



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

ROY COOPER  
GOVERNOR

JAMES H. TROGDON, III  
SECRETARY

January 7, 2019

Asheville Regulatory Field Office  
US Army Corps of Engineers  
151 Patton Avenue, Room 208  
Asheville, North Carolina 28801-5006

ATTN: Ms. Nicholle Braspennickx  
NCDOT Coordinator

Subject: **Request for Modification to Individual Section 404 and Section 401 Water Quality Certification** for the Winston-Salem Northern Beltway from US 52 to US 311 (New Walkertown Road), Forsyth County. Federal Aid Project No. NHP-0074(213), TIP Nos. U-2579D, E & F. Division 9. Debit \$570 from WBS 34839.3.GV7

References: Section 404 and 401 Individual Permit Application requested October 2, 2017 for Winston Salem Northern Beltway from I-40 to US 52 (R-2247B Phase 2, CA, CB, CD, D, EA, EB, and EC), from US 52 to US 311 north (U-2579C Phase 2, D, E, and F) and from I-40 Business to US 311 South (U-2579AA and AB)

Section 404 Individual Permit issued for Winston Salem Northern Beltway from I-40 to US 52 (R-2247B Phase 2, CA, CB, CD, D, EA, EB, and EC), from US 52 to US 311 north (U-2579C Phase 2, D, E, and F) and from I-40 Business to US 311 South (U-2579AA and AB) January 22, 2018 (SAW-2017-02112)

Section 401 Water Quality Certification issued November 14, 2017 (WQC004131); Revision 1 dated November 27, 2017 & Revision 2 dated December 21, 2017 for Winston Salem Northern Beltway from I-40 to US 52 (R-2247B Phase 2, CA, CB, CD, D, EA, EB, and EC), from US 52 to US 311 north (U-2579C Phase 2, D, E, and F) and from I-40 Business to US 311 South (U-2579AA and AB)

Dear Madam:

The purpose of this modification request is to provide final design and impact calculations for U-2579D, E & F which was in preliminary design when the original permit was requested in 2017 for the proposed Winston Salem Northern Beltway from I-40 to US 52 (TIP Nos. R-2247B Phase 2, CA, CB, CD, D, EA, EB, and EC) and from US 52 to US 311

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north (U-2579C Phase 2, D, E, and F) and from I-40 Business to US 311 South (U-2579AA and AB). U-2579D, E & F is an approximately 6.9 mile section of the Beltway to be constructed on new location that begins east of US 52 and extends to US 311 (New Walkertown Road).

U-2579C was divided into two phases for permitting purpose. These phases were identified as U-2579C Phase 1 and U-2579C Phase 2. U-2579C Phase 1 was issued as a separate Individual Permit (USACE Action ID SAW-2017-01232 issued August 17, 2017 and DWR WQC 004123 issued July 26, 2017). U-2579C Phase 2 was permitted as part of the phased Individual Permit for Winston Salem Northern Beltway (USACE Action ID SAW-2017-02112 issued January 22, 2018 and DWR WQC issued December 21, 2017). U-2579C Phase 2 included Permit sites 1-5 on the U-2579C project. These sites are located just west of US 311 and east of the Norfolk Southern Railroad. It was determined that the impacts on U-2579C Phase 2 could not be permitted independently from the impacts with U-2579D, hence U-2579C was split into Phase 1 and 2 and permitted separately.

U-2579 C Phase 2, Permit sites 3-5, are currently under construction for the U-2579C contract. Permit sites 1-2 were removed from the construction contract for U-2579C, and the limits of the U-2579D, E, & F project updated accordingly to include permit sites 1-2. The Flatiron Constructors Inc. - Blythe Development CO Joint Venture Design-Build Team currently working on the U-2579D, E & F project has incorporated permit sites 1 (new sites 28 and 29) and 2 (new site 30) into their design, which has resulted in decreased impacts and plan sheet changes. Revised impacts are shown in Tables 1 and 2 and included on Permit Impact Sheets 80 to 89 of 97 for U-2579C Phase 2 permit sites 1-2 (new sites 28, 29, and 30).

There will be 13,578 linear feet of permanent stream impacts and 608 linear feet of temporary stream impacts associated with construction of the U-2579 D, E & F project. Permanent impacts to wetlands total 1.66 acres due to fill, excavation, and mechanized clearing on the U-2579 D, E & F project. Of those totals, 1,524 linear feet of permanent stream impact, 34 linear feet of temporary stream impact, and 0.57 acre of permanent wetland impact (fill, excavation, and mechanized clearing) are due to the construction of U-2579C Phase 2 Sites 1-2 (Sites 28, 29, and 30). No temporary wetland impacts due to fill or hand clearing will occur during project construction.

Please see the enclosed Concurrence Point 4B and 4C meeting minutes, Stormwater Management Plan, permit drawings, and roadway plans for section U-2579 D, E & F.

Information regarding project purpose and need, NEPA document status, resource status, federally protected species, moratorium, indirect cumulative impact analysis, cultural resources, wild and scenic rivers, and FEMA compliance submitted in the original permit application remains valid and is incorporated by reference.

In October 2018, the HPO concurred to a design change at the Clayton Family Farm. The original plans indicated a temporary construction easement (TCE) would be needed; however, during final design a permanent drainage easement was deemed necessary to



accommodate a ditch tie-in and maintenance just inside the historic boundary of the Clayton Family Farm (see attached Greensheet Commitments and Concurrence Assessment and Roadway Plan Sheet 42).

### Impacts to Water of the U.S.

Tables 1, 2, and 3 summarize the impacts to jurisdictional water resources for the final design of U-2579D, E & F. Site numbers correspond with the permit (hydraulic) drawings included in this application. The stream and wetland site IDs correspond with the Preliminary Jurisdiction Determination Report, R-2247 / U-2579, January 2016. A brief description of each impact site will follow the tables.

**Table 1. U-2579D, E & F Wetlands Impacts \***

| Permit Site Number                                    | Site ID <sup>1</sup> | Wetland Size (ac) <sup>2</sup> | Permanent Fill Impacts (ac.) | Excavation (ac) | Mechanized Clearing (ac) | Impacts Requiring Mitigation (ac) |
|-------------------------------------------------------|----------------------|--------------------------------|------------------------------|-----------------|--------------------------|-----------------------------------|
| <b>Section D</b>                                      |                      |                                |                              |                 |                          |                                   |
| 15A                                                   | ES-W28               | 0.05                           | 0.04                         | 0               | 0                        | 0.04                              |
| <b>Section D Total <sup>3</sup>:</b>                  |                      |                                | <b>0.04</b>                  | <b>0</b>        | <b>0</b>                 | <b>0.04</b>                       |
| <b>Section E</b>                                      |                      |                                |                              |                 |                          |                                   |
| 6A                                                    | ES-W3                | 0.20                           | 0.11                         | <0.01           | 0.01                     | 0.12                              |
| 8A                                                    | ES-W38               | <0.01                          | <0.01                        | 0               | 0                        | 0.01                              |
| 8B                                                    | ES-W4                | 0.52                           | 0.51                         | 0               | 0                        | 0.51                              |
| 10A                                                   | ES-W36               | 0.08                           | 0.03                         | 0               | <0.01                    | 0.03                              |
| 10B                                                   | ES-W37               | <0.01                          | <0.01                        | 0               | 0                        | 0.01                              |
| 11A                                                   | ES-W33               | 0.10                           | 0.08                         | 0               | 0                        | 0.08                              |
| 12A                                                   | ES-W31               | 0.09                           | 0.08                         | 0               | 0                        | 0.08                              |
| 13A                                                   | ES-W51               | 0.41                           | 0                            | 0               | <0.01                    | 0.01                              |
| <b>Section E Total <sup>3</sup>:</b>                  |                      |                                | <b>0.82</b>                  | <b>0.01</b>     | <b>0.02</b>              | <b>0.85</b>                       |
| <b>Section F</b>                                      |                      |                                |                              |                 |                          |                                   |
| 1A                                                    | ES-W44               | 0.06                           | 0.06                         | 0               | 0                        | 0.06                              |
| 1B                                                    | ES-W1                | 0.10                           | 0.07                         | 0               | 0                        | 0.07                              |
| 1C                                                    | ES-W2                | 0.02                           | 0.02                         | 0               | 0                        | 0.02                              |
| 1D                                                    | ES-W43               | <0.01                          | <0.01                        | 0               | 0                        | 0.01                              |
| 2A                                                    | ES-W46               | 0.02                           | 0.01                         | 0               | 0                        | 0.01                              |
| 5A                                                    | ES-W47               | 0.03                           | 0.02                         | 0               | 0                        | 0.02                              |
| 5B                                                    | ES-W45               | 0.01                           | <0.01                        | <0.01           | 0                        | 0.01                              |
| <b>Section F Total <sup>3</sup>:</b>                  |                      |                                | <b>0.19</b>                  | <b>0.01</b>     | <b>0</b>                 | <b>0.20</b>                       |
| <b>U-2579D, E &amp; F Project Total <sup>3</sup>:</b> |                      |                                | <b>1.05</b>                  | <b>0.02</b>     | <b>0.02</b>              | <b>1.09</b>                       |

| Permit Site Number                                              | Site ID <sup>1</sup> | Wetland Size (ac) <sup>2</sup> | Permanent Fill Impacts (ac.) | Excavation (ac) | Mechanized Clearing (ac) | Impacts Requiring Mitigation (ac) |
|-----------------------------------------------------------------|----------------------|--------------------------------|------------------------------|-----------------|--------------------------|-----------------------------------|
| <b>Revised Section C-Phase 2 <sup>4</sup></b>                   |                      |                                |                              |                 |                          |                                   |
| 28<br>(Revised U-2579C-Phase 2, Site 1)                         | ES-W6                | 0.28                           | 0.26                         | 0               | 0                        | 0.26                              |
| 29A<br>(Revised U-2579C-Phase 2, Site 1)                        | ES-W7                | <0.01                          | <0.01                        | 0               | 0                        | 0.01                              |
| 29B<br>(Revised U-2579C-Phase 2, Site 1)                        | ES-W6                | 0.33                           | 0.26                         | 0.03            | 0.01                     | 0.30                              |
| <b>Section C-Phase 2 Revised 11/29/2018 Total <sup>3</sup>:</b> |                      |                                | <b>0.53</b>                  | <b>0.03</b>     | <b>0.01</b>              | <b>0.57</b>                       |

Notes: \* Wetlands impacted are riparian.

1 Wetland number corresponds with the Preliminary Jurisdictional Determination Report, R-2247 / U-2579, January 2016 labeling.

2 Wetland size is based on NCDOT WET File

3 Rounded totals are the sum of actual impacts to 1/1000th.

<sup>4</sup> Section U-2579C-Phase 2 was previously permitted and impacts were mitigated.

Sites 1A, 1B, 1C, 1D, and 2A are impacts as a result of roadway fill for the ramp, loop, and mainline at NC 66 (University Parkway). All of these are total take wetland impacts.

Site 5A and Site 5B are due to roadway fill, 6' x 6' RCBC, and ditch impacts. These are total take wetland impacts.

Site 6A impacts are due to roadway fill and 42" RCP; however, 2:1 side slopes with guardrail were used to minimize impacts.

Site 8A impacts are due to roadway fill and 42" RCP at the Germanton Road interchange.

Site 8B impacts are due to the proposed 36" RCP-IV outlet, and 15" RCP-III outlet at spring locations. An energy dissipator was added at the 36" outlet along with a ditch between the outlet of 36" RCP and 42" under the mainline. The wetland has been considered a total take at this location due to ditching through wetlands.

Site 10A and Site 10B are due to roadway fill and 42" RCP. 2:1 side slopes with guardrail were used to minimize impacts at Site 10A. Site 10B is a total take.

Site 11A impacts are due to roadway fill and 48" RCP. 2:1 side slopes with guardrail were used to minimize impacts; however, the wetland has been considered a total take at this location.

Site 12A impacts are due to roadway fill. This is a total take of the wetland.

Site 13A is due to mechanized clearing at the wetland located northeast of Site 13. This small impact is a result of ensuring the ditch is appropriately connected to the wetland. Elevations will be set in order to maintain the wetland and not create draining impacts.

Site 15A impacts are due to roadway fill and a 5' x 6' RCBC. 2:1 side slopes and guardrail were used for minimization of impacts; however, the wetland is a total take at this location.

Site 28, Site 29A, and Site 29B (Revised U-2579C-Phase 2 Permit Site 1) impacts are due to roadway fill. These locations were permitted and mitigated under the U-2579C – Phase 2 section of the project. The wetlands are total take impacts.

**Table 2. U-2579D, E, & F Surface Water Impacts and Descriptions**

| Permit Site Number | Stream ID / Waterbody      | Type of Stream | Impact Type        | Perm. Impacts lf. | Temp. Impacts lf. | Permanent Impacts Requiring Mitigation |
|--------------------|----------------------------|----------------|--------------------|-------------------|-------------------|----------------------------------------|
| <b>Section D</b>   |                            |                |                    |                   |                   |                                        |
| 15                 | ES-S14<br>UT to Mill Creek | Intermittent   | Perm. Fill         | 520               | 15                | Yes                                    |
| 16                 | ES-S15<br>UT to Mill Creek | Intermittent   | Perm. Fill         | 152               | 0                 | Yes                                    |
|                    |                            | Perennial      | Perm. Fill         | 361               | 20                | Yes                                    |
| 17                 | ES-S16<br>UT to Mill Creek | Perennial      | Perm. Fill         | 928               | 23                | Yes                                    |
| 18                 | ES-S68<br>UT to Mill Creek | Intermittent   | Perm. Fill         | 161               | 11                | Yes                                    |
| 19                 | ES-S19<br>UT to Mill Creek | Perennial      | Perm. Fill         | 250               | 11                | Yes                                    |
|                    |                            |                | Ditch              | 91                | 15                | Yes                                    |
| 20                 | ES-S20<br>Mill Creek       | Perennial      | Remove Pipe        | 35                | 31                | No                                     |
| 20A                |                            | Perennial      | Bank Stabilization | 16                | 21                | No                                     |
| 20B                |                            | Perennial      | Bank Stabilization | 20                | 21                | No                                     |
| 20C                |                            | Perennial      | Temp. Work Pad     | 0                 | 165<br>(0.06 ac)  | No                                     |
| 21                 | ES-S53<br>UT to Mill Creek | Perennial      | Channel Change     | 133               | 0                 | Yes                                    |
|                    |                            | Perennial      | Bank Stabilization | 10                | 10                | No                                     |
| 22                 | ES-S52<br>UT to Mill Creek | Perennial      | Perm. Fill         | 97                | 7                 | Yes                                    |
| 23                 | ES-S21<br>UT to Mill Creek | Perennial      | Perm. Fill         | 348               | 11                | Yes                                    |
|                    |                            |                | Bank Stabilization | 26                | 10                | No                                     |
| 24                 | ES-S22<br>UT to Mill Creek | Intermittent   | Channel Change     | 120               | 10                | Yes                                    |
| 25                 | ES-S23<br>UT to Mill Creek | Intermittent   | Perm. Fill         | 294               | 10                | Yes                                    |
| 26                 | ES-S24<br>UT to Mill Creek | Perennial      | Perm. Fill         | 519               | 10                | Yes                                    |
|                    |                            |                | Bank Stabilization | 24                | 10                | No                                     |
| 27                 | ES-S25<br>UT to Mill Creek | Perennial      | Perm. Fill         | 328               | 0                 | Yes                                    |
|                    |                            |                | Bank Stabilization | 35                | 8                 | No                                     |

| Permit Site Number                                       | Stream ID / Waterbody         | Type of Stream | Impact Type         | Perm. Impacts lf. | Temp. Impacts lf. | Permanent Impacts Requiring Mitigation |
|----------------------------------------------------------|-------------------------------|----------------|---------------------|-------------------|-------------------|----------------------------------------|
|                                                          |                               |                | Bank Stabilization  | 37                | 12                | No                                     |
| 32                                                       | ES-S17<br>Mill Creek          | Perennial      | Bank Stabilization  | 172               | 19                | No                                     |
| 34                                                       | ES-S26<br>UT to Mill Creek    | Perennial      | Bank Stabilization  | 24                | 11                | No                                     |
| Section D Total:                                         |                               |                |                     | 4,701             | 461               |                                        |
| Section D Total Perm. Impacts (Perm. Fill + Bank Stab.): |                               |                |                     | 4,701             |                   |                                        |
| Section D Bank Stabilization / Pipe Removal Impacts:     |                               |                |                     | 399               |                   |                                        |
| Section D Total Impact Requiring Mitigation:             |                               |                |                     | 4,302 lf          |                   |                                        |
| Section E                                                |                               |                |                     |                   |                   |                                        |
| 6                                                        | ES-S4<br>Trick-Um Creek       | Perennial      | Perm. Fill          | 824               | 7                 | Yes                                    |
| 7                                                        | ES-S5<br>UT to Trick-Um Creek | Intermittent   | Perm. Fill          | 266               | 0                 | Yes                                    |
| 8                                                        | ES-S6<br>UT to Trick-Um Creek | Intermittent   | Perm. Fill          | 215               | 0                 | Yes                                    |
|                                                          |                               | Perennial      | Perm. Fill          | 703               | 19                | Yes                                    |
| 9                                                        | ES-S7<br>UT to Buffalo Creek  | Intermittent   | Perm. Fill          | 154               | 0                 | Yes                                    |
|                                                          |                               | Perennial      | Perm. Fill          | 632               | 0                 | Yes                                    |
|                                                          |                               | Perennial      | Bank Stabilization  | 14                | 0                 | No                                     |
| 10                                                       | ES-S8<br>UT to Buffalo Creek  | Perennial      | Perm. Fill          | 364               | 13                | Yes                                    |
| 11                                                       | ES-S9<br>UT to Buffalo Creek  | Perennial      | Perm. Fill          | 615               | 0                 | Yes                                    |
| 12                                                       | ES-S58<br>UT to Mill Creek    | Perennial      | Perm. Fill          | 410               | 10                | Yes                                    |
| 13                                                       | ES-S10<br>UT to Mill Creek    | Perennial      | Perm. Fill          | 337               | 22                | Yes                                    |
| 14                                                       | ES-S13<br>UT to Mill Creek    | Perennial      | Perm. Fill          | 220               | 11                | Yes                                    |
| 31                                                       | ES-S60<br>UT to Ogburn Branch | Intermittent   | Ditch               | 57                | 0                 | Yes                                    |
| 33                                                       | ES-S62<br>Buffalo Creek       | Perennial      | Channel Improvement | 20                | 21                | Yes                                    |
| Section E Total:                                         |                               |                |                     | 4,831             | 103               |                                        |
| Section E Total Perm. Impacts (Perm. Fill + Bank Stab.): |                               |                |                     | 4,831             |                   |                                        |
| Section E Bank Stabilization Impacts:                    |                               |                |                     | 14                |                   |                                        |
| Section E Total Impact Requiring Mitigation:             |                               |                |                     | 4,817             |                   |                                        |
| Section F                                                |                               |                |                     |                   |                   |                                        |

| Permit Site Number                                                | Stream ID / Waterbody      | Type of Stream | Impact Type        | Perm. Impacts lf. | Temp. Impacts lf. | Permanent Impacts Requiring Mitigation |
|-------------------------------------------------------------------|----------------------------|----------------|--------------------|-------------------|-------------------|----------------------------------------|
| 1                                                                 | ES-S1<br>Rough Fork        | Perennial      | Perm. Fill         | 1522              | 0                 | Yes                                    |
|                                                                   |                            |                | Bank Stabilization | 20                | 0                 | No                                     |
| 2                                                                 | ES-S67<br>UT to Rough Fork | Perennial      | Perm. Fill         | 86                | 0                 | Yes                                    |
| 3                                                                 | ES-S65<br>UT to Rough Fork | Perennial      | Perm. Fill         | 120               | 0                 | Yes                                    |
| 4                                                                 | ES-S2<br>UT to Rough Fork  | Perennial      | Perm. Fill         | 132               | 0                 | Yes                                    |
| 5                                                                 | ES-S3<br>Rough Fork        | Perennial      | Perm. Fill         | 642               | 10                | Yes                                    |
| <b>Section F Total:</b>                                           |                            |                |                    | <b>2,522</b>      | <b>10</b>         |                                        |
| <b>Section F Total Perm. Impacts (Perm. Fill + Bank Stab.):</b>   |                            |                |                    | <b>2,522</b>      |                   |                                        |
| <b>Section F Bank Stabilization Impacts:</b>                      |                            |                |                    | <b>20</b>         |                   |                                        |
| <b>Section F Total Impact Requiring Mitigation:</b>               |                            |                |                    | <b>2,502</b>      |                   |                                        |
| <b>Section D, E &amp; F Totals</b>                                |                            |                |                    |                   |                   |                                        |
| <b>Total:</b>                                                     |                            |                |                    | <b>12,054</b>     | <b>574</b>        |                                        |
| <b>Total Permanent Impacts (Perm. Fill + Bank Stabilization):</b> |                            |                |                    | <b>12,054</b>     |                   |                                        |
| <b>Bank Stabilization / Pipe Removal Impacts:</b>                 |                            |                |                    | <b>433</b>        |                   |                                        |
| <b>Total Impact Requiring Mitigation:</b>                         |                            |                |                    | <b>11,621 lf</b>  |                   |                                        |

| Revised Section C-Phase 2 *                                |                               |           |                    |            |    |     |
|------------------------------------------------------------|-------------------------------|-----------|--------------------|------------|----|-----|
| 29<br>(U-2579C<br>Site 1)                                  | ES-S48<br>UT to Frazier Creek | Perennial | Perm. Fill / Ditch | 906        | 0  | Yes |
|                                                            |                               |           | Bank Stabilization | 40         | 10 | No  |
| 30<br>(U-2579C<br>Site 2)                                  | ES-S27<br>UT to Frazier Creek | Perennial | Perm. Fill         | 563        | 14 | Yes |
|                                                            |                               |           | Bank Stabilization | 15         | 10 | No  |
| Total:                                                     |                               |           |                    | 1,524      | 34 |     |
| Total Permanent Impacts (Perm. Fill + Bank Stabilization): |                               |           |                    | 1,524      |    |     |
| Bank Stabilization Impacts:                                |                               |           |                    | 55         |    |     |
| Total Impact Requiring Mitigation:                         |                               |           |                    | 1,469 If * |    |     |

\*Impacts for the Revised Section C-Phase 2 were previously mitigated. The design revisions illustrated in the attached plan sheets result in a reduction of impacts that will result in a surplus of mitigation obtained on the Section C-Phase 2 portion of the project. See Compensatory Mitigation discussion.

Site 1, Site 2, Site 3, and Site 4 impacts are due to the interchange at NC66. Roadway impacts include installation of a 54" RCP/66" RCP which will not be buried due to slope. 2:1 side slopes with guardrail were used to minimize impacts. Slopes were flattened in the Ramp A gore due to steep terrain. The last run of pipe (66" RCP) will be flattened to 0.5% to reduce outlet velocity. Of the 1,542 lf of permanent stream impacts at Site 1, 1,470 lf is due to the installation of the 54" RCP/66" RCP, 52 lf is due to outlet channel protection, and 20 lf is due to bank stabilization. The 86 lf of permanent impact at Site 2, 120 lf of

permanent impact at Site 3, and 132 lf of permanent impact at Site 4 are all due to roadway fill.

Site 5 impacts are due to the roadway fill and installation of a 6' x 6' box culvert. The outlet of a 30" pipe will be discharged into the existing channel and armored to allow dissipation before entering the main channel. The 24" pipe will be discharged to a ditch with flatter terrain to allow for dissipation before entering the main channel. Inlet protection is included due to a 15" pipe discharging near the headwall and the ditch entering on the opposite side of the channel. Of the 642 lf of permanent stream impacts at Site 5, 561 lf is due to the installation of the 6'x6' RCBC, 31 lf due to inlet channel protection, and 50 lf is due to outlet channel protection.

Site 6 includes a proposed 42" RCP which will not be buried due to the steep slope. A ditch will be added in the wetland at the inlet to create a single low point at the 42" pipe inlet. The pipe outlets to a lateral base ditch prior to entering the main channel to allow for energy dissipation. Outlet protection will be added to the 5' x 6' RCBC to maintain stream stability. Of the 824 lf of permanent stream impacts at Site 6, 740 lf is due to the installation of the 42" RCP/6'x6' RCBC and 84 lf is due to ditching at the inlet.

Site 7 impacts are due to a proposed 6'x 6' RCBC which will not be buried due to the steep slope. Inlet channel protection is illustrated at the culvert inlet where the ditches tie to the channel. Additional impacts will occur at the culvert inlet to fill in an existing headcut. An energy dissipator and overwidened ditch with permanent rock checks were provided prior to entering the stream. Of the 266 lf of permanent stream impacts at Site 7, 228 lf is due to the installation of the 6' x 6' RCBC and 38 lf is due to inlet channel protection.

Site 8 impacts are due to the interchange at NC 8 (Germanton Road). The majority of the impacts at this site are due to installation of a 42" RCP which will not be buried due to slope. A 30" pipe also outlets adjacent to the 42' RCP. The last section of the 42" pipe will be flattened to reduce velocity. There will be stream impacts due to ditching of the stream through the wetland in Ramp C as there is no defined channel. Of the 918 lf of permanent stream impacts at Site 8, 679 lf is due to the installation of the 42" RCP, 215 lf for ditching, and 24 lf is due to outlet channel protection.

Site 9 impacts are due to the interchange at NC 8 (Germanton Road). A 36" RCP/42" RCP will be installed at this location with an energy dissipator at the outlet due to high velocities. Slopes in the interior of the interchange were flattened. Of the 800 lf of permanent stream impacts at Site 9, 758 lf is due to the installation of the 42" RCP, 28 lf is due to installation of an energy dissipator basin, and 14 lf of bank stabilization.

Site 10 impacts are due to roadway fill. A 42" RCP will be installed but will not be buried due to steep slopes. The pipe location was altered in order to pick up the larger drainage area of the previously breached pond. Outlet protection is provided and the 18" RCP downstream of project will be left in place. Of the 364 lf of permanent stream impacts at Site 10, 335 lf is due to the installation of the 42" RCP and 29 lf is due to outlet channel protection.

Site 11 and Site 33 are due to roadway fill. A 48" RCP will be installed but not buried due to slope. An energy dissipator, overwidened ditch, and permanent rock checks will be provided to reduce velocity. The connection of the stream at Site 11 and Site 33 will be improved with grading for a better channel tie. The 24" RCP being retained at the inlet is perched so a drop box will be added and ditch graded between that pipe and the proposed 48" RCP. Site 33 was previously illustrated as Site 34 in the 4C minutes; however, this was updated as there was a numbering conflict in the permits drawings. Of the 615 lf of permanent stream impacts at Site 11, 557 lf is due to the installation of the 48" RCP and 58 lf is due to outlet channel protection.

Site 33 (previously illustrated as Site 34 as noted above) is at Buffalo Creek due to the channel tie noted above which results in 20 lf of permanent stream impacts illustrated as outlet channel protection.

Site 12 impacts are due to roadway fill. The stream will be relocated and a ditch block will be installed. The relocation will be lined with class I rip-rap. Channel modification at Site 13 allows the stream relocation to tie at a better angle. Of the 410 lf of permanent stream impact due to fill at Site 12, 334 lf will be relocated to a ditch.

Site 13 impacts are due to roadway fill and installation of a 5' x 6' reinforced concrete box culvert which will not be buried due to slope. Channel improvements will be made on the upstream side of the culvert to eliminate the bend and allow the ditch and stream relocation better ties. Outlet channel protection is provided. The 18" pipe which discharges upstream of ES-S11 (not impacted) should not restrict drainage to ES-S11 or create erosive flows to the channel. The ditch elevation near the inlet maintains the current elevation so it should not drain the wetland (Wetland ES-W51) (Site 13A). Of the 337 lf of permanent stream impacts at Site 13, 272 lf is due to the installation of the 5' x 6' RCBC, 19 lf is due to outlet channel protection, and 46 lf is due to inlet channel protection.

Site 14 impacts are due to roadway fill. Stream ES-S13 begins downstream of the jurisdictional pond ES-P2. A spring box will be installed and connect to the 48" RCP with outlet protection. The downstream channel will be altered to improve the bend. Of the 220 lf of permanent stream impacts at Site 14, 183 lf is due to the installation of the 48" RCP and 37 is due to outlet channel protection.

Site 15 impacts are due to roadway fill and a 5' x 6' culvert will be constructed but will not be buried due to steep slopes. Inlet and outlet channel protection will be installed to provide long term stability. Longer wing walls are shown on the plans and the ditches tie at appropriate angles. Of the 520 lf of permanent stream impacts at Site 15, 446 lf is due to the installation of the 5' x 6' RCBC, 43 lf is due to outlet channel protection, and 31 lf is inlet channel protection.

Site 16 impacts are due to roadway fill at the Baux Mountain Road interchange. A 42" RCP is proposed which will not be buried. There will be inlet and outlet protection. A ditch will be added between the 30" RCP and the 42" RCP inside the interchange due to

steep slopes and temporary impacts during construction. The 42" outlet ditch will be realigned for a better tie with existing stream. Of the 513 lf of permanent stream impacts at Site 16, 200 lf is due to the installation of the 42" RCP, 190 lf is due to ditching, 99 lf is due to roadway fill, and 24 lf for outlet channel protection.

Site 17 impacts are due to roadway fill and a proposed 6' x 6' RCBC which will not be buried. Inlet channel protection and outlet protection will be provided. Additional protection is proposed at the tie-in of the lateral base ditches near the inlet of the 6' x 6' RCBC. Of the 928 lf of permanent stream impacts at Site 17, 854 lf is due to the installation of the 6' x 6' RCBC, 45 lf is inlet channel protection, and 29 lf is due to outlet channel protection.

Site 18 impacts are due to roadway fill and proposed 42" RCP which is not buried due to steep slope. Outlet channel protection is provided. Of the 161 lf of permanent stream impacts at Site 18, 137 lf is due to the installation of the 42" RCP and 24 lf is due to outlet channel protection.

Site 19 impacts are due to roadway fill and proposed 5'x7' culvert which will be buried 1' with no baffles. A 1' sill will be placed on the culvert and backfilled with native material. The 24" pipe downstream will be removed. The downstream channel is shallower than upstream so outlet channel improvements will be provided which include ditching and outlet channel protection. Of the 341 lf of permanent stream impacts at Site 19, 250 lf is due to the installation of the 5' x 7' RCBC, 18 lf is due to the channel outlet protection at the outlet of the 5' x 7' RCBC, and 73 lf is due to ditching.

Site 20 involves removing 2 x 72" CMP (under Phelps Dive) at Mill Creek. Removal of these pipes will improve floodplain and floodway width. This location is downstream of the project crossing of Mill Creek. A large scour hole is present due to undersized pipes. Once the pipes are removed the site is to be monitored in the field for potential head cutting. If head cutting is an issue, changes will be made as needed. The 35 lf of permanent stream impact at Site 20 is due to placement of rip rap in scour hole.

Site 20A includes 16 lf of permanent bank stabilization (rip rap at embankment) at the ditch tie in to Mill Creek.

Site 20B includes 20 lf of permanent bank stabilization (rip rap at embankment) at the relocated ES-S53 channel tie in to Mill Creek.

Site 20C includes a temporary crossing added at Mill Creek. The temporary impact is 165 lf (0.06 ac). The Design Build Team will add pipes to the stream and cover them to create a temporary work pad. The temporary work pad pipes will maintain 50% of the open stream width. This location will be determined in the field and should be placed in a location that is not overwidened. The Design Build Team will also coordinate with the Division staff in order to have beaver dams removed prior to construction of the Mill Creek bridge.



Site 21 is due to needing to realign the tributary entering Mill Creek away from where the proposed bridge piers will be placed. Bank stabilization will be used for the lateral V ditch where it ties to the relocated stream into the lateral base ditch. Of the 143 lf of permanent stream impacts at Site 21, 133 lf is due to the channel realignment and 10 lf is due to bank stabilization along the channel.

Site 22 is due to roadway fill and a 30"/36" RCP which is being installed. To address outlet velocities, an energy dissipator and additional outlet channel protection are being provided. Of the 97 lf of permanent stream impacts at Site 22, 62 lf is due to the installation of the 30"/36" RCP, 14 lf is due to installation of an energy dissipator basin, and 21 lf of outlet channel protection.

Site 23 impacts are due to roadway fill and installation of a 6' x 6' RCBC which will not be buried. Channel protection will be added at the culvert outlet and extend to capture the tying in of a lateral V ditch and the tying in of the toe protection/18" pipe. Bank stabilization is provided at the inlet along the stream where ES-S22 ties to ES-S21. Of the 374 lf of permanent stream impacts at Site 23, 314 lf is due to the installation of the 6' x 6' RCBC, 34 lf is due to outlet channel protection, and 26 lf of bank stabilization.

Site 24 includes 120 lf of impacts due to a proposed channel change that will tie in at the inlet of the 6' x 6' RCBC noted in Site 23 above.

Site 25 impacts are due to roadway fill and installation of a 24" RCP. Outlet channel protection is provided. Of the 294 lf of permanent stream impacts at Site 25, 282 lf is due to the installation of the 24" RCP and 12 lf is due to outlet channel protection.

Site 26 impacts are due to roadway fill and a proposed 6' x 6' RCBC which will not be buried. Bank stabilization is provided at the inlet of the culvert, and channel protection is provided at the outlet of the culvert. Additional protection is proposed to extend to the tie-in of the lateral base ditch near the outlet of the RCBC. Of the 543 lf of permanent stream impacts at Site 26, 477 lf is due to the installation of the 6' x 6' RCBC, 42 lf is due to outlet channel protection, and 24 lf is due to bank stabilization.

Site 27 impacts are due to roadway fill and a proposed 7' x 7' RCBC which will be buried 1' without baffles. A 1' sill will be placed on the culvert and backfilled with native material. A dry detention basin has been included adjacent to the UT to Mill Creek and an overflow ditch added. Bank stabilization will be included at the inlet and outlet of the RCBC. Of the 400 lf of permanent stream impacts at Site 27, 306 lf is due to the installation of the 7' x 7' RCBC, 22 lf is due to outlet channel improvements, and 72 lf is due to bank stabilization.

Site 34 is a tributary that ties to the main channel discussed in Site 27 (ES-S25) above. Twenty-four lf of bank stabilization and channel improvements are illustrated at this site in order to align the two existing channels better prior to entering the 7' x 7' RCBC.

Site 29 (Revised U-2579C-Phase 2, Permit Site 1) impacts are due to roadway fill and installation of a 24" RCP and a 30" RCP. Stream jurisdiction begins under the mainline alignment. The two smaller cross pipes were designed with skew more perpendicular to the alignment due to the parallel stream and wetland impacts. Of the 946 lf of permanent stream impacts, 40 lf of bank stabilization is provided at the downstream ditch and the channel tie, and 906 lf of permanent impact is due to relocating the channel and piping.

Site 30 (Revised U-2579C-Phase 2, Permit Site 2) impacts are due to roadway fill and installation of a 54" RCP which will not be buried. Bank stabilization is shown at the pipe inlet as well as outlet channel protection. An energy dissipator basin will be added at the outlet of the 30" RCP with overwidened base ditch and permanent rock checks in order to provide dissipation of stormwater before outletting to Stream ES-S27. The outlet channel protection will extend to the tie-in of the standard base ditch. Of the 578 lf of permanent stream impacts at Site 30, 532 lf is due to the installation of the 54" RCP, 31 lf is due to outlet channel protection, and 15 lf of bank stabilization.

Site 31 is a Y- Line impact at Germanton Road. The stream jurisdiction begins at the edge of the existing right of way. The 57 lf of permanent stream impact is due to 16 lf of outlet channel protection at the proposed ditch tie in modification near the outlet of the existing 24" RCP. The remaining 41 lf is due to the stream being relocated to a ditch.

Site 32 is a Y- Line impact at Baux Mountain Road. The site includes channel improvements at the Mill Creek crossing by excavating a 1' culvert bench adjacent to the existing channel. Coir fiber matting will be used on top of the bench with rip rap armoring along the stream side. In addition, a lateral ditch is proposed. There will be 172 lf of bank stabilization impacts and 19 lf of temporary impact due to temporary dewatering at this site.

**Table 3. U-2579D, E, & F Surface Water (Pond) Impacts and Descriptions**

| <b>Permit Site Number</b> | <b>Stream ID / Waterbody</b> | <b>Type of Waterbody</b> | <b>Impact Type</b> | <b>Perm. Impacts ac</b> | <b>Temp. Impacts ac.</b> |
|---------------------------|------------------------------|--------------------------|--------------------|-------------------------|--------------------------|
| 14A                       | ES-P2                        | Pond                     | Perm. Draining     | 3.06                    | 0                        |

Site 14A is due to draining and roadway fill of Pond ES-P2. Location and stabilization of the remaining channel is to be adjusted in the field as needed. Toe protection (160 lf) has been included to keep the fill slope from eroding into the pond. A pond drainage plan will be provided by the design build team for NCDOT approval prior to dewatering. A Temporary Drainage Easement (TDE) has been shown on the plans to ensure the pond remains drained during construction and to reserve this area for the project in case the property should be sold.

#### **Pipe burial requirements provided by the 4B/4C meeting minutes**

As requested in the Concurrence Point 4B/4C meeting for U-2579D, E & F, Table 4 includes all cross pipes in jurisdictional streams and the proposed burial depth of their inverts. Please note that due to the slope of the existing stream channels and the high calculated velocities, many pipes on U-2579D, E & F carrying jurisdictional streams will

not be buried based on discussions held during the 4B/4C meetings regarding stream stability.

**Table 4. Pipe Invert Burial Depth in Jurisdiction Streams for U-2579D, E & F**

| Pipe Location | Size and Material | Impact Site    | Pipe Invert Burial Depth (feet) |
|---------------|-------------------|----------------|---------------------------------|
| 68+33 -L-     | 54" RCP/66" RCP   | 1, 2, 3, and 4 | 0'                              |
| 77+90 -L-     | 6'x6' RCBC        | 5              | 0'                              |
| 124+45 -L-    | 42" RCP           | 6              | 0'                              |
| 130+19 -L-    | 6'x6' RCBC        | 7              | 0'                              |
| 137+73 -L-    | 42' RCP           | 8              | 0'                              |
| 150+71 -L-    | 36" RCP/42" RCP   | 9              | 0'                              |
| 160+35 -L-    | 42" RCP           | 10             | 0'                              |
| 173+80 -L-    | 48" RCP           | 11             | 0'                              |
| 207+24 -L-    | 5'X6' RCBC        | 13             | 0'                              |
| 222+50 -L-    | 48" RCP           | 14             | 0'                              |
| 242+86 -L-    | 5'X6' RCBC        | 15             | 0'                              |
| 253+92 -L-    | 42" RCP           | 16             | 0'                              |
| 261+02 -L-    | 6'X6' RCBC        | 17             | 0'                              |
| 275+75 -L-    | 42" RCP           | 18             | 0'                              |
| 279+30 -L-    | 5'X7' RCBC        | 19             | 1'                              |
| 303+57 -L-    | 30" / 36" RCP     | 22             | 0'                              |
| 316+25 -L-    | 6'X6' RCBC        | 23             | 0'                              |
| 323+23 -L-    | 24" RCP           | 25             | 0'                              |
| 335+66 -L-    | 6'X6' RCBC        | 26             | 0'                              |
| 356+07 -L-    | 7'X7' RCBC        | 27             | 1'                              |
| 409+52 -L-    | 54' RCP           | 30             | 0'                              |

### **Summary of Jurisdictional Impacts by TIP**

The preliminary proposed impacts for the overall project (TIP Nos. R-2247B Phase 2, CA, CB, CD, D, EA, EB, and EC and TIP Nos. U-2579AA, AB, C Phase 2, D, E, and F) will be approximately 9.19 acres of permanent wetland impacts and 58,701 linear feet of permanent stream impacts. Reference Tables 5 and 6 for a breakdown of impacts by section.

The impacts reported in this Individual Permit Modification Application for R-2247 Sections CD and EC and U-2579C Phase 2 (Sites 3-5) are based on the permitted plans and U-2579D, E & F and U-2579C Phase 2 Sites 1 and 2 on final design. The proposed impacts for the remaining project sections were determined by offsetting preliminary slope stake lines outward 25 feet on both sides of the alignment and counting impacts to all jurisdictional features. As the final design is completed for each of the remaining sections, impacts will be updated and permit modification requests will be submitted as necessary.

**Table 5. Summary of Wetland Impacts by Project TIP**

| Section         | Design Stage | Impacts from Phased IP Application (ac) | Final Impacts (ac) <sup>1</sup>           | Impacts Requiring Mitigation (ac) |
|-----------------|--------------|-----------------------------------------|-------------------------------------------|-----------------------------------|
| R-2247EC        | Permitted    | 0.31                                    | 0.31                                      | 0.31                              |
| R-2247CD        | Permitted    | 0.04                                    | 0.04                                      | 0.04                              |
| U-2579C Phase 2 | Permitted    | 0.68                                    | 0.68<br>(Revised 12/18/2018) <sup>3</sup> | 0.68                              |
| U-2579AA        | Preliminary  | 1.43                                    | -                                         | 1.43                              |
| U-2579AB        | Preliminary  | 1.5                                     | -                                         | 1.5                               |
| U-2579D         | Final        | 0.08                                    | 0.04                                      | 0.04                              |
| U-2579E         | Final        | 0.99                                    | 0.85                                      | 0.85                              |
| U-2579F         | Final        | 0.24                                    | 0.20                                      | 0.20                              |
| R-2247EA        | Preliminary  | 0.57                                    | -                                         | 0.57                              |
| R-2247EB        | Preliminary  | 0.09                                    | -                                         | 0.09                              |
| R-2247B Phase 2 | Preliminary  | 0.27                                    | -                                         | *                                 |
| R-2247CA        | Preliminary  | 0.71                                    | -                                         | *                                 |
| R-2247CB        | Preliminary  | 1.98                                    | -                                         | *                                 |
| R-2247D         | Preliminary  | 0.52                                    | -                                         | *                                 |
| <b>Totals</b>   |              | 9.41                                    | 9.19 <sup>2</sup>                         | 5.71                              |

<sup>1</sup> Final impacts for each section in the preliminary design stage will be updated with future modifications.

<sup>2</sup> Assumes the preliminary impacts for the future sections.

<sup>3</sup> The revisions occur to Sites 1 and 2 of the U-2579C Phase 2 Permit included in this application as Sites 28, 29, and 30.

\* Indicate these sections will be let in greater than 5 years.

**Table 6. Summary of Stream Impacts by Project TIP**

| Section         | Design Stage | Impacts from Phased IP Application (lf) | Final Impacts (lf) <sup>1</sup>            | Impacts Requiring Mitigation (lf)          |
|-----------------|--------------|-----------------------------------------|--------------------------------------------|--------------------------------------------|
| R-2247EC        | Permitted    | 865                                     | 865                                        | 814                                        |
| R-2247CD        | Permitted    | 699                                     | 699                                        | 611                                        |
| U-2579C Phase 2 | Permitted    | 3,527                                   | 3,266<br>(Revised 12/18/2018) <sup>3</sup> | 3,178<br>(Revised 12/18/2018) <sup>3</sup> |
| U-2579AA        | Preliminary  | 3,019                                   | -                                          | 3,019                                      |
| U-2579AB        | Preliminary  | 10,315                                  | -                                          | 10,351                                     |
| U-2579D         | Final        | 5,043                                   | 4,701                                      | 4,302                                      |
| U-2579E         | Final        | 4,864                                   | 4,831                                      | 4,817                                      |
| U-2579F         | Final        | 2,544                                   | 2,522                                      | 2,502                                      |
| R-2247EA        | Preliminary  | 6,536                                   | -                                          | *                                          |
| R-2247EB        | Preliminary  | 6,593                                   | -                                          | 6,593                                      |
| R-2247B Phase 2 | Preliminary  | 862                                     | -                                          | **                                         |
| R-2247CA        | Preliminary  | 3,056                                   | -                                          | **                                         |

| Section       | Design Stage | Impacts from Phased IP Application (lf) | Final Impacts (lf) <sup>1</sup> | Impacts Requiring Mitigation (lf) |
|---------------|--------------|-----------------------------------------|---------------------------------|-----------------------------------|
| R-2247CB      | Preliminary  | 5,674                                   | -                               | **                                |
| R-2247D       | Preliminary  | 5,762                                   | -                               | **                                |
| <b>Totals</b> |              | 59,395                                  | 58,701 <sup>2</sup>             | 36,187                            |

<sup>1</sup> Final impacts for each section in the preliminary design stage will be updated with future modifications.

<sup>2</sup> Assumes the preliminary impacts for the future sections.

<sup>3</sup> The revisions occur to Sites 1 and 2 of the U-2579C Phase 2 Permit included in this application as Sites 28, 29, and 30.

\*Mitigation for R-2247EA was provided by a Mitigation Bank.

\*\* Indicate these sections will be let in greater than 5 years.

The final design impacts for U-2579D, E & F were less than previously estimated by 0.22 acres of wetland and 397 linear feet of stream. The revised design for U-2579C-Phase 2 Sites 1 and 2 resulted in a reduction of impacts by 261 linear feet of stream. The decrease in impacts will result in a surplus of previously requested mitigation from NCDMS. See the details regarding this in the compensatory mitigation section.

### Site Specific Avoidance and Minimization Efforts

Avoidance and minimization efforts were detailed in the previous permit application for the project. Additional measures have been incorporated during development of the U-2579D, E & F project plans. Below, site specific measures are detailed by permit site number and impact sheet number for ease in identification in the plan set.

- Dry detention basins have been incorporated on the project. These can be seen on Permit Drawing Sheet 2 of 97 and Permit Drawing Sheet 77 of 97.
- 2:1 slopes with guardrail were utilized to minimize fill impacts across the project.
- Included piping of streams internal to the interchange at NC 66 (University Parkway and NC 8 (Germanton Road) in order to minimize sediment losses due to clearing and steep slopes Site 1(Permit Drawing Sheet 2 of 97) and Site 9 (Permit Drawing Sheet 21 of 97).
- Steep slopes were flattened in specific areas to avoid sediment losses due to clearing and nearby fill activities at NC 8 – C quadrant Site 8/8B (Permit Drawing Sheet 21 of 97) and Baux Mountain Road – C quadrant Site 16 (Permit Drawing Sheet 54 of 97).
- Provided for energy dissipation from pipe outlets into open rip rap channels prior to tying to jurisdictional streams at Site 5 (Permit Drawing Sheet 10 of 97), Site 6 (Permit Drawing Sheet 16 of 97), Site 7 (Permit Drawing Sheet 16 of 97), Site 11 (Permit Drawing Sheet 34 of 97), Site 15 (Permit Drawing Sheet 50 of 97), Site 17 (Permit Drawing Sheet 54 of 97), Site 23 (Permit Drawing Sheet 69 of 97), and Site 30 (Permit Drawing Sheet 86 of 97).
- Several locations had the last segment of pipe dropped to a lower elevation in order to reduce velocity at the pipe outlets. These were Site 1 (Permit Drawing Sheet 2 of 97).

97), Sites 8, 8B, and 9 (Permit Drawing Sheet 21 of 97), and Site 22 (Permit Drawing Sheet 67 of 97).

- Flattened, widened, and added in permanent rock checks into the ditches at the Tributary to Trick-Um Creek Site 7 (Permit Drawing Sheet 16 of 97), ES-S9 Site 11 (Permit Drawing Sheet 34 of 97), and ES-S27 Site 30 (Permit Drawing Sheet 86 of 97) to provide energy dissipation.
- Included rock and backfill material to the Tributary to Trick-Um Creek Site 7 (Permit Drawing Sheet 16 of 97) to fix the head cut issue and the Design Build Team will attempt to leave the stump in place which is currently controlling the head cut.
- Added energy dissipator basins at Site 7 (Permit Drawing Sheet 16 of 97), Site 8/8B (Permit Drawing Sheet 21 of 97), Site 9 (Permit Drawing Sheet 21 of 97), Site 11 (Permit Drawing Sheet 34 of 97), Site 22 (Permit Drawing Sheet 67 of 97), and Site 30 (Permit Drawing Sheet 86 of 97) for added protection.
- Included ditching through the wetland at Site 8/8B (Permit Drawing Sheet 21 of 97) and outlet channel protection at Site 30 (Permit Drawing Sheet 86 of 97) to stabilize the streams.
- Corrected the stream ties at Site 1 (Permit Drawing Sheet 2 of 97), Site 5 (Permit Drawing Sheet 10 of 97), Site 6 (Permit Drawing Sheet 16 of 97), Site 7 (Permit Drawing Sheet 16 of 97), Site 12/13 (Permit Drawing Sheet 43 of 97), Site 14 (Permit Drawing Sheet 46 of 97), Site 19 (Permit Drawing Sheet 60 of 97), Site 27 (Permit Drawing Sheet 77 of 97), and Site 33 (Permit Drawing Sheet 34 of 97) to stabilize the existing stream.
- Added a drop box to correct elevations of the perched pipe at Site 11A (Permit Drawing Sheet 34 of 97).
- Relocated approximately 330 linear feet of stream at Site 12 (Permit Drawing Sheet 39 of 97) rather than piping and 44 linear feet of stream at Site 24 (Permit Drawing Sheet 69 of 97).
- Reevaluated the stormwater system at Site 13 (Permit Drawing Sheet 43 of 97) in order to maintain flow to the existing channel but not add additional drainage and stream velocity.
- Relocated the stream to provide a better alignment for the tie in and stability at Site 14 (Permit Drawing Sheet 46 of 97).
- Removed the 24" pipe downstream of the proposed 5' x 7' RCBC at Site 19 (Permit Drawing Sheet 60 of 97).
- Included temporary stream impact for construction access but will place the crossing at a narrow stream segment to avoid any over widened portions of the channel at Site 20C (Permit Drawing Sheet 64 of 97) at Mill Creek.
- Added in a ditch section between pipes at Site 16 (Permit Drawing Sheet 55 of 97) in order to ensure future stream stability.
- Removed the existing 72" pipes at Site 20 (Permit Drawing Sheet 60 of 97) as they were undersized and it improves the entire stream system up and downstream. During construction stabilization of the stream will be monitored and a structure may be required to ensure stability.
- Edited the channel relocation at Site 21 (Permit Drawing Sheet 64 of 97) to provide a better tie-in angle that closer matches the existing stream tie-in angle.

- Channel excavation and installation of floodplain bench at Baux Mountain Culverts Site 32 (Permit Drawing Sheet 92 of 97).
- Revised U-2579C-Phase 2 Sites 1 and 2 (Permit Drawing Sheets 80 and 81 of 97) resulted in a reduction of 261 linear feet of permanent stream impact including bank stabilization (231 lf excluding bank stabilization).

### Compensatory Mitigation

Total impacts for the U-2579D, E & F final design including changes to U-2579C Phase 2 permit sites 1 and 2 (U-2579D, E & F permit sites 28, 29, and 30) are 13,578 linear feet of permanent stream impact and 1.66 acres of permanent wetland impact. Of the total stream impacts, 488 linear feet is bank stabilization or pipe removal impacts and will not require mitigation. Compensatory mitigation is required for 13,090 linear feet of stream and 1.66 acres of wetland and will be provided by DMS (see attached acceptance letter dated 9/29/2017). Compensatory mitigation is required for 11,621 linear feet of stream and 1.09 acres of permanent wetland impacts for U-2579D, E & F and 1,469 linear feet of stream impact and 0.57 acre of wetland impact associated with the changes to U-2579C Phase 2 Sites 1 and 2 (U-2579D, E & F Sites 28, 29, and 30). Previously permitted U-2579C-Phase 2 Sites 1 and 2 were mitigated for which included 0.57 acre of wetland and 1,700 linear feet of stream. The revised design results in 231 lf less of stream impact requiring mitigation on U-2579C-Phase 2 Sites 1 and 2 based on changes made during final design of the U-2579D, E, & F Sites 28, 29, and 30. The previous mitigation acceptance also accounted for 12,451 linear feet of stream and 1.31 ac of wetland mitigation for U-2579D, E & F. The final design results in a reduction of required mitigation by 830 lf of stream and 0.22 ac of wetland impacts for U-2579D, E & F (not including sites 28, 29 and 30 which were accounted for in the U-2579C Phase 2 permit).

With the reduction in impacts and required mitigation of those impacts, a total of 0.22 ac of wetland mitigation and 1,061 linear feet of mitigation should be made available due to reducing impacts at Sites 1 and 2 of the U-2579C-Phase 2 (U-2579D, E & F Sites 28, 29, and 30) and on U-2579D, E & F sections (See Tables 7 and 8 as follows).

**Table 7. Summary of Wetland Impacts by Project TIP Requiring Mitigation**

| Section                                        | Design Stage | Wetland Impacts Requiring Mitigation from Phased IP Application (ac) | Final Wetland Impacts Requiring Mitigation (ac)<br><sup>1</sup> | Difference in Impacts Requiring Mitigation (ac) |
|------------------------------------------------|--------------|----------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------|
| R-2247EC                                       | Permitted    | 0.31                                                                 | 0.31                                                            | 0                                               |
| R-2247CD                                       | Permitted    | 0.04                                                                 | 0.04                                                            | 0                                               |
| U-2579C Phase 2 (U-2579D, E & F Sites 28 & 29) | Permitted    | 0.68                                                                 | 0.68                                                            | 0                                               |
| U-2579AA                                       | Preliminary  | 1.43                                                                 | 1.43                                                            | 0                                               |
| U-2579AB                                       | Preliminary  | 1.50                                                                 | 1.50                                                            | 0                                               |
| U-2579D                                        | Final        | 0.08                                                                 | 0.04                                                            | - 0.04                                          |
| U-2579E                                        | Final        | 0.99                                                                 | 0.85                                                            | - 0.14                                          |

| Section       | Design Stage | Wetland Impacts Requiring Mitigation from Phased IP Application (ac) | Final Wetland Impacts Requiring Mitigation (ac) <sup>1</sup> | Difference in Impacts Requiring Mitigation (ac) |
|---------------|--------------|----------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------|
| U-2579F       | Final        | 0.24                                                                 | 0.20                                                         | - 0.04                                          |
| R-2247EA      | Preliminary  | 0.57                                                                 | 0.57                                                         | 0                                               |
| R-2247EB      | Preliminary  | 0.09                                                                 | 0.09                                                         | 0                                               |
| <b>Totals</b> |              | 5.93                                                                 | 5.71                                                         | - 0.22                                          |

<sup>1</sup> Final impacts for each section in the preliminary design stage will be updated with future modifications.

**Table 8. Summary of Stream Impacts by Project TIP Requiring Mitigation**

| Section                                           | Design Stage | Stream Impacts Requiring Mitigation from Phased IP Application (lf) | Final Stream Impacts Requiring Mitigation (lf) <sup>1</sup> | Difference in Impacts Requiring Mitigation (lf) |
|---------------------------------------------------|--------------|---------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------|
| R-2247EC                                          | Permitted    | 814                                                                 | 814                                                         | 0                                               |
| R-2247CD                                          | Permitted    | 611                                                                 | 611                                                         | 0                                               |
| U-2579C<br>Phase 2 (U-2579D, E & F Sites 29 & 30) | Permitted    | 3,409                                                               | 3,178                                                       | - 231                                           |
| U-2579AA                                          | Preliminary  | 3,019                                                               | 3,019                                                       | 0                                               |
| U-2579AB                                          | Preliminary  | 10,315                                                              | 10,315                                                      | 0                                               |
| U-2579D                                           | Final        | 5,043                                                               | 4,302                                                       | - 741                                           |
| U-2579E                                           | Final        | 4,864                                                               | 4,817                                                       | - 47                                            |
| U-2579F                                           | Final        | 2,544                                                               | 2,502                                                       | - 42                                            |
| R-2247EA                                          | Preliminary  | *                                                                   | *                                                           | 0                                               |
| R-2247EB                                          | Preliminary  | 6,593                                                               | 6,593                                                       | 0                                               |
| <b>Totals</b>                                     |              | 37,212                                                              | 36,151                                                      | - 1,061                                         |

<sup>1</sup> Final impacts for each section in the preliminary design stage will be updated with future modifications.

\*Mitigation for R-2247EA was provided by a Mitigation Bank.

## Utility Impacts

There will be no impacts associated with utility relocations for U-2579D, E & F. For all other Sections, the utility relocations will be determined during final design.

## Regulatory Approvals

The design-build let date for the U-2579D, E & F project was March 20, 2018. Final completion is anticipated in September 2021.

Section 404: We are hereby requesting the modifications described above for the USACE Individual 404 Permit signed January 22, 2018 (SAW-2017-02112), for the above-described activities.



Section 401: We are hereby requesting a modification to the 401 Water Quality Certification from the NCDWR issued November 14, 2017 (revised November 27, 2017 & December 21, 2017) (WQC004131). In compliance with Section 143-215.3D(e) of the NCAC, we will provide \$570.00 to act as payment for processing the Section 401 permit modification (see Subject line).

A copy of this modification request and its distribution list will be posted on the NCDOT website at: <https://xfer.services.ncdot.gov/pdea/PermApps/>

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Bill Barrett at 919-707-6103 or [wabarrett@ncdot.gov](mailto:wabarrett@ncdot.gov).

Sincerely,

*Carla Dagnino*

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

cc:  
NCDOT Permit Application Standard Distribution List.

Attachments:  
NCDMS Acceptance Letter (dated 9/29/2017)  
Concurrence Point 4B/4C Meeting Minutes for U-2579D, E & F  
Stormwater Management Plan for U-2579D, E & F  
Permit Drawings for U-2579D, E & F  
Roadway Plans for U-2579D, E & F



ROY COOPER  
Governor

September 29, 2017

Mr. Philip S. Harris III, P.E., CPM  
Natural Environment Section, PDEA  
North Carolina Department of Transportation  
1598 Mail Service Center  
Raleigh, North Carolina 27699-1598

Dear Mr. Harris:

Subject: DMS Mitigation Acceptance Letter: **U-2579 / R-2247**, Winston-Salem Northern Beltway – from South of I-40 Southwest of the City to I-74 / US 311 Southeast of the City, Forsyth County

The purpose of this letter is to notify you that the Division of Mitigation Services (DMS) will provide the stream and wetland mitigation for the subject project. Based on the information supplied by you on September 28, 2017, the stream and wetland impacts are located in CU 03040101 of the Yadkin River basin and 03010103 of the Roanoke River basin in the Central Piedmont (CP) Eco-Region, and are as follows:

| Stream & Wetlands | River Basin | CU Location | Eco-Region | Stream |      |          | Wetlands |              |               |
|-------------------|-------------|-------------|------------|--------|------|----------|----------|--------------|---------------|
|                   |             |             |            | Cold   | Cool | Warm     | Riparian | Non-Riparian | Coastal Marsh |
| Impacts           | Yadkin      | 03040101    | CP         | 0      | 0    | 30,834.0 | 4.79     | 0            | 0             |
| Impacts           | Roanoke     | 03010103    | CP         | 0      | 0    | 6,414.0  | 1.14     | 0            | 0             |

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

These impacts and associated mitigation needs were under projected by the NCDOT in the 2017 impact data. DMS will commit to implement sufficient compensatory stream and riparian wetland mitigation credits to offset the impacts associated with this project as determined by the regulatory agencies using the delivery timeline listed in Section F.3.c.iii of the In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from DMS.

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

Sincerely,

  
James B. Stanfill  
DMS Credit Management Supervisor

Cc: Mr. James Lastinger, USACE – Raleigh Regulatory Field Office  
Ms. Amy Chapman, NC Division of Water Resources – Raleigh  
File: U-2579 / R-2247



## **PROJECT COMMITMENTS**

### **Winston-Salem Northern Beltway**

WBS Element No. 34839.3.GV7

Federal-Aid Project No. NHP-0074(213)

#### **STIP PROJECTS U-2579DEF**

All commitments developed during the project development and design phases for the Winston-Salem Northern Beltway have been incorporated into the current design. Commitments that apply specifically to STIP Project U-2579DEF are shown in bold. Those which are not pertinent to U-2579DEF have been grayed out.

#### **PDEA, Roadway Design, Division 9**

1. Archaeological site 31FY570\*\*, a historic cemetery, will require avoidance or compliance with North Carolina General Statute, Chapter 70.

*Action: This site is located outside of the Area of Potential Effects (A.P.E.) of the U-2579D, E & F segments of the project and is a short distance to the west of R-2247EB.*

2. \*Temporary construction easements may be required for the historic Clayton Family Farm Property. Temporary easements would not constitute a use under Section 4(f). No permanent right of way (ROW) will be acquired from the Clayton Family Farm Property, and the encroachment on the property will be minimal. The duration of the temporary encroachment on the property will be shorter than the timeframe of construction for the project. The land temporarily occupied from the Clayton Family Farm will be fully restored, that is, the Clayton Family Farm will be returned to a condition that is at least as good as that which existed prior to the project. Based on preliminary plans, a temporary easement is required.

***Action: The project originally limited the designers to the TCE as described above within the historic boundary but current plans require a Permanent Drainage Easement (PDE). The PDE was deemed necessary to accommodate a ditch tie-in and maintenance just inside the historic boundary of the Clayton Family Farm. In October 2018, the HPO concurred to this design change at the Clayton Family Farm noting that the PDE will not affect the qualities that make this property historically significant. The property owners have been notified and area amenable to the PDE and the maintenance.***

3. \*The Eligibility of Site 31FY64 is unknown because archaeologists were denied access to the property. If changes to the preferred alternative causes this site to fall within the

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**

area of potential disturbance, an assessment will be conducted prior to construction. Currently, this site is adjacent to a non-selected alternative.

Action: This site is located outside of the Area of Potential Effects (A.P.E.) of the U-2579D, E & F segments of the project and is well to the north of U-2579D. The commitment will be fulfilled during ROW acquisition.

4. A design noise study will be prepared for the selected alternative. The date of public knowledge for noise abatement purposes is the date the Record of Decision (ROD) is signed. Projects let for construction on or after July 13, 2011 shall be reviewed under NCDOT 2011 noise analysis criteria; however, the original date of public knowledge shall remain unchanged.

Action: The ROD was signed in February 2008. Design Noise Reports based upon preliminary design were completed for U-2579 AB, B&C in 2009. A Revised Design Noise Report based upon final design was completed for U-2579B and approved by FHWA in 2014. A Revised Design Noise Report based upon final design was completed and approved by FHWA in August 2014. Revised Design Noise Reports based upon final design of U-2579AA and AB will be completed prior to Project Letting scheduled for October 2020. All Design Noise Reports are subject to approval by NCDOT and FHWA. The original Date of Public Knowledge of February 15, 2008 will remain unchanged for all sections of U-2579. The Design Noise report for R-22247 EC and CD was completed and approved in October 2016. A Design Noise Report Addendum for R-2247CD was completed and approved in September 2017, and a Design Noise Report Addendum for R-2247EC was completed and approved in October 2017.

**Action: Design Noise Report (DNR) for U-2579DEF will be completed by the Design Build team. Draft DNR results will be reviewed by internal NCDOT units for engineering feasibility prior to finalizing the DNR. Noise walls that are recommended in the approved DNR and that pass the public preference balloting process will be constructed.**

5. The design noise study for the Project R-2247 portion of the Beltway will include an evaluation of Ronald Reagan High School

Action: This is not located within the U-2579D, E & F sections of the project.

6. \*The NCDOT will develop Data Recovery Plans (DRP) for Sites 3IFY888, 3IFY893\*\*, 3IFY901, 3IFY902\*\*, 3IFY903, 3IFY910\*\*, 3IFY911 \*\*, 3IFY912\*\*, 3IFY921, 3IFY925\*\*, 3IFY944, **3IFY1053/I053\*\***, all of which will be affected by the subject project, in consultation with the North Carolina SHPO.

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. It will be impacted by the construction. A data recovery plan has been developed. The excavation will be conducted once Right-of-Way is acquired.***

7. \*The NCDOT will ensure that each DRP is implemented after Right-of-Way is acquired or once Right-of-Entry is secured from the property owners and prior to construction activities within the site location as shown in the DRP.

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. It will be impacted by the construction. A data recovery plan has been developed. The excavation will be conducted once Right-of-Way is acquired.***

8. \*As they are developed, each individual DRP will be forwarded for review by the SHPO.

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. This commitment will be fulfilled after the completion of the 31FY1053/1053\*\* data recovery excavation.***

9. \*Upon completion of each Data Recovery effort, the NCDOT will prepare and forward a Management Summary to the SHPO detailing the results of the Data Recovery field investigations. The Management Summary will contain sufficient information to demonstrate that the field investigation portion of the DRP has been implemented.

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. This commitment will be fulfilled after the completion of the 31FY1053/1053\*\* data recovery excavation.***

10. \*Upon receipt of the Management Summary, the SHPO will respond within ten (10) days to the recommendations contained within the document.

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. This commitment will be fulfilled after the completion of the 31FY1053/1053\*\* data recovery excavation.***

11. \*Upon acceptance of the recommendations contained in the Management Summary, the SHPO will issue the NCDOT documentation that the Data Recovery field investigations have been completed.

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. This commitment will be fulfilled after the completion of the 31FY1053/1053\*\* data recovery excavation.***

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**

12. \*The analysis and report preparation, detailing Sites 31FY888, 31FY893\*\*, 31FY90I, 31FY902\*\*, 31FY903, 31FY91O\*\*, 31FY9II \*\*, 31FY9I2\*\*, 31FY92I, 31FY925\*\*, 31FY944, **31FY1053/1053\*\*** will be completed by the NCDOT, or their consultants, within twenty-four (24) months after completion of each site's fieldwork schedule.

***Action: Site 31FY1053/1053\*\* is located within the A.P.E. of Segment U-2579D. This commitment will be fulfilled after the completion of the 31FY1053/1053\*\* data recovery excavation.***

PDEA, Roadway Design, Division 9, ROW Branch

1. \*In the vicinity of the Alexander Hege House, NCDOT in consultation with NC-HPO will determine the extent of control-of-access fencing, as well as its type, material, and finish. NCDOT will purchase and then install the control-of-access fencing within NCDOT ROW. NCDOT will maintain the control-of-access fencing.

*Action: The commitment will be fulfilled during final design and construction.*

Roadway Design, Utility Unit, Division 9, ROW Branch

1. NCDOT will continue to work with residents of affected communities to develop mitigation strategies for community impacts. The following options will be considered during final design to minimize impacts to communities/subdivisions: construction of noise abatement barriers landscaping or vegetative screens based on NCDOT policies and guidelines. These types of options already have been incorporated into the preliminary engineering designs where practicable, but will be further considered during final design.

*Action: The commitment will be fulfilled during final design and construction.*

2. During final design for Projects R-2247, U-2579, and U-2579A, all utility providers and railroad operators would be coordinated with to ensure that the proposed design and construction of the project would not substantially disrupt service.

*Action: The commitment will be fulfilled during final design and construction.*

3. The development of this project will be further coordinated with the City of Winston-Salem and Forsyth County Parks and Recreation Departments to minimize any conflicts with future parks and greenways planning. Provisions will be considered to maintain the future viability of any impacted proposed greenways.

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**

*Action: The commitment will be fulfilled during final design and construction.*

4. NCDOT coordinated with the NCDENR Division of Waste Management and the property owner regarding the Reynolds Auto Junkyard. No known issues remain within the right of way of this site. Other sites along the selected alternatives for Projects R-2247, U-2579, and U-2579A will be remediated as required.

*Action: The GeoEnvironmental Section of the Geotechnical Engineering Unity will coordinate with the Right of Way Branch to provide acquisition recommendations for sites of concern. This coordination will occur prior to the parcel being acquired. Prior to construction the GeoEnvironmental Section will also address contaminated soil and ground water the may be encountered during construction. Contamination will be addressed by removal and/or in a Project Special Provision.*

5. NCDOT will consider wildlife crossings where appropriate in the vicinity of stream crossings, which will allow animals to cross under the Beltway.

*Action: No special wildlife crossings are proposed. Opportunities for wildlife to cross exist along streams under bridges and through culverts. Also, small wildlife can use floodplain drains which are provided.*

6. NCDOT will coordinate with the Town of Kernersville regarding the compatibility of the Beltway design with the proposed Big Mill Farm Road interchange at US 421. This coordination will take place once all relevant design information has been obtained regarding the design of the Big Mill Farm Road interchange.

*Action: Roadway Design coordinated and will continue to coordinate until project completion.*

7. \*NCDOT will align the Alexander Hege House driveway opposite the new intersection ramp, so property access will be under full traffic control. This will allow NCDOT and the property owner full movement for equipment and trucks.

*Action: The commitment will be fulfilled during final design and construction.*

#### Hydraulics Unit

1. All bridges and culverts located in designated FEMA flood zones will be designed such than an increase in flood elevations would not exceed the lesser of 0.5 foot per the 100-year flood event or the elevation needed to protect structures.

***Action: The commitment will be fulfilled during final design and construction.***

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**

2. The Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), to determine status of project with regard to applicability of NCDOT'S Memorandum of Agreement, or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

**Action: The commitment will be fulfilled during final design and construction. Coordination with the FMP will continue through project completion.**

3. NCDOT will avoid installing bridge bents in creeks to the maximum extent practicable.

**Action: For U-2579DEF no bents were placed in any jurisdictional waters and jurisdictional resources were avoided to the maximum extent practicable.**

#### Roadside Environmental, Division 9

1. During design and construction, efforts will be made to minimize the impact to existing vegetative buffers and natural areas. NCDOT will prepare a post construction landscape design/corridor plan to mitigate construction impacts and integrate enhancements, while remaining sensitive to the environment and to the safety of the traveling public.

Action: Post-construction plans will be prepared.

2. NCDOT will incorporate sediment and erosion control measures according to the Design Standards in Sensitive Watersheds for all construction in the 303(d) listed portions of Muddy Creek in compliance with 15a NCAC 04B.0124.

Action: The commitment will be fulfilled during final design and construction.

3. \* NCDOT will provide tree protection measures along the National Register boundary lines adjoining project construction areas. NCDOT will exercise best management practices to minimize, as practicable, tree trimming and disturbance of existing plantings along the National Register boundary.

**Action: NCDOT will implement commitment as described in the concurrence form with SHPO. Properties listed are Alexander Hege House, Samuel Stauber House & Barn, Jon Henry Kapp Farm, **Clayton Family Farm**, Seaver's Gas Station, Hammock Family Farm and John & Charles Fries Day Farm.**

#### Roadway, Hydraulics

1. Generally, 2:1 slopes will be used where possible to minimize culvert length, and NCDOT will shorten culvert lengths where possible and daylight systems between culverts where possible in interchange areas.

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**



***Action: For U-2579DEF, 2:1 slopes were used where possible to minimize culvert lengths and areas in interchanges were improved in order to daylight systems.***

Right of Way Branch

1. NCDOT will work with the property owner of Walker Mobile Home Park off of Bethania-Tobaccoville Road to determine the feasibility of relocating the homes to another area of the parcel.

*Action: This commitment will take place after design is complete and during Right of Way acquisition.*

2. NCDOT will contact the pastor of Mount Pleasant Holiness Church prior to the public hearing and will, if desired, meet with the pastor and members of the church to discuss the impact of Project U-2579 on the church, NCDOT relocation policies, and potential relocation.

*Action: Since the 2004 SFEIS/SEDEIS, NCDOT and consultant staff met with the Pastor and member of Mount Pleasant Holiness Church during the 2005 Public hearings. The church representatives declined to attend an additional meeting regarding this project or impacts of the Northern Beltway of the church.*

3. NCDOT will contact minority residents of North Oaks subdivision prior to the public hearing and will, if desired, meet with the pastor and members of the church to discuss the impact of Project U-2579 on the church, NCDOT relocation policies and potential mitigation.

*Action: NCDOT and consultant staff met with North Oaks community on November 15, 2014.*

Division 9 Construction Unit

1. A pre-construction survey will be done in areas of possible concern regarding structural damage to assess a pre-construction condition.

***Action: If needed, the commitment will be fulfilled during final design and construction of U-2579DEF.***

Division 9

1. During construction for Project U-2579AB, NCDOT will coordinate with the Forsyth County School Board to ensure the safety of those students bicycling and/or walking to Sedge Garden Elementary School. If a portion of school property is needed for a temporary construction easement, the area will be fenced to keep school children out of the construction site. The school property will be restored following construction.

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**\*Commitments marked by an asterisk (\*) are taken from the Memorandum of Agreement between SHPO, NCDOT, and FHWA regarding addressing the Adverse Effects to historic resources.**

*This commitment will be implemented during construction.*

2. NCDOT will coordinate with local media during the construction of the project to alert the public of traffic restrictions and construction related activities.

*Action: In process and ongoing for U-2579DEF*

3. NCDOT shall not approve any new driveway permits along the property of the historic John Henry Kapp Farm within the right of way for the Preferred Alternative. This condition shall be filed in the NCDOT Division office responsible for driveway permits.

*Action: This commitment will be implemented as described in the concurrence form with SHPO, during construction of the project.*

4. This project involves construction activities on or adjacent to FEMA-regulated stream(s). Therefore, the Division shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment that are located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

***Action: The commitment will be fulfilled post- construction.***

**TO: Craig Lee**  
**NCDOT Hydraulics Unit**

**FROM: Brian Steffen, PE / James Rice, PE (HDR)**

**DATE: September 25, 2018**

**SUBJECT: U-2579 DEF - 4B Meeting Minutes FINAL**

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Meeting Attendees:

Robert Patterson, NCDEQ-DWR  
Dave Wanucha, NCDEQ-DWR (via phone)  
Marla Chambers, NCWRC  
Marella Buncick, USFWS  
Claire Ellwanger, USFWS  
Bill Barrett, NCDOT-EAU  
Carla Dagnino, NCDOT-EAU  
David Stutts, NCDOT-SMU  
Michael Shumsky, NCDOT-Design Build  
Thomas Terry, NCDOT-Design Build  
Craig Lee, NCDOT-Hydraulics  
Amy Euliss, NCDOT-Division 9 (via phone)  
Mark Staley, NCDOT-Roadside Environmental (via phone)  
Travis Padgett, Blythe Development  
James Rice, HDR  
Brain Steffen, HDR  
Jonathan Henderson, HDR  
Will Moody, HDR  
Vickie Miller, HDR  
Kathleen Bell, HDR  
Edward Vance, STV

*Bryan Roden-Reynolds, US Army Corp of Engineers reviewed the 4B Plan Set separately and had no additional comments.*

The meeting was held on August 8<sup>th</sup>, 2018 from 9am to 12pm in the NCDOT Hydraulics Conference Room. The meeting was opened with introductions and the following items were covered with James Rice facilitating. A full set of PDF drawings was projected on screen as well as via skype for those on the phone to follow along. These resources will be made available to all attendees. The meeting attendees sign in sheet is attached.

The USACE was not represented at the meeting; however, Brian Roden-Reynolds was contacted and it was determined that the meeting would move forward and a separate discussion with Brian would be available if needed prior to 4C.

The *italicized* text indicates notes from the meeting discussion.

## **General**

- Future I-74 Winston-Salem Northern Beltway from west of NC 66/SR 4000 to US 311. Approx. 7.0 miles of a six lane divided highway in new location.
- 3 major interchanges: University Parkway, Germantown Rd, and Baux Mountain Rd. 1 bridge over Mill Creek.
- Hydraulic analysis was based on the Winston-Salem Land Use Plans, corridor discharges were developed primarily on the assumption of single family residential areas except in the vicinity of University Parkway where some commercial development is expected
- Located within the Yadkin River Basin, there are no specific stormwater requirements for this area, but will follow MEP.
- Basins have been added where possible.
  - *Turbidity MDL in this basin.*
- Stormwater Basin locations are still under review. Steep terrain and proximity to water table may limit use in some cases.
  - *Design team is awaiting geotech borings in these locations.*
- Median ditches may provide some treatment as well as grass swale treatment for many of the ditches.
- Some outlets of large pipes and culverts have high velocities due to steep terrain. Additional rip-rap placed in the bed of the jurisdictional streams is shown for mitigation of velocities. Rip-rap in streams will be embedded flush with existing stream bed.
- Many of the steep pipes will not be buried.
- Due to steep culverts, we have proposed baffles at 25' spacing that have been backfilled with rip-rap. These were reviewed on a case by case basis to see if there is any benefit during the meeting review.
  - *USFWS noted culverts 300'-400' or more are barriers for fish passage; however, stated that it is site and species specific as to which species will navigate long culverts.*
- All pipe/culvert sizes are preliminary and may change.
- Box culverts have been used instead of pipes in some areas for maintenance purposes.
- Photos of many of the sites were available during plan sheet review, but not all field work is complete yet.
  - *Add notes on plans to indicate whether the pipe is buried or not.*
  - *Add labels for 4C plans indicating the start of jurisdictional streams if located on plans or just outside.*

## **PSH 4**

- Potential impact due to PUE
  - Will revisit at 4C based on design

## **PSH 5-A**

### Jurisdictional stream Impacts

- Site 1 (ES-S1)
  - Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts
  - 54" pipe – 850 lf. 1.75% slope. Pipe is not buried due to steepness and long length

### Wetland Impacts

- Site 1B (ES-W1), 1C (ES-W2), 1D (ES-W43)

- o Due to roadway fill for ramp, loop, and mainline
- Y1LPD 14+00 LT
  - o Media filter basin location
  - o Receiving drainage from loop and University Parkway

### **PSH 5-B**

#### Jurisdictional stream

- Site 1(ES-S1), Site 2 (ES-67), Site 3 (ES-65), Site 4 (ES-S2),
  - o From embankment rip-rap for proposed culverts and roadway fill
- Site 1 – Rip-rap in stream for larger velocity, will be embedded
  - o Consider filling in A Quadrant due to multiple pipes, steep terrain, eliminate guardrail which is a hazard, and reduce risk for sediment loss. Stream is unstable and has vertical banks in area where we would keep it open.
    - *Length of pipes indication no aquatic passage is likely here.*
    - *Discussions about options at this site included straight lining channel and adding rip-rap to stabilize the stream. The final decision by all parties is to pipe the entire thing. This will aid in long term stability.*
    - *Pipe and culvert do not need to be buried. Look into flattening the system or the last section of the system to dissipate energy.*

#### Wetland Impacts

- Site 2A (ES-W46), Site 1A (ES-W44)
  - o Due to roadway fill where 2:1 slopes and guardrail used to minimize impacts
- Y1LPA 16+50 LT - Media filter basin location
  - o Treating University Parkway, mainline, and Y1LPA
    - *Request from DWR to add a forebay and rip-rap berm if basins change to dry detention.*

### **PSH 5-C and 5-D** - No impacts to jurisdictional features

### **PSH 6**

#### Jurisdictional Stream Impacts

- Site 5 (ES-S3)
  - o Intermittent, JS starts just off the page, has steep terrain.
  - o 455 ft long Box Culvert. 1.6% slope. Bank stabilization at culvert inlet and outlet channel protection for proposed culvert keyed into stream bed
    - *Conversation on culvert grade. If culvert is buried, request from DEO to add a rock sill to the inlet. DEO provided detail to the Design Build team after meeting.*
    - *Aquatic passage is questionable at this length. Final decision was to not bury the pipe and eliminate baffles*
    - *Concern over 18" and 24" pipes discharging into stream. Ditches can't be continued to stream bed due to steep slopes (slope can't be above 10%). Outlet the 18" into the old channel just left of the culvert outlet and rip-rap to the confluence. This will act as a dissipater before it meets the larger channel. Come up with something creative for the 24" outlet.*
    - *Add embedded rip-rap at culvert inlet.*

#### Wetland Impacts – L 78+00 LT

- Site 5A (ES-W47), Site 5B (ES-W45)
  - o Roadway fill and ditch impacts

#### **PSH 7-9** - No impacts to jurisdictional features

#### **PSH 10**

##### Jurisdictional Stream Impacts

- Site 6 (ES-S4 (Trick-um Creek)) - Perennial
  - o Proposed 42" RCP-IV – 550' and steep slope – Not buried.
    - *Look into ditching along wetland so there's one inlet.*
- Site 7 (ES-S5 (Trib to Trick-um Creek)) - Intermittent
  - o Proposed 5'x7' culvert buried 1', 330' long at 1.6% slope
  - o Outlet channel protection on proposed culvert outlet and embankment rip-rap on culvert inlet.
  - o Large tree located at ditch outlet is currently stabilizing the culvert inlet channel.
    - *Change label on plans from Trick-um Creek to Trib to Trick-um Creek.*
    - *Agreement to not bury. No baffles needed.*
    - *Decision to bring the channel flat from behind the tree into the culvert. Line the new channel with rip-rap. Include permanent impacts all the way to the start of the stream.*
- Site 8 (ES-S6) - Perennial
  - o Proposed 54" and 30" outlets and dry detention basin location. Awaiting boring logs.
  - o Outlet channel protection on proposed culvert outlet and embankment rip-rap on culvert inlet.

##### Wetland Impacts

- Site 6A (ES-W3)
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts
    - *Both wetland and stream impacts in this location for permitting.*
    - *Illustrate the wetland as a total take for permitting.*

#### **PSH 11-A**

##### Jurisdictional Stream Impacts

- Site 9 (ES-S7) – mostly perennial
  - o Proposed 54" and 42" – Assumed not buried 4.5% slope
  - o Outlet protection in stream bed and banks
  - o 2:1 and guardrail for minimization
    - *Do whatever is needed for non-erosive velocities at the outlet. Can be energy dissipater, plunge pool, etc.*
    - *Final decision to pipe the entire thing. Add a drop box for energy dissipation and an OTCB for overland flow.*

#### **PSH 11-B**

##### Jurisdictional Stream Impacts

- Site 8 (ES-S6)
  - o 54" Pipe under –Y3RPB- and –L-. 6.8% slope.

#### Wetland Impacts

- Site 8A (ES-W38)
  - o Roadway Fill

#### **PSH 11-C**

##### Jurisdictional Stream Impacts

- Site 8 (ES-S6)
  - Inlet of 54" pipe under –Y3RPB- Not buried

##### Wetland Impacts

- Site 8B (ES-W4)
  - o Proposed 42" RCP-IV outlet, and 15" RCP-III outlet at spring locations
  - o Looking at rip-rap in wetland at the outlet of 42" pipe. 6.8% slope.
    - *Rip-rap is for velocity control.*
    - *NCDOT Hydraulics to check to see if energy dissipaters can be used in wetlands due to maintenance. DEO okay with an energy dissipater as long as it will sheet flow out.*
    - *Design team to see if a drop box and energy dissipater is enough. If not, a ditch will be added from the 42" outlet to the 54" inlet.*
    - *Wetland may end up as a total take.*

#### **PSH 11-D**

##### Jurisdictional Stream Impacts

- Site 9 (ES-S7)
  - o Spring site and 42" under proposed roadway

#### **PSH 12**

##### Jurisdictional Stream Impacts

- Site 10 (ES-S8)
  - o Embankment rip-rap at outlet and in stream bed
  - o 48" pipe not buried
  - o Location of pipe inlet based on larger drainage area of the breached pond.
    - *Concern over 18" potential driveway pipe downstream of the outlet but outside of ROW. NCDOT Hydraulics to look into this during design review and determine how far this is carried off the project and how it should be handled.*

##### Wetland Impacts

- Site 10A (ES-W36), Site 10B (ES-W37)
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts

#### **PSH 13**

##### Jurisdictional Stream Impacts

- Site 11 (ES-S9) – jurisdictional upstream
  - o Embankment rip-rap for basin outlet and 54" cross pipe
  - o Not burying pipe
  - o Proposed location of dry detention basin
    - *24" pipe coming onto ROW is perched. Suggestion to add a drop box near the ROW.*

##### Wetland Impacts

- Site 11A (ES-W33)

- Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts
  - *Total take because cutting off hydraulics*

**PSH 14** - No impacts to jurisdictional features

**PSH 15**

Jurisdictional Stream Impacts

- Site 12 (ES-S58) - comes out of Pond 9 (P9). Perennial
  - Proposed stream relocation with ditch block
  - Lined with class I rip-rap

Wetland Impacts

- Site 12A (ES-W31)
  - Roadway Fill 2:1 and guardrail for minimization

**PSH 16**

Jurisdictional Stream Impacts

- Site 13 (ES-S10) - Intermittent in wetland, perennial outside the wetland
  - Proposed 5'x7' culvert buried 1', 233' at 2.25% slope
  - Embankment rip-rap for inlet of culvert and channel protection at the outlet with embedded rip-rap
    - *Baffles not needed*
    - *Concern about velocity at outlet. Look into a channel modification at inlet due to channel turn.*
    - *Concern over stormwater outlet into non jurisdictional channel. Pre vs post will be run in this area. May look into out-letting into the side of the culvert.*

**PSH 17**

Jurisdictional Stream Impacts

- Site 14 (ES-S13)
  - Embankment rip-rap for outlet of 54" contractor design
    - *Straighten rip-rap pad at outlet.*
  - Pipe at 3.9% so not proposing to bury the pipe.

