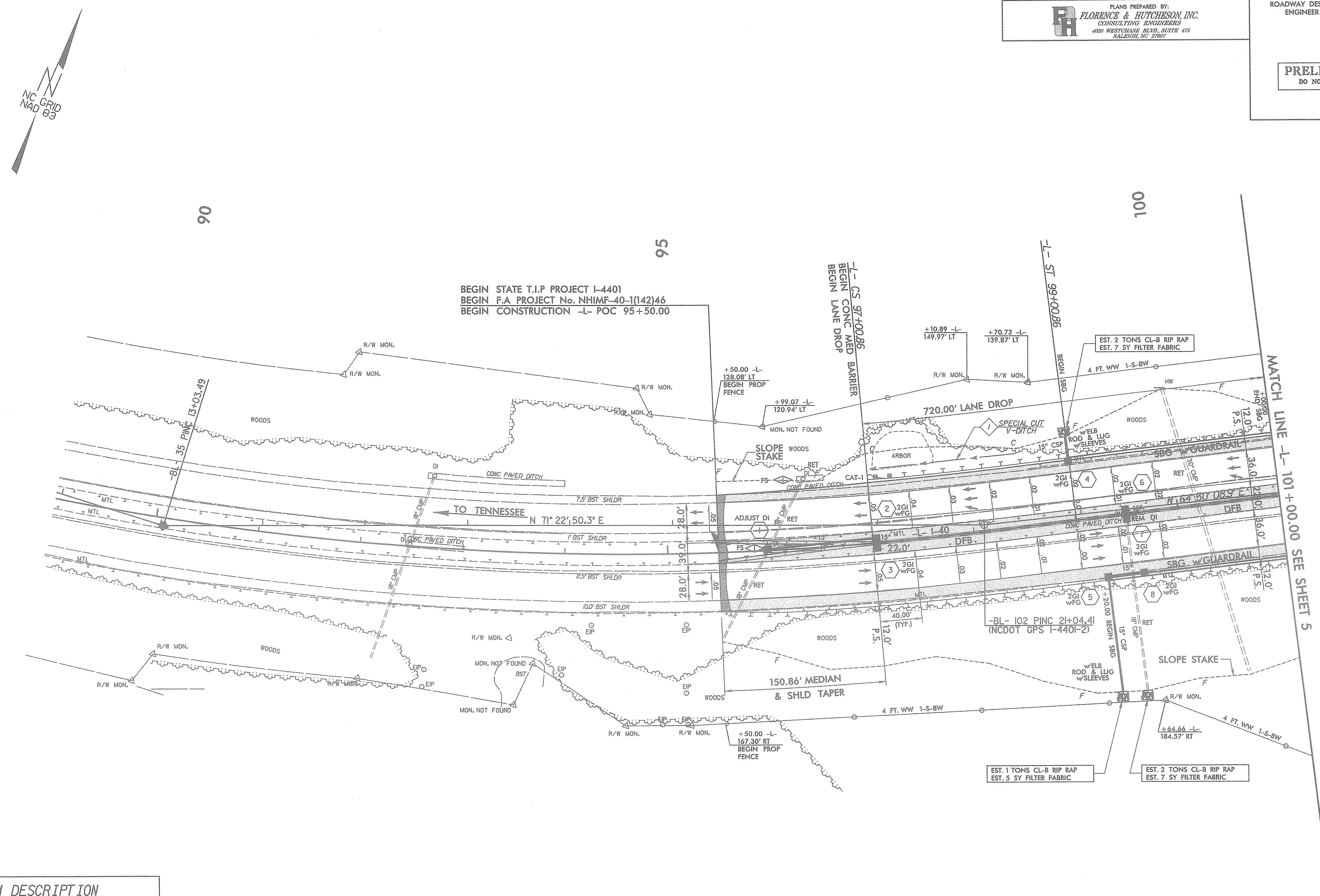
TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "U-3601-2" WITH NAD 83 STATE PLANE GRID COORDINATES OF NORTHING: 668135.3271(ft) EASTING: 927655.2346(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.99978235 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "U-3601-2" TO -L- STATION 95+50.00 IS N 55 32 53.13 W 1669.54' ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES VERTICAL DATUM USED IS NAVD 88

CURVE DATA FOR -L-

PIs Sta 75+11.85	PI Sta 86+91.41	PIs Sta 97+67.54
θs = 2° 00' 24.7"	Δ = 42° 35' 33.7" (LT)	θs = 2° 00' 24.7"
Ls = 200.00'	D = 2° 00' 24.7"	Ls = 200.00'
LT = 133.34'	L = 2,122.36'	LT = 133.34'
ST = 66.67'	T = 1,112.91'	ST = 66.67'
	R = 2,855.00'	
	Se = 0.05	

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

SEE SHEET 13 FOR -L- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

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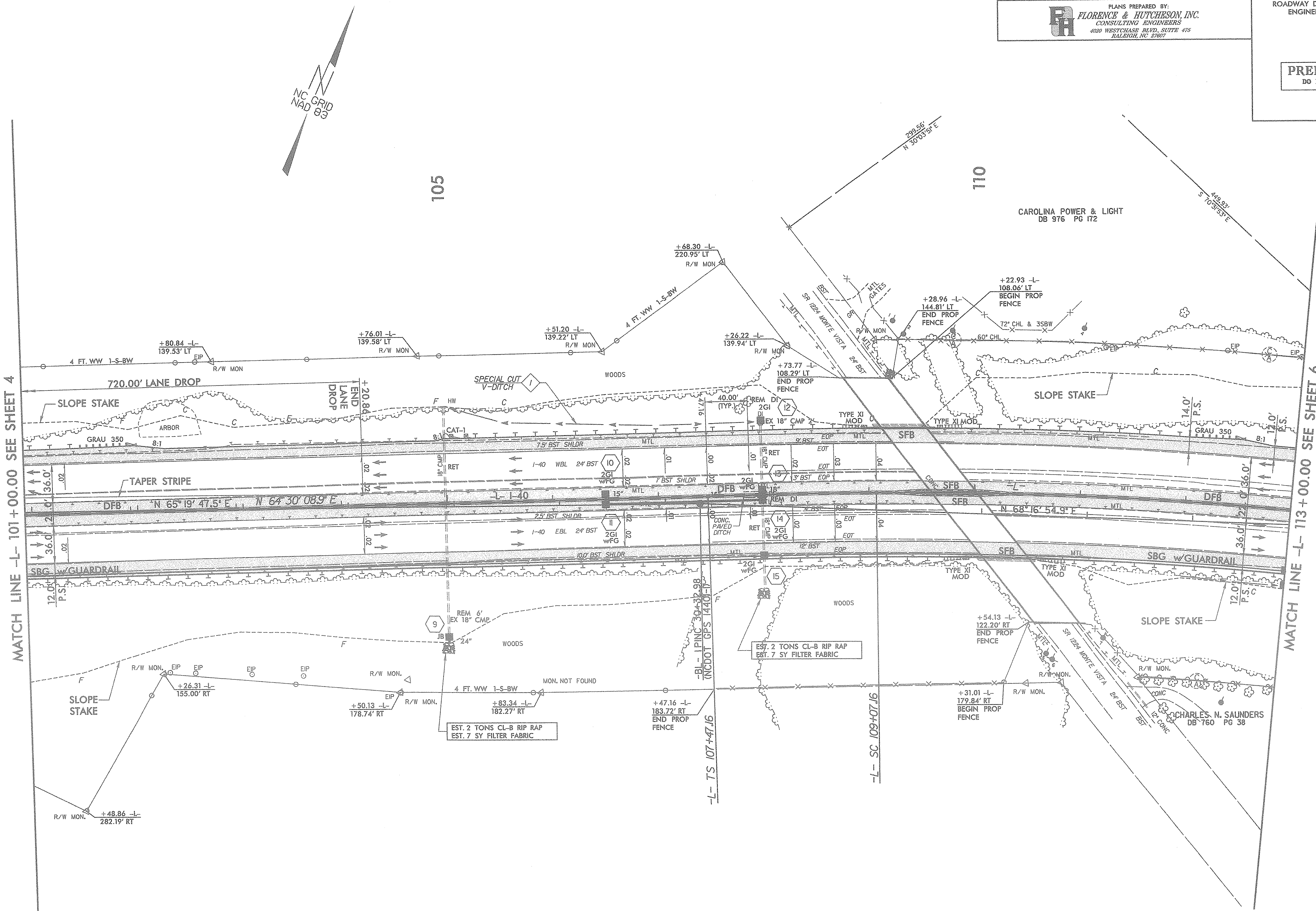
07/29/2005
03:50:51 PM

PROJECT REFERENCE NO.	SHEET NO.
I-4401	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NC GRID NAD 83
105
110
CAROLINA POWER & LIGHT
DB 976 PG 172
MATCH LINE -L- 101+00.00 SEE SHEET 4
MATCH LINE -L- 113+00.00 SEE SHEET 6
720.00' LANE DROP
END LANE DROP
SLOPE STAKE
TAPER STRIPE
DFB
N 65° 19' 47.5" E
N 64° 30' 08.9" E
N 68° 16' 54.9" E
-L- I-40
I-40 WBL 24' BST
I-40 EBL 24' BST
SBG w/GUARDRAIL
SFB
SPECIAL CUT V-DITCH
4 FT. WW 1-S-BW
WOODS
ARBOR
GRAU 350
CAT-1
72" CHL & 3SBW
60" CHL
SR 1224 MONTE VISTA
TYPE XI MOD
EST. 2 TONS CL-B RIP RAP
EST. 7 SY FILTER FABRIC
REM 6' EX 18" CMP
-BL- I-PINC 30+32.98 (NCDOT GPS 1440-1)
-L- TS 107+47.16
-L- SC 109+07.16
CHARLES N. SAUNDERS
DB 760 PG 38
MON. NOT FOUND
+68.30 -L- 220.95' LT R/W MON
+22.93 -L- 108.06' LT BEGIN PROP FENCE
+28.96 -L- 144.81' LT END PROP FENCE
+73.77 -L- 108.29' LT END PROP FENCE
+54.13 -L- 122.20' RT END PROP FENCE
+31.01 -L- 179.84' RT BEGIN PROP FENCE
+47.16 -L- 183.72' RT END PROP FENCE
+48.86 -L- 282.19' RT

CURVE DATA FOR -L-

PIs Sta 108+53.83	PI Sta 120+30.96	PIs Sta 131+46.43
Θs = 1° 11' 59.7"	Δ = 32° 47' 11.6" (RT)	Θs = 1° 11' 59.7"
Ls = 160.00'	D = 1° 29' 59.6"	Ls = 160.00'
LT = 106.67'	L = 2,185.93'	LT = 106.67'
ST = 53.34'	T = 1,123.80'	ST = 53.34'
	R = 3,820.00'	
	Se = 0.04	

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

SEE SHEET 14 FOR -L- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

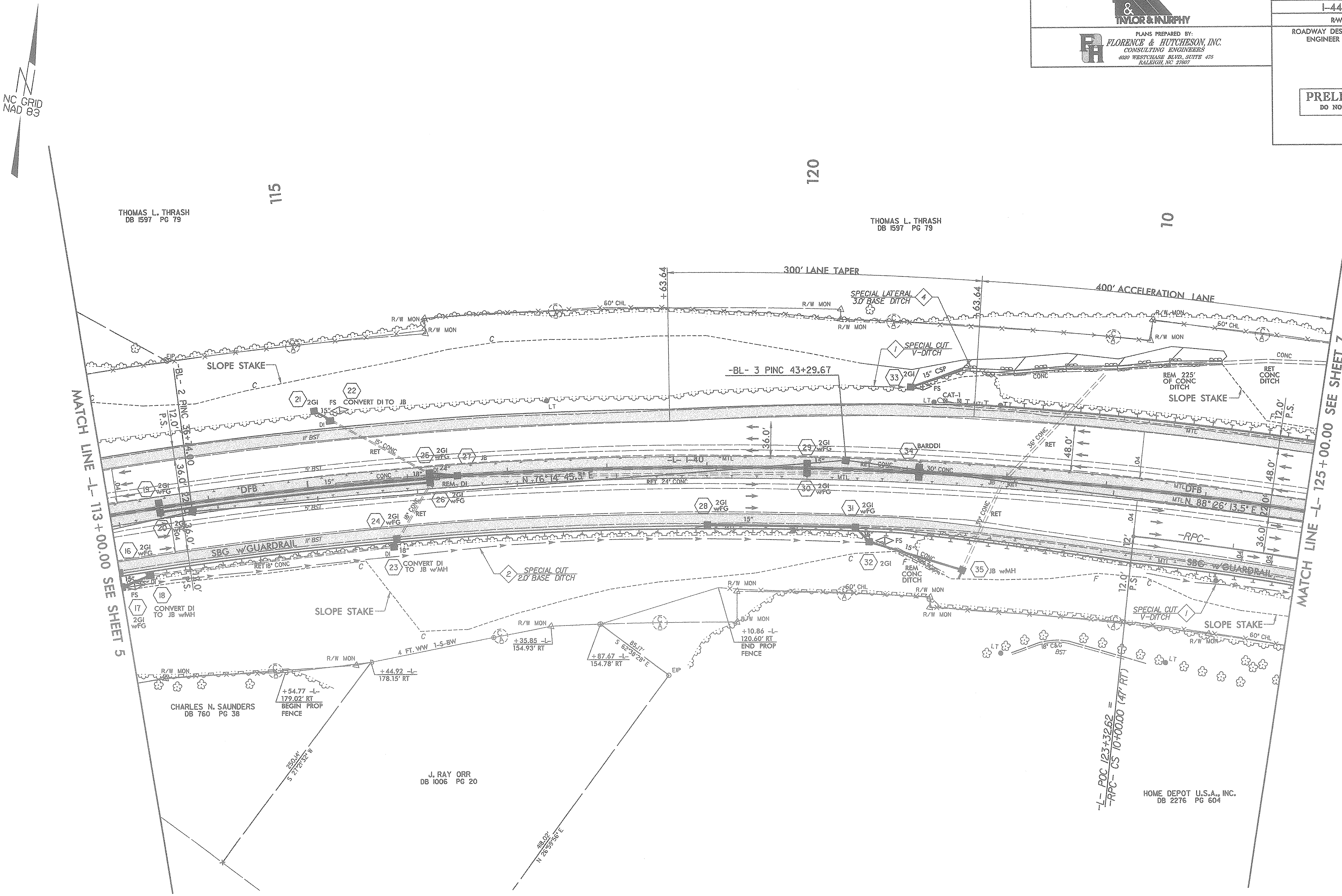
$FILE$
$DATE$
$TIME$

PROJECT REFERENCE NO.	SHEET NO.
I-4401	6
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NC GRID NAD 83
THOMAS L. THRASH DB 1597 PG 79
THOMAS L. THRASH DB 1597 PG 79
300' LANE TAPER
400' ACCELERATION LANE
SPECIAL LATERAL 3.0' BASE DITCH
SPECIAL CUT V-DITCH
-BL- 3 PINC 43+29.67
-BL- 2 PINC 36+14.00
SLOPE STAKE
CONVERT DI TO JB
REM 225' OF CONC DITCH
RET CONC DITCH
MATCH LINE -L- 113+00.00 SEE SHEET 5
MATCH LINE -L- 125+00.00 SEE SHEET 7
-L- I-40
N 76° 14' 45.3" E
N 88° 26' 13.5" E
-RPC-
SBG w/GUARDRAIL
DFB
SPECIAL CUT 2.0' BASE DITCH
CONVERT DI TO JB w/MH
JB w/MH
END PROP FENCE
BEGIN PROP FENCE
4 FT. WW 1-S-BW
CHARLES N. SAUNDERS DB 760 PG 38
J. RAY ORR DB 1006 PG 20
HOME DEPOT U.S.A., INC. DB 2276 PG 604
-L- POC 123+32.62 = -RPC- CS 10+00.00 (41' RT)