Pond Impacts – Grubs Lake

- Site 14A (ES-P2)
  - Roadway Impacts. Pond to be drained. Location and stabilization of channel to be adjusted in the field as needed
  - Will provide additional coverage for top of pond. Doesn't appear to have a jurisdictional feature upstream of the pond
    - *Design Build Team to come up with a plan to drain the pond by 4C.*
    - *Pond is jurisdictional. Line pond as JS on plans.*
    - *TDE if just draining the pond. PDE will be needed otherwise. Include additional plan sheet to illustrate full pond area.*
    - *NCDOT owns the property the pond is located on. Questions on whether easements should be drawn if DOT owns the property. Design Build Team has had experience on other projects that line work is still expected but will check with ROW agent. If not, a label will be added to plans indicating DOT ownership.*



## **PSH 18**

### Jurisdictional Stream Impacts

- Site 15 (ES-S14) - Intermittent
  - Proposed 7'x7' culvert buried 1', 390' at 1.4%
  - Embankment rip-rap at inlet and channel protection at culvert outlet
    - *Does not need to be buried or have baffles.*

### Wetland Impacts

- Site 15A (ES-W28)
  - Roadway Fill
  - 2:1 slopes with guardrail for minimization

## **PSH 19-A**

### Jurisdictional Stream Impacts

- Site 17 (ES-S16)
  - Proposed 7' x 7' RCBC, 770' with baffles at 1.8%
  - Embankment rip-rap at Inlet
    - *Concern over 30" out-letting to ditch then to stream. Suggest to rip-rap this ditch to ensure stability.*
    - *Pipes connecting to the culvert are to pick up low points in the ramp.*

## **PSH 19-B**

### Jurisdictional Stream Impacts

- Site 16 (ES-S15)
  - JS starts in interchange

## **PSH 19-C**

### Jurisdictional Stream Impacts

- Site 16 (ES-S15)
  - Proposed 54" RCP inlet and outlet protection, not buried
  - 42" Outlet Ditch - realigned outlet ditch to line up with existing stream

## **PSH 19-D**

### Jurisdictional Stream Impacts

- Site 17 (ES-S16)
  - Outlet protection for 7' x 7' RCBC

## **PSH 20**

### Jurisdictional Stream Impacts

- Site 18 (ES-S68)
  - Proposed 42" RCP outlet – Not buried due to steepness and JS starts under alignment
  - Embankment rip-rap at outlet
- Site 19 (ES-S19)
  - Proposed 6'x7' culvert buried 1', 273' at 1%
  - Embankment rip-rap and outlet channel protection
  - Removing 24" CMP downstream of culvert outlet
    - *Add a sill to the inlet if culvert is buried and backfill with native material.*
- Site 20 (ES-S20)
  - Removing 2 x 72" CMP

- Large scour hole present due to undersized pipes
- Will improve floodplain and floodway width
- Downstream of Mill Creek crossing
  - *Turn around will be moved to the other side of the stream. Concern over whether this will impact the wetland. Preliminary designs show they will be minor but will have final design by 4C.*
  - *Request to rip-rap the channel. Look at upstream and downstream slopes to determine if there will be any head cutting issues. Ensure stability of the channel at this location.*

## **PSH 21**

### Jurisdictional Stream Impacts

- Site 21 (ES-S53)
  - Embankment rip-rap and bank stabilization for lateral base ditch
  - Need to do a stream relocation due to bridge pier
- Site 20 (ES-S20) Mill Creek
  - No anticipated impacts to Mill Creek due to bridge construction. This is hauling break point
  - Embankment rip-rap and bank stabilization for lateral base ditch
    - *Due to FEMA and span length there was no opportunity to avoid the area of stream relocation at the bridge foundation.*
    - *If there's a possibility that temporary impacts may be needed for stream crossing then go ahead and permit for it. Don't want to hold up construction later on.*
    - *A lot of beaver activity in this area. Design Build Team to talk and determine if beaver dams need to be removed prior to construction. NCDOT has a team to help with this, just provide information to the DEO.*

## **PSH 22**

### Jurisdictional Stream Impacts

- Site 22 (ES-S52)
  - Embankment rip-rap at 36" outlet
  - Not burying – not JS upstream

## **PSH 23**

### Jurisdictional Stream Impacts

- Site 23 (ES-S21)
  - 6X7 RCBC, 230' at 2.6%
  - Inlet and Outlet Protection for RCBC
    - *If the jurisdictional stream ends just outside of the page, no need to bury and baffles are not required. Team will check on jurisdiction.*
    - *Design Build team to look into angling the channel change.*
- Site 24 (ES-S22) - Intermittent
  - Proposed channel relocation at outlet
- Site 25 (ES-S23)
  - Proposed tail ditch at 30" RCP outlet; however, profile has been adjusted and may not need tail ditch anymore

## **PSH 24**

### Jurisdictional Stream Impacts

- Site 25 (ES-S23)
  - o Proposed tail ditch at 30" RCP outlet
- Site 26 (ES-S24) – JS ends on the page.
  - o Proposed 6X6 RCBC, 352' at 2.4%
  - o Rip-rap in stream at outlet
    - *Does not require baffles and does not need to be buried.*

## **PSH 25**

### Jurisdictional Stream Impacts

- Site 26 (ES-S24)
  - o Embankment rip-rap at RCBC inlet

## **PSH 26**

### Jurisdictional Stream Impacts

- Site 27 (ES-S25) - Perennial with pond upstream
  - o Proposed 7x7 RCBC, 244' at 1.3%
  - o dry detention basin
  - o Embankment rip-rap at inlet, rip-rap in stream at outlet
    - *Pipe to be buried but baffles are not required.*
- Need to add site for (ES-S26) for inlet bank stabilization
  - *Intermittent at the top, perennial by the confluence*
  - *Design Build Team to look into relocating a piece of S26 to better align the channel at culvert inlet.*

## **PSH 27-28** - No impacts to jurisdictional features

## **PSH 29 (Point where project overlaps with the C Project Sites 1 to 5)**

### Wetland Impacts

- Site 28 (ES-W6)
  - o Roadway Fill

*Permit Sites 1-5 of the C project were modified under R-2247B and U-2579 (Application dated October 2, 2017, 404 Permit Modification dated January 22, 2018 and 401 Permit Modification dated December 21, 2017). These are available in NCDOT Permits Folder online. Will discuss these sites at 4C.*

## **PSH 30**

### Jurisdictional Stream Impacts

- Site 29 (ES-S48)
  - o Proposed 54" RCP outlet protection
    - *Concern about pipe skews. Conversation about better aligning the pipes and breaking up the huge stormwater system.*
    - *This part of the job lines up with the C section. Fills are 60' in this area so other options are not feasible.*

### Wetland Impacts

- Site 28 (ES-W6), Site 29A (ES-W7), Site 29B (ES-W8)
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts

**PSH 31**

## Jurisdictional Stream Impacts

- Site 30 (ES-S27)
  - RCBC inlet and outlet protection and proposed media filter
  - Embankment rip-rap for lateral base ditch

**PSH 32-43** - No impacts to jurisdictional features**PSH 44**

## Jurisdictional Stream Impacts

- Site 31 (ES-S60) rip-rap and proposed ditch tie in

**PSH 45-49** - No impacts to jurisdictional features**PSH 50**

## Jurisdictional Stream Impacts

- Site 32 (ES-S17)
  - Proposed supplemental culvert on existing triple barrel RCBC
  - Stream improvements and proposed lateral ditch tie in
    - *A lot of sedimentation upstream and downstream. Proposed design is to direct the stream into new barrel and use the existing three barrels as overflow. Channel improvements will clean out sedimentation as well as create a bench.*

**PSH 51-56** - No impacts to jurisdictional features**4C will tentatively be scheduled for October 10, 2018.**

**TO:** Craig Lee  
NCDOT Hydraulics Unit

**FROM:** Brian Steffen, PE / James Rice, PE (HDR)

**DATE:** October 10, 2018

**SUBJECT:** U-2579 DEF – 4C Meeting Agenda

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Meeting Attendees:

Nicole Braspenick, USACE  
Robert Patterson, NCDEQ-DWR (via phone)  
Dave Wanucha, NCDEQ-DWR (via phone)  
Marella Buncick, USFWS  
Donnie Brew, FHWA (via phone)  
Bill Barrett, NCDOT-EAU  
Carla Dagnino, NCDOT-EAU  
Jorge Maturano, NCDOT  
John Jamison, NCDOT Environmental Policy  
Michael Shumsky, NCDOT-Design Build  
Karen Capps, NCDOT-Design Build  
Tucker Martin, NCDOT Utilities  
Craig Lee, NCDOT-Hydraulics  
Amy Euliss, NCDOT-Division 9 (via phone)  
Mark Staley, NCDOT-Roadside Environmental (via phone)  
Jason Mroz, Flatiron  
James Rice, HDR  
Brian Steffen, HDR  
Vickie Miller, HDR  
Kathleen Bell, HDR  
Edward Vance, STV

The meeting was held on October 10<sup>th</sup>, 2018 from 1am to 4pm in the NCDOT Structures Conference Room. The meeting was opened with introductions and the following items were covered with James Rice facilitating. A full set of PDF drawings was projected on screen as well as via skype for those on the phone to follow along. These resources will be made available to all attendees. The meeting attendees sign in sheet is attached.

The *italicized* text indicates notes from the meeting discussion.

**General**

- Future I-74 Winston-Salem Northern Beltway from west of NC 66/SR 4000 to US 311. Approx. 7.0 miles of a six lane divided highway in new location.
- 3 major interchanges: University Parkway, Germantown Rd, and Baux Mountain Rd. 1 bridge over Mill Creek.

- Located within the Yadkin River Basin, there are no specific stormwater requirements for this area, but will follow MEP.
- Stormwater BMP locations have been finalized.
- Median ditches may provide some treatment and lateral ditches were flattened where feasible to provide grass swale treatment.
- Some outlets of large pipes and culverts have high velocities due to steep terrain. Additional rip-rap placed in the bed of the jurisdictional streams is shown for mitigation of velocities. Rip-rap in streams will be embedded flush with existing stream bed.
- Many of the steep pipes and culverts will not be buried, and pipes have been labeled as such.
- *Break out bank stabilization and show in impact summary sheets.*
- *Details that tie to jurisdictional features to be included in permit drawings.*
- *NCDOT-EAU noted to provide a table of buried pipes in the permit application.*
- *NCDOT DEO request to add enlargement boxes to plans to help avoid confusion.*
- *Locations where impacts are present but the design calls to embed rip rap and leave the channel open instead of piping will be analyzed further to see if lower mitigation ratios are viable.*
- *Utility impacts to be accounted for in impact drawings and permit application.*
- *Add 10' of bank stabilization impacts downstream of all energy dissipators.*
- *Place permit impact site labels closer to impact locations.*

#### **PSH 5-A – New Sheet Provided**

##### Jurisdictional stream Impacts

- **Site 1 (ES-S1)**
  - o 54" RCP
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts

##### Wetland Impacts

- **Site 1A (ES-W44), 1B (ES-W1), 1C (ES-W2), 1D (ES-W43)**
  - o Due to roadway fill for ramp, loop, and mainline

##### Basins

- **Y1LPD 14+00 LT**
  - o Dry Detention basin location
    - Class C receiving waters, dry detention deemed MEP for this project
  - o Forebay and berm have been lined with riprap
  - o Receiving drainage from loop and University Parkway

#### **PSH 5-B – New Sheet Provided**

##### Jurisdictional stream

- **Site 1(ES-S1), Site 2 (ES-67), Site 3 (ES-65), Site 4 (ES-S2),**
  - o Due to outlet channel protection for proposed culverts and roadway fill
  - o Flattened slopes to close in Ramp A gore due to steep terrain
  - o Flattened last run of pipe to 0.5% to help with outlet velocity
  - o *Change ES-65 label on plans to ES-S65.*

##### Wetland Impacts

- **Site 2A (ES-W46), Site 1A (ES-W44)**
  - o Due to roadway fill where 2:1 slopes and guardrail used to minimize impacts

##### Basin

- Y1LPA 15+00 RT – Dry Detention Basin
  - o Moved basin from Loop A to Ramp A gore to eliminate long run of pipe, better constructability
  - o Detaining University Parkway, mainline, and Y1LPA
  - o From 4B, we have shown a forebay and rip-rapped berm

## **PSH 6**

### Jurisdictional Stream Impacts

- **Site 5 (ES-S3)**
  - o Intermittent, JS starts just off the page, has steep terrain.
  - o Culvert is not buried, inlet and outlet channel protection added due to discharge coming to each point (Shown embedded in detail)
  - o From 4B meeting, at outlet of culvert
    - 18” - outlet taken to existing channel to allow dissipation before main channel
    - 24” – ditch was added at flatter terrain to allow for dissipation before main channel protection
  - o *Add a note on the plans to indicate the stream near Site 5B is not jurisdictional.*

### Wetland Impacts – L 78+00 LT

- **Site 5A (ES-W47), Site 5B (ES-W45)**
  - o Roadway fill and ditch impacts

## **PSH 10**

### Jurisdictional Stream Impacts

- **Site 6 (ES-S4 (Trick-um Creek)) - Perennial**
  - o Proposed 42” RCP-IV – 550’ and steep slope – Not buried.
  - o Looked into ditching to energy dissipator, due to terrain would have ROW impacts on nearby house
  - o At 42” pipe inlet, ditch added in wetland to make sure only 1 low point
  - o *Change ES-S5 label on plans to ES-S4.*
- **Site 7 (ES-S5 (Trib to Trick-um Creek)) - Intermittent**
  - o Proposed 5’x6’ culvert not buried, 330’ long at 1.6% slope
  - o Outlet channel protection on proposed culvert outlet and embankment rip-rap on culvert inlet.
  - o At culvert inlet, filling in headcut with Class II rip rap. Detail added to plans
  - o Energy dissipator and overwidened ditch with permanent rock checks to stream. ROW impacts and nearby property owner
  - o *Add note on plans to indicate start of jurisdiction.*
  - o *Add a cross section detail to the plans for culvert inlet channel.*
- **Site 8 (ES-S6) - Perennial**
  - o Proposed 42” and 30” outlets.
  - o Flattened the last section of the 42” pipe to reduce velocity

### Wetland Impacts

- **Site 6A (ES-W3)**
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts

## **PSH 11-A**

### Jurisdictional Stream Impacts

- **Site 9 (ES-S7) – mostly perennial**
  - o Proposed 42” outlet with energy dissipator

- o Outlet protection in stream bed and banks
- o Slopes in interchange interior were flattened to 4:1 and energy dissipator added to outlet due to high velocities

### **PSH 11-B**

#### Jurisdictional Stream Impacts

- **Site 8 (ES-S6)**
  - o Flattened the last section of the 42" pipe to reduce velocity

#### Wetland Impacts

- **Site 8A (ES-W38)**
  - o Roadway Fill

### **PSH 11-C**

#### Jurisdictional Stream Impacts

- **Site 8 (ES-S6)**
  - Inlet of 42" pipe under -L- Not buried due to slope
  - Provided a ditch from the 36" pipe.

#### Wetland Impacts

- **Site 8B (ES-W4)**
  - o Proposed 36" RCP-IV outlet, and 15" RCP-III outlet at spring locations
  - o Energy dissipator was added at 36" outlet, along with ditch between outlet of 36" RCP and 42" under -L-
  - o *Calling for a total take of this wetland even though the plans just show ditch work. Since NCDOT is already mitigating for its loss, water quality will be protected downstream at the pipe outlet during construction.*

### **PSH 11-D**

#### Jurisdictional Stream Impacts

- **Site 9 (ES-S7)**
  - o Spring site and 36" under proposed roadway

### **PSH 12**

#### Jurisdictional Stream Impacts

- **Site 10 (ES-S8)**
  - o Outlet channel protection
  - o 42" pipe not buried
  - o Location of pipe inlet based on larger drainage area of the breached pond.
  - o 18" pipe downstream of project was left in place
  - o *Impacts to be extended to the PDE limits.*

#### Wetland Impacts

- **Site 10A (ES-W36), Site 10B (ES-W37)**
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts

### **PSH 13**

#### Jurisdictional Stream Impacts

- **Site 11 (ES-S9) – jurisdictional upstream / Site 34 (ES-S62, Buffalo Creek)**
  - o 48" cross pipe not buried due to slope
  - o Energy dissipator, over widened ditch and permanent rock checks
  - o Connection of ES-S9 and ES-S62 was improved with grading
  - o Upstream: 24" that was perched, a drop box was added and ditch graded between Ex. 24" and 48" inlet



- o *Break in stream is in question, a connection was not shown in the provided WET file. Final decision to leave the plans as shown in the WET file.*
- o *Concern over angle of rip rap placement. The angle shown is due to ditch grading, this is where it ties into natural ground.*

#### Wetland Impacts

- **Site 11A (ES-W33)**
  - o Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts
  - o Wetland was taken as a total take

#### **PSH 15**

##### Jurisdictional Stream Impacts

- **Site 12 (ES-S58) - comes out of Pond 9 (P9). Perennial**
  - o Proposed stream relocation with ditch block
  - o Lined with class I rip-rap
  - o Stream relocation tied at a better angle to existing JS
  - o *Add leader line to plans to channel block callout to clarify location.*

#### Wetland Impacts

- **Site 12A (ES-W31)**
  - o Roadway Fill 2:1 and guardrail for minimization

#### **PSH 16**

##### Jurisdictional Stream Impacts

- **Site 13 (ES-S10) - Intermittent in wetland, perennial outside the wetland**
  - o Proposed 5'x6' culvert not buried due to slope
  - o Channel improved on upstream side of the culvert to eliminate bend
  - o Outlet channel velocity in 10-Year storm is same pre vs post 50' downstream of culvert
  - o Concern over non-JS outlet at 208+40 RT in 4B, drainage layout has been updated to send more drainage through culvert and reduce discharge at 18" outlet more similar to existing conditions
  - o Maintaining same ditch elevation so do not anticipate draining the wetland

#### *Wetland Impacts*

- *New site location: Site 13A. Mechanized clearing to be added to wetland located to the northeast of Site 13.*

#### **PSH 17**

##### Jurisdictional Stream Impacts

- **Site 14 (ES-S13)**
  - o Embankment rip-rap for outlet of 48" contractor design
  - o Downstream channel has be updated to improve bend

#### Pond Impacts – Grubbs Lake

- **Site 14A (ES-P2)**
  - o Roadway Impacts. Pond to be drained. Location and stabilization of channel to be adjusted in the field as needed
  - o Pond plan will be provided by the design build team for NCDOT approval

- *The pond is more than 20 feet deep so dam safety would need to be involved to build a new embankment.*
- *Even though the pond is located on a NCDOT parcel, TDE is being shown to reserve this area for the project in case anything should happen with the property.*

### **PSH 18**

#### Jurisdictional Stream Impacts

- **Site 15 (ES-S14) - Intermittent**
  - Proposed 5'x6', not buried
  - Bank Stabilization at inlet and channel protection at culvert outlet
  - *Longer wing walls to be shown on the plans or reconfiguration of the ditch tie in to provide a better angle. Embedded rip rap to be provided in the channel for long term stability.*
  - *Pre vs post analysis to be taken at the 15" CMP located downstream to determine if there are any potential property impacts.*

#### Wetland Impacts

- **Site 15A (ES-W28)**
  - Roadway Fill
  - 2:1 slopes with guardrail for minimization

### **PSH 19-A**

#### Jurisdictional Stream Impacts

- **Site 17 (ES-S16)**
  - Proposed 6' x 6' RCBC, not buried
  - Bank Stabilization at Inlet
  - Ditch was added to 24" outlet to dissipate some energy before culvert inlet, at 4B showing pipe directly into stream. No ditch was shown at 4B.3
  - *Rip rap to be provided at culvert inlet since stream is intermittent.*
  - *Add note on plans to indicate start of jurisdiction.*

### **PSH 19-C**

#### Jurisdictional Stream Impacts

- **Site 16 (ES-S15)**
  - Proposed 42" RCP inlet and outlet protection, not buried
  - 42" Outlet Ditch - realigned outlet ditch to line up with existing stream
  - Ditch was added between 30" outlet and 42" inlet inside interchange due to temporary impact concerns

### **PSH 19-D**

#### Jurisdictional Stream Impacts

- **Site 17 (ES-S16)**
  - Outlet protection for 6' x 6' RCBC
  - *Add embedded rip rap at culvert outlet for long term stability.*

### **PSH 20 – New Sheet Provided**

#### Jurisdictional Stream Impacts

- **Site 18 (ES-S68)**
  - Proposed 42" RCP outlet – Not buried due to steepness and JS starts under alignment

- o Detail added for outlet channel protection
- **Site 19 (ES-S19)**
  - o Proposed 5'x7' culvert buried 1', no baffles
    - Sill added to inlet and will be backfilled with native material
  - o Looking at possibly lowering culvert in order to have a more defined channel downstream where 24" CMP is being removed
  - o Embankment rip-rap and outlet channel protection
  - o Removing 24" CMP downstream of culvert outlet
  - o *Downstream channel is shallower than upstream so outlet channel improvements will be provided. NCDOT owns parcels in this area (187, 188) but their extent is unknown. Parcel ownership to be confirmed. NCDOT to determine if 24" pipe downstream will be removed.*
- **Site 20 (ES-S20)**
  - o Removing 2 x 72" CMP
    - Detail added to plans showing excavation and stabilization since 4C set was uploaded – New sheet provided
  - o Large scour hole present due to undersized pipes
  - o Will improve floodplain and floodway width
  - o Downstream of Mill Creek crossing
  - o *Site to be monitored in the field. If head cutting is an issue changes will be made as needed.*

### **PSH 21 – New Sheet Provided**

#### Jurisdictional Stream Impacts

- **Site 21 (ES-S53)**
  - o Embankment rip-rap and bank stabilization for lateral base ditch
  - o Need to do a stream relocation due to bridge pier
  - o *Revise ditch to provide a better tie in angle with Mill Creek.*
- **Site 20 (ES-S20) Mill Creek**
  - o *Anticipated temporary crossing added at Mill Creek*
    - *Adding pipes to stream covering then covering over*
    - *Pipe sizes will be determined later for appropriate temp design year*
  - o Embankment rip-rap and bank stabilization for lateral base ditch
  - o Beaver dams should be removed before construction
    - *Beaver activity is causing the high water surface elevation shown in the profile.*
  - o *Change temporary work bridge label on plans to causeway or temporary work pad.*
  - o *NCDOT request to place the causeway in a location that is not over widened.*
    - *A causeway was provided as the worst case scenario but impacts will be minimized to the extent practicable.*

### **PSH 22**

#### Jurisdictional Stream Impacts

- **Site 22 (ES-S52)**
  - o Added energy dissipator basin due to outlet velocities
  - o *Add embedded rip rap to culvert inlet channel.*
  - o *Add 10' of impacts past energy dissipator for possible bank stabilization. Need for stabilization to be determined in the field.*

### **PSH 23 – New Sheet Provided**

#### Jurisdictional Stream Impacts

- **Site 23 (ES-S21)**
  - 6X6 RCBC, not buried
  - Ditch added at 18” outlet at culvert to help with dissipation
  - Inlet and Outlet Protection for RCBC
    - *Revised drainage coming to outlet.*
- **Site 24 (ES-S22) - Intermittent**
  - Proposed channel relocation at inlet based on 4B
  - *Change standard rip rap pad to rip rap at embankment.*
- **Site 25 (ES-S23)**
  - Bank Stabilization at 24” outlet

### **PSH 24**

#### Jurisdictional Stream Impacts

- **Site 25 (ES-S23)**
- **Site 26 (ES-S24) – JS ends on the page**
  - Proposed 5X6 RCBC, not buried
  - Outlet channel protection
  - Impacts will be updated
- *Extend impacts to end of rip rap.*
- *Change jurisdictional rip rap pad to standard rip rap pad at –L- Sta. 332+00 LT.*

### **PSH 25**

#### Jurisdictional Stream Impacts

- **Site 26 (ES-S24)**
  - Bank Stabilization at RCBC inlet
  - *Bank stabilization needs to be separated on impacts sheet for Site 26*

### **PSH 26 – New Sheet Provided**

#### Jurisdictional Stream Impacts

- **Site 27 (ES-S25) - Perennial with pond upstream**
  - Proposed 7x7 RCBC, 1’ buried no baffles
  - Dry detention basin
    - Overflow ditch added
    - Added bank stabilization
  - Bank Stabilization at inlet, rip-rap in stream at outlet
  - *Fill in gap downstream of culvert with rip rap. Extend to overflow ditch tie in.*
  - *Add bank stabilization past right wing wall on the culvert inlet.*
  - *Utility easement to be explored to see if it will remain.*
- **Site 27A (ES-S26)**
  - Bank stabilization and channel improvements

*Permit Sites 1-5 of the C project were modified under R-2247B and U-2579 (Application dated October 2, 2017, 404 Permit Modification dated January 22, 2018 and 401 Permit Modification dated December 21, 2017.*

### **PSH 29 (Point where project overlaps with the C Project Sites 1 to 5)**

*Reference will be made to original site numbers in U-2579C Phase II Permits in cover letter and impact summary sheet.*

#### **Wetland Impacts**

- **Site 28 (ES-W6)**
  - Roadway Fill

### **PSH 30**

#### **Jurisdictional Stream Impacts**

- **Site 29 (ES-S48)**
  - *Large pipe with bad skew was broken up into two smaller cross pipes with a skew more perpendicular to the alignment*

#### **Wetland Impacts**

- **Site 28 (ES-W6), Site 29A (ES-W7), Site 29B (ES-W8)**
  - Roadway Impacts: 2:1 side slopes w/ guardrail used to minimize impacts

### **PSH 31**

#### **Jurisdictional Stream Impacts**

- **Site 30 (ES-S27)**
  - Energy dissipator basin was added with over widened base ditch with permanent rock checks

### **PSH 44**

#### **Jurisdictional Stream Impacts**

- **Site 31 (ES-S60)** rip-rap and proposed ditch tie in

### **PSH 50**

#### **Jurisdictional Stream Impacts**

- **Site 32 (ES-S17)**
  - After detailed analysis, no supplemental pipe was needed
  - Added detail showing channel improvements, plan is to excavate down to a 1' bench, no sills in the culvert since that is how the culver was designed
  - Stream improvements and proposed lateral ditch tie in
  - *Update culvert bench detail on plans. Coir fiber matting to be shown on top the bench with rip rap armoring along the stream side.*
  - *Change Mill Creek label on plans from SE-17 to ES-17.*

### **PSH 51**

#### **Wetland Impacts**

- **Site 33 (ES-W24)**
  - Cul-de-sac is being moved to miss the gas line. Will work to shift cul-de-sac off the wetland and avoid impacts.
  - *Jurisdictional stream is running through the wetland. Change line style on plans to reflect this and add stream label.*

**PSH 7&42**

Historic Property

- *This project is federally funded so there is a green sheet commitment to have no permanent easements on the Clayton Family Farm property. Design will be reviewed to see if impacts can be minimized.*



## North Carolina Department of Transportation

Highway Stormwater Program  
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FOR NCDOT PROJECTS

(Version 2.08; Released April 2018)

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## General Project Information

|                                 |          |                                           |             |           |                        |              |                                                      |            |
|---------------------------------|----------|-------------------------------------------|-------------|-----------|------------------------|--------------|------------------------------------------------------|------------|
| WBS Element:                    |          | 34839.3.GV7                               | TIP Number: | U-2579DEF | Project Type:          | New Location | Date:                                                | 10/16/2018 |
| NCDOT Contact:                  |          | Craig J Lee, PE                           |             |           | Contractor / Designer: |              | Brian M Steffen, PE                                  |            |
|                                 | Address: | 1020 Birch Ridge Dr.<br>Raleigh, NC 27610 |             |           |                        | Address:     | 555 Fayetteville St., Suite 900<br>Raleigh, NC 27601 |            |
|                                 | Phone:   | 919-707-6708                              |             |           |                        | Phone:       | 919-232-6609                                         |            |
|                                 | Email:   | cjlee@ncdot.gov                           |             |           |                        | Email:       | brian.steffen@hdrinc.com                             |            |
| City/Town:                      |          | Winston-Salem                             |             |           | County(ies):           |              | Forsyth                                              |            |
| River Basin(s):                 |          | Yadkin-Pee Dee                            | Roanoke     |           | CAMA County?           |              | No                                                   |            |
| Wetlands within Project Limits? |          | Yes                                       |             |           |                        |              |                                                      |            |

## Project Description

|                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |                             |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------|
| Project Length (lin. miles or feet):                                                 | 6.95 miles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Surrounding Land Use: | Residential (Single Family) |
|                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Proposed Project      | Existing Site               |
| Project Built-Up Area (ac.)                                                          | 189.0 ac.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 43.0 ac.              |                             |
| Typical Cross Section Description:                                                   | 6 lane divided freeway w/ an 18 foot grass median: (2) 12 foot outside paved shoulders, (3) 12 foot travel lanes, (2) 12 foot paved median shoulders - Total width of 146'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                       |                             |
| Annual Avg Daily Traffic (veh/hr/day):                                               | Design/Future: 60,200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Year: 2040            | Existing: 34,000 Year: 2016 |
| General Project Narrative:<br>(Description of Minimization of Water Quality Impacts) | <p><b>Project Description:</b> The proposed project (U-2579DEF) is part of the future I-74 Winston-Salem Northern Beltway from west of NC 66/SR 4000 to US 311 and will construct approximately 7 miles of 6-lane divided highway in new location. The project includes 3 major interchanges: University Parkway, Germantown Rd., and Baux Mountain Rd. There are 8 proposed single barrel culvert crossings on the project at Rough Fork, Trick-um Creek, 5 Unnamed Tributaries to Mill Creek, an unnamed tributary to Frazier Creek, and one supplemented existing triple barrel culvert crossing at Mill Creek. The project includes one major bridge crossing over Mill Creek. Pipe culverts will be used to convey all other jurisdictional stream crossings through the project. Wetlands are also located throughout the length of the entire project.</p> <p><b>Impact Minimization Efforts:</b> Guardrail with 2:1 slopes were utilized throughout the project to minimize surface water impacts to streams and wetlands. Ditches and pipes that outlet adjacent to wetlands have been designed to have non-erosive velocities to help protect the existing wetlands.</p> <p><b>Stormwater BMP Measures:</b> Stormwater control measures such as dry detention and energy dissipator basins were proposed at specific locations along the project. The Design-Build Team has designed ditches to achieve grass swale credit</p> |                       |                             |

## Waterbody Information

|                                                                  |                                     |                                                                                                      |           |
|------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------|-----------|
| Surface Water Body (1):                                          | Rough Fork                          | NCDWR Stream Index No.:                                                                              | 22-25-5-2 |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:             | Class C                                                                                              |           |
|                                                                  | Supplemental Classification:        | None                                                                                                 |           |
| Other Stream Classification:                                     | None                                |                                                                                                      |           |
| Impairments:                                                     | None                                |                                                                                                      |           |
| Aquatic T&E Species?                                             | Comments:                           |                                                                                                      |           |
| NRTR Stream ID:                                                  | ES-S1, ES-S2, ES-S3, ES-S67, ES-S65 | Buffer Rules in Effect:                                                                              | N/A       |
| Project Includes Bridge Spanning Water Body?                     | No                                  | Deck Drains Discharge Over Buffer?                                                                   | N/A       |
| Deck Drains Discharge Over Water Body?                           | N/A                                 | Dissipator Pads Provided in Buffer?                                                                  | N/A       |
| (If yes, provide justification in the General Project Narrative) |                                     | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |           |



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## Additional Waterbody Information

|                                                                  |                              |                                                                  |                                                                                                      |
|------------------------------------------------------------------|------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Surface Water Body (2):                                          | Trick-um Creek               | NCDWR Stream Index No.:                                          | 22-25-5-1                                                                                            |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:      | Class C                                                          |                                                                                                      |
|                                                                  | Supplemental Classification: | None                                                             |                                                                                                      |
| Other Stream Classification:                                     | None                         |                                                                  |                                                                                                      |
| Impairments:                                                     | None                         |                                                                  |                                                                                                      |
| Aquatic T&E Species?                                             | Comments:                    |                                                                  |                                                                                                      |
| NRTR Stream ID:                                                  | ES-S4, ES-S5, ES-S6          | Buffer Rules in Effect:                                          | N/A                                                                                                  |
| Project Includes Bridge Spanning Water Body?                     | No                           | Deck Drains Discharge Over Buffer?                               | N/A                                                                                                  |
| Deck Drains Discharge Over Water Body?                           | N/A                          | (If yes, provide justification in the General Project Narrative) | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |
| (If yes, provide justification in the General Project Narrative) |                              |                                                                  |                                                                                                      |

|                                                                  |                              |                                                                  |                                                                                                      |
|------------------------------------------------------------------|------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Surface Water Body (3):                                          | Ogburn Branch                | NCDWR Stream Index No.:                                          | 12-94-7-2                                                                                            |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:      | Class C                                                          |                                                                                                      |
|                                                                  | Supplemental Classification: | None                                                             |                                                                                                      |
| Other Stream Classification:                                     | None                         |                                                                  |                                                                                                      |
| Impairments:                                                     | None                         |                                                                  |                                                                                                      |
| Aquatic T&E Species?                                             | Comments:                    |                                                                  |                                                                                                      |
| NRTR Stream ID:                                                  | ES-S59, ES-S60               | Buffer Rules in Effect:                                          | N/A                                                                                                  |
| Project Includes Bridge Spanning Water Body?                     | No                           | Deck Drains Discharge Over Buffer?                               | N/A                                                                                                  |
| Deck Drains Discharge Over Water Body?                           | N/A                          | (If yes, provide justification in the General Project Narrative) | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |
| (If yes, provide justification in the General Project Narrative) |                              |                                                                  |                                                                                                      |

|                                                                  |                              |                                                                  |                                                                                                      |
|------------------------------------------------------------------|------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Surface Water Body (4):                                          | Buffalo Creek                | NCDWR Stream Index No.:                                          | 22-25-5                                                                                              |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:      | Class C                                                          |                                                                                                      |
|                                                                  | Supplemental Classification: | None                                                             |                                                                                                      |
| Other Stream Classification:                                     | None                         |                                                                  |                                                                                                      |
| Impairments:                                                     | None                         |                                                                  |                                                                                                      |
| Aquatic T&E Species?                                             | Comments:                    |                                                                  |                                                                                                      |
| NRTR Stream ID:                                                  | ES-S7, ES-S8, ES-S9, ES-S62  | Buffer Rules in Effect:                                          | N/A                                                                                                  |
| Project Includes Bridge Spanning Water Body?                     | No                           | Deck Drains Discharge Over Buffer?                               | N/A                                                                                                  |
| Deck Drains Discharge Over Water Body?                           | N/A                          | (If yes, provide justification in the General Project Narrative) | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |
| (If yes, provide justification in the General Project Narrative) |                              |                                                                  |                                                                                                      |

|                                                                  |                                                                |                                                                  |                                                                                                      |
|------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Surface Water Body (5):                                          | Mill Creek                                                     | NCDWR Stream Index No.:                                          | 12-94-7                                                                                              |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:                                        | Class C                                                          |                                                                                                      |
|                                                                  | Supplemental Classification:                                   | None                                                             |                                                                                                      |
| Other Stream Classification:                                     | None                                                           |                                                                  |                                                                                                      |
| Impairments:                                                     | None                                                           |                                                                  |                                                                                                      |
| Aquatic T&E Species?                                             | Comments:                                                      |                                                                  |                                                                                                      |
| NRTR Stream ID:                                                  | ES-S10, ES-S11, ES-S13, ES-S26, ES-S27, ES-S48, ES-S52, ES-S58 | Buffer Rules in Effect:                                          | N/A                                                                                                  |
| Project Includes Bridge Spanning Water Body?                     | No                                                             | Deck Drains Discharge Over Buffer?                               | N/A                                                                                                  |
| Deck Drains Discharge Over Water Body?                           | N/A                                                            | (If yes, provide justification in the General Project Narrative) | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |
| (If yes, provide justification in the General Project Narrative) |                                                                |                                                                  |                                                                                                      |





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Additional Waterbody Information

|                                                                  |                              |                                                                                                      |           |
|------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------|-----------|
| Surface Water Body (6):                                          | Grassy Creek                 | NCDWR Stream Index No.:                                                                              | 12-94-7-3 |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:      | Class C                                                                                              |           |
|                                                                  | Supplemental Classification: | None                                                                                                 |           |
| Other Stream Classification:                                     | None                         |                                                                                                      |           |
| Impairments:                                                     | None                         |                                                                                                      |           |
| Aquatic T&E Species?                                             | Comments:                    |                                                                                                      |           |
| NRTR Stream ID:                                                  | N/A                          | Buffer Rules in Effect:                                                                              | N/A       |
| Project Includes Bridge Spanning Water Body?                     | No                           | Deck Drains Discharge Over Buffer?                                                                   | N/A       |
| Deck Drains Discharge Over Water Body?                           | N/A                          | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |           |
| (If yes, provide justification in the General Project Narrative) |                              |                                                                                                      |           |

|                                                                  |                              |                                                                                                      |               |
|------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------|---------------|
| Surface Water Body (7):                                          | Frazier Creek                | NCDWR Stream Index No.:                                                                              | Frazier Creek |
| NCDWR Surface Water Classification for Water Body                | Primary Classification:      | Class C                                                                                              |               |
|                                                                  | Supplemental Classification: | None                                                                                                 |               |
| Other Stream Classification:                                     | None                         |                                                                                                      |               |
| Impairments:                                                     | None                         |                                                                                                      |               |
| Aquatic T&E Species?                                             | Comments:                    |                                                                                                      |               |
| NRTR Stream ID:                                                  | N/A                          | Buffer Rules in Effect:                                                                              | N/A           |
| Project Includes Bridge Spanning Water Body?                     | No                           | Deck Drains Discharge Over Buffer?                                                                   | N/A           |
| Deck Drains Discharge Over Water Body?                           | N/A                          | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) |               |
| (If yes, provide justification in the General Project Narrative) |                              |                                                                                                      |               |



# North Carolina Department of Transportation

## Highway Stormwater Program STORMWATER MANAGEMENT PLAN



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| Swales    |                                                    |                    |                 |                   |                  |                    |                                  |                    |                        |          |          |           |           |                  |                                 |
|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| Sheet No. | Station & Coordinates (Road and Non Road Projects) | Surface Water Body | Base Width (ft) | Front Slope (H:1) | Back Slope (H:1) | Drainage Area (ac) | Recommended Treatm't Length (ft) | Actual Length (ft) | Longitudinal Slope (%) | Q2 (cfs) | V2 (fps) | Q10 (cfs) | V10 (fps) | Rock Checks Used | BMP Associated w/ Buffer Rules? |
| 5         | -Y1RPD- 19+75 RT<br>36.204277/-80.277437           | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.3                | 34                               | 63                 | 2.00%                  | 0.9      | 1.6      | 1.1       | 1.7       | No               | No                              |
| 5         | -Y1- 22+98 RT<br>36.207540/-80.281904              | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.3                | 34                               | 188                | 1.00%                  | 0.9      | 1.4      | 1.1       | 1.4       | No               | No                              |
| 5         | -Y1- 28+00 RT<br>36.206175/-80.281384              | (1)Rough Fork      | 0.0             | 2.0               | 2.0              | 0.5                | 48                               | 55                 | 2.00%                  | 1.2      | 1.9      | 1.6       | 2.0       | No               | No                              |
| 5         | -Y1- 28+20 RT<br>36.206175/-80.281384              | (1)Rough Fork      | 0.0             | 2.0               | 2.0              | 1.1                | 109                              | 515                | 0.24%                  | 2.8      | 1.0      | 3.6       | 1.1       | No               | No                              |
| 5         | -L- 59+34 M<br>36.204306/-80.281710                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.2                | 15                               | 135                | 0.27%                  | 0.4      | 0.6      | 0.5       | 0.7       | No               | No                              |
| 5         | -L- 59+34 LT<br>36.204587/-80.281767               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.5                | 49                               | 135                | 0.27%                  | 1.3      | 0.9      | 1.6       | 1.0       | No               | No                              |
| 5         | -L- 61+00 RT<br>36.204104/-80.281094               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 1.1                | 106                              | 301                | 0.60%                  | 2.7      | 1.5      | 3.5       | 1.6       | No               | No                              |
| 5         | -L- 61+00 LT<br>36.204659/-80.281204               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.5                | 52                               | 166                | 0.87%                  | 1.3      | 1.4      | 1.7       | 1.5       | No               | No                              |
| 5         | -L- 61+00 LT<br>36.204659/-80.281204               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.2                | 23                               | 77                 | 2.62%                  | 0.6      | 1.7      | 0.8       | 1.9       | No               | No                              |
| 5         | -L- 65+55 M<br>36.204597/-80.279634                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.3                | 33                               | 226                | 1.64%                  | 0.9      | 1.5      | 1.1       | 1.6       | No               | No                              |
| 5         | -L- 69+50 M<br>36.204772/-80.278339                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.7                | 71                               | 395                | 1.35%                  | 1.8      | 1.7      | 2.3       | 1.8       | No               | No                              |
| 5         | -L- 70+27 M<br>36.204807/-80.278061                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.9                | 86                               | 472                | 0.23%                  | 2.2      | 0.9      | 2.8       | 1.0       | No               | No                              |
| 5         | -L- 70+27 M<br>36.204807/-80.278061                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.4                | 42                               | 123                | 0.28%                  | 1.1      | 0.8      | 1.4       | 0.9       | No               | No                              |
| 6         | -Y1RPD- 18+50 LT<br>36.204274/-80.276989           | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.6                | 59                               | 190                | 0.63%                  | 1.5      | 1.3      | 2.0       | 1.4       | No               | No                              |
| 6         | -Y1RPD- 18+50 RT<br>36.204449/-80.277097           | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.3                | 34                               | 190                | 0.63%                  | 0.9      | 1.1      | 2.3       | 1.1       | No               | No                              |
| 6         | -Y1RPD- 18+50 RT<br>36.204449/-80.277097           | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.2                | 19                               | 200                | 1.04%                  | 0.5      | 1.2      | 0.6       | 1.3       | No               | No                              |
| 6         | -L- 71+71 RT<br>36.204625/-80.277505               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.5                | 52                               | 91                 | 0.56%                  | 1.3      | 1.2      | 1.7       | 1.3       | No               | No                              |
| 6         | -L- 72+50 RT<br>36.204640/-80.277273               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.5                | 52                               | 170                | 0.22%                  | 1.3      | 0.8      | 1.7       | 0.9       | No               | No                              |
| 6         | -L- 73+00 RT<br>36.204661/-80.277111               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 1.0                | 96                               | 170                | 1.44%                  | 2.5      | 2.0      | 3.2       | 2.1       | No               | No                              |

### Additional Comments



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## Swales

| Sheet No. | Station & Coordinates (Road and Non Road Projects) | Surface Water Body | Base Width (ft) | Front Slope (H:1) | Back Slope (H:1) | Drainage Area (ac) | Recommended Treatm't Length (ft) | Actual Length (ft) | Longitudinal Slope (%) | Q2 (cfs) | V2 (fps) | Q10 (cfs) | V10 (fps) | Rock Checks Used | BMP Associated w/ Buffer Rules? |
|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 6         | -L- 71+50 M<br>36.204861/-80.277624                | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.4                | 42                               | 100                | 0.67%                  | 1.1      | 1.2      | 1.4       | 1.3       | No               | No                              |
| 6         | -L- 72+50 M<br>36.204894/-80.277309                | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.7                | 67                               | 350                | 1.45%                  | 1.7      | 1.8      | 2.2       | 1.9       | No               | No                              |
| 6         | -L- 80+86 M<br>36.204839/-80.274480                | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.4                | 44                               | 214                | 1.54%                  | 1.1      | 1.7      | 1.5       | 1.8       | No               | No                              |
| 6         | -L- 83+00 M<br>36.204724/-80.273772                | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.4                | 38                               | 150                | 1.54%                  | 1.0      | 1.6      | 1.3       | 1.7       | No               | No                              |
| 6         | -L- 72+50 LT<br>36.205301/-80.277362               | (1)Rough Fork      | 0.0             | 2.0               | 2.0              | 0.7                | 71                               | 103                | 0.20%                  | 1.8      | 1.1      | 2.3       | 1.1       | No               | No                              |
| 7         | -Y2- 26+00 RT<br>36.202694/-80.271675              | (1)Rough Fork      | 0.0             | 4.0               | 2.0              | 0.3                | 31                               | 367                | 1.15%                  | 0.7      | 1.5      | 0.9       | 1.6       | No               | No                              |
| 7         | -L- 84+00 M<br>36.204662/-80.273442                | (1)Rough Fork      | 0.0             | 7.0               | 4.0              | 0.6                | 64                               | 336                | 1.47%                  | 1.7      | 1.8      | 2.1       | 1.9       | No               | No                              |
| 7         | -L- 87+36 M<br>36.204382/-80.272357                | (1)Rough Fork      | 0.0             | 7.0               | 4.0              | 0.3                | 27                               | 139                | 1.51%                  | 0.7      | 1.4      | 0.9       | 1.5       | No               | No                              |
| 7         | -L- 88+75 M<br>36.204234/-80.271923                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.7                | 67                               | 488                | 1.35%                  | 1.7      | 1.7      | 2.2       | 1.8       | No               | No                              |
| 7         | -L- 93+63 M<br>36.203698/-80.270407                | (1)Rough Fork      | 0.0             | 6.0               | 6.0              | 0.3                | 31                               | 297                | 1.19%                  | 0.8      | 1.3      | 1.0       | 1.4       | No               | No                              |
| 7         | -L- 88+75 RT<br>36.203984/-80.272052               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.6                | 59                               | 260                | 1.74%                  | 1.5      | 1.9      | 2.0       | 2.0       | No               | No                              |
| 7         | -L- 93+63 RT<br>36.203464/-80.270542               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.5                | 51                               | 88                 | 0.95%                  | 1.3      | 1.5      | 1.7       | 1.6       | No               | No                              |
| 7         | -L- 93+63 RT<br>36.203464/-80.270542               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 1.1                | 105                              | 297                | 1.22%                  | 2.7      | 1.9      | 3.5       | 2.0       | No               | No                              |
| 7         | -L- 87+36 LT<br>36.204610/-80.272250               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.9                | 88                               | 506                | 0.47%                  | 2.3      | 1.3      | 2.9       | 1.4       | No               | No                              |
| 7         | -L- 93+63 LT<br>36.203942/-80.270274               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.2                | 23                               | 69                 | 2.65%                  | 0.6      | 1.8      | 0.8       | 1.9       | No               | No                              |
| 7         | -L- 93+63 LT<br>36.203942/-80.270274               | (1)Rough Fork      | 0.0             | 6.0               | 4.0              | 0.8                | 76                               | 297                | 1.25%                  | 2.0      | 1.8      | 2.5       | 1.9       | No               | No                              |
| 8         | -L- 108+05 LT<br>36.202327/-80.265812              | (2)Trick-um Creek  | 0.0             | 2.0               | 2.0              | 0.2                | 18                               | 195                | 2.34%                  | 0.4      | 1.5      | 0.5       | 1.6       | No               | No                              |
| 8         | -L- 96+60 LT<br>36.203594/-80.269364               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 1.0                | 95                               | 368                | 0.70%                  | 2.5      | 1.5      | 3.1       | 1.6       | No               | No                              |
| 8         | -L- 108+05 LT<br>36.202329/-80.265811              | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.3                | 26                               | 105                | 2.81%                  | 0.7      | 1.8      | 0.9       | 1.9       | No               | No                              |

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## Swales

| Sheet No. | Station & Coordinates (Road and Non Road Projects) | Surface Water Body | Base Width (ft) | Front Slope (H:1) | Back Slope (H:1) | Drainage Area (ac) | Recommended Treatm't Length (ft) | Actual Length (ft) | Longitudinal Slope (%) | Q2 (cfs) | V2 (fps) | Q10 (cfs) | V10 (fps) | Rock Checks Used | BMP Associated w/ Buffer Rules? |
|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 8         | -L- 96+60 M<br>36.203369/-80.269487                | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.4                | 39                               | 368                | 1.24%                  | 1.0      | 1.4      | 1.3       | 1.5       | No               | No                              |
| 8         | -L- 107+00 M<br>36.202216/-80.266262               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.7                | 72                               | 672                | 1.62%                  | 1.9      | 1.9      | 2.4       | 2.0       | No               | No                              |
| 8         | -L- 96+60 RT<br>36.203139/-80.269612               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 1.0                | 96                               | 368                | 0.70%                  | 2.5      | 1.5      | 3.2       | 1.6       | No               | No                              |
| 9         | -L- 122+00 M<br>36.200549/-80.261612               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.5                | 53                               | 500                | 3.72%                  | 1.4      | 1.9      | 1.8       | 2.1       | No               | No                              |
|           |                                                    |                    |                 |                   |                  |                    |                                  |                    |                        |          |          |           |           |                  |                                 |
| 10        | -L- 125+50 M<br>36.200157/-80.260530               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.4                | 37                               | 350                | 1.90%                  | 1.0      | 1.7      | 1.2       | 1.8       | No               | No                              |
| 10        | -L- 127+22 M<br>36.199967/-80.259996               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.2                | 17                               | 172                | 0.47%                  | 0.4      | 0.8      | 0.6       | 0.9       | No               | No                              |
| 10        | -L- 127+22 M<br>36.199967/-80.259996               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.2                | 23                               | 213                | 0.57%                  | 0.6      | 0.9      | 0.8       | 1.0       | No               | No                              |
| 11        | -Y3- 26+87 RT<br>36.198691/-80.254395              | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.2                | 22                               | 57                 | 0.28%                  | 0.6      | 0.7      | 0.8       | 0.8       | No               | No                              |
| 11        | -Y3- 27+70 RT<br>36.198475/-80.254491              | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.2                | 22                               | 140                | 1.88%                  | 0.6      | 1.5      | 0.8       | 1.6       | No               | No                              |
| 11        | -Y3- 26+70 LT<br>36.198676/-80.254062              | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.5                | 51                               | 110                | 0.71%                  | 1.1      | 1.2      | 1.4       | 1.3       | No               | No                              |
| 11        | -Y3- 27+70 LT<br>36.198403/-80.254111              | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.5                | 51                               | 210                | 0.58%                  | 1.1      | 1.1      | 1.4       | 1.2       | No               | No                              |
| 11        | -Y3- 31+40 LT<br>36.197400/-80.254323              | (2)Trick-um Creek  | 0.0             | 2.0               | 2.0              | 0.2                | 15                               | 30                 | 3.87%                  | 0.5      | 1.9      | 0.6       | 2.0       | No               | No                              |
| 11        | -L- 139+00 M<br>36.198657/-80.256345               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.3                | 32                               | 300                | 1.00%                  | 0.8      | 1.3      | 1.1       | 1.4       | No               | No                              |
| 11        | -L- 142+00 M<br>36.198323/-80.255415               | (2)Trick-um Creek  | 0.0             | 6.0               | 6.0              | 0.2                | 21                               | 450                | 1.00%                  | 0.5      | 1.1      | 0.7       | 1.2       | No               | No                              |
| 11        | -L- 146+50 M<br>36.197823/-80.254021               | (4)Buffalo Creek   | 0.0             | 6.0               | 6.0              | 0.5                | 47                               | 375                | 1.01%                  | 1.2      | 1.4      | 1.6       | 1.5       | No               | No                              |
| 11        | -L- 150+25 M<br>36.197407/-80.252859               | (4)Buffalo Creek   | 0.0             | 6.0               | 6.0              | 0.4                | 40                               | 235                | 0.90%                  | 1.0      | 1.3      | 1.3       | 1.4       | No               | No                              |
| 11        | -L- 152+60 M<br>36.197145/-80.252130               | (4)Buffalo Creek   | 0.0             | 6.0               | 6.0              | 0.3                | 25                               | 379                | 0.35%                  | 0.6      | 0.8      | 0.8       | 0.9       | No               | No                              |
| 11        | -L- 134+50 RT<br>36.198898/-80.257881              | (2)Trick-um Creek  | 0.0             | 6.0               | 4.0              | 0.3                | 33                               | 100                | 1.10%                  | 0.9      | 1.4      | 1.2       | 1.5       | No               | No                              |

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|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 11        | -L- 142+30 RT<br>36.198061/-80.255447              | (2)Trick-um Creek  | 2.0             | 6.0               | 4.0              | 0.8                | 80                               | 270                | 1.00%                  | 2.1      | 1.6      | 2.6       | 1.7       | No               | No                              |
| 11        | -L- 142+70 RT<br>36.198012/-80.255326              | (2)Trick-um Creek  | 0.0             | 6.0               | 4.0              | 0.8                | 80                               | 230                | 0.80%                  | 2.1      | 1.5      | 2.6       | 1.6       | No               | No                              |
| 11        | -L- 146+60 RT<br>36.197574/-80.254120              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.3                | 25                               | 88                 | 2.03%                  | 0.6      | 1.6      | 0.8       | 1.7       | No               | No                              |
| 11        | -L- 146+60 RT<br>36.197574/-80.254120              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 1.4                | 143                              | 340                | 1.05%                  | 3.1      | 1.9      | 3.9       | 2.0       | No               | No                              |
| 11        | -L- 152+20 RT<br>36.196961/-80.252379              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.9                | 85                               | 380                | 1.04%                  | 2.2      | 1.7      | 2.8       | 1.8       | No               | No                              |
| 11        | -L- 140+80 LT<br>36.198751/-80.255698              | (2)Trick-um Creek  | 0.0             | 6.0               | 4.0              | 0.1                | 13                               | 60                 | 1.00%                  | 0.3      | 1.1      | 0.4       | 1.1       | No               | No                              |
| 11        | -L- 141+40 LT<br>36.198617/-80.255478              | (2)Trick-um Creek  | 0.0             | 6.0               | 4.0              | 1.3                | 129                              | 326                | 0.90%                  | 3.0      | 1.8      | 3.9       | 1.9       | No               | No                              |
| 11        | -L- 146+20 LT<br>36.198098/-80.253982              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.4                | 37                               | 80                 | 2.40%                  | 0.9      | 1.9      | 1.1       | 2.0       | No               | No                              |
| 11        | -L- 146+20 LT<br>36.198098/-80.253982              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 1.0                | 101                              | 330                | 1.06%                  | 2.4      | 1.8      | 3.1       | 1.9       | No               | No                              |
| 11        | -L- 152+60 LT<br>36.197148/-80.252129              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.9                | 86                               | 390                | 0.37%                  | 2.4      | 1.2      | 3.1       | 1.3       | No               | No                              |
| 11        | -Y3RPA- 19+50 RT<br>36.197900/-80.251290           | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.7                | 71                               | 420                | 0.81%                  | 2.0      | 1.5      | 2.5       | 1.6       | No               | No                              |
| 11        | -Y3RPA- 19+50 LT<br>36.197763/-80.251503           | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 1.0                | 102                              | 407                | 1.51%                  | 1.5      | 1.8      | 2.0       | 1.9       | No               | No                              |
| 11        | -Y3RPD- 16+55 RT<br>36.196697/-80.251825           | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.1                | 12                               | 98                 | 0.38%                  | 0.2      | 0.6      | 0.2       | 0.7       | No               | No                              |
| 11        | -Y3RPD- 17+50 LT<br>36.196505/-80.252170           | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 2.3                | 230                              | 530                | 0.26%                  | 4.9      | 1.3      | 6.3       | 1.3       | No               | No                              |
| 12        | -L- 159+00 M<br>36.196434/-80.250147               | (4)Buffalo Creek   | 0.0             | 4.0               | 4.0              | 0.3                | 28                               | 261                | 0.76%                  | 0.7      | 1.2      | 0.9       | 1.3       | No               | No                              |
| 12        | -L- 164+00 M<br>36.195864/-80.248605               | (4)Buffalo Creek   | 0.0             | 6.0               | 6.0              | 0.9                | 87                               | 500                | 0.74%                  | 2.7      | 1.5      | 3.5       | 1.6       | No               | No                              |
| 12        | -L- 164+00 M<br>36.195864/-80.248605               | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.7                | 70                               | 350                | 0.27%                  | 2.3      | 1.0      | 2.9       | 1.1       | No               | No                              |
| 12        | -L- 166+00 M<br>36.195605/-80.248007               | (4)Buffalo Creek   | 0.0             | 7.0               | 4.0              | 0.7                | 70                               | 150                | 0.52%                  | 2.3      | 1.3      | 2.9       | 1.4       | No               | No                              |
| 12        | -L- 164+00 RT<br>36.195609/-80.248763              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.9                | 88                               | 350                | 0.44%                  | 2.3      | 1.3      | 3.0       | 1.3       | No               | No                              |

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|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 12        | -L- 167+50 RT<br>36.194177/-80.247737              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.6                | 61                               | 250                | 0.49%                  | 1.6      | 1.2      | 2.0       | 1.3       | No               | No                              |
| 13        | -L- 167+50 M<br>36.195396/-80.247570               | (4)Buffalo Creek   | 0.0             | 7.0               | 4.0              | 0.9                | 85                               | 450                | 0.52%                  | 2.7      | 1.4      | 3.5       | 1.5       | No               | No                              |
| 13        | -L- 172+00 M<br>36.194685/-80.246323               | (4)Buffalo Creek   | 0.0             | 7.0               | 4.0              | 1.0                | 95                               | 500                | 0.52%                  | 3.1      | 1.4      | 3.9       | 1.5       | No               | No                              |
| 13        | -L- 177+00 M<br>36.193766/-80.245066               | (4)Buffalo Creek   | 0.0             | 7.0               | 4.0              | 0.8                | 76                               | 400                | 0.49%                  | 2.5      | 1.3      | 3.1       | 1.4       | No               | No                              |
| 13        | -L- 177+00 RT<br>36.193591/-80.245287              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.8                | 80                               | 400                | 0.52%                  | 2.2      | 1.3      | 2.8       | 1.4       | No               | No                              |
| 13        | -L- 172+25 LT<br>36.194878/-80.246023              | (4)Buffalo Creek   | 0.0             | 4.0               | 4.0              | 0.6                | 55                               | 225                | 0.73%                  | 1.1      | 1.3      | 1.4       | 1.4       | No               | No                              |
| 13        | -L- 174+50 LT<br>36.194487/-80.245403              | (4)Buffalo Creek   | 0.0             | 4.0               | 4.0              | 0.6                | 61                               | 250                | 1.85%                  | 1.2      | 1.9      | 1.5       | 2.0       | No               | No                              |
| 13        | -L- 175+50 LT<br>36.194300/-80.245151              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 0.6                | 61                               | 150                | 1.19%                  | 1.2      | 1.5      | 1.5       | 1.6       | No               | No                              |
| 13        | -L- 177+00 LT<br>36.194004/-80.244764              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 1.0                | 97                               | 400                | 1.50%                  | 1.9      | 1.9      | 2.4       | 2.0       | No               | No                              |
| 13        | -Y4- 33+20 LT<br>36.194118/-80.244612              | (4)Buffalo Creek   | 0.0             | 4.0               | 2.0              | 0.1                | 5                                | 90                 | 0.52%                  | 0.1      | 0.6      | 0.1       | 0.7       | No               | No                              |
| 13        | -Y4- 33+20 LT<br>36.194118/-80.244612              | (4)Buffalo Creek   | 0.0             | 4.0               | 2.0              | 0.2                | 24                               | 410                | 2.71%                  | 0.3      | 1.7      | 0.4       | 1.8       | No               | No                              |
| 13        | -Y4- 34+20 LT<br>36.193899/-80.244400              | (4)Buffalo Creek   | 0.0             | 4.0               | 2.0              | 0.2                | 24                               | 310                | 1.44%                  | 0.3      | 1.3      | 0.4       | 1.4       | No               | No                              |
| 14        | -L- 181+00 M<br>36.192941/-80.244170               | (4)Buffalo Creek   | 0.0             | 7.0               | 4.0              | 1.3                | 132                              | 765                | 0.34%                  | 4.3      | 1.3      | 5.5       | 1.4       | No               | No                              |
| 14        | -L- 195+00 M<br>36.189723/-80.241579               | (5)Mill Creek      | 0.0             | 7.0               | 4.0              | 1.0                | 101                              | 635                | 0.37%                  | 3.3      | 1.3      | 4.2       | 1.3       | No               | No                              |
| 14        | -L- 181+00 RT<br>36.192788/-80.244409              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 1.9                | 191                              | 770                | 0.53%                  | 3.9      | 1.5      | 4.9       | 1.6       | No               | No                              |
| 14        | -L- 188+70 RT<br>36.191053/-80.242985              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.2                | 120                              | 630                | 0.65%                  | 2.3      | 1.5      | 3.0       | 1.5       | No               | No                              |
| 14        | -Y4- 37+33 RT<br>36.193155/-80.243838              | (4)Buffalo Creek   | 0.0             | 6.0               | 4.0              | 1.0                | 98                               | 637                | 1.66%                  | 1.9      | 2.0      | 2.4       | 2.1       | No               | No                              |
| 15        | -L- 205+50 M<br>36.187613/-80.238168               | (5)Mill Creek      | 0.0             | 7.0               | 4.0              | 0.4                | 43                               | 130                | 0.98%                  | 1.4      | 1.5      | 1.8       | 1.6       | No               | No                              |
| 15        | -L- 206+32 M<br>36.187441/-80.238904               | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.4                | 43                               | 212                | 0.60%                  | 1.3      | 0.9      | 1.7       | 0.9       | No               | No                              |

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|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 18        | -L- 236+50 M<br>36.184444/-80.229444               | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.6                | 60                               | 572                | 1.26%                  | 2.3      | 1.5      | 3.0       | 1.7       | No               | No                              |
| 18        | -L- 242+22 M<br>36.184167/-80.22750                | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.7                | 71                               | 678                | 0.34%                  | 2.7      | 1.0      | 3.5       | 1.1       | No               | No                              |
| 18        | -L- 236+50 RT<br>36.184444/-80.229444              | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 1.5                | 146                              | 550                | 1.25%                  | 3.8      | 1.8      | 4.8       | 1.9       | No               | No                              |
| 18        | -L- 229+50 M<br>36.185000/-80.231667               | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.6                | 60                               | 700                | 1.67%                  | 2.3      | 1.7      | 3.0       | 1.9       | No               | No                              |
| 18        | -L- 241+00 LT<br>36.184722/-80.227777              | (5)Mill Creek      | 0.0             | 4.0               | 4.0              | 1.1                | 109                              | 285                | 0.67%                  | 3.1      | 1.5      | 4.0       | 1.6       | No               | No                              |
| 18        | -L- 244+50 LT<br>36.184722/-80.226944              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.4                | 144                              | 475                | 0.53%                  | 3.4      | 1.3      | 4.3       | 1.4       | No               | No                              |
| 19        | -L- 266+50 LT<br>36.182534/-80.219483              | (5)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.5                | 53                               | 150                | 0.73%                  | 1.1      | 1.4      | 1.4       | 1.5       | No               | No                              |
| 19        | -Y6RPB- 27+50 LT<br>36.184636/-80.224103           | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.4                | 37                               | 300                | 2.17%                  | 0.7      | 1.3      | 0.9       | 1.4       | No               | No                              |
| 19        | -Y6RPB- 27+50 RT<br>36.184414/-80.224157           | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.6                | 57                               | 300                | 2.51%                  | 1.5      | 1.7      | 1.9       | 1.8       | No               | No                              |
| 19        | -Y6RPA- 23+50 RT<br>36.183963/-80.221654           | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.7                | 65                               | 200                | 0.30%                  | 1.3      | 0.8      | 1.6       | 0.9       | No               | No                              |
| 19        | -Y6RPA- 25+50 RT<br>36.184179/-80.222278           | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.3                | 34                               | 130                | 0.31%                  | 0.8      | 0.7      | 1.0       | 0.7       | No               | No                              |
| 19        | -L- 248+90 RT<br>36.183435/-80.225501              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.2                | 121                              | 240                | 0.97%                  | 3.3      | 1.7      | 4.2       | 1.8       | No               | No                              |
| 19        | -L- 249+50 RT<br>36.183433/-80.22592               | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 1.4                | 139                              | 550                | 0.16%                  | 3.9      | 0.9      | 5.0       | 0.9       | No               | No                              |
| 19        | -L- 249+00 M<br>36.183708/-80.225382               | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.2                | 122                              | 600                | 0.33%                  | 4.7      | 1.2      | 6.0       | 1.3       | No               | No                              |
| 19        | -L- 250+50 LT<br>36.183850/-80.224812              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.0                | 99                               | 450                | 0.58%                  | 1.5      | 1.1      | 1.9       | 1.2       | No               | No                              |
| 19        | -L- 255+00 M<br>36.183260/-80.223425               | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.6                | 57                               | 300                | 0.37%                  | 2.2      | 1.1      | 2.8       | 1.1       | No               | No                              |
| 19        | -L- 258+00 M<br>36.182982/-80.222471               | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.5                | 53                               | 300                | 1.40%                  | 2.1      | 1.7      | 2.6       | 1.8       | No               | No                              |
| 19        | -L- 258+00 LT<br>36.183220/-80.222355              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.4                | 35                               | 200                | 1.20%                  | 0.6      | 1.1      | 0.7       | 1.1       | No               | No                              |
| 19        | -L- 267+00 RT<br>36.181559/-80.219966              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.9                | 85                               | 250                | 1.45%                  | 2.4      | 1.8      | 3.1       | 1.9       | No               | No                              |

Additional Comments





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## Swales

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|-----------|-------------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 19        | -L- 266+50 M<br>36.181976/-80.219870                  | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.3                | 128                              | 525                | 0.46%                  | 4.9      | 1.4      | 6.3       | 1.5       | No               | NO                              |
| 19        | -L- 248+00 RT<br>36.183284/-80.225862                 | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.6                | 55                               | 300                | 0.32%                  | 1.3      | 0.8      | 1.6       | 0.9       | No               | NO                              |
| 19        | -Y6RPC- 18+50 RT<br>36.183034/-80.225436              | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.5                | 52                               | 400                | 2.46%                  | 1.0      | 1.5      | 1.3       | 1.6       | No               | NO                              |
| 19        | -Y6RPC- 18+50 LT<br>36.183203/-80.225261              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.1                | 106                              | 350                | 0.82%                  | 1.9      | 1.4      | 2.4       | 1.5       | No               | NO                              |
| 19        | -Y6RPC- 25+00 LT<br>36.182281/-80.223470              | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.6                | 63                               | 50                 | 0.72%                  | 1.8      | 1.3      | 2.3       | 1.4       | No               | NO                              |
| 20        | -L- 280+80 RT<br>36.179370/-80.216304                 | (5)Mill Creek      | 6.0             | 2.0               | 2.0              | 3.4                | 341                              | 30                 | 1.67%                  | 9.4      | 1.8      | 12.5      | 2.0       | No               | No                              |
| 20        | -L- 275+50 RT<br>36.180372/-80.217565                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.9                | 89                               | 375                | 0.79%                  | 2.6      | 1.5      | 3.3       | 1.6       | No               | No                              |
| 20        | -L- 274+25 LT<br>36.181017/-80.217485                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.4                | 38                               | 250                | 0.72%                  | 0.7      | 0.9      | 1.0       | 1.0       | No               | No                              |
| 20        | -L- 279+00 M<br>36.179981/-80.216438                  | (5)Mill Creek      | 0.0             | 7.0               | 4.0              | 0.8                | 76                               | 400                | 0.65%                  | 2.9      | 1.4      | 3.7       | 1.5       | No               | No                              |
| 21        | -L- 293+50 M<br>36.176998/-80.213202                  | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.1                | 114                              | 590                | 2.47%                  | 3.3      | 1.7      | 4.4       | 1.8       | No               | No                              |
| 21        | -L- 293+50 LT<br>36.177138/-80.212945                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.3                | 125                              | 590                | 2.20%                  | 1.7      | 1.4      | 2.3       | 1.5       | No               | No                              |
| 22        | -L- 304+00 RT<br>36.174373/-80.211695                 | (5)Mill Creek      | 2.0             | 2.0               | 2.0              | 2.1                | 212                              | 50                 | 19.38%                 | 4.3      | 1.8      | 5.5       | 1.8       | No               | NO                              |
| 22        | -L- 307+00 M<br>36.173804/-80.210878                  | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.5                | 53                               | 500                | 0.55%                  | 2.1      | 1.2      | 2.6       | 1.2       | No               | NO                              |
| 22        | -L- 299+50 M<br>36.175592/-80.212136                  | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.8                | 82                               | 750                | 0.98%                  | 3.2      | 1.7      | 4.1       | 1.8       | No               | NO                              |
| 22        | -L- 307+00 RT<br>36.173679/-80.211145                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.3                | 128                              | 500                | 0.55%                  | 3.3      | 1.4      | 4.2       | 1.4       | No               | NO                              |
| 22        | -L- 299+50 RT<br>36.175592/-80.212137                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.2                | 124                              | 400                | 1.28%                  | 3.2      | 1.8      | 4.0       | 2.0       | No               | NO                              |
| 22        | -L- 307+00 LT<br>36.173926/-80.210609                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.1                | 108                              | 500                | 0.55%                  | 2.9      | 1.3      | 3.7       | 1.4       | No               | NO                              |
| 22        | -L- 305+50 LT<br>36.174290/-80.210853                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.3                | 31                               | 150                | 0.63%                  | 0.9      | 0.9      | 1.1       | 1.0       | No               | NO                              |
| 22        | -L- 299+50 LT<br>36.175717/-80.211869                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.3                | 31                               | 350                | 0.97%                  | 0.9      | 1.1      | 1.1       | 1.2       | No               | NO                              |

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|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 23        | -L- 316+35 LT<br>36.171763/-80.208897              | (5)Mill Creek      | 2.0             | 2.0               | 2.0              | 1.2                | 115                              | 165                | 12.99%                 | 2.3      | 1.5      | 3.0       | 1.5       | NO               | NO                              |
| 23        | -L- 318+50 M<br>36.171058/-80.208945               | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.7                | 68                               | 650                | 0.55%                  | 2.6      | 1.2      | 3.4       | 1.3       | NO               | NO                              |
| 23        | -L- 312+00 M<br>36.172611/-80.210037               | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.7                | 69                               | 650                | 0.55%                  | 2.7      | 1.2      | 3.4       | 1.3       | NO               | NO                              |
| 23        | -L- 318+50 RT<br>36.170936/-80.209213              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.9                | 189                              | 700                | 0.55%                  | 4.7      | 1.5      | 6.0       | 1.6       | NO               | NO                              |
| 23        | -L- 312+00 RT<br>36.172488/-80.210305              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.3                | 130                              | 350                | 0.51%                  | 3.1      | 1.3      | 3.9       | 1.4       | NO               | NO                              |
| 23        | -L- 318+50 LT<br>36.171189/-80.208667              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.1                | 112                              | 450                | 0.58%                  | 2.9      | 1.3      | 3.7       | 1.4       | NO               | NO                              |
| 23        | -L- 312+00 LT<br>36.172734/-80.209770              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.7                | 67                               | 300                | 0.51%                  | 1.9      | 1.1      | 2.4       | 1.2       | NO               | NO                              |
| 24        | -L- 335+80 M<br>36.166937/-80.206028               | (5)Mill Creek      | 0.0             | 4.0               | 11.0             | 0.4                | 39                               | 170                | 2.75%                  | 1.5      | 1.7      | 1.9       | 1.8       | NO               | NO                              |
| 24        | -L- 334+50 M<br>36.167242/-80.206259               | (5)Mill Creek      | 0.0             | 4.0               | 32.0             | 0.3                | 30                               | 130                | 2.75%                  | 1.2      | 1.3      | 1.5       | 1.4       | NO               | NO                              |
| 24        | -L- 331+50 M<br>36.167960/-80.206762               | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.5                | 46                               | 300                | 2.10%                  | 1.8      | 1.8      | 2.3       | 1.9       | NO               | NO                              |
| 24        | -L- 328+50 M<br>36.168676/-80.207268               | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.3                | 32                               | 300                | 0.62%                  | 1.2      | 1.0      | 1.6       | 1.2       | NO               | NO                              |
| 24        | -L- 325+00 M<br>36.169509/-80.207855               | (5)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.4                | 37                               | 350                | 0.55%                  | 1.4      | 1.0      | 1.8       | 1.1       | NO               | NO                              |
| 24        | -L- 328+50 RT<br>36.168551/-80.207535              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.1                | 106                              | 300                | 0.94%                  | 2.4      | 1.5      | 3.0       | 1.6       | NO               | NO                              |
| 24        | -L- 325+50 RT<br>36.169267/-80.208039              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.8                | 78                               | 300                | 0.55%                  | 2.0      | 1.2      | 2.5       | 1.3       | NO               | NO                              |
| 24        | -L- 331+75 LT<br>36.168022/-80.206452              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.7                | 71                               | 325                | 1.68%                  | 2.0      | 1.7      | 2.5       | 1.9       | NO               | NO                              |
| 24        | -L- 328+50 LT<br>36.168797/-80.206999              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.9                | 89                               | 325                | 0.66%                  | 2.2      | 1.3      | 2.8       | 1.4       | NO               | NO                              |
| 24        | -L- 324+50 LT<br>36.169757/-80.207663              | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 1.1                | 114                              | 400                | 0.58%                  | 2.8      | 1.3      | 3.6       | 1.4       | NO               | NO                              |
| 25        | -Y7- 22+00 LT<br>36.163920/-80.203053              | (5)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.5                | 48                               | 100                | 1.54%                  | 0.9      | 1.7      | 1.2       | 1.9       | NO               | NO                              |
| 25        | -Y7- 22+80 RT<br>36.163716/-80.203278              | (5)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.1                | 9                                | 20                 | 0.30%                  | 0.3      | 0.6      | 0.4       | 0.8       | NO               | NO                              |

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|-----------|-------------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 25        | -L- 347+50 RT<br>36.164258/-80.203626                 | (5)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.3                | 27                               | 131                | 0.30%                  | 0.7      | 0.9      | 0.9       | 0.9       | NO               | NO                              |
| 25        | -L- 343+50 M<br>36.165308/-80.204377                  | (5)Mill Creek      | 0.0             | 4.0               | 9.0              | 0.8                | 83                               | 450                | 0.99%                  | 3.2      | 1.6      | 4.1       | 1.7       | NO               | NO                              |
| 25        | -L- 340+75 M<br>36.165843/-80.205019                  | (5)Mill Creek      | 0.0             | 4.0               | 12.0             | 0.5                | 52                               | 275                | 1.99%                  | 2.0      | 1.6      | 2.6       | 1.7       | NO               | NO                              |
| 25        | -L- 338+00 M<br>36.166437/-80.205612                  | (5)Mill Creek      | 0.0             | 4.0               | 11.0             | 0.5                | 54                               | 275                | 2.52%                  | 2.1      | 1.8      | 2.7       | 1.9       | NO               | NO                              |
| 25        | -L- 351+50 RT<br>36.163836/-80.202300                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.9                | 90                               | 375                | 0.73%                  | 1.5      | 1.2      | 1.9       | 1.3       | NO               | NO                              |
| 25        | -L- 343+50 RT<br>36.165107/-80.204561                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.8                | 75                               | 400                | 0.87%                  | 1.1      | 1.1      | 1.4       | 1.2       | NO               | NO                              |
| 25        | -L- 343+50 LT<br>36.165492/-80.204166                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.2                | 123                              | 425                | 0.87%                  | 3.3      | 1.6      | 4.2       | 1.7       | NO               | NO                              |
| 26        | -L- 360+50 M<br>36.163239/-80.199291                  | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.4                | 37                               | 350                | 2.43%                  | 1.4      | 1.8      | 1.8       | 1.9       | NO               | NO                              |
| 26        | -L- 357+50 M<br>36.163460/-80.200270                  | (5)Mill Creek      | 0.0             | 4.0               | 7.0              | 0.5                | 49                               | 300                | 1.16%                  | 1.9      | 1.4      | 2.4       | 1.6       | NO               | NO                              |
| 26        | -L- 356+31 M<br>36.163554/-80.200656                  | (5)Mill Creek      | 0.0             | 4.0               | 10.0             | 0.2                | 20                               | 119                | 0.18%                  | 0.8      | 0.5      | 1.0       | 0.6       | NO               | NO                              |
| 26        | -L- 352+00 M<br>36.163992/-80.202011                  | (5)Mill Creek      | 0.0             | 4.0               | 9.0              | 1.0                | 95                               | 400                | 1.12%                  | 3.7      | 1.7      | 4.7       | 1.8       | NO               | NO                              |
| 26        | -L- 355+13 M<br>36.163658/-80.201035                  | (5)Mill Creek      | 0.0             | 4.0               | 8.0              | 0.6                | 60                               | 313                | 1.58%                  | 2.3      | 1.6      | 3.0       | 1.9       | NO               | NO                              |
| 26        | -L- 356+31 M<br>36.163554/-80.200656                  | (5)Mill Creek      | 0.0             | 4.0               | 8.0              | 0.2                | 21                               | 118                | 0.37%                  | 0.8      | 0.7      | 1.0       | 0.8       | NO               | NO                              |
| 26        | -L- 352+00 LT<br>36.164214/-80.201871                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.9                | 94                               | 50                 | 1.62%                  | 2.3      | 1.9      | 3.0       | 2.0       | NO               | NO                              |
| 26        | -L- 354+50 LT<br>36.163952/-80.201124                 | (5)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.5                | 54                               | 250                | 1.64%                  | 1.5      | 1.5      | 1.9       | 1.6       | NO               | NO                              |
| 26        | -L- 352+00 RT<br>36.163770/-80.202149                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.9                | 90                               | 50                 | 1.54%                  | 1.5      | 1.5      | 1.9       | 1.6       | NO               | NO                              |
| 26        | -L- 355+00 RT<br>36.163427/-80.201185                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 1.1                | 110                              | 300                | 1.56%                  | 1.8      | 1.6      | 2.4       | 1.8       | NO               | NO                              |
| 26        | -L- 360+50 RT<br>36.162997/-80.199373                 | (5)Mill Creek      | 0.0             | 6.0               | 4.0              | 0.7                | 71                               | 250                | 2.08%                  | 2.0      | 1.8      | 2.5       | 1.9       | NO               | NO                              |
| 27        | -L- 372+50 LT<br>36.162585/-80.195264                 | (6)Mill Creek      | 2.0             | 2.0               | 2.0              | 0.9                | 94                               | 250                | 1.69%                  | 1.4      | 1.7      | 1.8       | 1.8       | NO               | NO                              |

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|-----------|----------------------------------------------------|--------------------|-----------------|-------------------|------------------|--------------------|----------------------------------|--------------------|------------------------|----------|----------|-----------|-----------|------------------|---------------------------------|
| 27        | -L- 370+50 LT<br>36.162858/-80.195888              | (6)Mill Creek      | 2.0             | 2.0               | 2.0              | 0.9                | 94                               | 50                 | 0.86%                  | 1.4      | 1.3      | 1.8       | 1.4       | NO               | NO                              |
| 27        | -L- 373+50 RT<br>36.161950/-80.195217              | (6)Mill Creek      | 0.0             | 6.0               | 2.0              | 0.3                | 31                               | 50                 | 0.84%                  | 0.7      | 1.0      | 0.9       | 1.1       | NO               | NO                              |
| 27        | -L- 363+00 RT<br>36.162816/-80.198556              | (6)Mill Creek      | 0.0             | 4.0               | 6.0              | 0.7                | 71                               | 100                | 2.21%                  | 2.0      | 1.8      | 2.5       | 1.9       | NO               | NO                              |
| 28        | -Y8ADR1- 10+64 LT<br>36.161755/-80.194609          | (6)Mill Creek      | 2.0             | 2.0               | 2.0              | 0.6                | 60                               | 95                 | 1.51%                  | 0.9      | 1.4      | 1.2       | 1.5       | NO               | NO                              |
| 28        | -Y8ADR1- 10+64 LT<br>36.161511/-80.194693          | (6)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.0                | 2                                | 50                 | 9.24%                  | 0.0      | 1.3      | 0.0       | 1.4       | NO               | NO                              |
| 28        | -L- 384+50 M<br>36.160530/-80.191988               | (6)Mill Creek      | 0.0             | 5.0               | 6.0              | 0.4                | 42                               | 400                | 1.94%                  | 1.6      | 1.6      | 2.1       | 1.7       | NO               | NO                              |
| 28        | -Y8- 28+00 LT<br>36.161442/-80.191883              | (6)Mill Creek      | 0.0             | 4.0               | 2.0              | 2.9                | 293                              | 700                | 0.34%                  | 6.6      | 1.9      | 8.4       | 2.0       | NO               | NO                              |
| 29        | -L- 396+50 LT<br>36.158762/-80.188513              | (6)Mill Creek      | 2.0             | 2.0               | 2.0              | 2.0                | 202                              | 200                | 7.04%                  | 3.7      | 1.1      | 4.7       | 1.1       | NO               | NO                              |
| 29        | -Y9- 25+50 LT<br>36.160062/-80.188895              | (6)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.1                | 10                               | 30                 | 4.43%                  | 0.2      | 1.6      | 0.2       | 1.7       | NO               | NO                              |
| 29        | -L- 388+50 M<br>36.159813/-80.190978               | (6)Mill Creek      | 0.0             | 6.0               | 6.0              | 0.2                | 16                               | 150                | 0.33%                  | 0.6      | 0.6      | 0.8       | 0.7       | NO               | NO                              |
| 30        | -L- 408+00 LT<br>36.156716/-80.185568              | (8)Frazier Creek   | 2.0             | 2.0               | 2.0              | 1.7                | 174                              | 112                | 16.46%                 | 3.1      | 0.7      | 4.0       | 0.7       | NO               | NO                              |
| 30        | -L- 409+00 LT<br>36.156597/-80.185257              | (8)Frazier Creek   | 2.0             | 2.0               | 2.0              | 1.7                | 174                              | 10                 | 12.31%                 | 3.1      | 0.6      | 4.0       | 0.6       | NO               | NO                              |
| 30        | -L- 409+49 LT<br>36.156546/-80.185102              | (8)Frazier Creek   | 2.0             | 2.0               | 2.0              | 1.7                | 174                              | 49                 | 2.98%                  | 3.1      | 1.9      | 4.0       | 2.0       | NO               | NO                              |
| 30        | -L- 409+00 M<br>36.156130/-80.185726               | (8)Frazier Creek   | 0.0             | 6.0               | 6.0              | 0.5                | 53                               | 500                | 1.19%                  | 2.1      | 1.4      | 2.6       | 1.6       | NO               | NO                              |
| 31        | -L- 410+50 M<br>36.155983/-80.185501               | (8)Frazier Creek   | 0.0             | 6.0               | 6.0              | 0.1                | 13                               | 150                | 1.01%                  | 0.5      | 0.9      | 0.7       | 1.0       | NO               | NO                              |
| 31        | -L- 411+58 RT<br>36.155129/-80.185583              | (8)Frazier Creek   | 8.0             | 2.0               | 2.0              | 6.3                | 626                              | 108                | 5.72%                  | 24.2     | 3.5      | 31.0      | 3.8       | Yes              | No                              |
| 52        | -Y7- 23+00 LT<br>36.163647/-80.203085              | (6)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.5                | 48                               | 100                | 1.53%                  | 0.9      | 1.7      | 1.1       | 1.8       | NO               | NO                              |
| 52        | -Y7- 23+00 RT<br>36.163670/-80.203283              | (6)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.1                | 10                               | 32                 | 0.31%                  | 0.3      | 0.7      | 0.4       | 0.8       | NO               | NO                              |
| 56        | -Y9- 27+00 LT<br>36.160199/-80.188409              | (6)Mill Creek      | 0.0             | 2.0               | 2.0              | 0.1                | 10                               | 150                | 4.43%                  | 0.2      | 1.6      | 0.2       | 1.7       | NO               | NO                              |

## Additional Comments



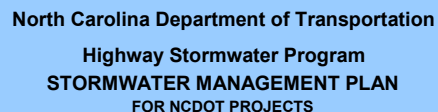


**FOR NCDOT PROJECTS**

Page 16 of 17

### Additional Comments

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



**WBS Element: 34839.3.GV7**

**TIP No.: U-2579DEF**

County(ies): Forsyth

Page 17 of 17

[illegible]

### Additional Comments



09/08/99

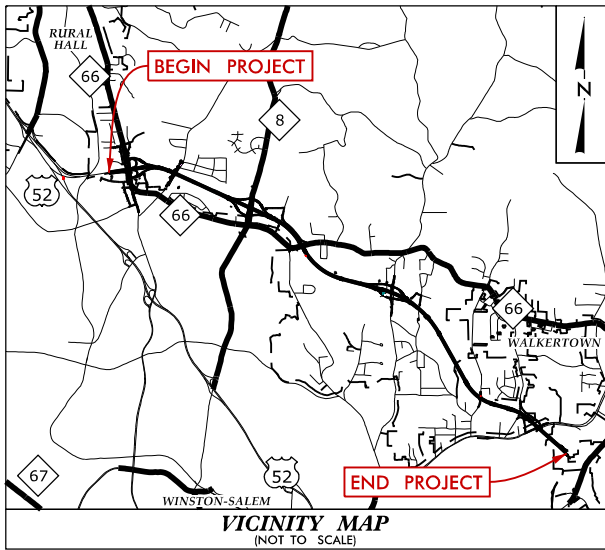
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CONTRACT: C204088

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DATE: 12/18/2018

See Sheet 1A-1 For Sheet Symbology

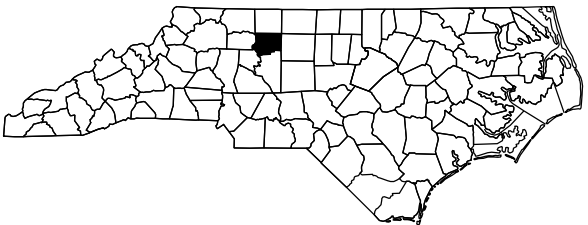


STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

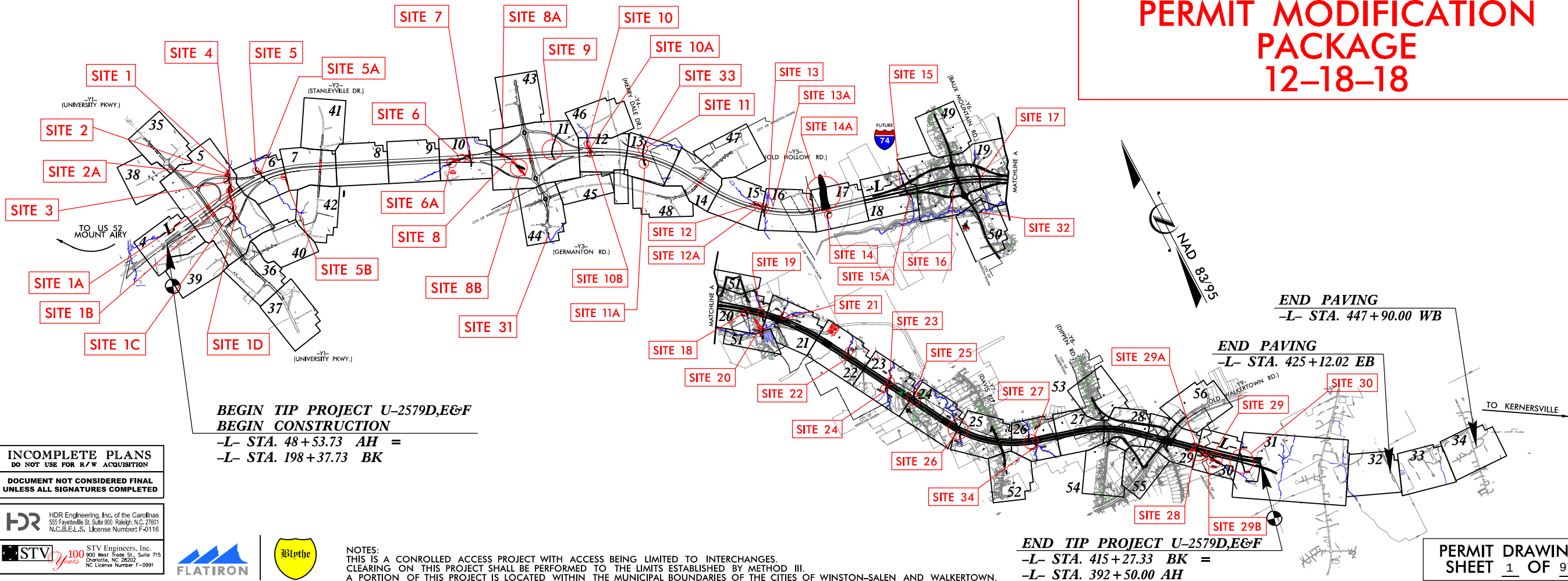
FORSYTH COUNTY

LOCATION: WINSTON-SALEM - NORTHERN BELTWAY  
FROM WEST OF NC 66 /SR 4000 (UNIVERSITY  
PARKWAY) TO US 311 (NEW WALKERTON ROAD)  
TYPE OF WORK: DESIGN-BUILD AS SPECIFIED IN THE SCOPE OF WORK  
CONTAINED IN THE REQUEST FOR PROPOSALS

| STATE          | STATE PROJECT REFERENCE NO. | SHEET NO.                    | TOTAL SHEETS |
|----------------|-----------------------------|------------------------------|--------------|
| N.C.           | U-2579D,E&F                 | 1                            |              |
| STATE PROJ.NO. | F.A.PROJ.NO.                | DESCRIPTION                  |              |
| 34839.3.GV7    | NHP-0074(213)               | PE, ROW, UTILITIES & CONSTR. |              |
|                |                             |                              |              |
|                |                             |                              |              |
|                |                             |                              |              |
|                |                             |                              |              |



U-2579DEF:  
PERMIT MODIFICATION  
PACKAGE  
12-18-18



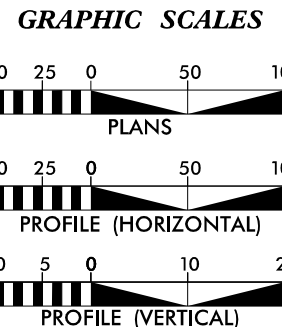
INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION  
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

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555 Fayetteville St., Suite 900 Raleigh, NC 27601  
N.C.B.E.L.S. License Number: F-41116

STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number: F-0991



NOTES:  
THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.  
A PORTION OF THIS PROJECT IS LOCATED WITHIN THE MUNICIPAL BOUNDARIES OF THE CITIES OF WINSTON-SALEM AND WALKERTOWN.