CURVE DATA FOR -L-

PIs Sta 108+53.83	PI Sta 120+30.96	PIs Sta 131+46.43
Θs = 1° 11' 59.7"	Δ = 32° 47' 11.6" (RT)	Θs = 1° 11' 59.7"
Ls = 160.00'	D = 1° 29' 59.6"	Ls = 160.00'
LT = 106.67'	L = 2,185.93'	LT = 106.67'
ST = 53.34'	T = 1,123.80'	ST = 53.34'
	R = 3,820.00'	
	Se = 0.04	

CURVE DATA FOR -RPC-

PIs Sta 11+10.98	PI Sta 14+84.21	PIs Sta 18+76.81
Θs = 1° 31' 05.6"	Δ = 16° 55' 36.7" (RT)	Θs = 2° 59' 46.7"
Θs = 3° 00' 00.4"	D = 2° 59' 59.2"	Θs = 6° 30' 51.7"
Ls = 200.00'	L = 564.27'	Ls = 200.00'
LT = 110.98'	T = 284.21'	LT = 112.54'
ST = 89.12'	R = 1,910.00'	ST = 87.91'
	Se = 0.07	

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

SEE SHEET 15 FOR -L- PROFILE
SEE SHEET 24 FOR -RPC- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

$FILE$
$DATE$
$TIME$

PROJECT REFERENCE NO.	SHEET NO.
I-4401	7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4400 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BRIDGE SKETCH
-L- OVER -Y1-

CURVE DATA FOR -L-

PIs Sta 108+53.83	PI Sta 120+30.96	PIs Sta 131+46.43
Θs = 1° 11' 59.7"	Δ = 32° 47' 11.6" (RT)	Θs = 1° 11' 59.7"
Ls = 160.00'	D = 1° 29' 59.6"	Ls = 160.00'
LT = 106.67'	L = 2,185.93'	LT = 106.67'
ST = 53.34'	T = 1,123.80'	ST = 53.34'
	R = 3,820.00'	
	Se = 0.04	

CURVE DATA FOR -RPB-

PIs Sta 11+46.74	PI Sta 13+80.61	PIs Sta 16+05.81	PIs Sta 19+07.28	PI Sta 21+28.51	PIs Sta 23+38.49
Θs = 5° 34' 38.9"	Δ = 16° 10' 45.0" (LT)	Θs = 5° 04' 13.5"	Θs = 13° 01' 18.4"	Δ = 38° 47' 33.3" (RT)	Θs = 13° 01' 18.4"
Ls = 220.00'	D = 5° 04' 13.5"	Ls = 200.00'	Ls = 200.00'	D = 13° 01' 18.4"	Ls = 200.00'
LT = 146.74'	L = 319.09	LT = 133.39'	LT = 133.70'	L = 297.91	LT = 133.70'
ST = 73.40'	T = 160.61'	ST = 66.72'	ST = 67.00'	T = 154.92'	ST = 67.00'
	R = 1,130.00'			R = 440.00'	
	Se = 0.08			Se = EXIST.	

CURVE DATA FOR -RPD-

PIs Sta 11+67.38	PI Sta 13+12.35	PIs Sta 14+59.56
Θs = 16° 16' 38.0"	Δ = 16° 07' 50.1" (LT)	Θs = 16° 36' 09.9"
Ls = 250.00'	D = 13° 01' 18.4"	Ls = 255.00'
LT = 167.38'	L = 123.87	LT = 170.75'
ST = 83.98'	T = 62.35'	ST = 85.69'
	R = 440.00'	
	Se = 0.08	

CURVE DATA FOR -LPB-

PIs Sta 12+21.66	PI Sta 13+68.85	PI Sta 16+50.59	PIs Sta 17+80.64
Θs = 37° 14' 32.1"	Δ = 19° 53' 47.3" (RT)	Δ = 115° 43' 32.1" (RT)	Θs = 36° 17' 14.4"
Ls = 325.00'	D = 22° 55' 05.9"	D = 38° 11' 49.9"	Ls = 190.00'
LT = 221.66'	L = 86.81'	L = 302.97'	LT = 129.43'
ST = 112.89'	T = 43.85'	T = 238.78'	ST = 65.86'
	R = 250.00'	R = 150.00'	
	Se = 0.08	Se = 0.08	

CURVE DATA FOR -RPC-

PIs Sta 11+10.98	PI Sta 14+84.21	PIs Sta 18+76.81	PI Sta 21+95.19
Θs = 1° 31' 05.6"	Δ = 16° 55' 36.7" (RT)	Θs = 2° 59' 46.7"	Δ = 29° 24' 26.1" (RT)
Θs = 3° 00' 00.4"	D = 2° 59' 59.2"	Θs = 6° 30' 51.7"	D = 6° 30' 39.2"
Ls = 200.00'	L = 564.27'	Ls = 200.00'	L = 451.66'
LT = 110.98'	T = 284.21'	LT = 112.54'	T = 230.92'
ST = 89.12'	R = 1,910.00'	ST = 87.91'	R = 880.00'
	Se = 0.07		Se = 0.04

CURVE DATA FOR -Y1-

PIs Sta 17+81.79	PI Sta 23+49.71	PIs Sta 28+84.04
Θs = 6° 15' 01.6"	Δ = 37° 35' 48.8" (RT)	Θs = 6° 15' 01.6"
Ls = 300.00'	D = 4° 10' 01.1"	Ls = 300.00'
LT = 200.12'	L = 902.26	LT = 200.12'
ST = 100.11'	T = 468.05'	ST = 100.11'
	R = 1,375.00'	
	Se = EXIST.	

▭	SINGLE FACE BARRIER (SFB)
▨	DOUBLE FACE BARRIER (DFB)

ENVIRONMENTALLY SENSITIVE AREA (ESA)

BRIDGE SKETCH
-L- OVER -RR-

SEE SHEETS 16 & 17 FOR -L- PROFILE
SEE SHEET 23 FOR -RPB- PROFILE
SEE SHEET 23 FOR -LPB- PROFILE
SEE SHEET 24 FOR -RPC- PROFILE
SEE SHEET 24 FOR -RPD- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

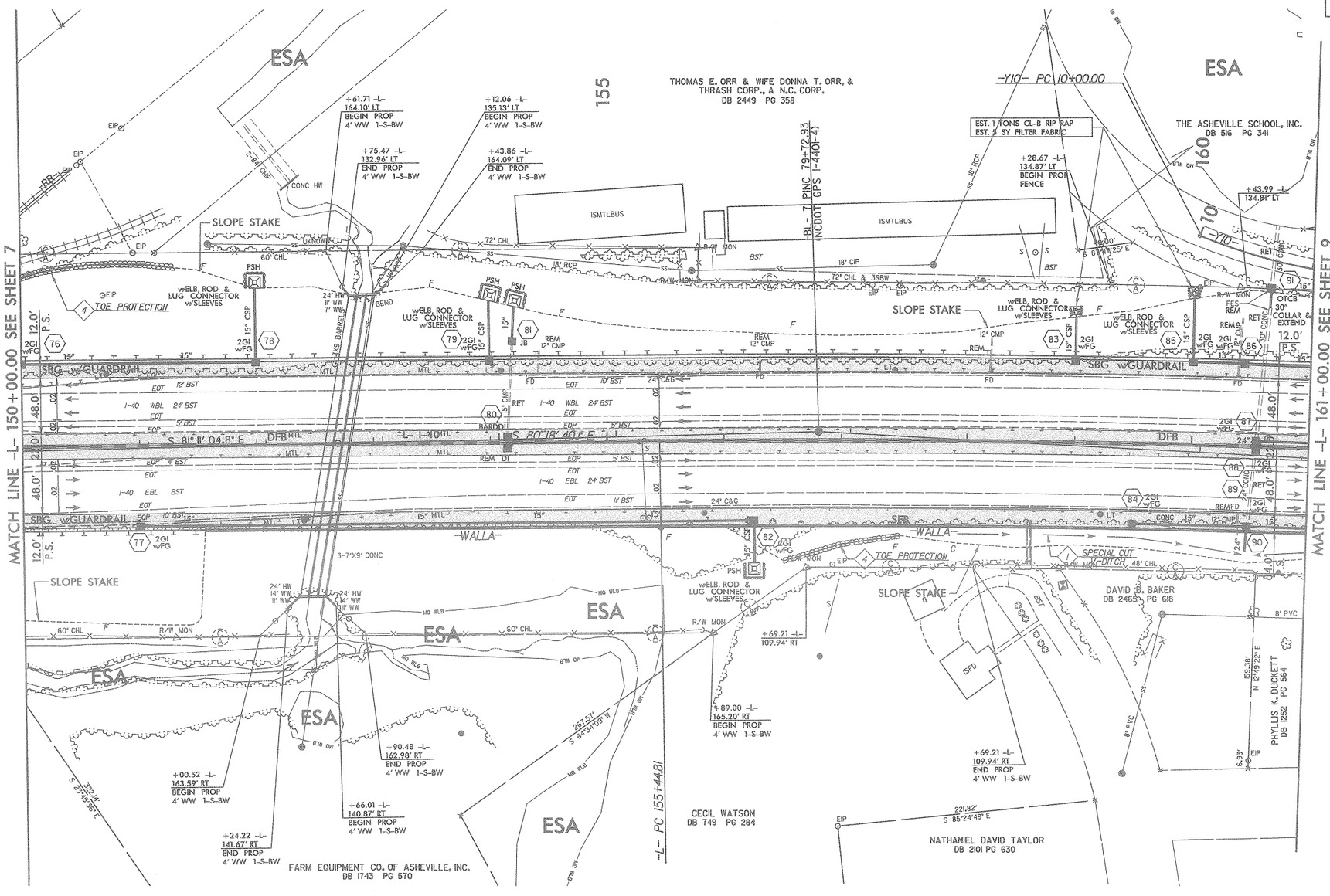
PROJECT REFERENCE NO.	SHEET NO.
I-4401	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID NAD 83



CURVE DATA FOR -L-

PI Sta 160+67.66
Δ = 4° 59' 22.6" (RT)
D = 0° 28' 38.9"
L = 1,045.02'
T = 522.84'
R = 12,000.00'
Se = NC

CURVE DATA FOR -Y10-

PI Sta 10+78.12
Δ = 19° 41' 45.9" (LT)
D = 12° 43' 56.6"
L = 154.69'
T = 78.12'
R = 450.00'
Se = EXIST.

PI Sta 17+18.65
Δ = 16° 28' 27.7" (LT)
D = 14° 19' 26.2"
L = 115.01'
T = 57.91'
R = 400.00'
Se = EXIST.

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEETS 17 & 18 FOR -L- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

$FILE$
$DATE$
$TIME$

PROJECT REFERENCE NO.	SHEET NO.
I-4401	9
R/W SHEET NO.	