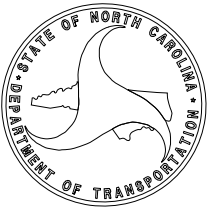


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ADT 2040 = 60,200  
K = 9 %  
D = 55 %  
T = 15 % \*  
V = 70 MPH  
\* TTST = 10% DUAL = 5%  
FUNC CLASS =  
INTERSTATE  
STATEWIDE TIER

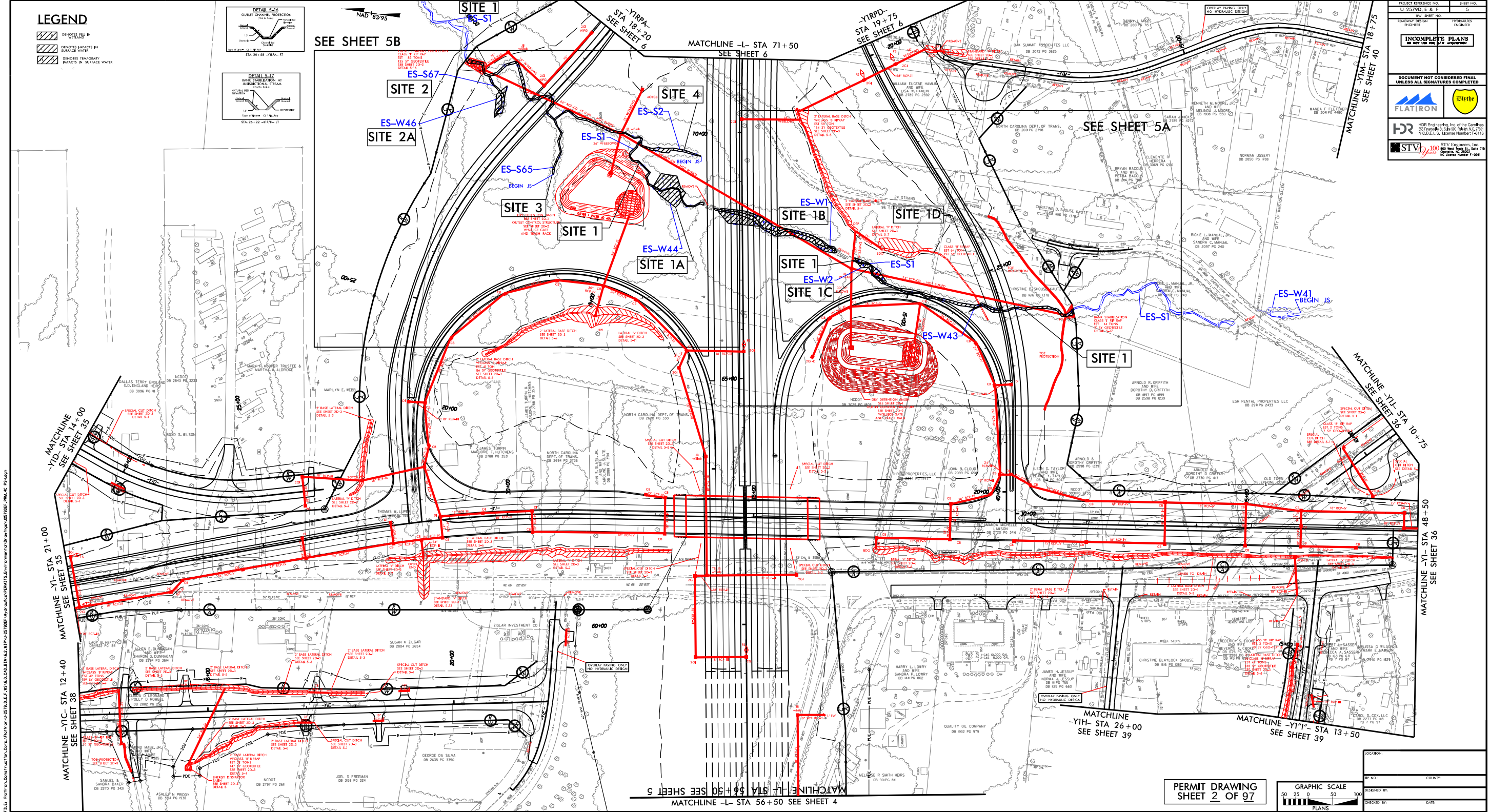
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LENGTH ROADWAY TIP PROJECT U-2579DEF = 6.859 MILES  
LENGTH STRUCTURES TIP PROJECT U-2579DEF = 0.087 MILES \*  
TOTAL LENGTH TIP PROJECT U-2579DEF = 6.946 MILES  
\* LENGTH BASED ON WB BRIDGES  
NCDOT CONTACT: K. ZAK HAMIDI, PE  
DESIGN-BUILD UNIT - PROJECT ENGINEER

Prepared for the Office of:  
DIVISION OF HIGHWAYS  
1000 Birch Ridge Dr., Raleigh NC, 27610  
2018 STANDARD SPECIFICATIONS  
RIGHT OF WAY DATE: MARCH 20, 2018  
LETTING DATE: MARCH 20, 2018  
JONATHAN HENDERSON, PE  
PROJECT ENGINEER  
CALVIN W. MOODY, III, PE  
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER  
SIGNATURE: P.E.  
ROADWAY DESIGN ENGINEER  
SIGNATURE: P.E.

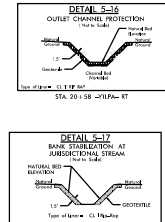






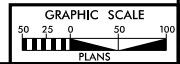
**LEGEND**

- DENOTES FILL IN WETLANDS
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER



PROJECT REFERENCE NO. U-2579D, E & F  
SHEET NO. 2  
REV. SHEET NO. 1  
ROADWAY DESIGN INCHES  
INCOMPLETE PLANS  
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STV  
STV Engineers, Inc.  
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Durham, NC 27601  
N.C.E.E.L.S. License Number: F-0116  
STV Engineers, Inc.  
800 West 10th St., Suite 105  
Durham, NC 27601  
N.C.E.E.L.S. License Number: F-0116

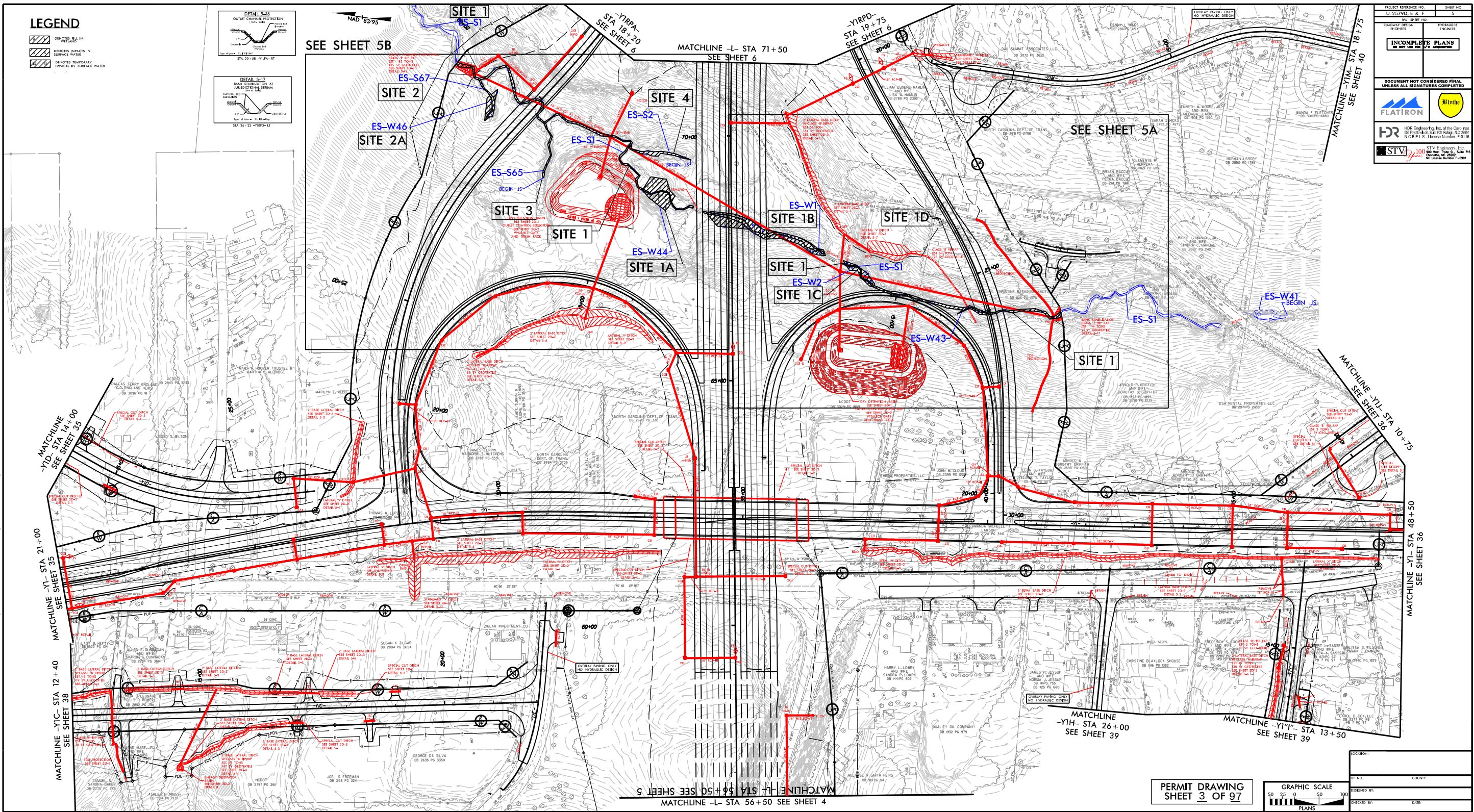
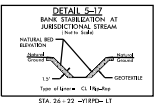
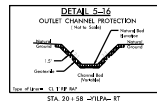
PERMIT DRAWING  
SHEET 2 OF 97



LOCATION:  
TP NO.:  
COUNTY:  
DESIGNED BY:  
CHECKED BY:  
DATE:

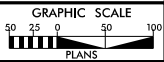


LEGEND



PROJECT REFERENCE NO. 11-2575D, E & F  
SHEET NO. 3  
REV. SHEET NO. 1  
ROADWAY DESIGN INCHES  
HYDRAULICS INCHES  
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Durham, NC 27601  
N.C. License Number: F-009

PERMIT DRAWING  
SHEET 3 OF 97



LOCATION: \_\_\_\_\_  
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CHECKED BY: \_\_\_\_\_ DATE: \_\_\_\_\_



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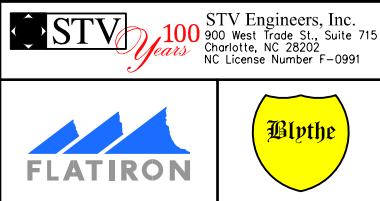
8/17/99

REVISIONS

## LEGEND

-  DENOTES FILL IN WETLAND
-  DENOTES IMPACTS IN SURFACE WATER
-  DENOTES TEMPORARY IMPACTS IN SURFACE WATER

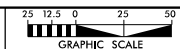
NAD 83/95



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| INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION |           |

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**HDR** HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St., Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

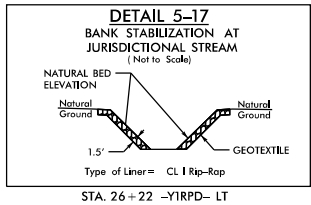
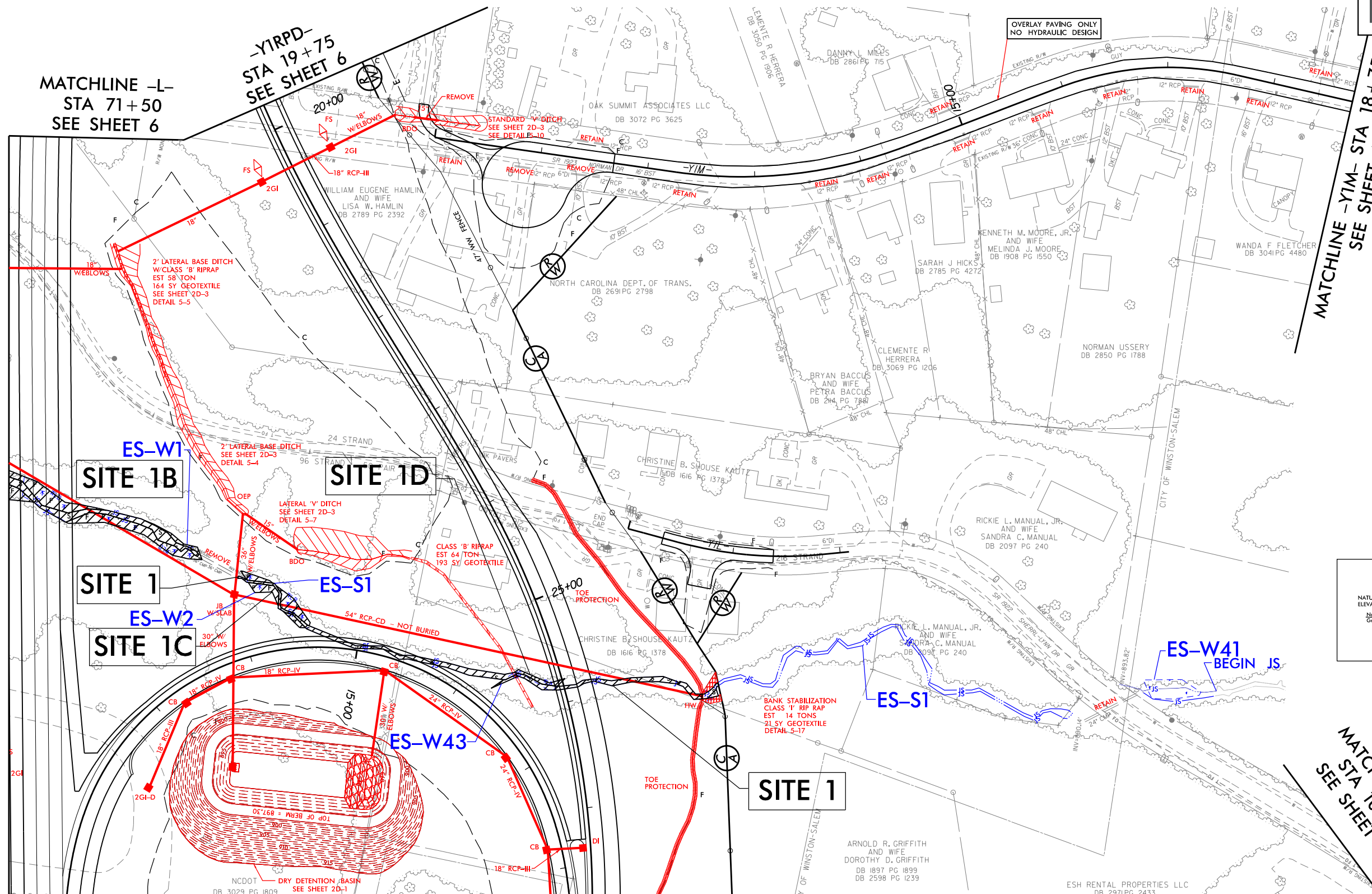


MATCHLINE SEE SHEET 5B

MATCHLINE -L-  
STA 71+50  
SEE SHEET 6

-YIRPD-  
STA 19+75  
SEE SHEET 6

MATCHLINE -YIM- STA 18+75  
SEE SHEET 40



MATCHLINE SEE SHEET 5D

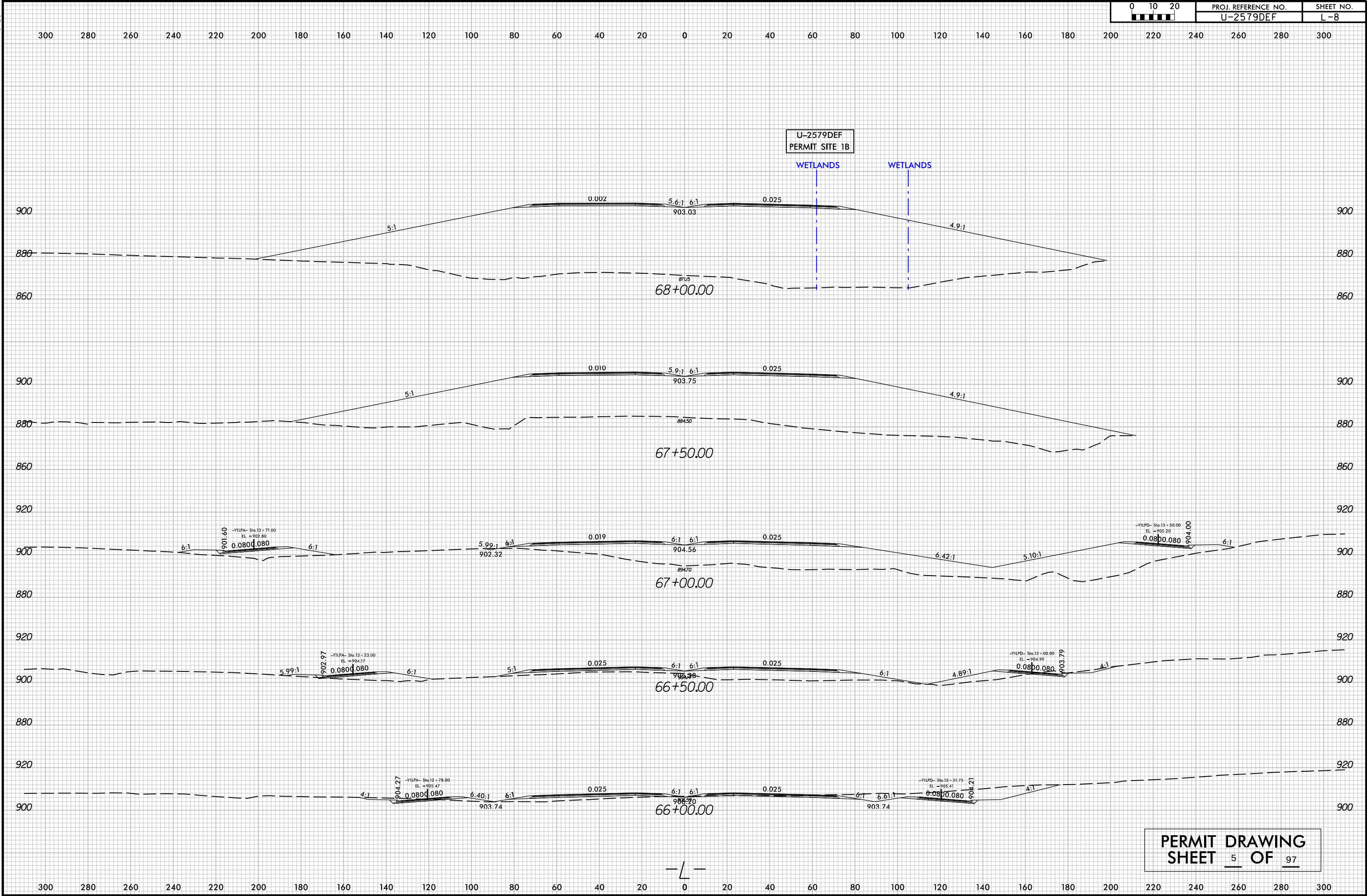
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PERMIT DRAWING  
SHEET 4 OF 97

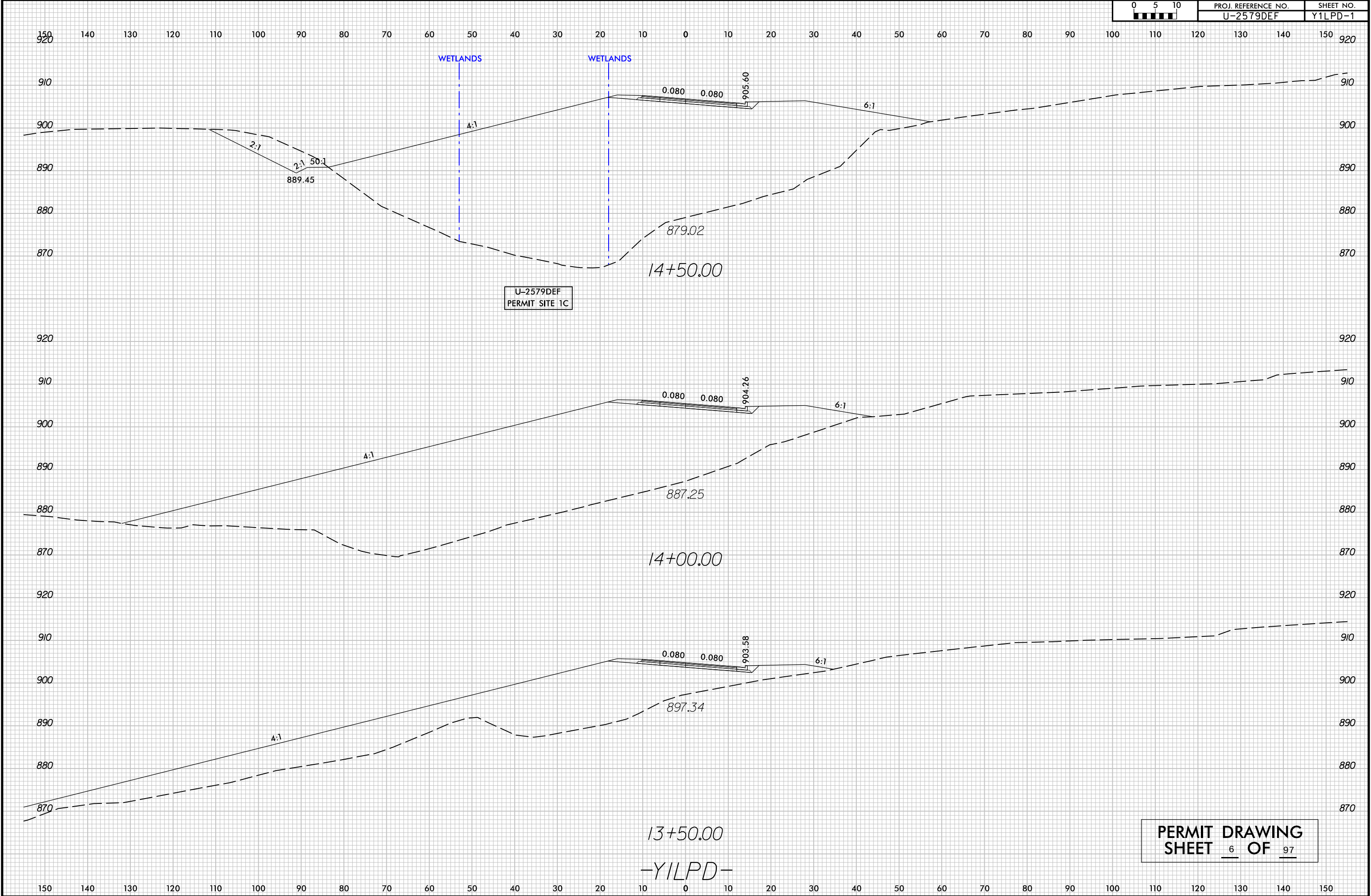
8/23/99



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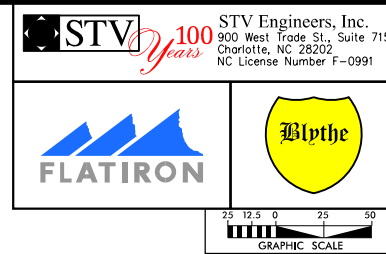


## LEGEND



DENOTES FILL IN  
WETLAND

DENOTES IMPACT  
SURFACE WATER



|                                                                                                                                                       |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| PROJECT REFERENCE NO.                                                                                                                                 | SHEET NO. |
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**DOCUMENT NOT CONSIDERED FINAL  
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**DETAIL 5-16**

**OUTLET CHANNEL PROTECTION**  
(Not to Scale)

Natural Bed Elevation

Natural Ground

1.5'

Geotextile

Channel Bed (Variable)

Type of Lining - CL 1' RAP

STA. 20 + 58 -YILPA- RT

NAD 83/95

**SITE 1**

ES-S1

STA 18+20  
SEE SHEET 6

**MATCHLINE -L-**  
**STA 71+50**  
**SEE SHEET 6**

ES-S67-  
SITE 2

ES-W46  
SITE 2A

ES-S65—

## SITE 3

# SITE 1

# SITE 4

2

**E 1A**

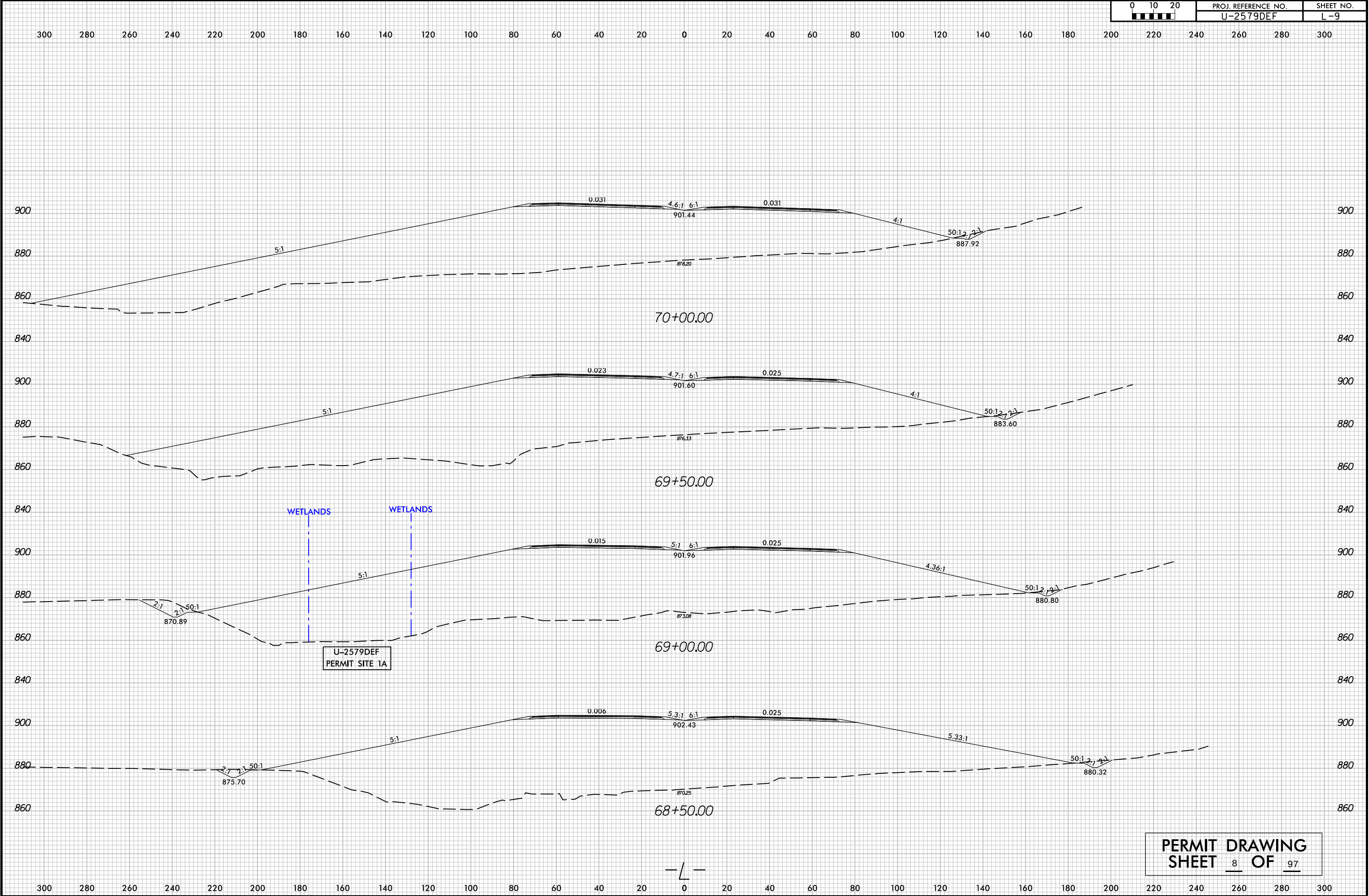
FS-W1

CITE 15

## SITE 1B

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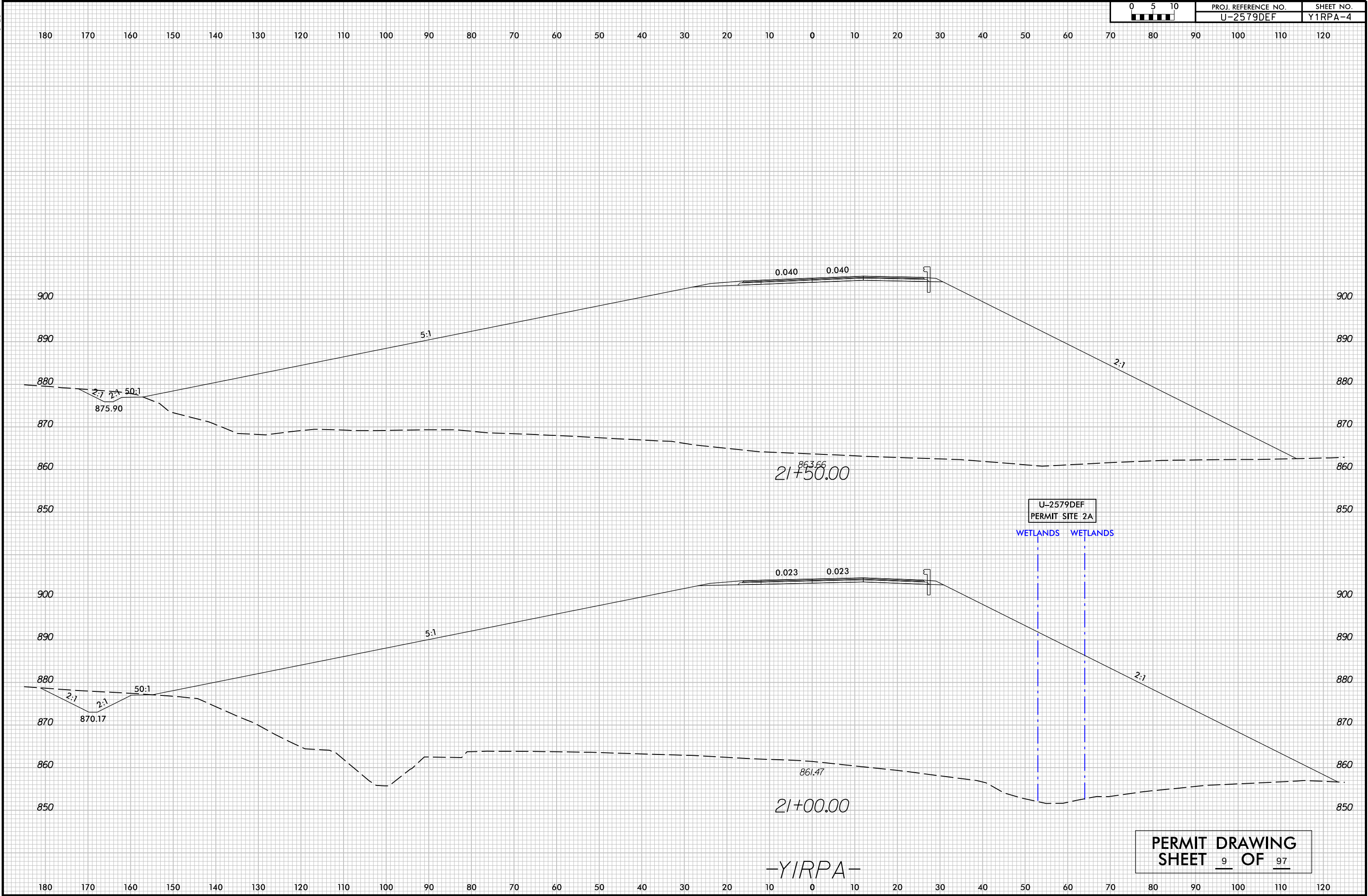
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8/23/99



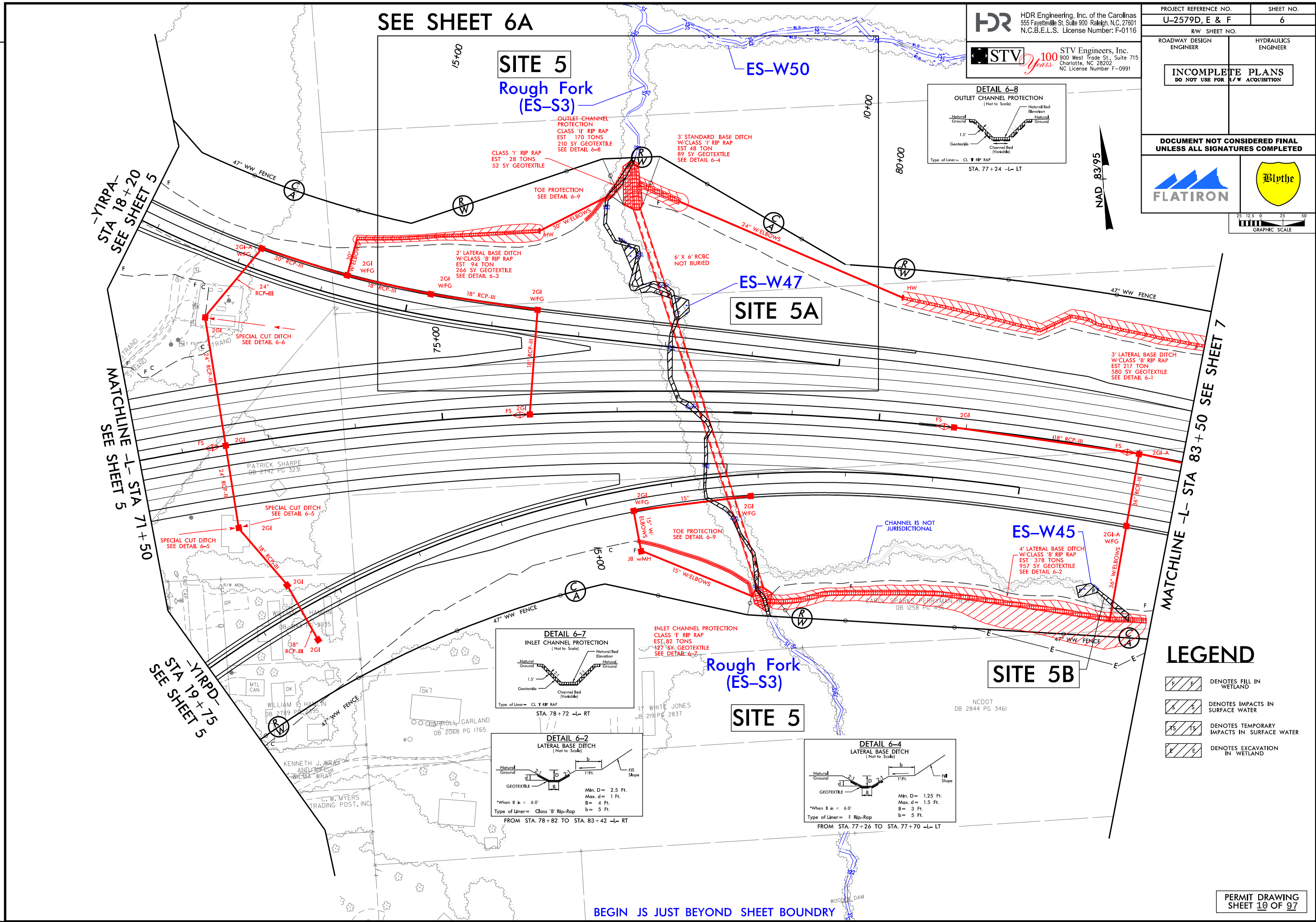
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PERMIT DRAWING  
SHEET 9 OF 97

-YIRPA-



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N.C.B.E.L.S. License Number: F-0116

**STV** 100 Years  
STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**6**

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
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**DOCUMENT NOT CONSIDERED FINAL**  
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**FLATIRON**

**Blythe**

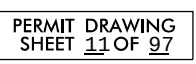
NAD 83/95

GRAPHIC SCALE

LEGEND

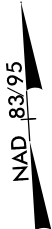
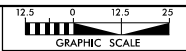
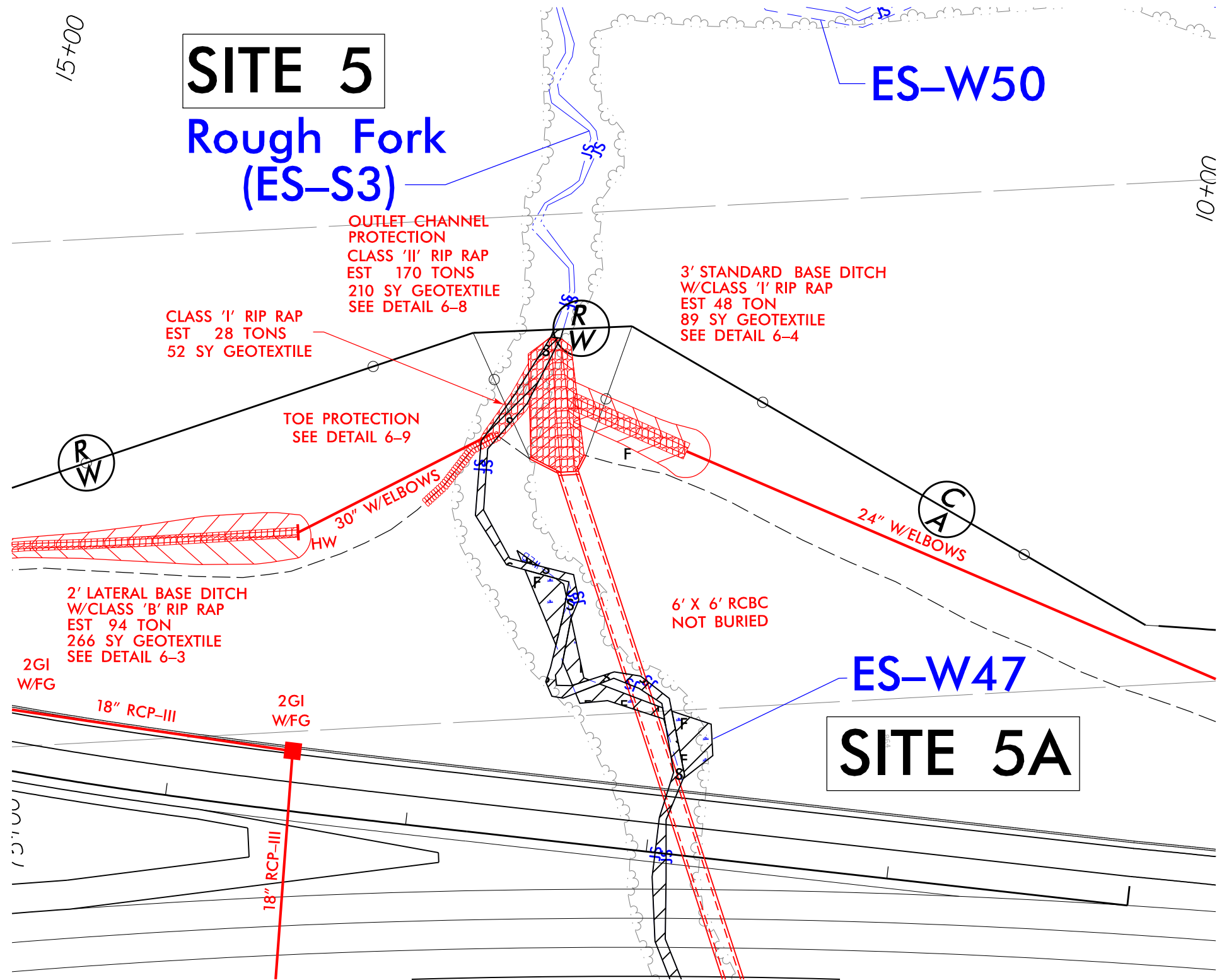
- DENOTES FILL IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES EXCAVATION IN WETLAND





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DATE: 10/23/2018

REVISIONS



## LEGEND



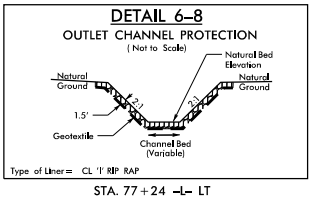
DENOTES FILL IN WETLAND



DENOTES IMPACTS IN SURFACE WATER



DENOTES TEMPORARY IMPACTS IN SURFACE WATER



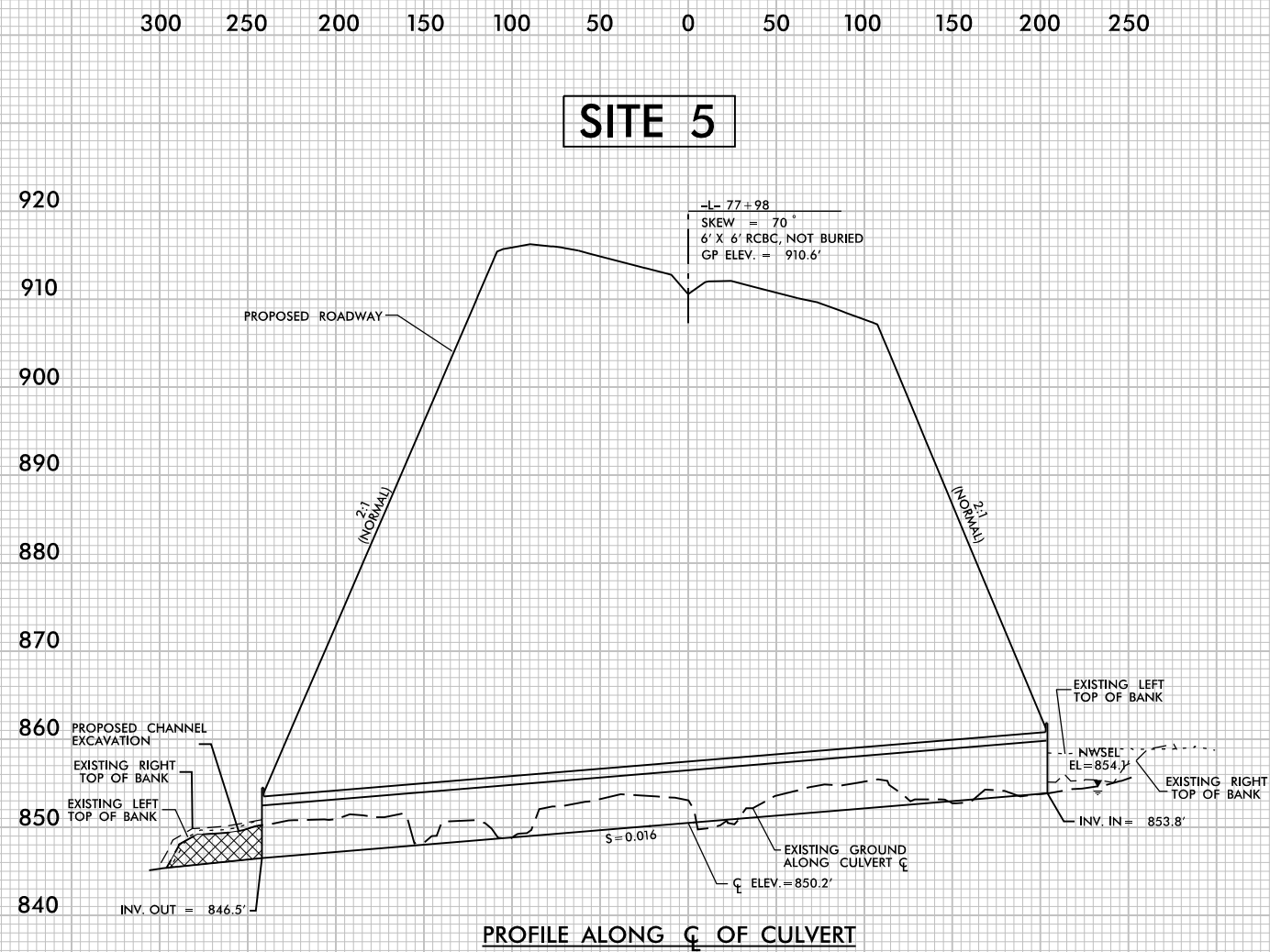


5/14/99

| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 100' HORIZONTAL  
1" = 20' VERTICAL

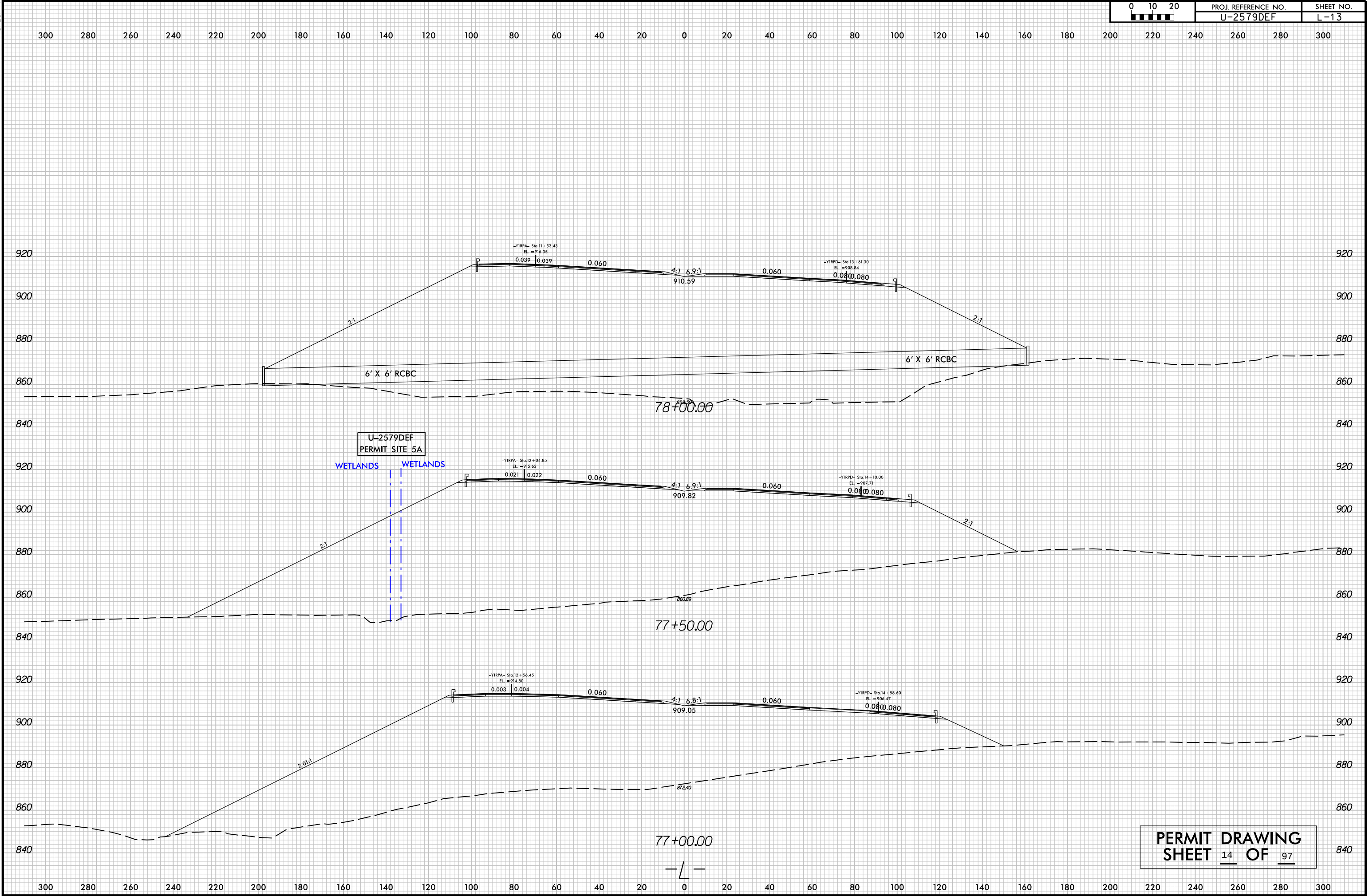


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DATE: 10/26/2018

TIME: 9:12:28 AM

8/23/99

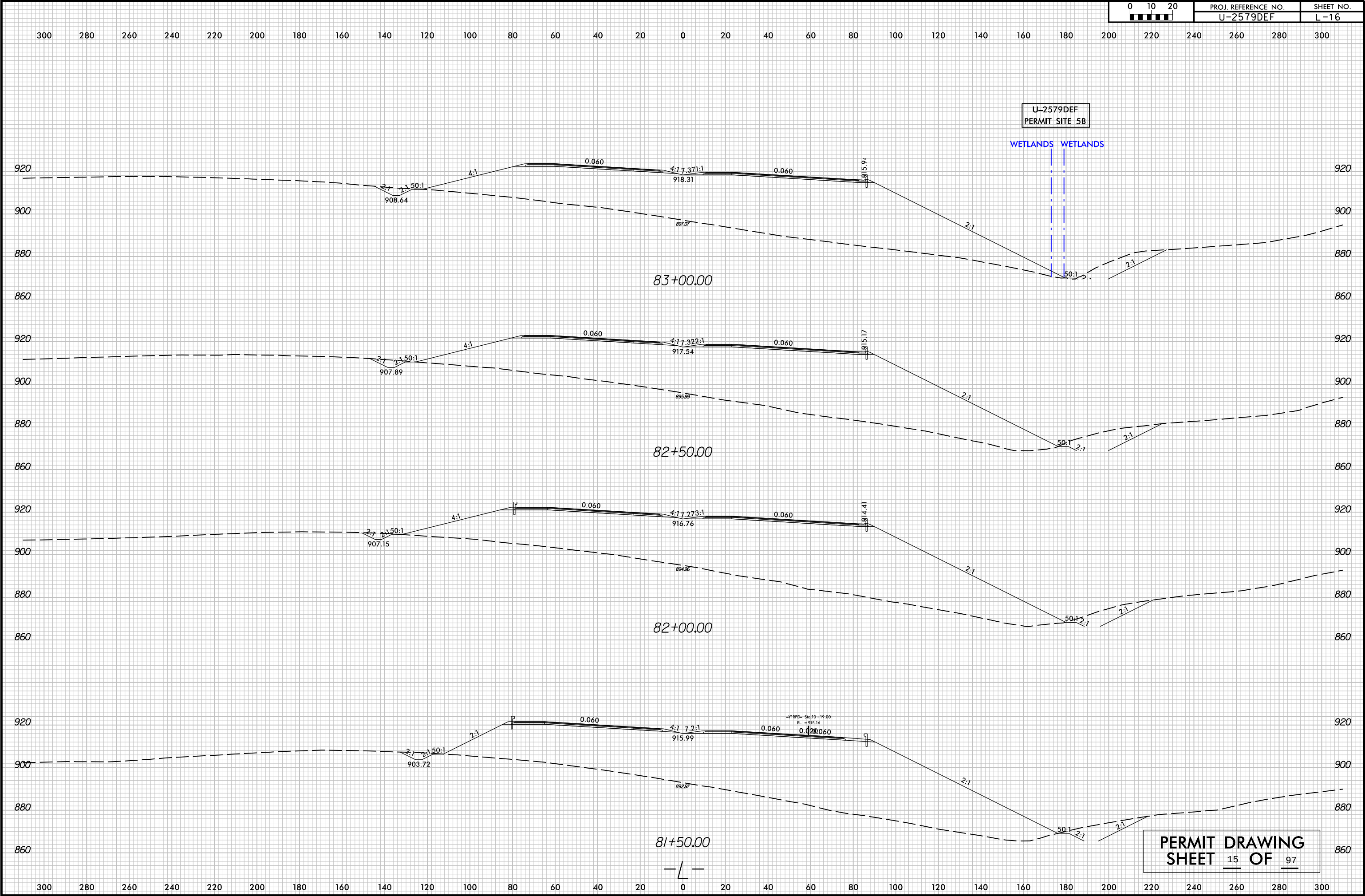


PERMIT DRAWING  
SHEET 14 OF 97

8/23/99



| PROJ. REFERENCE NO. | SHEET NO. |
|---------------------|-----------|
| U-2579DEF           | L-16      |



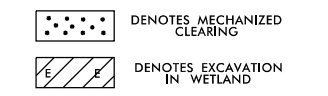
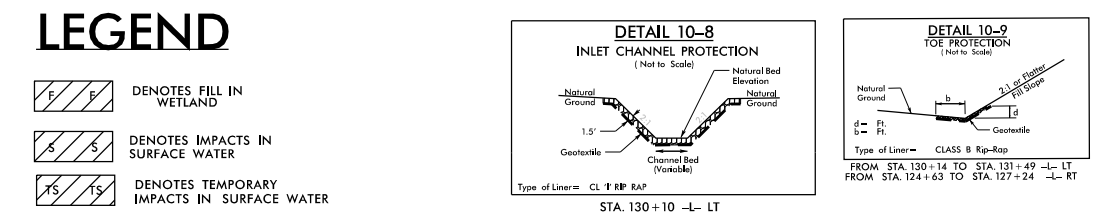
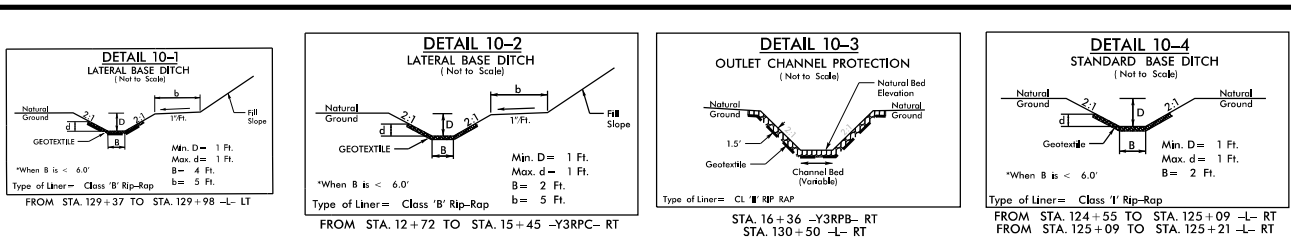
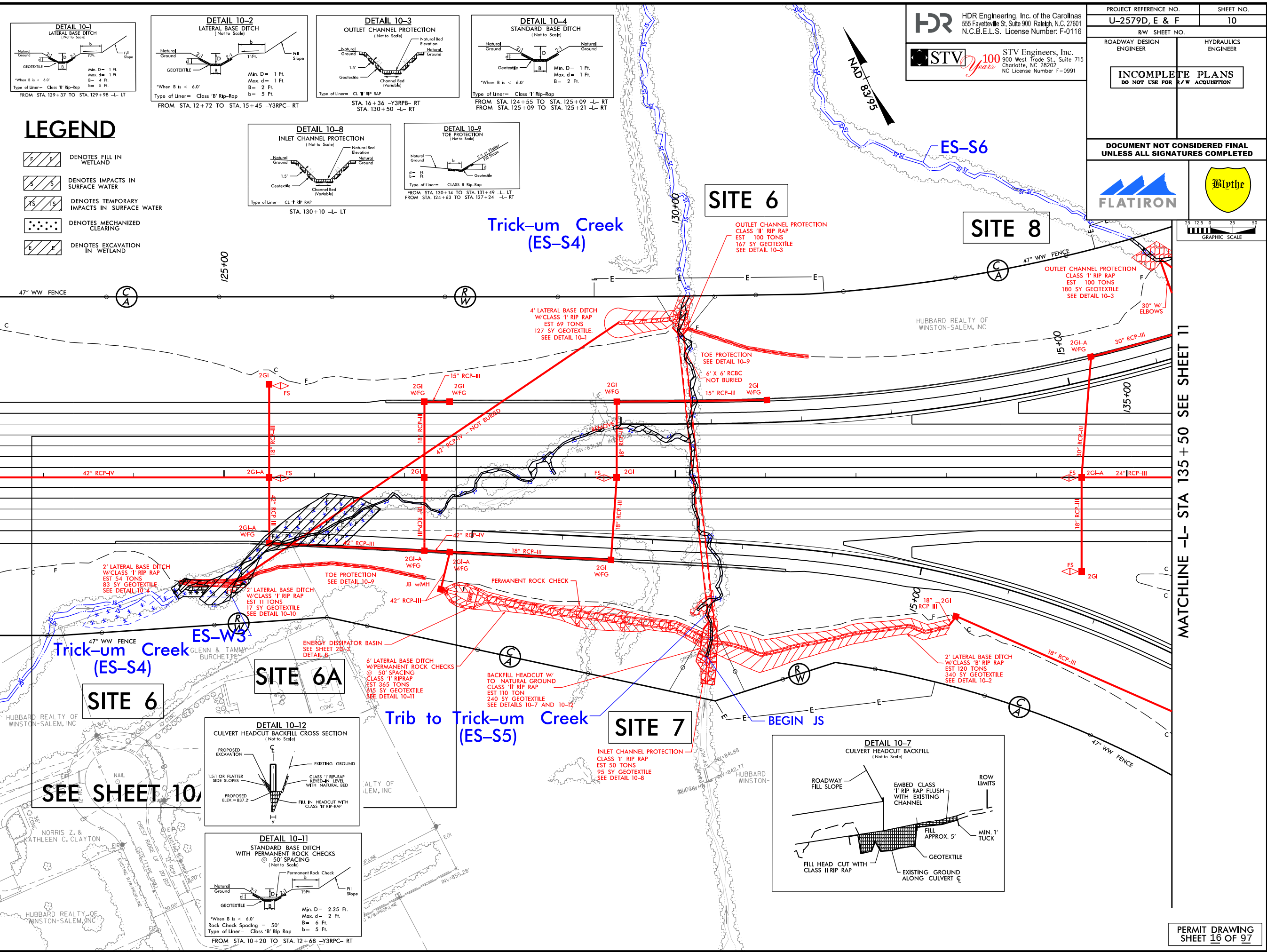
PERMIT DRAWING  
SHEET 15 OF 97

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DATE: 10/17/2018  
TIME: 6:10:30 PM

REVISIONS

MATCHLINE -L- STA 122 + 50 SEE SHEET 9

MATCHLINE -L- STA 135 + 50 SEE SHEET 11



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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**10**

R/W SHEET NO.

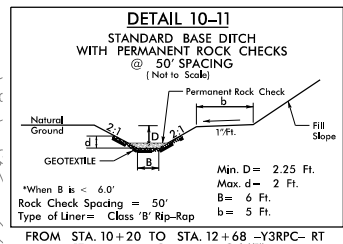
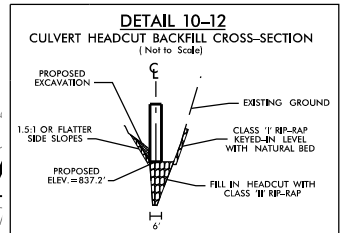
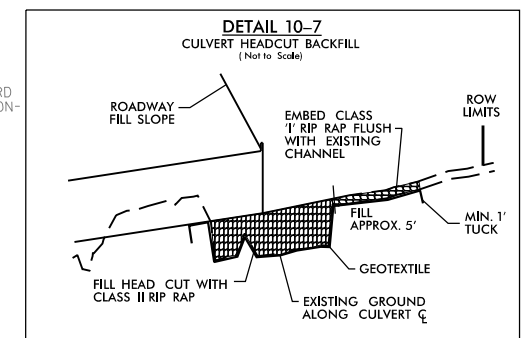
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR A/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL**  
UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALE  
0 12.5 25 50





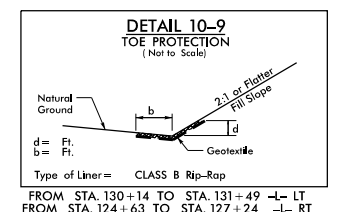




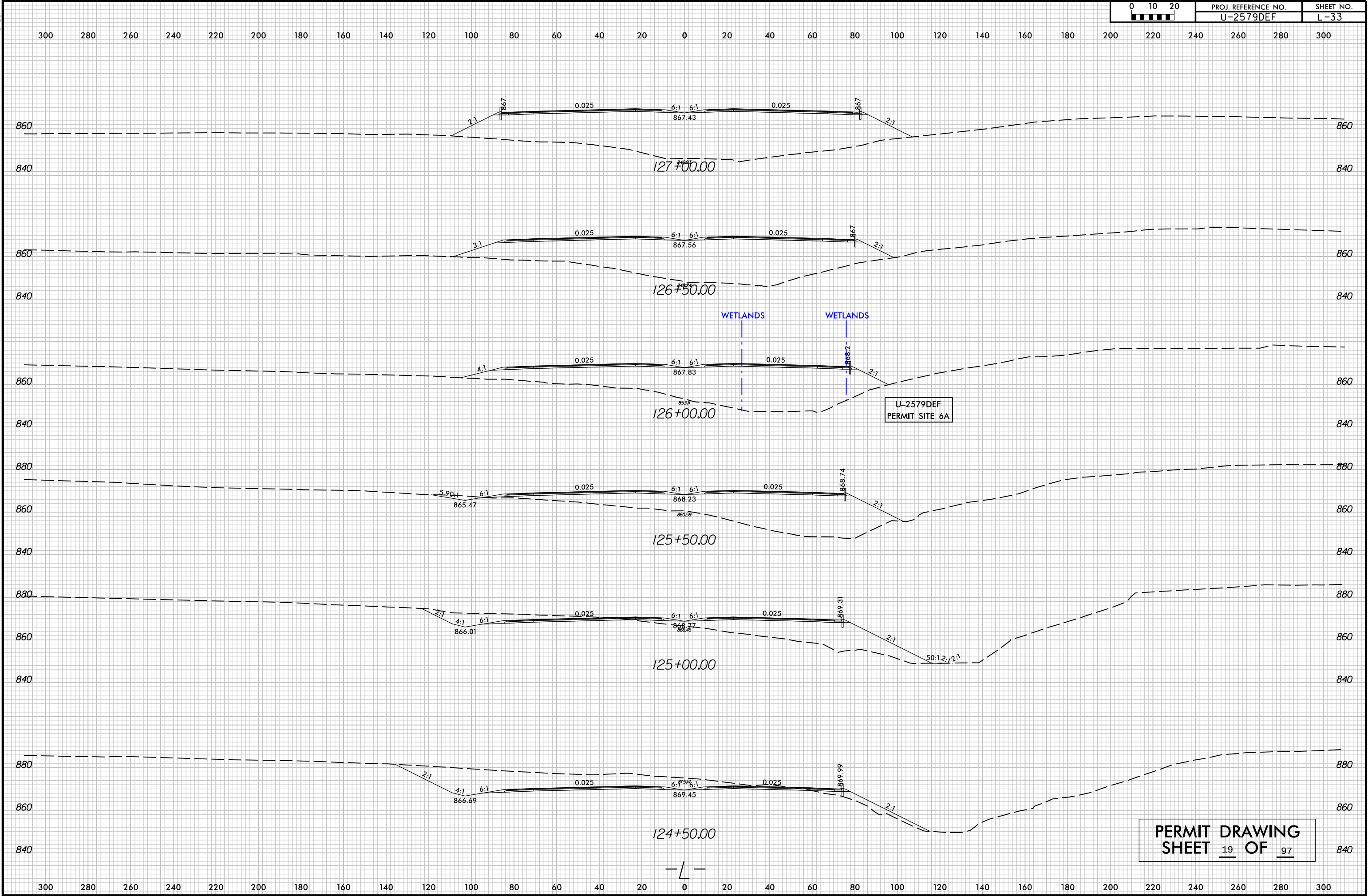

 DENOTES MECHANIZED CLEARING


 DENOTES FILL IN WETLAND


 DENOTES IMPACTS IN SURFACE WATER

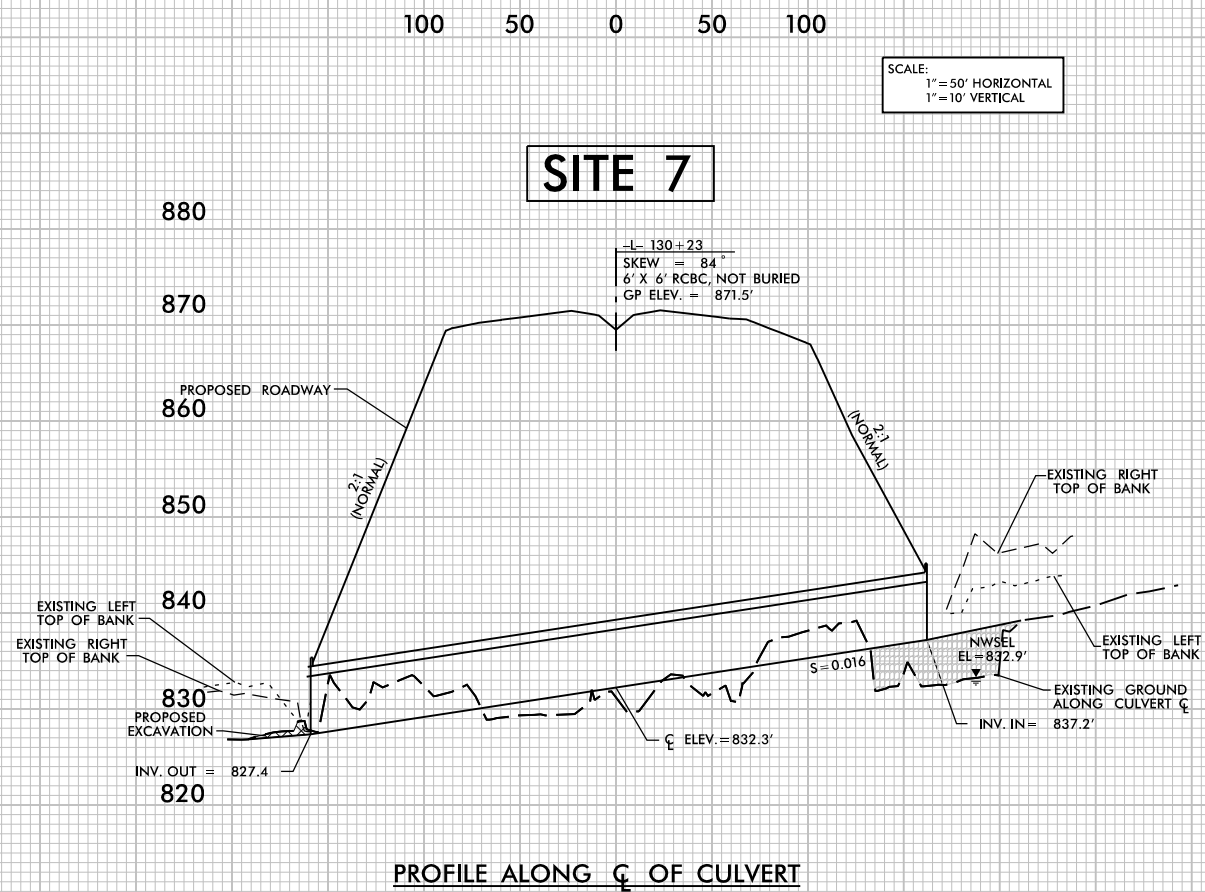






5/14/99

| PROJECT REFERENCE NO.                                            |                        | SHEET NO. |
|------------------------------------------------------------------|------------------------|-----------|
| U-2579D,E & F                                                    |                        |           |
| ROADWAY DESIGN<br>ENGINEER                                       | HYDRAULICS<br>ENGINEER |           |
|                                                                  |                        |           |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |                        |           |

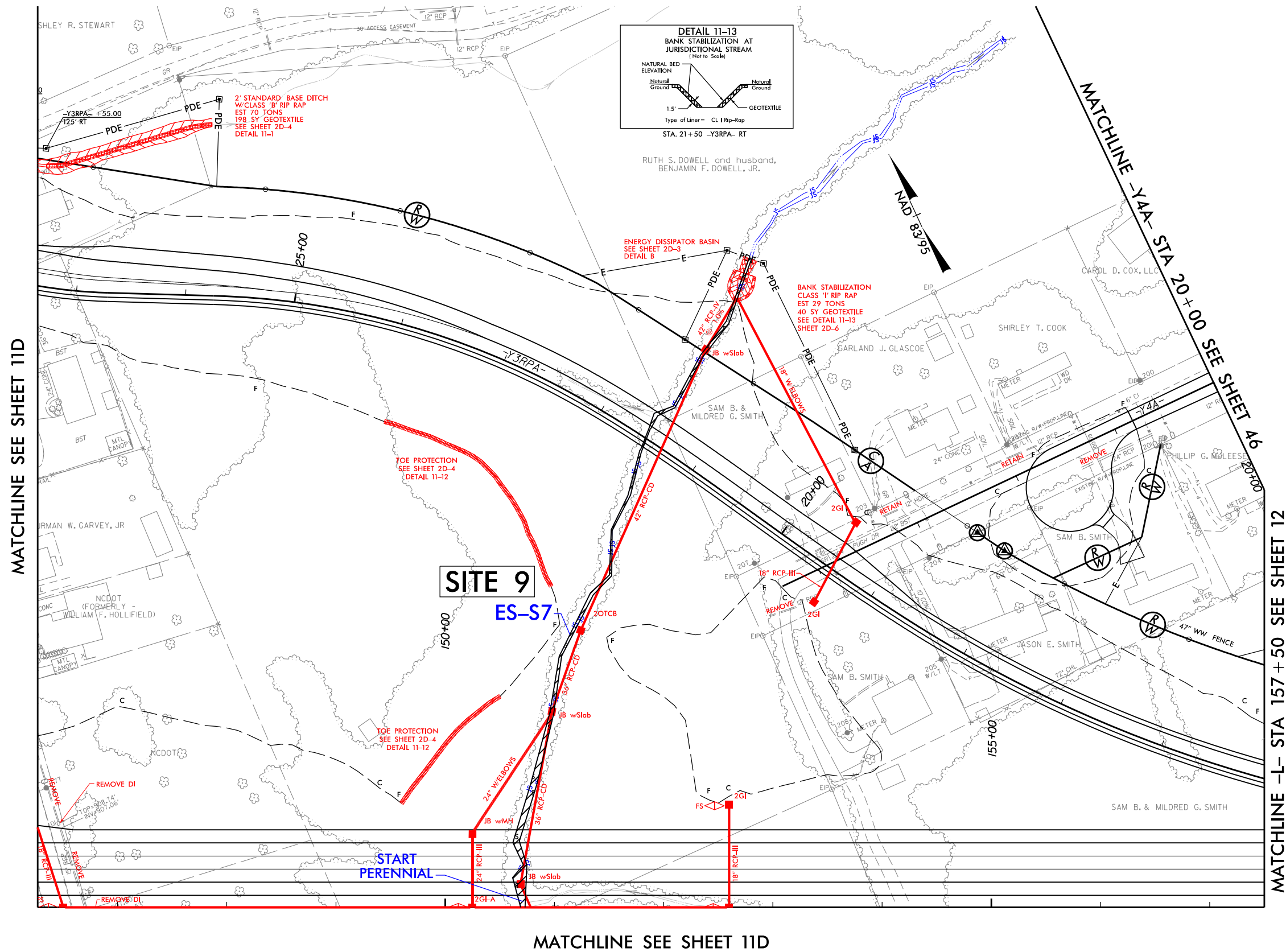












### DETAIL B

**RIP-RAPPED ENERGY DISSIPATOR BASIN**

The figure consists of two main parts: a table of dimensions and two technical drawings.

| DIM.<br>(ft) | RIP RAP<br>BASIN # |
|--------------|--------------------|
| A            | 3.51               |
| B            | 2.34               |
| C            | 5.70               |
| D            | 3.36               |
| E            | 9.0                |
| F            | 21.0               |
| G            | 18.0               |

ALL DIMENSIONS  
APPROXIMATE

**PLAN**

The plan view shows a rectangular basin labeled "RIP RAP NOT SHOWN". It has a width dimension of 21' and a length dimension of 21'. A "CULVERT" is shown entering from the left, with a flow arrow indicating direction. The basin is bounded by a wall on the right side, labeled "A/RCON".

**ELEVATION**

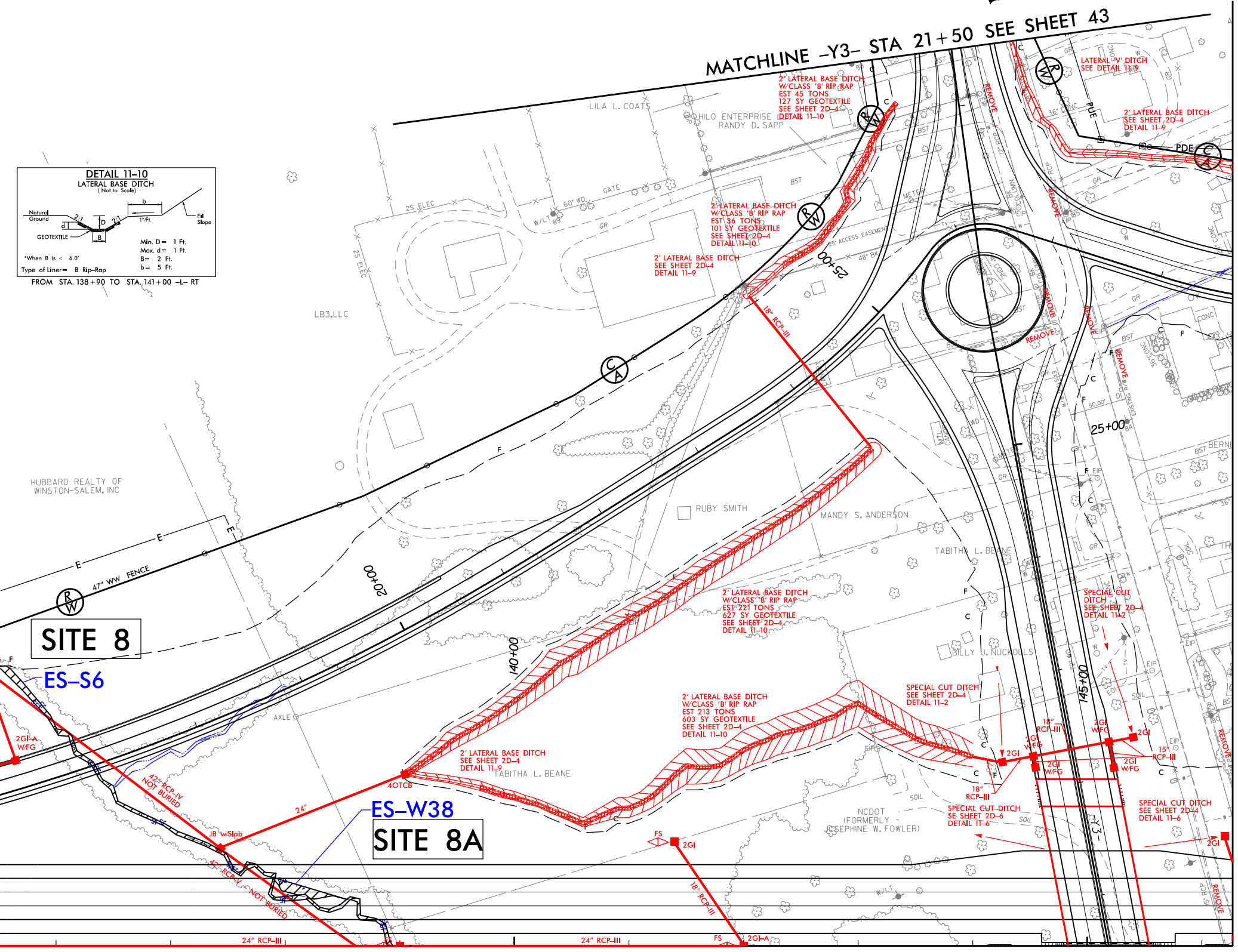
The elevation view shows a cross-section of the basin. The top part is labeled "DISSIPATOR POOL" and "A/RCON". The bottom part is labeled "NATURAL GROUND". The rip rap layer is shown as a sloped area between the dissipator pool and the natural ground. Dimensions include a vertical height of 21' for the dissipator pool, a horizontal distance of 21' for the rip rap slope, and a total horizontal distance of 21' + 52' RT (Right) for the entire section. Other labels include "CULVERT", "WY" (Weir), "GEOTECH", and "F" (Foundation).