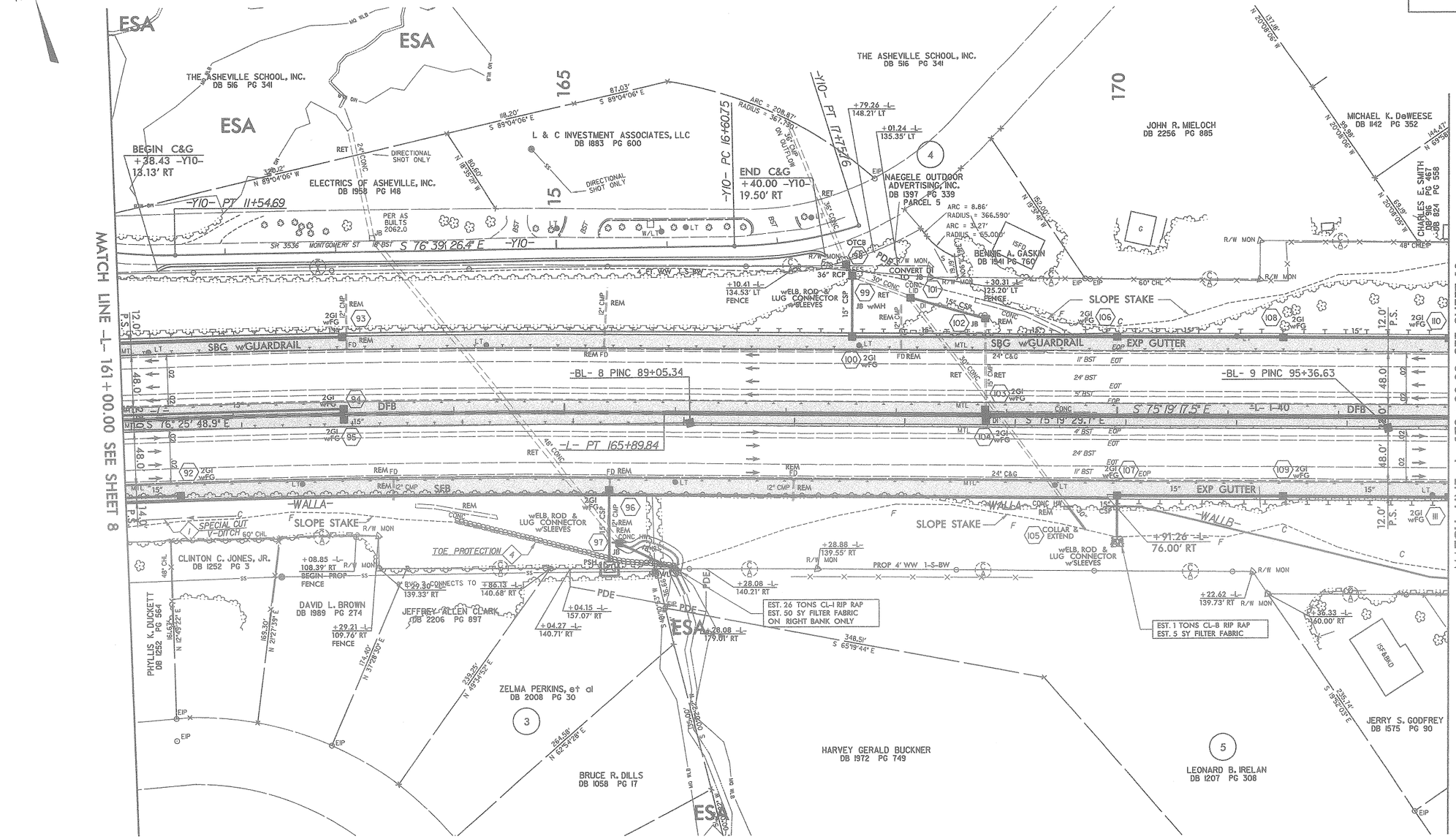
TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID NAD 83



CURVE DATA FOR -L-

PI Sta 160+67.66
Δ = 4° 59' 22.6" (RT)
D = 0° 28' 38.9"
L = 1,045.02'
T = 522.84'
R = 12,000.00'
Se = NC

CURVE DATA FOR -Y10-

PI Sta 10+78.12
Δ = 19° 41' 45.9" (LT)
D = 12° 43' 56.6"
L = 154.69'
T = 78.12'
R = 450.00'
Se = EXIST.

PI Sta 17+18.65
Δ = 16° 28' 27.7" (LT)
D = 14° 19' 26.2"
L = 115.01'
T = 57.91'
R = 400.00'
Se = EXIST.

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEETS 18 & 19 FOR -L- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

$FILE$
$DATE$
$TIME$

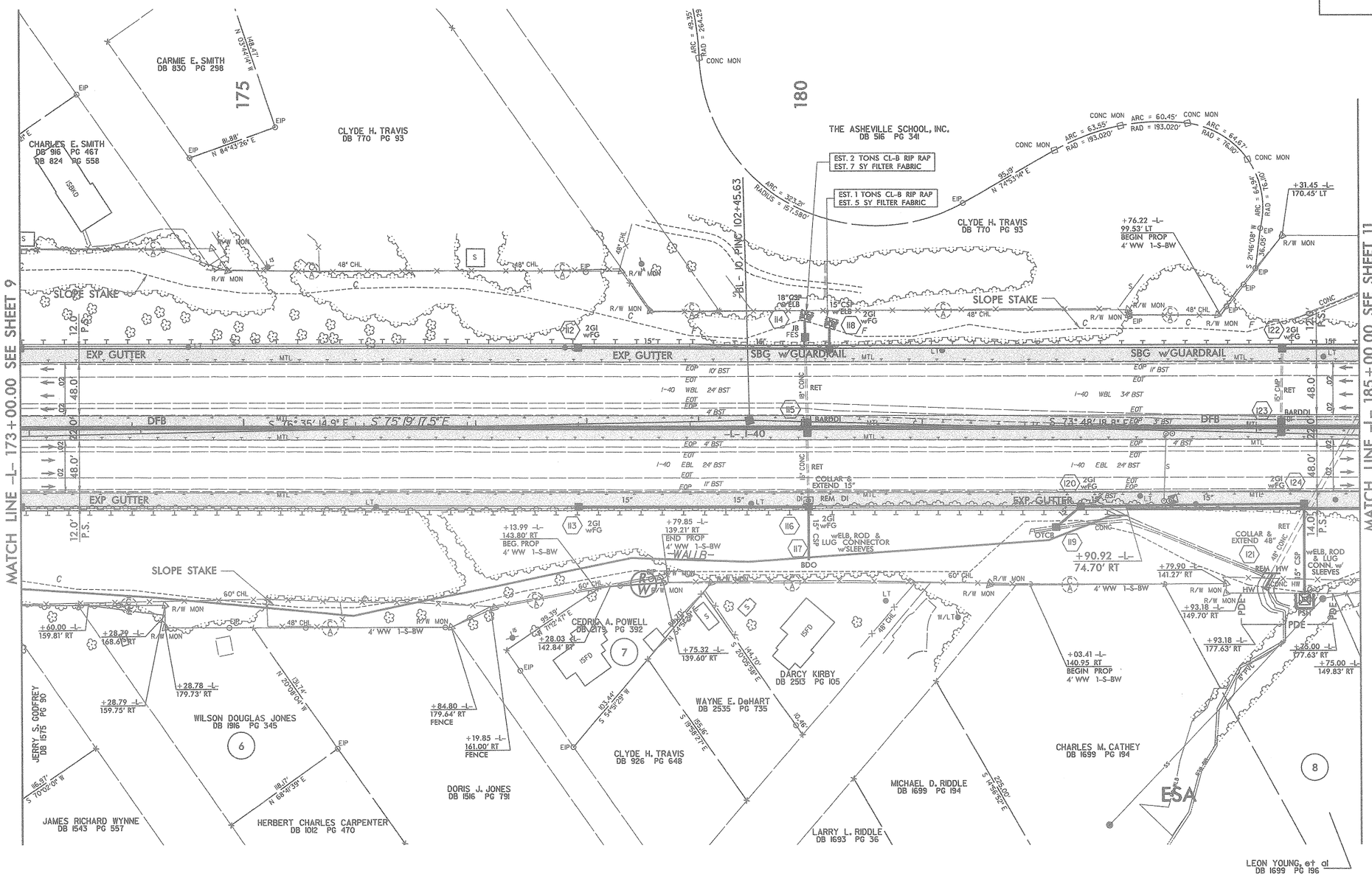
TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
8000 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID NAD 83



CURVE DATA FOR -L-
PI Sta 160+67.62
Δ = 4° 59' 23.0" (RT)
D = 0° 28' 38.9"
L = 1,045.04'
T = 522.85'
R = 12,000.00'
Se = NC

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ENVIRONMENTALLY SENSITIVE AREA (ESA)

SEE SHEETS 19 & 20 FOR -L- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

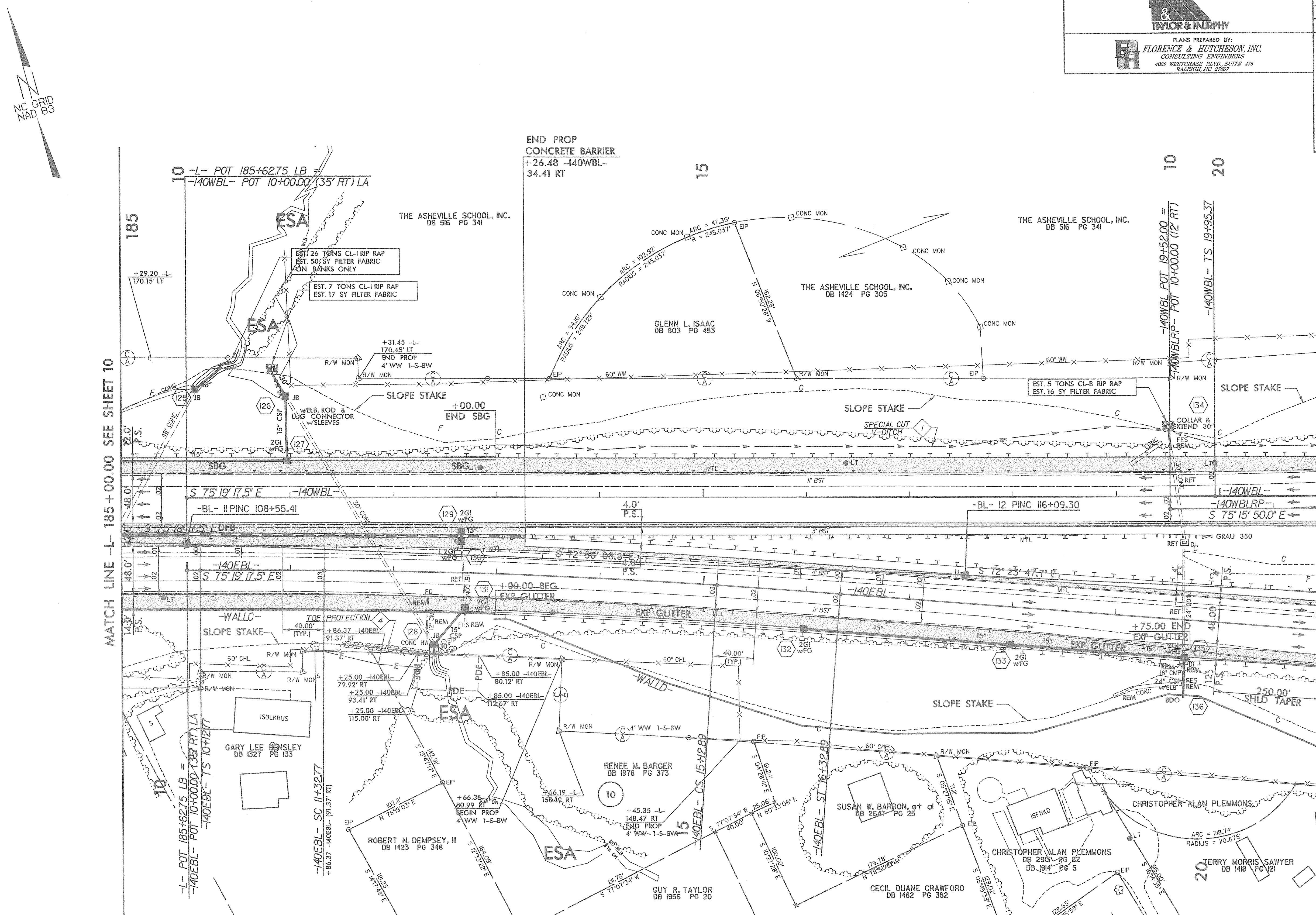
$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



NC GRID NAD 83
MATCH LINE -L- 185+00.00 SEE SHEET 10
MATCH LINE -I40WBL- 21+00.00 SEE SHEET 12
END PROP CONCRETE BARRIER +26.48 -I40WBL- 34.41 RT
-L- POT 185+62.75 LB = -I40WBL- POT 10+00.00 (35' RT) LA
THE ASHEVILLE SCHOOL, INC. DB 516 PG 341
THE ASHEVILLE SCHOOL, INC. DB 1424 PG 305
GLENN L. ISAAC DB 803 PG 453
EST. 26 TONS CL-I RIP RAP EST. 50 SY FILTER FABRIC ON BANKS ONLY
EST. 7 TONS CL-I RIP RAP EST. 17 SY FILTER FABRIC
EST. 5 TONS CL-B RIP RAP EST. 16 SY FILTER FABRIC
-I40WBL POT 19+52.00 = -I40WBLRP- POT 10+00.00 (12' RT)
-I40WBL- TS 19+95.37
+00.00 END SBG
SLOPE STAKE
SPECIAL CUT V-DITCH
S 75°19' 17.5" E -I40WBL-
-BL- 11 PINC 108+55.41
-BL- 12 PINC 116+09.30
S 75°15' 50.0" E
S 72°56' 08.8" E
S 72°23' 47.7" E
-I40EBL-
S 75°19' 17.5" E
+00.00 BEG. EXP GUTTER
EXP GUTTER
+75.00 END EXP GUTTER
TOE PROTECTION
250.00' SHLD TAPER
GARY LEE HENSLEY DB 1327 PG 133
RENEE M. BARGER DB 1978 PG 373
ROBERT N. DEMPSEY, III DB 1423 PG 348
GUY R. TAYLOR DB 1956 PG 20
SUSAN W. BARRON, et al DB 2647 PG 25
CECIL DUANE CRAWFORD DB 1482 PG 382
CHRISTOPHER ALAN PLEMMONS
CHRISTOPHER ALAN PLEMMONS DB 2913 PG 82 DB 1914 PG 5
TERRY MORRIS SAWYER DB 1418 PG 121
-L- POT 185+62.75 LB = -I40EBL- POT 10+00.00 (35' RT) LA
-I40EBL- TS 10+12.77
-I40EBL- SC 11+32.77
-I40EBL- CS 15+12.89
-I40EBL- ST 16+32.89
ESA

CURVE DATA FOR -I40EBL-

PIs Sta 10+92.77	PI Sta 13+22.89	PIs Sta 15+52.89
θs = 0° 32' 13.7"	Δ = 3° 24' 10.8" (RT)	θs = 0° 32' 13.7"
Ls = 120.00'	D = 0° 53' 42.9"	Ls = 120.00'
LT = 80.00'	L = 380.12	LT = 80.00'
ST = 40.00'	T = 190.12'	ST = 40.00'
	R = 6,400.00'	
	Se = 0.03	

CURVE DATA FOR -I40WBL-

PIs Sta 23+28.89	PI Sta 27+82.81	PIs Sta 31+47.55
θs = 5° 58' 05.9"	Δ = 13° 39' 33.8" (LT)	θs = 2° 51' 53.2"
Ls = 500.00'	D = 2° 23' 14.4"	Ls = 240.00'
LT = 333.52'	L = 572.16	LT = 160.02'
ST = 166.84'	T = 287.44'	ST = 80.02'
	R = 2,400.00'	
	Se = 0.06	

ENVIRONMENTALLY SENSITIVE AREA (ESA)