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REVISIONS

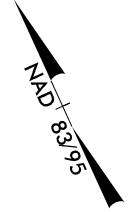
8/17/99

MATCHLINE -L- STA 135 + 50 SEE SHEET 10



MATCHLINE SEE SHEET 11C

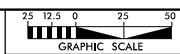
MATCHLINE SEE SHEET 11A





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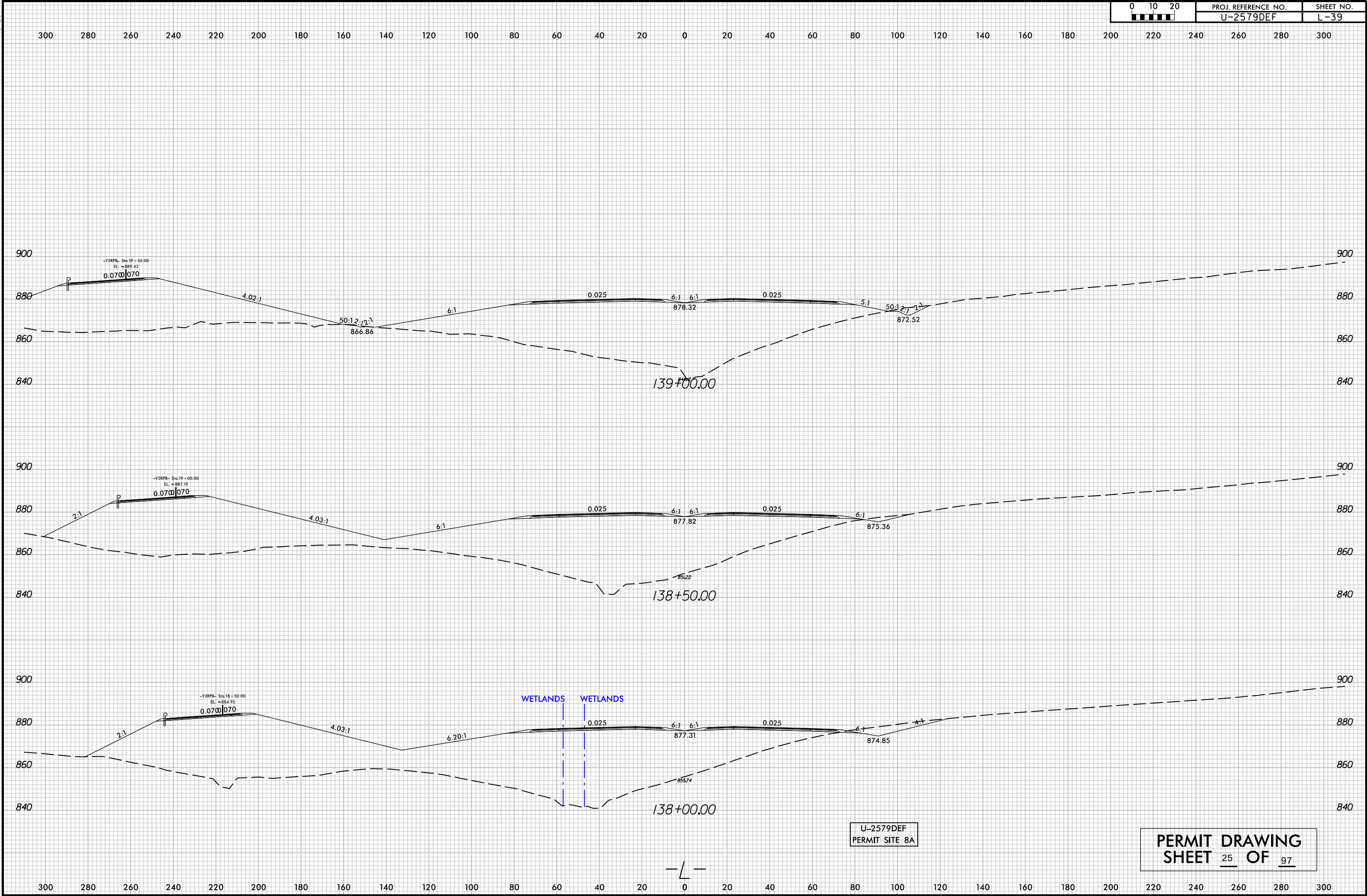


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| PROJECT REFERENCE NO.<br><b>U-2759D, E &amp; F</b>                                                                                                                                                                                     |  | SHEET NO.<br><b>11B</b>    |
| <div>INCOMPLETE PLANS<br/>DO NOT USE FOR R/W ACQUISITION</div>                                                                                                                                                                         |  | ROADWAY DESIGN<br>ENGINEER |
|                                                                                                                                                                                                                                        |  |                            |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                                                                                                                                                                       |  |                            |
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|                                                                                                                                                     |  |                            |

LEGEND

-  DENOTES FILL IN WETLAND
-  DENOTES IMPACTS IN SURFACE WATER
-  DENOTES TEMPORARY IMPACTS IN SURFACE WATER

8/23/99

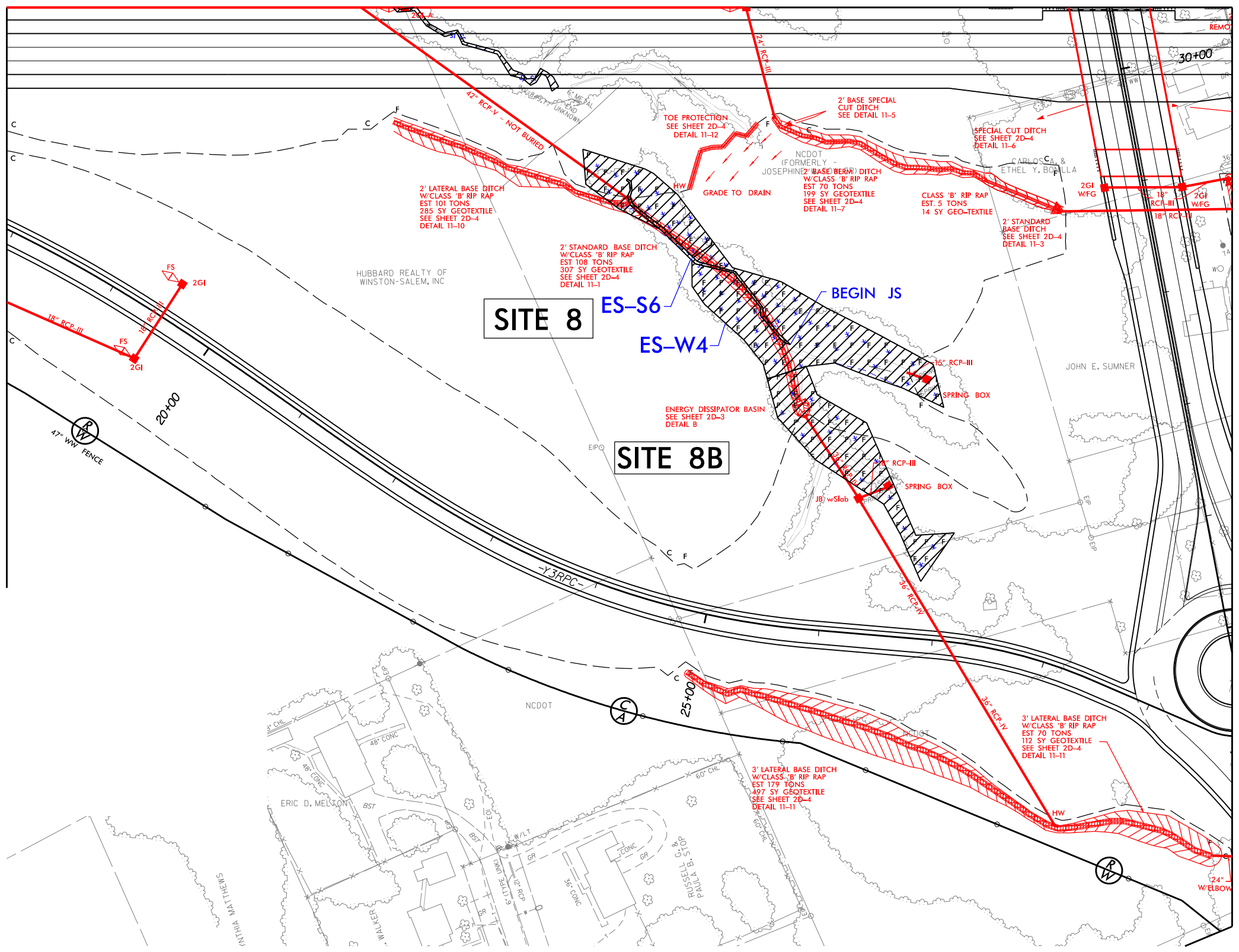




REVISIONS

8/17/99

MATCHLINE -L-  
STA 135+50 SEE SHEET 10



MATCHLINE SEE SHEET 11B

MATCHLINE SEE SHEET 11D

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PROJECT REFERENCE NO.  
**U-2759D, E & F**

SHEET NO.  
**11C**

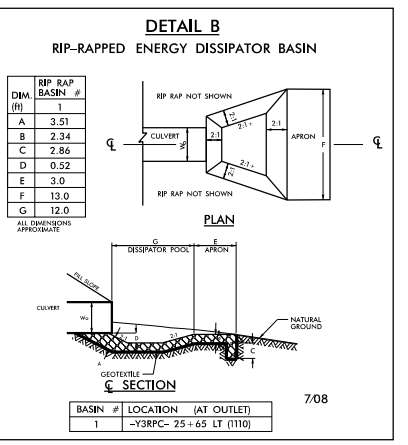
ROADWAY DESIGN  
ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

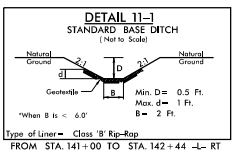
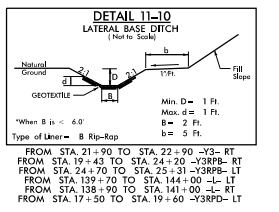
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N.C.B.E.L.S. License Number: F-0116

25 12.5 0 25 50  
GRAPHIC SCALE

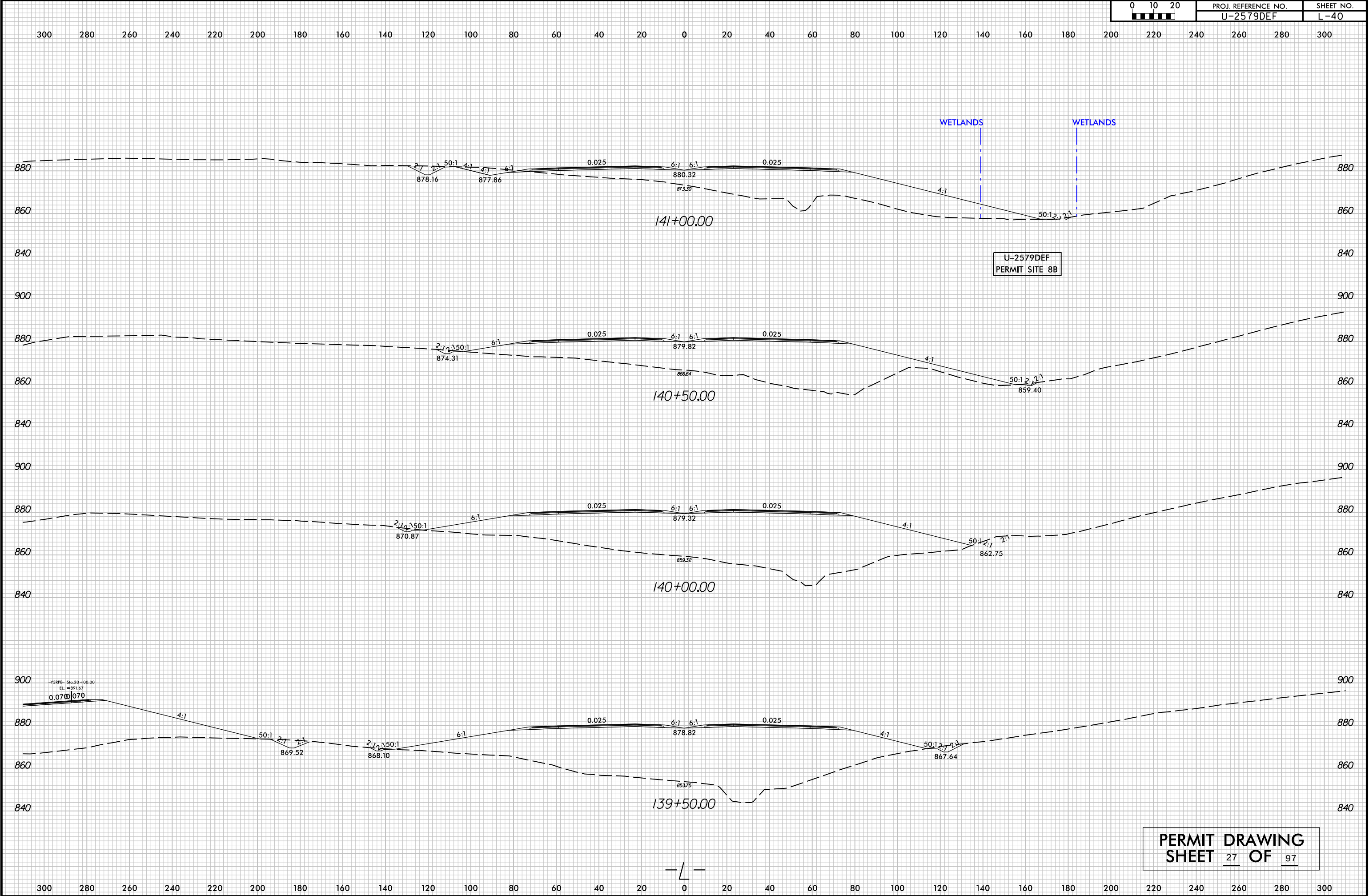


LEGEND

- DENOTES FILL IN WETLAND
- DENOTES MECHANIZED CLEARING
- DENOTES IMPACTS IN SURFACE WATER



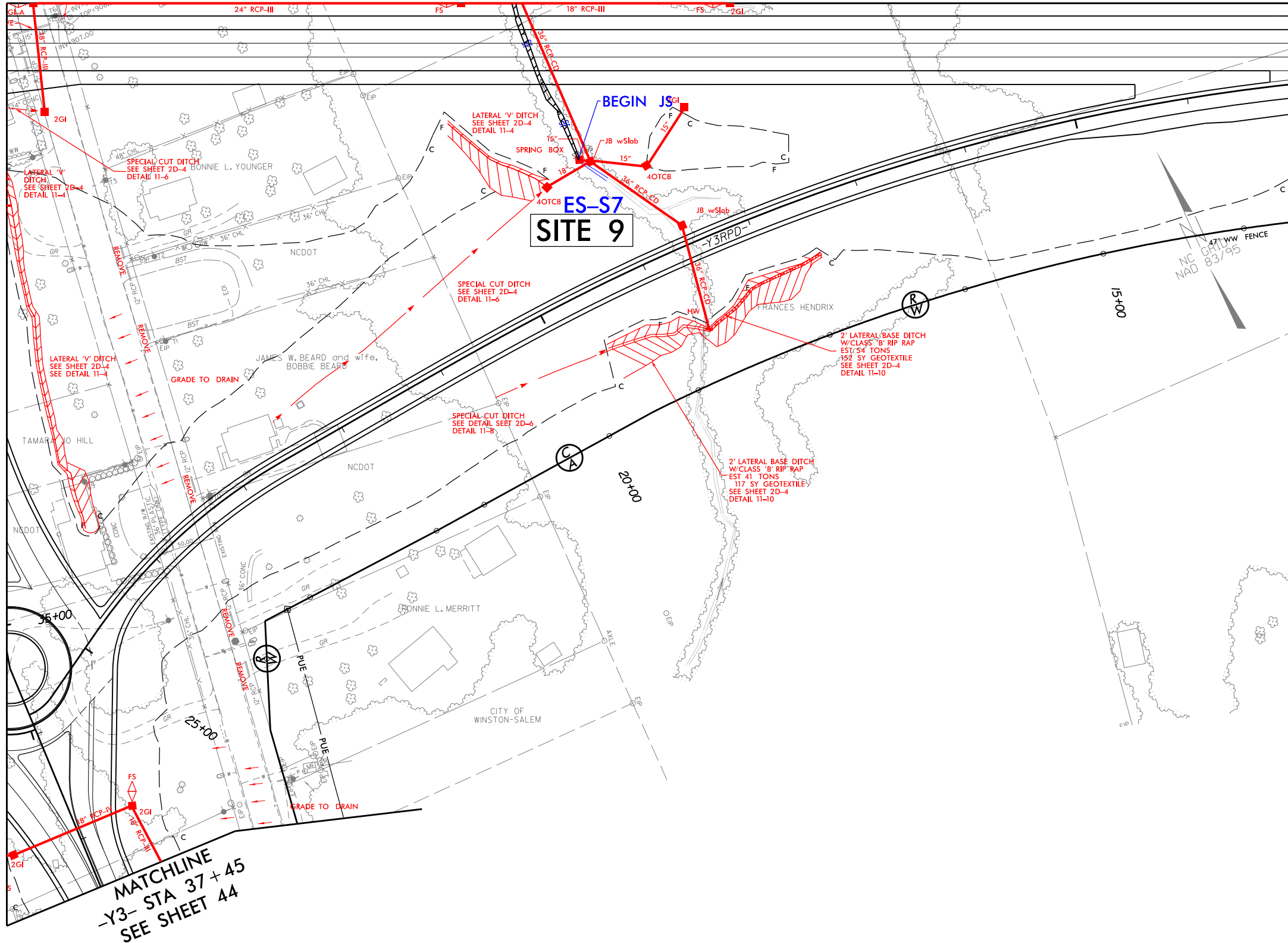
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TIME: 6:10:36 PM



REVISIONS

8/17/99

MATCHLINE SEE SHEET 11C



MATCHLINE  
-Y3- STA 37+45  
SEE SHEET 44

MATCHLINE SEE SHEET 11A

ES-S7  
SITE 9

NAD 83/95

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|                                                                                     |  |                                                                                                                                                    |  |
|-------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                                                                                          |  |
| U-2759D, E & F                                                                      |  | 11D                                                                                                                                                |  |
| <div>INCOMPLETE PLANS</div> <div>DO NOT USE FOR R/W ACQUISITION</div>               |  | ROADWAY DESIGN<br>ENGINEER                                                                                                                         |  |
|                                                                                     |  |                                                                                                                                                    |  |
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|                                                                                     |  | <div>25 12.5 0 25 50</div> <div></div> <div>GRAPHIC SCALE</div> |  |

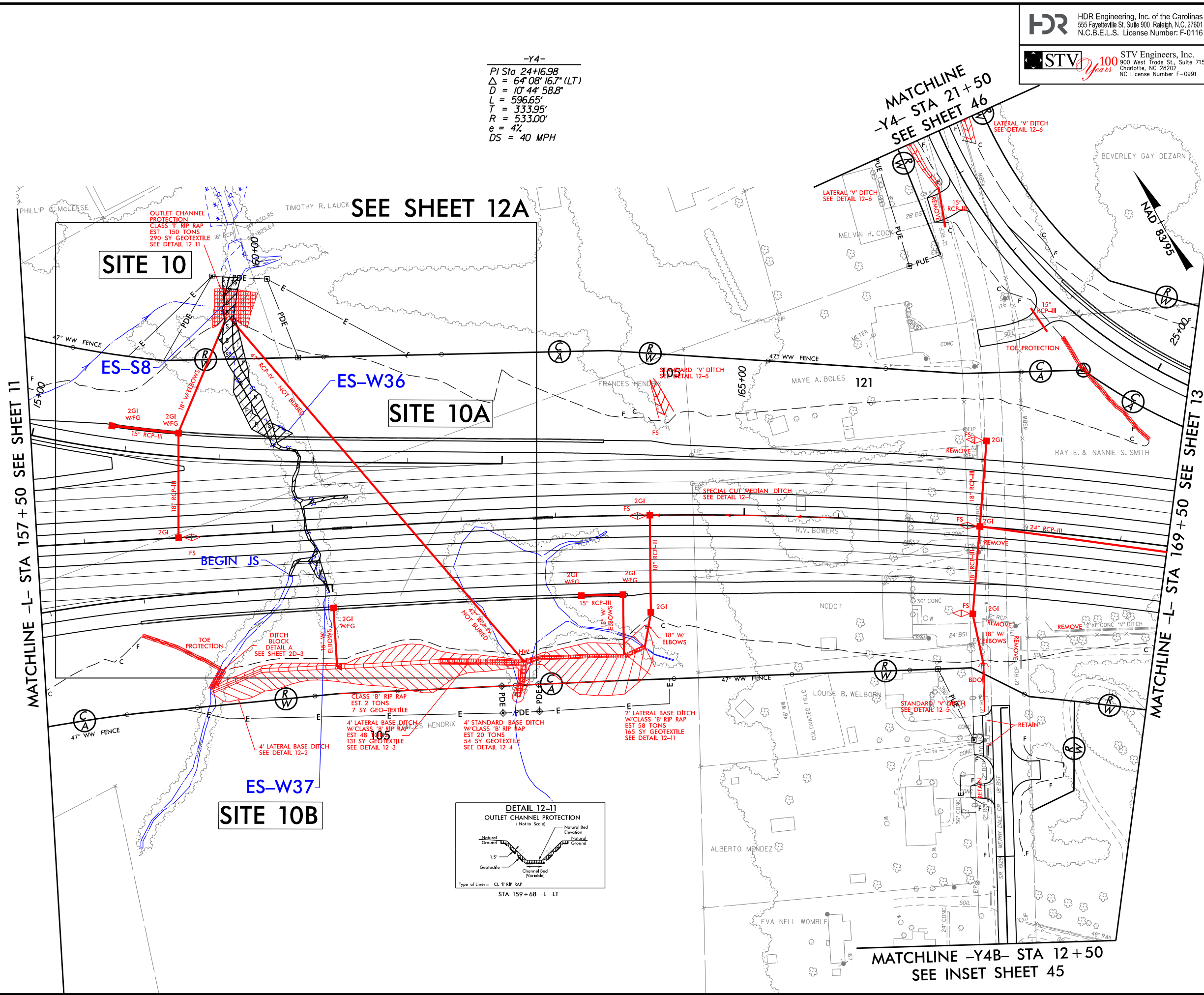
MATCHLINE -L-  
STA 157+50 SEE SHEET 12

LEGEND

DENOTES IMPACTS IN  
SURFACE WATER



REVISIONS



-Y4-  
PI Sta 24+16.98  
 $\Delta = 64^{\circ} 08' 16.7''$  (LT)  
 $D = 10^{\circ} 44' 58.8''$   
 $L = 596.65'$   
 $T = 333.95'$   
 $R = 533.00'$   
 $e = 4\%$   
 $DS = 40$  MPH

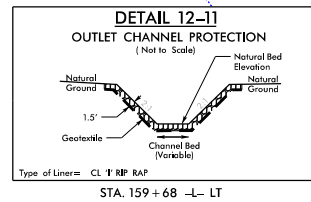
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|                                                                         |  |                        |  |
|-------------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                      |  | SHEET NO.<br><b>12</b> |  |
| RW SHEET NO.                                                            |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                 |  | HYDRAULICS ENGINEER    |  |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |  |                        |  |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |  |                        |  |
|                                                                         |  |                        |  |
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LEGEND

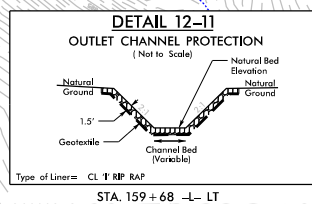
- DENOTES FILL IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES MECHANIZED CLEARING





|                                                                                     |                                               |
|-------------------------------------------------------------------------------------|-----------------------------------------------|
|  | DENOTES FILL IN<br>WETLAND                    |
|  | DENOTES IMPACTS IN<br>SURFACE WATER           |
|  | DENOTES TEMPORARY<br>IMPACTS IN SURFACE WATER |
|  | DENOTES MECHANIZED<br>CLEARING                |

**MATCHLINE**  
**-Y4- STA 21+50**  
**SEE SHEET 46**

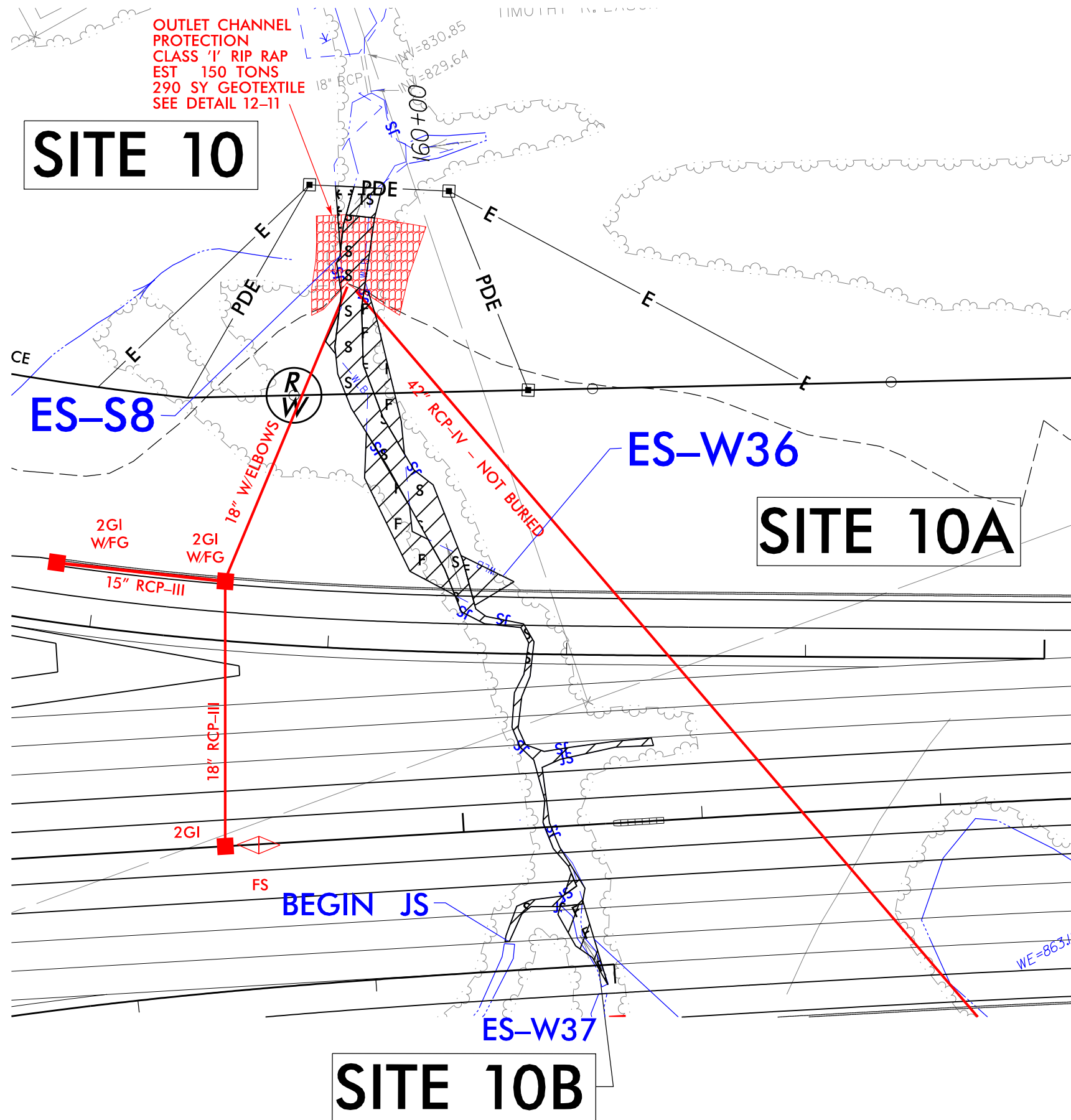


## REVISIONS

PERMIT DRAWING  
SHEET 30 OF 97

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TIME: 2:38:14 PM  
DATE: 10/25/2018

REVISIONS



OUTLET CHANNEL  
PROTECTION  
CLASS 'I' RIP RAP  
EST 150 TONS  
290 SY GEOTEXTILE  
SEE DETAIL 12-11

SITE 10

ES-S8

ES-W36

SITE 10A

BEGIN JS

ES-W37

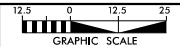
SITE 10B



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PROJECT REFERENCE NO. SHEET NO.

U-2579D, E & F 12A

R/W SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

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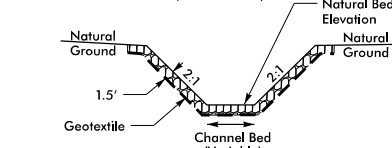
DOCUMENT NOT CONSIDERED FINAL  
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DETAIL 12-11

OUTLET CHANNEL PROTECTION

(Not to Scale)



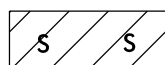
Type of Liner = CL 'I' RIP RAP

STA. 159 + 68 -L- LT

## LEGEND



DENOTES FILL IN  
WETLAND



DENOTES IMPACTS IN  
SURFACE WATER



DENOTES MECHANIZED  
CLEARING

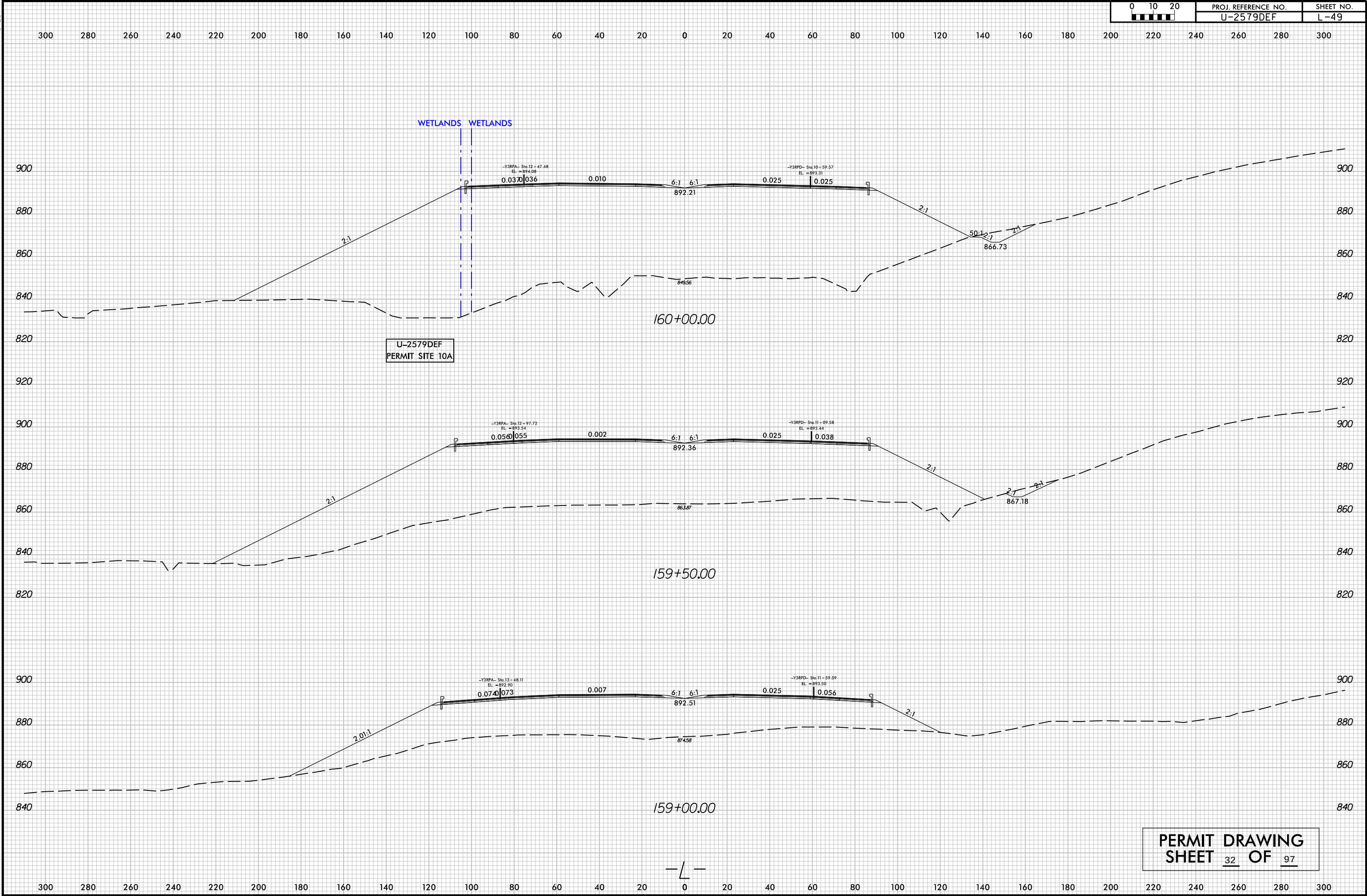


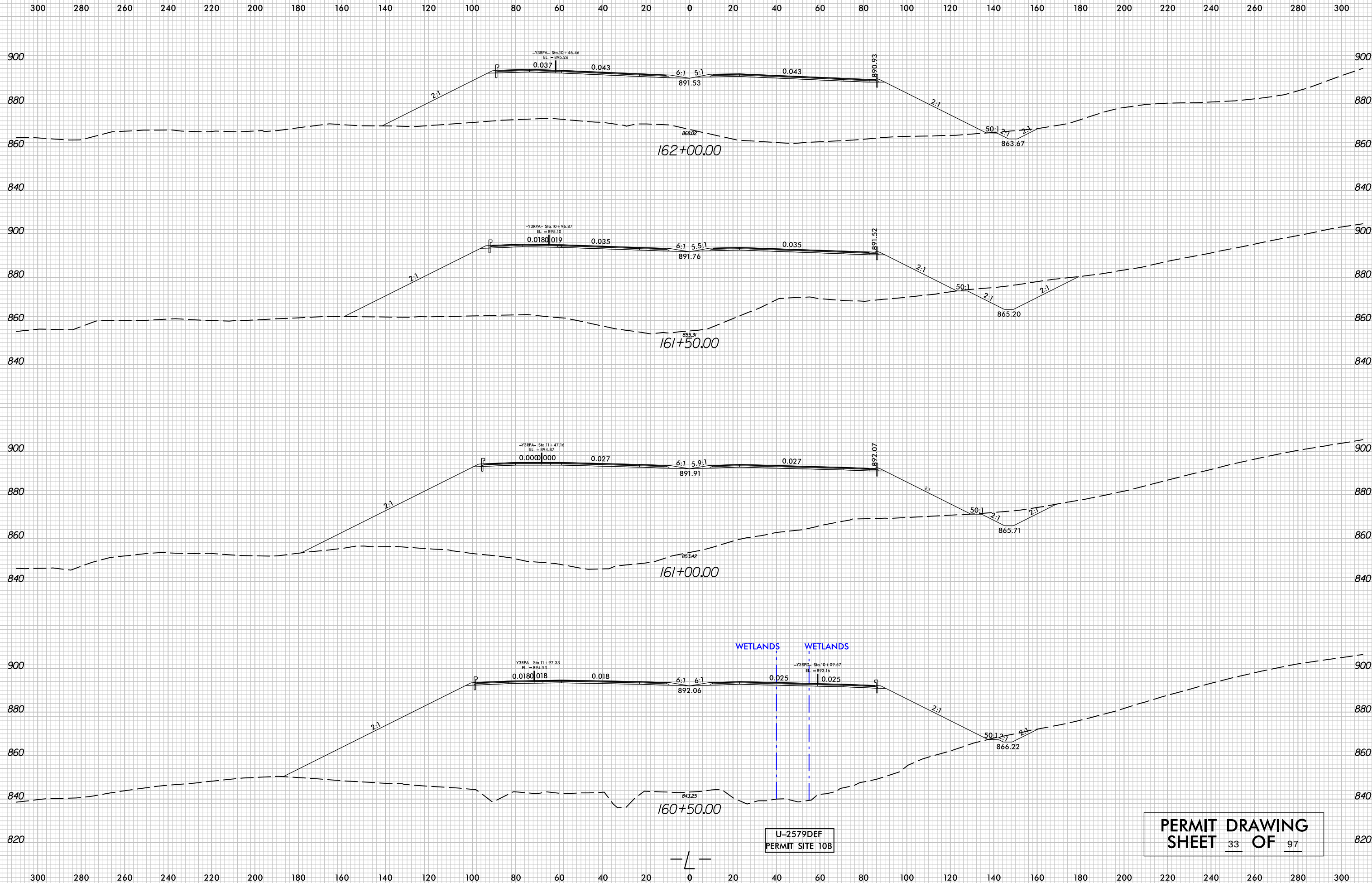
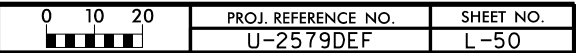
DENOTES TEMPORARY  
IMPACTS IN SURFACE WATER

PERMIT DRAWING  
SHEET 31 OF 97



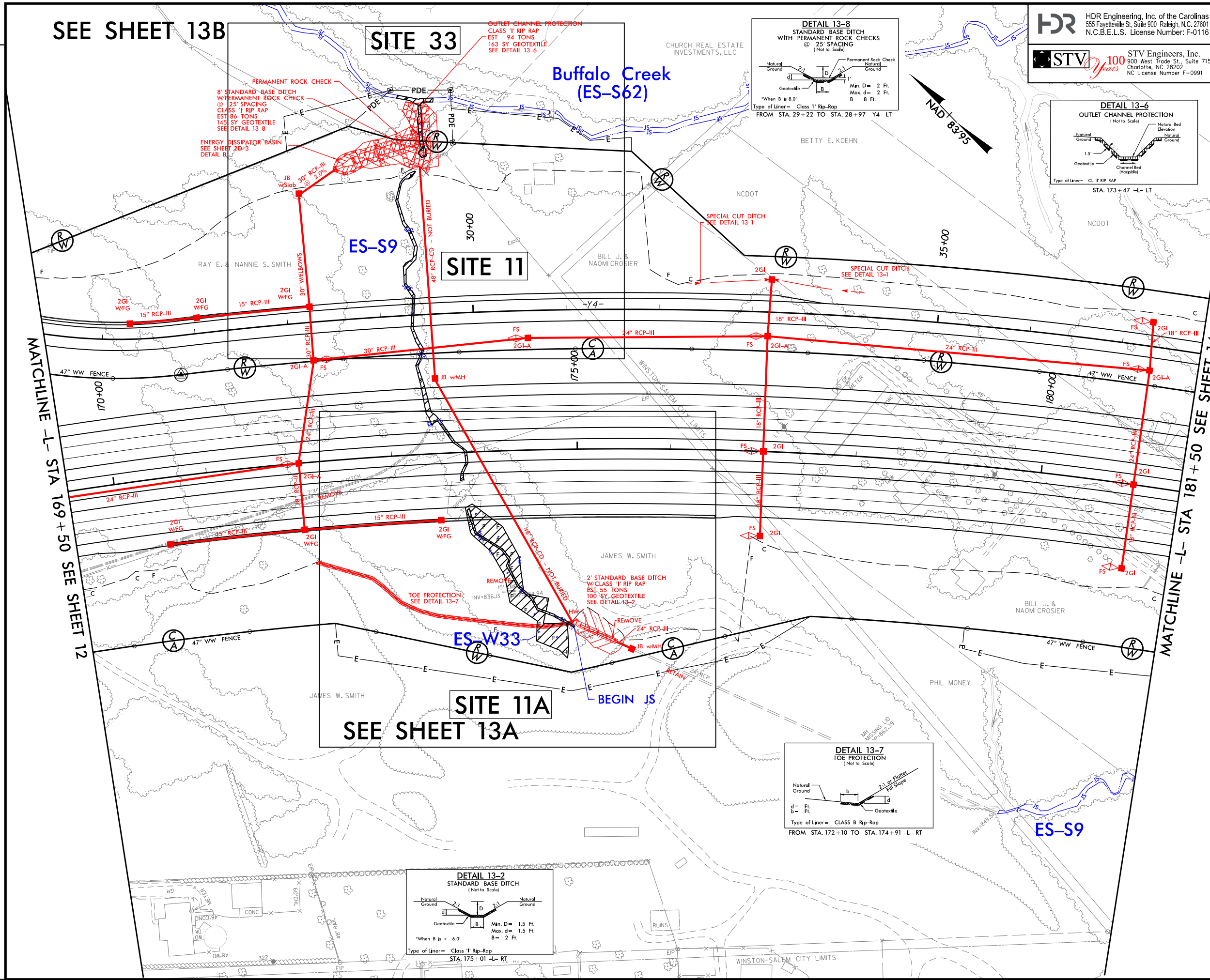
8/23/99







REVISIONS



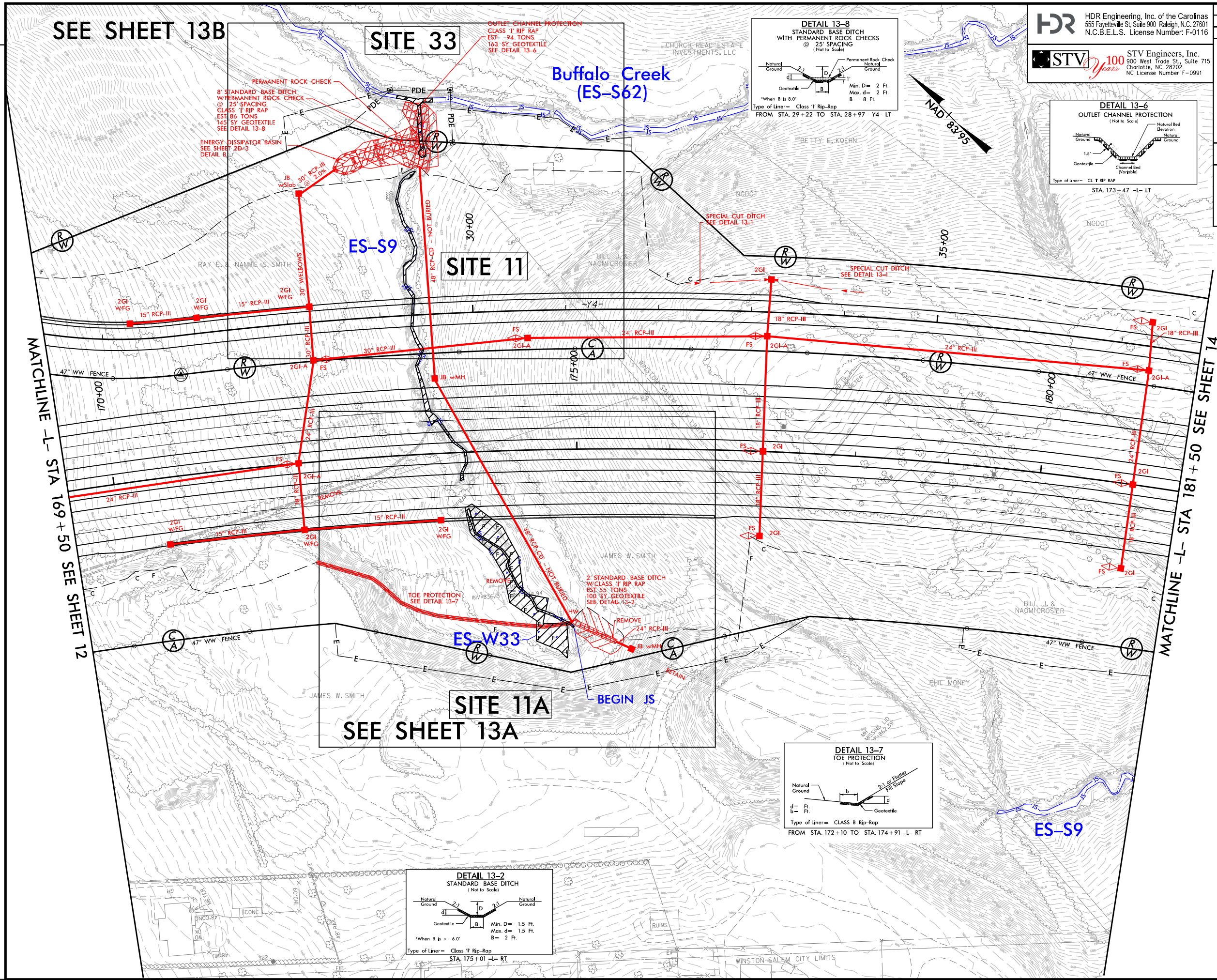
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| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                      |  | SHEET NO.<br><b>13</b> |  |
| RW SHEET NO.                                                            |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                 |  | HYDRAULICS ENGINEER    |  |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR A/W ACQUISITION               |  |                        |  |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |  |                        |  |
|                                                                         |  |                        |  |
|                                                                         |  |                        |  |

**LEGEND**

|  |                                            |
|--|--------------------------------------------|
|  | DENOTES FILL IN WETLAND                    |
|  | DENOTES IMPACTS IN SURFACE WATER           |
|  | DENOTES TEMPORARY IMPACTS IN SURFACE WATER |



REVISIONS



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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**13**

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

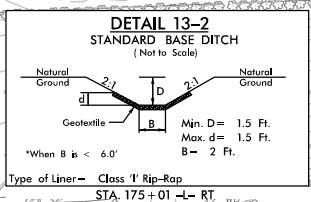
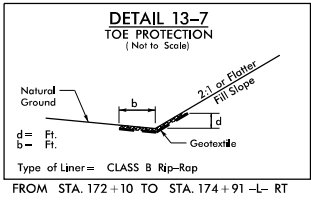
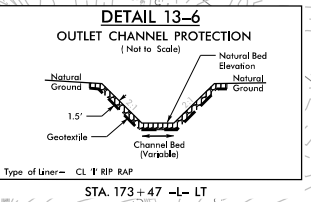
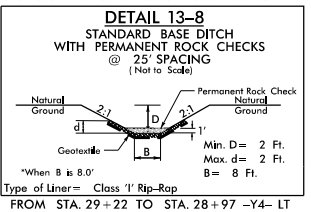
**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL**  
UNLESS ALL SIGNATURES COMPLETED

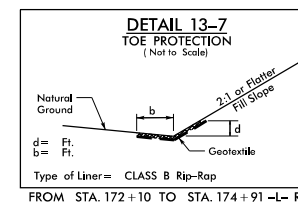
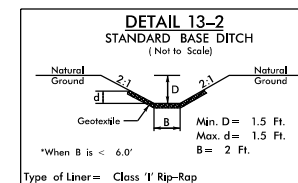
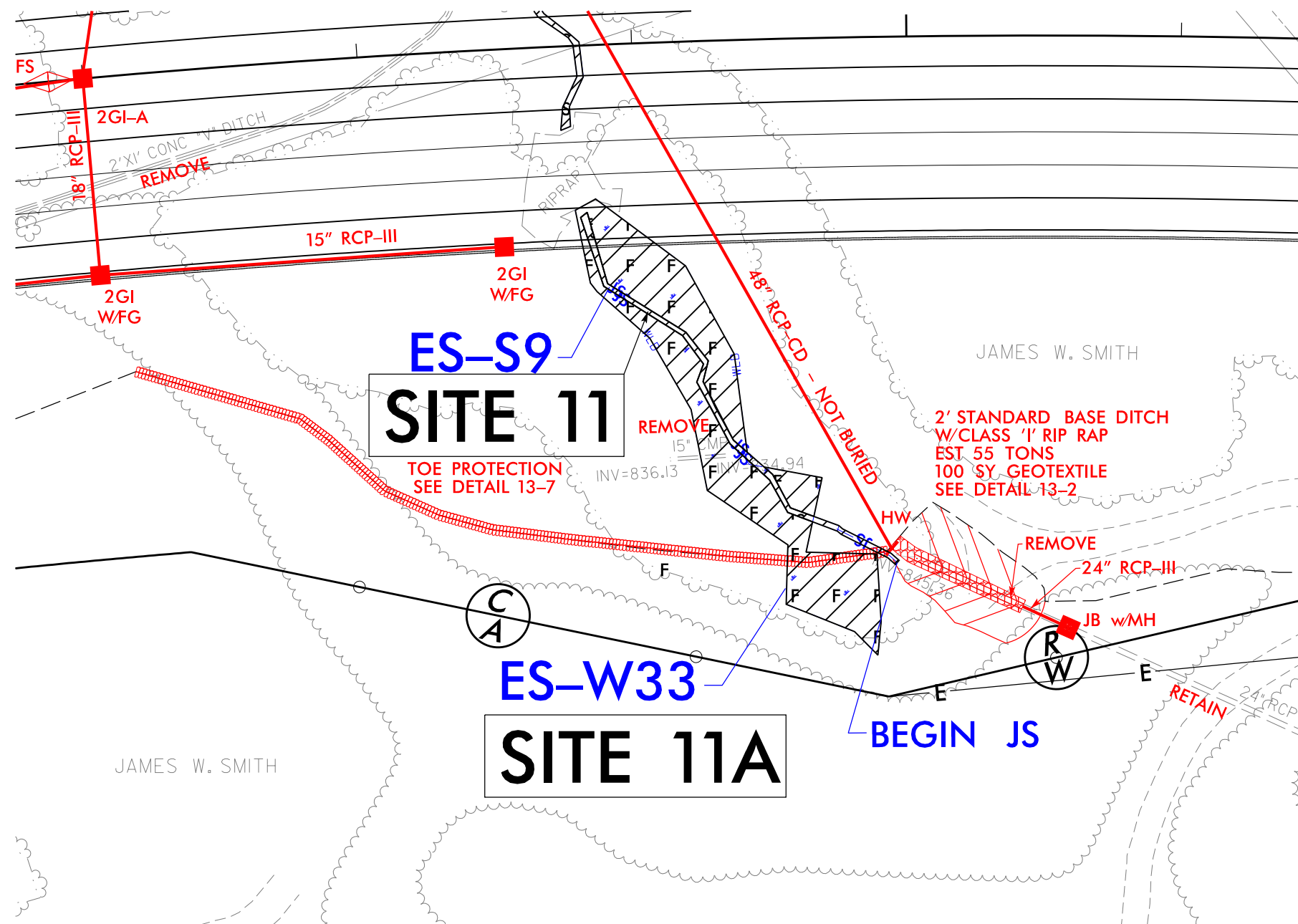
GRAPHIC SCALE

**LEGEND**

|  |                                            |
|--|--------------------------------------------|
|  | DENOTES FILL IN WETLAND                    |
|  | DENOTES IMPACTS IN SURFACE WATER           |
|  | DENOTES TEMPORARY IMPACTS IN SURFACE WATER |





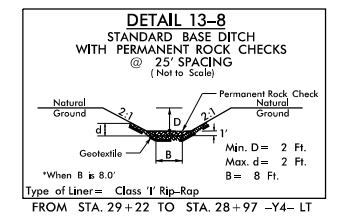


## LEGEND

- F** DENOTES FILL IN WETLAND

**TS** DENOTES TEMPORARY IMPACTS IN SURFACE WATER

**S** DENOTES IMPACTS IN SURFACE WATER

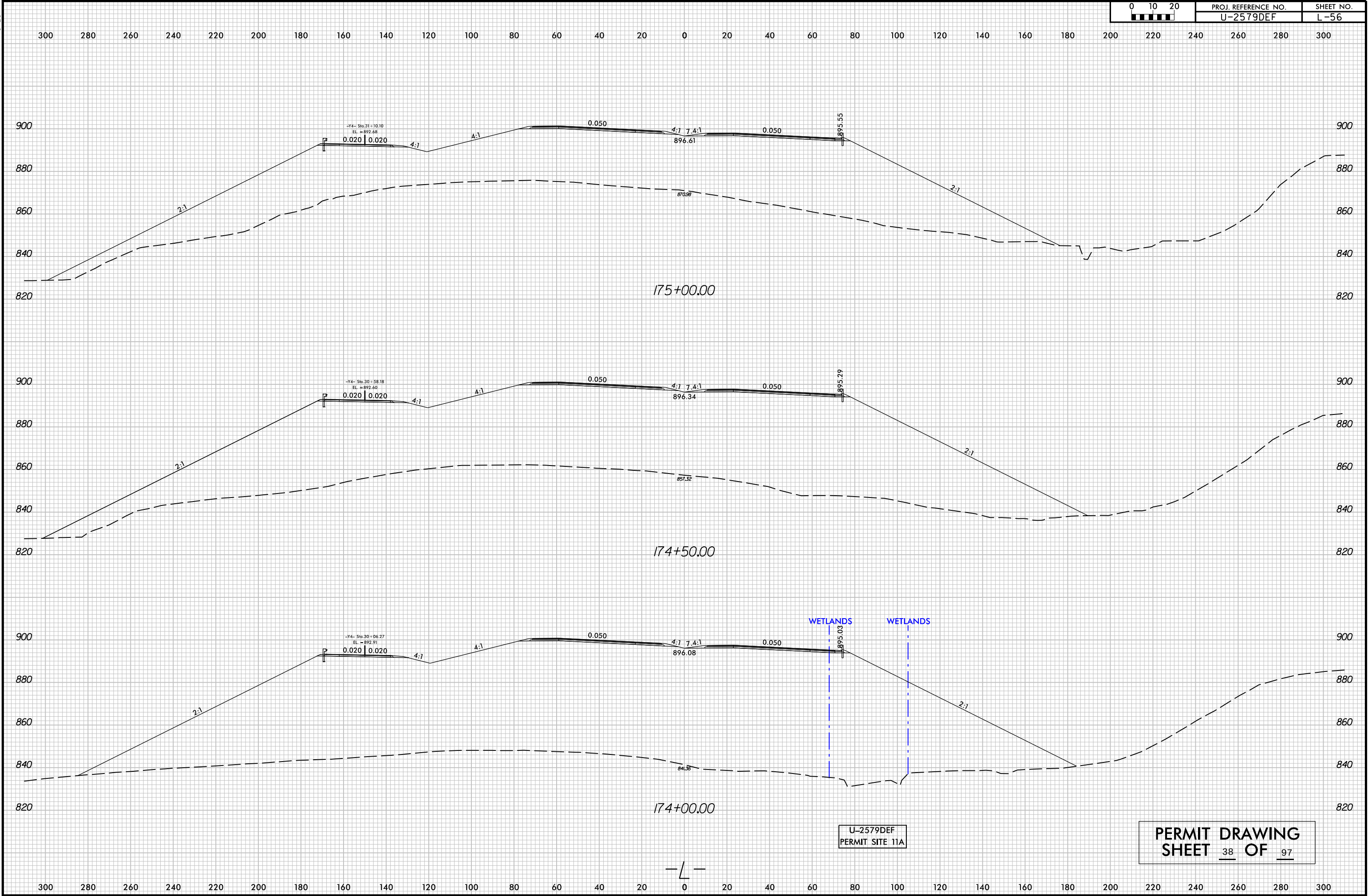


 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

 DENOTES IMPACTS IN SURFACE WATER

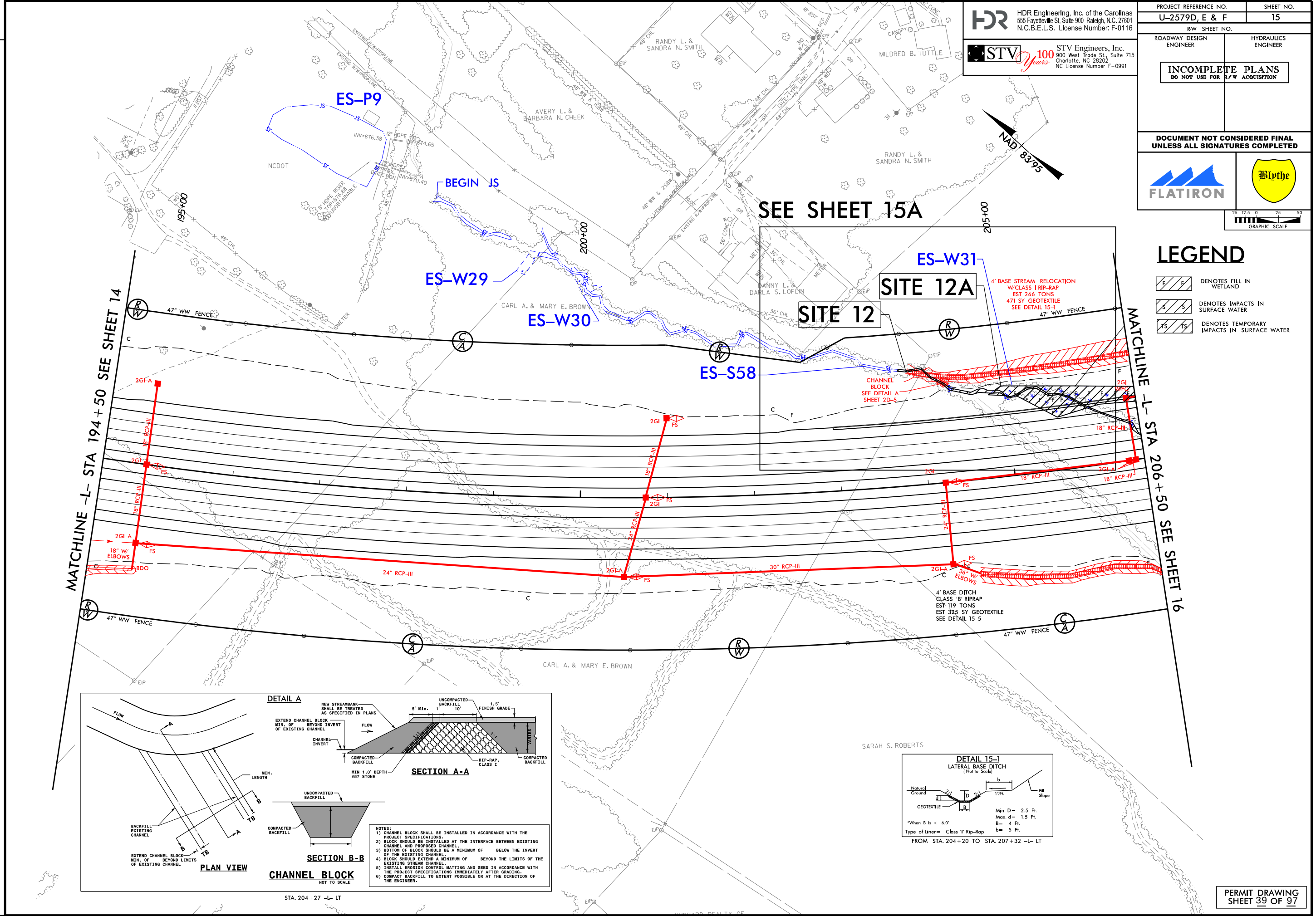
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TIME: 6:10:41 PM

8/23/99



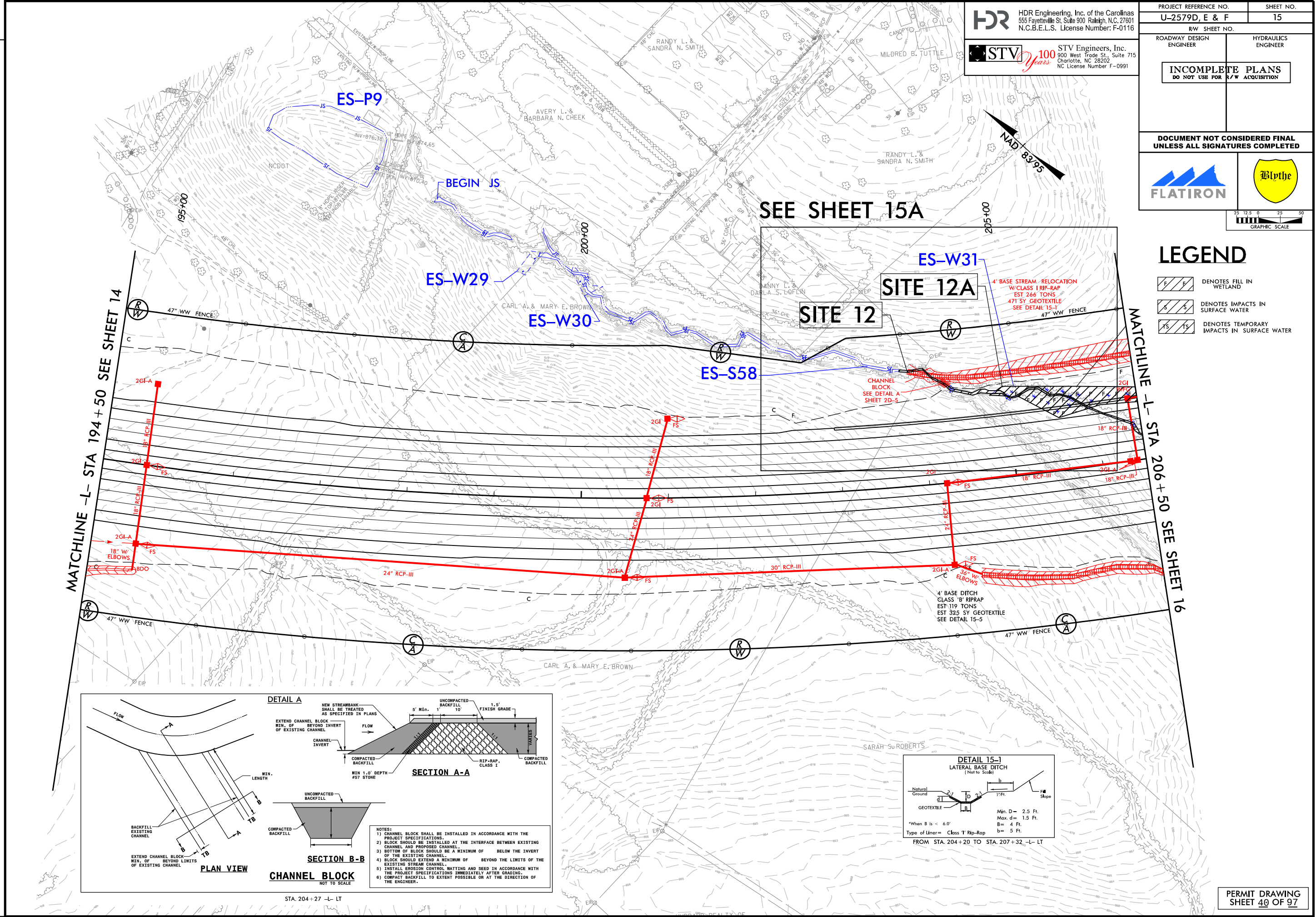


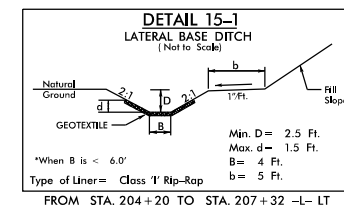
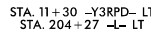
REVISIONS





REVISIONS





 DENOTES FILL IN WETLAND

 DENOTES IMPACTS IN SURFACE WATER

 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

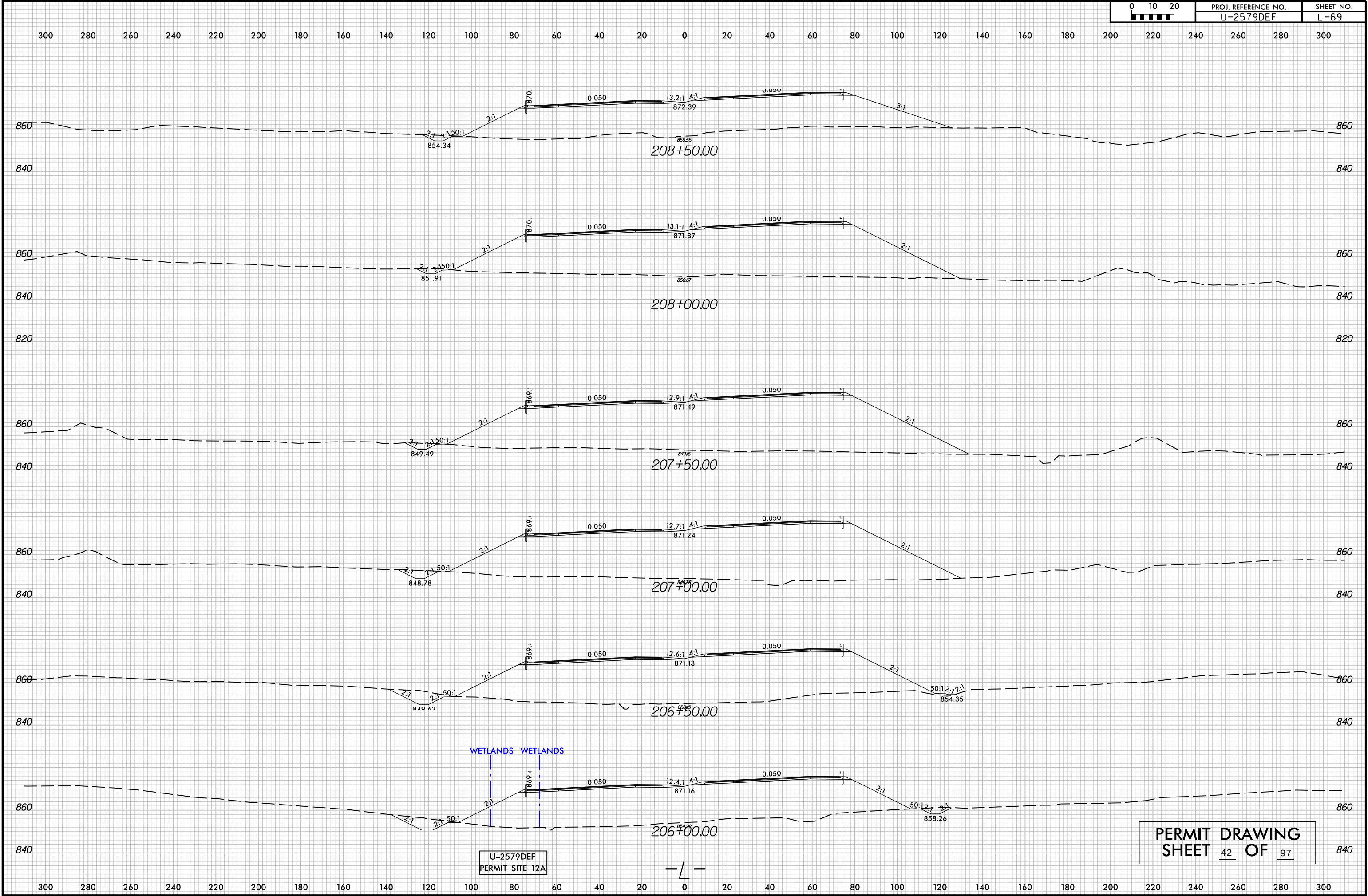


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FILE: U2579DEF\_PRM\_XPL.L.HDR.dgn

DATE: 10/17/2018

TIME: 6:10:43 PM

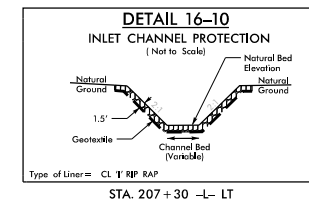
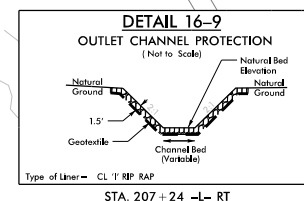
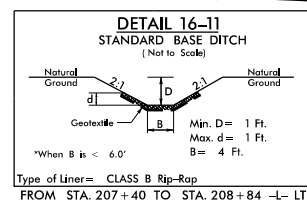
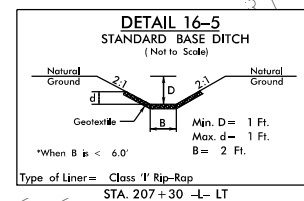
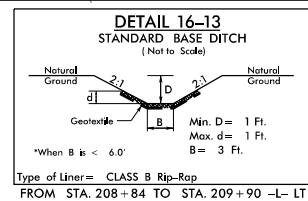
8/23/99



 DENOTES FILL IN WETLAND

 DENOTES IMPACTS IN SURFACE WATER

 DENOTES TEMPORARY IMPACTS IN SURFACE WATER



PERMIT DRAWING  
SHEET 43 OF 97

PLOT DRIVER: NCDOT\_pdf\_color\_eng.100.plt  
PENTABLE: NCDOT\_permits\_NUON.tbl  
USER: BSTEFFEN  
DATE: 10/25/2018  
TIME: 5:52:40 PM

DATE: 10/25/2018

TIME: 5:52:40 PM

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USER: BSTEFFEN      DATE: 10/25/2018      TIME: 5:52:40 PM  
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## REVISIONS

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Charlotte, NC 28202  
NC License Number F-0991

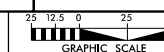
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| PROJECT REFERENCE NO. | SHEET NO. |
| 11 2570D E 8 E        | 14        |

RW SHEET NO.

ENGINEER ENGINEER

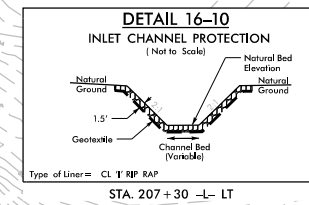
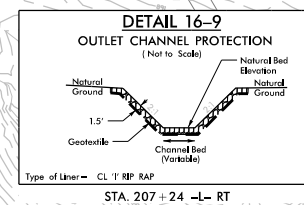
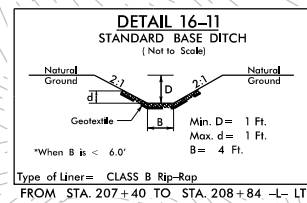
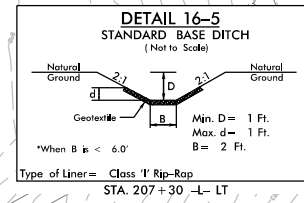
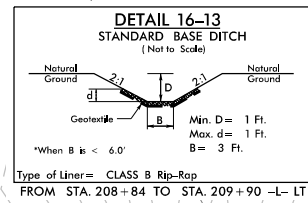
**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETE**





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



RICKY L. PHILLIPS



**V** *100 Years* STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                                                                                                                     |  |                        |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.                                                                                                                               |  | SHEET NO.              |  |
| U-2579D, E & F                                                                                                                                      |  | 16                     |  |
| R/W SHEET NO.                                                                                                                                       |  |                        |  |
| ROADWAY DESIGN<br>ENGINEER                                                                                                                          |  | HYDRAULICS<br>ENGINEER |  |
| <div style="border: 1px solid black; padding: 10px; text-align: center;"> <b>INCOMPLETE PLANS</b><br/> <b>DO NOT USE FOR R/W ACQUISITION</b> </div> |  |                        |  |

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**



5 12.5 0 25 50

GRAPHIC SCALE

MATCHLINE -L- STA 206+50 SEE SHEET 15

**MATCHLINE -L- STA 219 + 50 SEE SHEET 17**

# SITE 12

# SITE 12A

**SITE 13A**

# SITE 13

—BEGIN JS

**-ES-S11**

ES-S10

PENTABLE:NCDOT\_permits\_CON.tbl

TIME: 5:53:16 PM

DATE: 10/25/2018

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USER: BSTEFFEN

FILE: Flatiron\_Construction\_Corp.\Flatiron-U-2579-D-E-F\_WS\6.0\_CAD-BIM\6.2\_WIP\U-2579DEF\_Hydraulics\PERMITS\_Environmental\Drawings\U2579DEF\_PPM\_4C\_PSH.dgn

## REVISIONS

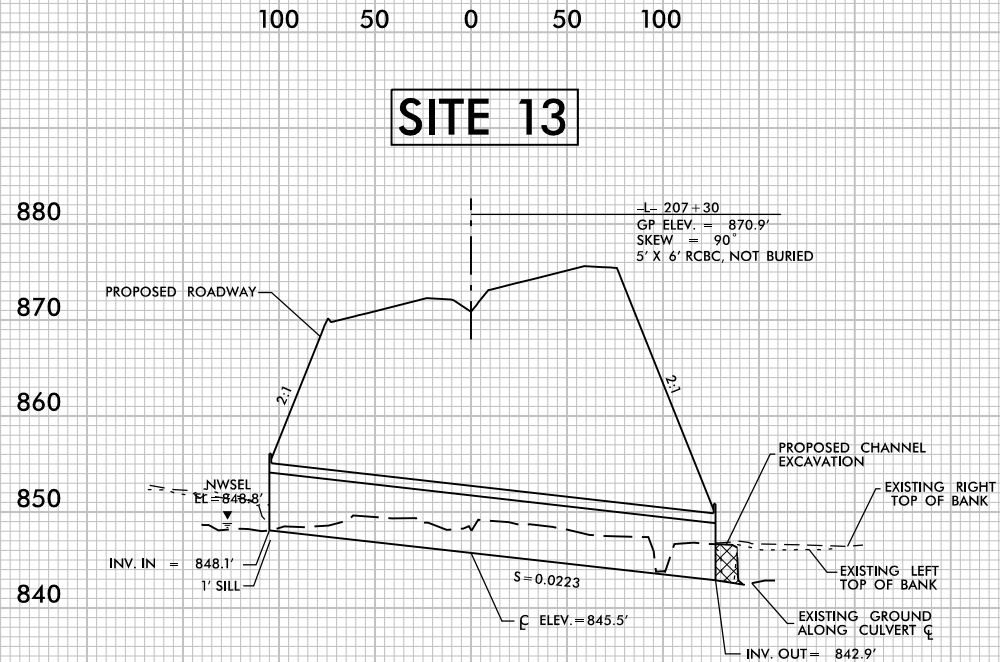
PERMIT DRAWING  
SHEET 44 OF 97

5/14/99

| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL



PROFILE ALONG C OF CULVERT




 DENOTES IMPACTS IN SURFACE WATER (POND)  
 DENOTES IMPACTS IN SURFACE WATER  
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NCDOT OWNED PROPERTY

MATCHLINE SEE SHEET 17A

## DRAIN POND

THE LOCATION AND STABILIZATION OF CHANNEL MAY BE ADJUSTED BY THE ENGINEER IN THE FIELD.

ES-P2

# SITE 14A

MATCHLINE -L- STA 219+50 SEE SHEET 16

—BEGIN JS

ES-S13

## SITE 14

**DETAIL 17-7**  
**TOE PROTECTION**  
(Not to Scale)

5d

5

Type of Liner= CLASS B Rip-Rap

FROM STA. 221+90 TO STA. 223+30 -L- LT  
FROM STA. 219+94 TO STA. 222+52 -L- RT

FROM STA. 221+90 TO STA. 223+30 -L- LT  
FROM STA. 219+94 TO STA. 222+52 -L- RT

DETAIL 17-5

**OUTLET CHANNEL PROTECTION**  
(Link to Sample)

Natural  
Elevation

STA. 222+64 -L- LT

PROJECT REFERENCE NO.

SHEET NO.

U-2579D, E &amp; F

---

17

RW SHEET NO.

---

|                |  |
|----------------|--|
| ROADWAY DESIGN |  |
|----------------|--|

HYDRAULICS

ENGINEER

ENGINEER

|  |  |
|--|--|
|  |  |
|--|--|

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INCOMPLETE

ANS

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**



MATCHLINE -L- STA 232+50 SEE SHEET 18

PERMIT DRAWING  
SHEET 46 OF 97

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## REVISIONS

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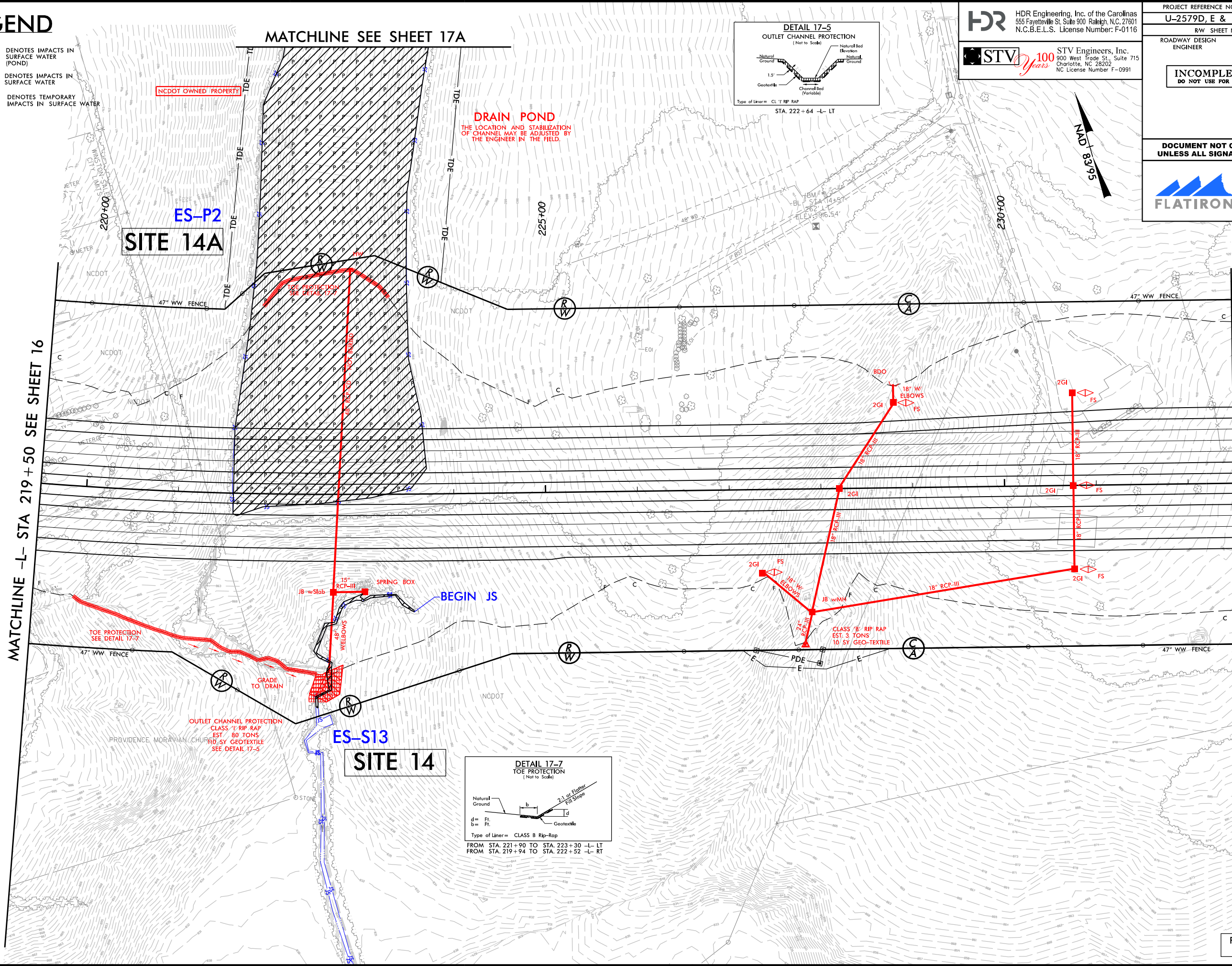
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TIME: 10/16/13 AM  
DATE: 10/22/2018  
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REVISIONS

# LEGEND

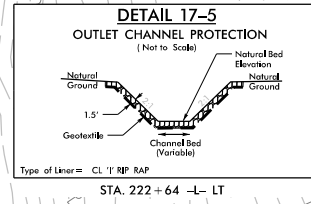
- DENOTES IMPACTS IN SURFACE WATER (POND)
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MATCHLINE -L- STA 219+50 SEE SHEET 16

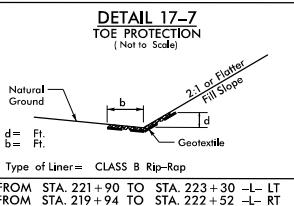


MATCHLINE SEE SHEET 17A

**DRAIN POND**  
THE LOCATION AND STABILIZATION  
OF CHANNEL MAY BE ADJUSTED BY  
THE ENGINEER IN THE FIELD.



STA. 222+64 -L- LT



FROM STA. 221+90 TO STA. 223+30 -L- LT  
FROM STA. 219+94 TO STA. 222+52 -L- RT

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NC License Number F-0991

|                                                                                     |  |                                                                                     |  |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.<br>U-2579D, E & F                                             |  | SHEET NO.<br>17                                                                     |  |
| RW SHEET NO.                                                                        |  | HYDRAULICS ENGINEER                                                                 |  |
| ROADWAY DESIGN ENGINEER                                                             |  | HYDRAULICS ENGINEER                                                                 |  |
| <div>INCOMPLETE PLANS<br/>DO NOT USE FOR A/W ACQUISITION</div>                      |  |                                                                                     |  |
|                                                                                     |  |                                                                                     |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |  |                                                                                     |  |
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|  |  |                                                                                     |  |

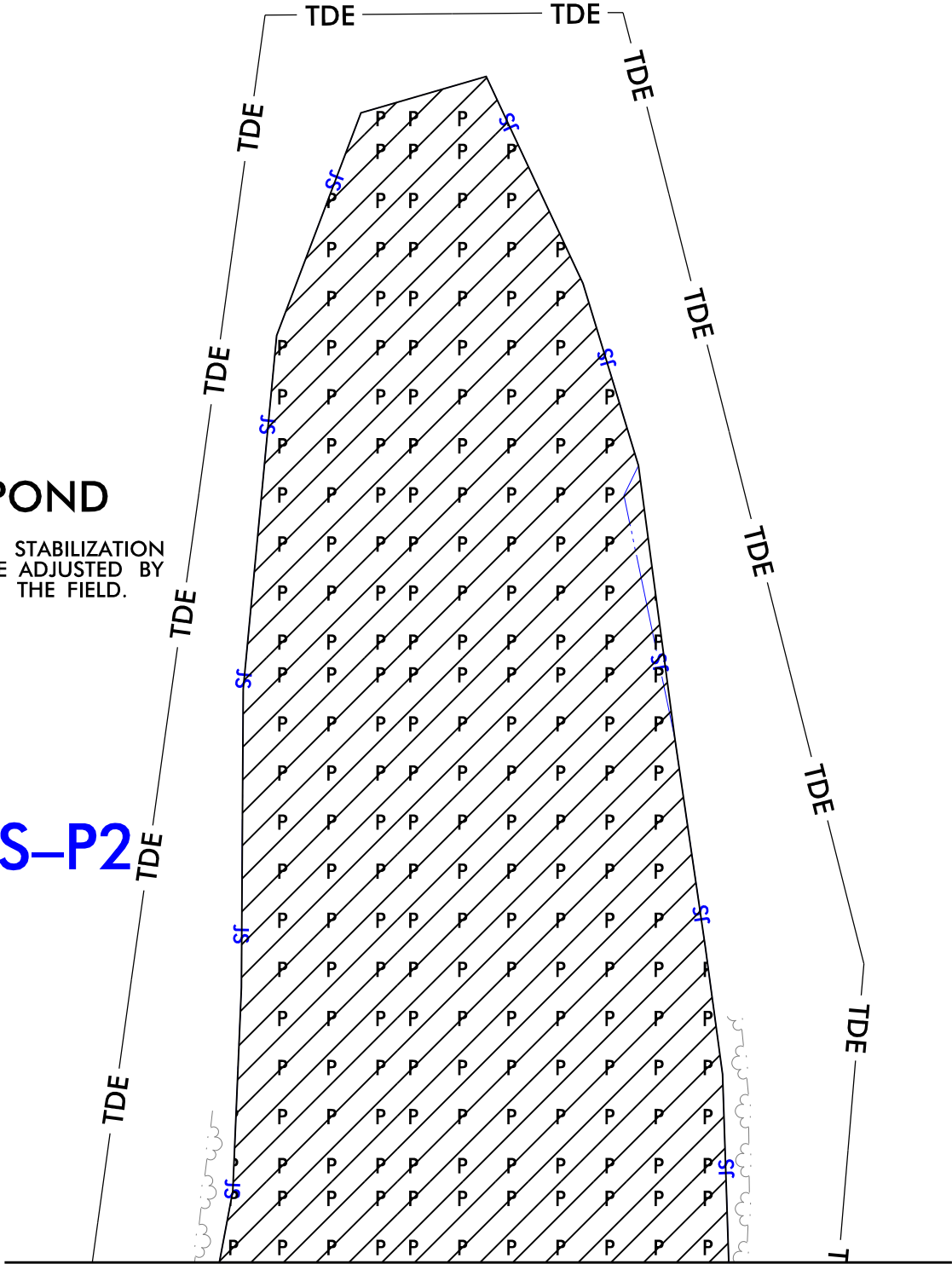
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REVISIONS

**DRAIN POND**  
THE LOCATION AND STABILIZATION  
OF CHANNEL MAY BE ADJUSTED BY  
THE ENGINEER IN THE FIELD.

**ES-P2**



**MATCHLINE SEE SHEET 17**

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Charlotte, NC 28202  
NC License Number F-0991

12.5 0 12.5 25  
GRAPHIC SCALE

|                                                                  |  |                         |  |
|------------------------------------------------------------------|--|-------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>               |  | SHEET NO.<br><b>17A</b> |  |
| ROADWAY DESIGN ENGINEER                                          |  | HYDRAULICS ENGINEER     |  |
| INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION               |  |                         |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |  |                         |  |
|                                                                  |  |                         |  |

**LEGEND**

DENOTES IMPACTS IN  
SURFACE WATER  
(POND)



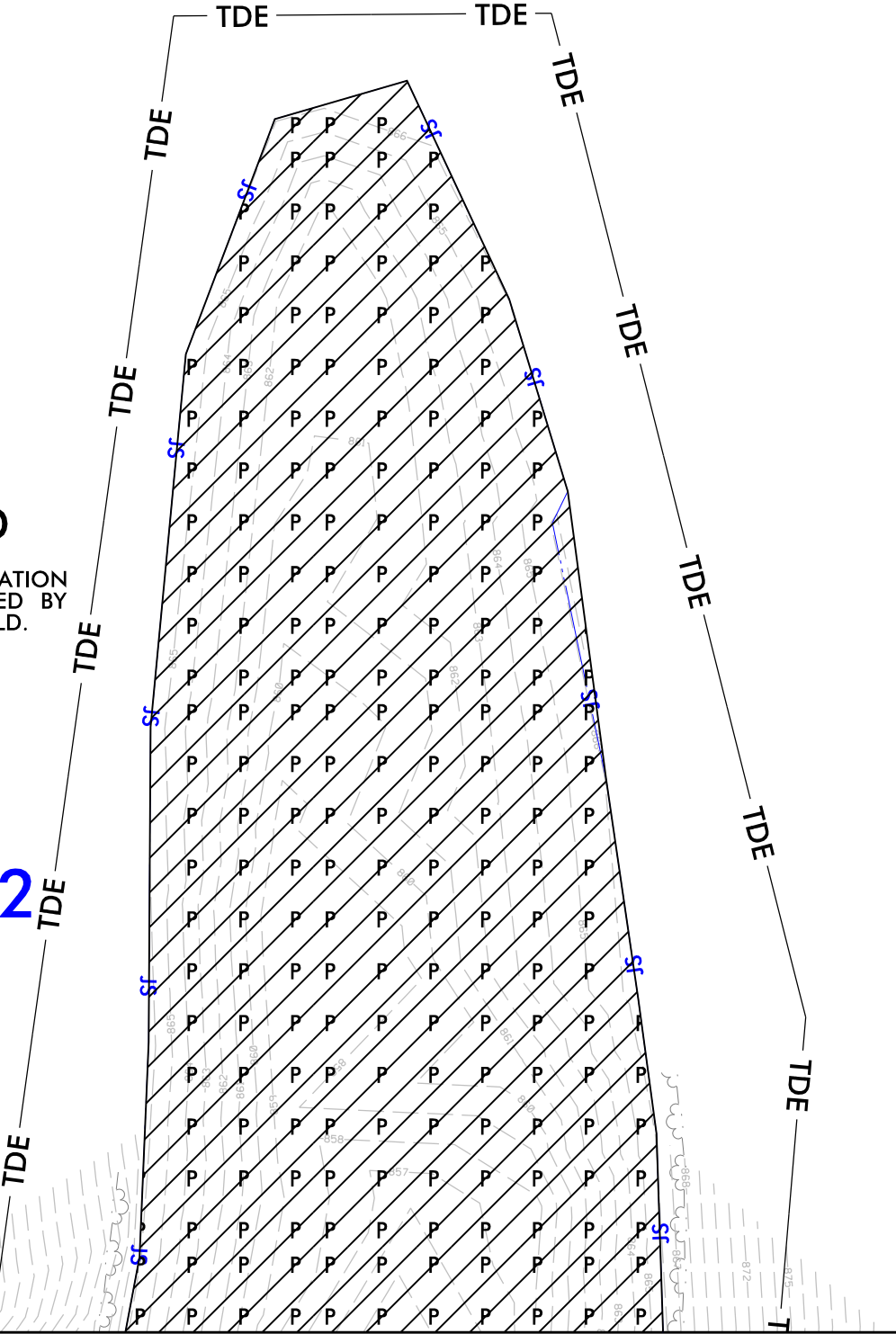
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USER: CMYERS  
FILE: Flatiron.Construction\_Corp.\Flatiron-U-2579.D.E.F.WS\6.0.CAD.BIM\6.2.WIP\U-2579DEF\Hydraulics\PERMITS\Environmental\Drawings\U2579DEF\_PRM\_4C\_PSH.dgn

PENTABLE: NCDOT\_permits.CON.tbl  
DATE: 10/17/2018  
TIME: 5:59:09 PM

REVISIONS

**DRAIN POND**  
THE LOCATION AND STABILIZATION  
OF CHANNEL MAY BE ADJUSTED BY  
THE ENGINEER IN THE FIELD.

**ES-P2**



**LEGEND**



DENOTES IMPACTS IN  
SURFACE WATER  
(POND)



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Charlotte, NC 28202  
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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**17A**

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS  
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED





12.5 0 12.5 25  
GRAPHIC SCALE

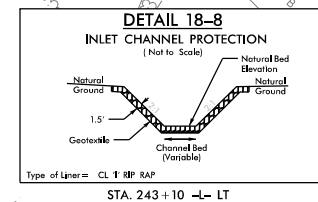
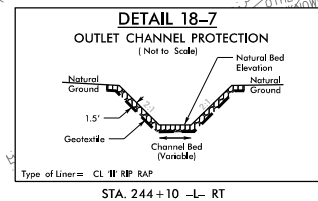
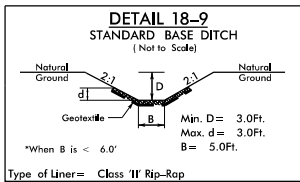
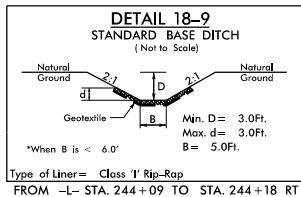
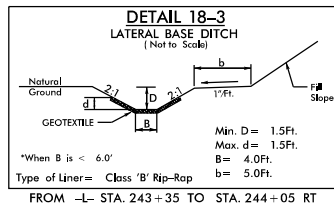
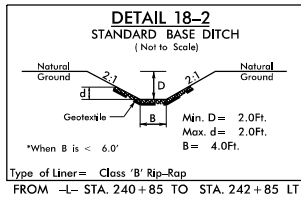
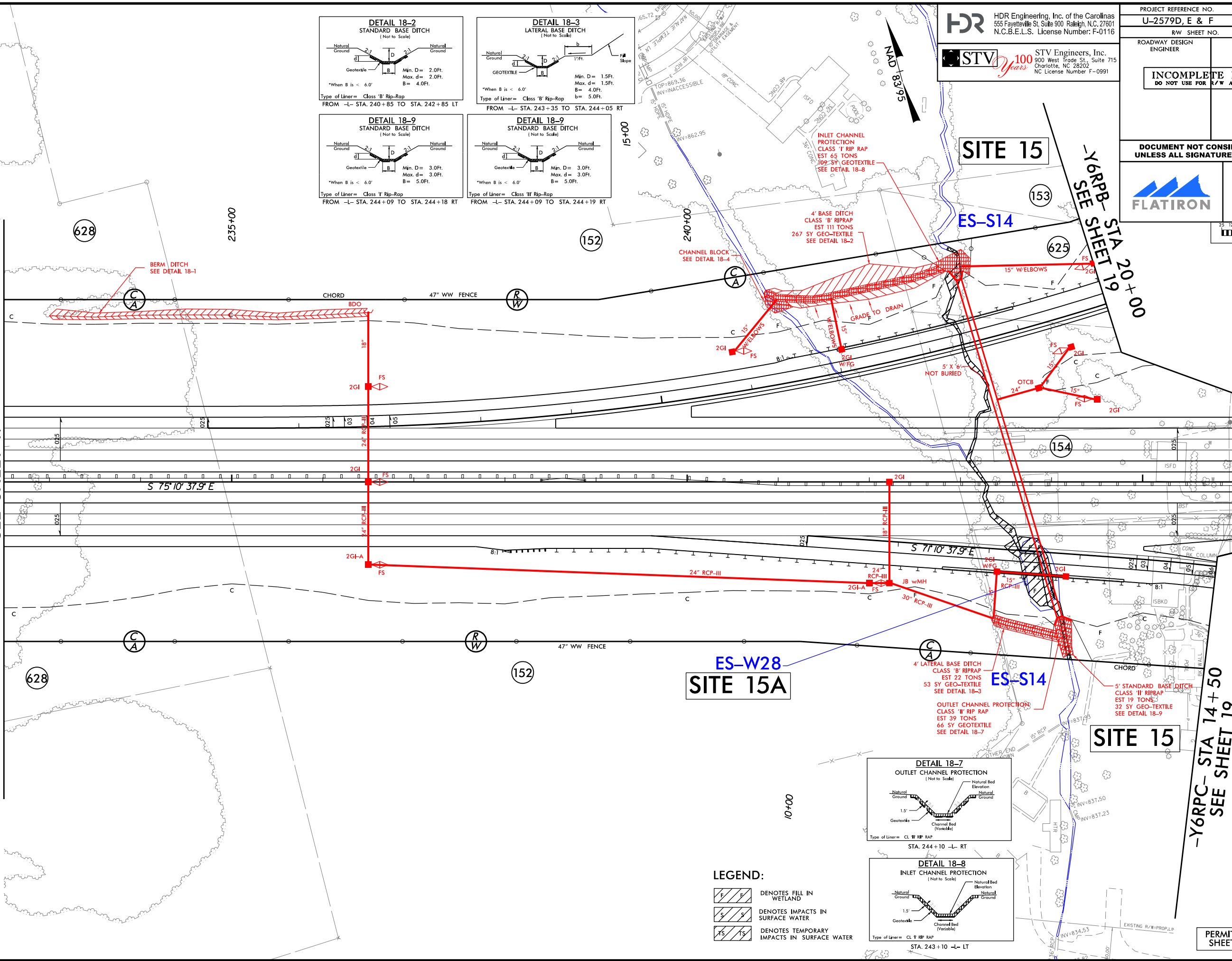
  
NAD 83/95

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PENTABLE: NCDOT\_permits.CON.tbl  
DATE: 10/17/2018  
TIME: 5:59:09 PM

REVISIONS

MATCHLINE -L- STA 232 + 50  
SEE SHEET 17



LEGEND:

- DENOTES FILL IN WETLAND
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER

|                                                                         |  |                        |  |
|-------------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                      |  | SHEET NO.<br><b>18</b> |  |
| RW SHEET NO.                                                            |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                 |  | HYDRAULICS ENGINEER    |  |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |  |                        |  |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |  |                        |  |
|                                                                         |  |                        |  |
| GRAPHIC SCALE<br>0 12.5 25 50                                           |  |                        |  |

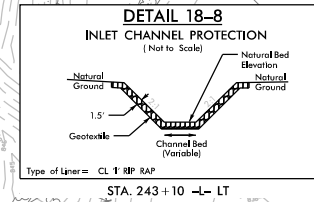
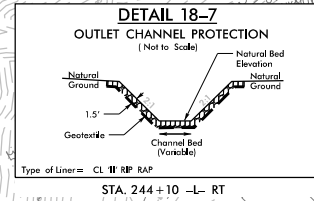
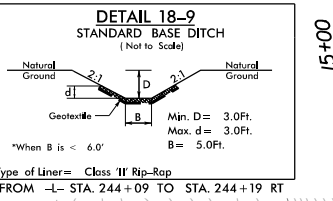
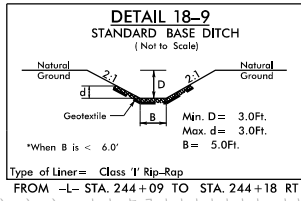
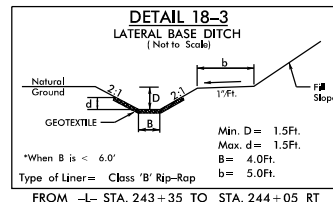
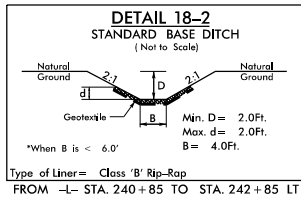
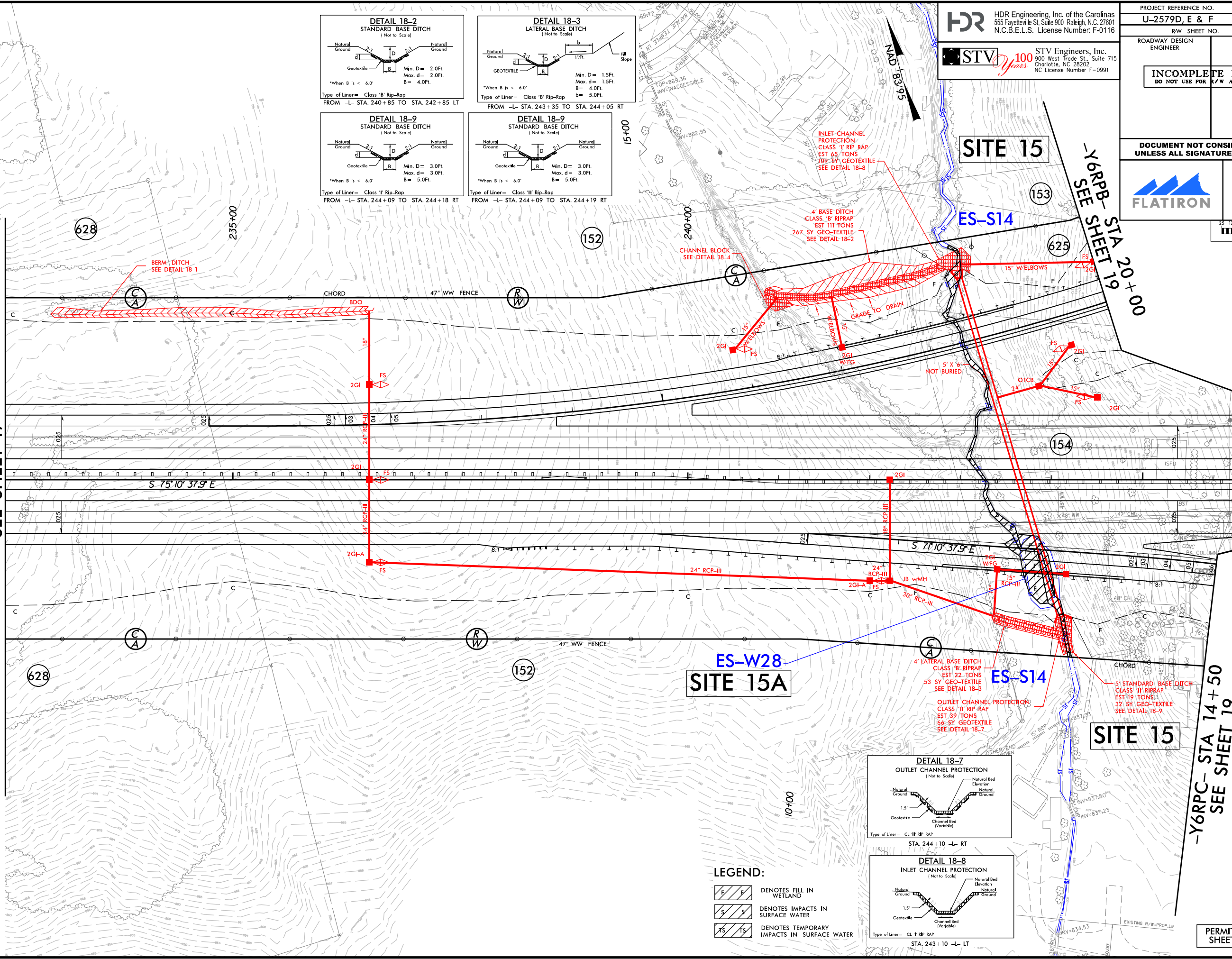
MATCHLINE  
-L- STA 246 + 00  
SEE SHEET 19

-Y6RPC- STA 14 + 50  
SEE SHEET 19



REVISIONS

MATCHLINE -L- STA 232 + 50  
SEE SHEET 17



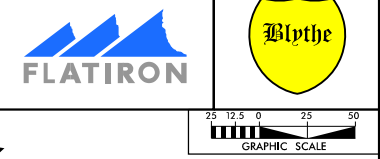
- LEGEND:**
- DENOTES FILL IN WETLAND
  - DENOTES IMPACTS IN SURFACE WATER
  - DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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NC License Number F-0991

|                                                    |                     |
|----------------------------------------------------|---------------------|
| PROJECT REFERENCE NO.                              | SHEET NO.           |
| U-2579D, E & F                                     | 18                  |
| RW SHEET NO.                                       |                     |
| ROADWAY DESIGN ENGINEER                            | HYDRAULICS ENGINEER |
| INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION |                     |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

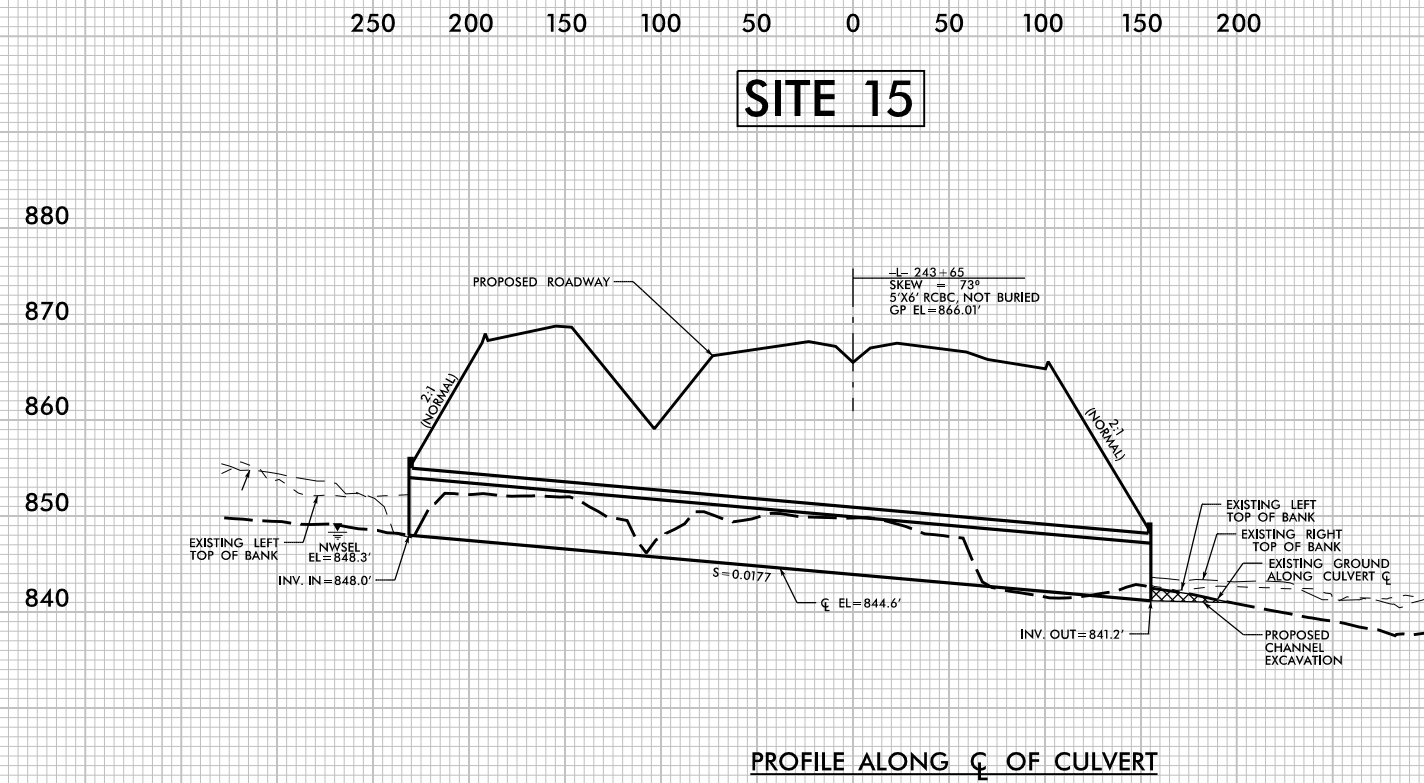


MATCHLINE  
-L- STA 246 + 00  
SEE SHEET 19

-Y6RPC- STA 14 + 50  
SEE SHEET 19

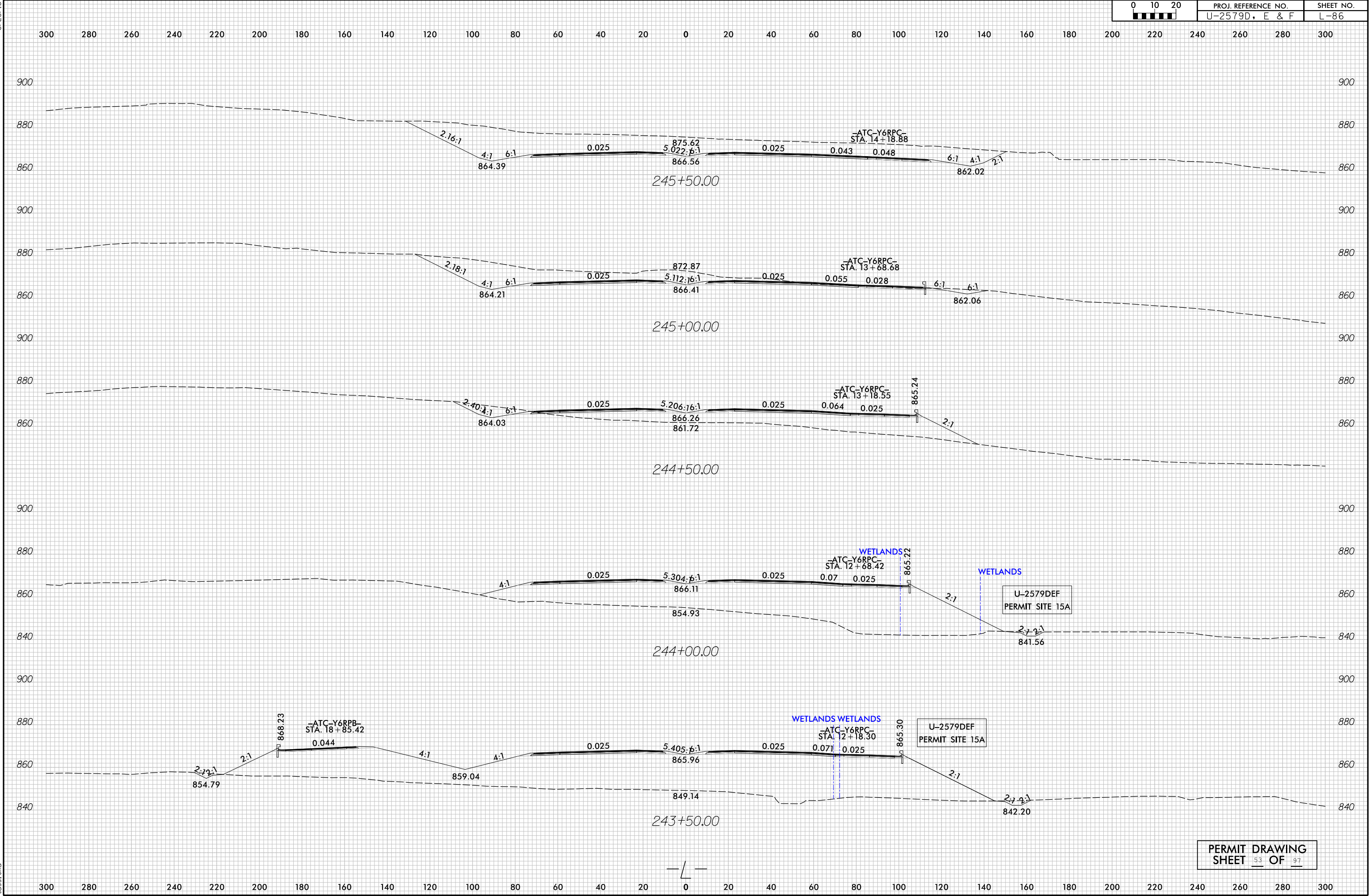
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UNLESS ALL SIGNATURES COMPLETED**

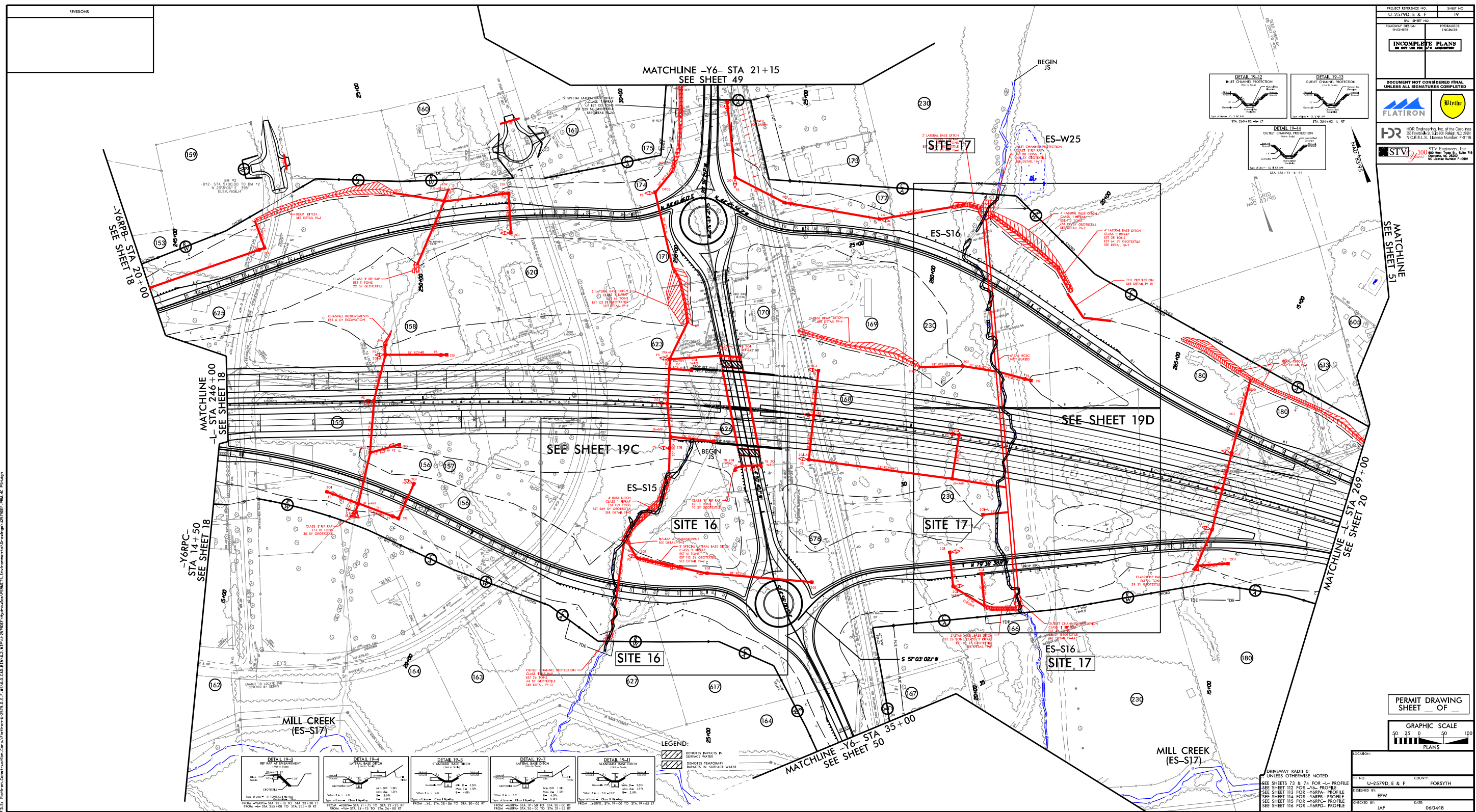
SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL



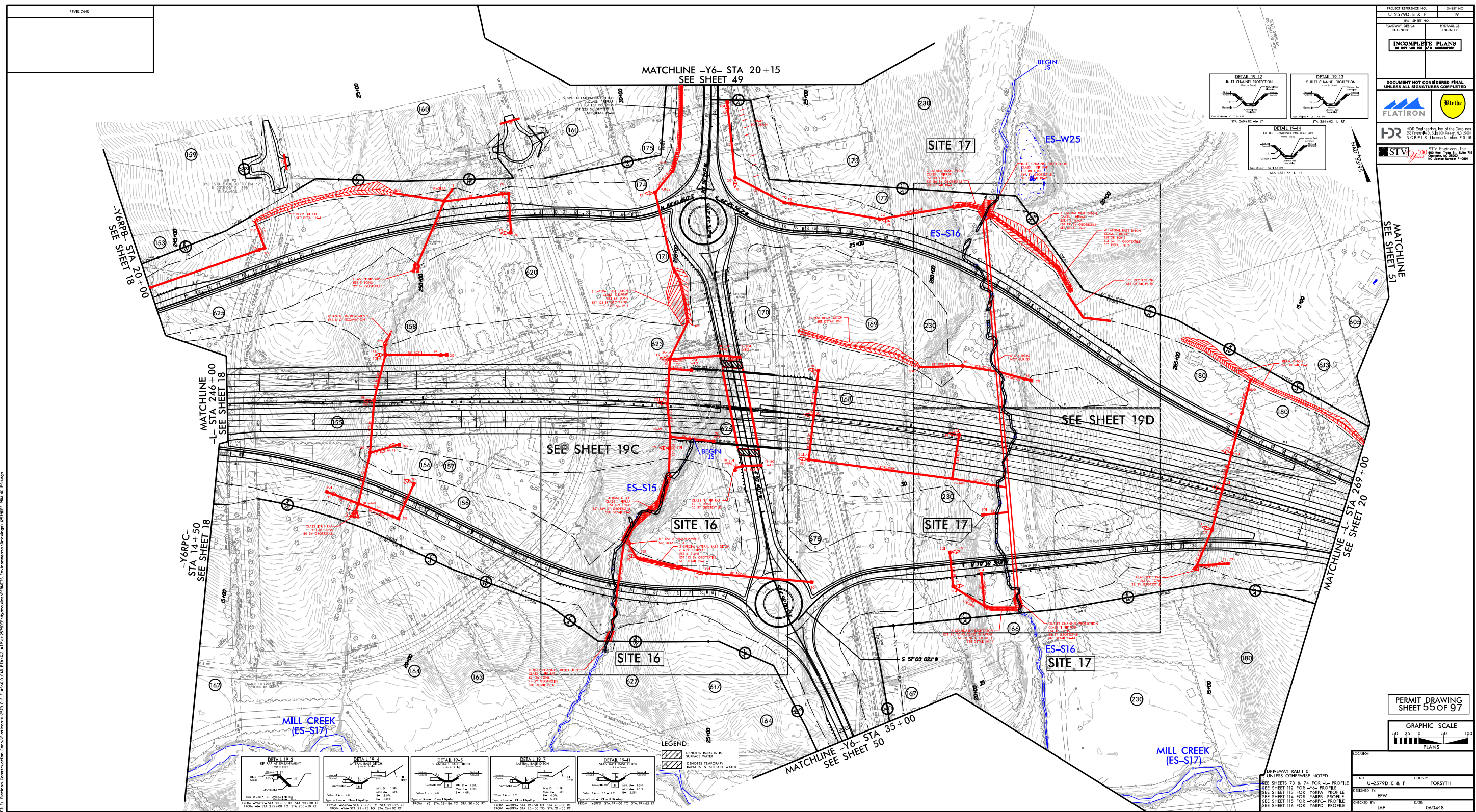


6/23/16











 DENOTES IMPACTS IN SURFACE WATER

 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

BEGIN  
JS

[illegible]

**DETAIL 19-12**  
**INLET CHANNEL PROTECTION**  
 (Not to Scale)

Natural Ground

1.5'

Geotextile

Channel Bed (Variable)

Natural Bed Elevation

Natural Ground

Type of Liner = CL T RP RAP

STA. 260 + 82 -L- LT

## SITE 17

ES-W25

ES-S16

4' LATERAL BASE DITCH  
CLASS 'I' RIPRAP  
EST 113 TONS  
EST 191 SY GEOTEXTILE  
SEE DETAIL 19-7

4' LATERAL BASE DITCH  
CLASS 'I' RIPRAP  
EST 38 TONS  
EST 64 SY GEOTEXTILE  
SEE DETAIL 19-7

TOE PROTECTION  
SEE DETAIL 19-15

2' BASE BERM DITCH -  
GR SEE DETAIL 19-6

**MATCHLINE SEE SHEET 19B**

**MATCHLINE  
SEE SHEET 51**

**MATCHLINE SEE SHEET 19D**

PERMIT DRAWING  
SHEET 56 OF 97



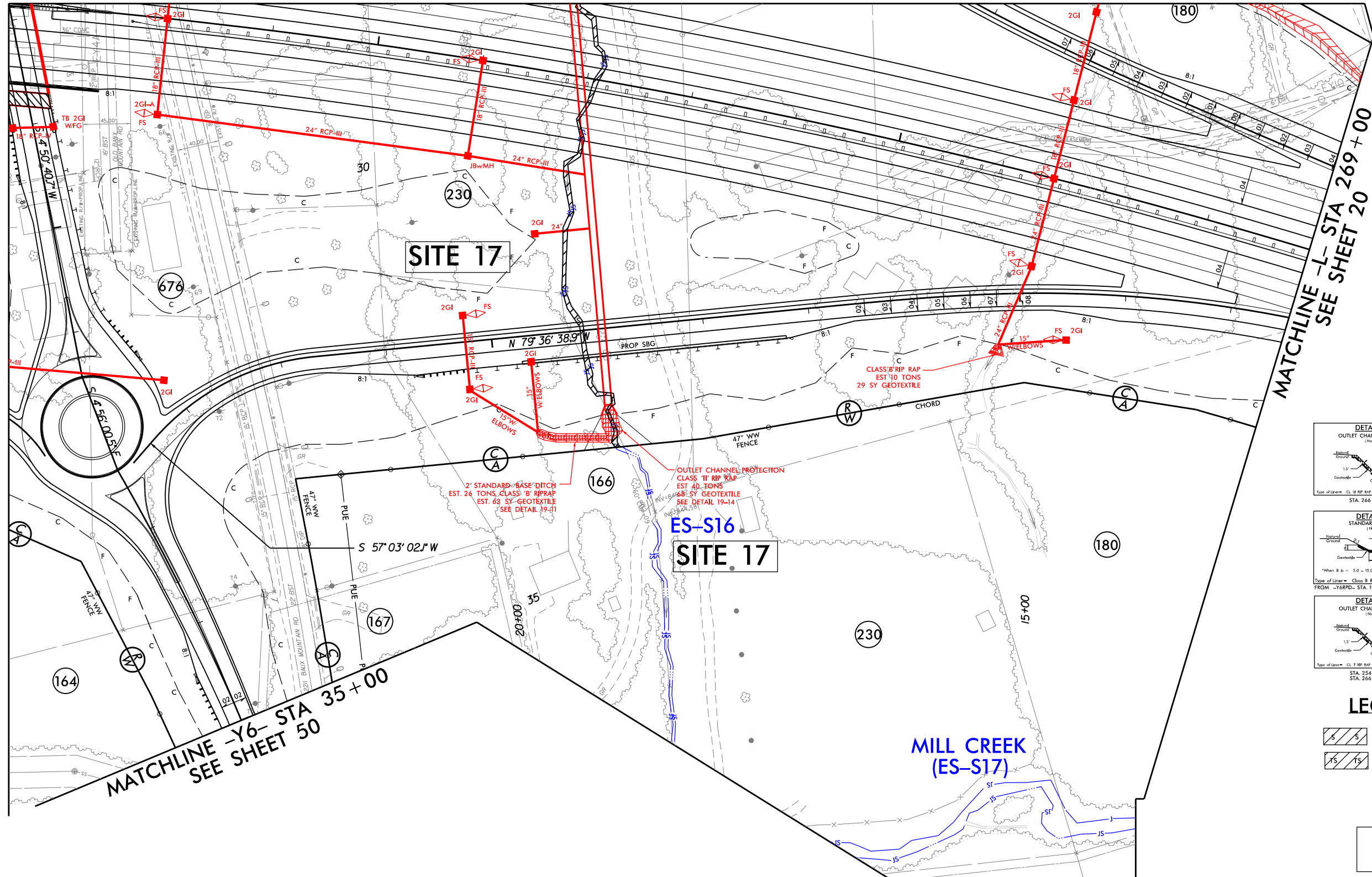


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USER: CMYERS  
DATE: 10/26/2018  
TIME: 10:07:36 AM  
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REVISIONS

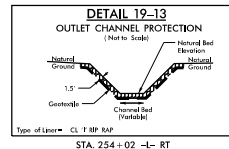
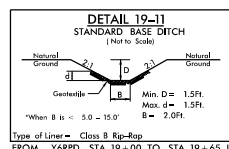
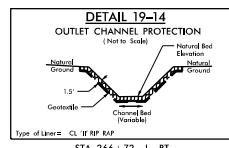
8/17/99

MATCHLINE SEE SHEET 19C



MATCHLINE -Y6- STA 35+00  
SEE SHEET 50

MATCHLINE SEE SHEET 19A



LEGEND

- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER

PERMIT DRAWING  
SHEET 58 OF 97

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900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

FLATIRON

Blythe

25 12.5 0 25 50  
GRAPHIC SCALE

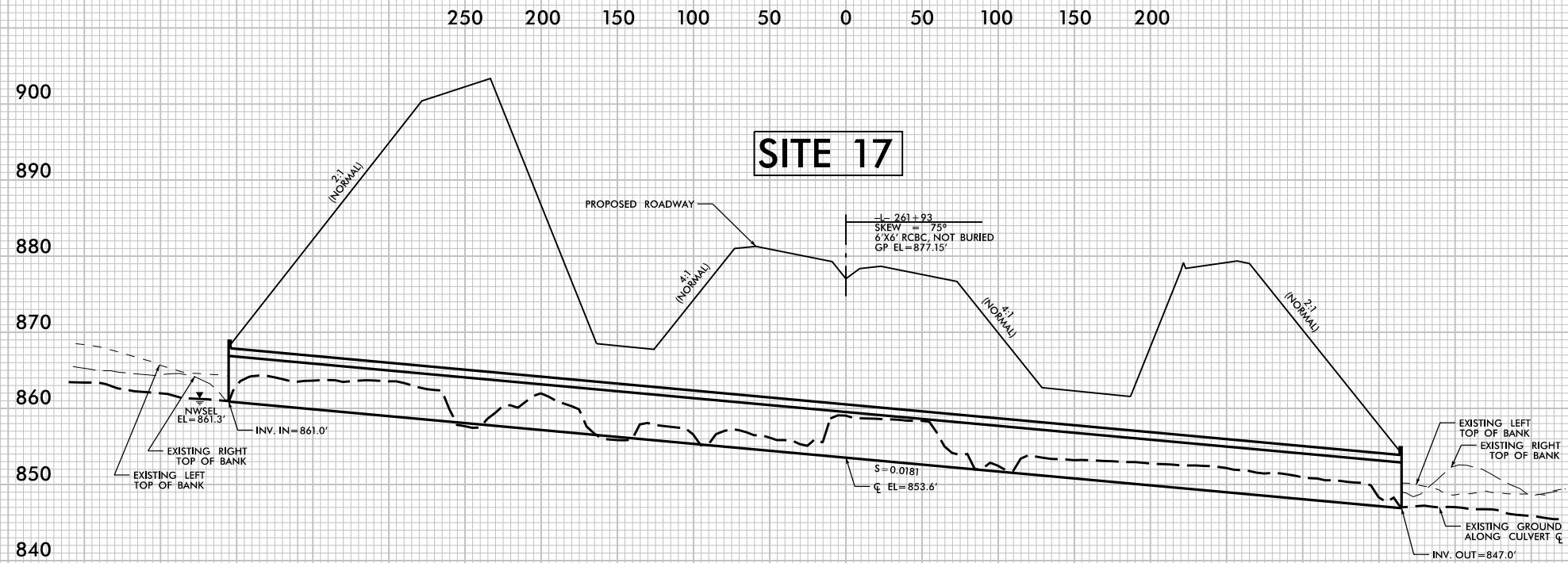
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| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                                                                            |  |
| U-2759D, E & F                                                                      |  | 19D                                                                                                                                  |  |
|                                                                                     |  | ROADWAY DESIGN<br>ENGINEER                                                                                                           |  |
| <div>INCOMPLETE PLANS<br/>DO NOT USE FOR R/W ACQUISITION</div>                      |  |                                                                                                                                      |  |
|                                                                                     |  |                                                                                                                                      |  |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b>            |  |                                                                                                                                      |  |
|  |  | HDR Engineering, Inc. of the Carolinas<br>555 Fayetteville St, Suite 900, Raleigh, N.C. 27601<br>N.C.B.E.L.S. License Number: F-0116 |  |

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| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL

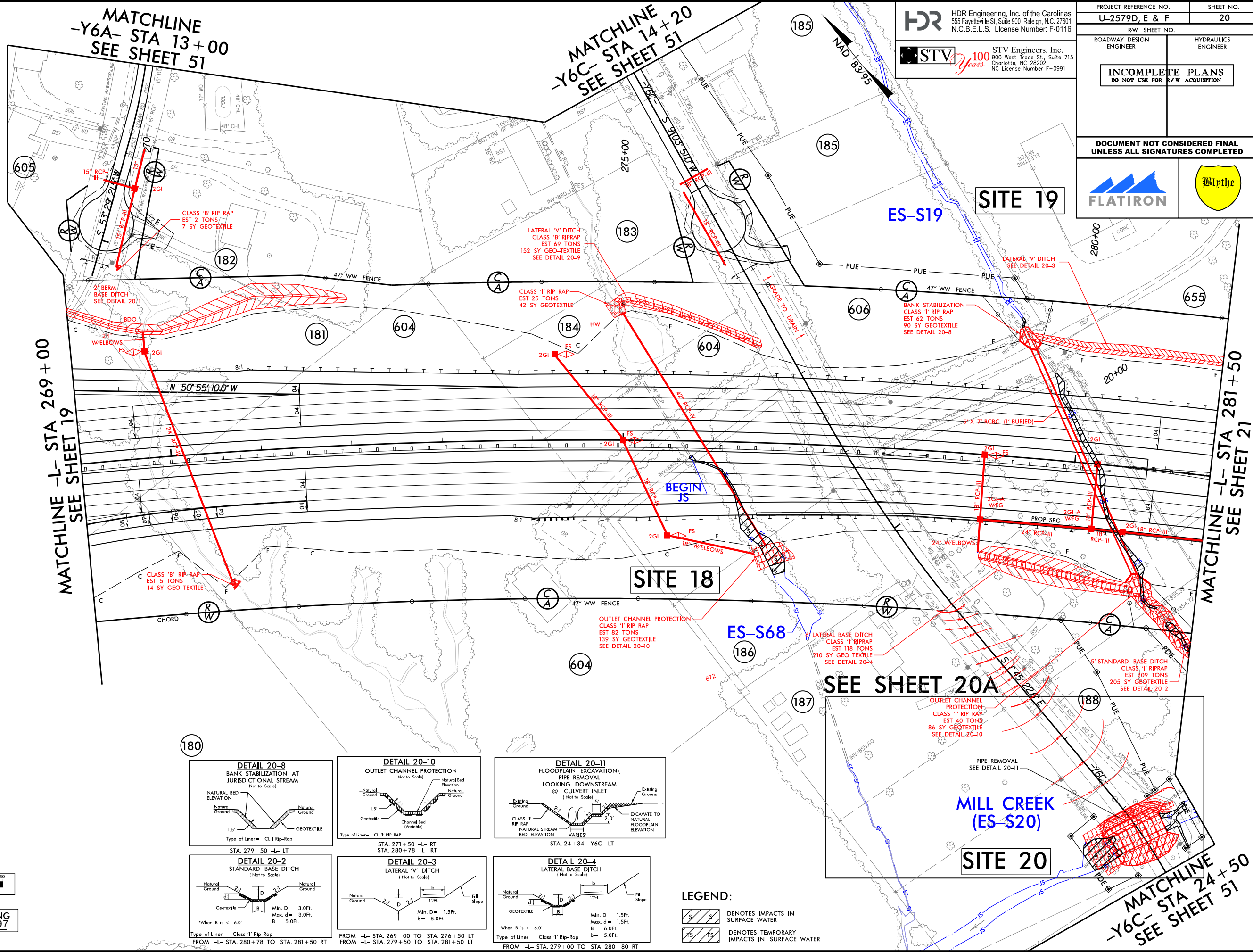


PROFILE ALONG CL OF CULVERT



REVISIONS

25 12.5 0 25 50  
GRAPHIC SCALE  
PERMIT DRAWING  
SHEET 60 OF 97



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|                                                                  |                        |                        |
|------------------------------------------------------------------|------------------------|------------------------|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>               |                        | SHEET NO.<br><b>20</b> |
| RW SHEET NO.                                                     |                        |                        |
| ROADWAY DESIGN<br>ENGINEER                                       | HYDRAULICS<br>ENGINEER |                        |
| INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION               |                        |                        |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |                        |                        |
|                                                                  |                        |                        |



REVISIONS

25 12.5 0 25 50  
GRAPHIC SCALE  
PERMIT DRAWING  
SHEET 61 OF 97

MATCHLINE -L- STA 269+00  
SEE SHEET 19

MATCHLINE  
-Y6A- STA 13+00  
SEE SHEET 51

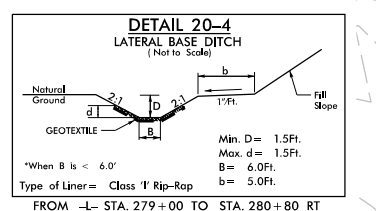
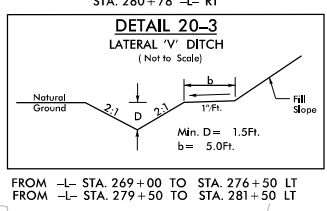
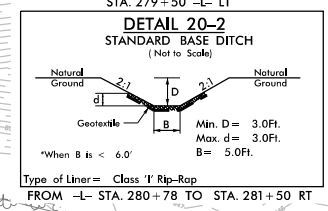
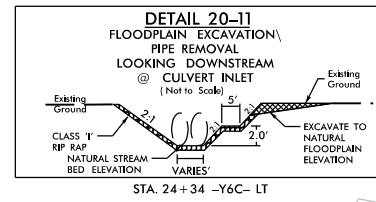
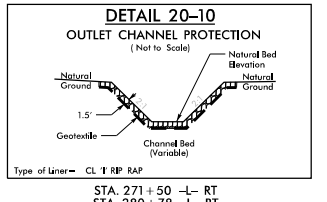
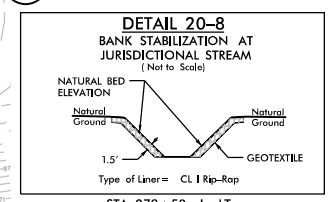
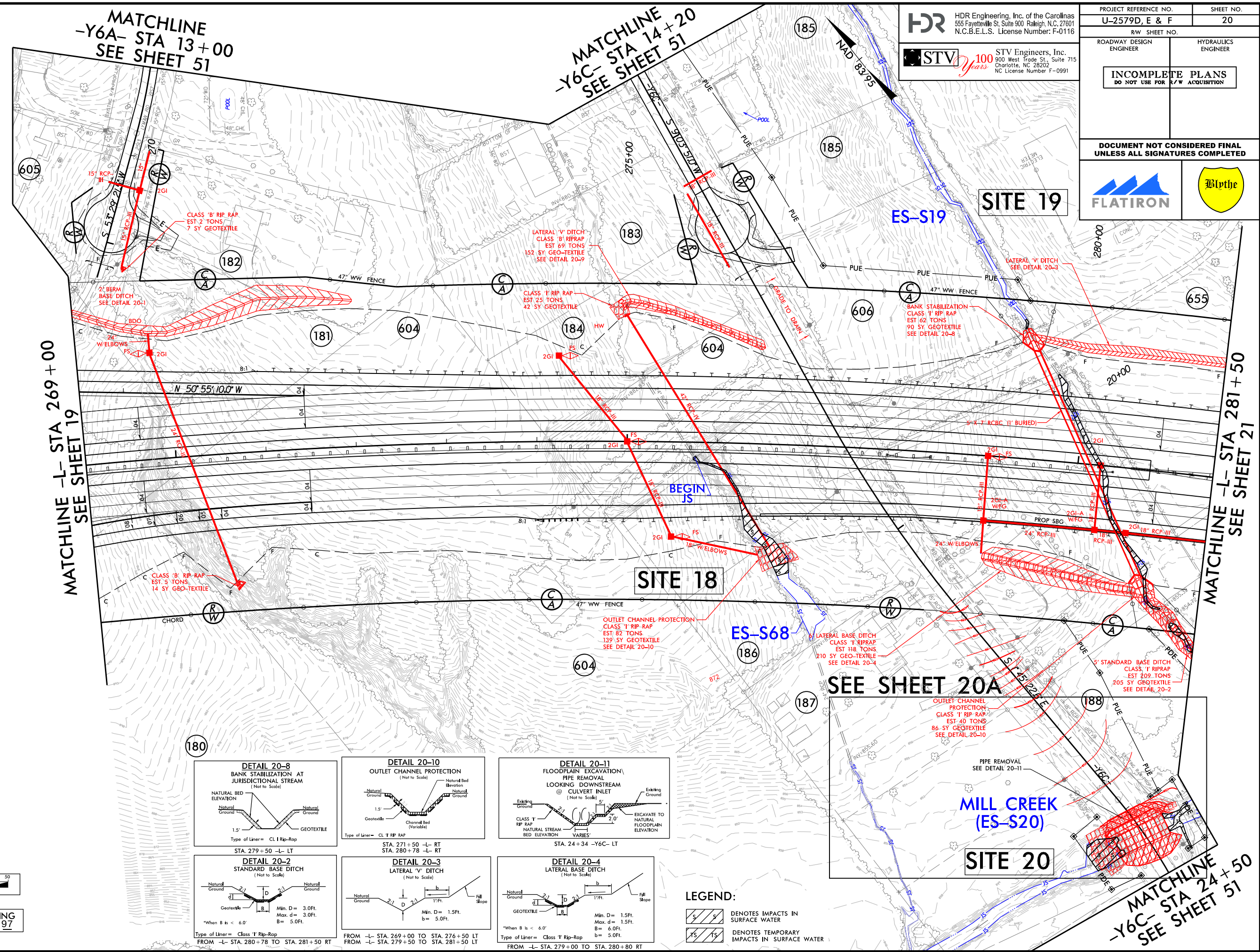
MATCHLINE  
-Y6C- STA 14+20  
SEE SHEET 51

MATCHLINE -L- STA 281+50  
SEE SHEET 21

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|                                                                  |  |                                                    |  |
|------------------------------------------------------------------|--|----------------------------------------------------|--|
| PROJECT REFERENCE NO.<br>U-2579D, E & F                          |  | SHEET NO.<br>20                                    |  |
| RW SHEET NO.                                                     |  | ROADWAY DESIGN ENGINEER                            |  |
| HYDRAULICS ENGINEER                                              |  | INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |  | FLATIRON                                           |  |



- LEGEND:**
- DENOTES IMPACTS IN SURFACE WATER
  - DENOTES TEMPORARY IMPACTS IN SURFACE WATER

MILL CREEK  
(ES-S20)

SITE 20

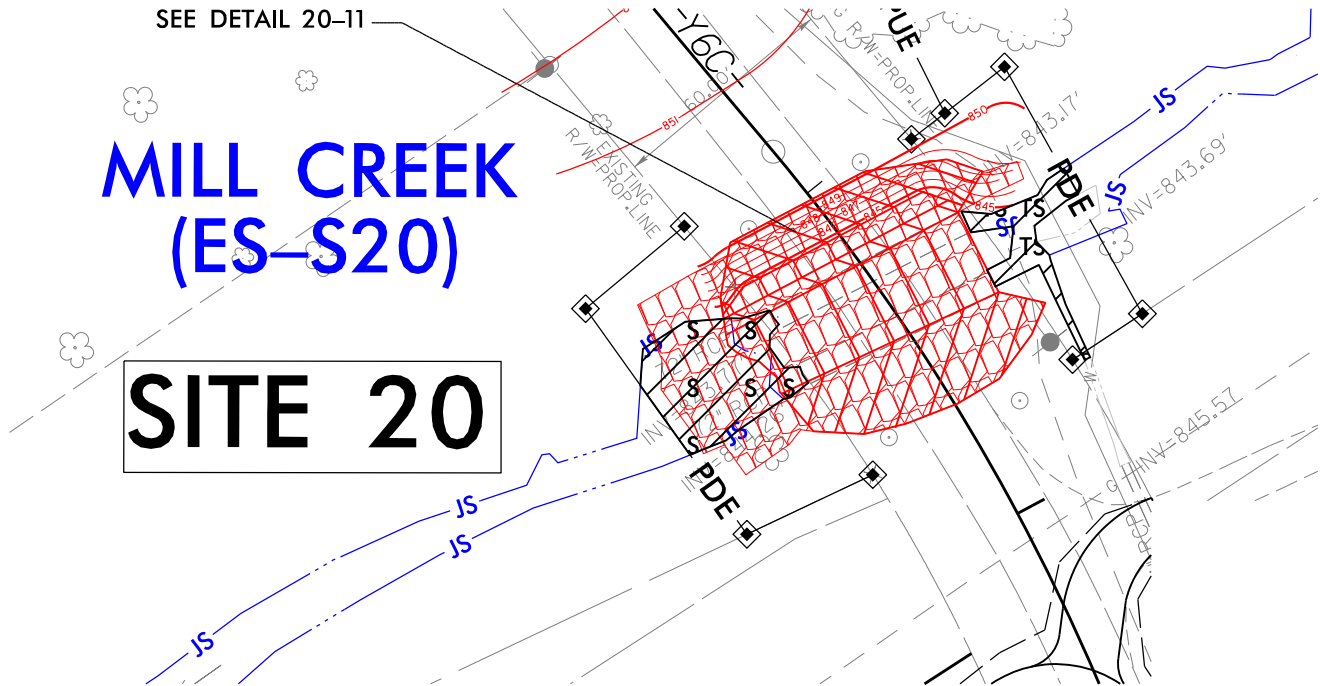
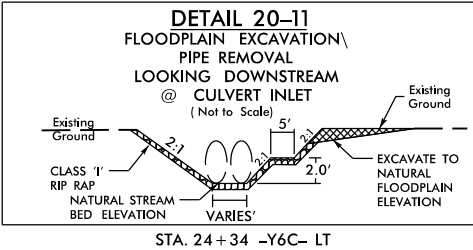
SEE SHEET 20A

SITE 18

SITE 19



REVISIONS



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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**20A**

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

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UNLESS ALL SIGNATURES COMPLETED**

**LEGEND**

DENOTES IMPACTS IN  
SURFACE WATER

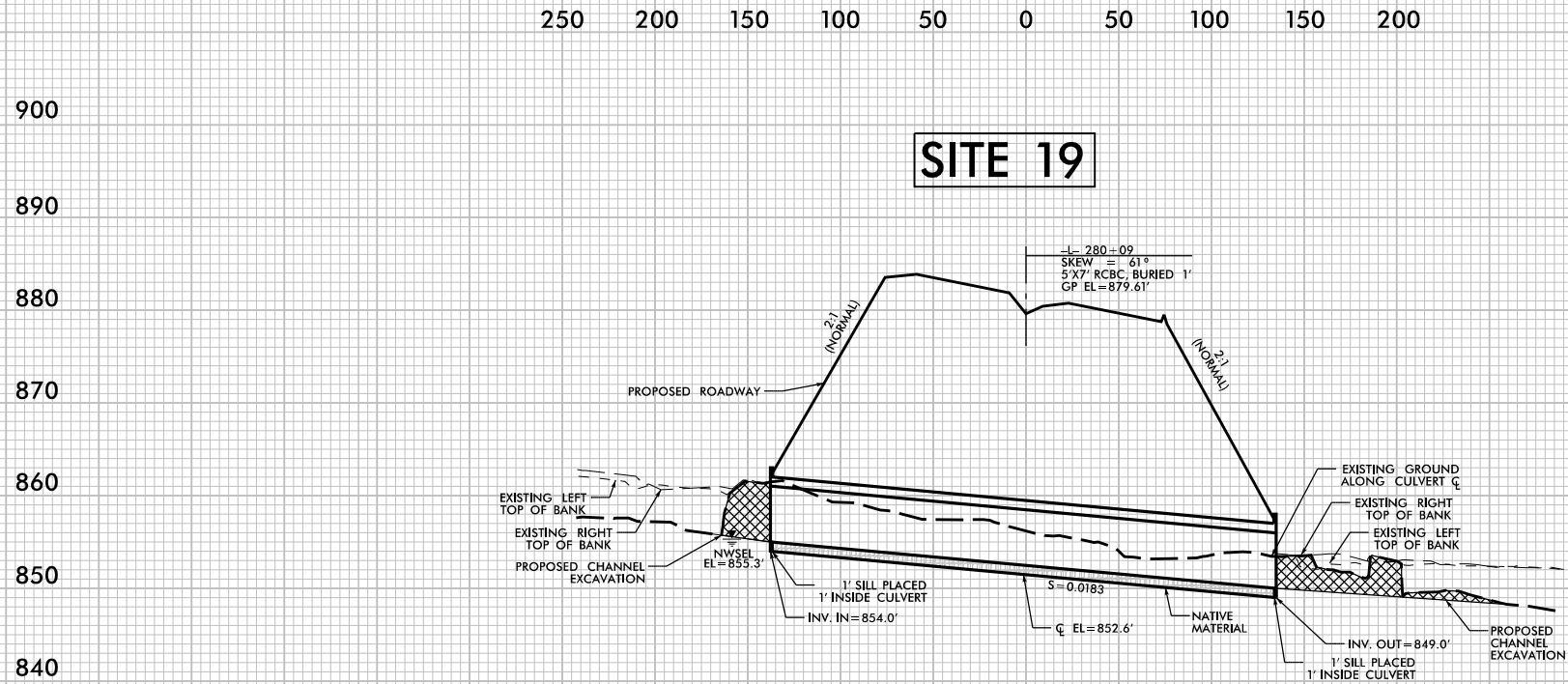
DENOTES TEMPORARY  
IMPACTS IN SURFACE WATER

5/14/99

| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

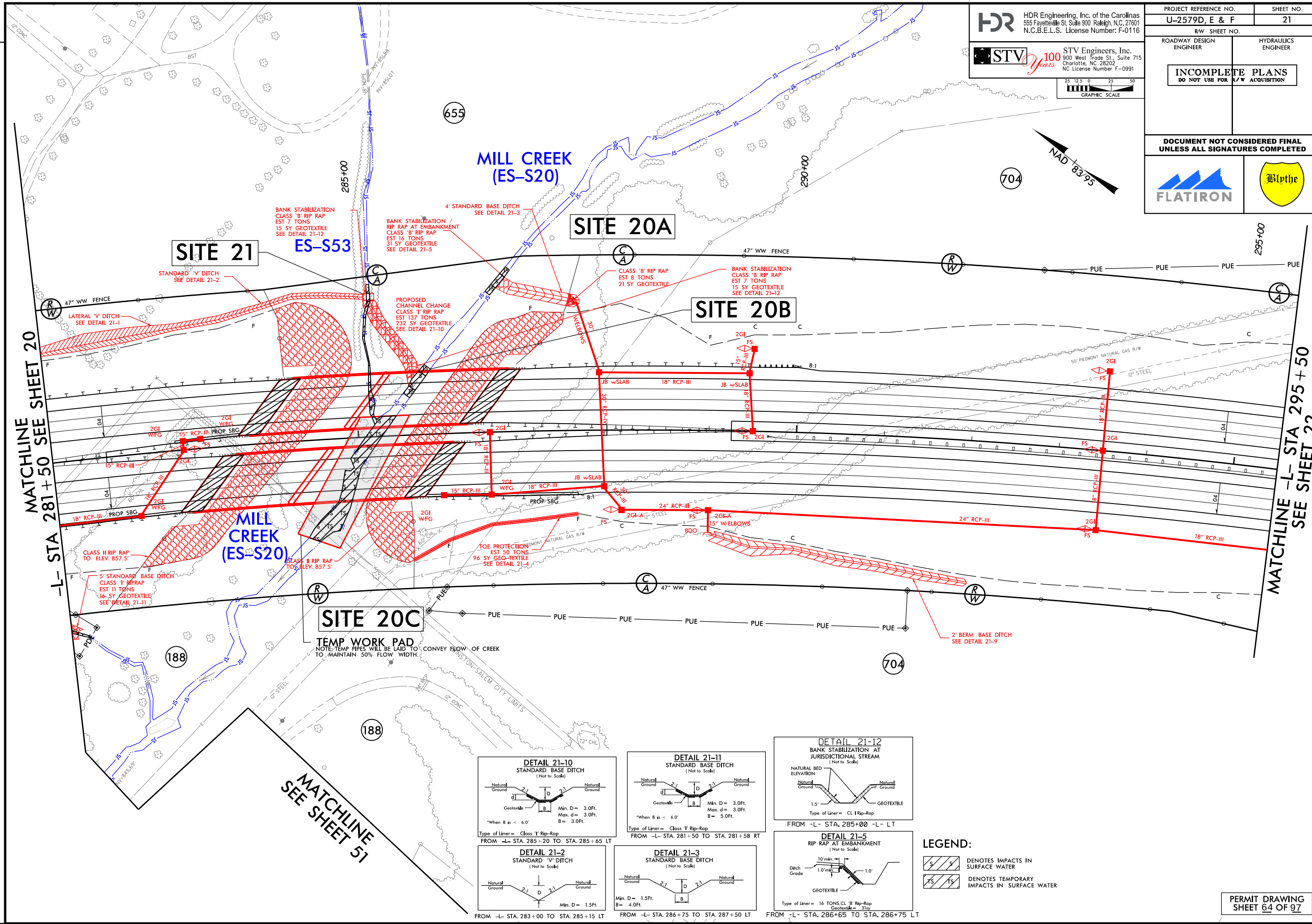
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL



PROFILE ALONG CL OF CULVERT

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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**21**

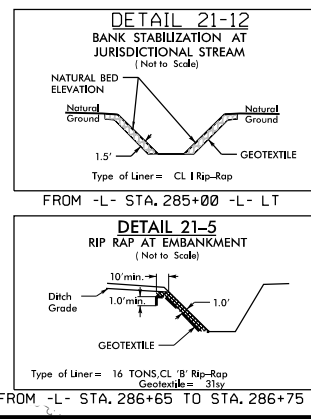
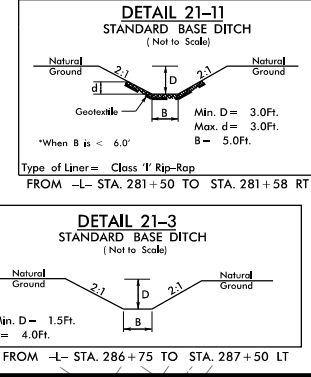
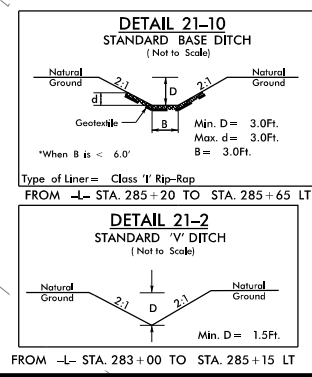
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR A/W ACQUISITION

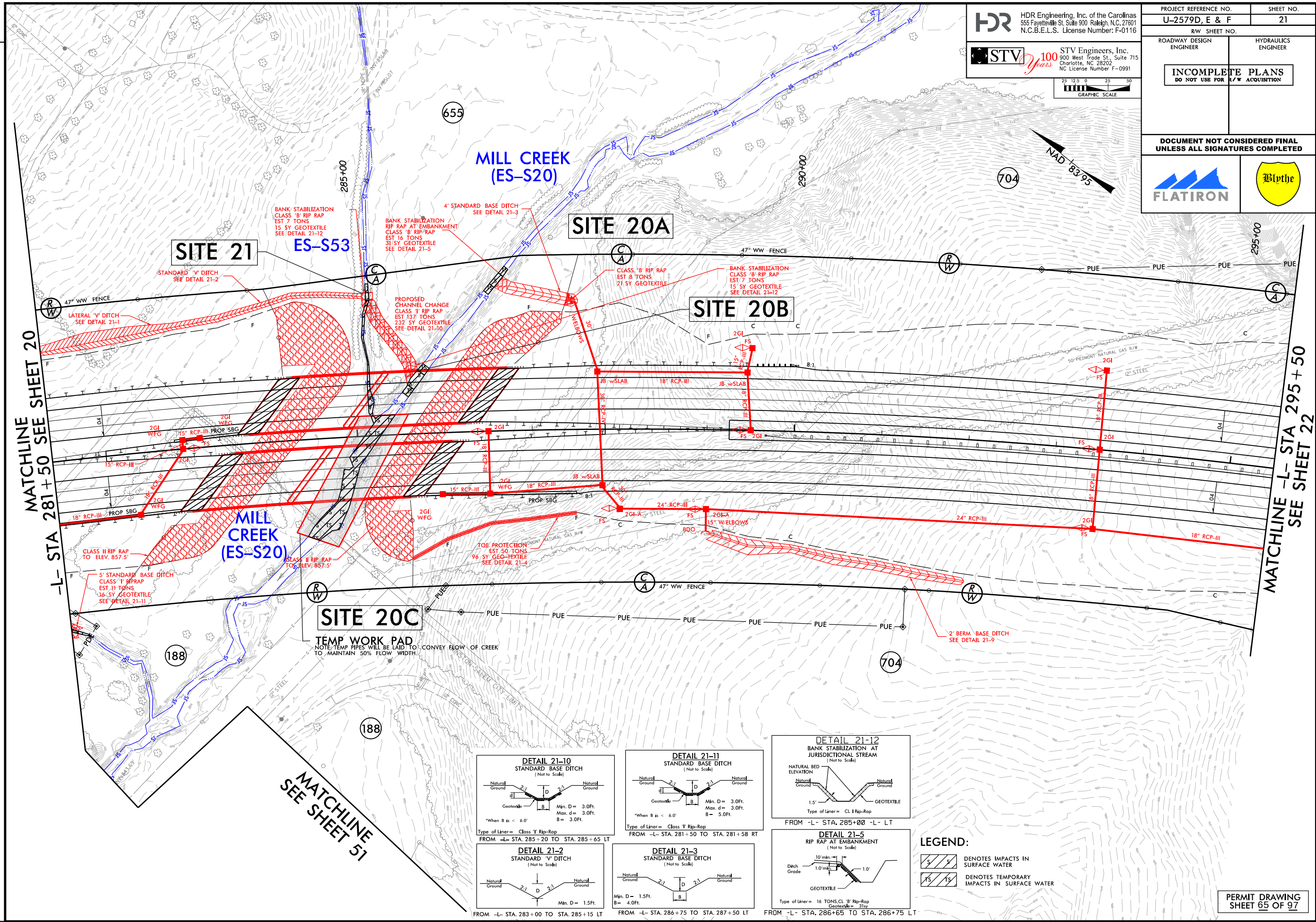
**DOCUMENT NOT CONSIDERED FINAL**  
UNLESS ALL SIGNATURES COMPLETED



- LEGEND:**
- DENOTES IMPACTS IN SURFACE WATER
  - DENOTES TEMPORARY IMPACTS IN SURFACE WATER



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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**21**

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

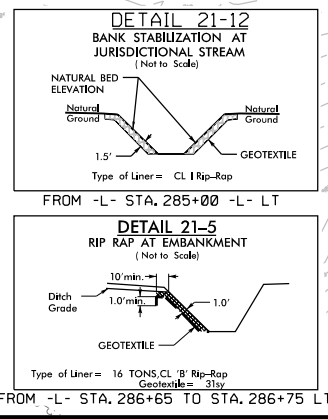
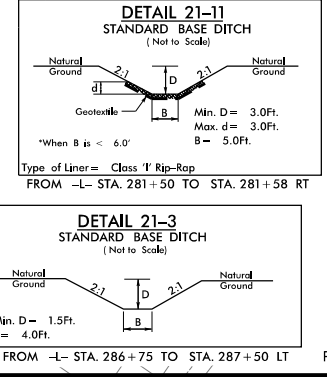
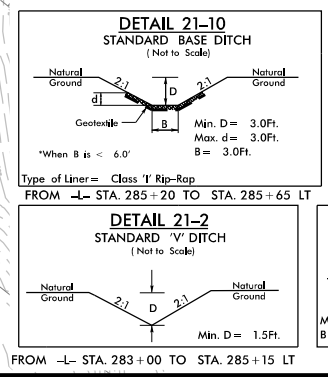
HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL**  
UNLESS ALL SIGNATURES COMPLETED

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GRAPHIC SCALE

NAD 83 95



**LEGEND:**

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

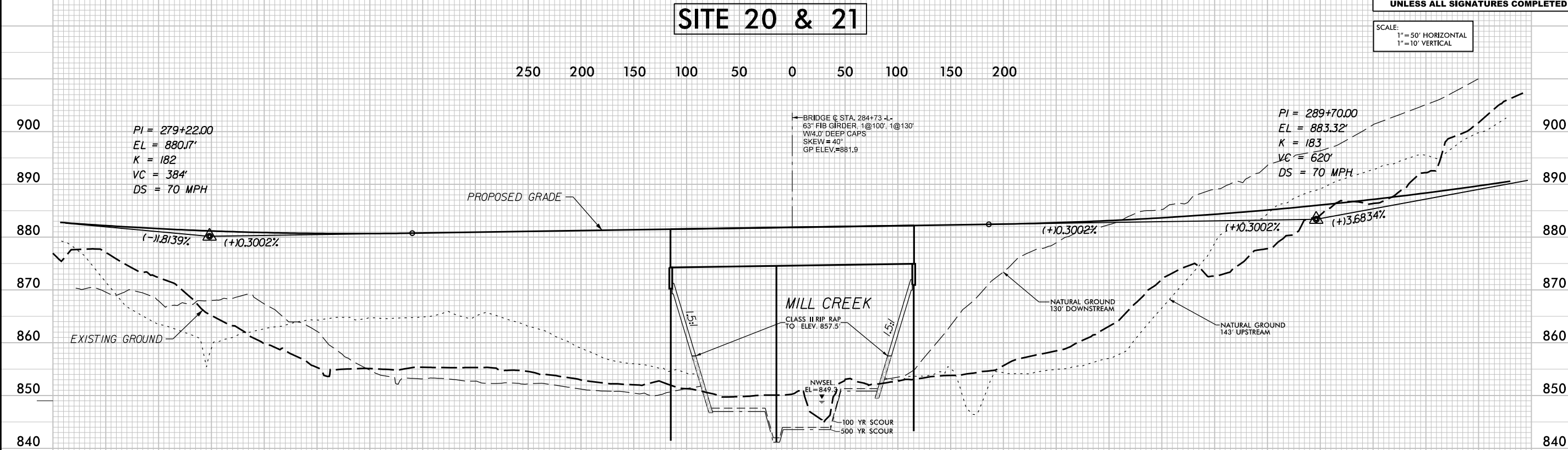
5/14/99

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| PROJECT REFERENCE NO.      |  | SHEET NO.              |
|----------------------------|--|------------------------|
| U-2579D,E & F              |  |                        |
| ROADWAY DESIGN<br>ENGINEER |  |                        |
|                            |  |                        |
|                            |  | HYDRAULICS<br>ENGINEER |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL

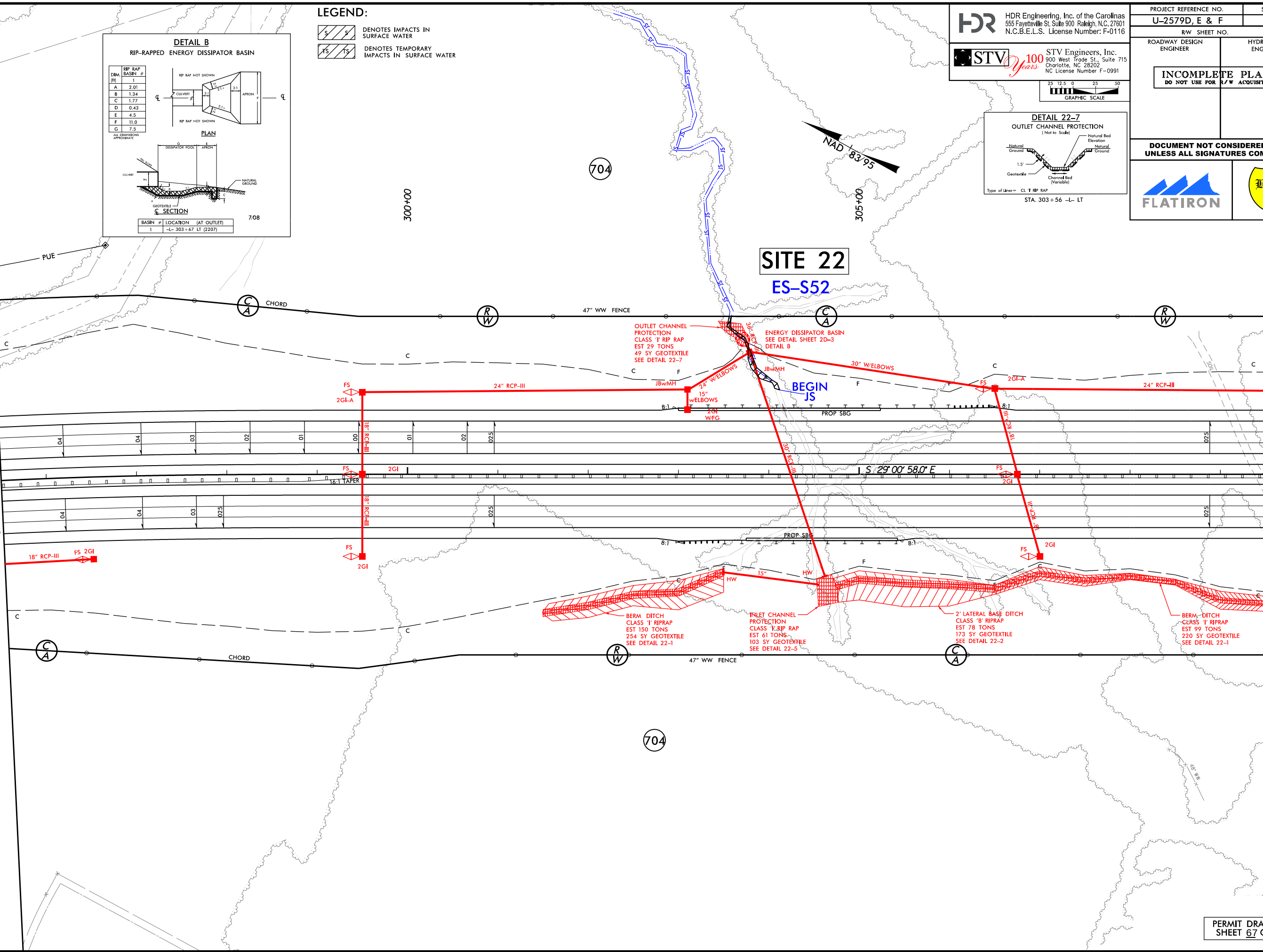


☒ PROFILE - PROPOSED BRIDGE



REVISIONS

MATCHLINE -L- STA 295 + 50  
SEE SHEET 21



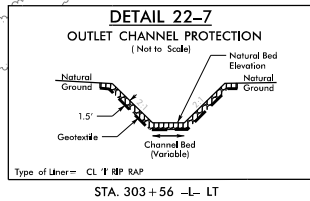
MATCHLINE -L- STA 309 + 50  
SEE SHEET 23

LEGEND:  
S S DENOTES IMPACTS IN SURFACE WATER  
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

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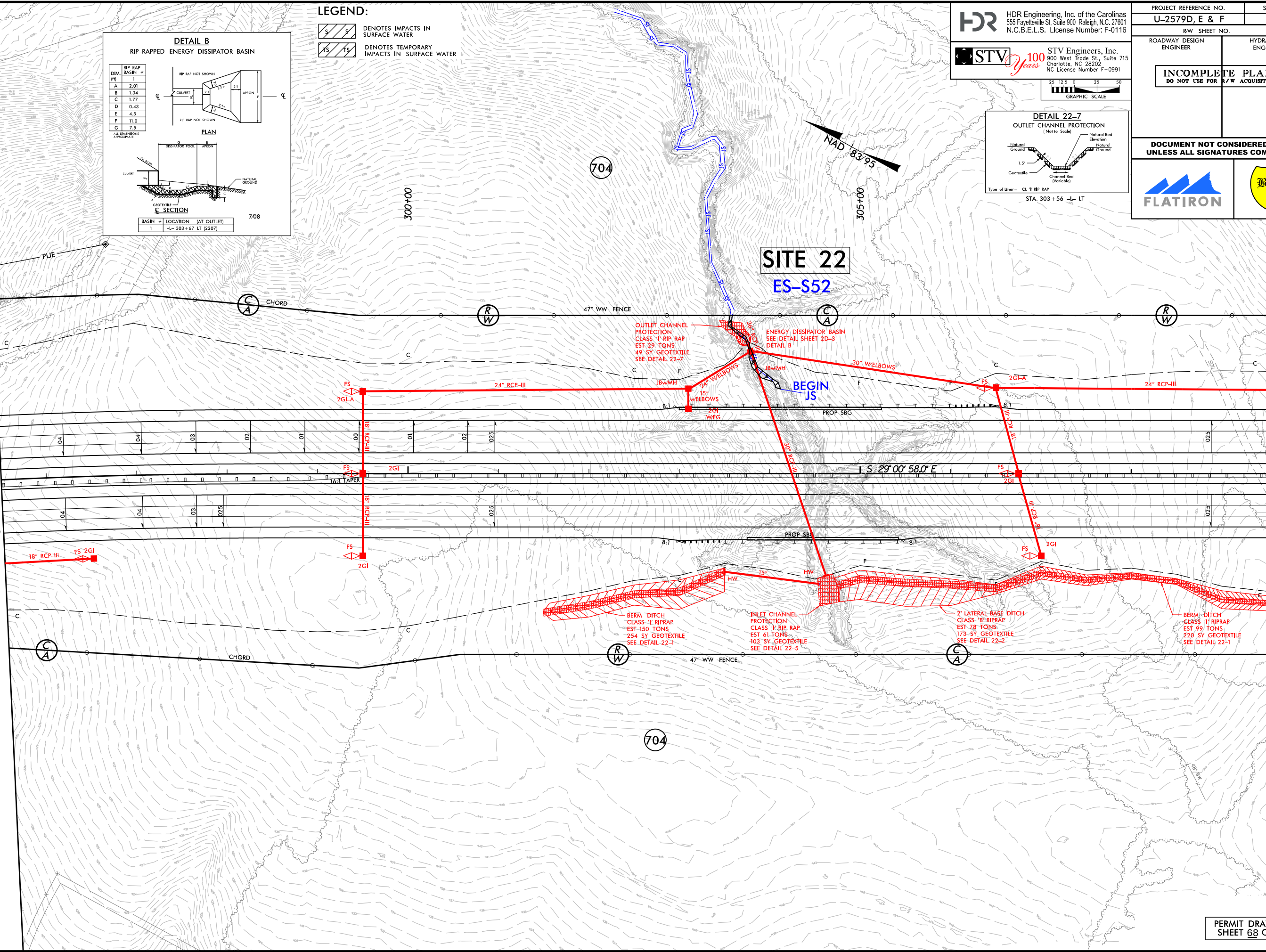
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GRAPHIC SCALE



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| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                      |  | SHEET NO.<br><b>22</b> |  |
| RW SHEET NO.                                                            |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                 |  | HYDRAULICS ENGINEER    |  |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |  |                        |  |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |  |                        |  |
|                                                                         |  |                        |  |

REVISIONS

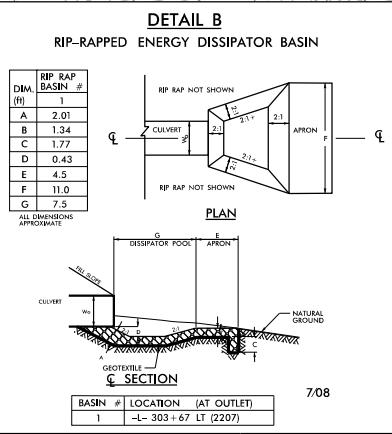
MATCHLINE -L- STA 295 + 50  
SEE SHEET 21



MATCHLINE -L- STA 309 + 50  
SEE SHEET 23

LEGEND:

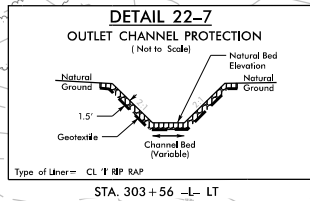
- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER



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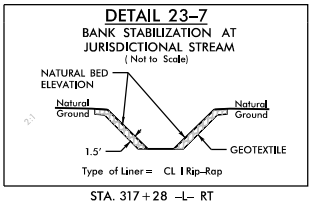
**STV** 100 Years STV Engineers, Inc.  
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Charlotte, NC 28202  
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25 12.5 0 25 50  
GRAPHIC SCALE



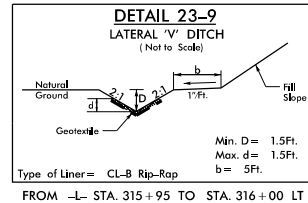
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| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>               |  | SHEET NO.<br><b>22</b>                             |
| RW SHEET NO.                                                     |  | HYDRAULICS ENGINEER                                |
| ROADWAY DESIGN ENGINEER                                          |  | INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |  |                                                    |





 DENOTES IMPACTS IN SURFACE WATER

 DENOTES TEMPORARY IMPACTS IN SURFACE WATER



PERMIT DRAWING  
SHEET 69 OF 97







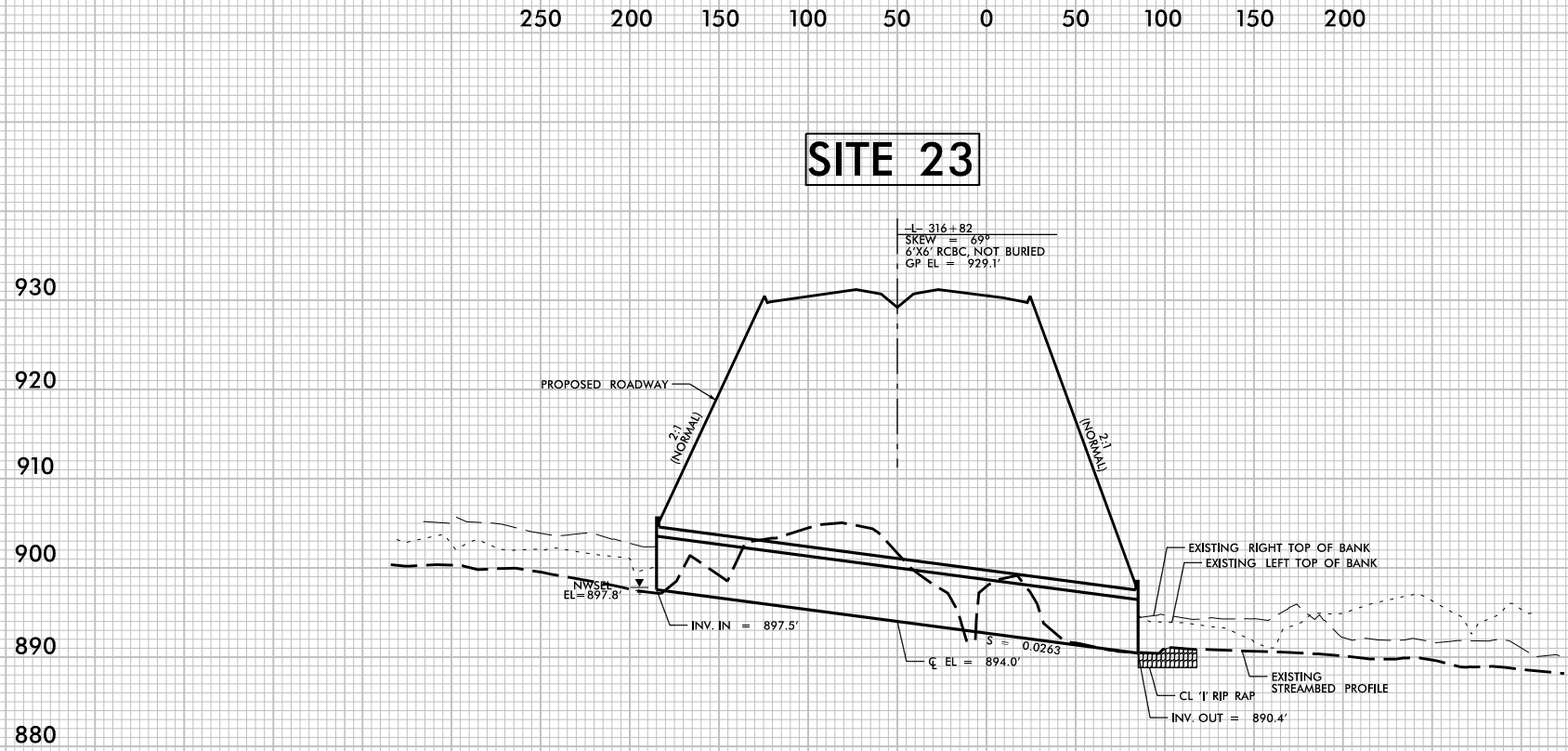
5/14/99

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| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL

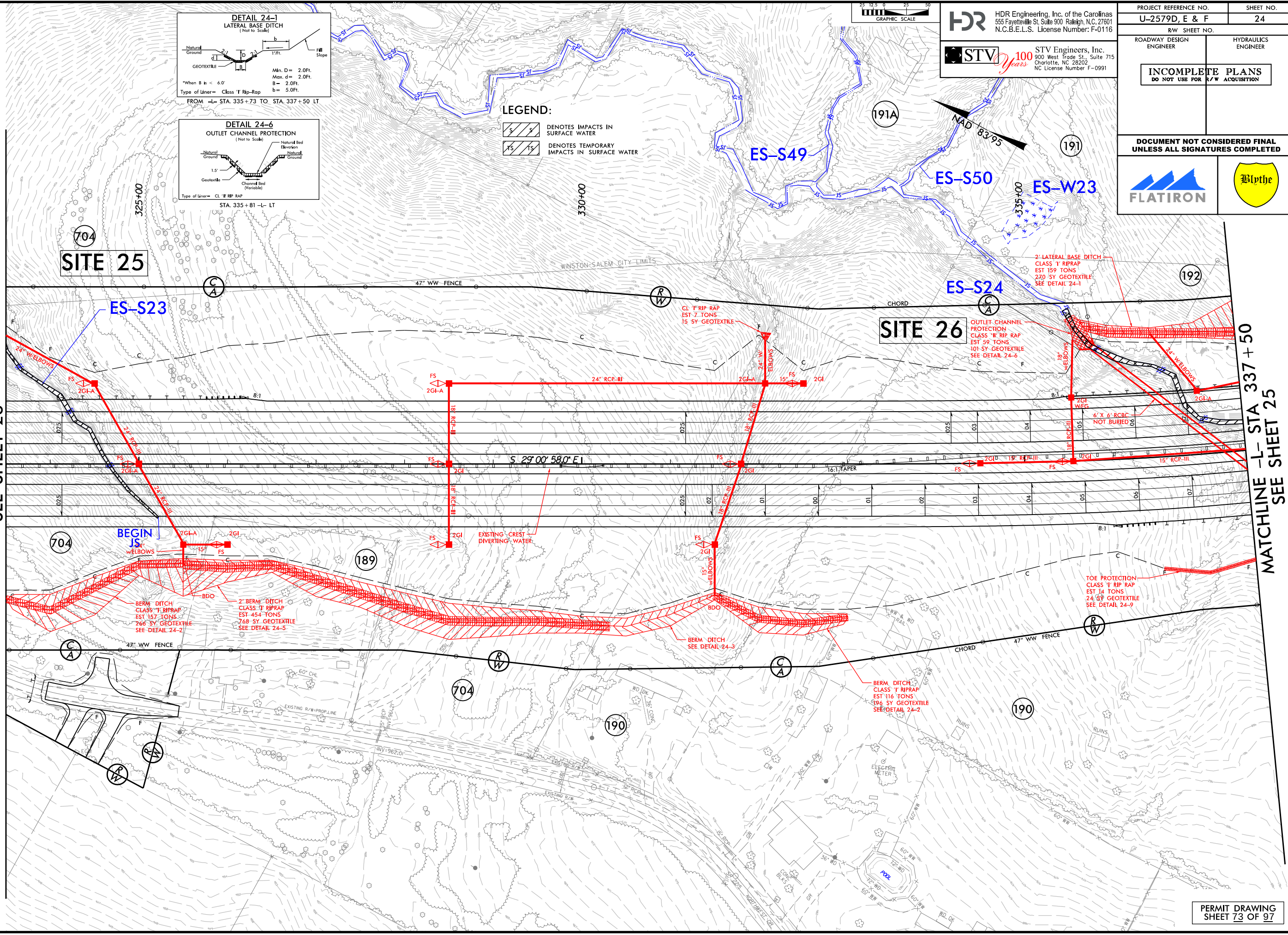


PROFILE ALONG C<sub>L</sub> OF CULVERT

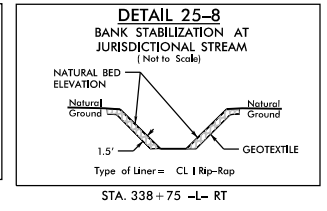








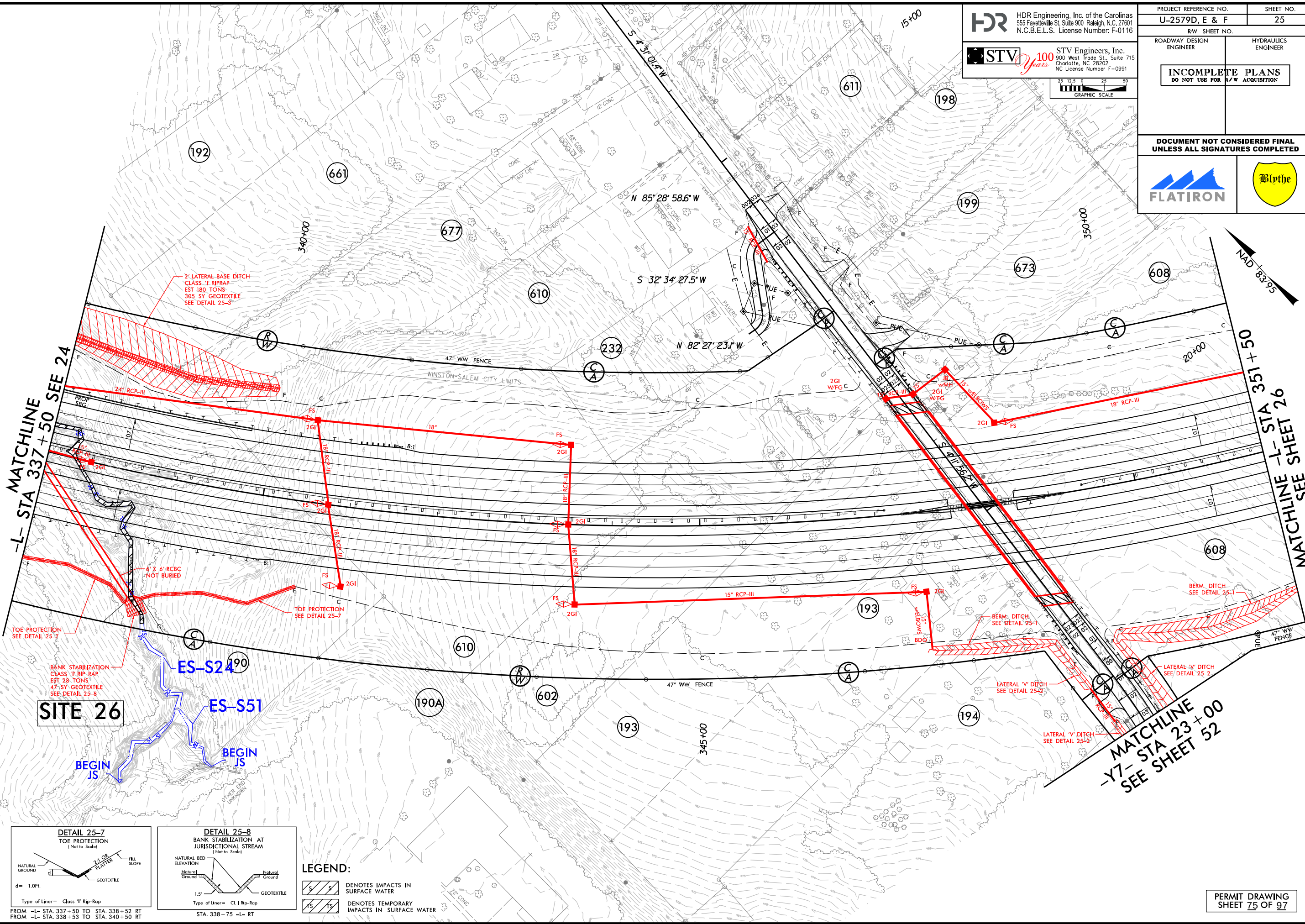




 DENOTES IMPACTS IN SURFACE WATER  
 DENOTES TEMPORARY IMPACTS IN SURFACE WATER



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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**25**

R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL**  
UNLESS ALL SIGNATURES COMPLETED