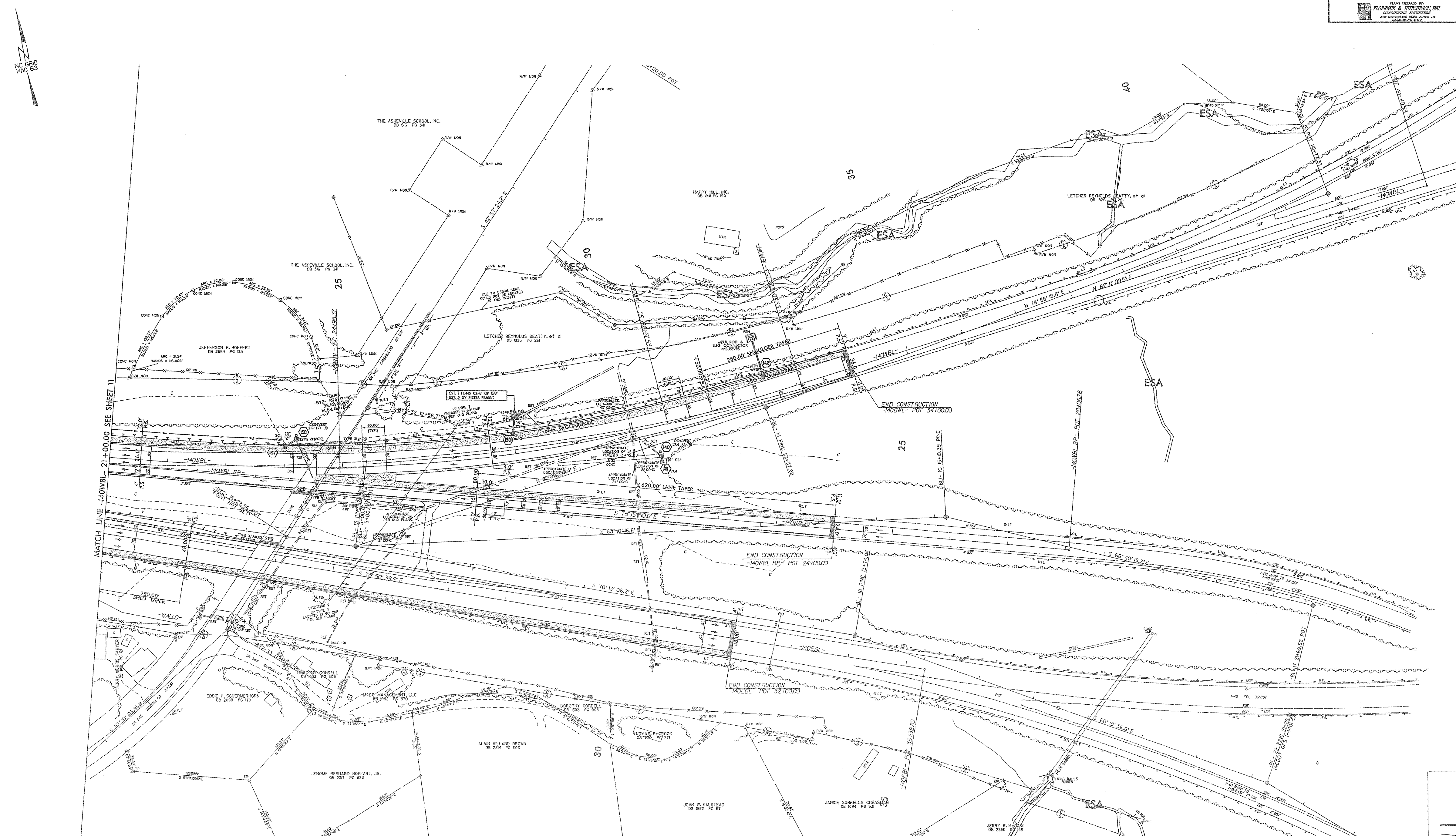
SEE SHEET 20 FOR -L- PROFILE
SEE SHEETS 20 & 21 FOR -I40EBL- PROFILE
SEE SHEETS 20 & 21 FOR -I40WBL- PROFILE
SEE SHEET 25 FOR -I40WBLRP- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

$FILE$ $DATE$ $TIME$

PROJECT REFERENCE NO.	SHEET NO.
I-4401	12
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



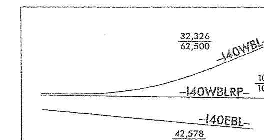
CURVE DATA FOR -I40EBL-		
PIs Sta 10+92.77	PI Sta 13+22.89	PIs Sta 15+52.89
θs = 0° 32' 13.7"	Δ = 3° 24' 10.8" (RT)	θs = 0° 32' 13.7"
Ls = 120.00'	D = 0° 53' 42.9"	Ls = 120.00'
LT = 80.00'	L = 380.12	LT = 80.00'
ST = 40.00'	T = 190.12'	ST = 40.00'
	R = 6,400.00'	
	Se = 0.03	

CURVE DATA FOR -I40WBL-		
PIs Sta 23+28.89	PI Sta 27+82.81	PIs Sta 31+47.55
θs = 5° 58' 05.9"	Δ = 13° 39' 33.8" (LT)	θs = 2° 51' 53.2"
Ls = 500.00'	D = 2° 23' 14.4"	Ls = 240.00'
LT = 333.52'	L = 572.16	LT = 160.02'
ST = 166.84'	T = 287.44'	ST = 80.02'
	R = 2,400.00'	
	Se = 0.06	

SINGLE FACE BARRIER (SFB)

DOUBLE FACE BARRIER (DFB)

ENVIRONMENTALLY SENSITIVE AREA (ESA)



LEGEND
2005 ADT
2025 ADT
ADT (IN 100'S)

SEE SHEETS 21 & 22 FOR -I40EBL- PROFILE
SEE SHEETS 21 & 22 FOR -I40WBL- PROFILE
SEE SHEET 25 FOR -I40WBLRP- PROFILE
SEE SHEET 2-R FOR DITCH DETAILS

TAYLOR & MURPHY

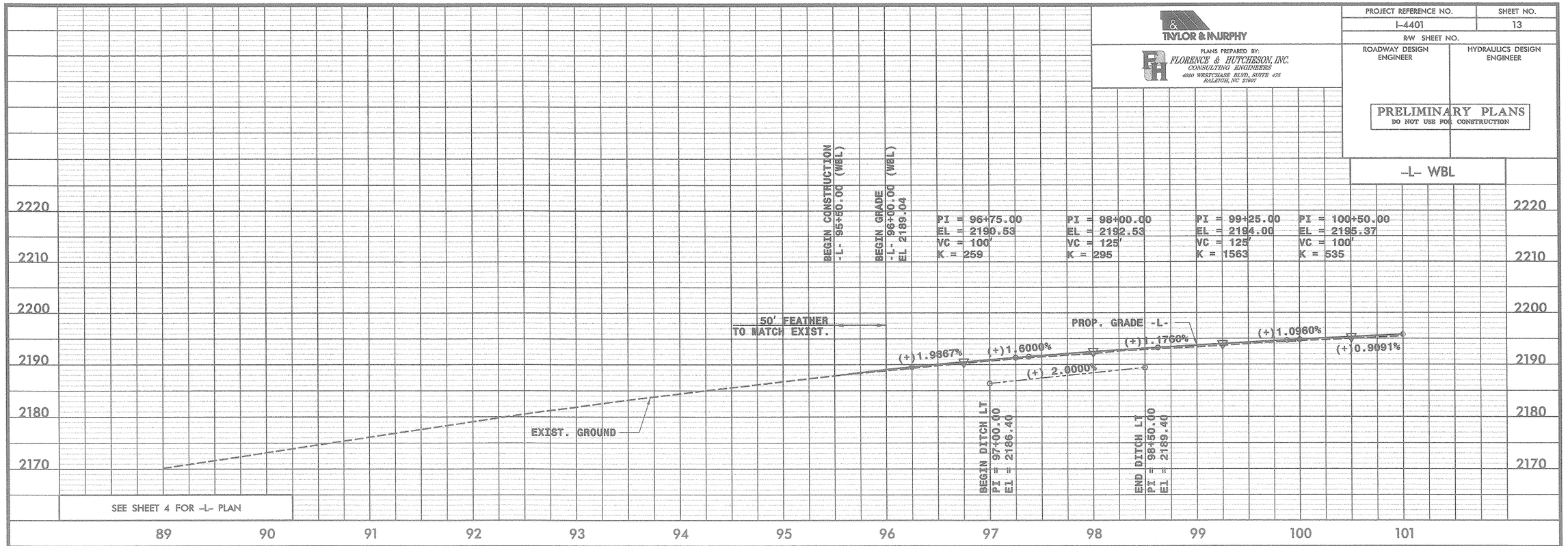
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	13
R/W SHEET NO.	

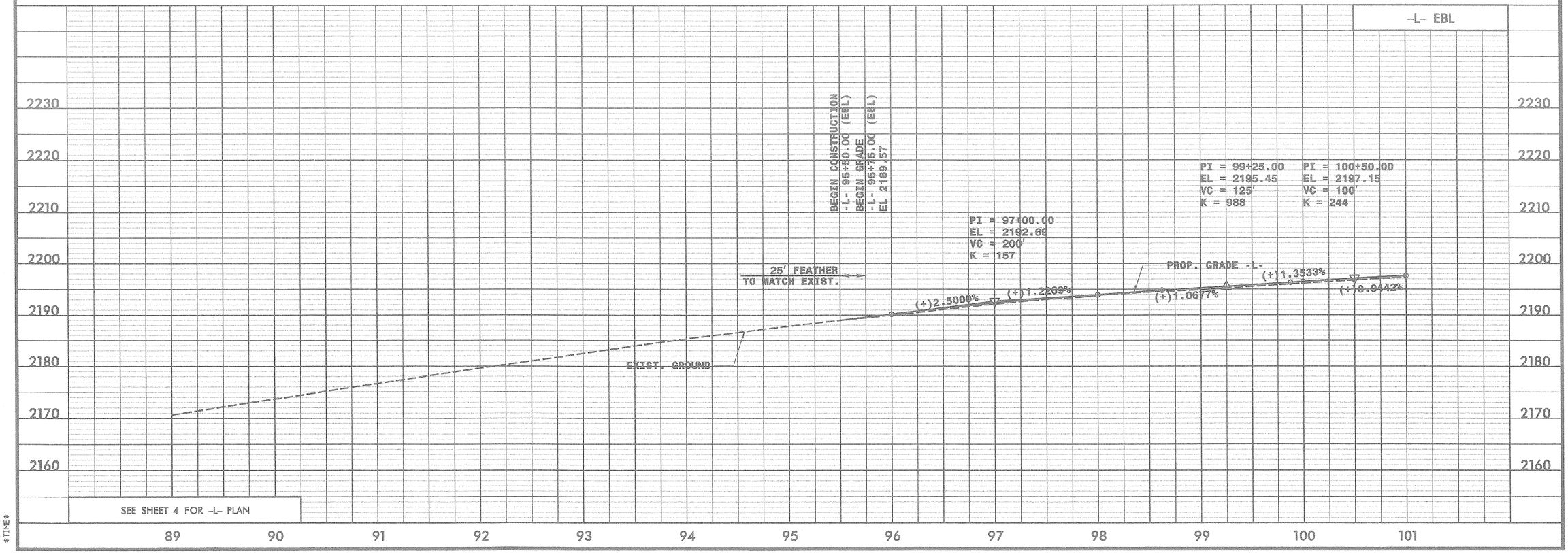
ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SEE SHEET 4 FOR -L- PLAN



SEE SHEET 4 FOR -L- PLAN

$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	14
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- WBL

BENCHMARK (BM#1)
-BL- Sta. 32+09.26 (128.68' LT) =
-L- Sta. 109+21.04 (111.61' LT)
EL 2214.08'

-L- 109+80.98 (WBL)
MONTE VISTA RD

PI = 103+50.00
EL = 2198.10
VC = 450'
K = 358

PI = 106+50.00
EL = 2197.05
VC = 150'
K = 221

PI = 108+75.00
EL = 2194.74
VC = 150'
K = 326

PI = 110+25.00
EL = 2192.51
VC = 150'
K = 516

PI = 112+75.00
EL = 2189.52
VC = 300'
K = 218

PROP. GRADE -L-
EXIST. GROUND

(+)0.9091% (+)0.9091% (-)0.3491% (-)0.3491% (-)1.0267% (-)1.0267% (-)1.4867% (-)1.1960% (-)1.1960% (-)2.5720%

(+) 1.7200% (-) 0.5300%

18" CMP
2183.37

BEGIN DITCH LT
PI = 105+50.00
El = 2190.84

PI = 107+00 .00
El = 2193.42

END DITCH LT
PI = 108+00.00
El = 2192.89

SEE SHEET 5 FOR -L- PLAN

-L- EBL

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.

DRAINAGE AREA (ACRES)	=	8.6 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	33.0 CFS
DESIGN HW ELEVATION	=	2166.79 FT
100 YR DISCHARGE	=	37.0 CFS
100 YR HW ELEVATION	=	2167.54 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	+59.0 CFS
OVERTOPPING ELEVATION	=	2169.29 FT

PI = 103+25.00
EL = 2199.74
VC = 450'
K = 344

PI = 106+50.00
EL = 2198.56
VC = 200'
K = 293

PI = 108+75.00
EL = 2196.21
VC = 150'
K = 244

PI = 110+25.00
EL = 2193.72
VC = 150'
K = 735

PI = 112+75.00
EL = 2190.07
VC = 300'
K = 225

PROP. GRADE -L-
EXIST. GROUND

(+)0.9442% (+)0.9442% (-)0.3624% (-)0.3624% (-)1.0459% (-)1.0459% (-)1.6619% (-)1.4578% (-)1.4578% (-)2.7912%

(-) 3.6000% (-) 2

18" CMP
2174.22

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.

DRAINAGE AREA (ACRES)	=	3.0 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	11.5 CFS
DESIGN HW ELEVATION	=	2190.00 FT
100 YR DISCHARGE	=	13.0 CFS
100 YR HW ELEVATION	=	2190.50 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	20.7 CFS
OVERTOPPING ELEVATION	=	2193.29 FT

BEGIN DITCH RT
PI = 112+00.00
EL = 2187.10

PI = 112+50.00
EL = 2185.30

SEE SHEET 5 FOR -L- PLAN

$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	15
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- WBL

PI = 115+25.00
EL = 2183.09
VC = 200'
K = 649

PI = 118+25.00
EL = 2174.45
VC = 125'
K = 344

PI = 121+00.00
EL = 2167.53
VC = 100'
K = 174

PI = 122+00.00
EL = 2164.44
VC = 100'
K = 769

PI = 123+00.00
EL = 2161.22
VC = 100'
K = 625

PI = 124+50.00
EL = 2156.63
VC = 200'
K = 1549

(-)2.5720%
(-)2.5720%
(-)2.8800%
PROP. GRADE -L-
(-)2.8800%
(-)2.5164%
EXIST. GROUND
(-)2.5164%
(-) 2.4000%
(-)3.0900%
(-)3.2200%
(-)3.0600%
(-)2.9309%
(-) 12.4000%
(-) 8.6000%
(-) 12.8000%
(-) 9.6000%

BEGIN DITCH LT
PI = 120+50.00
EL = 2166.50

END DITCH LT
PI = 121+00.00
EL = 2165.30

BEGIN DITCH LT
PI = 121+50.00
EL = 2157.40

30" RCP
2140.27

PI=122+50.00
EL=2145.00

PI = 123+00.00
EL = 2140.60

PI = 123+50.00
EL = 2134.20

END DITCH LT
PI = 124+00.00
EL = 2129.40

SEE SHEET 6 FOR -L- PLAN

-L- EBL

PI = 115+25.00
EL = 2183.10
VC = 200'
K = 1712

PI = 118+25.00
EL = 2174.37
VC = 200'
K = 2368

PI = 121+00.00
EL = 2166.61
VC = 100'
K = 226

PI = 122+00.00
EL = 2163.34
VC = 100'
K = 156

PI = 123+00.00
EL = 2160.72
VC = 100'
K = 636

PI = 124+50.00
EL = 2156.54
VC = 200'
K = 1331

(-)2.7912%
2000%
(-) 4.4000%
(-) 2.4667%
(-)2.7912%
(-)2.9080%
(-) 1.2000%
(-) 2.3000%
(-)2.9080%
(-)2.8236%
(-) 3.2000%
PROP. GRADE -L-
(-)2.8236%
(-)3.2664%
(-)2.6250%
EXIST. GROUND
(-)2.7822%
(-)2.9325%
(-) 3.8000%
(-) 2.8500%

PI = 113+50.00
EL = 2183.10

PI = 114+50.00
EL = 2178.70

PI = 116+00.00
EL = 2176.00

PI = 117+00.00
EL = 2173.80

PI = 118+00.00
EL = 2171.50

END DITCH RT
PI = 120+50.00
EL = 2163.50

-L- 123+32.62 (EBL)
RPC- 10+00.00 (47.00' RT')

BEGIN DITCH RT
PI = 123+50.00
EL = 2154.90

PI = 124+00.00
EL = 2153.00

30" RCP
2140.27

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.

DRAINAGE AREA (ACRES)	=	7.0 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	31.4 CFS
DESIGN HW ELEVATION	=	2146.50 FT
100 YR DISCHARGE	=	35.3 CFS
100 YR HW ELEVATION	=	2146.90 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	+56.2 CFS
OVERTOPPING ELEVATION	=	2154.90 FT

SEE SHEET 6 FOR -L- PLAN

$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

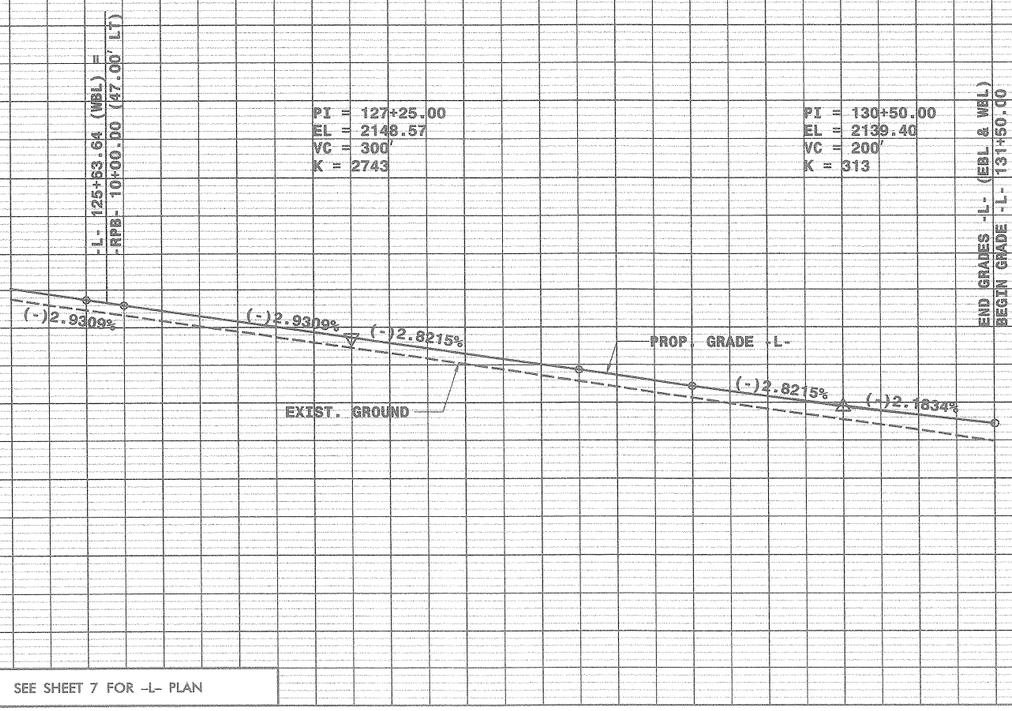
PROJECT REFERENCE NO.	SHEET NO.
I-4401	16
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

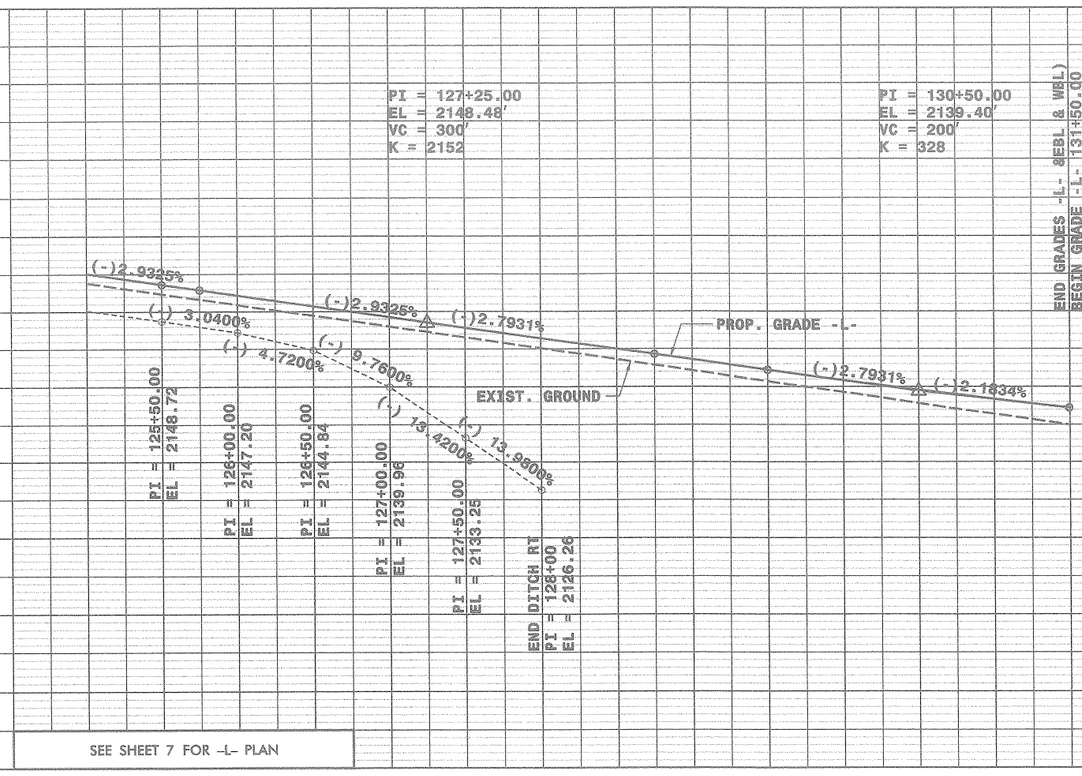
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

-L- WBL



SEE SHEET 7 FOR -L- PLAN

-L- EBL



SEE SHEET 7 FOR -L- PLAN

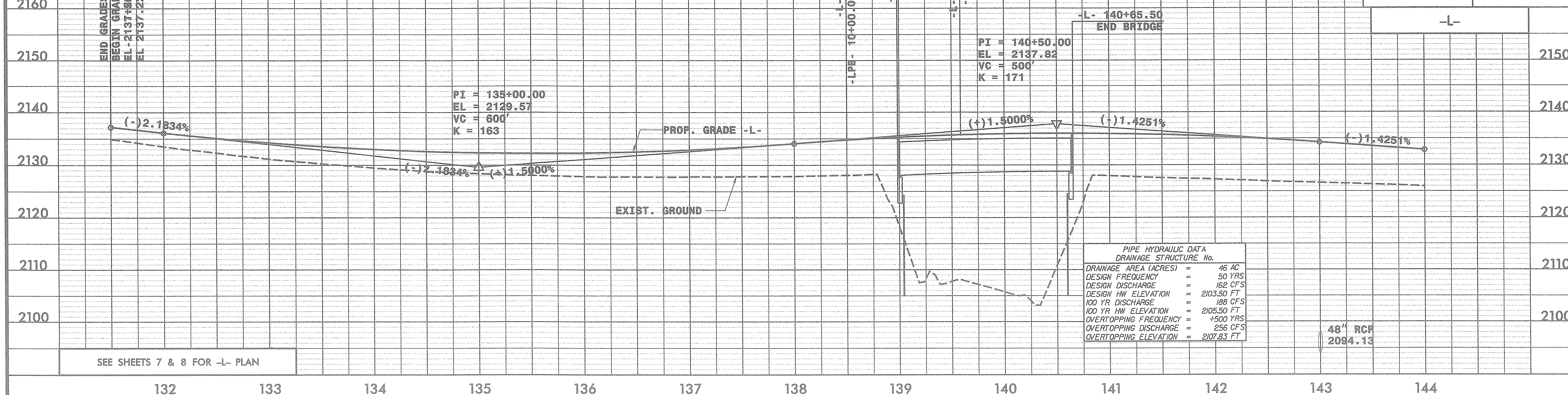
$FILE$
$DATE$
$TIME$

PROJECT REFERENCE NO.	SHEET NO.
I-4401	17
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

TAYLOR & MURPHY

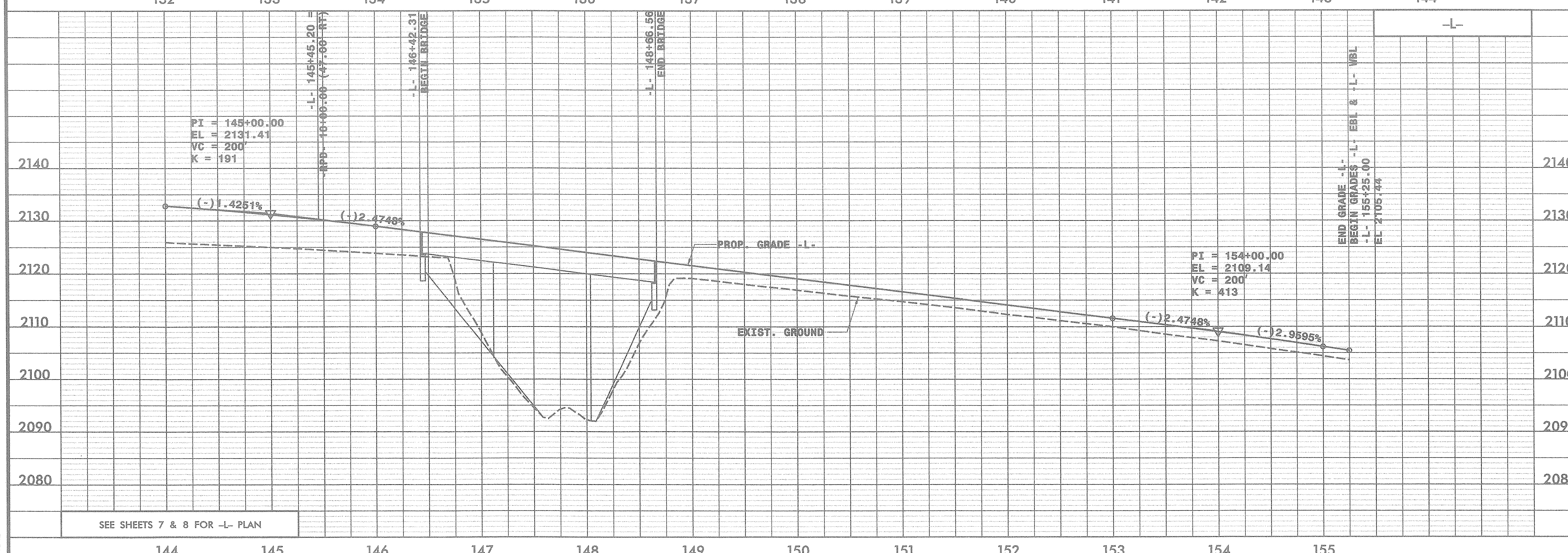
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



-L-
BENCHMARK (BM#2)
-BL- Sta. 63+21.44 (45.80' RT) =
-L- Sta. 140+29.23 (53.35' RT)
EL 2128.54'
END GRADES -L- EBL & -L- WBL
BEGIN GRADE -L- 131+50.00
EL 2137.22
PI = 135+00.00
EL = 2129.57
VC = 600'
K = 163
(-)2.1834%
(+)1.5000%
PROP. GRADE -L-
EXIST. GROUND
-L- 138+50.18 =
-LPE- 10+00.00 (47.00' LT)
-L- 138+98.50
BEGIN BRIDGE
-L- 139+00.55 =
-Y1- 19+57.84
-L- 140+65.50
END BRIDGE
PI = 140+50.00
EL = 2137.82
VC = 500'
K = 171
(+)1.4251%
(-)1.4251%
48" RCP
2094.13
SEE SHEETS 7 & 8 FOR -L- PLAN
2160
2150
2140
2130
2120
2110
2100
132
133
134
135
136
137
138
139
140
141
142
143
144

PIPE HYDRAULIC DATA DRAINAGE STRUCTURE No.		
DRAINAGE AREA (ACRES)	=	46 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	162 CFS
DESIGN HW ELEVATION	=	2103.50 FT
100 YR DISCHARGE	=	188 CFS
100 YR HW ELEVATION	=	2105.50 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	256 CFS
OVERTOPPING ELEVATION	=	2107.83 FT



-L-
PI = 145+00.00
EL = 2131.41
VC = 200'
K = 191
(-)1.4251%
(-)2.4748%
-L- 145+45.20 =
-RPD- 16+00.00 (47.00' RT)
-L- 146+42.31
BEGIN BRIDGE
-L- 148+66.56
END BRIDGE
PROP. GRADE -L-
EXIST. GROUND
PI = 154+00.00
EL = 2109.14
VC = 200'
K = 413
(-)2.9595%
END GRADE -L-
BEGIN GRADES -L- EBL & -L- WBL
-L- 155+25.00
EL 2105.44
SEE SHEETS 7 & 8 FOR -L- PLAN
2140
2130
2120
2110
2100
2090
2080
144
145
146
147
148
149
150
151
152
153
154
155

$FILE$
$DATE$
$TIME$

PROJECT REFERENCE NO.	SHEET NO.
I-4401	18
R/W SHEET NO.	