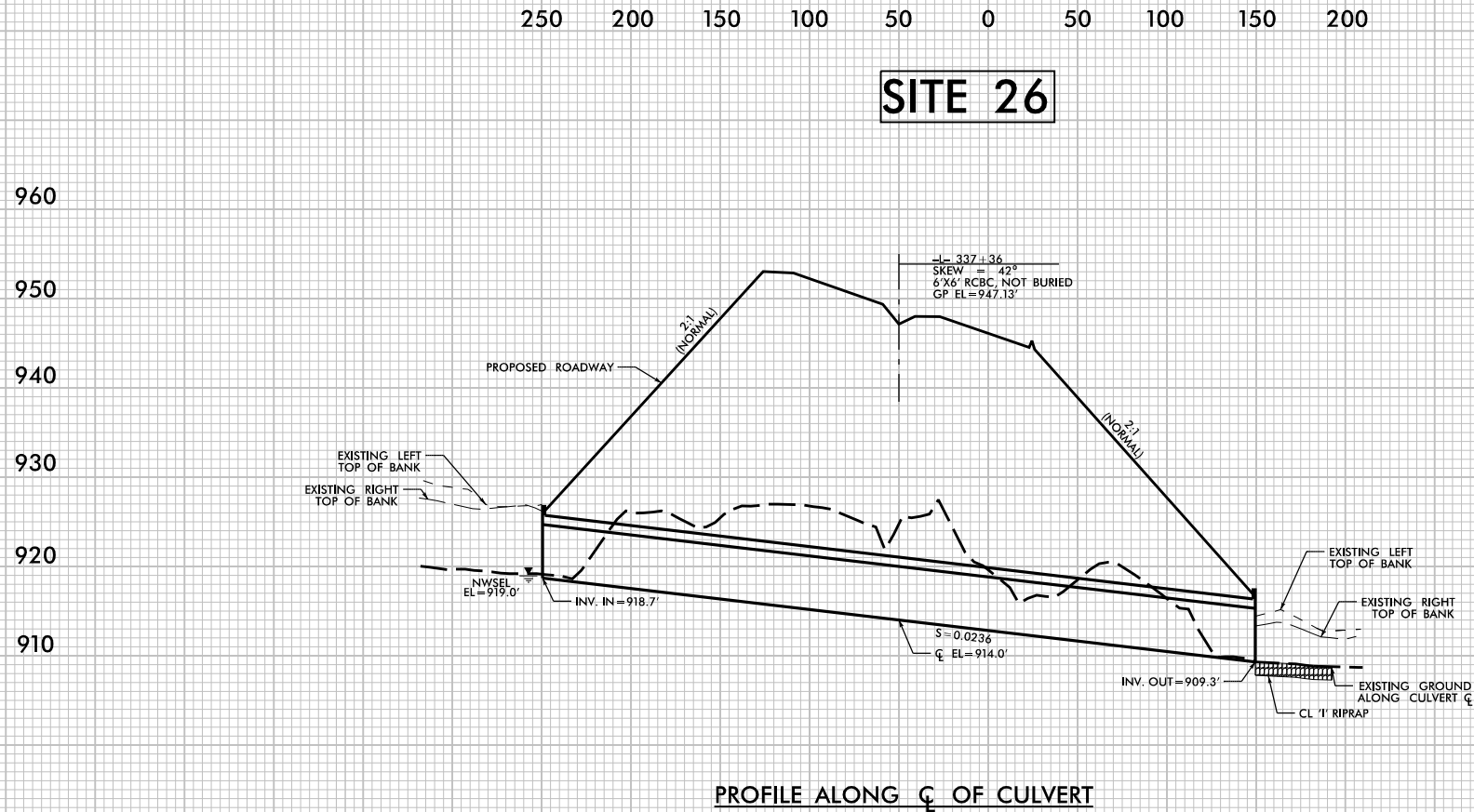
5/14/99

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3/2/99 DE

| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

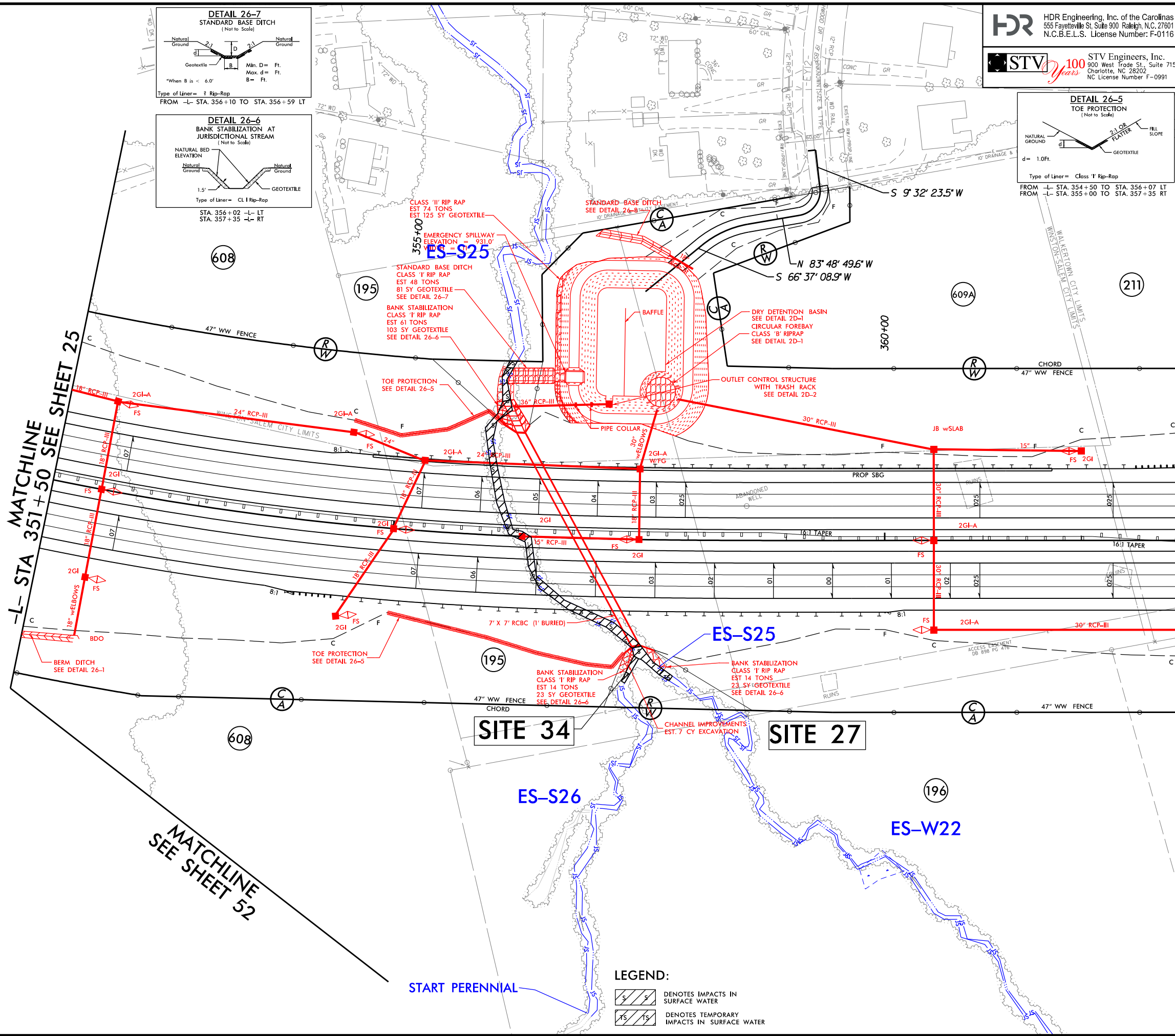
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL





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Charlotte, NC 28202  
NC License Number F-0991

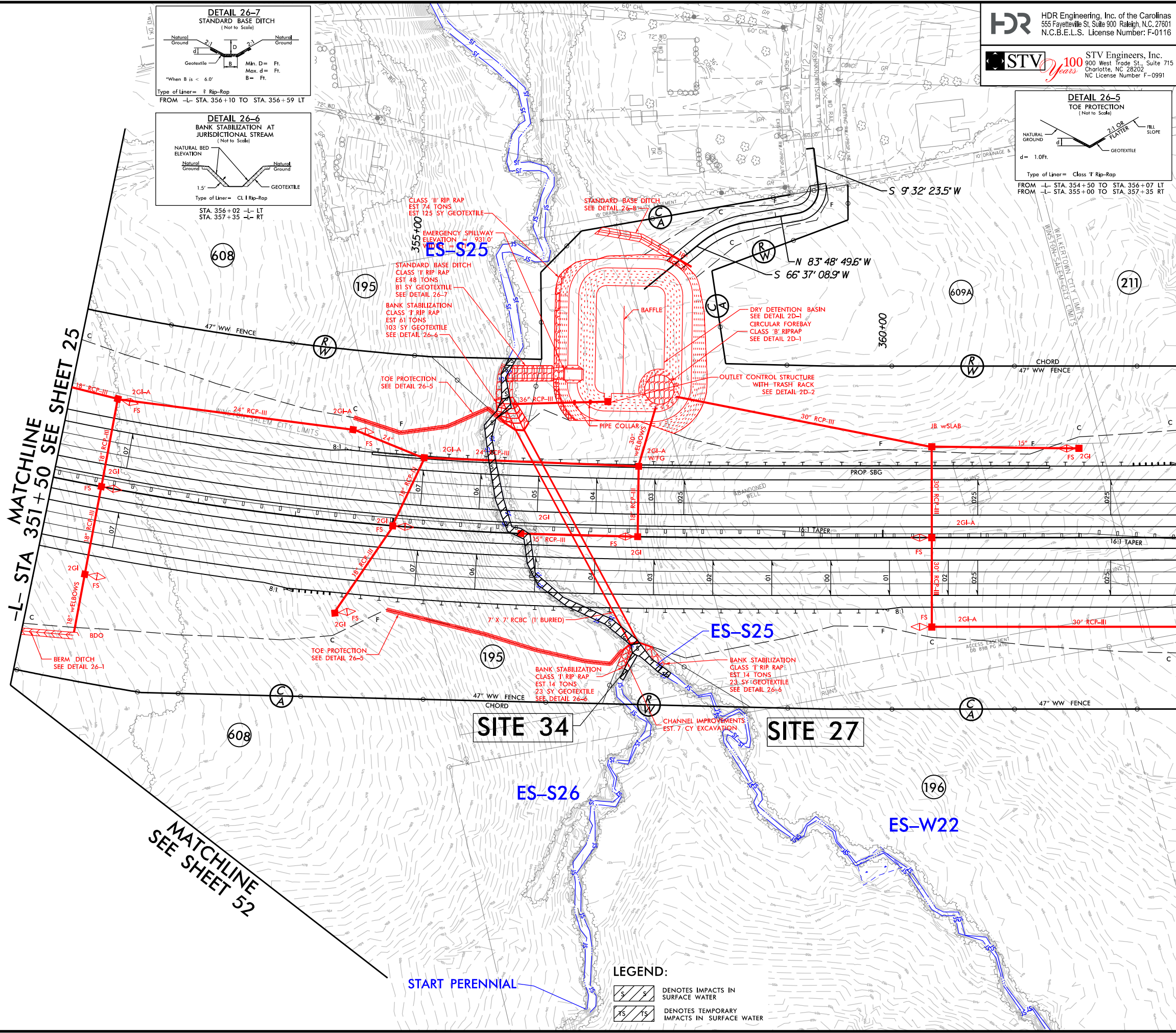
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| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                      |  | SHEET NO.<br><b>26</b> |  |
| RW SHEET NO.                                                            |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                 |  | HYDRAULICS ENGINEER    |  |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |  |                        |  |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |  |                        |  |
|                                                                         |  |                        |  |
|                                                                         |  |                        |  |

**GRAPHIC SCALE**  
0 12.5 25 50  
Feet





REVISIONS



MATCHLINE -L- STA 363+00  
SEE SHEET 27

|                                                                         |  |                        |  |
|-------------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                      |  | SHEET NO.<br><b>26</b> |  |
| RW SHEET NO.                                                            |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                 |  | HYDRAULICS ENGINEER    |  |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |  |                        |  |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |  |                        |  |
|                                                                         |  |                        |  |
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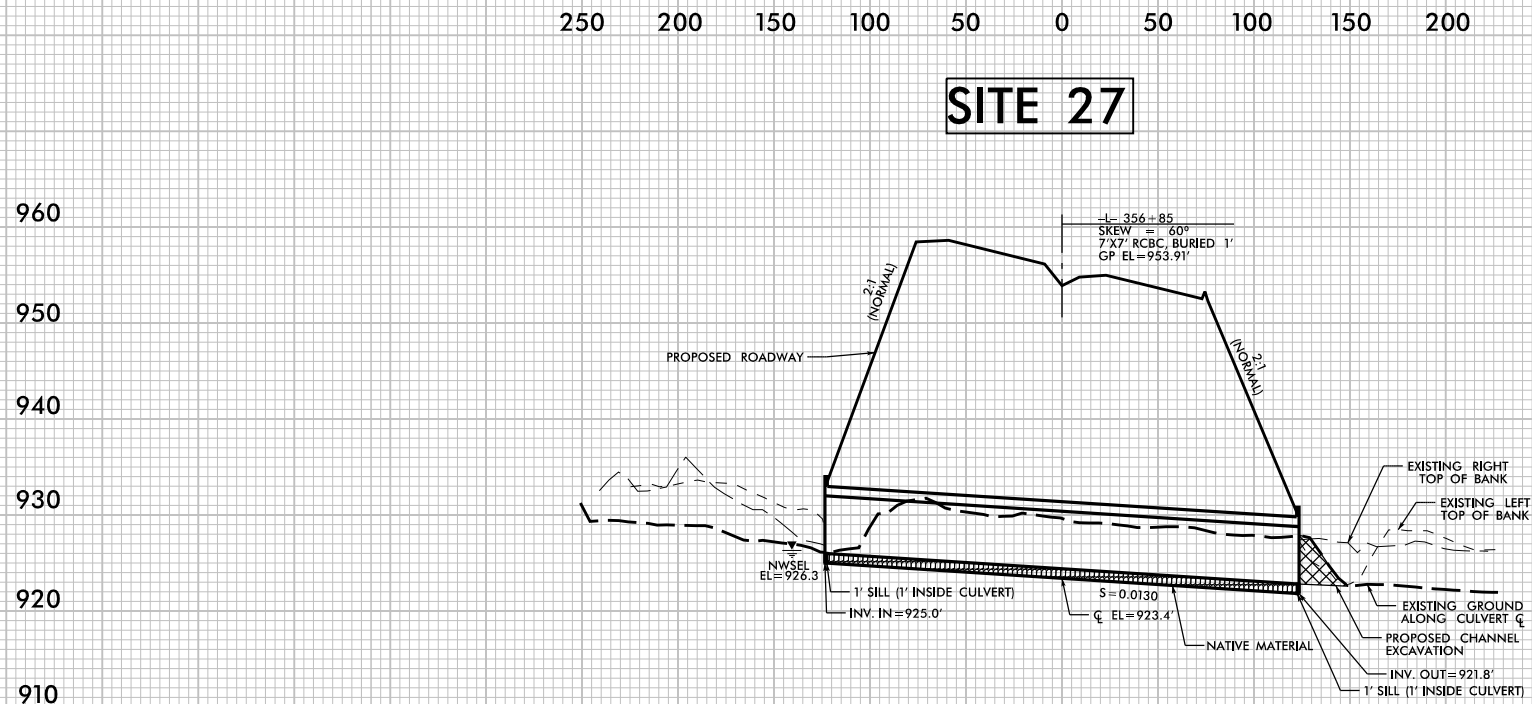


5/14/99

| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

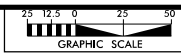
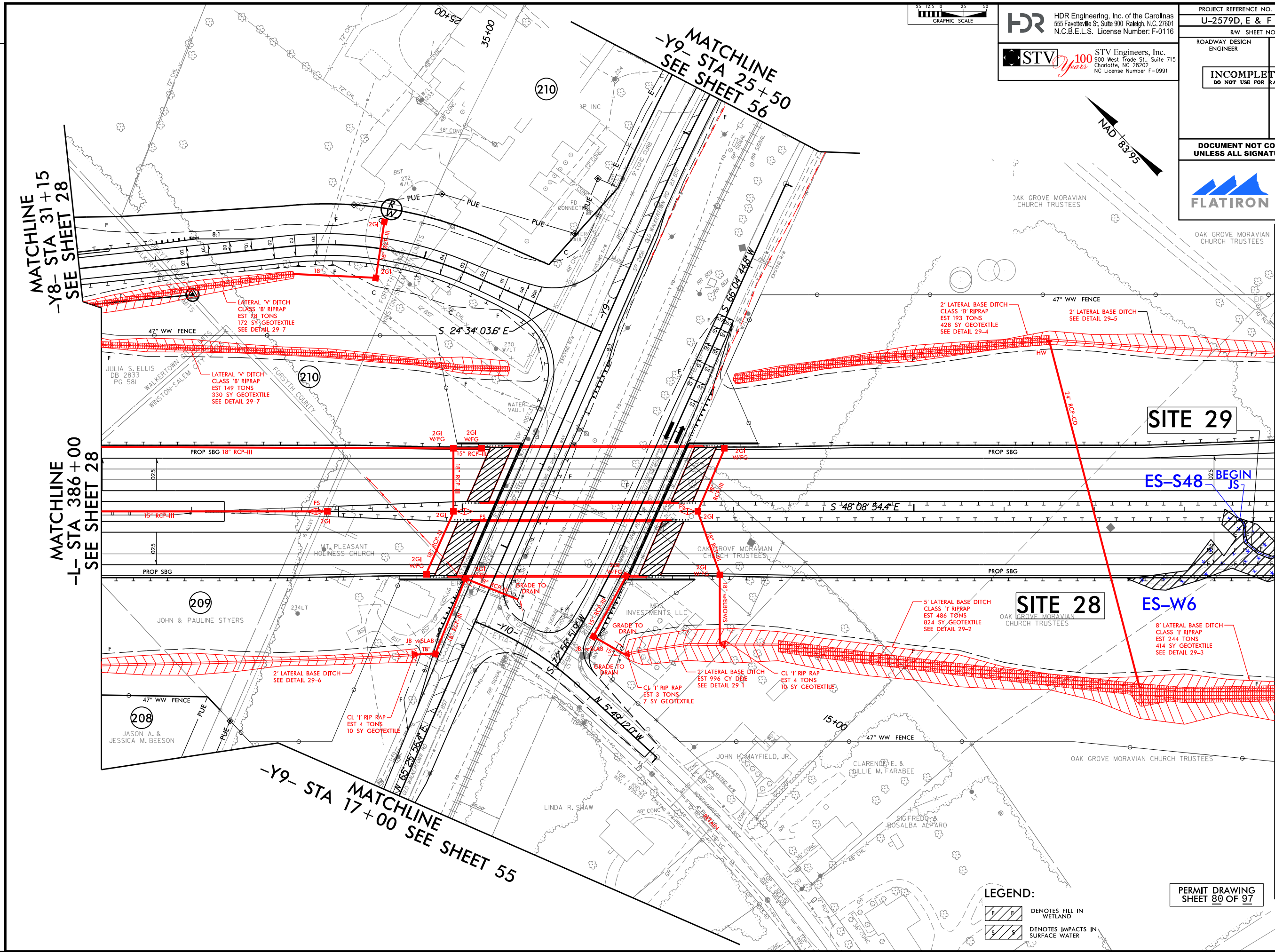
SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL



PROFILE ALONG C OF CULVERT



REVISIONS



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N.C.B.E.L.S. License Number: F-0116

**STV** STV Engineers, Inc.  
100 Years  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                                                     |  |                                                                                     |  |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                           |  |
| U-2579D, E & F                                                                      |  | 29                                                                                  |  |
| RW SHEET NO.                                                                        |  |                                                                                     |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | HYDRAULICS<br>ENGINEER                                                              |  |
| INCOMPLETE PLANS<br>DO NOT USE FOR R/W ACQUISITION                                  |  |                                                                                     |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |  |                                                                                     |  |
|  |  |  |  |

**LEGEND:**

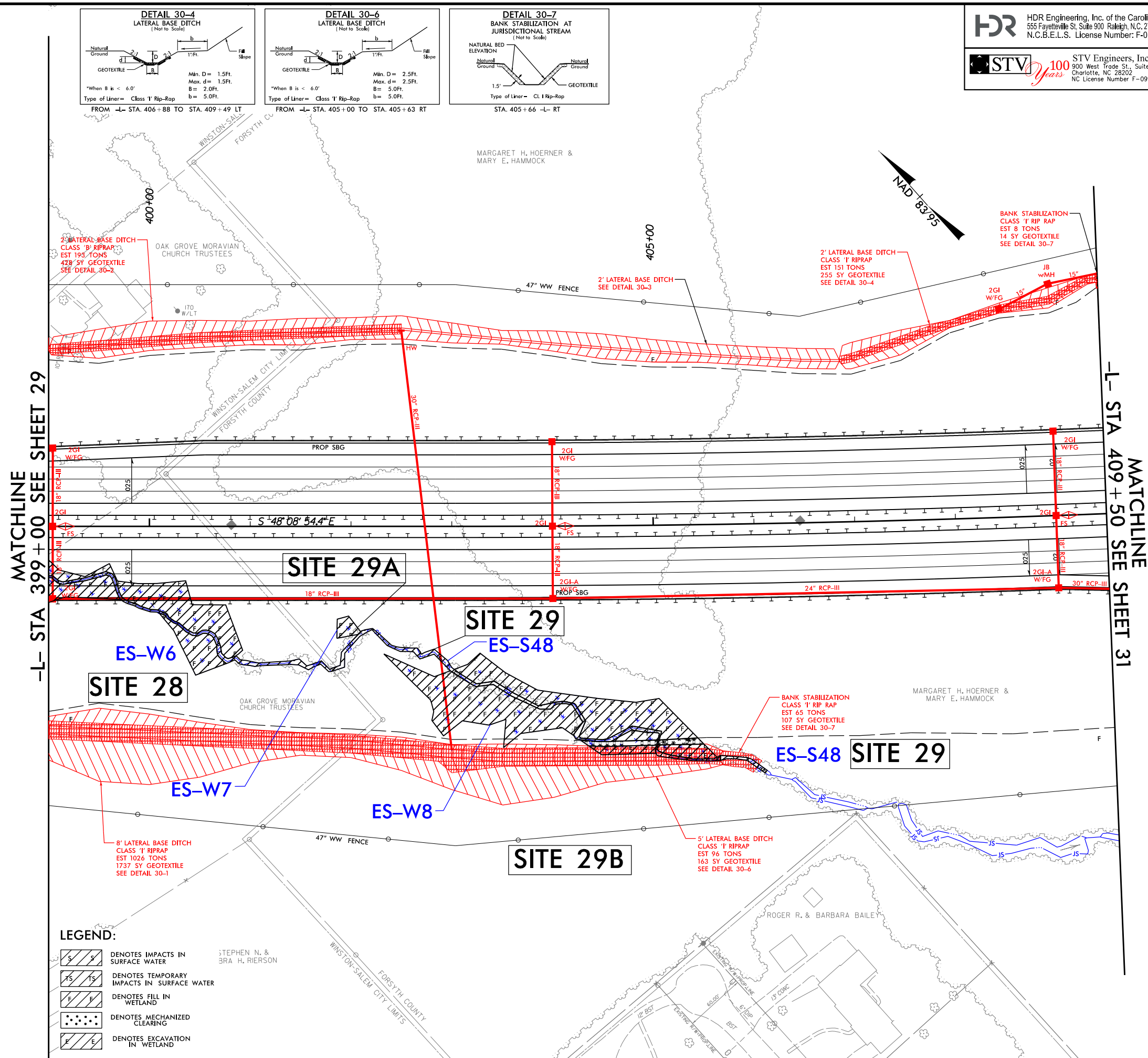
|  |                                  |
|--|----------------------------------|
|  | DENOTES FILL IN WETLAND          |
|  | DENOTES IMPACTS IN SURFACE WATER |

PERMIT DRAWING  
SHEET 80 OF 97



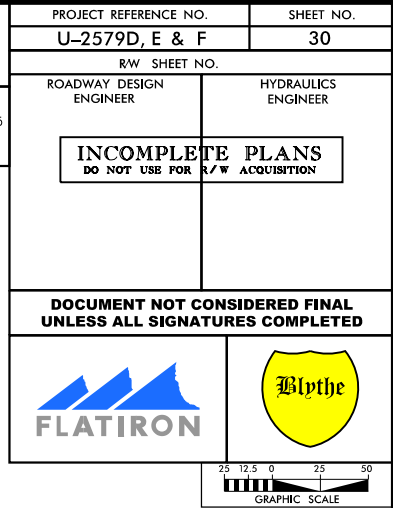




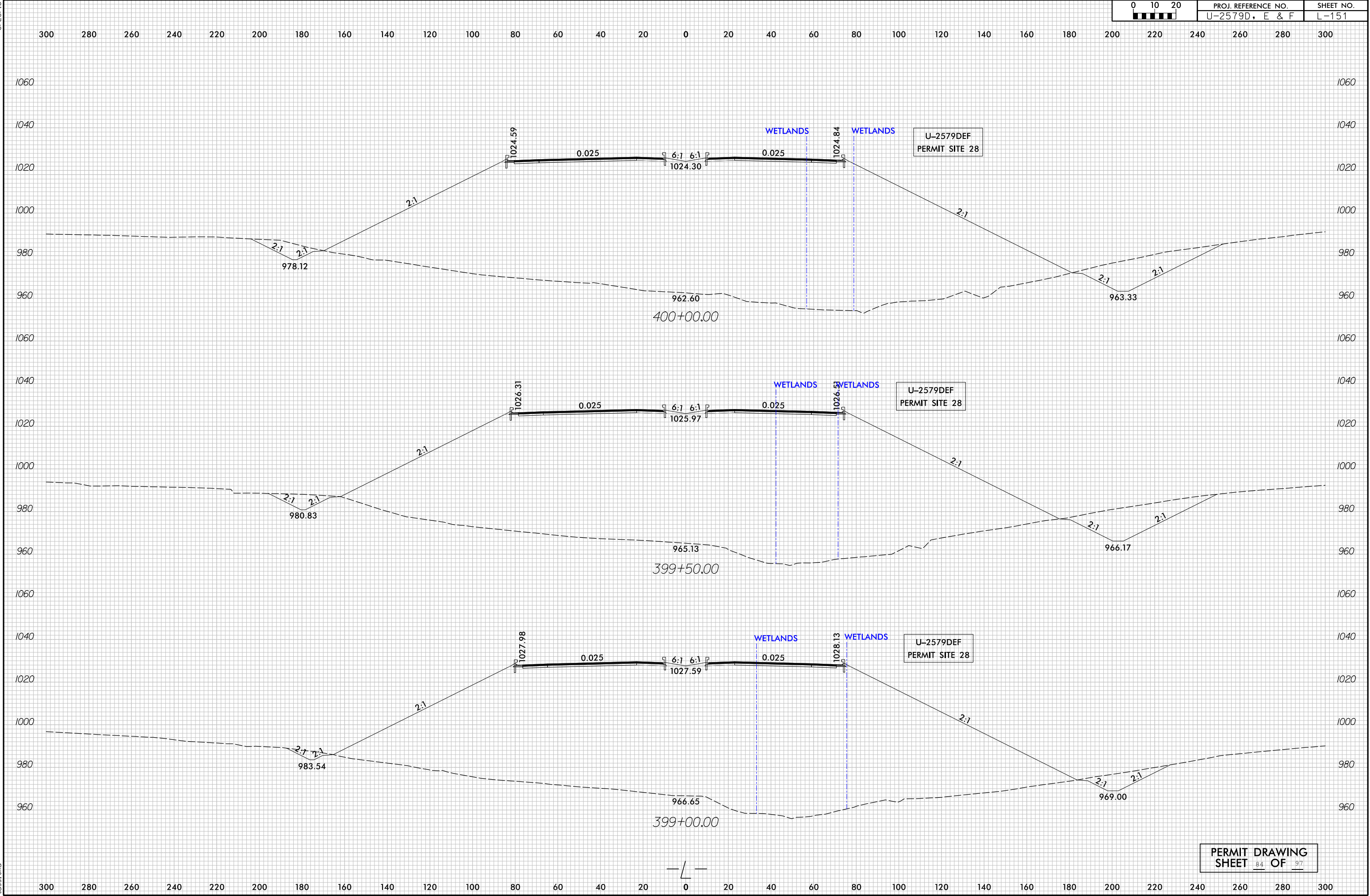


|                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                             |                       |           |                           |           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------|---------------------------|-----------|
| <div style="display: flex; align-items: center;"> <div> <p><b>HDR Engineering, Inc. of the Carolinas</b><br/> 555 Fayetteville St, Suite 900 Raleigh, N.C. 27601<br/> N.C.B.E.L.S. License Number: F-0116</p> </div> </div> | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">PROJECT REFERENCE NO.</td> <td style="width: 50%; padding: 2px;">SHEET NO.</td> </tr> <tr> <td style="text-align: center; padding: 5px;"><b>U-2579D, E &amp; F</b></td> <td style="text-align: center; padding: 5px;"><b>30</b></td> </tr> </table>                           | PROJECT REFERENCE NO. | SHEET NO. | <b>U-2579D, E &amp; F</b> | <b>30</b> |
| PROJECT REFERENCE NO.                                                                                                                                                                                                       | SHEET NO.                                                                                                                                                                                                                                                                                                                                                                                   |                       |           |                           |           |
| <b>U-2579D, E &amp; F</b>                                                                                                                                                                                                   | <b>30</b>                                                                                                                                                                                                                                                                                                                                                                                   |                       |           |                           |           |
| R/W SHEET NO.                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                             |                       |           |                           |           |
| <div style="display: flex; align-items: center;"> <div> <p><b>STV Engineers, Inc.</b><br/> 900 West Trade St., Suite 715<br/> Charlotte, NC 28202<br/> NC License Number F-0991</p> </div> </div>                           | <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>ROADWAY DESIGN<br/>ENGINEER</b></p> </div> <div style="width: 45%;"> <p><b>HYDRAULICS<br/>ENGINEER</b></p> </div> </div> <div style="border: 1px solid black; text-align: center; padding: 10px; margin-top: 20px;"> <p><b>INCOMPLETE PLANS</b><br/> DO NOT USE FOR R/W ACQUISITION</p> </div> |                       |           |                           |           |
| <p><b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b></p>                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                             |                       |           |                           |           |
|                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                             |                       |           |                           |           |
| <div style="display: flex; align-items: center;"> <div style="text-align: left;"> <p><b>BANK STABILIZATION<br/>CLASS 'I' RIP RAP<br/>EST 8 TONS<br/>14 SY GEOTEXTILE<br/>SEE DETAIL 30-7</b></p> </div> </div>              |                                                                                                                                                                                                                                                                                                                                                                                             |                       |           |                           |           |



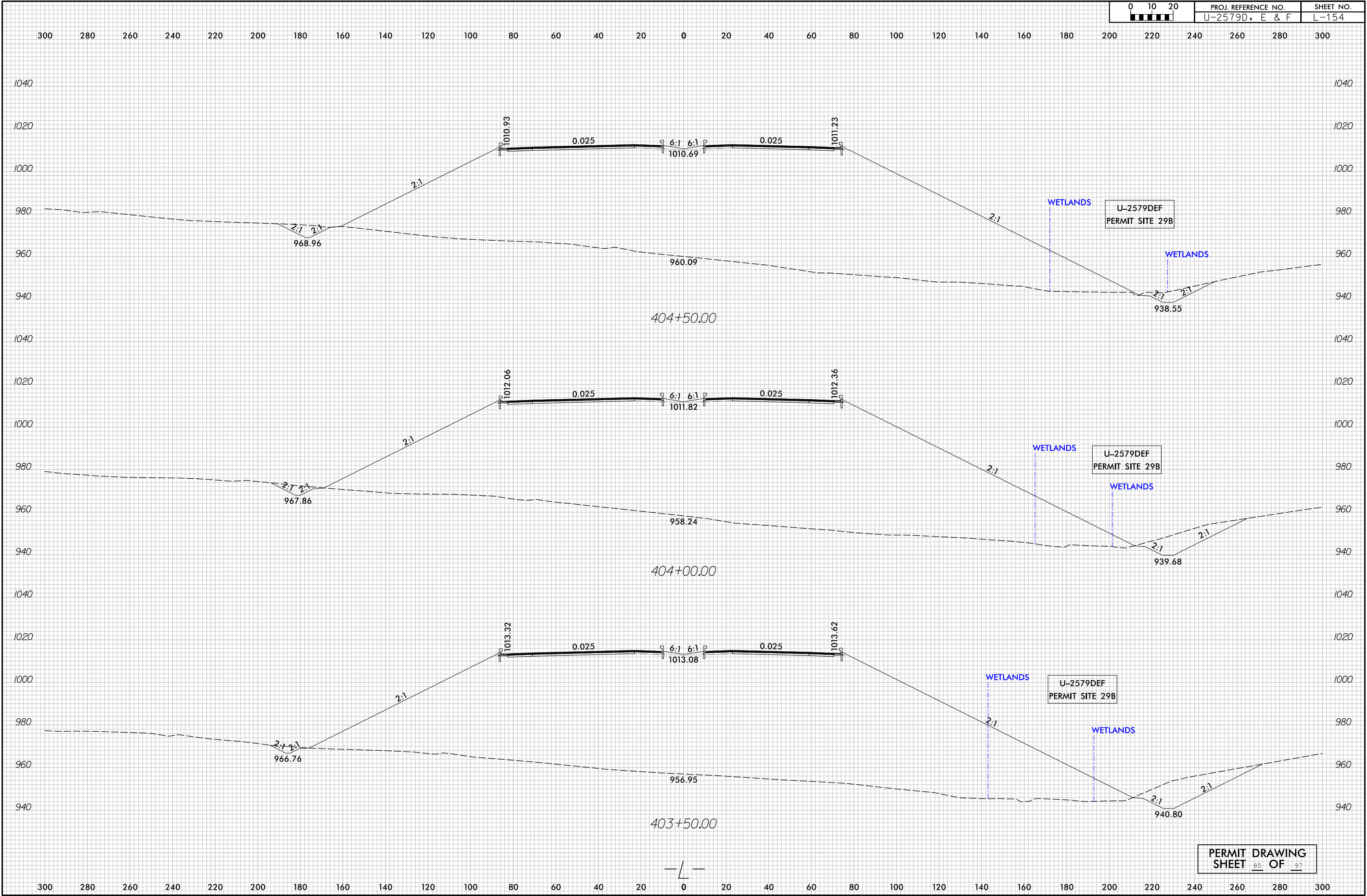


6/23/16





6/23/16

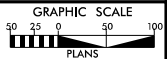




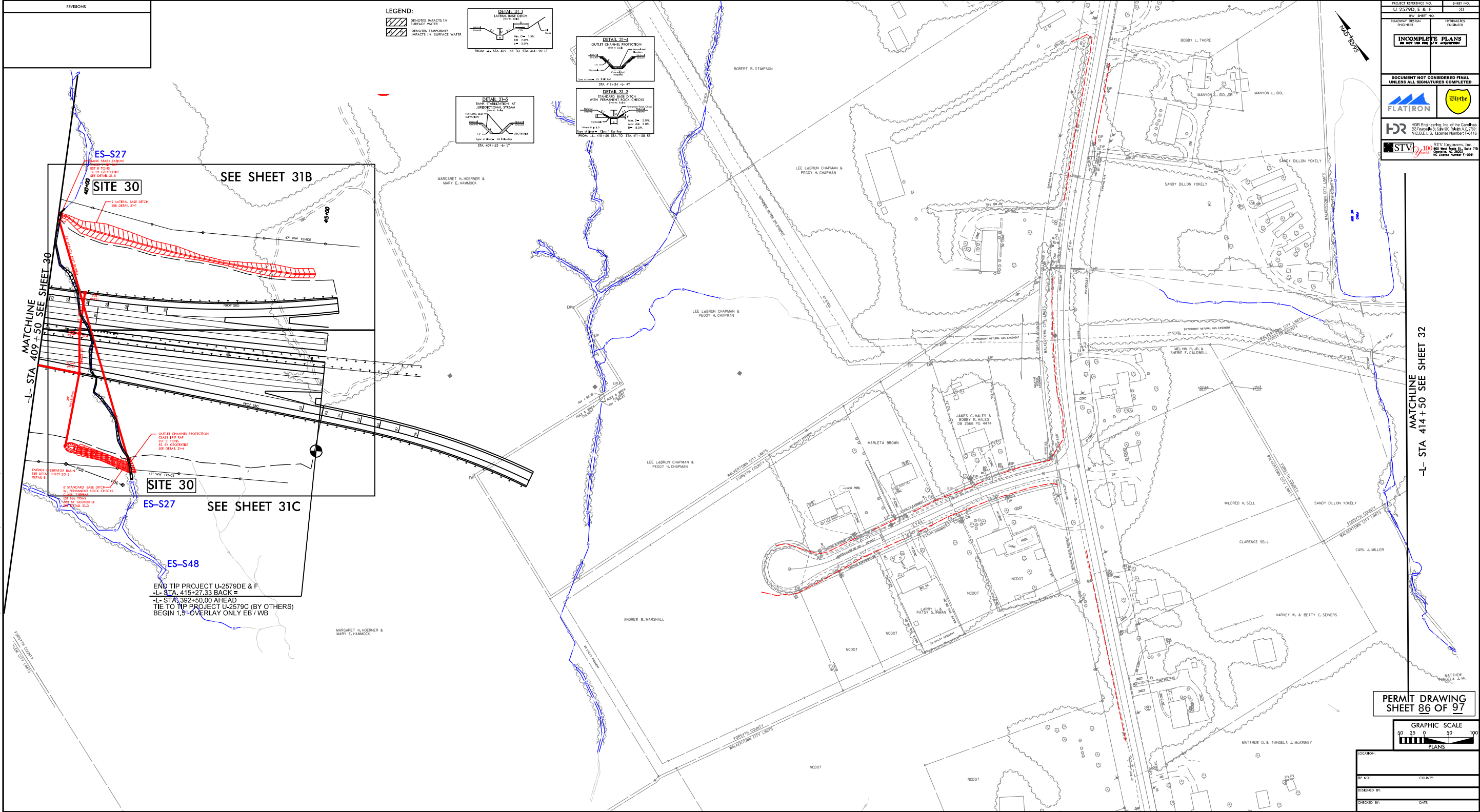
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|--------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| PROJECT REFERENCE NO.<br>U-2579D, E & F                                                                                        | SHEET NO.<br>31          |
| RDW SHEET NO.                                                                                                                  | RDW SHEET NO.            |
| ROADWAY DESIGN<br>INCHES                                                                                                       | ROADWAY DESIGN<br>INCHES |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR CONSTRUCTION                                                                         |                          |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                                                               |                          |
|                                                                                                                                |                          |
| HDR Engineering, Inc. of the Carolinas<br>400 Franklin St., Suite 100 Raleigh, NC 27601<br>N.C.E.E.L.S. License Number: F-0116 |                          |
| STV Engineers, Inc.<br>800 West 10th St., Suite 105<br>Durham, NC 27601<br>N.C. License Number: F-0091                         |                          |

MATCHLINE  
-L- STA 414+50 SEE SHEET 32

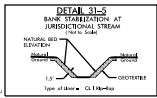
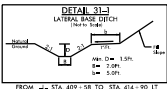
PERMIT DRAWING  
SHEET 86 OF 97



|             |              |
|-------------|--------------|
| LOCATION:   | COUNTY:      |
| TP NO.:     | DESIGNED BY: |
| CHECKED BY: | DATE:        |



LEGEND:  
DENOTES IMPACTS IN  
SURFACE WATER  
DENOTES TEMPORARY  
IMPACTS IN SURFACE WATER



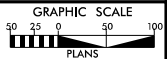
END TIP PROJECT U-2579D & F  
-L- STA 415+27.33 BACK =  
-L- STA 392+50.00 AHEAD  
TIE TO TIP PROJECT U-2579C (BY OTHERS)  
BEGIN 1.5' OVERLAY ONLY EB / WB



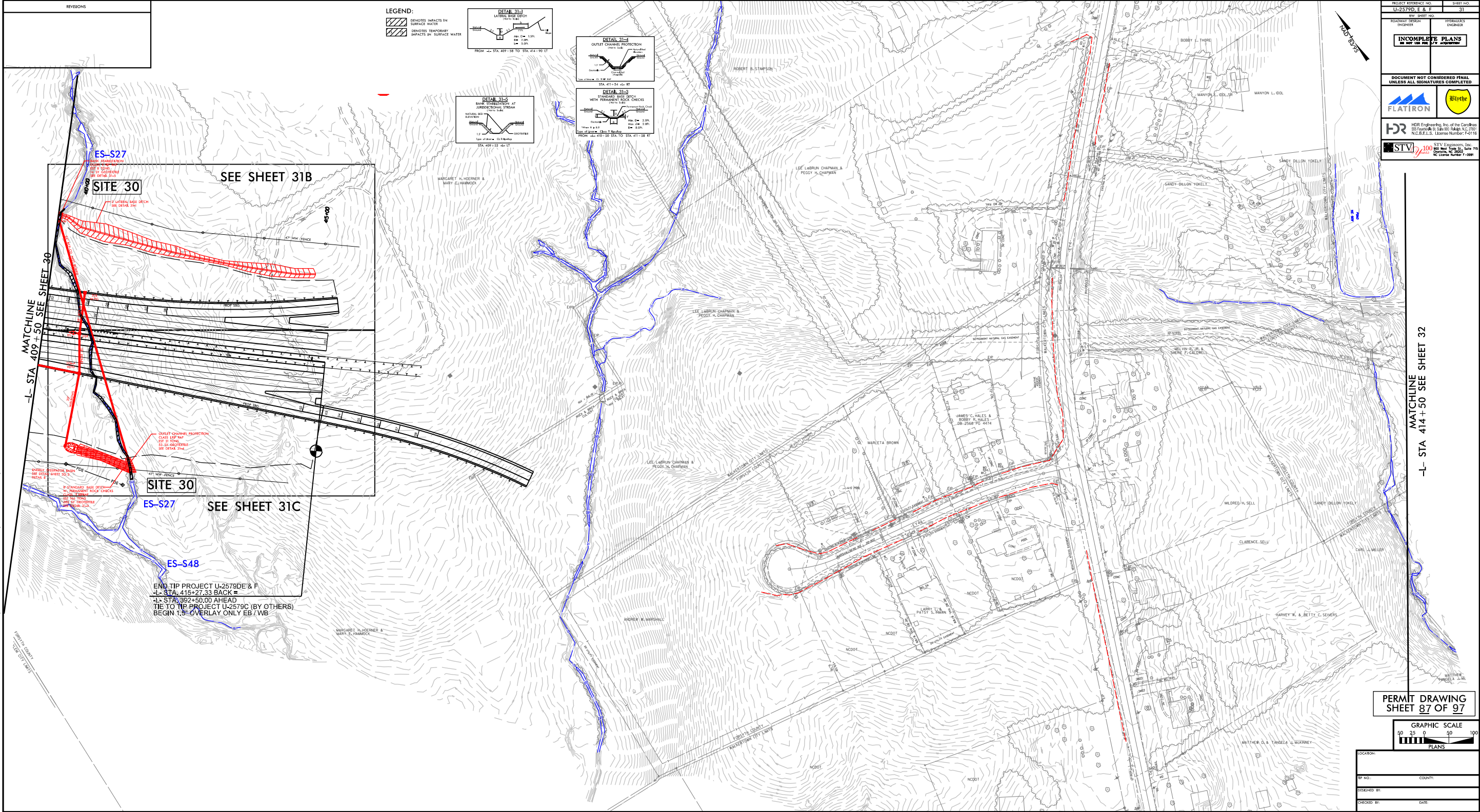
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| PROJECT REFERENCE NO.<br>U-2579D, E & F                                                                                        |  | SHEET NO.<br>31                                 |  |
| REV. SHEET NO.                                                                                                                 |  | REVISIONS                                       |  |
| ROADWAY DESIGN                                                                                                                 |  | HYDRAULICS                                      |  |
| INCOMPLETE PLANS<br>DO NOT USE FOR CONSTRUCTION                                                                                |  | INCOMPLETE PLANS<br>DO NOT USE FOR CONSTRUCTION |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                                                               |  |                                                 |  |
| FLATIRON                                                                                                                       |  | STV                                             |  |
| HDR Engineering, Inc. of the Carolinas<br>400 Franklin St., Suite 100 Raleigh, NC 27601<br>N.C.E.E.L.S. License Number: F-0116 |  |                                                 |  |
| STV Engineers, Inc.<br>400 West 10th St., Suite 105<br>Durham, NC 27601<br>N.C. License Number: F-009                          |  |                                                 |  |

MATCHLINE  
-L- STA 414+50 SEE SHEET 32

PERMIT DRAWING  
SHEET 87 OF 97

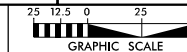


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|--------------|---------|
| LOCATION:    |         |
| TP NO.:      | COUNTY: |
| DESIGNED BY: |         |
| CHECKED BY:  | DATE:   |



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DATE: 10/26/2017  
TIME: 10:26:00 AM  
PLOT FILE: NCDOT\2017\2017-01\2017-01.dwg  
PLOT: 10/26/2017 10:26:00 AM  
PLOT FILE: NCDOT\2017\2017-01\2017-01.dwg



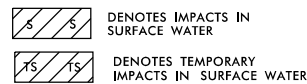


**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

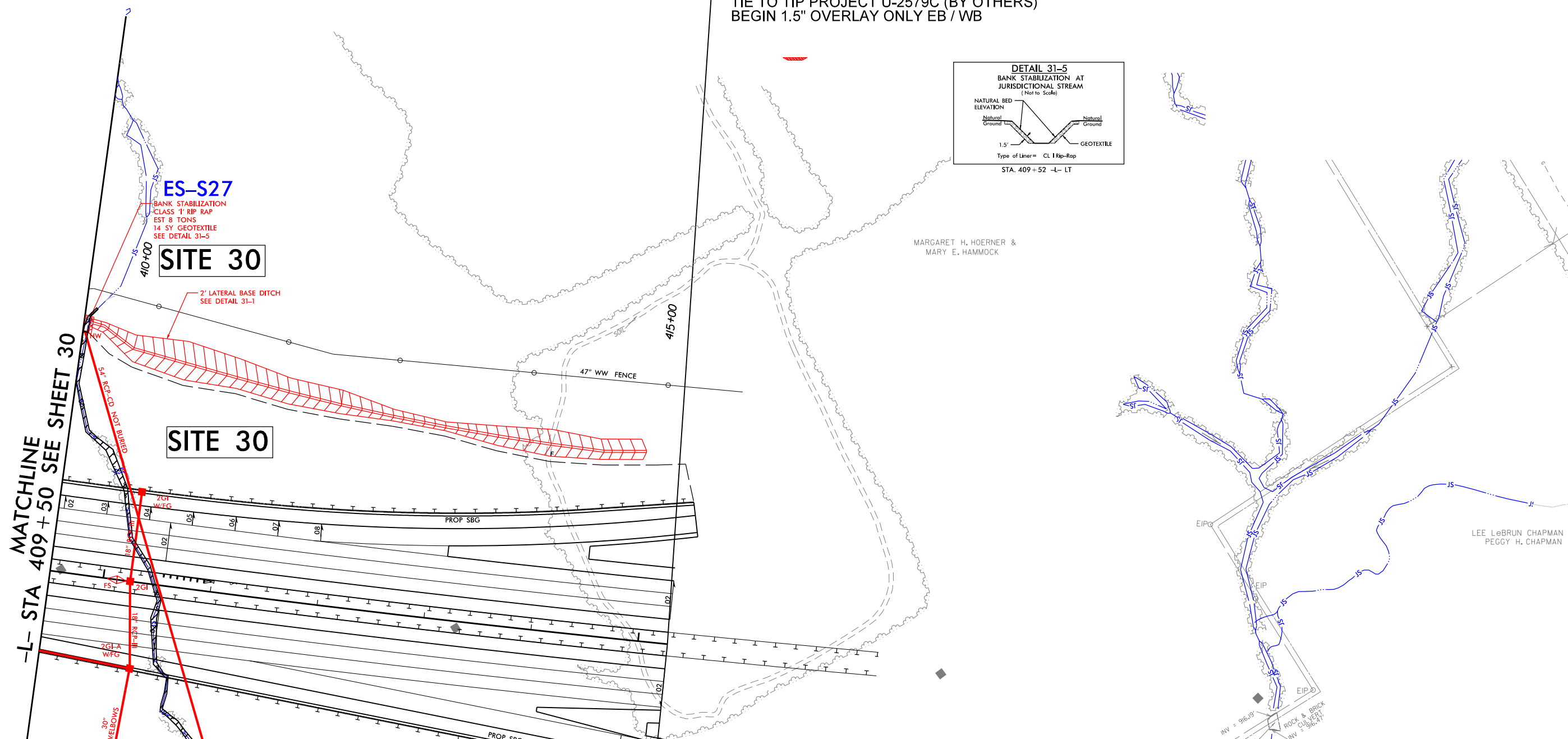
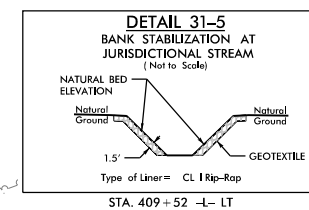
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N.C.B.E.L.S. License Number: F-0116

### LEGEND



END TIP PROJECT U-2579DE & F  
-L- STA. 415+27.33 BACK =  
-L- STA. 392+50.00 AHEAD  
TIE TO TIP PROJECT U-2579C (BY OTHERS)  
BEGIN 1.5" OVERLAY ONLY EB / WB



**MATCHLINE SEE SHEET 31C**

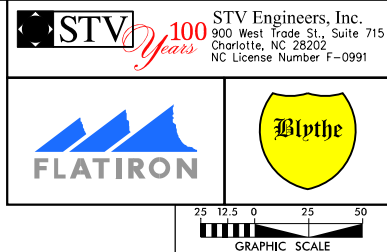
PERMIT DRAWING  
SHEET 88 OF 97



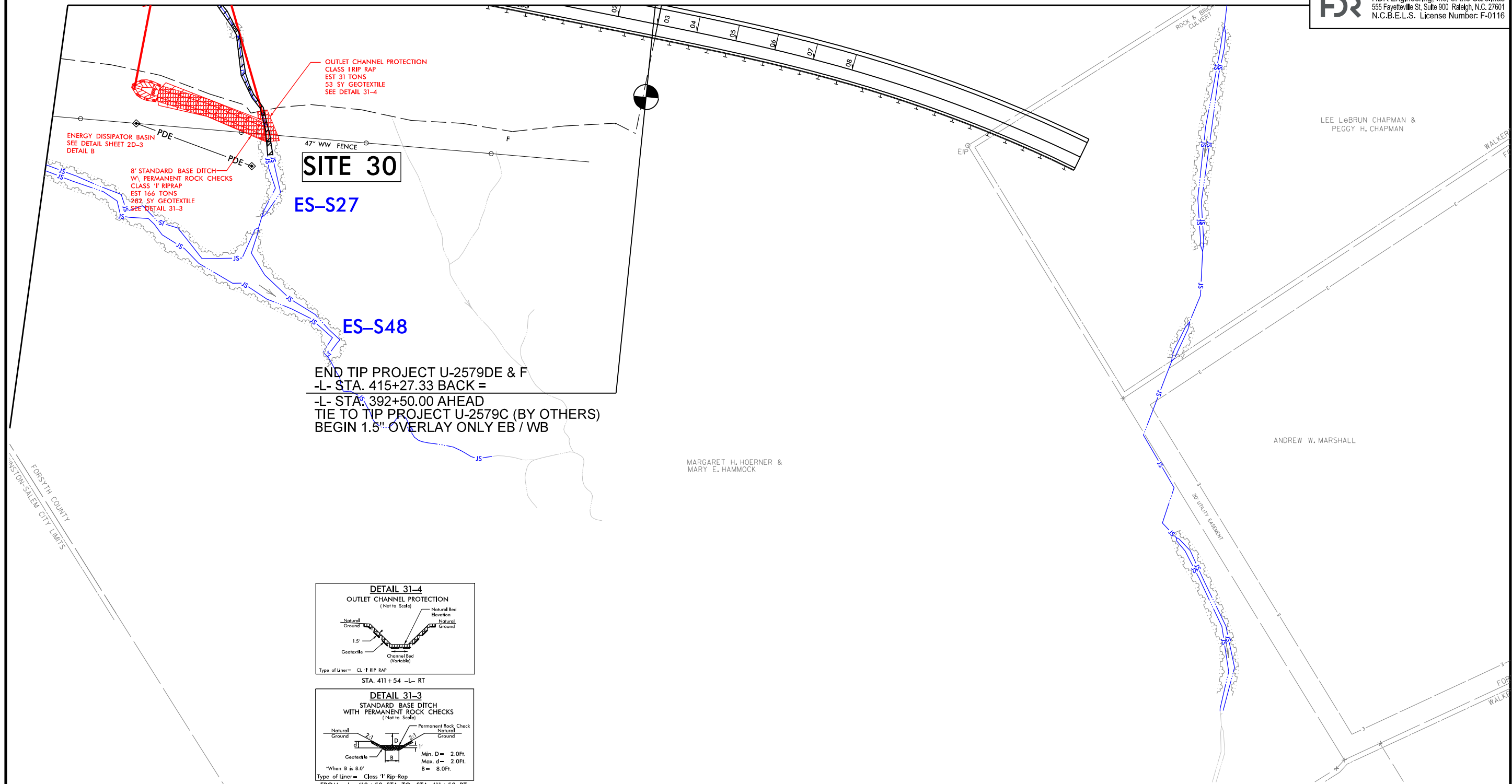
 DENOTES IMPACTS IN SURFACE WATER

 DENOTES TEMPORARY IMPACTS IN SURFACE WATER

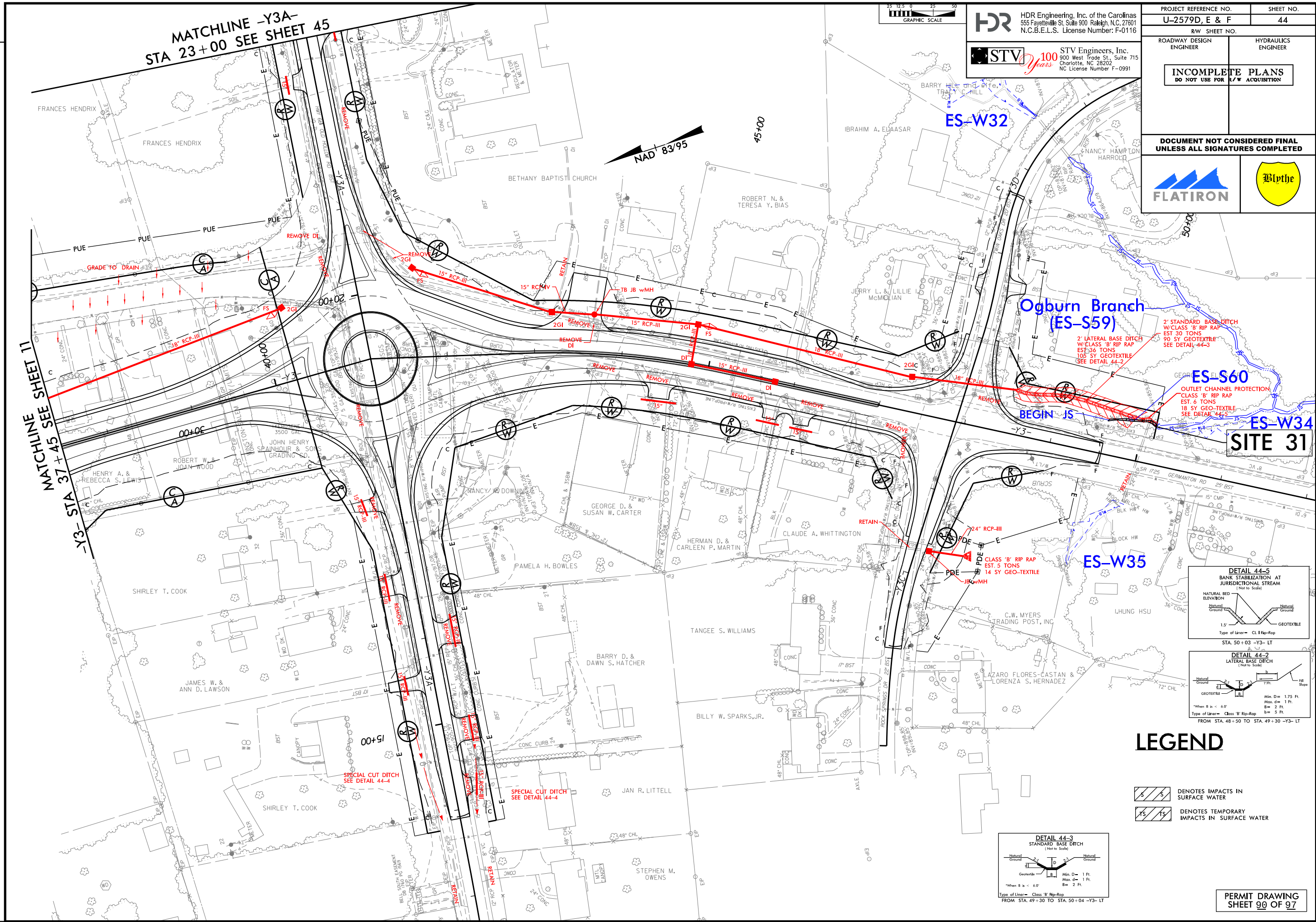
NAD  $+83/95$



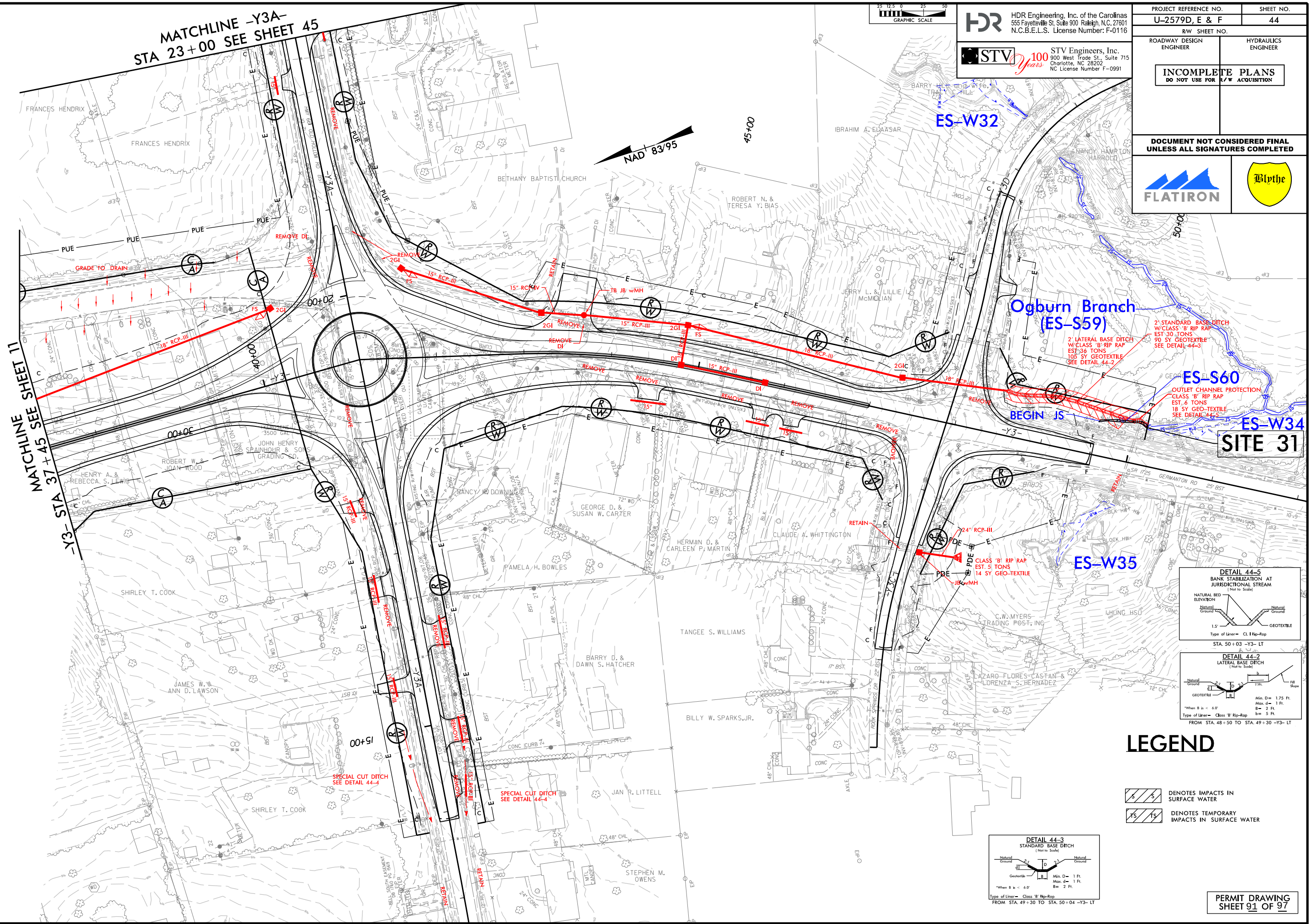
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| PROJECT REFERENCE NO.                                                                                                                                                                                                                                                                                                                            | SHEET NO. |
| U-2759D, E & F                                                                                                                                                                                                                                                                                                                                   | 31-C      |
| ROADWAY DESIGN<br>ENGINEER                                                                                                                                                                                                                                                                                                                       |           |
| <div style="border: 1px solid black; padding: 10px; text-align: center;"> <b>INCOMPLETE PLANS</b><br/>         DO NOT USE FOR R/W ACQUISITION       </div>                                                                                                                                                                                       |           |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b>                                                                                                                                                                                                                                                                         |           |
|  <div style="display: inline-block; vertical-align: middle; margin-left: 10px;">         HDR Engineering, Inc. of the Carolinas<br/>         555 Fayetteville St. Suite 900 Raleigh, N.C. 27601<br/>         N.C.B.E.L.S. License Number: F-0116       </div> |           |

PERMIT DRAWING  
SHEET 89 OF 97

REVISIONS





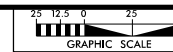


## LEGEND

-  DENOTES IMPACTS IN SURFACE WATER
-  DENOTES TEMPORARY IMPACTS IN SURFACE WATER







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555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116



**STV Engineers, Inc.**  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

PROJECT REFERENCE NO.

U-2579D, E &amp; F

SHEET NO.

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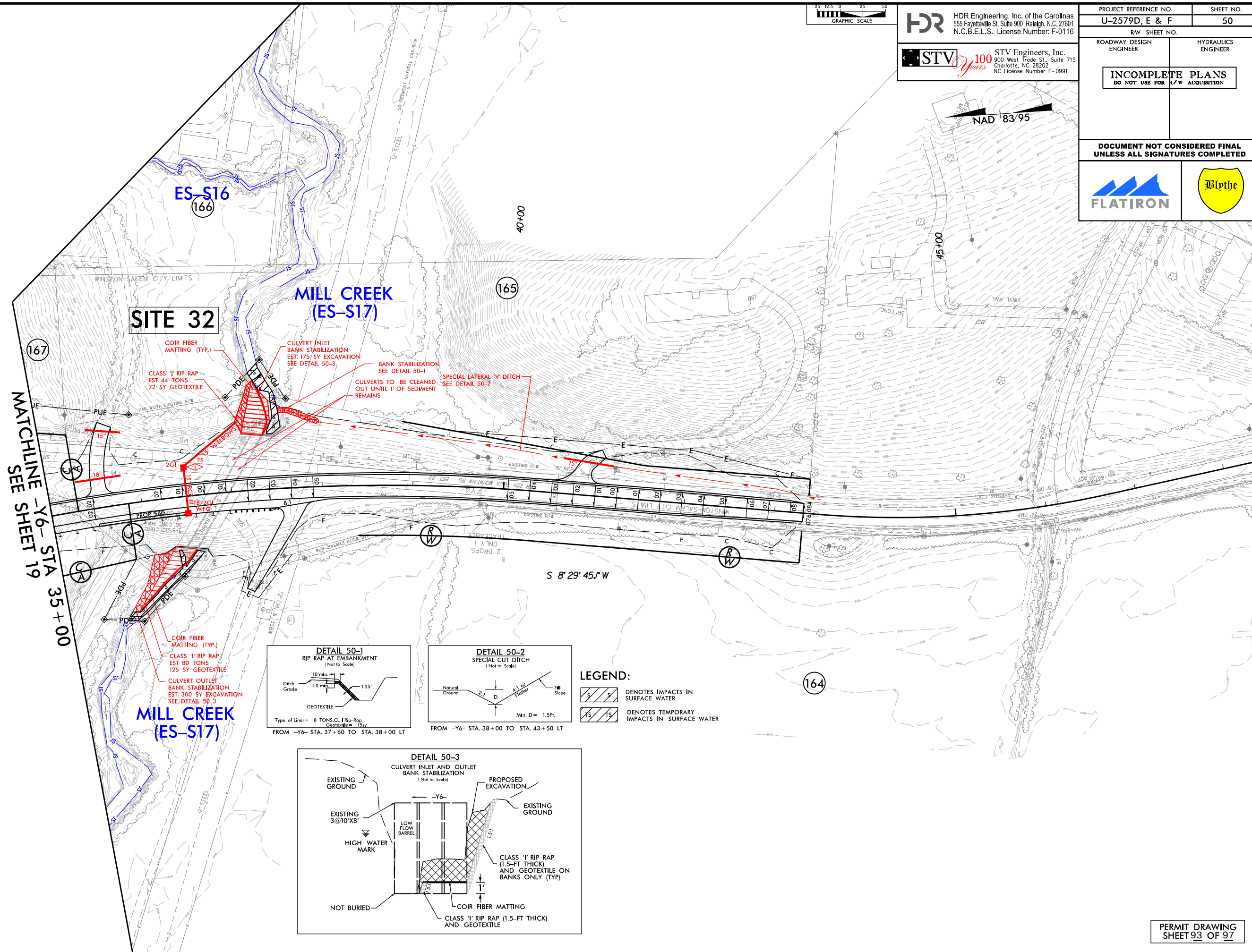
50

|                            |  |
|----------------------------|--|
| ROADWAY DESIGN<br>ENGINEER |  |
|----------------------------|--|

HYDRAULICS  
ENGINEER

**INCOMPLETE PLANS**  
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**



PERMIT DRAWING  
SHEET 93 OF 97

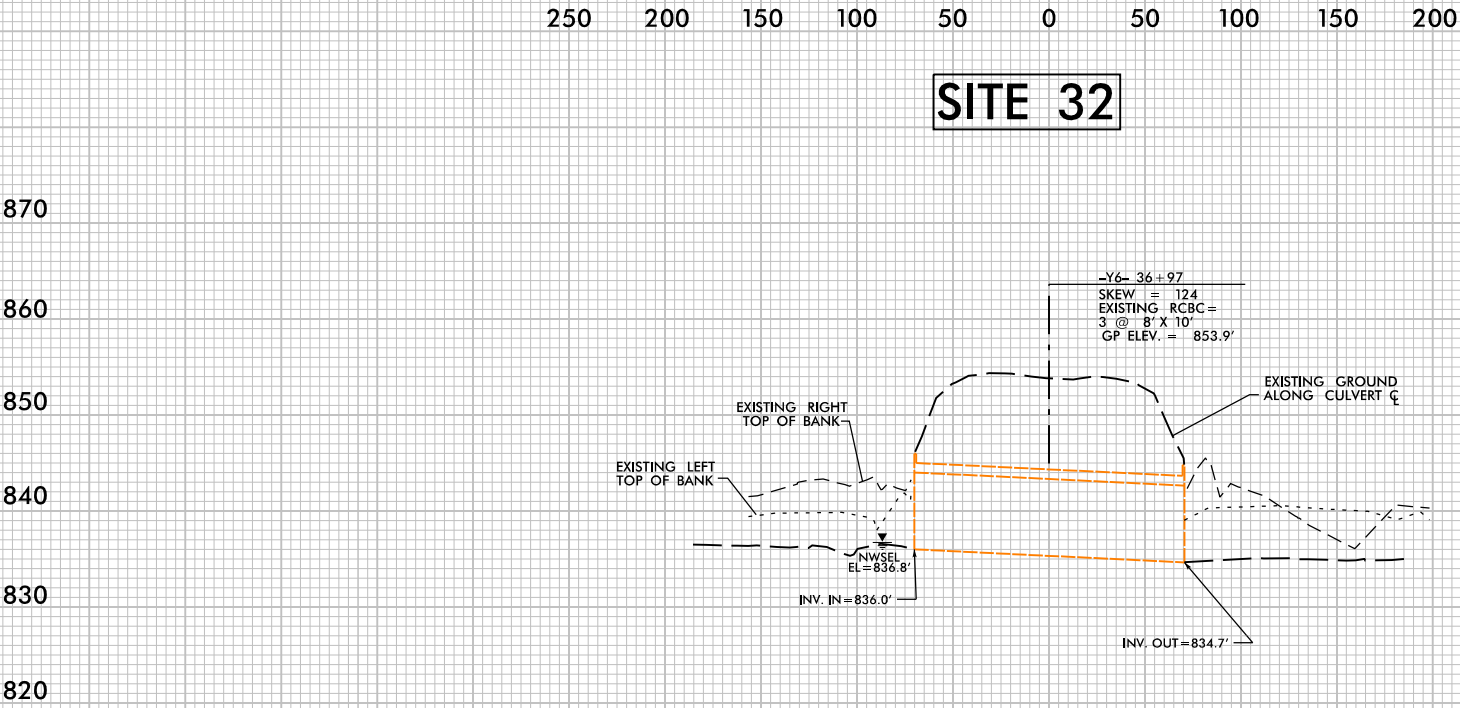
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| PROJECT REFERENCE NO.   |                     | SHEET NO. |
|-------------------------|---------------------|-----------|
| U-2579D,E & F           |                     |           |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

SCALE:  
1" = 50' HORIZONTAL  
1" = 10' VERTICAL



PROFILE ALONG C OF CULVERT



| 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                             | 68+33 -L-                | 54" RCP                |                                 |                             |                             |                                      |                                | 0.13                      |                       | 1522                                    |                                     |                            |
| 1                             | 26+22 -Y1RPD LT          | BANK STABILIZATION     |                                 |                             |                             |                                      |                                | < 0.01                    |                       | 20                                      |                                     |                            |
| 1A                            | 68+85 -L- LT             | ROADWAY FILL/ 54" RCP  | 0.06                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 1B                            | 68+33 -L-                | ROADWAY FILL / 54" RCP | 0.07                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 1C                            | 14+35 - Y1LPD- LT        | ROADWAY FILL / 54" RCP | 0.02                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 1D                            | 25+73 - Y1RPD- RT        | ROADWAY FILL / 54" RCP | < 0.01                          |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 2                             | 20+56 - 20+97 -Y1RPA- RT | ROADWAY FILL / 66" RCP |                                 |                             |                             |                                      |                                | < 0.01                    |                       | 86                                      |                                     |                            |
| 2A                            | 20+79 -Y1RPA- RT         | ROADWAY FILL / 66" RCP | 0.01                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 3                             | 20+32 - 21+17 -Y1RPA- LT | ROADWAY FILL / 66" RCP |                                 |                             |                             |                                      |                                | < 0.01                    |                       | 120                                     |                                     |                            |
| 4                             | 69+66 -L- LT             | ROADWAY FILL / 54" RCP |                                 |                             |                             |                                      |                                | 0.01                      |                       | 132                                     |                                     |                            |
| 5                             | 77+90 -L-                | 6x6 RCBC               |                                 |                             |                             |                                      |                                | 0.06                      | < 0.01                | 642                                     | 10                                  |                            |
| 5A                            | 12+39 -Y1RPA- RT         | 6x6 RCBC               | 0.02                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 5B                            | 82+90 -L- LT             | ROADWAY FILL / 36" RCP | < 0.01                          |                             | < 0.01                      |                                      |                                |                           |                       |                                         |                                     |                            |
| 6                             | 124+45 - 130+16 -L-      | 42" RCP                |                                 |                             |                             |                                      |                                | 0.08                      | < 0.01                | 824                                     | 7                                   |                            |
| 6A                            | 125+65 -L- RT            | 42" RCP                | 0.11                            |                             | < 0.01                      | 0.01                                 |                                |                           |                       |                                         |                                     |                            |
| 7                             | 130+19 -L-               | 6x6 RCBC               |                                 |                             |                             |                                      |                                | 0.02                      |                       | 266                                     |                                     |                            |
| 8                             | 137+73 -L-               | 42" RCP                |                                 |                             |                             |                                      |                                | 0.06                      | < 0.01                | 918                                     | 19                                  |                            |
| 8A                            | 138+12 -L- RT            | 42" RCP                | < 0.01                          |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 8B**                          | 142+04 -L- RT            | 42" RCP/2' BASE DITCH  | 0.51                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 9                             | 150+71 -L-               | 36" RCP / 42" RCP      |                                 |                             |                             |                                      |                                | 0.06                      |                       | 786                                     |                                     |                            |
| 9                             | 21+60 -Y3RPA- RT         | BANK STABILIZATION     |                                 |                             |                             |                                      |                                | < 0.01                    |                       | 14                                      |                                     |                            |
| 10                            | 160+35 -L-               | 42" RCP                |                                 |                             |                             |                                      |                                | 0.06                      | < 0.01                | 364                                     | 13                                  |                            |
| 10A                           | 159+72 -L- LT            | 42" RCP                | 0.03                            |                             |                             | < 0.01                               |                                |                           |                       |                                         |                                     |                            |
| 10B                           | 160+46 -L- RT            | ROADWAY FILL           | < 0.01                          |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| TOTALS SHEET 1*:              |                          |                        | 0.87                            |                             | < 0.01                      | 0.01                                 |                                | 0.49                      | < 0.01                | 5694                                    | 49                                  | 0                          |

\*Rounded totals are sum of actual impacts

NOTES:

\*\*Wetland ES-W4 is a total take

- SITE 12 IS A CHANNEL RELOCATION

- SITE 21 IS A CHANNEL RELOCATION

| 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) |
| 11                            | 173+80 -L-             | 48" RCP                |                                 |                             |                             |                                      |                                | 0.04                      |                       | 615                                     |                                     |                            |
| 11A**                         | 174+23 -L- RT          | 48" RCP                | 0.08                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 12                            | 203+75 - 207+10 -L- RT | ROADWAY FILL           |                                 |                             |                             |                                      |                                | 0.02                      | < 0.01                | 410                                     | 10                                  |                            |
| 12A                           | 205+69 -L- RT          | FILL IN WETLAND        | 0.08                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 13                            | 207+24 -L-             | 5x6 CULVERT            |                                 |                             |                             |                                      |                                | 0.03                      | < 0.01                | 337                                     | 22                                  |                            |
| 13A                           | 209+14 -L- LT          | 4' BASE DITCH          |                                 |                             |                             | < 0.01                               |                                |                           |                       |                                         |                                     |                            |
| 14                            | 222+50 - 223+56 -L- RT | 48" RCP                |                                 |                             |                             |                                      |                                | 0.01                      | < 0.01                | 220                                     | 11                                  |                            |
| 14A                           | 222+65 -L- LT          | POND                   |                                 |                             |                             |                                      |                                | 3.06                      |                       |                                         |                                     |                            |
| 15                            | 242+86/244+20 -L-      | 5'x6' RCBC             |                                 |                             |                             |                                      |                                | 0.05                      | < 0.01                | 520                                     | 15                                  |                            |
| 15A                           | 243+60/244+00 -L-      | 5'x6' RCBC             | 0.04                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 16                            | 253+92/255+58 -L-      | 42" RCP AND DITCH      |                                 |                             |                             |                                      |                                | 0.05                      | < 0.01                | 513                                     | 20                                  |                            |
| 17                            | 261+02/262+96 -L-      | 6'x6' RCBC             |                                 |                             |                             |                                      |                                | 0.08                      | < 0.01                | 928                                     | 23                                  |                            |
| 18                            | 275+75/276+78 -L-      | 42" RCP                |                                 |                             |                             |                                      |                                | 0.03                      | < 0.01                | 161                                     | 11                                  |                            |
| 19                            | 279+30/280+86 -L-      | 5'x7' RCBC             |                                 |                             |                             |                                      |                                | 0.04                      | < 0.01                | 250                                     | 11                                  |                            |
| 19                            | 280+86/281+71 -L-      | 5' STANDARD BASE DITCH |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 91                                      | 15                                  |                            |
| 20                            | 280+61/281+66 -L-      | REMOVE 2 - 72" CMP     |                                 |                             |                             |                                      |                                | 0.02                      | < 0.01                | 35                                      | 31                                  |                            |
| 20A                           | 286+51/286+74 -L-      | BANK STABILIZATION     |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 16                                      | 21                                  |                            |
| 20B                           | 285+56/285+81 -L-      | BANK STABILIZATION     |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 20                                      | 21                                  |                            |
| 20C                           | 285+19/285+65 -L-      | TEMPORARY WORK PAD     |                                 |                             |                             |                                      |                                |                           | 0.06                  |                                         | 165                                 |                            |
| 21                            | 285+19/285+65 -L-      | CHANNEL CHANGE         |                                 |                             |                             |                                      |                                | < 0.01                    |                       | 133                                     |                                     |                            |
| 21                            | 285+19 -L-             | BANK STABILIZATION     |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 10                                      | 10                                  |                            |
| 22                            | 303+57/304+09 -L-      | 30" RCP/ 36" RCP       |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 97                                      | 7                                   |                            |
| 23                            | 316+25/317+41 -L-      | 6'x6' RCBC             |                                 |                             |                             |                                      |                                | 0.04                      | < 0.01                | 348                                     | 11                                  |                            |
| 23                            | 317+40/317+49 -L-      | BANK STABILIZATION     |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 26                                      | 10                                  |                            |
| TOTALS SHEET 2*:              |                        |                        | 0.20                            |                             |                             | < 0.01                               |                                | 3.50                      | 0.09                  | 4730                                    | 414                                 | 0                          |

\*Rounded totals are sum of actual impacts

NOTES:

- \*\*Wetland ES-W33 is total take
- Site 24 is a Channel Relocation

NC DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
10/29/2018  
FORSYTH  
U-2579D, E & F  
34839.3.GV7

| 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) |
| 24                            | 316+84/317+01 -L-     | CHANNEL CHANGE               |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 120                                     | 10                                  |                            |
| 25                            | 323+23/325+22 -L-     | 24" RCP                      |                                 |                             |                             |                                      |                                | 0.02                      | < 0.01                | 294                                     | 10                                  |                            |
| 26                            | 335+66/338+74 -L-     | 6'x6' RCBC                   |                                 |                             |                             |                                      |                                | 0.05                      | < 0.01                | 519                                     | 10                                  |                            |
| 26                            | 338+82 -L-            | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 24                                      | 10                                  |                            |
| 27                            | 356+07/357+64 -L-     | 7'x7' RCBC                   |                                 |                             |                             |                                      |                                | 0.05                      |                       | 328                                     |                                     |                            |
| 27                            | 356+07 -L- LT         | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 35                                      | 8                                   |                            |
| 27                            | 357+63 -L- RT         | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 37                                      | 12                                  |                            |
| 28**                          | 397+37/400+85 -L-     | ROADWAY FILL                 | 0.26                            |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 29**                          | 398+61/405+73 -L-     | ROADWAY FILL / 5' BASE DITCH |                                 |                             |                             |                                      |                                | 0.06                      |                       | 906                                     |                                     |                            |
| 29**                          | 398+61/405+73 -L-     | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 40                                      | 10                                  |                            |
| 29A**                         | 401+96 -L-            | ROADWAY FILL                 | < 0.01                          |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| 29B**                         | 402+33/405+59 -L-     | ROADWAY FILL / 5' BASE DITCH | 0.26                            |                             | 0.03                        | 0.01                                 |                                |                           |                       |                                         |                                     |                            |
| 30***                         | 409+52/411+61 -L-     | 54" RCP                      |                                 |                             |                             |                                      |                                | 0.05                      | < 0.01                | 563                                     | 14                                  |                            |
| 30***                         | 409+53 -L-            | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 15                                      | 10                                  |                            |
| 31                            | 49+59 - 50+28 -Y3- LT | 2' BASE DITCH                |                                 |                             |                             |                                      |                                | < 0.01                    |                       | 57                                      |                                     |                            |
| 32                            | 35+68/37+32 -Y6-      | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | 0.03                      | < 0.01                | 172                                     | 19                                  |                            |
| 33                            | 173+50 -L- LT         | CHANNEL IMPROVEMENT TIE-IN   |                                 |                             |                             |                                      |                                | 0.03                      | < 0.01                | 20                                      | 21                                  |                            |
| 34                            | 357+38/357+49 -L-     | BANK STABILIZATION           |                                 |                             |                             |                                      |                                | < 0.01                    | < 0.01                | 24                                      | 11                                  |                            |
|                               |                       |                              |                                 |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
|                               |                       | TOTAL SHEET 1                | 0.87                            |                             | < 0.01                      | 0.01                                 |                                | 0.49                      | < 0.01                | 5694                                    | 49                                  |                            |
|                               |                       | TOTAL SHEET 2                | 0.20                            |                             |                             | < 0.01                               |                                | 3.50                      | 0.09                  | 4730                                    | 414                                 |                            |
|                               |                       | TOTAL SHEET 3                | 0.53                            |                             | 0.03                        | 0.01                                 |                                | 0.30                      | 0.02                  | 3154                                    | 145                                 |                            |
|                               |                       |                              |                                 |                             |                             |                                      |                                |                           |                       |                                         |                                     |                            |
| TOTALS ALL SHEETS*:           |                       |                              | 1.60                            | 0.00                        | 0.03                        | 0.03                                 | 0.00                           | 4.30                      | 0.11                  | 13578                                   | 608                                 |                            |

\*Rounded totals are sum of actual impacts  
\*\* SITE 28, 29, 29A, AND 29B - SITE 1 IN U-2579C PHASE 2 PERMIT  
\*\*\* SITE 30 - SITE 2 IN U-2579C PHASE 2 PERMIT

NOTES  
- ISOLATED WETLANDS SITE  
- SITE 24 IS A CHANNEL RELOCATION

NC DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
10/29/2018  
FORSYTH  
U-2579D, E & F  
34839.3.GV7

SHEET 97 OF 97



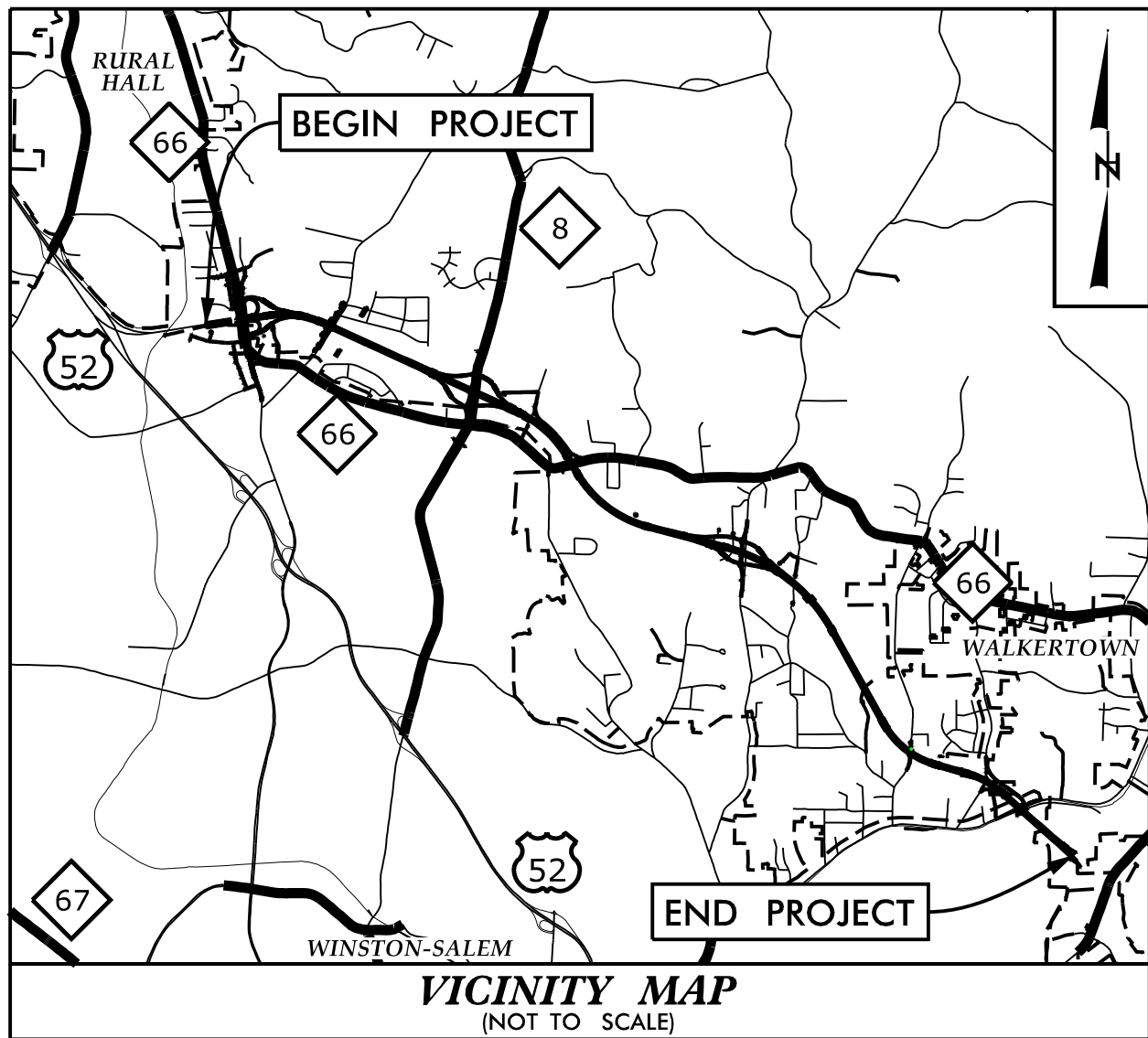
09.08/99

TIP PROJECT: U-2579D,E&F

CONTRACT: C204088

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DATE: 11/16/2018  
TIME: 3:21:37 PM  
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See Sheet 1A-1 For Sheet Symbolology



VICINITY MAP  
(NOT TO SCALE)

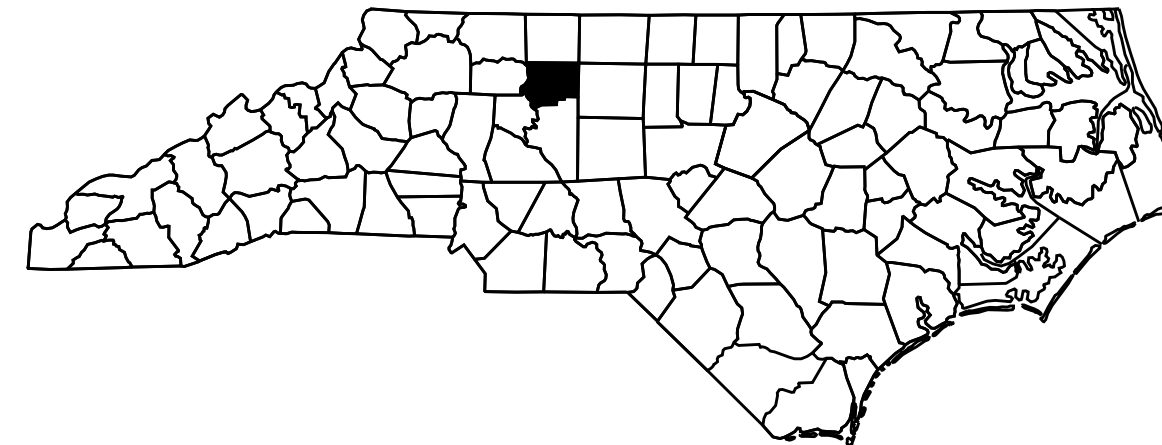
60% PLANS

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

## FORSYTH COUNTY

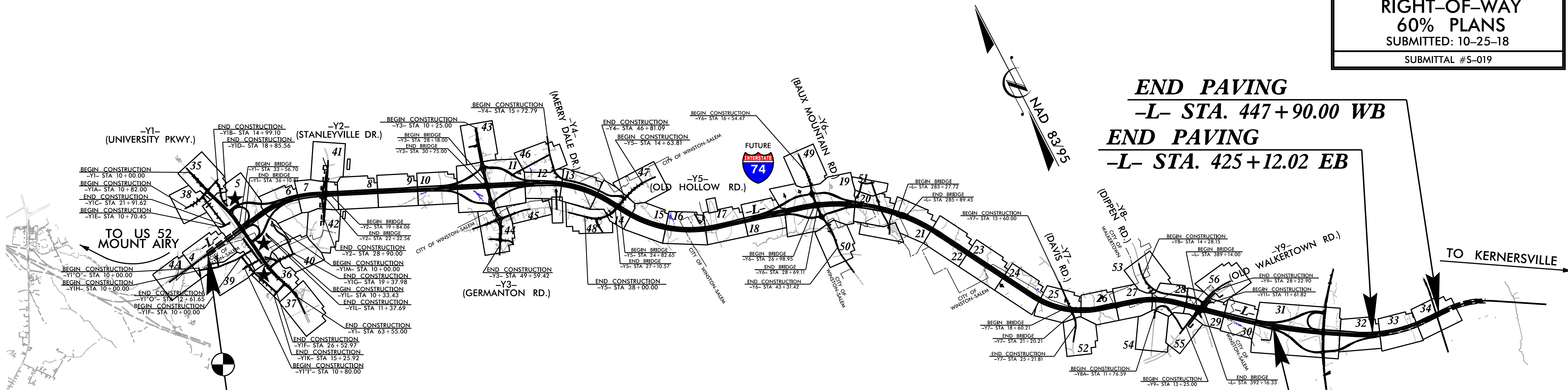
**LOCATION: WINSTON-SALEM - NORTHERN BELTWAY  
FROM WEST OF NC 66 /SR 4000 (UNIVERSITY  
PARKWAY) TO US 311 (NEW WALKERTON ROAD)**  
**TYPE OF WORK: DESIGN-BUILD AS SPECIFIED IN THE SCOPE OF WORK  
CONTAINED IN THE REQUEST FOR PROPOSALS**

| STATE           | STATE PROJECT REFERENCE NO. | SHEET NO.                    | TOTAL SHEETS |
|-----------------|-----------------------------|------------------------------|--------------|
| N.C.            | U-2579D,E&F                 | 1                            |              |
| STATE PROJ. NO. | F.A. PROJ. NO.              | DESCRIPTION                  |              |
| 34839.3.GV7     | NHP-0074(213)               | PE, ROW, UTILITIES & CONSTR. |              |
|                 |                             |                              |              |
|                 |                             |                              |              |
|                 |                             |                              |              |
|                 |                             |                              |              |



**RIGHT-OF-WAY  
60% PLANS**  
SUBMITTED: 10-25-18

SUBMITTAL #S-019



**BEGIN TIP PROJECT U-2579D,E&F  
BEGIN CONSTRUCTION**

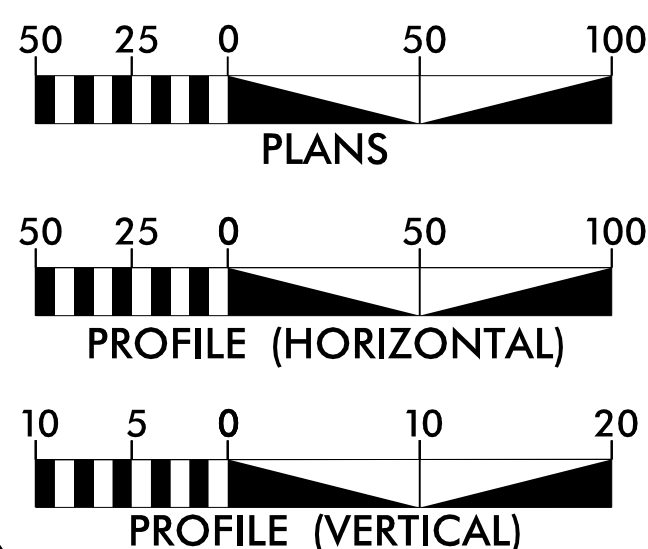
**-L- STA. 48+53.73 AH =**  
**-L- STA. 198+37.73 BK**

**END TIP PROJECT U-2579D,E&F**  
**-L- STA. 415+27.33 BK =**  
**-L- STA. 392+50.00 AH**

★ PROPOSED TRAFFIC SIGNAL

NOTES:  
THIS IS A CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.  
A PORTION OF THIS PROJECT IS LOCATED WITHIN THE MUNICIPAL BOUNDARIES OF THE CITIES OF WINSTON-SALEM AND WALKERTOWN.