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

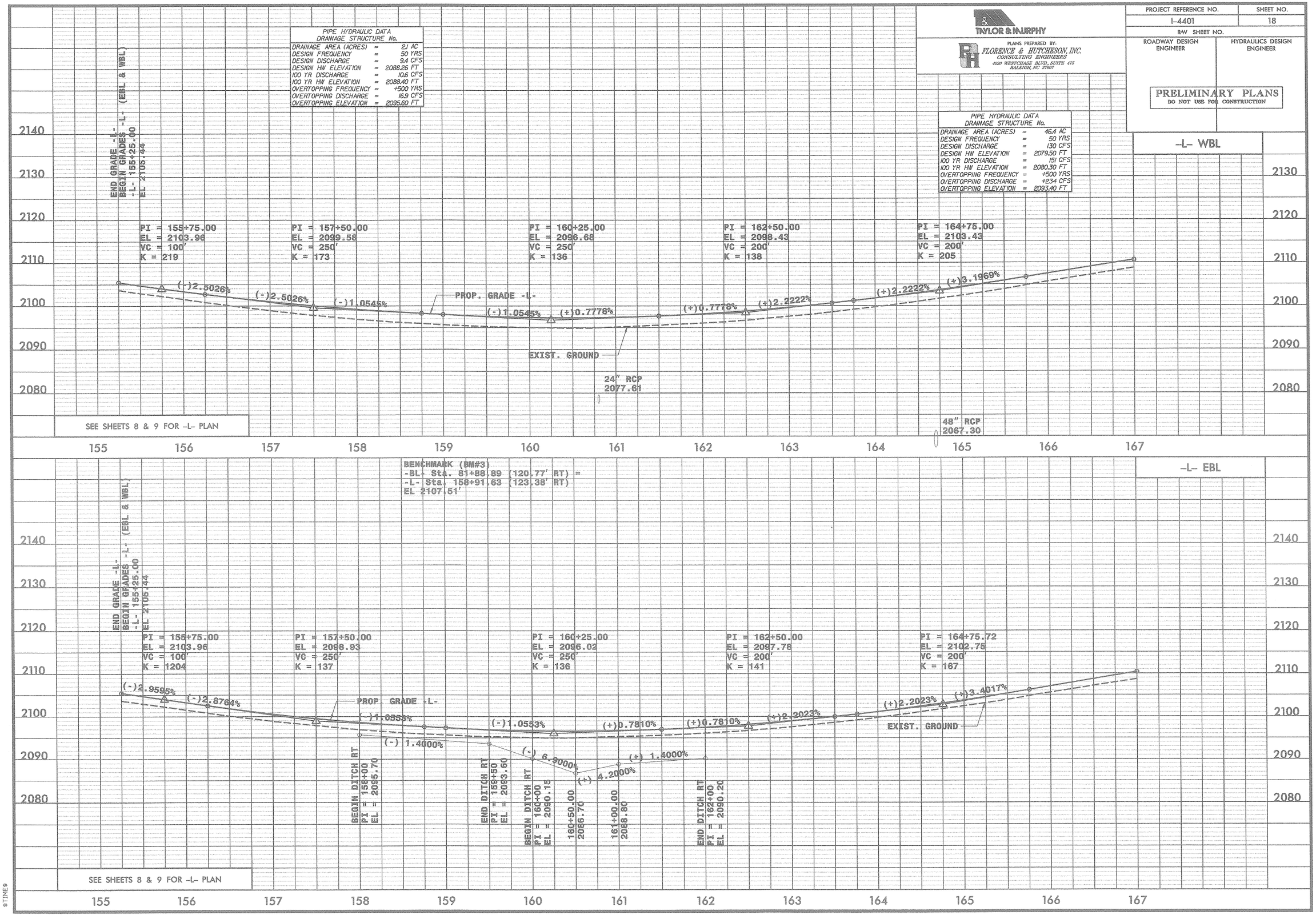
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.

DRAINAGE AREA (ACRES)	=	2.1 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	9.4 CFS
DESIGN HW ELEVATION	=	2088.26 FT
100 YR DISCHARGE	=	10.6 CFS
100 YR HW ELEVATION	=	2088.40 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	16.9 CFS
OVERTOPPING ELEVATION	=	2095.60 FT

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.

DRAINAGE AREA (ACRES)	=	46.4 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	130 CFS
DESIGN HW ELEVATION	=	2079.50 FT
100 YR DISCHARGE	=	151 CFS
100 YR HW ELEVATION	=	2080.30 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	+234 CFS
OVERTOPPING ELEVATION	=	2093.40 FT



$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
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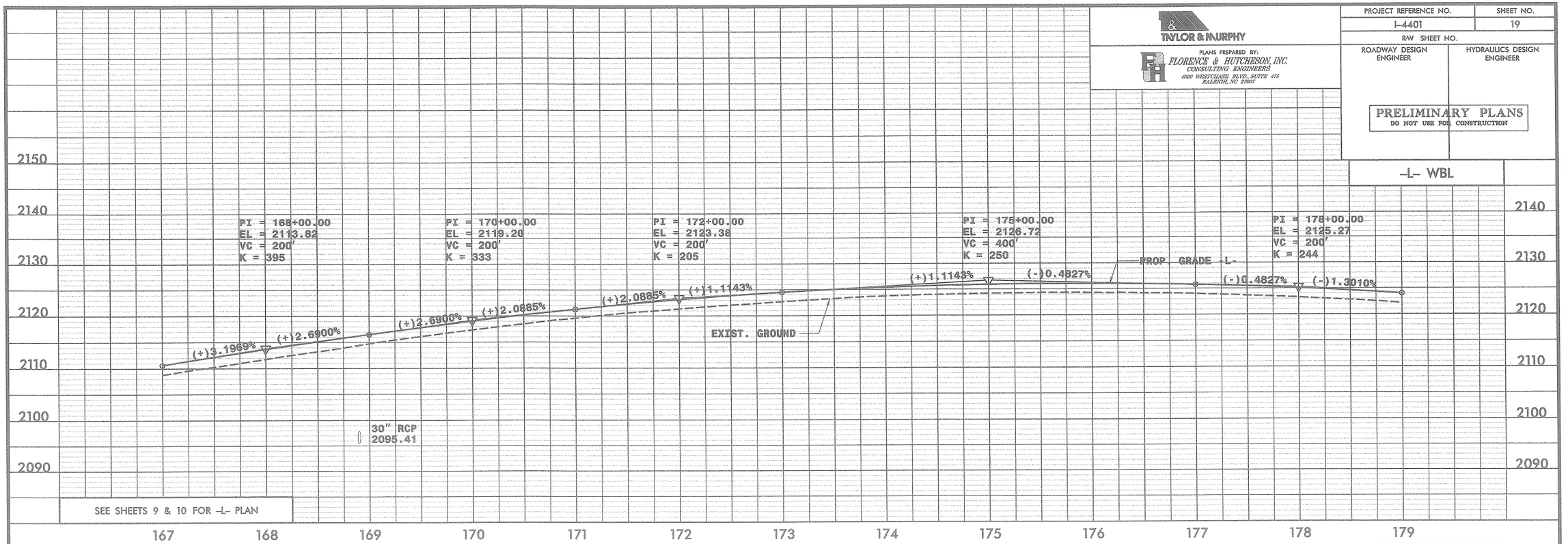
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

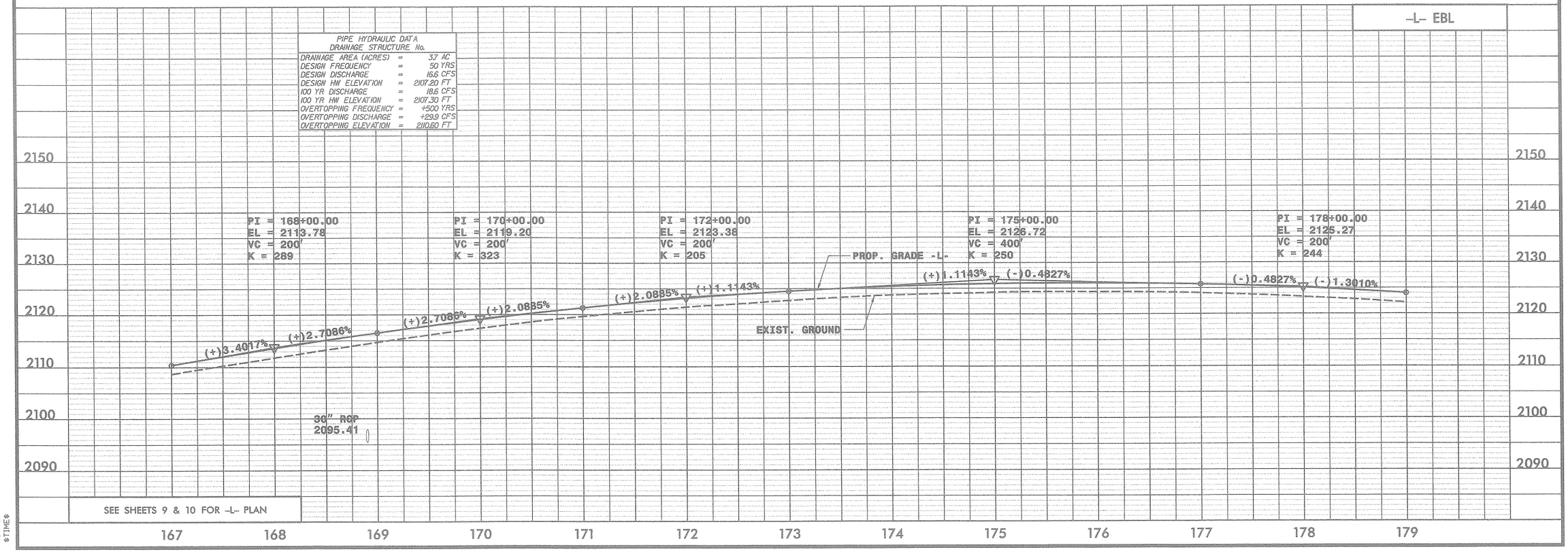
PROJECT REFERENCE NO.	SHEET NO.
I-4401	19
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE No.

DRAINAGE AREA (ACRES)	=	3.7 AC
DESIGN FREQUENCY	=	50 YRS
DESIGN DISCHARGE	=	16.6 CFS
DESIGN HW ELEVATION	=	2107.80 FT
100 YR DISCHARGE	=	18.6 CFS
100 YR HW ELEVATION	=	2107.30 FT
OVERTOPPING FREQUENCY	=	+500 YRS
OVERTOPPING DISCHARGE	=	+29.9 CFS
OVERTOPPING ELEVATION	=	2110.60 FT



$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

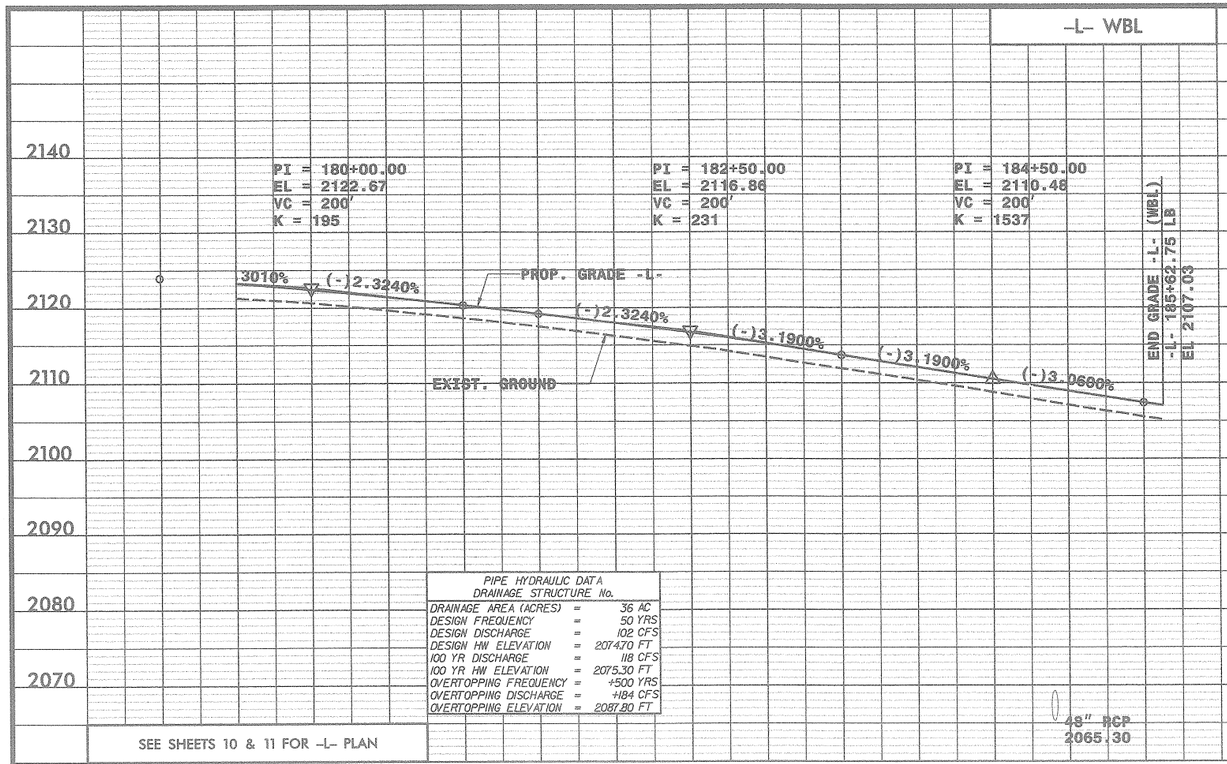
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

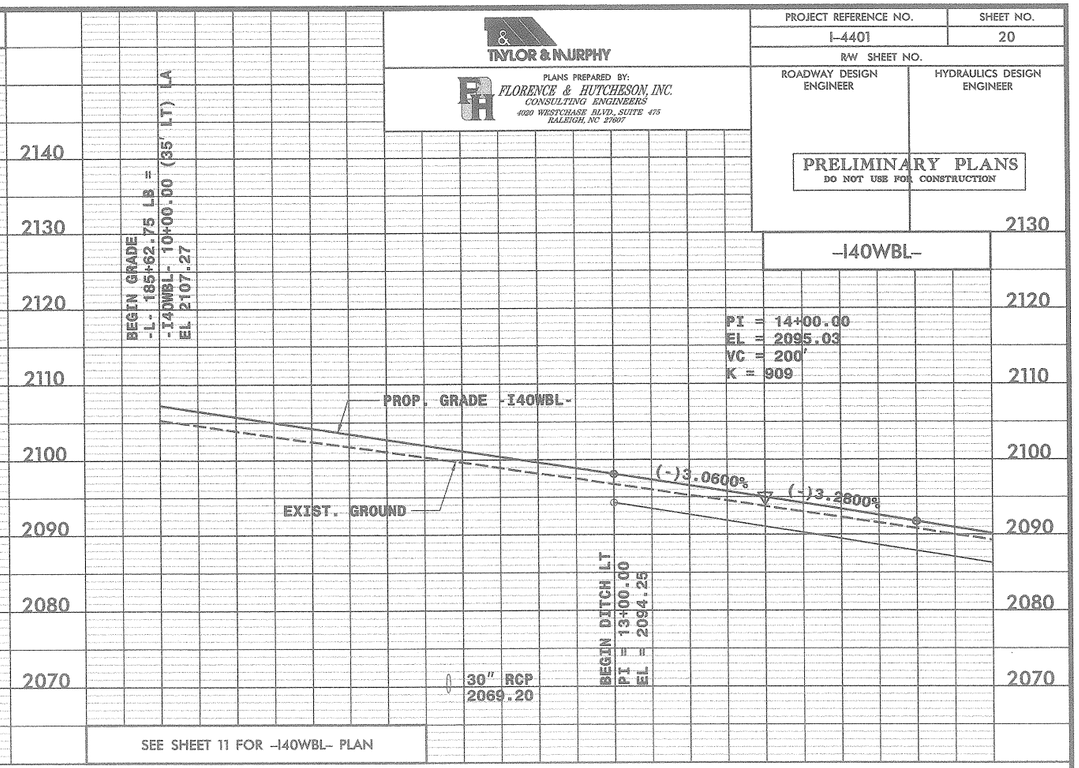
PROJECT REFERENCE NO.	SHEET NO.
I-4401	20
R/W SHEET NO.	

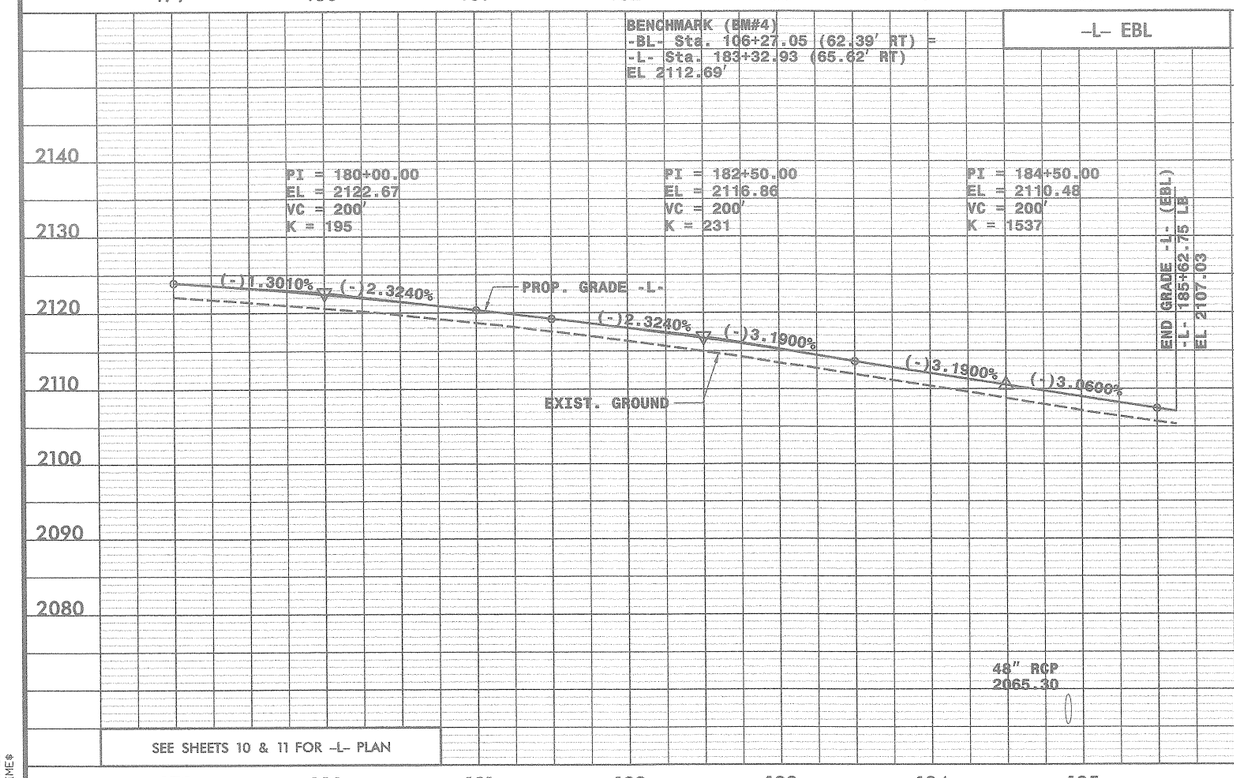
ROADWAY DESIGN ENGINEER

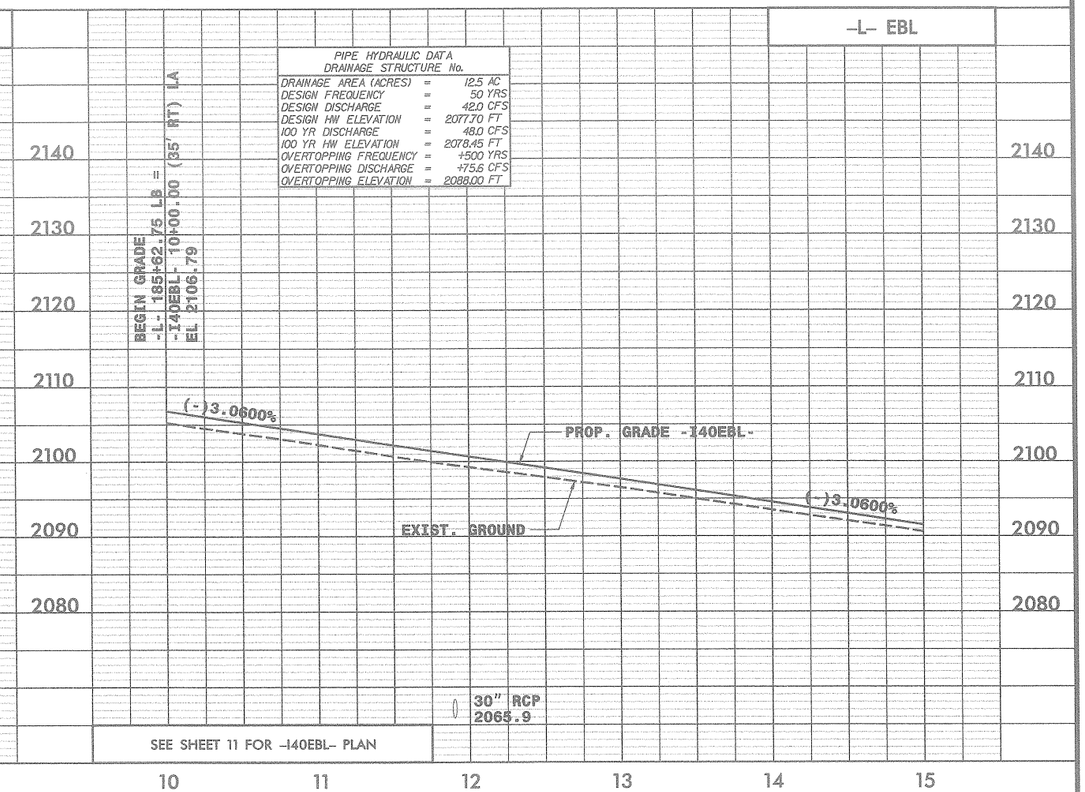
HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION









$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4000 WESTCHASE BLVD. SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

BENCHMARK (BM#5)
-BY2- Sta. 12+95.31 (36.10' RT) =
-I40WBL- Sta. 24+95.93 (92.08' LT)
EL 2078.18'

-I40WBL-

-I40WBL- 19+52.00 =
-I40WBLRP- 10+00.00 (12.00' RT)

PI = 18+20.00
EL = 2081.25
VC = 180'
K = 2250

PI = 20+00.00
EL = 2075.21
VC = 180'
K = 295

PI = 22+00.00
EL = 2069.71
VC = 200'
K = 800

PI = 24+50.00
EL = 2062.21'
VC = 200'
K = 244

PI = 26+50.00
EL = 2057.85
VC = 200'
K = 194

(-)3.2800% (-)3.2000% (-)3.2800% (-)3.3600% (-)6.1000% (-)8.0000% (-)2.7500% (-)2.9000% (-)2.7500% (-)3.0000% (-)3.0000% (-)2.1800% (-)2.1800% (-)3.2113%