### GRAPHIC SCALES



### DESIGN DATA

ADT 2016 = 34,000  
ADT 2040 = 60,200  
K = 9 %  
D = 55 %  
T = 15 % \*  
V = 70 MPH  
\* TTST = 10% DUAL = 5%  
FUNC CLASS =  
INTERSTATE  
STATEWIDE TIER

### PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-2579DEF = 6.859 MILES  
LENGTH STRUCTURES TIP PROJECT U-2579DEF = 0.087 MILES \*  
TOTAL LENGTH TIP PROJECT U-2579DEF = 6.946 MILES

\* LENGTH BASED ON WB BRIDGES

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

Prepared for the Office of:  
**DIVISION OF HIGHWAYS**  
1000 Birch Ridge Dr., Raleigh NC, 27610

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:  
MARCH 20, 2018

LETTING DATE:  
MARCH 20, 2018

JONATHAN HENDERSON, PE  
PROJECT ENGINEER

CALVIN W. MOODY, III, PE  
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

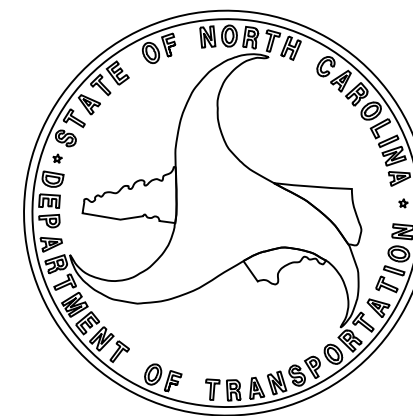
ROADWAY DESIGN  
ENGINEER

SIGNATURE: P.E.

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St., Suite 900 Raleigh, NC 27601  
N.C.B.E.L.S. License Number: F-0116

STV 100 Years STV Engineers, Inc.  
300 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number: F-0991





STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS  
CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

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

BUILDINGS AND OTHER CULTURE:

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

HYDROLOGY:

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

RAILROADS:

|                    |  |
|--------------------|--|
| Standard Gauge     |  |
| RR Signal Milepost |  |
| Switch             |  |
| RR Abandoned       |  |
| RR Dismantled      |  |

RIGHT OF WAY & PROJECT CONTROL:

|                                                           |  |
|-----------------------------------------------------------|--|
| Secondary Horiz and Vert Control Point                    |  |
| Primary Horiz Control Point                               |  |
| Primary Horiz and Vert Control Point                      |  |
| Exist Permanent Easment Pin and Cap                       |  |
| New Permanent Easement Pin and Cap                        |  |
| Vertical Benchmark                                        |  |
| Existing Right of Way Marker                              |  |
| Existing Right of Way Line                                |  |
| New Right of Way Line                                     |  |
| New Right of Way Line with Pin and Cap                    |  |
| New Right of Way Line with Concrete or Granite R/W Marker |  |
| New Control of Access Line with Concrete C/A Marker       |  |
| Existing Control of Access                                |  |
| New Control of Access                                     |  |
| Existing Easement Line                                    |  |
| New Temporary Construction Easement                       |  |
| New Temporary Drainage Easement                           |  |
| New Permanent Drainage Easement                           |  |
| New Permanent Drainage /Utility Easement                  |  |
| New Permanent Utility Easement                            |  |
| New Temporary Utility Easement                            |  |
| New Aerial Utility Easement                               |  |

ROADS AND RELATED FEATURES:

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

VEGETATION:

|              |  |
|--------------|--|
| Single Tree  |  |
| Single Shrub |  |

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

|            |  |
|------------|--|
| Hedge      |  |
| Woods Line |  |
| Orchard    |  |
| Vineyard   |  |

EXISTING STRUCTURES:

|                                          |  |
|------------------------------------------|--|
| MAJOR:                                   |  |
| Bridge, Tunnel or Box Culvert            |  |
| Bridge Wing Wall, Head Wall and End Wall |  |
| MINOR:                                   |  |
| Head and End Wall                        |  |
| Pipe Culvert                             |  |
| Footbridge                               |  |
| Drainage Box: Catch Basin, DI or JB      |  |
| Paved Ditch Gutter                       |  |
| Storm Sewer Manhole                      |  |
| Storm Sewer                              |  |

UTILITIES:

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

TELEPHONE:

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

WATER:

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

TV:

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

GAS:

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

SANITARY SEWER:

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

MISCELLANEOUS:

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







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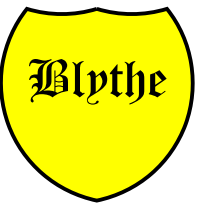
REVISIONS



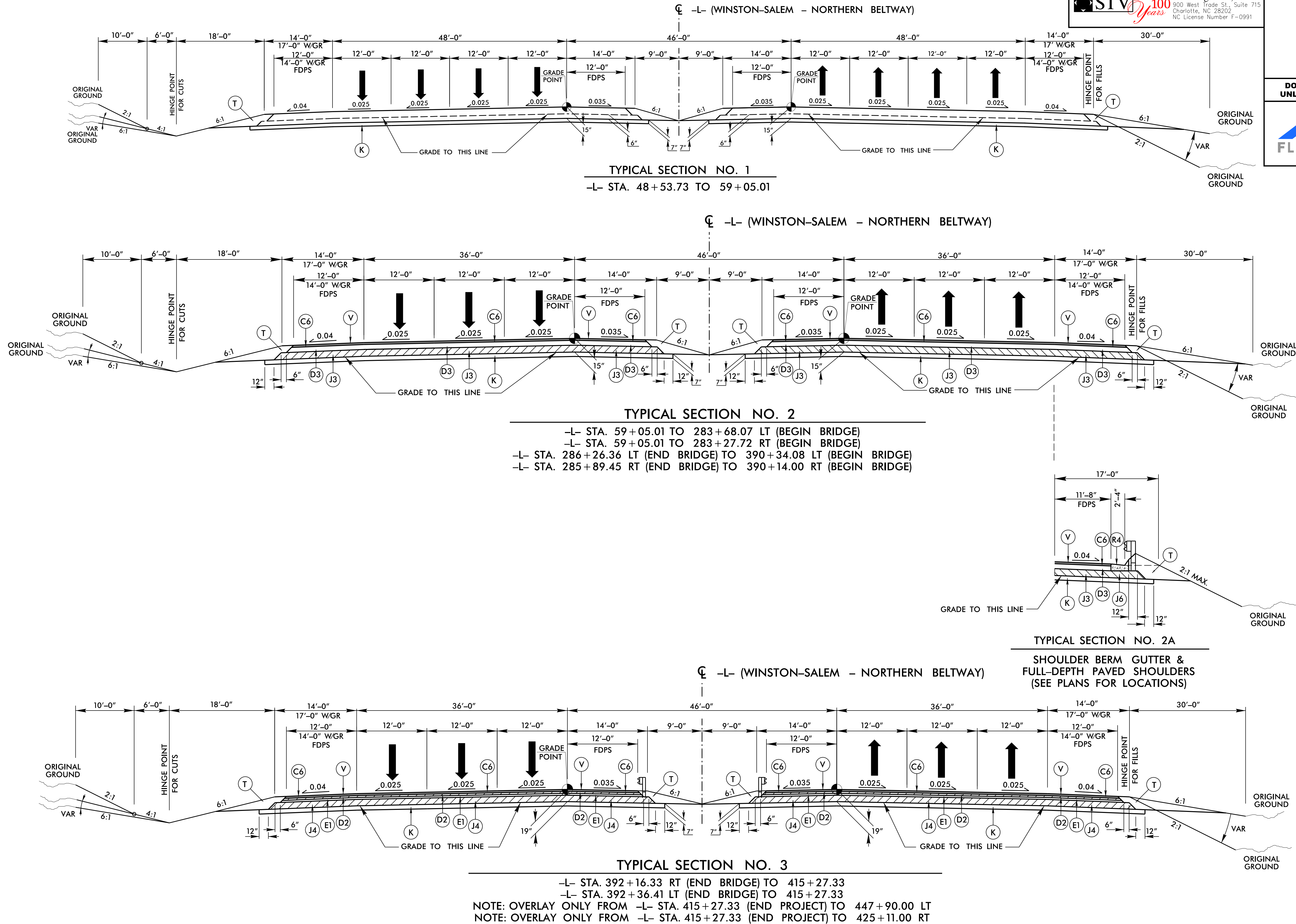
HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116



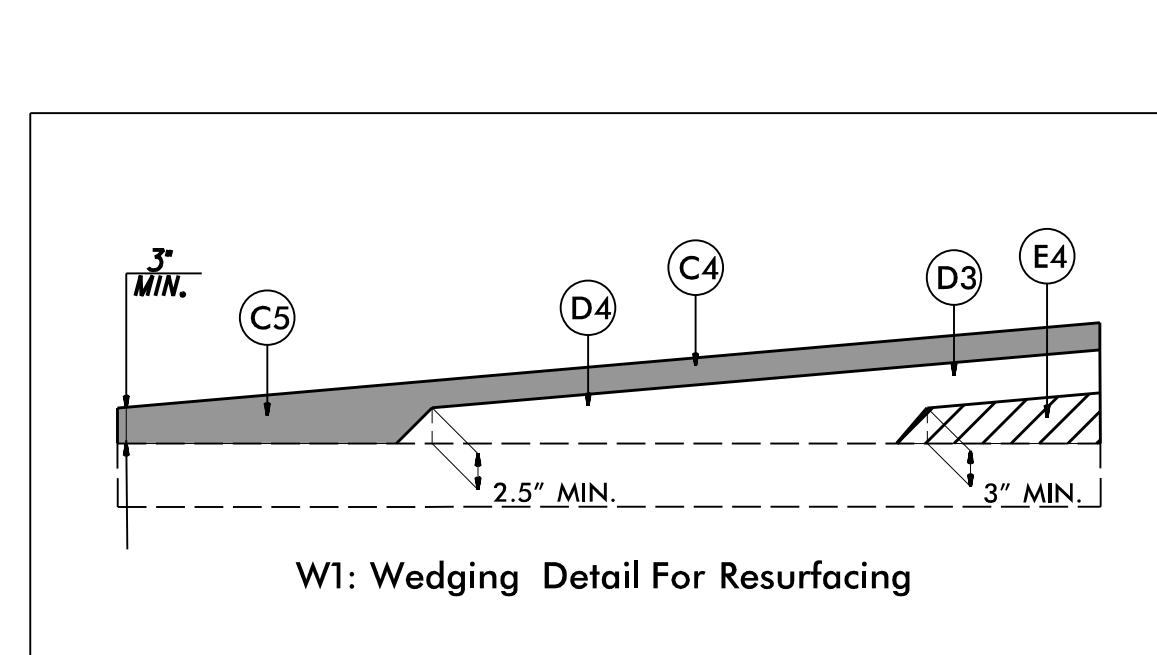
STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                                                     |  |                                                                                     |  |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                                  |  | SHEET NO.<br><b>2A-2</b>                                                            |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | PAVEMENT DESIGN<br>ENGINEER                                                         |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |  |                                                                                     |  |
|  |  |  |  |

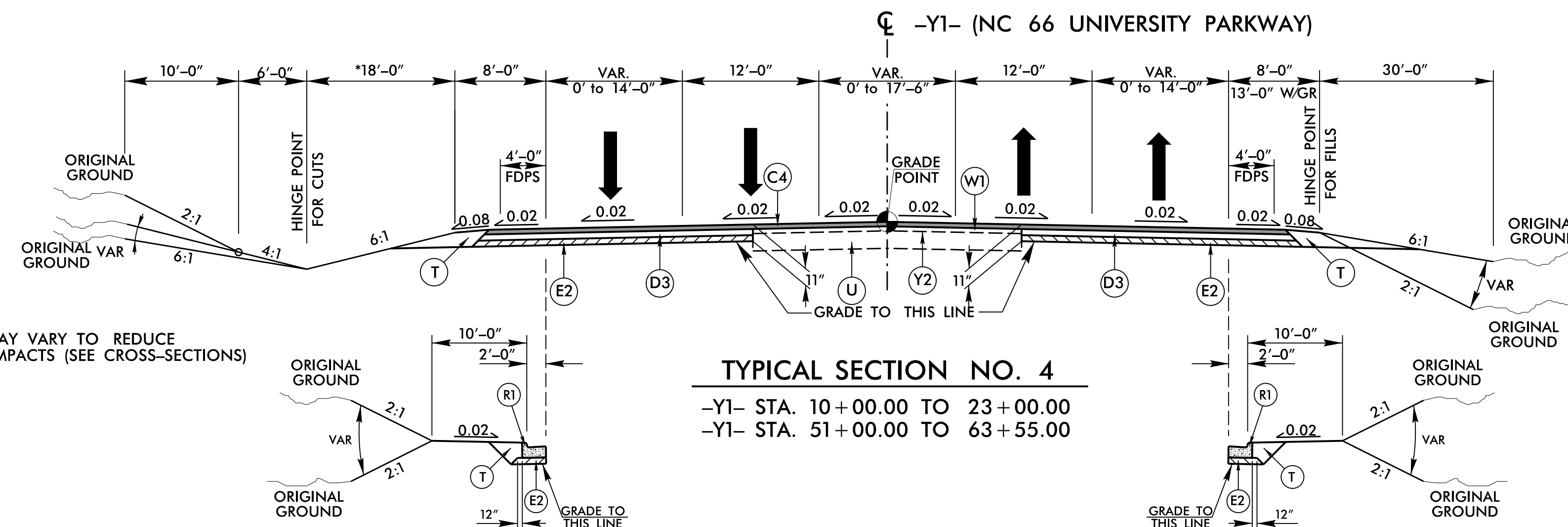
| PAVEMENT SCHEDULE |                      |
|-------------------|----------------------|
| C6                | 3" S9.5C             |
| D2                | 3" I19.0C            |
| D3                | 4" I19.0C            |
| E1                | 3" B25.0C            |
| J3                | 8" CTABC             |
| J4                | 10" CTABC            |
| J6                | VAR. CTABC           |
| K                 | SUBGRADE STAB.       |
| R4                | SHOULDER BERM GUTTER |
| T                 | EARTH MATERIAL       |
| U                 | EXISTING PAVEMENT    |
| V                 | RUMBLE STRIPS        |







\* DITCH WIDTH MAY VARY TO REDUCE  
RIGHT OF WAY IMPACTS (SEE CROSS-SECTIONS)



TYPICAL SECTION NO. 4

-Y1- STA. 10+00.00 TO 23+00.00  
 -Y1- STA. 51+00.00 TO 63+55.00

TYPICAL SECTION NO. 4A

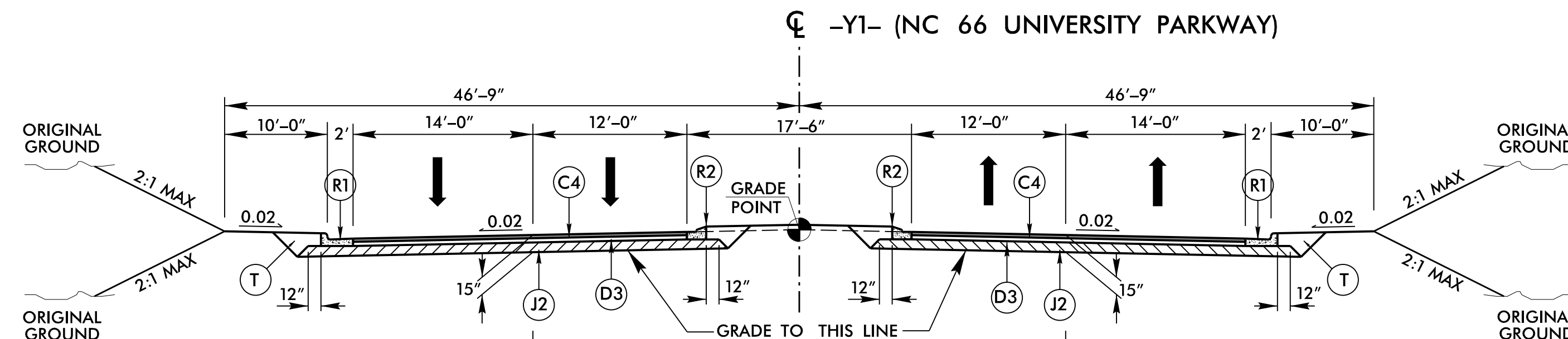
USE TYPICAL SECTION NO. 4A  
IN CONJUNCTION WITH TYPICAL  
NO. 4

-Y1- STA. 51+00.00 TO STA. 63+55.00 (LT)

TYPICAL SECTION NO. 4B

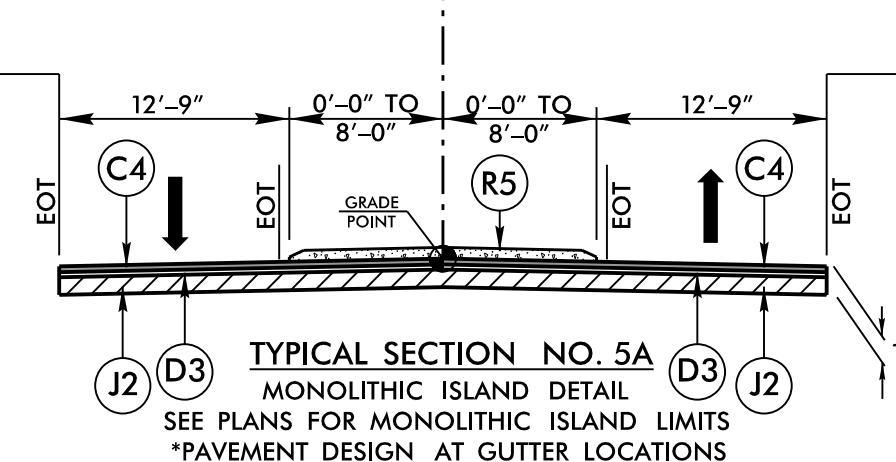
USE TYPICAL SECTION NO. 4B  
IN CONJUNCTION WITH TYPICAL  
NO. 4

-Y1- STA. 51+00.00 TO STA. 63+55.00 (RT)



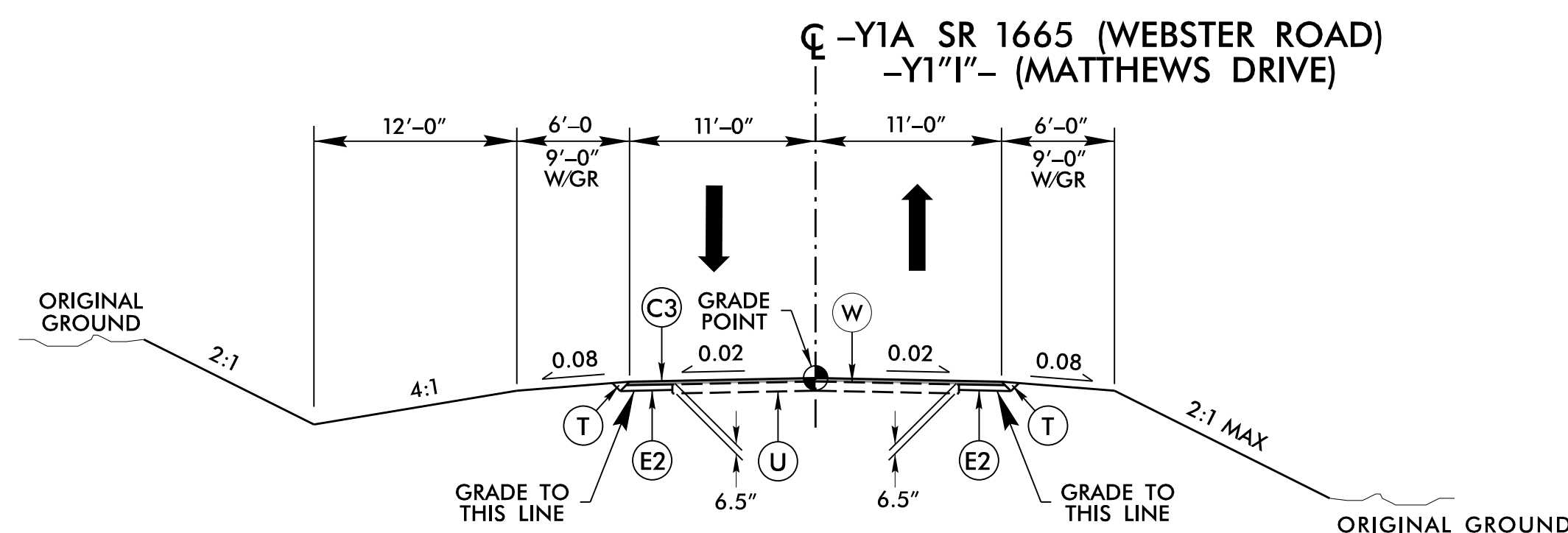
TYPICAL SECTION NO. 5

-Y1- STA. 23+00.00 TO 33+60.26 (BEGIN BRIDGE)  
-Y1- STA. 36+12.76 (END BRIDGE) TO 51+00.00



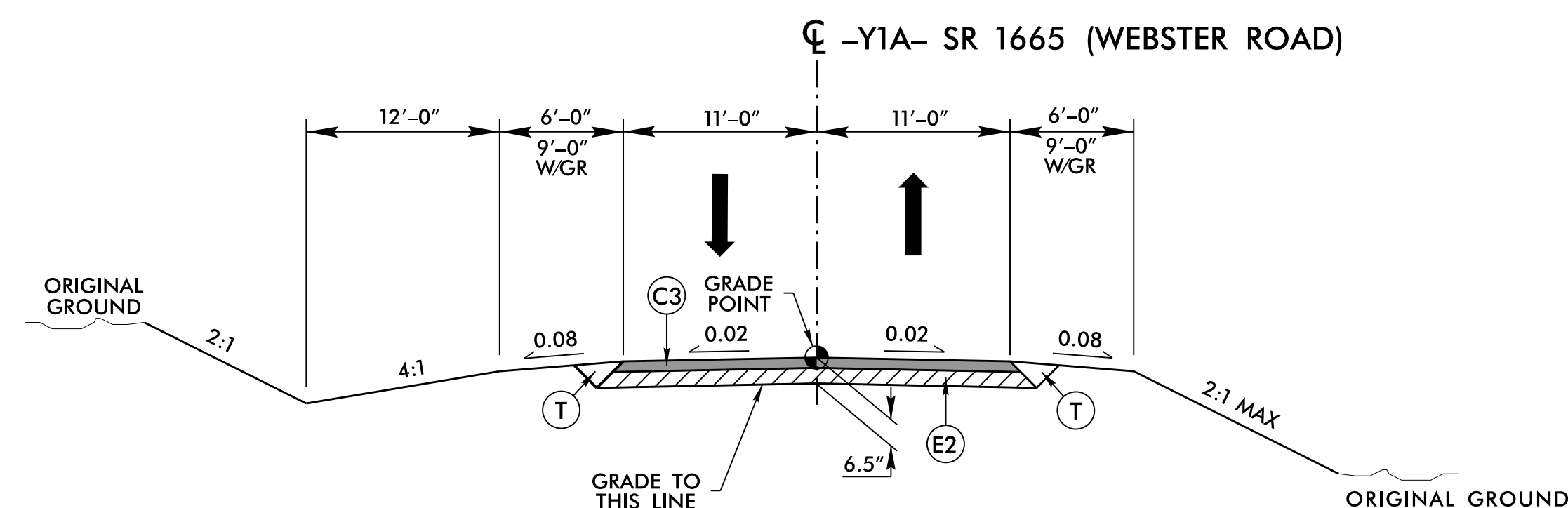
TYPICAL SECTION NO. 5A (D3)

MONOLITHIC ISLAND DETAIL  
SEE PLANS FOR MONOLITHIC ISLAND LIMITS  
\*PAVEMENT DESIGN AT GUTTER LOCATIONS



### TYPICAL SECTION NO. 6

-Y1A- STA. 10+82.00 TO 14+35.00  
 -Y1'I"- STA. 10+80.00 TO 11+70.00  
 -Y1'I"- STA. 13+20.00 TO 16+56.24



TYPICAL SECTION NO. 7

—Y1A— STA. 14+35.00 TO 19+26.11

|    | PAVEMENT SCHEDULE |
|----|-------------------|
| C3 | 2.5" S9.5B        |
| C4 | 3" S9.5B          |
| C5 | VAR. S9.5B        |
| D3 | 4" I19.0C         |
| D4 | VAR. I19.0C       |
| E2 | 4" B25.0C         |
| E4 | VAR. B25.0C       |
| J2 | 8" ABC            |
| R1 | 2'-6" CONC. C&G   |
| T  | EARTH MATERIAL    |
| U  | EXISTING PAVEMENT |
| W  | WEDGING           |
| Y2 | 3" MILLING        |



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USER: SHILTON  
DATE: 11/16/2018  
TIME: 3:22:01 PM  
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REVISIONS



HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116



STV Engineers, Inc.  
300 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

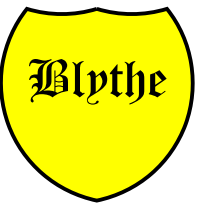
PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**2A-4**

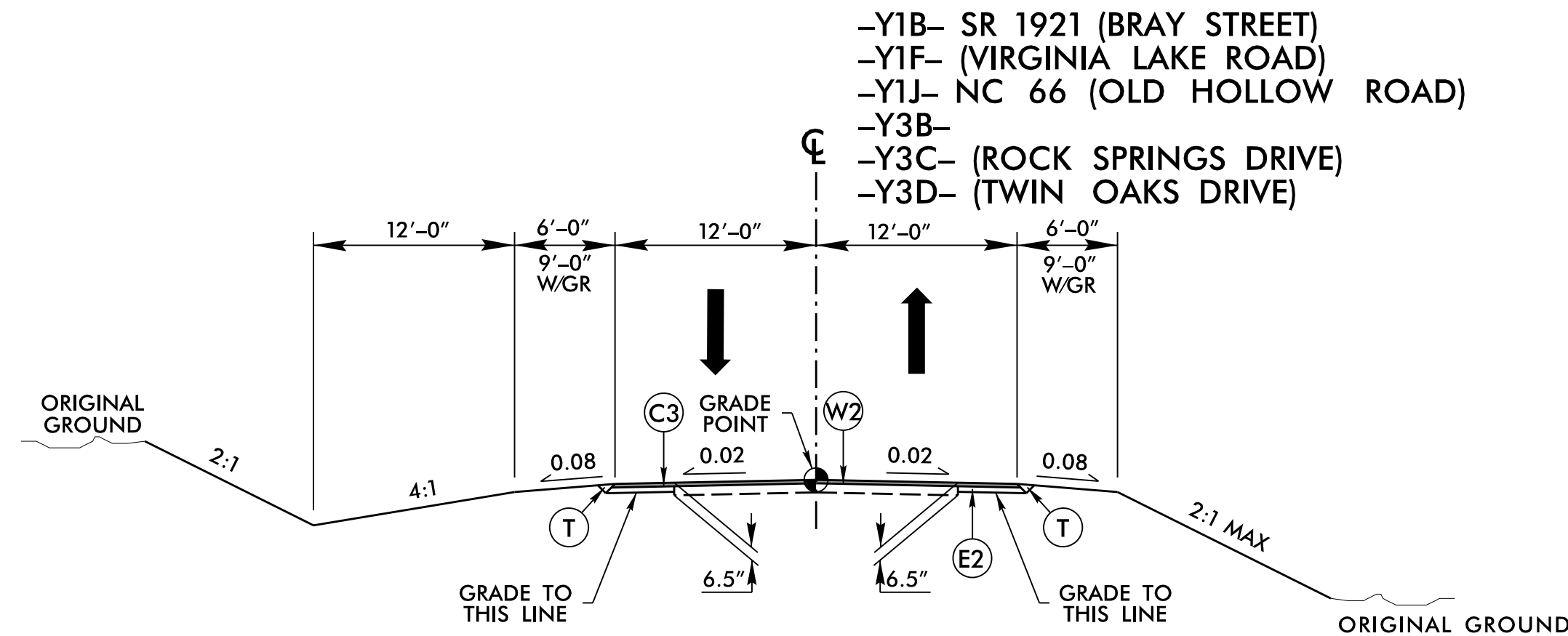
ROADWAY DESIGN  
ENGINEER

PAVEMENT DESIGN  
ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

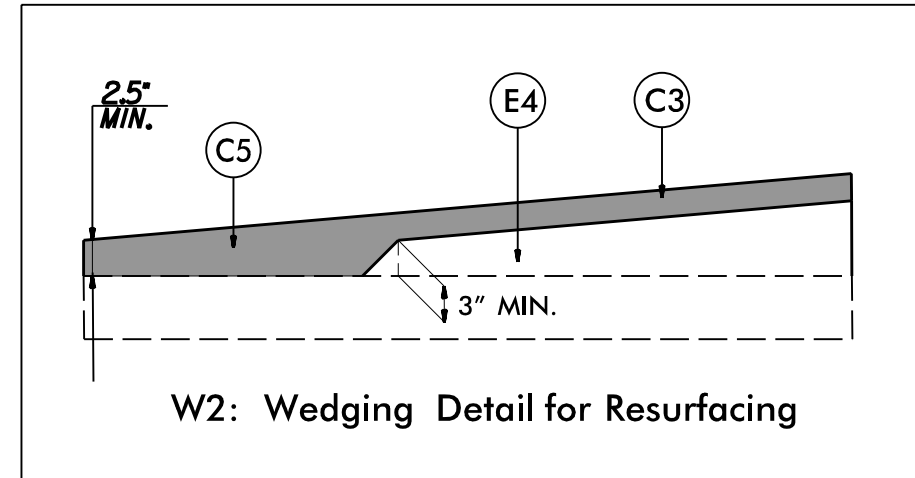


| PAVEMENT SCHEDULE |                   |
|-------------------|-------------------|
| C1                | 1.5" S9.5B        |
| C3                | 2.5" S9.5B        |
| C4                | 3" S9.5B          |
| C5                | VAR. S9.5B        |
| D3                | 4" I19.0C         |
| D4                | VAR. I19.0C       |
| E2                | 4" B25.0C         |
| E4                | VAR. B25.0C       |
| J2                | 8" ABC            |
| P                 | PRIME COAT        |
| T                 | EARTH MATERIAL    |
| U                 | EXISTING PAVEMENT |
| W                 | WEDGING           |

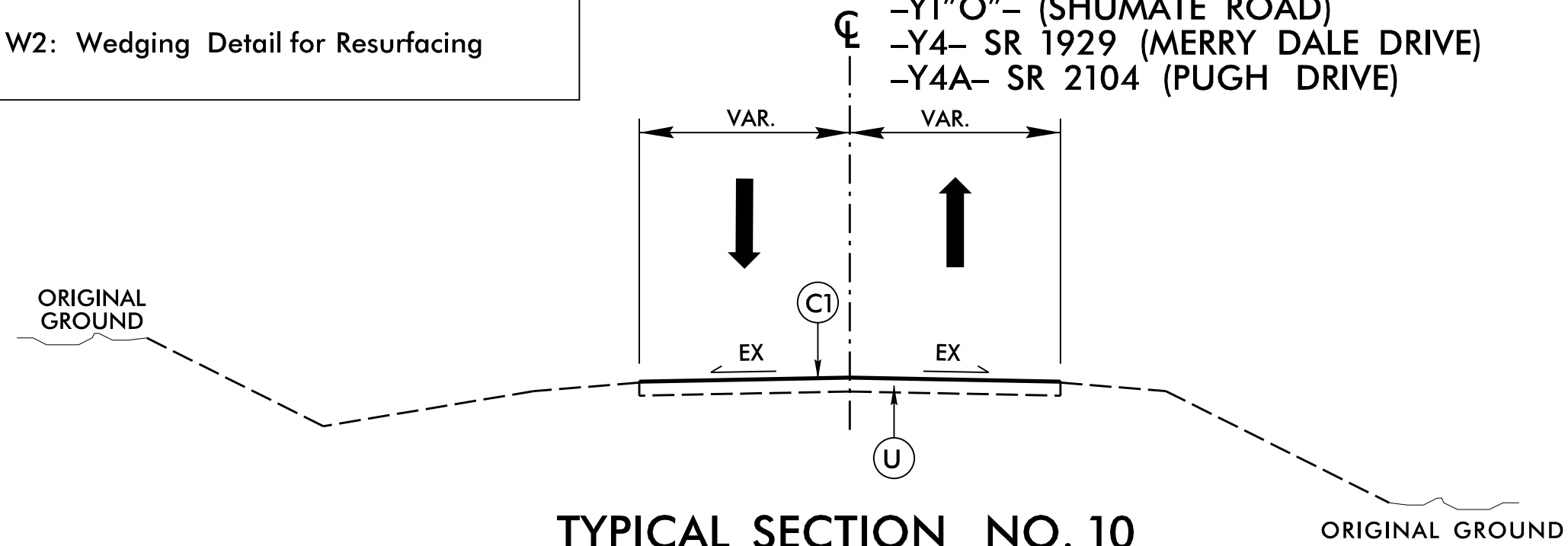


**TYPICAL SECTION NO. 8**

-Y1B- STA. 10+24.96 TO 11+68.29  
-Y1F- STA. 16+00.00 TO 26+42.58  
-Y1J- STA. 9+48.19 TO 11+75.00  
-Y3B- STA. 10+95.00 TO 13+00.74  
-Y3C- STA. 11+60.00 TO 13+57.34  
-Y3D- STA. 10+16.04 TO 12+00.00

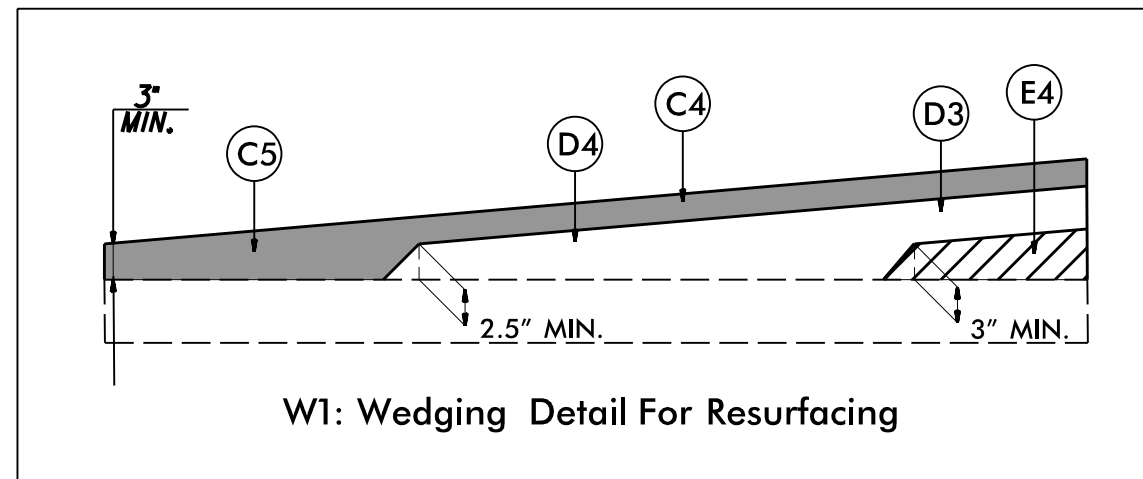


W2: Wedging Detail for Resurfacing

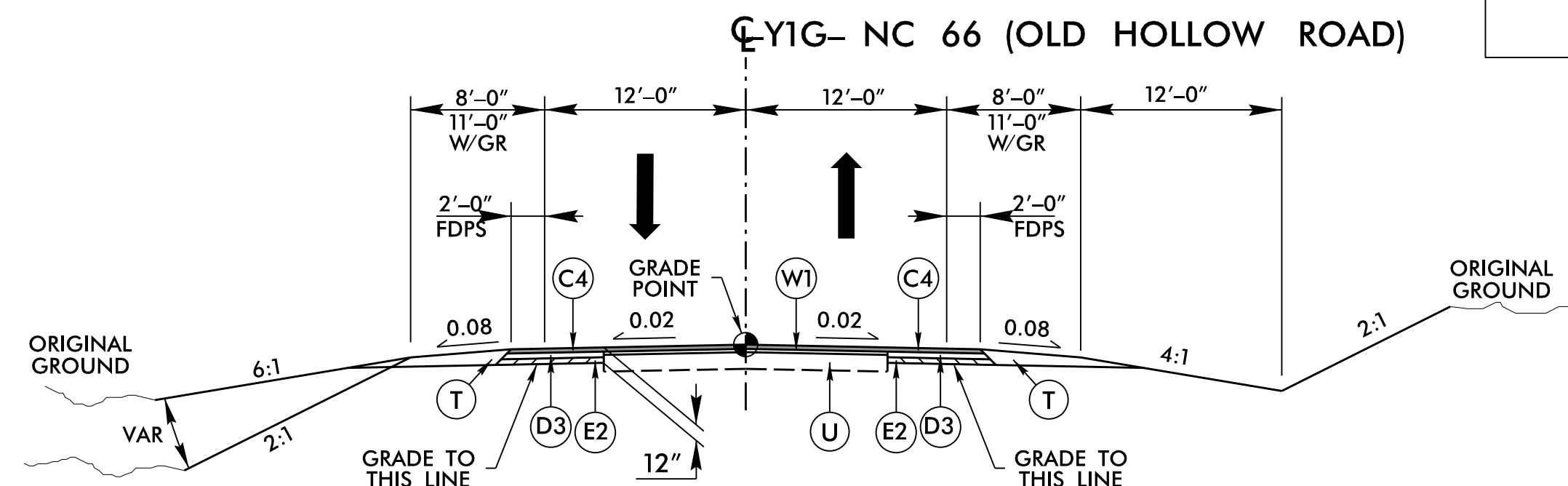


**TYPICAL SECTION NO. 10**

-Y1E- STA. 10+70.25 TO 13+03.05  
-Y1H- STA. 10+06.93 TO 28+56.10  
-Y1K- STA. 11+45.00 TO 15+25.92  
-Y1M- STA. 11+61.74 TO 22+76.50  
-Y1N- STA. 11+46.24 TO 13+75.25  
-Y1"O"- STA. 10+00.00 TO 12+61.73  
-Y4- STA. 15+80.00 TO 19+50.00  
-Y4A- STA. 10+10.00 TO 20+82.00

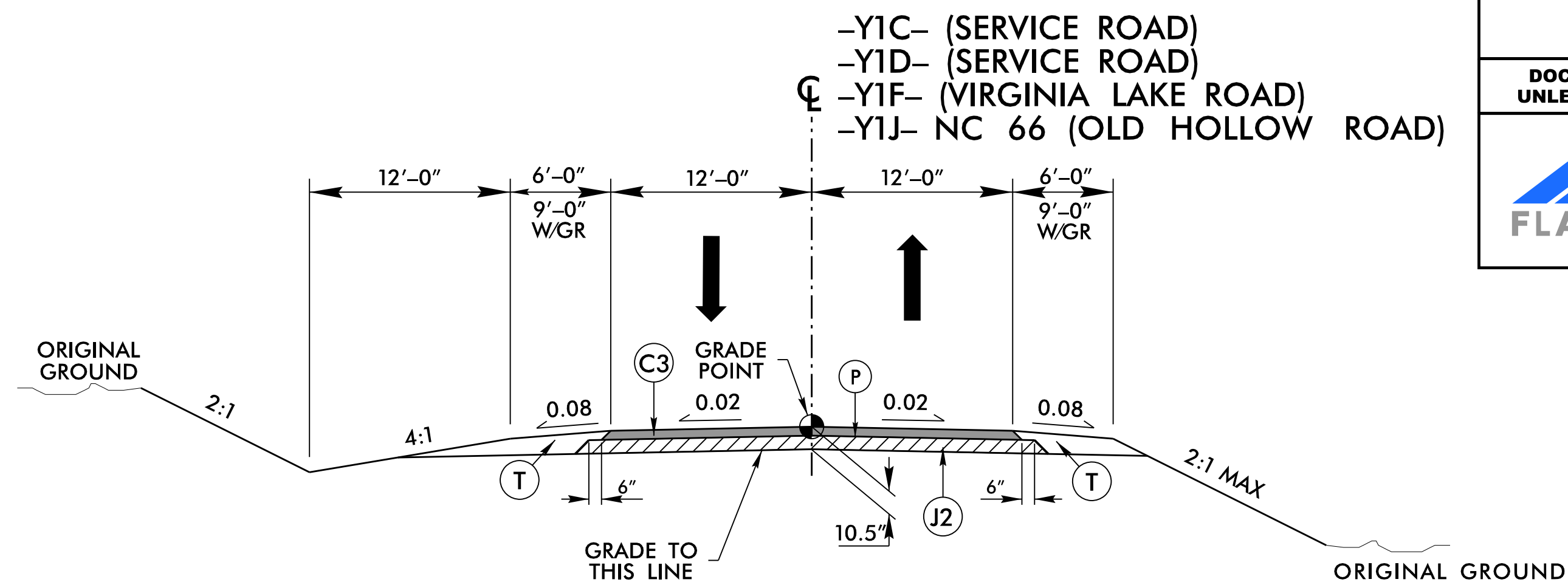


W1: Wedging Detail For Resurfacing



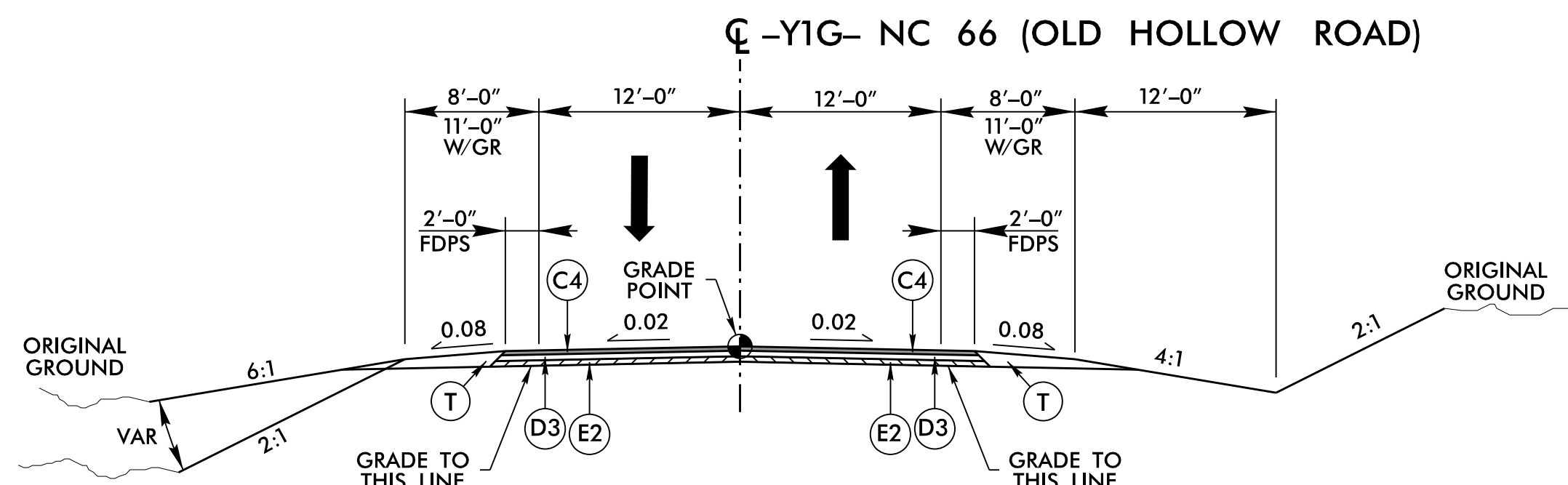
**TYPICAL SECTION NO. 12**

-Y1G- STA. 14+50.00 TO 18+80.00



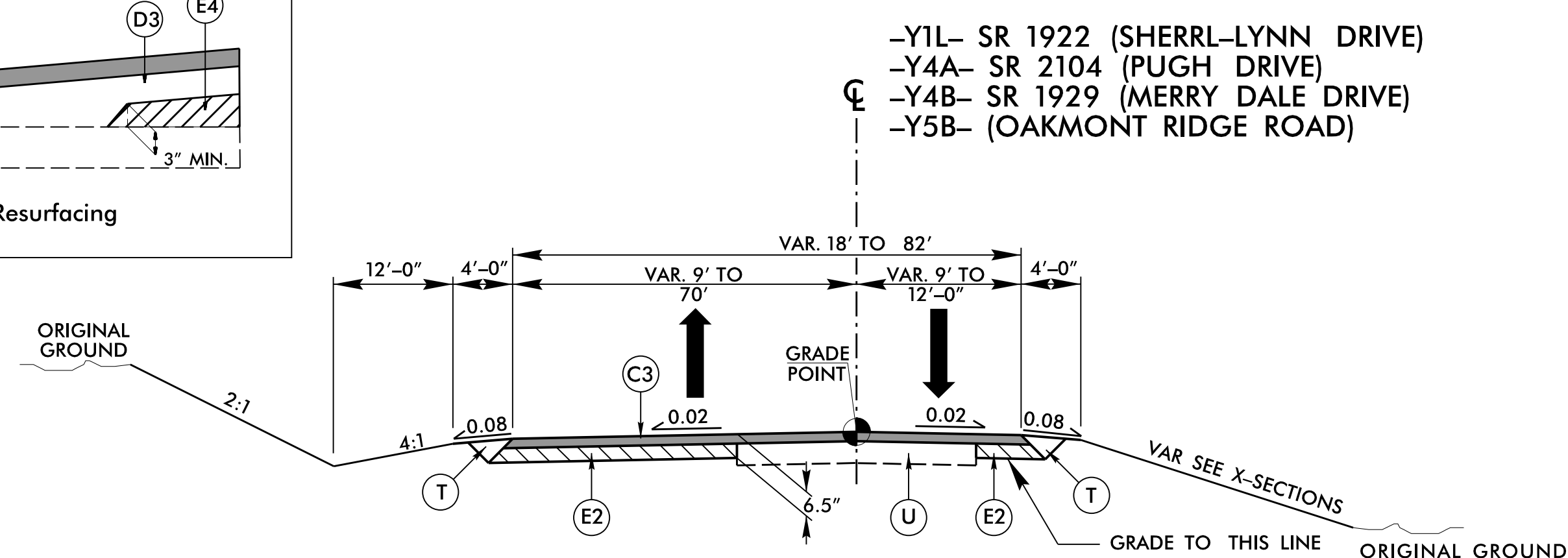
**TYPICAL SECTION NO. 9**

-Y1C- STA. 10+12.41 TO 21+82.55  
-Y1D- STA. 10+08.27 TO 18+85.56  
-Y1F- STA. 10+08.85 TO 16+00.00  
-Y1J- STA. 11+75.00 TO 13+25.41



**TYPICAL SECTION NO. 11**

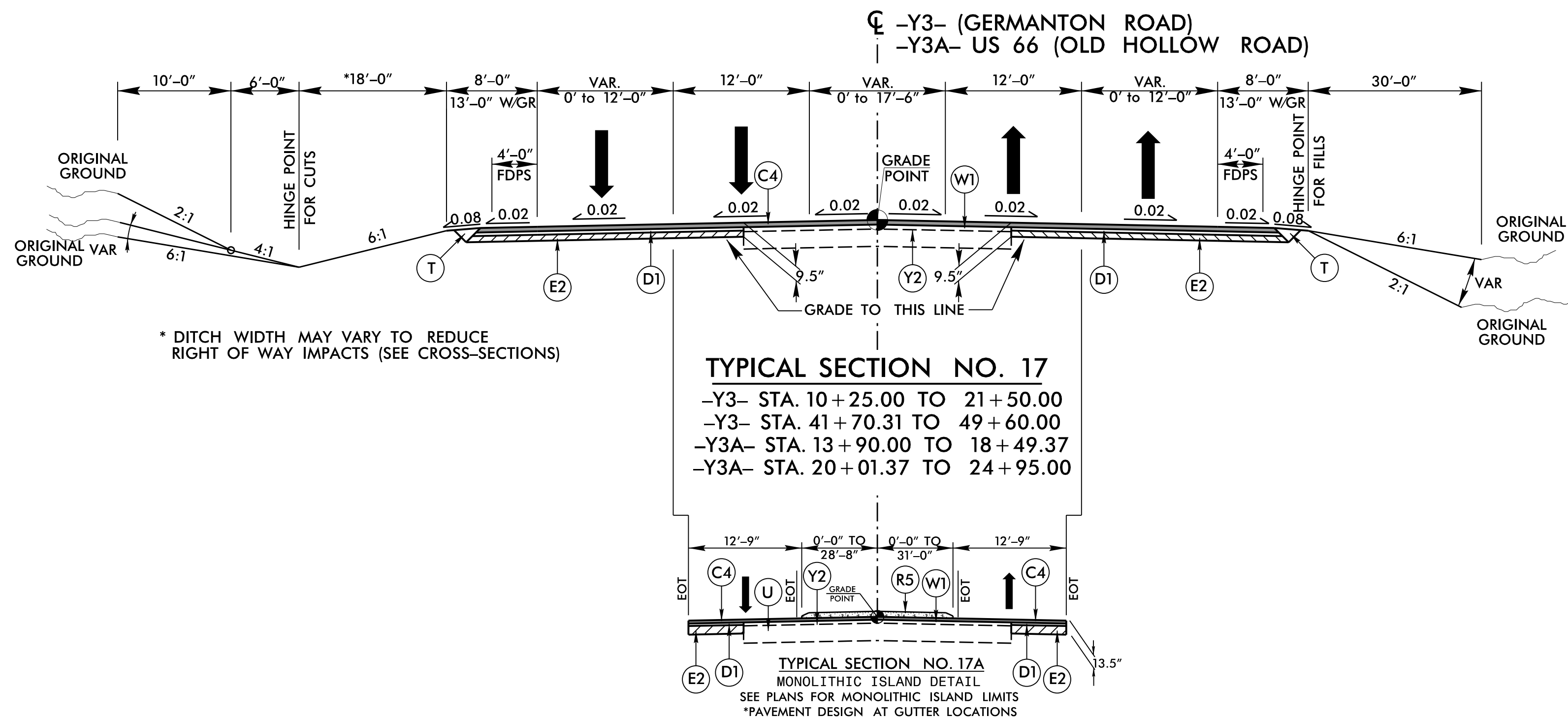
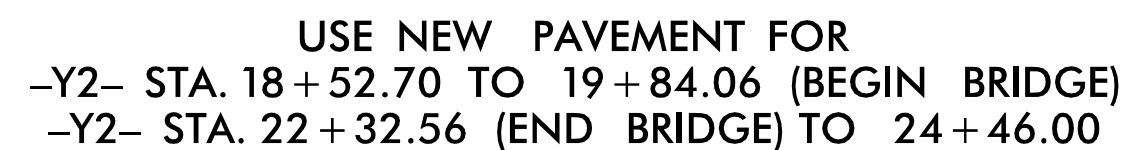
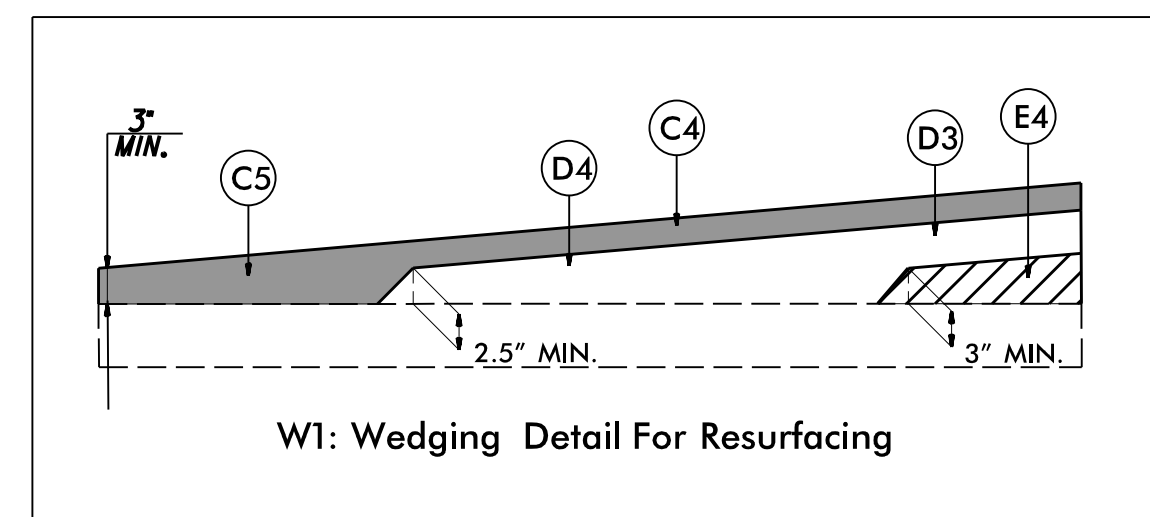
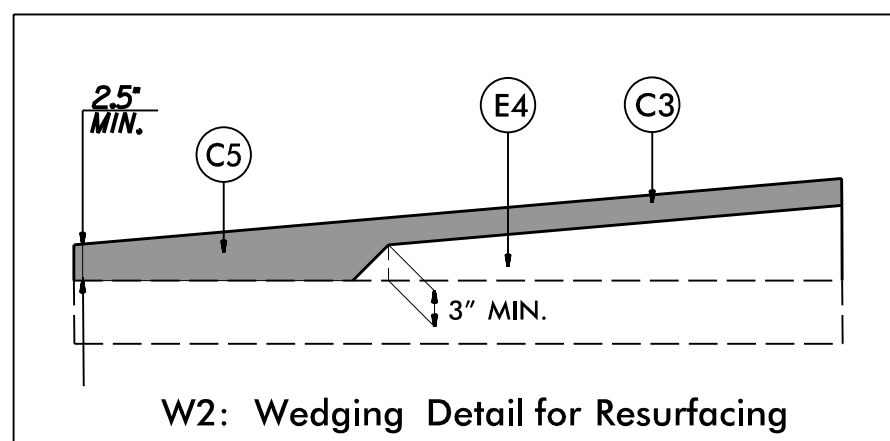
-Y1G- STA. 10+33.76 TO 14+50.00



**TYPICAL SECTION NO. 13**

-Y1L- STA. 10+10.13 TO 11+37.69  
-Y4A- STA. 20+82.00 TO 22+00.00  
-Y4B- STA. 10+39.61 TO 11+57.44  
-Y5B- STA. 12+42.13 TO 13+59.47







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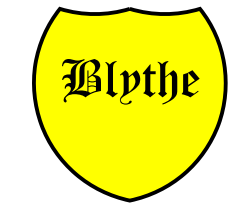
REVISIONS



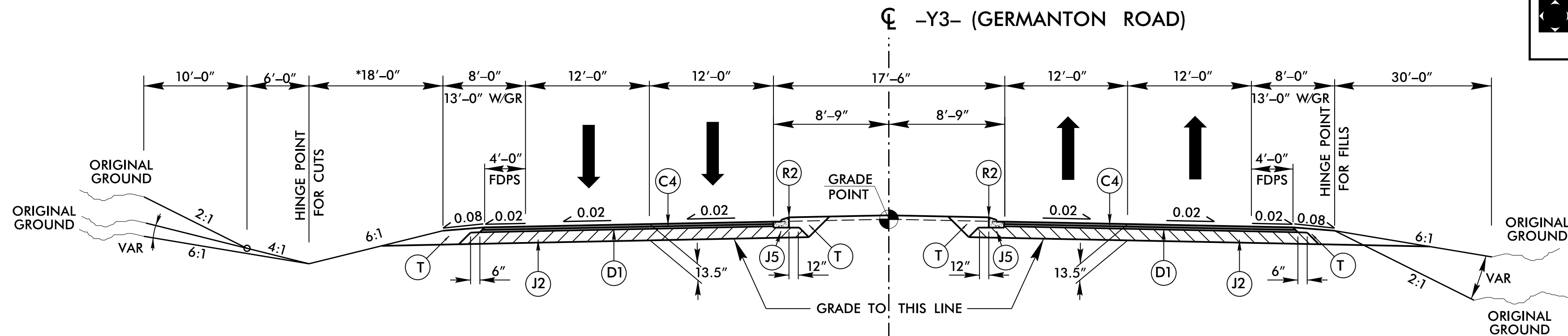
HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116



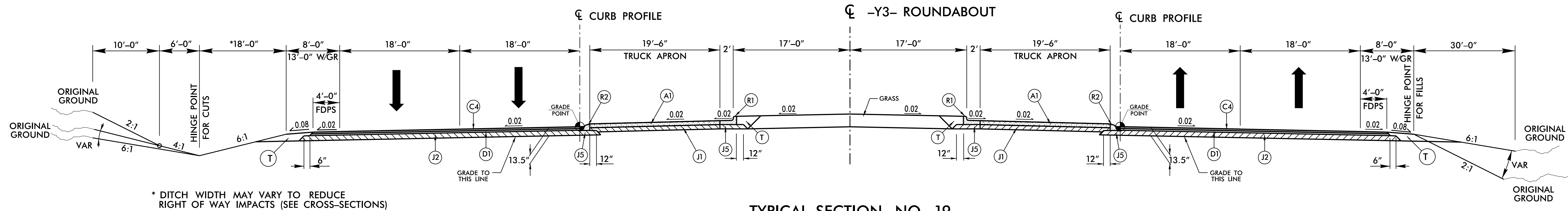
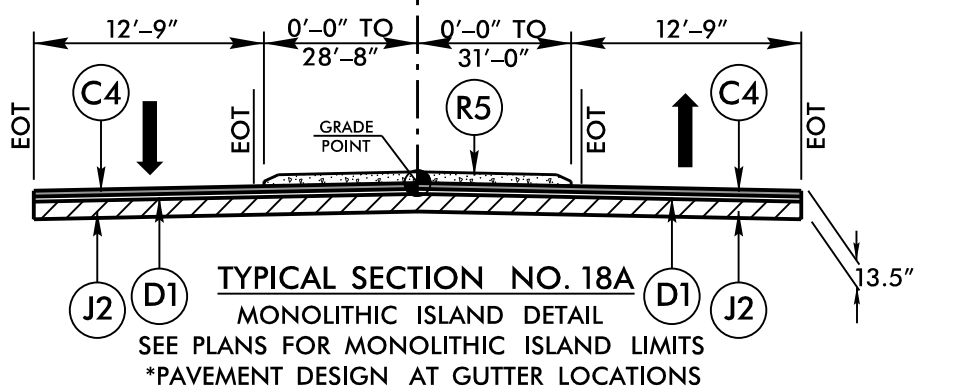
STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                                                     |  |                                                                                     |  |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                                  |  | SHEET NO.<br><b>2A-6</b>                                                            |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | PAVEMENT DESIGN<br>ENGINEER                                                         |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |  |                                                                                     |  |
|  |  |  |  |

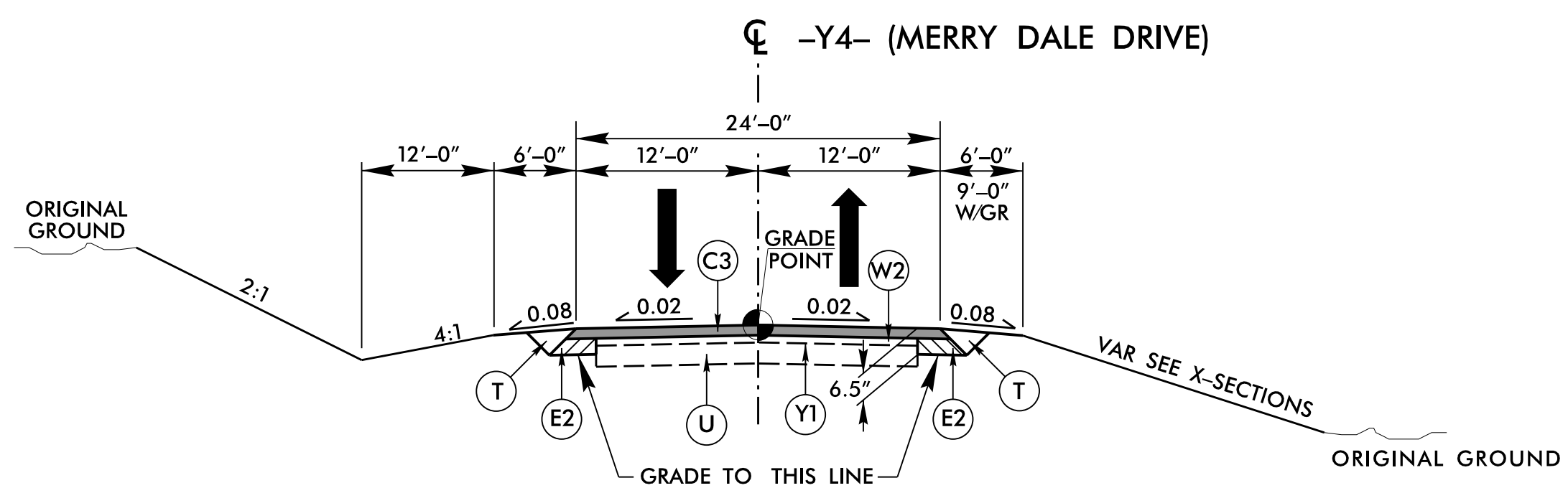
| PAVEMENT SCHEDULE |                   |
|-------------------|-------------------|
| A1                | 7" PORT CEMENT    |
| C1                | 1.5" S9.5B        |
| C3                | 2.5" S9.5B        |
| C4                | 3" S9.5B          |
| C5                | VAR. S9.5B        |
| D1                | 2.5" I19.0C       |
| E2                | 4" B25.0C         |
| E4                | VAR. B25.0C       |
| J1                | 6" ABC            |
| J2                | 8" ABC            |
| J5                | VAR. ABC          |
| P                 | PRIME COAT        |
| R1                | 2'-6" CONC. C&G   |
| R2                | 1'-6" CONC. C&G   |
| R5                | 5" CONC. ISLAND   |
| T                 | EARTH MATERIAL    |
| U                 | EXISTING PAVEMENT |
| W                 | WEDGING           |
| Y1                | 2.5" MILLING      |



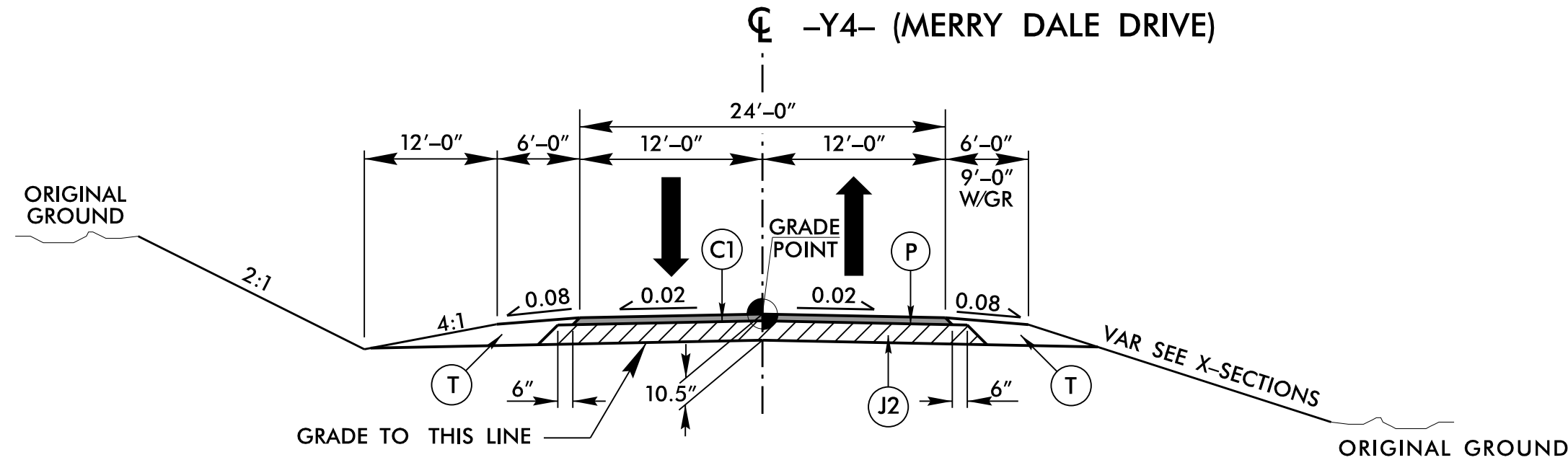
**TYPICAL SECTION NO. 18**  
-Y3- STA. 21+50.00 TO 23+04.35  
-Y3- STA. 24+20.35 TO 28+18.00 (BEGIN BRIDGE)  
-Y3- STA. 30+75.00 (END BRIDGE) TO 34+79.88  
-Y3- STA. 35+95.88 TO 40+54.31



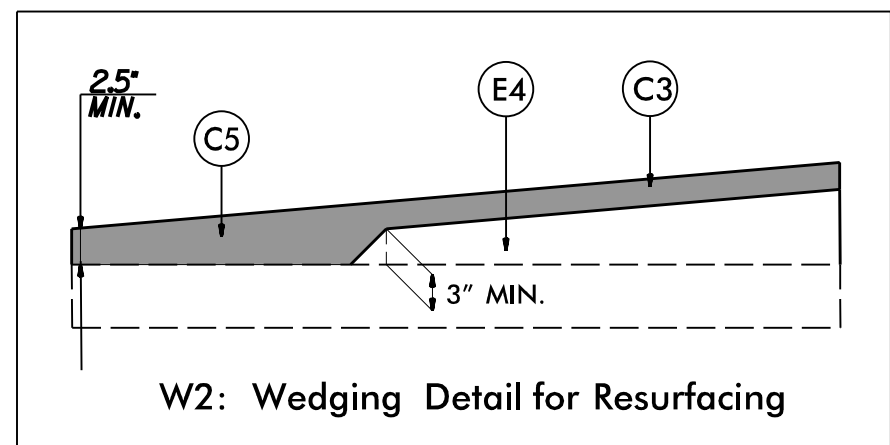
**TYPICAL SECTION NO. 19**



**TYPICAL SECTION NO. 20**  
-Y4- STA. 19+50.00 TO 22+10.00

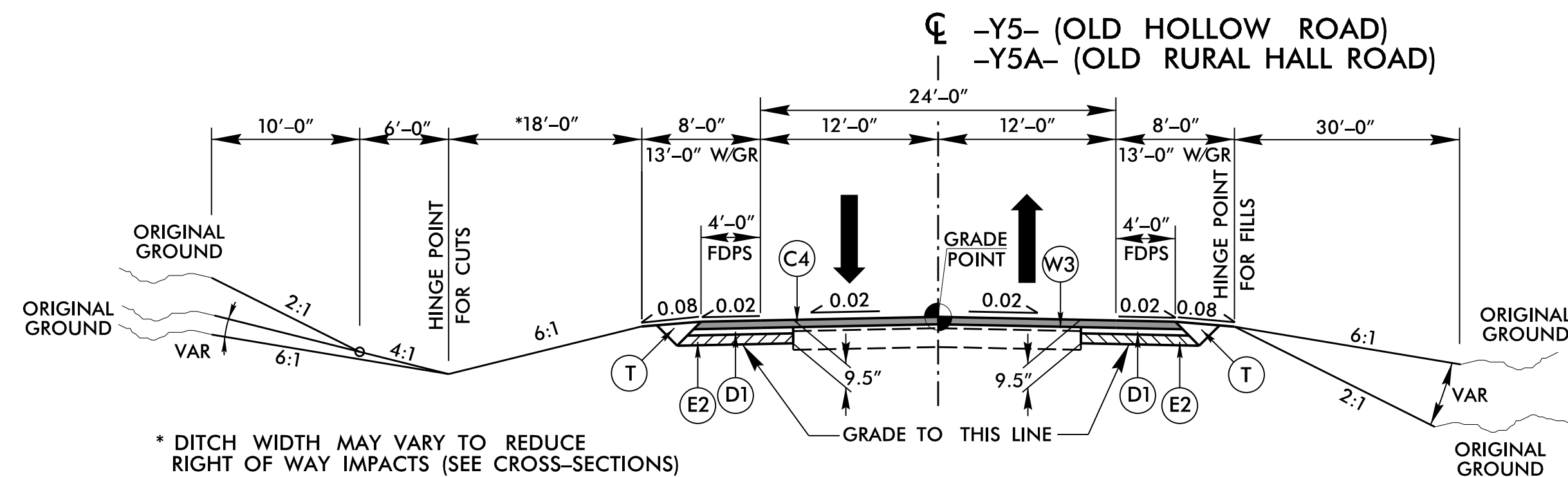


**TYPICAL SECTION NO. 21**  
-Y4- STA. 22+10.00 TO 46+81.09



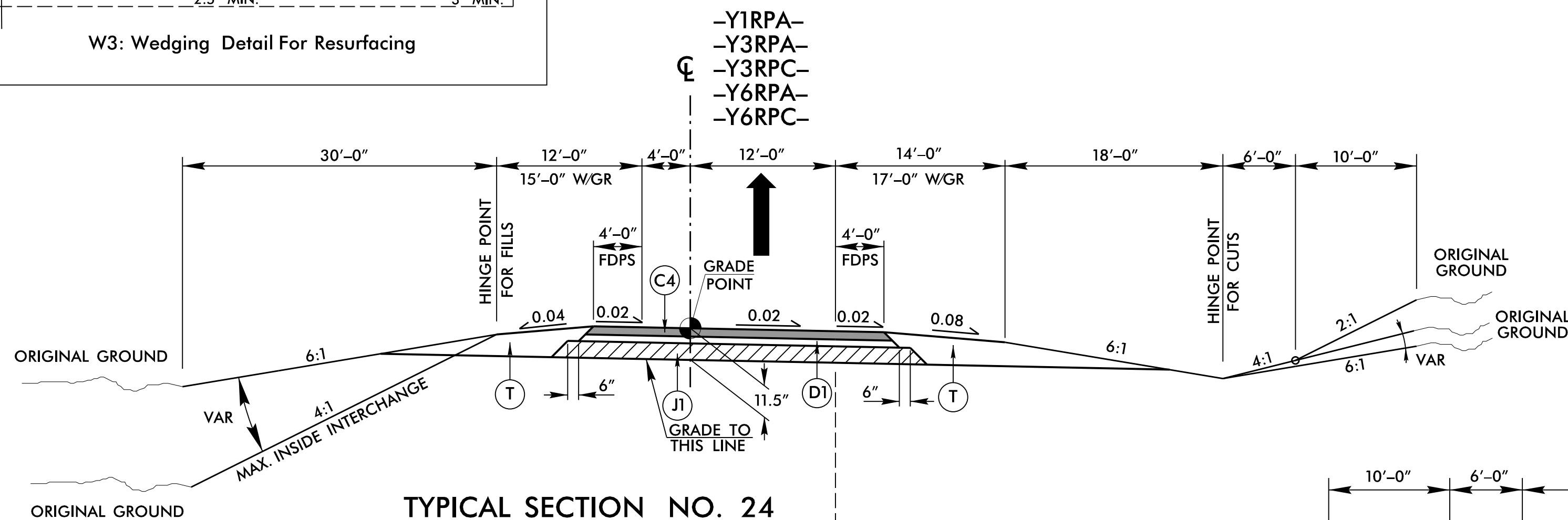
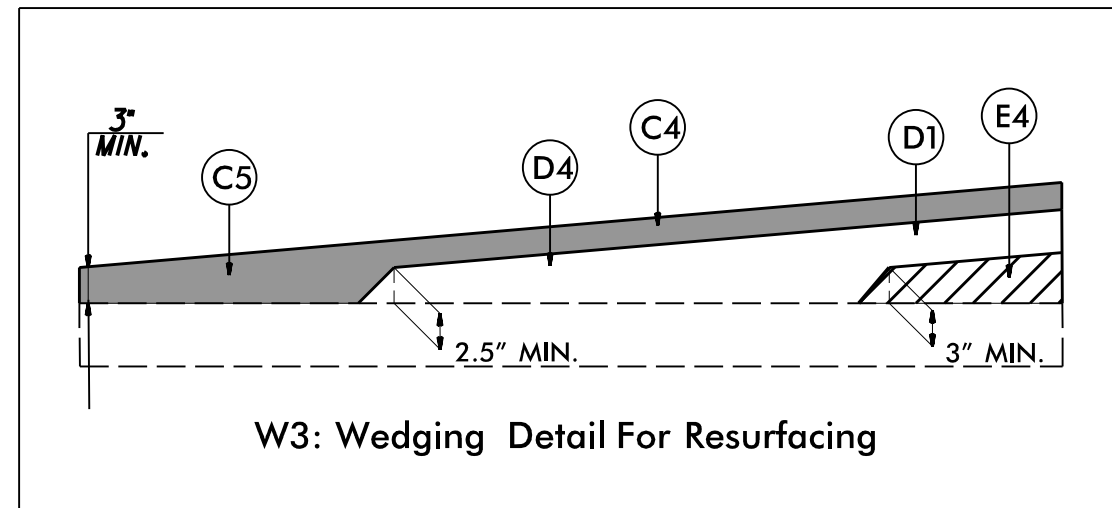


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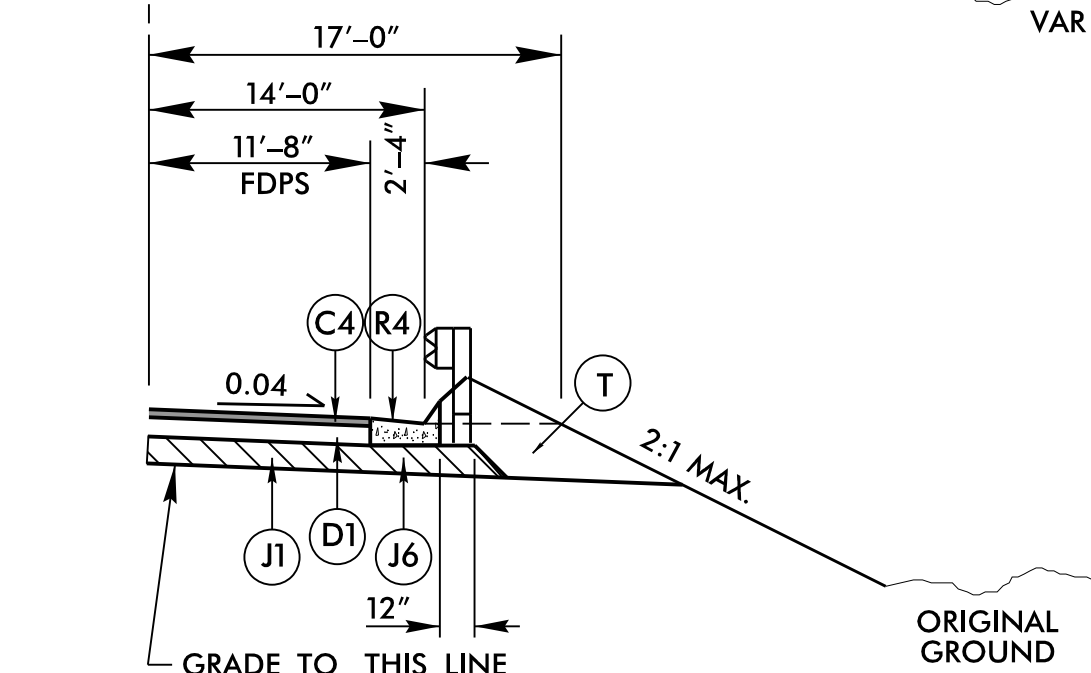
TYPICAL SECTION NO. 22

-Y5- STA. 14+70.00 TO 20+50.00  
-Y5- STA. 33+10.00 TO 38+00.00  
-Y5A- STA. 10+13.61 TO 13+30.00



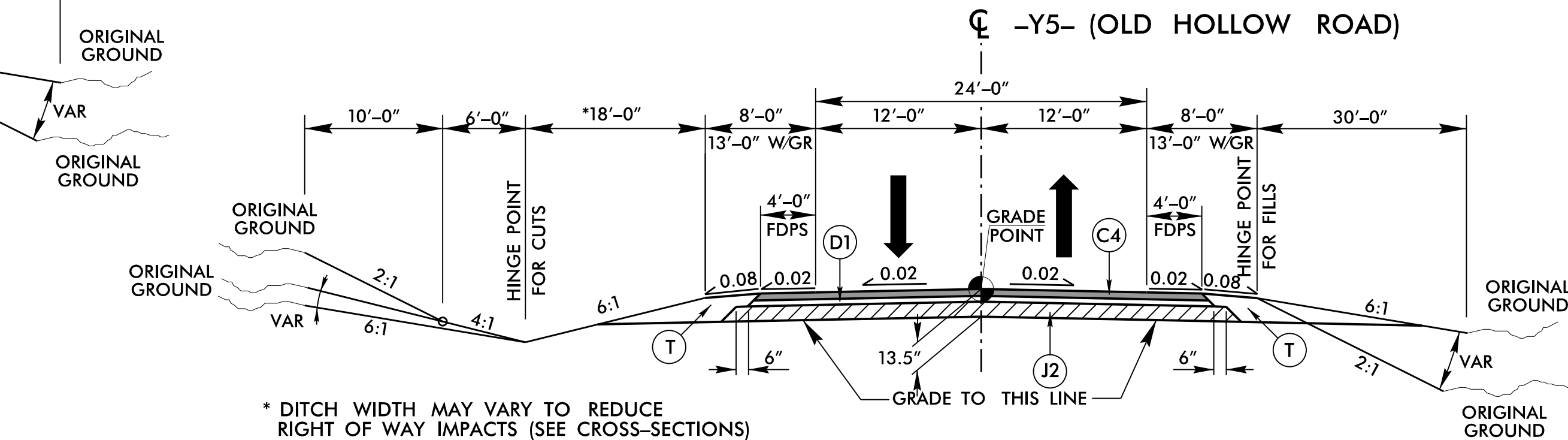
TYPICAL SECTION NO. 24

-Y1RPA- STA. 15+95.24 TO 31+61.38  
-Y3RPA- STA. 14+13.11 TO 28+79.56  
-Y3RPC- STA. 14+14.28 TO 27+77.45  
-Y6RPA- STA. 13+71.31 TO 26+51.39  
-Y6RPC- STA. 14+68.99 TO 25+95.34



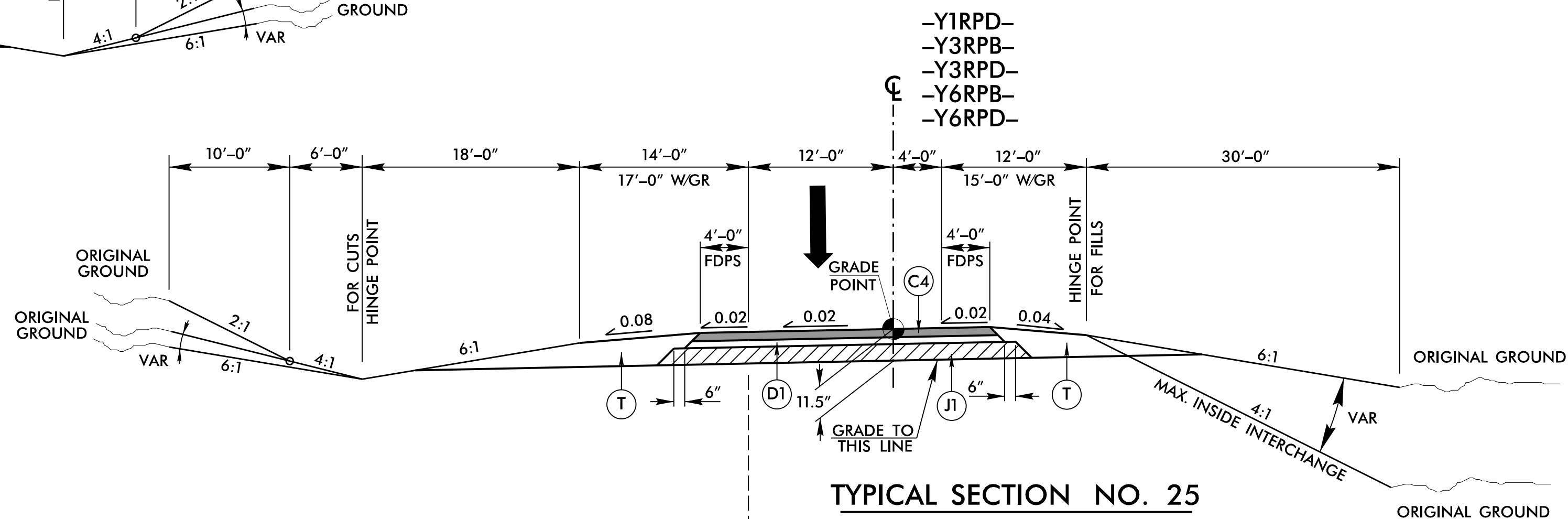
TYPICAL SECTION NO. 24B

SHOULDER BERM GUTTER & FULL-DEPTH PAVED SHOULDERS (SEE PLANS FOR LOCATIONS)



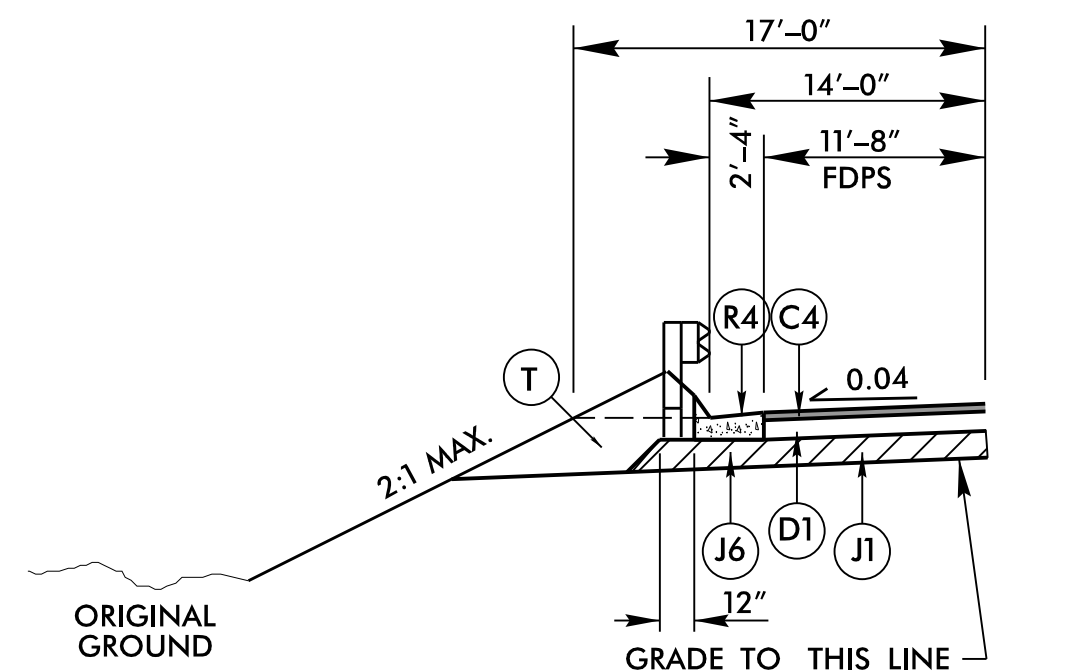
TYPICAL SECTION NO. 23

-Y5- STA. 20+50.00 TO 24+82.65 (BEGIN BRIDGE)  
-Y5- STA. 27+10.57 (END BRIDGE) TO 33+10.00



TYPICAL SECTION NO. 25

-Y1RPD- STA. 14+58.25 TO 29+84.07  
-Y3RPB- STA. 14+40.60 TO 25+18.73  
-Y3RPD- STA. 14+45.07 TO 25+14.25  
-Y6RPB- STA. 15+31.20 TO 30+93.10  
-Y6RPD- STA. 14+34.56 TO 25+38.12