PI = 17+50.00
EL = 2079.85

PI = 19+50.00
EL = 2067.65

PI = 20+00.00
EL = 2071.55

PI = 23+50.00
EL = 2061.50

PROP. GRADE -I40WBL-

EXIST. GROUND

END DITCH LT

SEE SHEETS 11 & 12 FOR -I40WBL- PLAN

-I40EBL-

PI = 18+95.00
EL = 2079.40
VC = 300'
K = 195

PI = 21+95.00
EL = 2074.84
VC = 300'
K = 6000

PI = 24+50.00
EL = 2071.09
VC = 200'
K = 3333

(-)3.0600% (-)3.0600% (-)1.5200% (-)1.5200% (-)1.4700% (-)1.4700% (-)1.4100%

PROP. GRADE -I40EBL-

EXIST. GROUND

SEE SHEETS 11 & 12 FOR -I40EBL- PLAN

$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

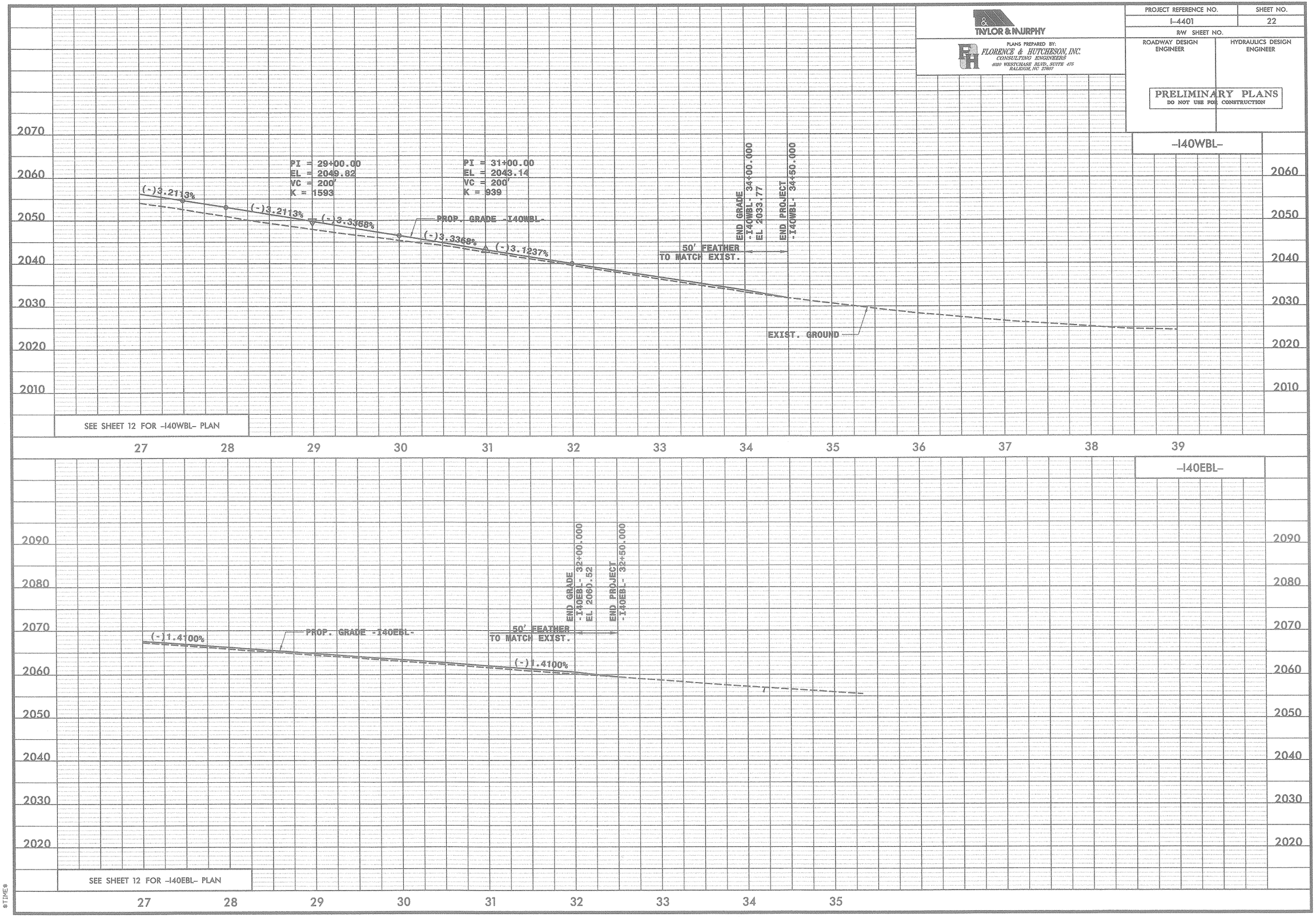
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	22
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
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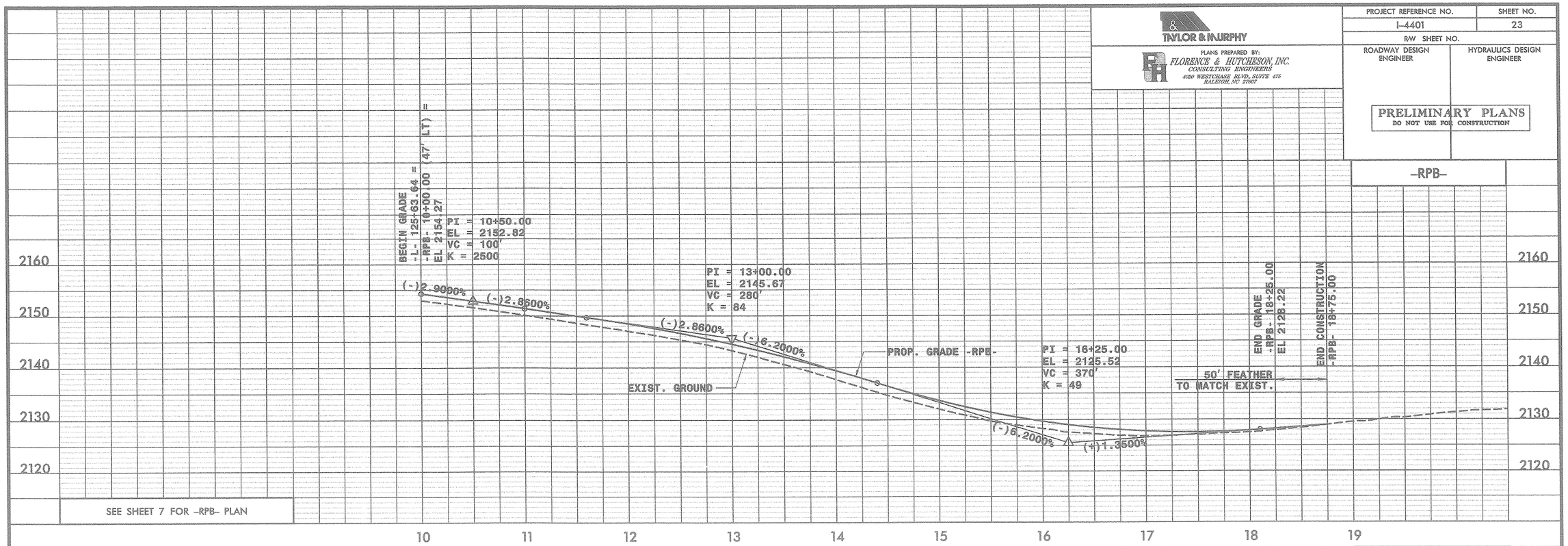
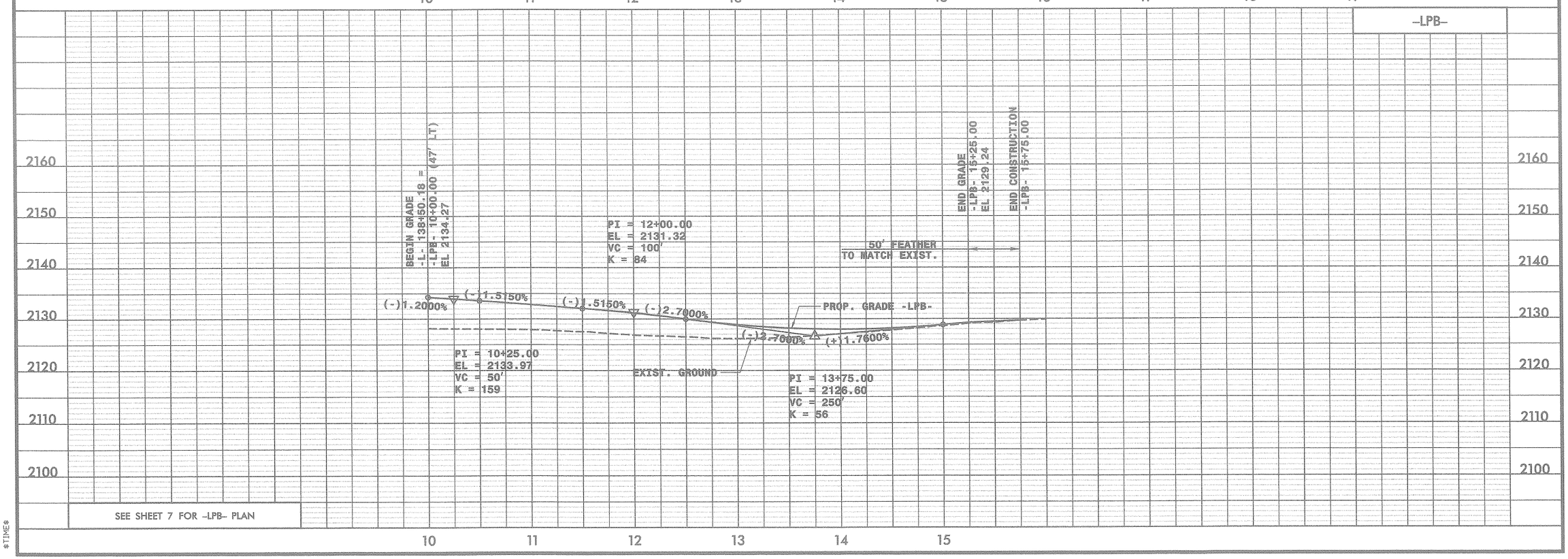
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	23
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



SEE SHEET 7 FOR -RPB- PLAN



SEE SHEET 7 FOR -LPB- PLAN

$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

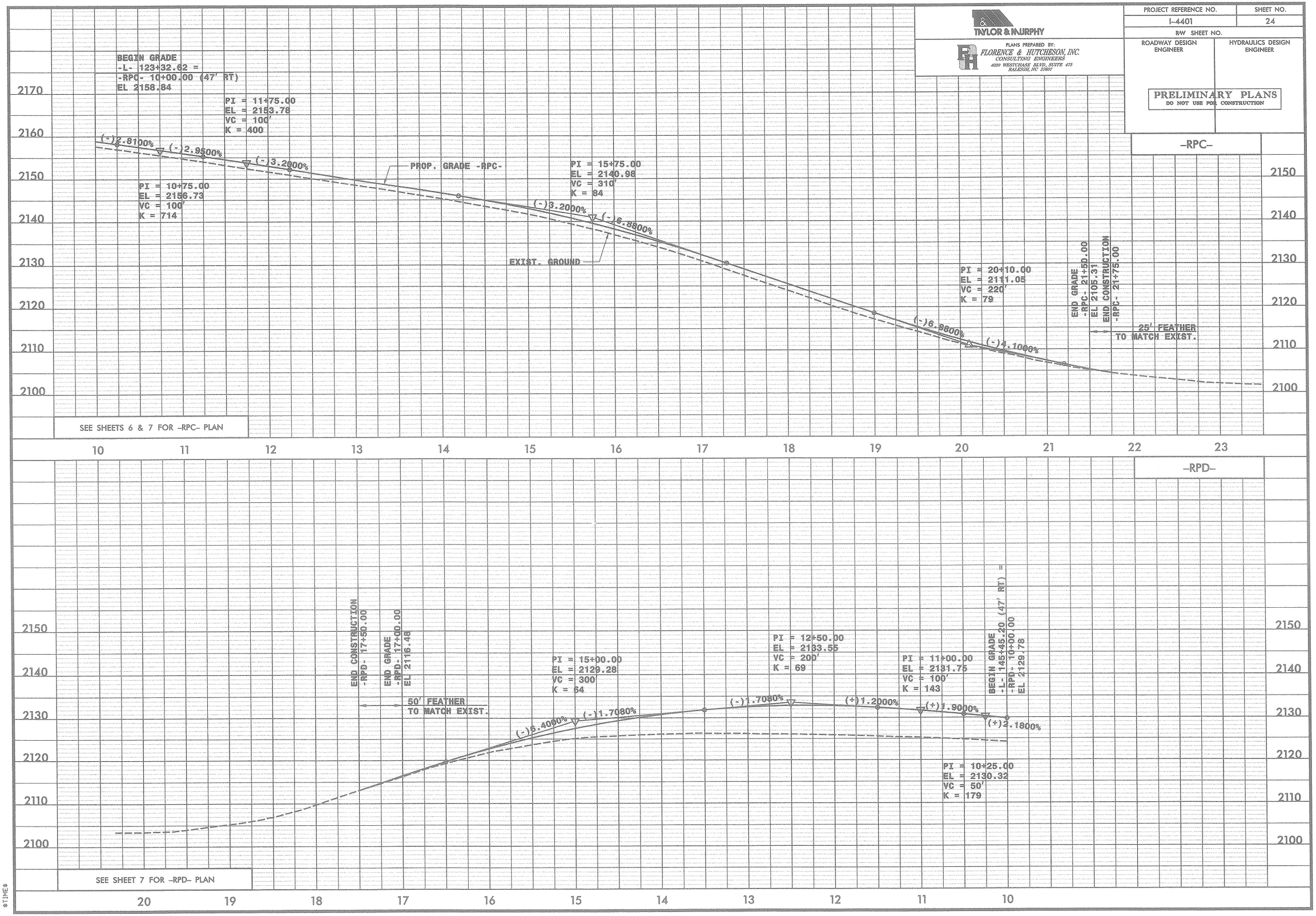
PLANS PREPARED BY:
FLORENCE & HUTCHESON, INC.
CONSULTING ENGINEERS
4020 WESTCHASE BLVD., SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	24
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



$FILE$
$DATE$
$TIME$

TAYLOR & MURPHY

PLANS PREPARED BY:
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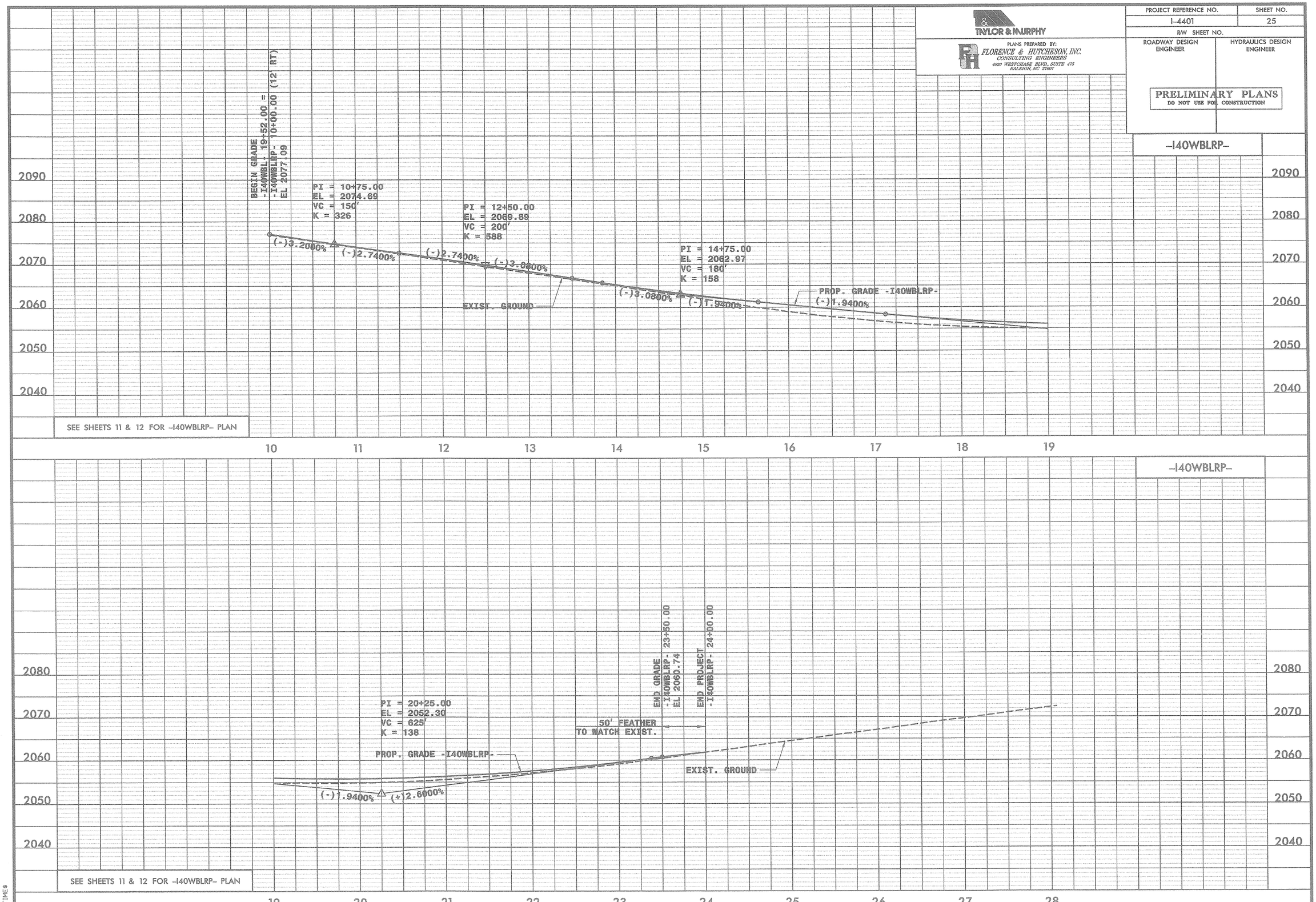
CONSULTING ENGINEERS
4020 WESTCHASE BLVD, SUITE 475
RALEIGH, NC 27607

PROJECT REFERENCE NO.	SHEET NO.
I-4401	25
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER

HYDRAULICS DESIGN ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



$FILE$
$DATE$
$TIME$