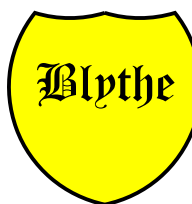


TYPICAL SECTION NO. 25A

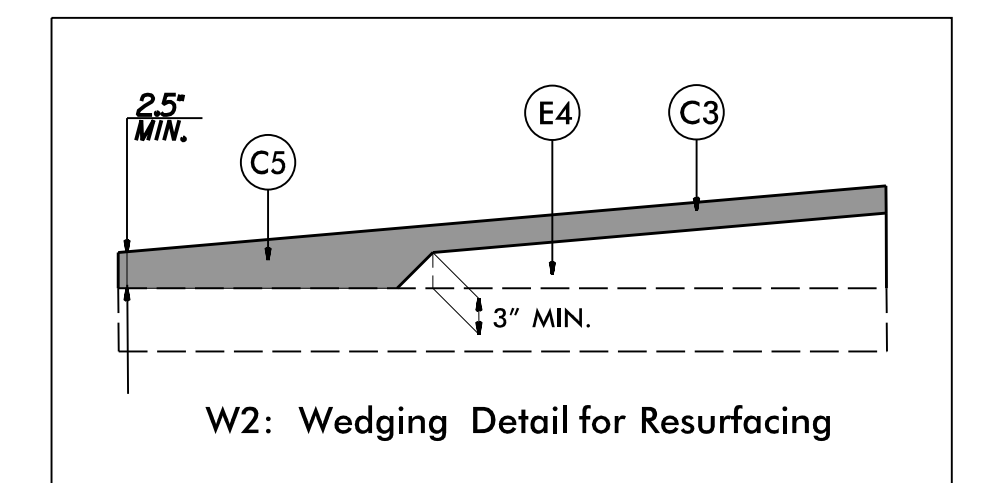
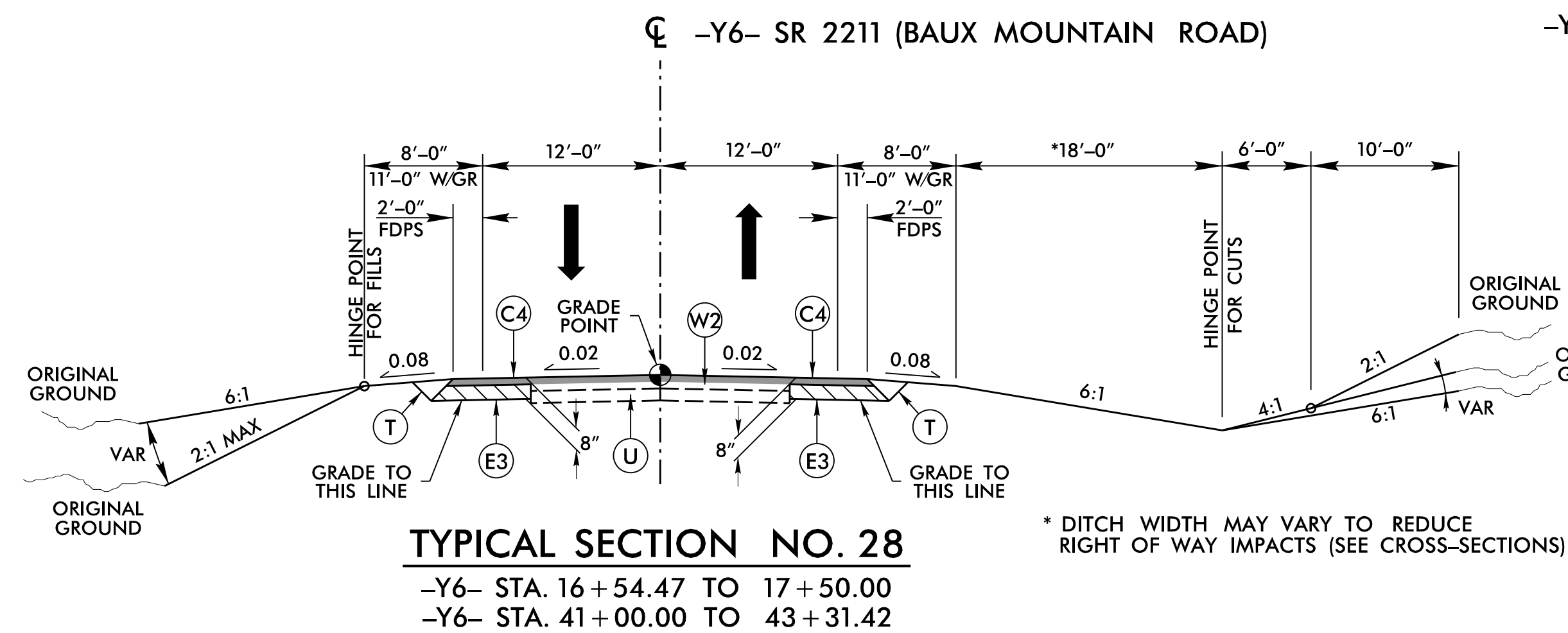
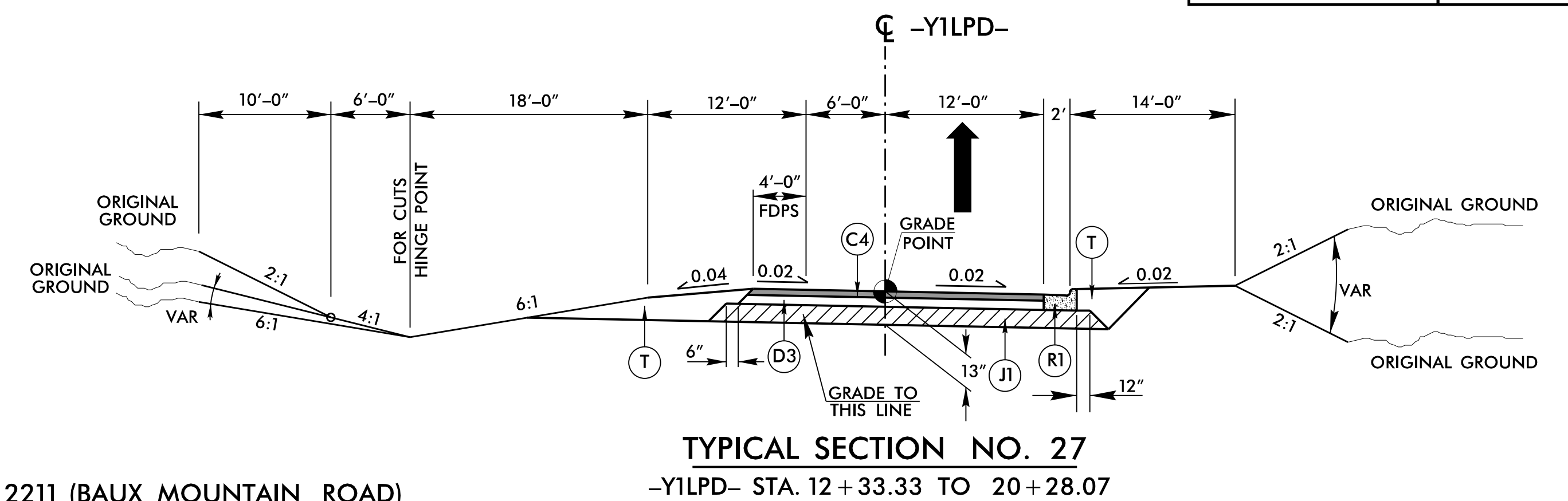
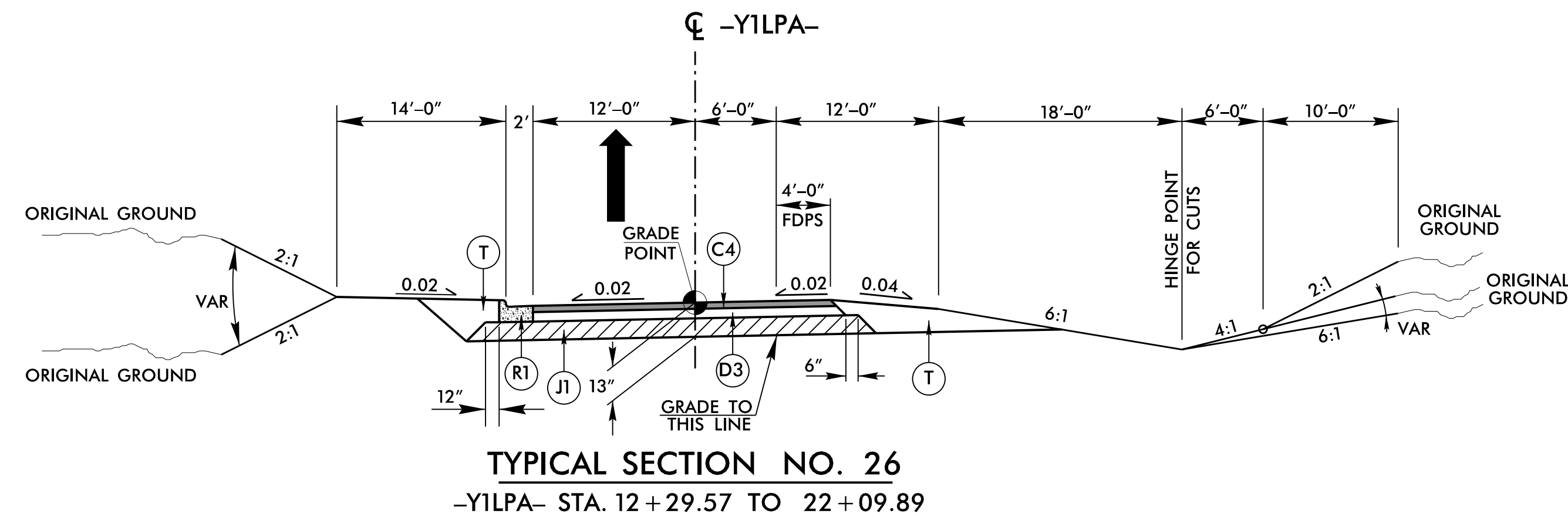
SHOULDER BERM GUTTER & FULL-DEPTH PAVED SHOULDERS (SEE PLANS FOR LOCATIONS)

HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

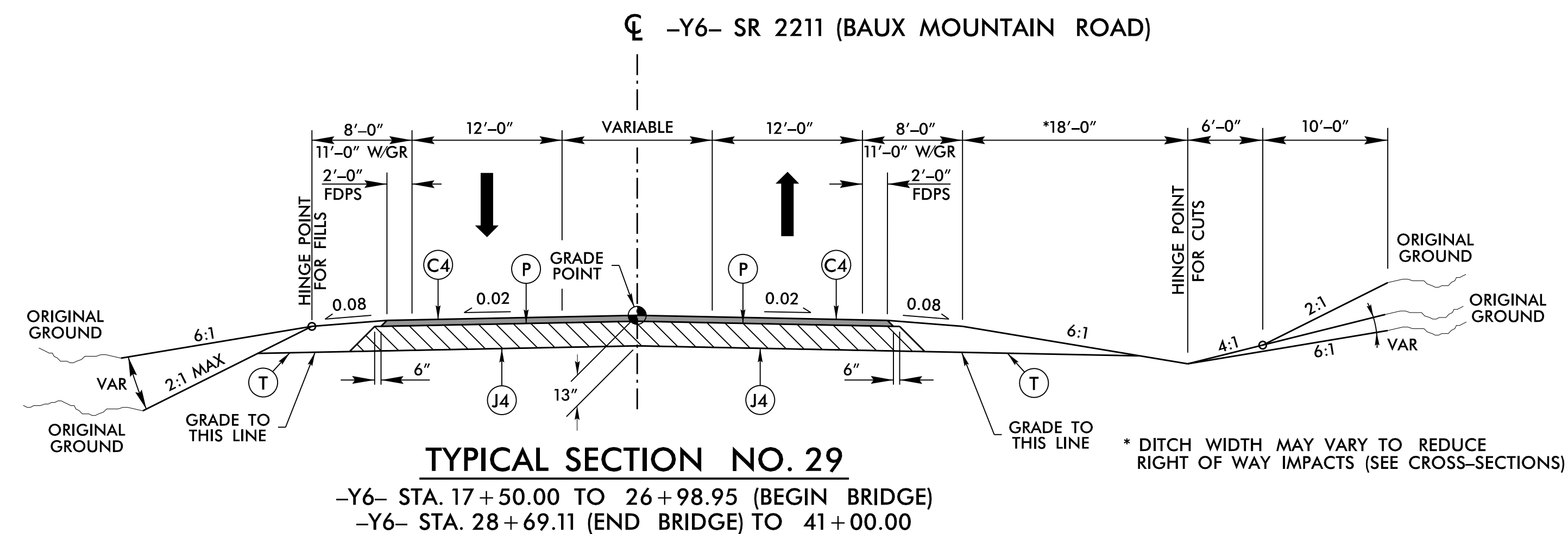
STV 100 Years STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                                                     |  |                                                                                     |  |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                           |  |
| U-2579D, E & F                                                                      |  | 2A-7                                                                                |  |
| ROADWAY DESIGN ENGINEER                                                             |  | PAVEMENT DESIGN ENGINEER                                                            |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |  |                                                                                     |  |
|  |  |  |  |
|                                                                                     |  | PAVEMENT SCHEDULE                                                                   |  |
|                                                                                     |  | C4 3" S9.5B                                                                         |  |
|                                                                                     |  | C5 VAR. S9.5B                                                                       |  |
|                                                                                     |  | D1 2.5" I19.0C                                                                      |  |
|                                                                                     |  | D4 VAR. I19.0C                                                                      |  |
|                                                                                     |  | E2 4" B25.0C                                                                        |  |
|                                                                                     |  | E4 VAR. B25.0C                                                                      |  |
|                                                                                     |  | J1 6" ABC                                                                           |  |
|                                                                                     |  | J2 8" ABC                                                                           |  |
|                                                                                     |  | J6 VAR. CTABC                                                                       |  |
|                                                                                     |  | R4 SHOULDER BERM GUTTER                                                             |  |
|                                                                                     |  | T EARTH MATERIAL                                                                    |  |
|                                                                                     |  | W WEDGING                                                                           |  |

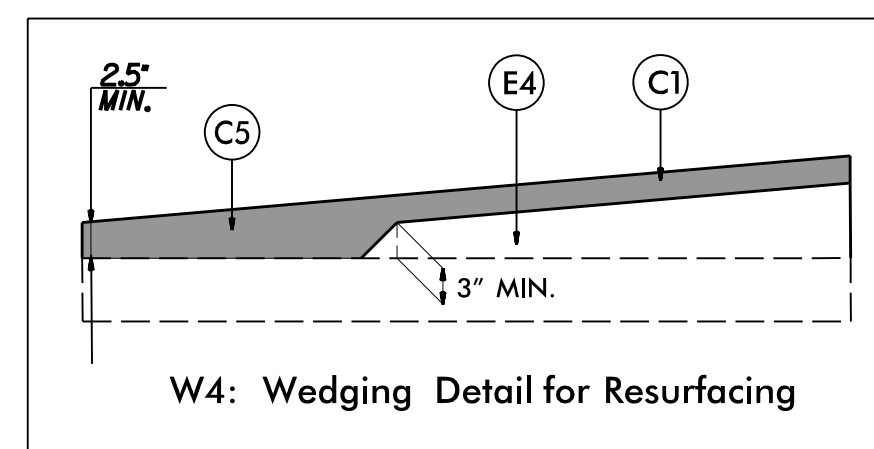
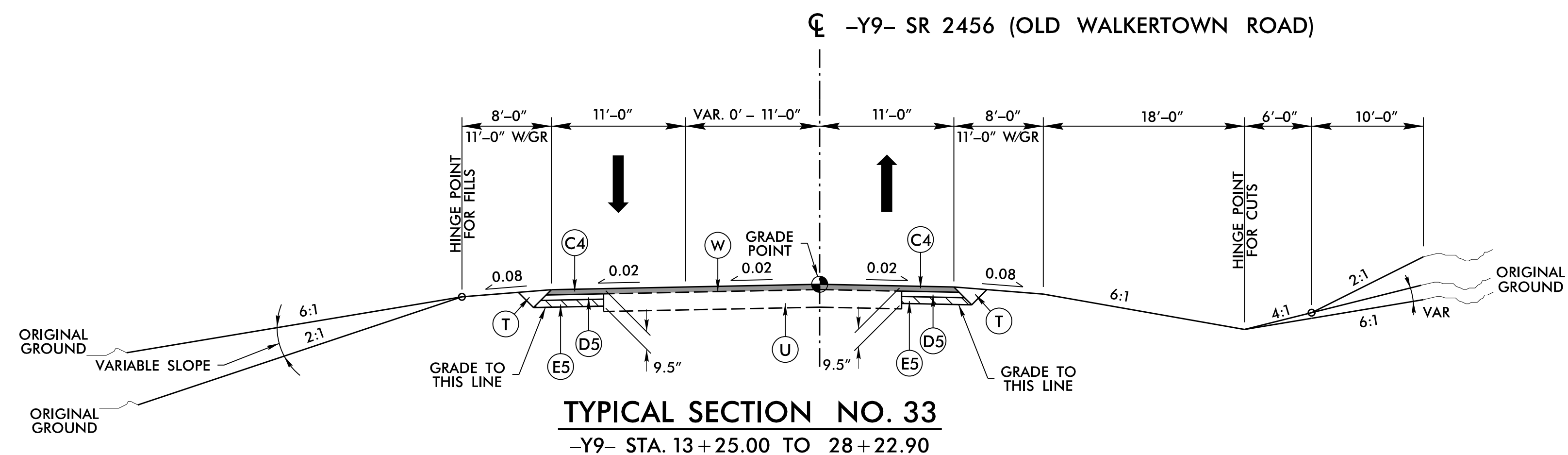
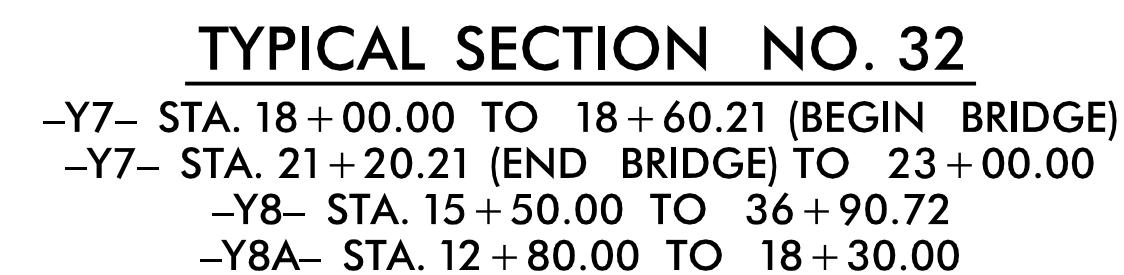
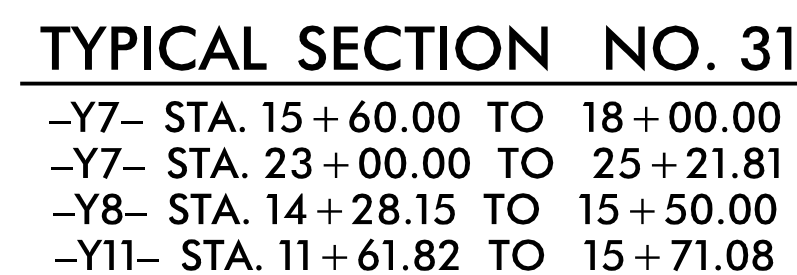
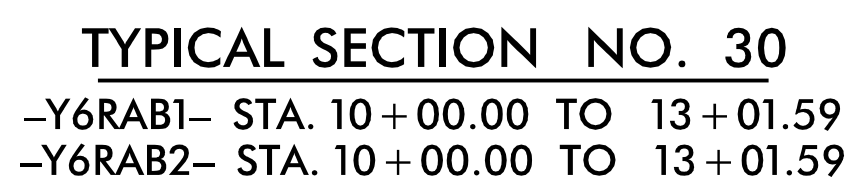




| PAVEMENT SCHEDULE |                   |
|-------------------|-------------------|
| C3                | 2.5" S9.5B        |
| C4                | 3" S9.5B          |
| C5                | VAR. S9.5B        |
| D3                | 4" I19.0C         |
| E3                | B25.0C            |
| E4                | VAR. B25.0C       |
| J1                | 6" ABC            |
| J4                | 10" ABC           |
| P                 | PRIME COAT        |
| R1                | 2'-6" CONC. C&G   |
| T                 | EARTH MATERIAL    |
| U                 | EXISTING PAVEMENT |
| W                 | WEDGING           |



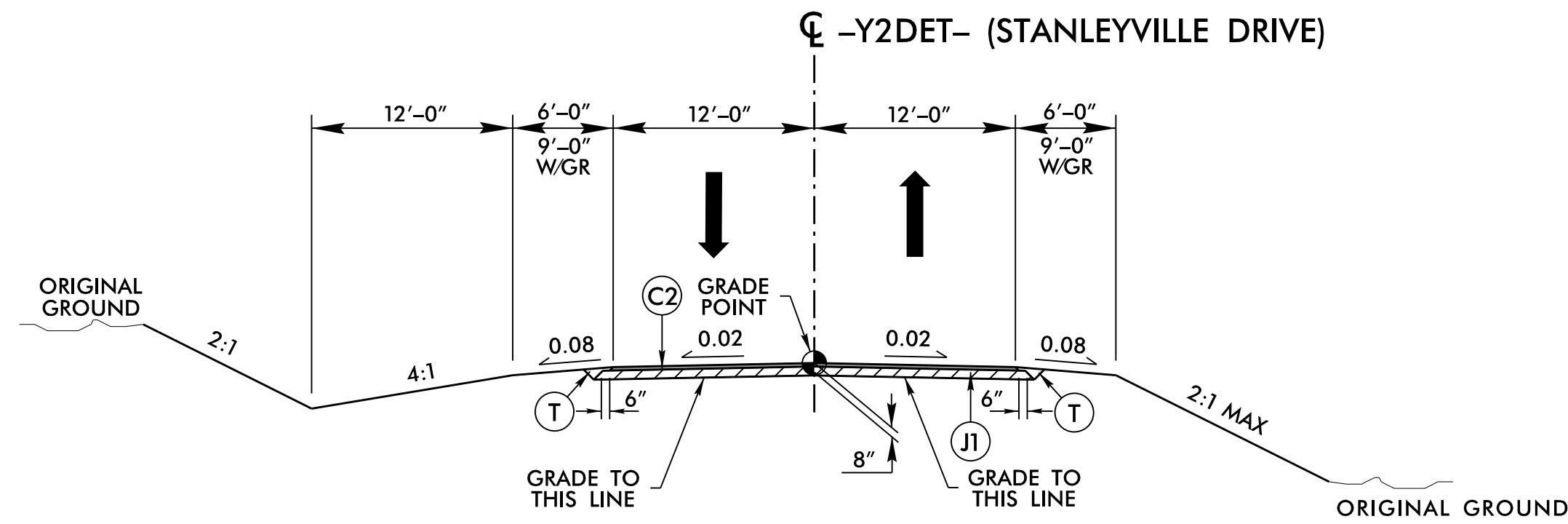




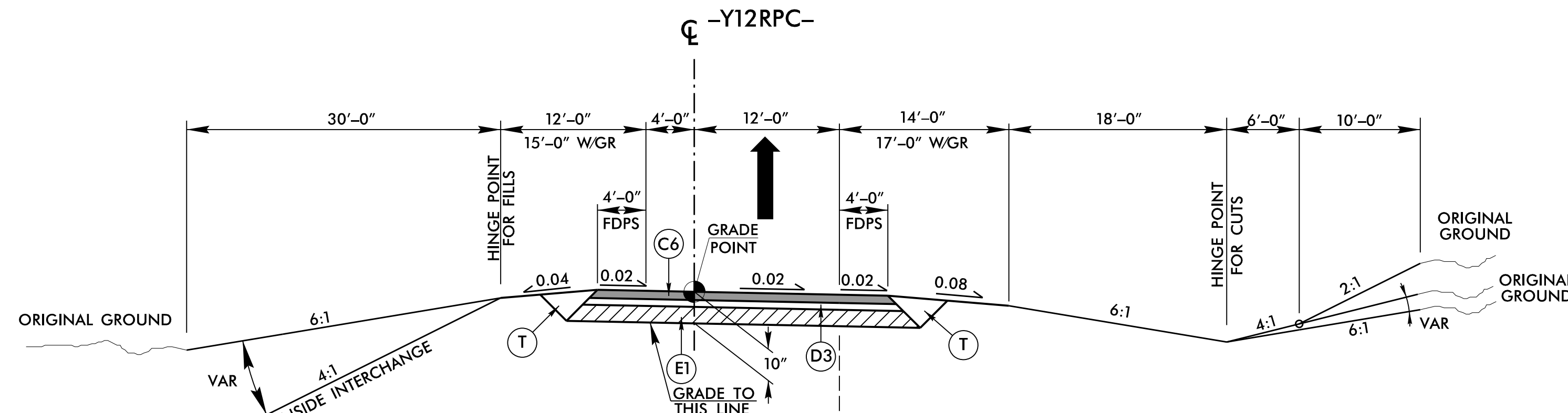


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TIME: 3:22:10 PM  
DATE: 11/16/2018

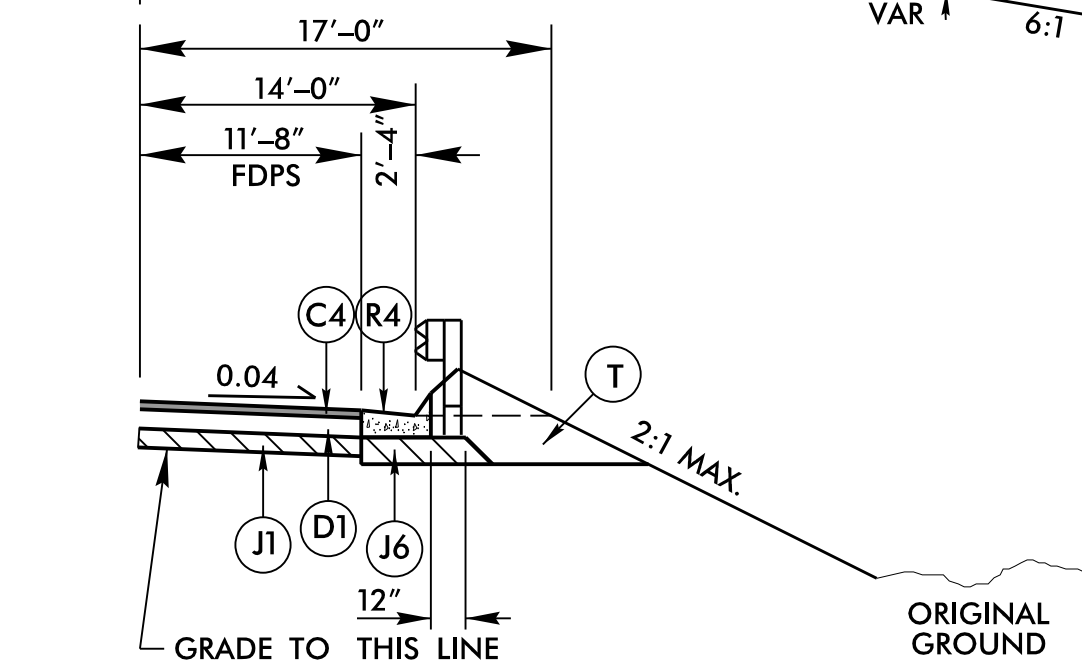
REVISIONS



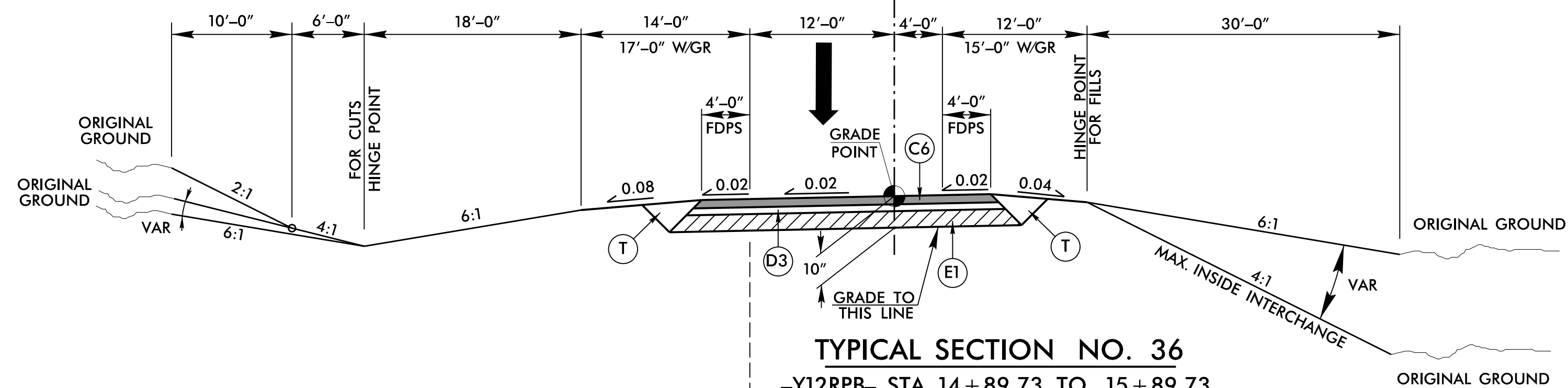
**TYPICAL SECTION NO. 34**  
-Y2DET- STA. 13+09.13 TO 25+76.29



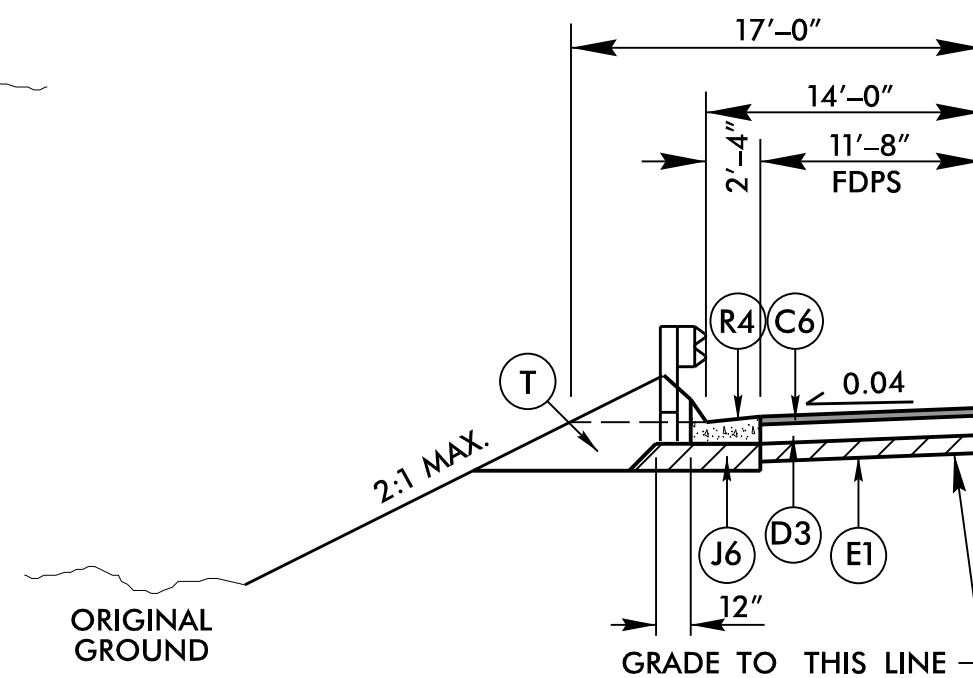
**TYPICAL SECTION NO. 35**  
-Y12RPC- STA. 14+30.42 TO 14+48.00



**TYPICAL SECTION NO. 35A**  
SHOULDER BERM GUTTER & FULL-DEPTH PAVED SHOULDERS  
(SEE PLANS FOR LOCATIONS)



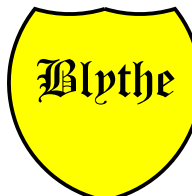
**TYPICAL SECTION NO. 36**  
-Y12RPB- STA. 14+89.73 TO 15+89.73



**TYPICAL SECTION NO. 36A**  
SHOULDER BERM GUTTER & FULL-DEPTH PAVED SHOULDERS  
(SEE PLANS FOR LOCATIONS)

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Charlotte, NC 28202  
NC License Number F-0991

|                                                                                     |                |                                                                                     |  |
|-------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.                                                               |                | SHEET NO.                                                                           |  |
| U-2579D, E & F                                                                      |                | 2A-10                                                                               |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |                | PAVEMENT DESIGN<br>ENGINEER                                                         |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |                |                                                                                     |  |
|  |                |  |  |
|                                                                                     |                | PAVEMENT SCHEDULE                                                                   |  |
| C2                                                                                  | 2"             | S9.5B                                                                               |  |
| J1                                                                                  | 6"             | ABC                                                                                 |  |
| T                                                                                   | EARTH MATERIAL |                                                                                     |  |



PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
PENTABLE: NCDOT\_pshp.fltd  
USER: SHILTON  
DATE: 11/16/2018  
TIME: 3:22:21 PM  
FILE: Flatiron-Construction-Corp.\Flatiron-U-2579-D.E.F.WS\6.0.CAD.BIM\6.2.WIP\U-2579DEF\Roadway\Proj\HDR\U2579DEF\_RDY\_STRUCTURE.RECS.dgn

REVISIONS

# UNIVERSITY PKWY. OVER I-74



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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**2A-11**

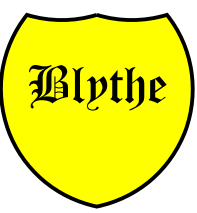
RW SHEET NO.

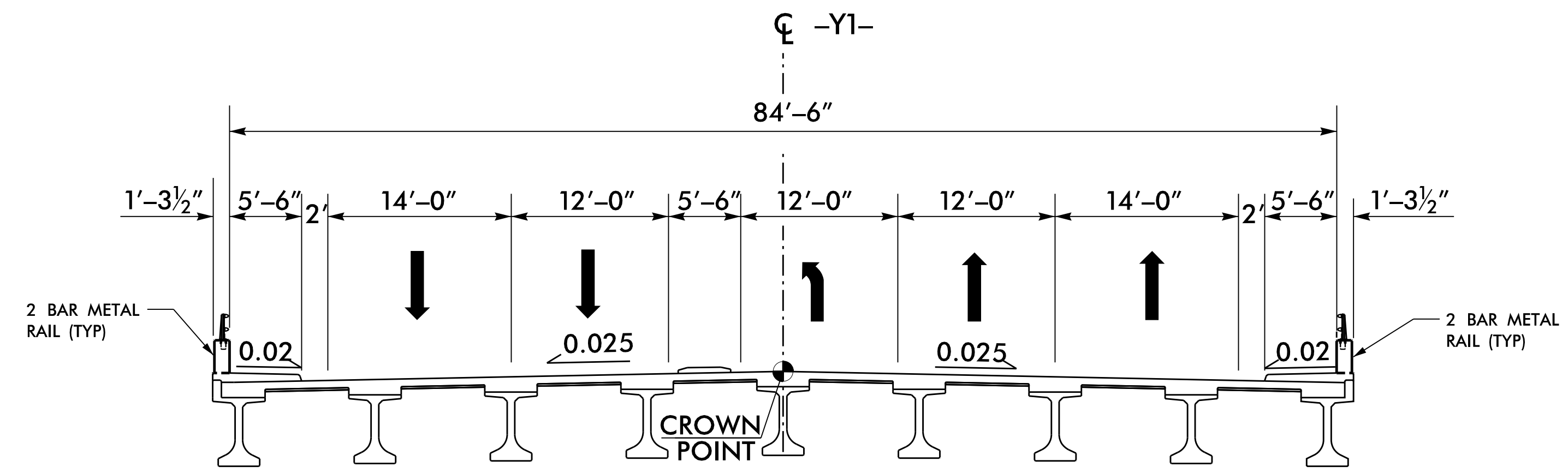
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

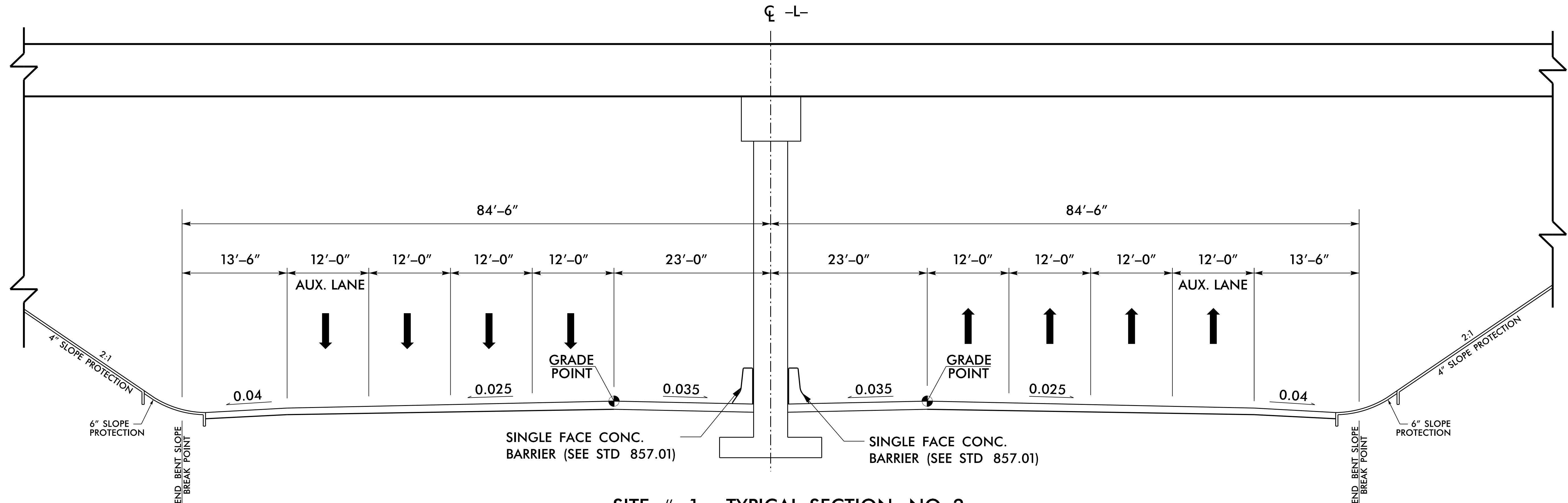
FLATIRON





**SITE # 1 – TYPICAL SECTION NO. 1**  
-Y1- FUNCTIONAL CLASS. = MINOR ARTERIAL

| (-Y1-) FUTURE UNIV. PKWY. |        |            |
|---------------------------|--------|------------|
| 2016 ADT                  | 18,700 | TTST = 3%  |
| 2040 ADT                  | 20,500 | DUALS = 3% |
|                           |        | DHV = 8%   |
|                           |        | DIR = 60%  |



**SITE # 1 – TYPICAL SECTION NO. 2**  
FUTURE I-74 UNDER  
UNIVERSITY PARKWAY  
MINIMUM VERTICAL CLEARANCE = 17'-0" (FUTURE & ACTUAL)  
-L- FUNCTIONAL CLASS. = FREEWAY /INTERSTATE

| (-L-) I-74 |        |            |
|------------|--------|------------|
| 2016 ADT   | 34,000 | TTST = 10% |
| 2040 ADT   | 60,200 | DUALS = 5% |
|            |        | DHV = 9%   |
|            |        | DIR = 55%  |

SEE SHEET 2B-1 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR ROADWAY APPROACH TYPICAL



# STANLEYVILLE DR. OVER I-74



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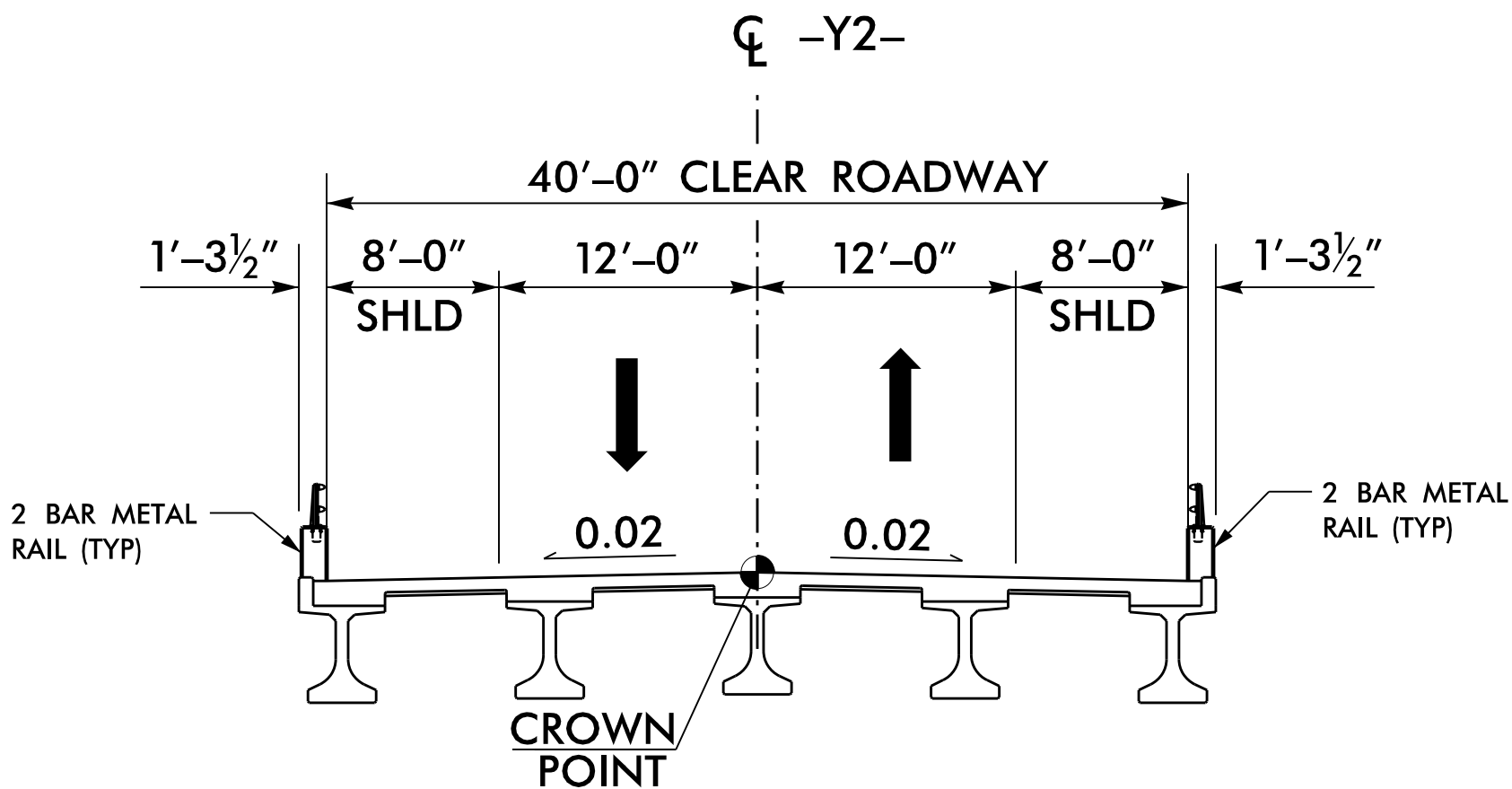
PROJECT REFERENCE NO. SHEET NO.

U-2579D, E & F 2A-12

RW SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

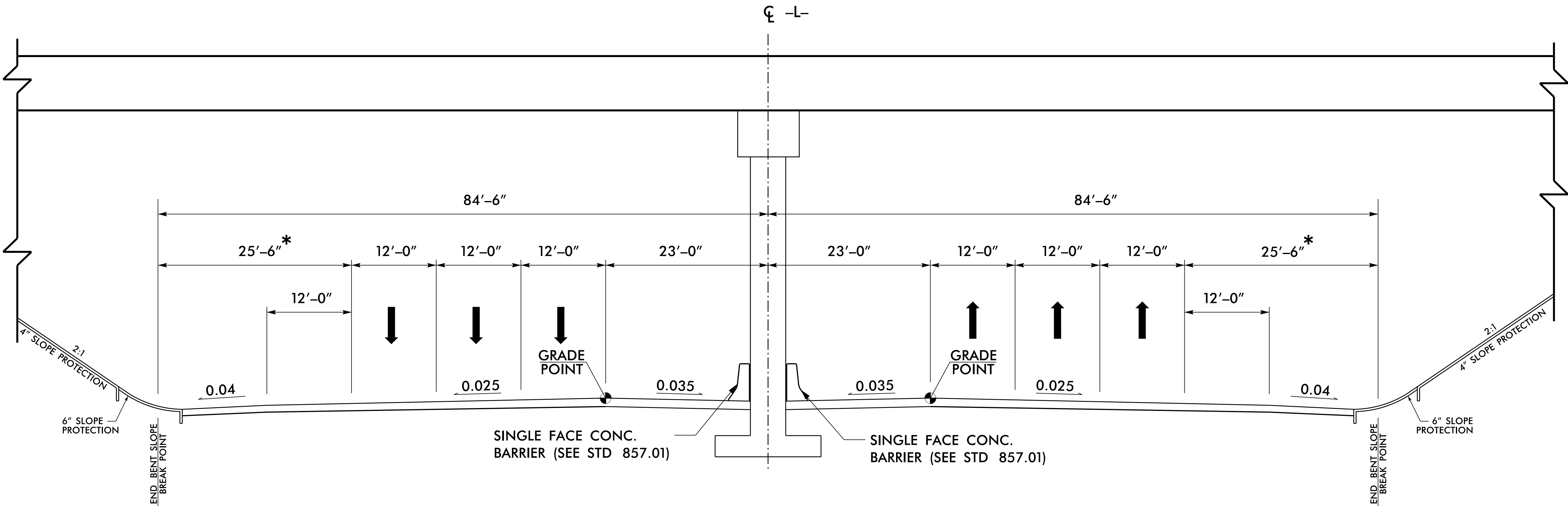
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



SITE # 2 - TYPICAL SECTION NO. 3  
-Y2- FUNCTIONAL CLASS. = MAJOR COLLECTOR

## (-Y2-) STANLEYVILLE DR.

|          |       |            |
|----------|-------|------------|
| 2016 ADT | 5,600 | TTST = 1%  |
| 2040 ADT | 5,800 | DUALS = 6% |
|          |       | DHV = 10%  |
|          |       | DIR = 70%  |



## (-L-) I-74

|          |        |            |
|----------|--------|------------|
| 2016 ADT | 34,000 | TTST = 10% |
| 2040 ADT | 60,200 | DUALS = 5% |
|          |        | DHV = 9%   |
|          |        | DIR = 55%  |

SITE # 2 - TYPICAL SECTION NO. 4  
FUTURE I-74 UNDER  
STANLEYVILLE DRIVE  
MINIMUM VERTICAL CLEARANCE = 17'-0" (FUTURE & ACTUAL)  
-L- FUNCTIONAL CLASS. = FREEWAY /INTERSTATE

\* ADDITIONAL WIDTH PROVIDED FOR FUTURE  
AUXILIARY LANE

SEE SHEET 2B-1 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR ROADWAY APPROACH TYPICAL

PLOT DRIVER: NCDOT\_color\_eng\_50.plt PENTABLE: NCDOT\_pshp.fltd  
USER: SHILTON DATE: 11/16/2018 TIME: 3:22:22 PM  
FILE: Flatiron-Construction-Corp.\Flatiron-U-2579-D.E.F.WS\6.0.CAD.BTM\6.2.WTP-U-2579DEF-Roadway\Proj\HDR\U2579DEF\_RDY\_STRUCTURE\_REC.dgn

REVISIONS



# GERMANTON RD. OVER I-74

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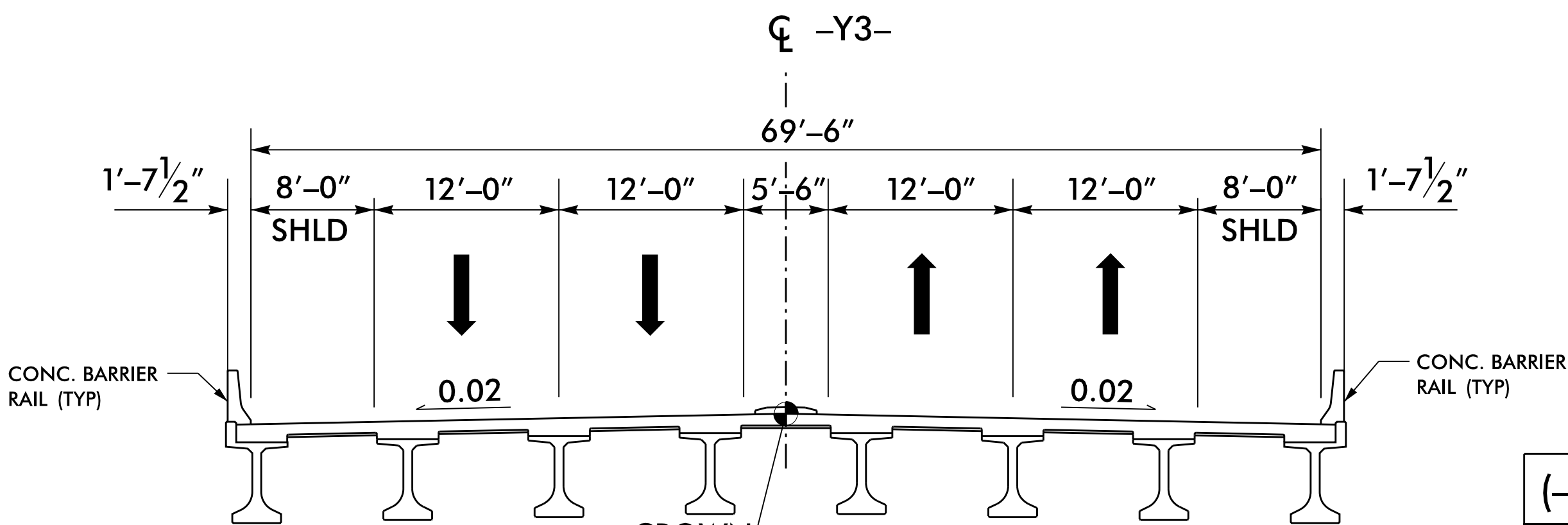
PROJECT REFERENCE NO. SHEET NO.

U-2579D, E & F 2A-13

RW SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

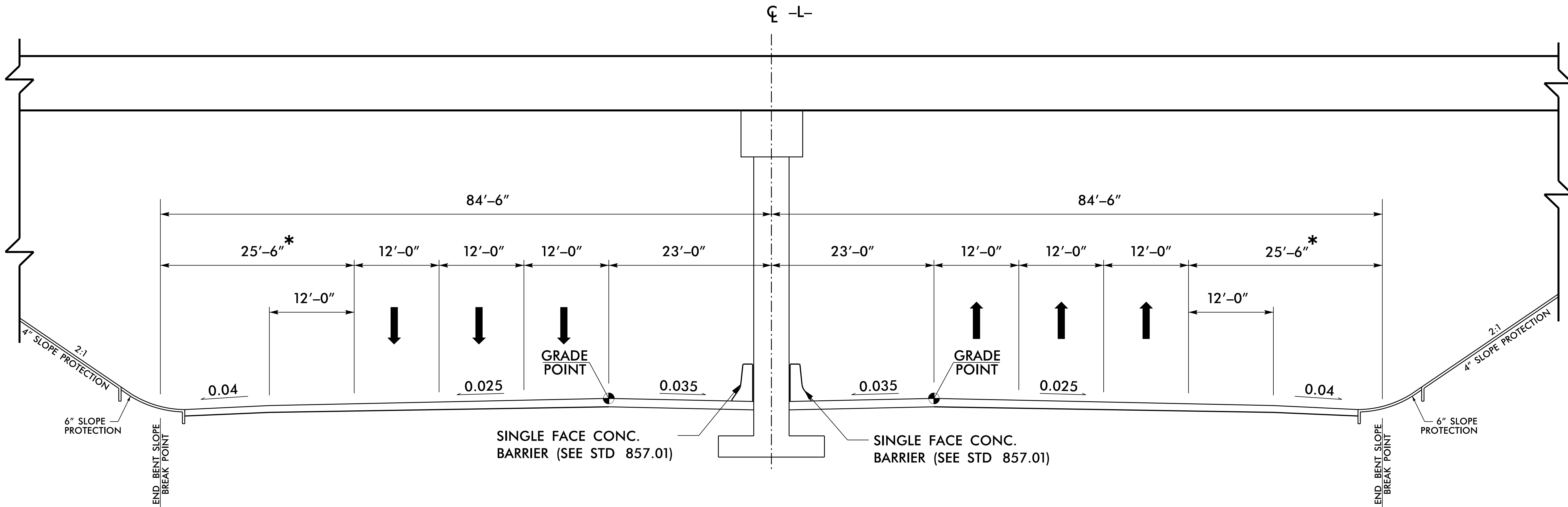


SITE # 3 - TYPICAL SECTION NO. 5

-Y3- FUNCTIONAL CLASS. = MINOR ARTERIAL

(-Y3-) GERMANTON RD.

|          |        |            |
|----------|--------|------------|
| 2016 ADT | 16,300 | TTST = 1%  |
| 2040 ADT | 18,400 | DUALS = 2% |
|          |        | DHV = 10%  |
|          |        | DIR = 70%  |



(-L-) I-74

|          |        |            |
|----------|--------|------------|
| 2016 ADT | 34,000 | TTST = 10% |
| 2040 ADT | 60,200 | DUALS = 5% |
|          |        | DHV = 9%   |
|          |        | DIR = 55%  |

SITE # 3 - TYPICAL SECTION NO. 6

FUTURE I-74 UNDER  
GERMANTON ROAD

MINIMUM VERTICAL CLEARANCE = 17'-0" (FUTURE & ACTUAL)

-L- FUNCTIONAL CLASS. = FREEWAY /INTERSTATE

\* ADDITIONAL WIDTH PROVIDED FOR FUTURE  
AUXILIARY LANE

SEE SHEET 2B-2 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR -L- ROADWAY APPROACH TYPICAL  
SEE SHEET TYP 2 FOR -Y3- ROADWAY APPROACH TYPICAL

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REVISIONS



# OLD HOLLOW RD. OVER I-74

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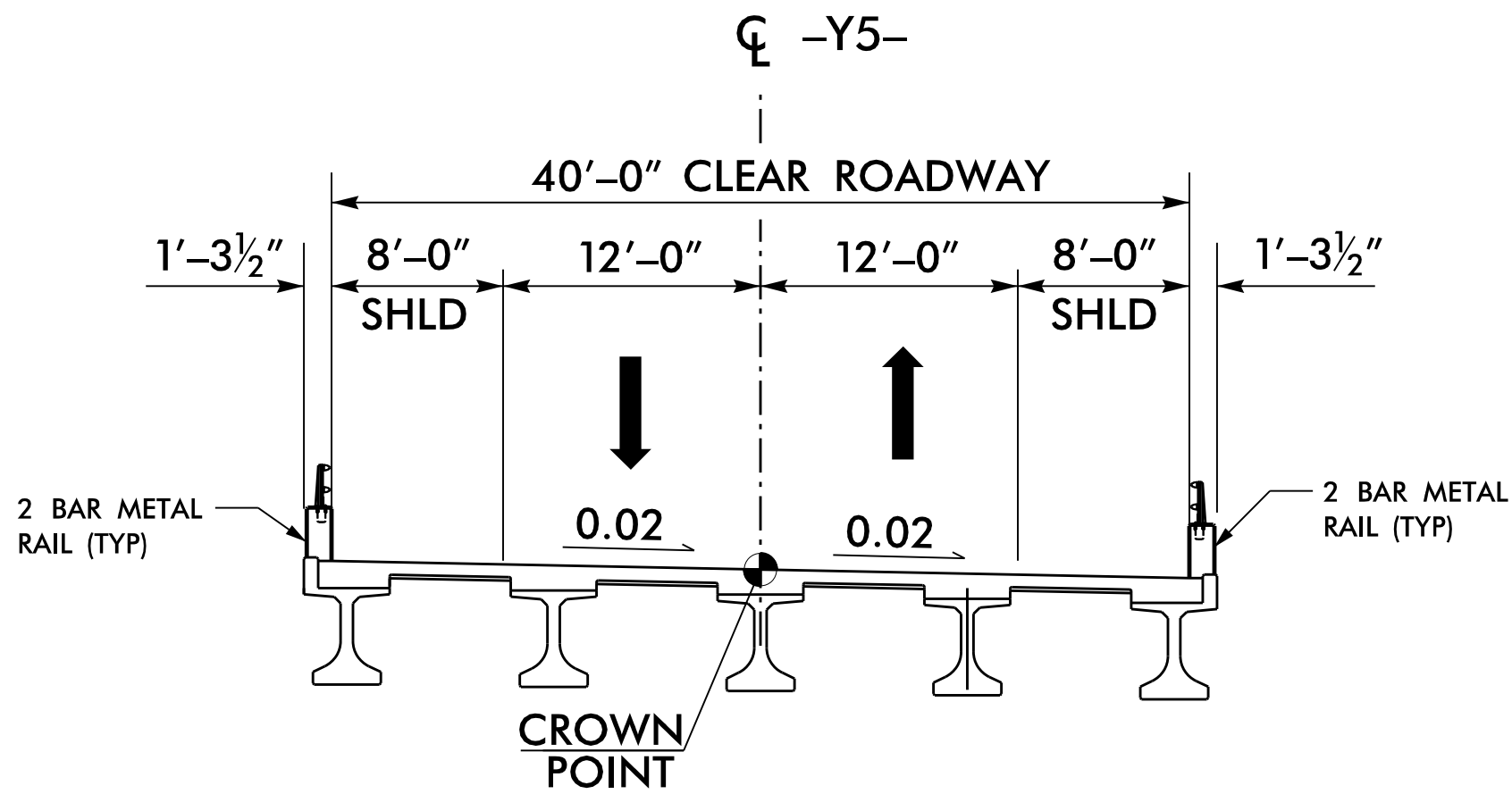
PROJECT REFERENCE NO. SHEET NO.

U-2579D, E & F 2A-14

RW SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

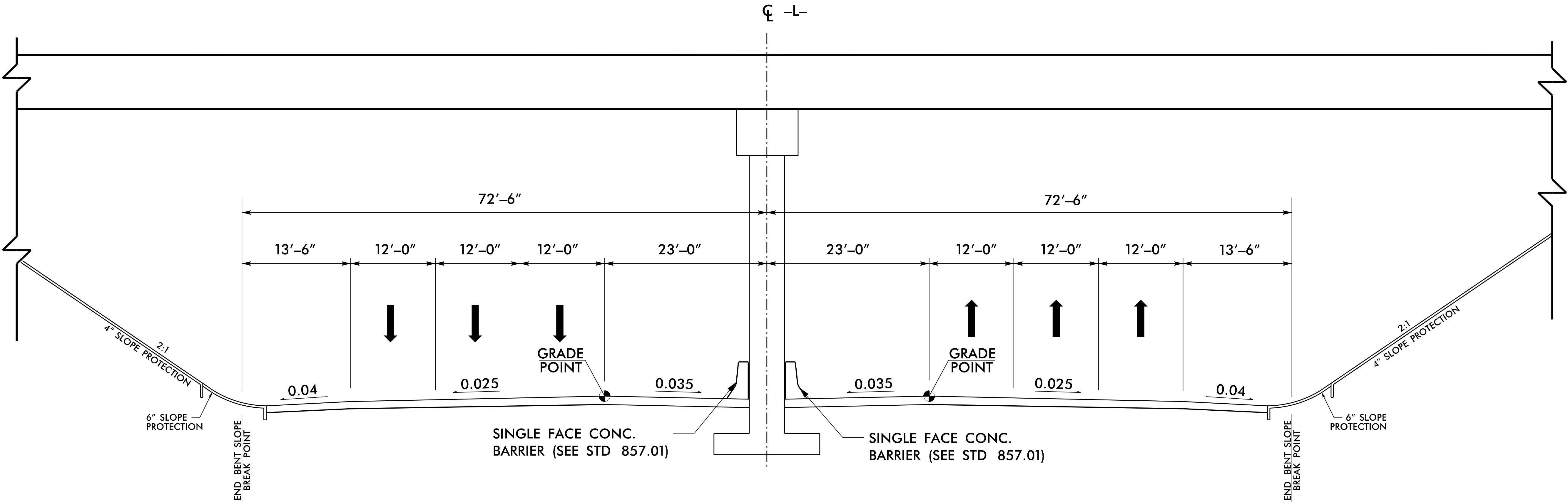


SITE # 4 - TYPICAL SECTION NO. 7

-Y5- FUNCTIONAL CLASS. = MINOR ARTERIAL

(-Y5-) OLD HOLLOW RD.

|          |       |            |
|----------|-------|------------|
| 2016 ADT | 7,500 | TTST = 1%  |
| 2040 ADT | 9,400 | DUALS = 3% |
|          |       | DHV = 10%  |
|          |       | DIR = 60%  |



SITE # 4 - TYPICAL SECTION NO. 8

FUTURE I-74 UNDER  
OLD HOLLOW ROAD

MINIMUM VERTICAL CLEARANCE = 17'-0" (FUTURE & ACTUAL)

-L- FUNCTIONAL CLASS. = FREEWAY /INTERSTATE

(-L-) I-74

|          |        |            |
|----------|--------|------------|
| 2016 ADT | 34,000 | TTST = 10% |
| 2040 ADT | 60,200 | DUALS = 5% |
|          |        | DHV = 9%   |
|          |        | DIR = 55%  |

SEE SHEET 2B-2 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR -L- ROADWAY APPROACH TYPICAL  
SEE SHEET TYP 2 FOR -Y5- ROADWAY APPROACH TYPICAL

PLOT DRIVER: NCDOT\_color\_eng\_50.plt PENTABLE: NCDOT\_pshp.fltd  
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REVISIONS



# BAUX MOUNTAIN RD. OVER I-74



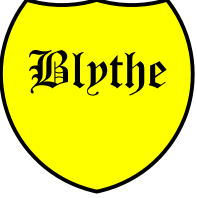
HDR Engineering, Inc. of the Carolinas  
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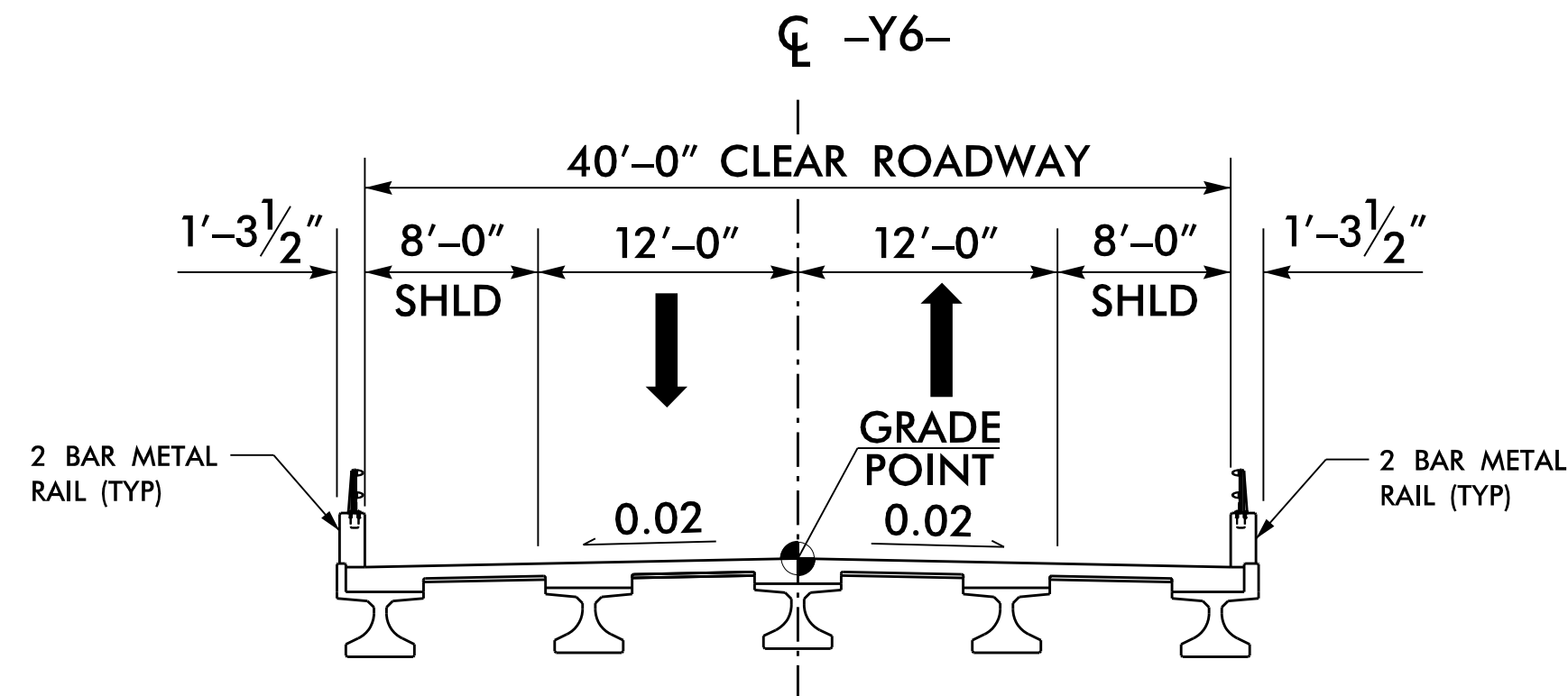


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NC License Number F-0991

100 Years

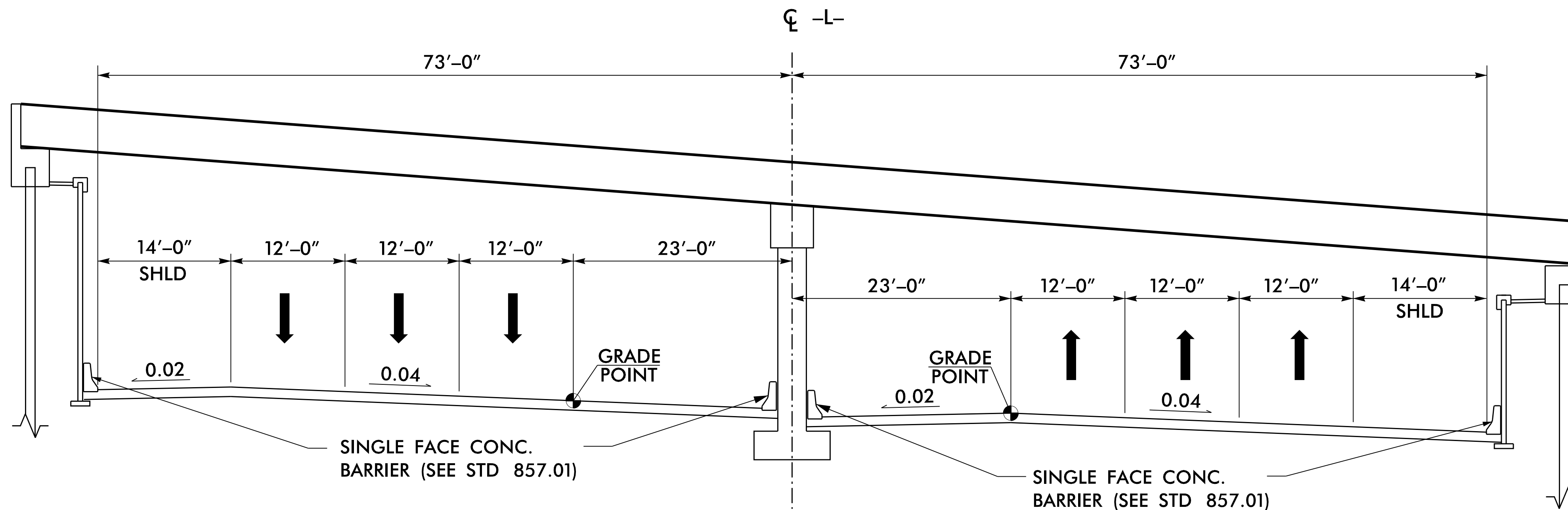
STV Engineers, Inc.  
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Charlotte, NC 28202  
NC License Number F-0991

|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PROJECT REFERENCE NO.                                                               | SHEET NO.                                                                           |
| U-2579D, E & F                                                                      | 2A-15                                                                               |
| R/W SHEET NO.                                                                       |                                                                                     |
| ROADWAY DESIGN ENGINEER                                                             | HYDRAULICS ENGINEER                                                                 |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |                                                                                     |
|  |  |



SITE # 5 – TYPICAL SECTION NO. 9  
-L- FUNCTIONAL CLASS. = FREEWAY/INTERSTATE

|                          |       |            |
|--------------------------|-------|------------|
| (-Y6-) BAUX MOUNTAIN RD. |       |            |
| 2016 ADT                 | 2,900 | TTST = 1%  |
| 2040 ADT                 | 4,800 | DUALS = 8% |
|                          |       | DHV = 11%  |
|                          |       | DIR = 60%  |



SITE # 5 – TYPICAL SECTION NO. 10  
FUTURE I-74 UNDER BAUX MOUNTAIN RD.  
MINIMUM VERTICAL CLEARANCE = 17'-0" (FUTURE & ACTUAL)  
-Y6- FUNCTIONAL CLASS. = MAJOR COLLECTOR

|            |        |            |
|------------|--------|------------|
| (-L-) I-74 |        |            |
| 2016 ADT   | 34,000 | TTST = 10% |
| 2040 ADT   | 60,200 | DUALS = 5% |
|            |        | DHV = 9%   |
|            |        | DIR = 50%  |

SEE SHEET 2B-3 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR -L- ROADWAY APPROACH TYPICAL  
SEE SHEET TYP 2 FOR -Y6- ROADWAY APPROACH TYPICAL



PLOT DRIVER: NCDOT\_pdf\_color\_eng\_50.plt  
USER: SHILTON  
FILE: Flatiron\_Construction\_Corp.\Flatiron-U-2579.D.E.F.WS\6.0.CAD.BTM 6.2.WIP\U-2579DEF\Roadway\Proj\HDR\U2579DEF\_RDY\_STRUCTURE.RECS.dgn

PENTABLE: NCDOT\_pshp.fltd  
DATE: 11/16/2018  
TIME: 3:22:25 PM

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# I-74 OVER MILL CREEK



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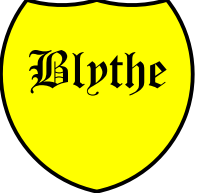
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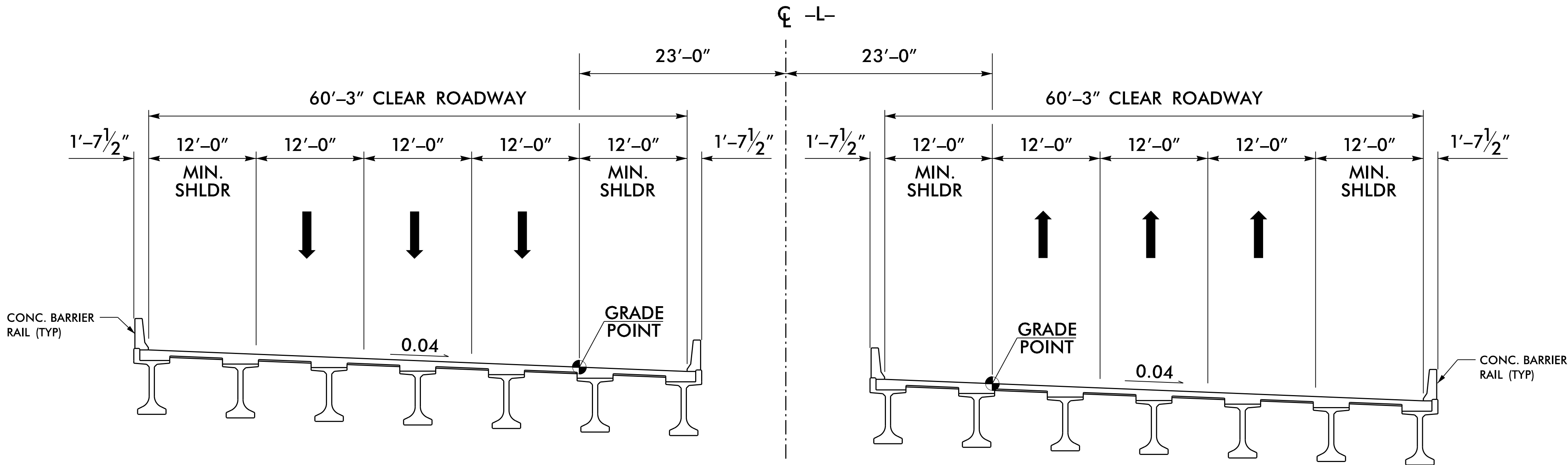
SHEET NO.  
2A-16

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED





| (-L-) I-74 |        |            |
|------------|--------|------------|
| 2016 ADT   | 34,000 | TTST = 10% |
| 2040 ADT   | 60,200 | DUALS = 5% |
|            |        | DHV = 9%   |
|            |        | DIR = 50%  |

SITE # 6 – TYPICAL SECTION NO. 11

-L- FUNCTIONAL CLASS. = FREEWAY /INTERSTATE

MINIMUM VERTICAL CLEARANCE BASED ON HYDRAULICS

SEE SHEET 2B-3 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR ROADWAY APPROACH TYPICAL







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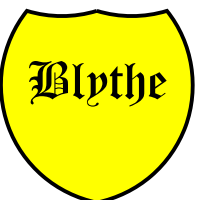
# I-74 OVER OLD WALKERTOWN RD. NORFOLK SOUTHERN RIALROAD & HAMMOCK FARM RD.

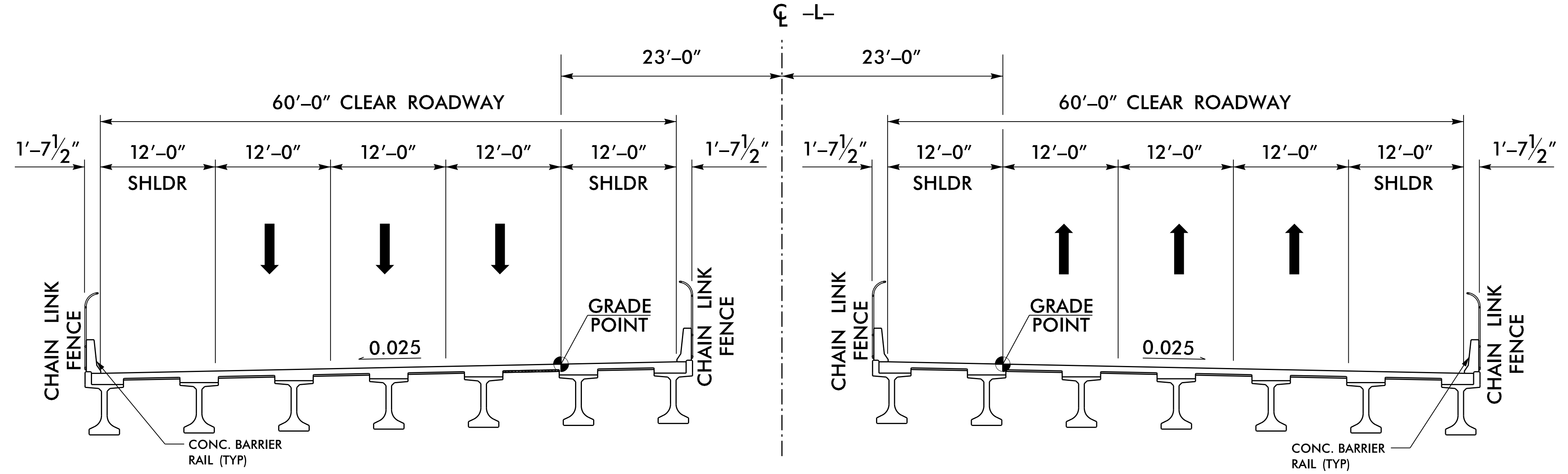


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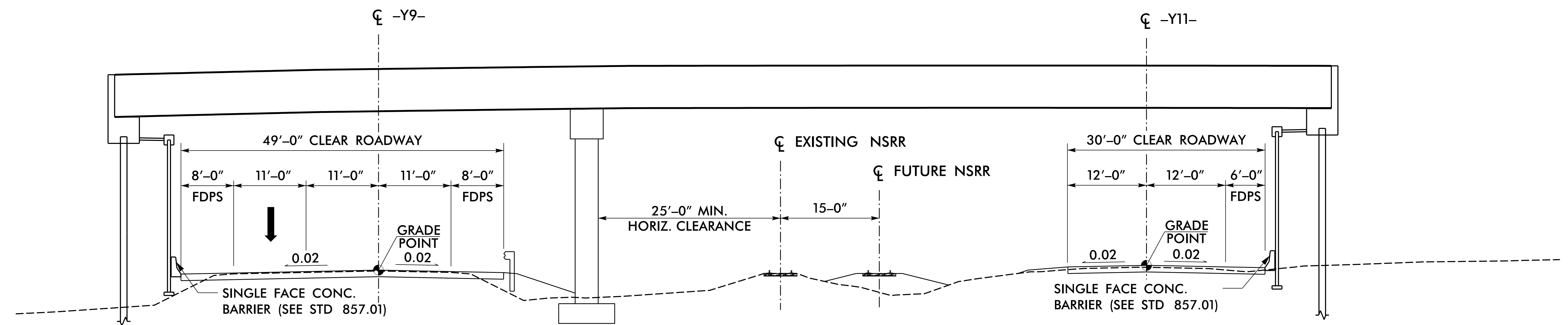
STV Engineers, Inc.  
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NC License Number F-0991

|                                                                                     |  |                                                                                     |  |
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| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                           |  |
| U-2579D, E & F                                                                      |  | 2A-18                                                                               |  |
| RW SHEET NO.                                                                        |  |                                                                                     |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | HYDRAULICS<br>ENGINEER                                                              |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |  |                                                                                     |  |
|  |  |  |  |



| (-L-) I-74 |        |            |
|------------|--------|------------|
| 2016 ADT   | 34,000 | TTST = 10% |
| 2040 ADT   | 60,200 | DUALS = 5% |
|            |        | DHV = 9%   |
|            |        | DIR = 50%  |

**SITE # 8 – TYPICAL SECTION NO. 14**  
-L- FUNCTIONAL CLASS. = FREEWAY /INTERSTATE



**(-Y9-) OLD WALKERTOWN RD.**  
2016 ADT 7,900 TTST = 2%  
2040 ADT 13,000 DUALS = 4%  
DHV = 9%  
DIR = 65%  
**OLD WALKERTOWN RD. UNDER FUTURE I-74**  
MINIMUM VERTICAL CLEARANCE = 15'-6" (FUTURE & ACTUAL)  
-Y9- FUNCTIONAL CLASS. = MAJOR COLLECTOR

**SITE # 8 – TYPICAL SECTION NO. 15**  
**NORFOLK SOUTHERN RAILROAD UNDER FUTURE I-74**  
MINIMUM VERTICAL CLEARANCE = 23'-0" (ACTUAL & FUTURE)

**(-Y11-) HAMMOCK FARM RD.**  
2016 ADT N/A TTST = N/A  
2040 ADT N/A DUALS = N/A  
DHV = N/A  
DIR = N/A  
**HAMMOCK FARM RD. UNDER FUTURE I-74**  
MINIMUM VERTICAL CLEARANCE = 15'-6" (FUTURE & ACTUAL)  
-Y9- FUNCTIONAL CLASS. = LOCAL

SEE SHEET 2B-3 FOR BRIDGE SKETCH  
SEE SHEET TYP 1 FOR -L- ROADWAY APPROACH TYPICAL  
SEE SHEET TYP 3 FOR -Y9- & -Y11- ROADWAY APPROACH TYPICALS



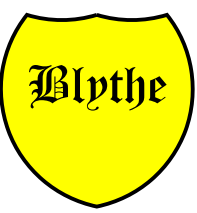
BRIDGE SKETCHES

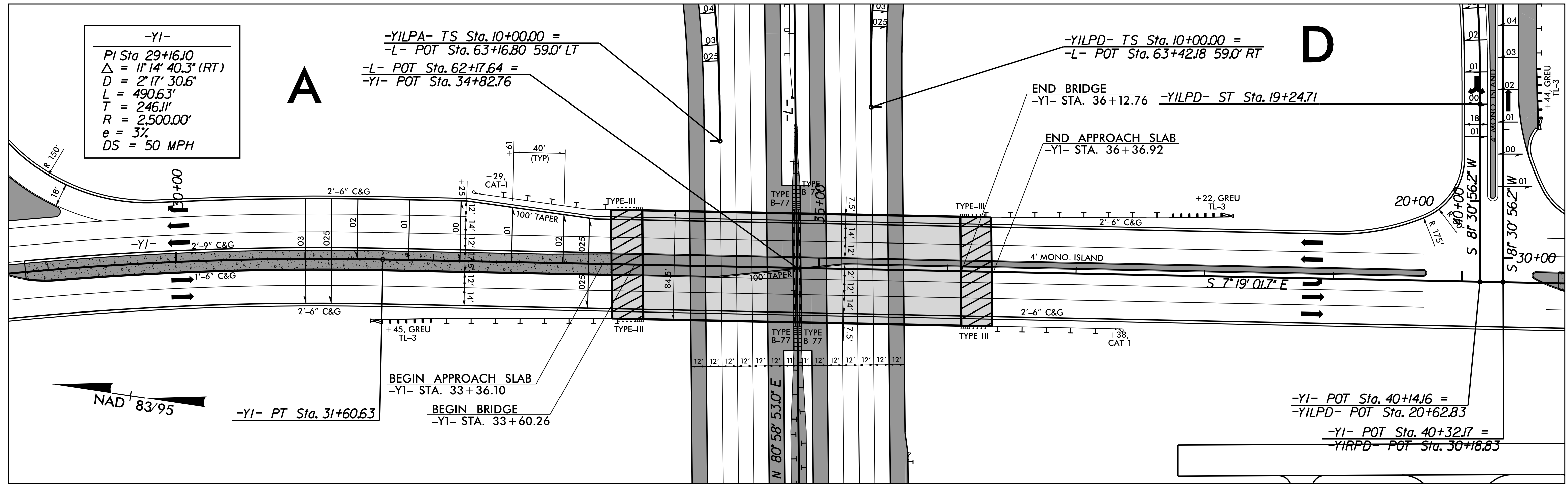


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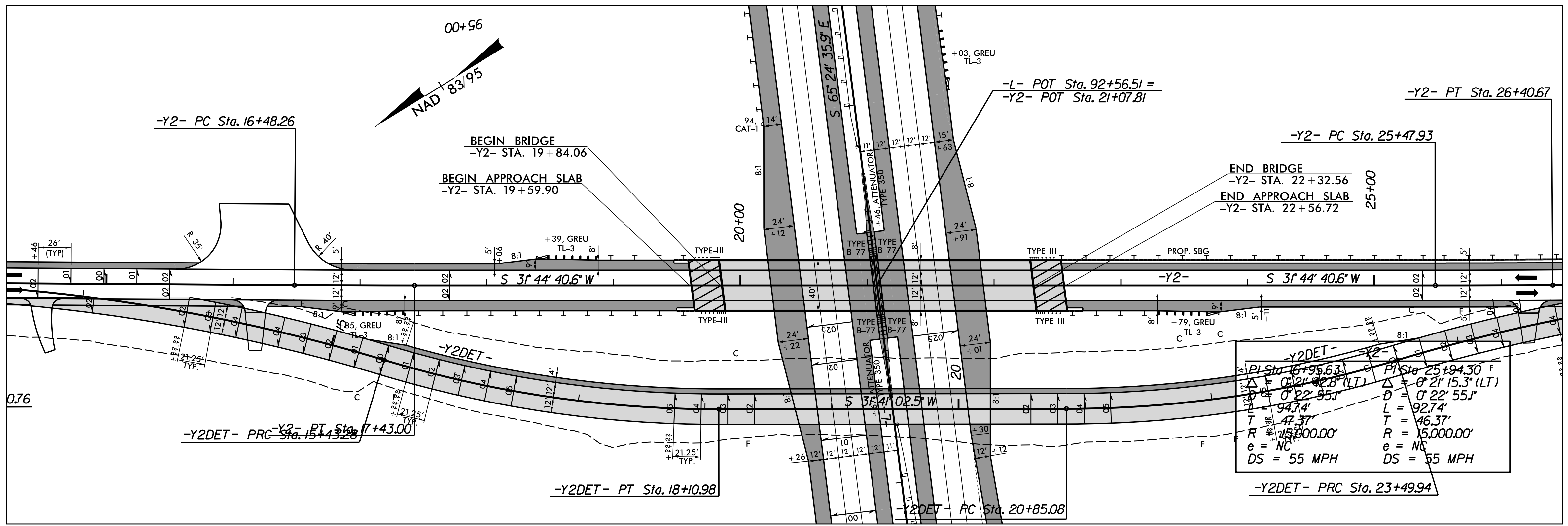


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|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PROJECT REFERENCE NO.                                                               | SHEET NO.                                                                           |
| U-2579D, E & F                                                                      | 2B-1                                                                                |
| RW SHEET NO.                                                                        |                                                                                     |
| ROADWAY DESIGN ENGINEER                                                             | HYDRAULICS ENGINEER                                                                 |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |                                                                                     |
|  |  |



STRUCTURE SITE 1: -Y1- OVER -L- (SEE PLAN SHEET 5)  
NOT TO SCALE



STRUCTURE SITE 2: -Y2- OVER -L- (SEE PLAN SHEET 7)  
NOT TO SCALE

PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
USER: SHILTON  
FILE: Flatiron.Construction.Corp.\Flatiron-U-2579.D.E.F.WS\6.0.CAD.BTM.6.2.WIP\U-2579DEF\Roadway\Proj\HDR\U2579DEF\_RDY\_STRUCTURE\_SKETCH\_HDR.dgn  
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TIME: 3:22:47 PM  
DATE: 11/16/2018

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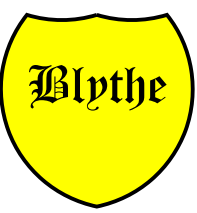
BRIDGE SKETCHES

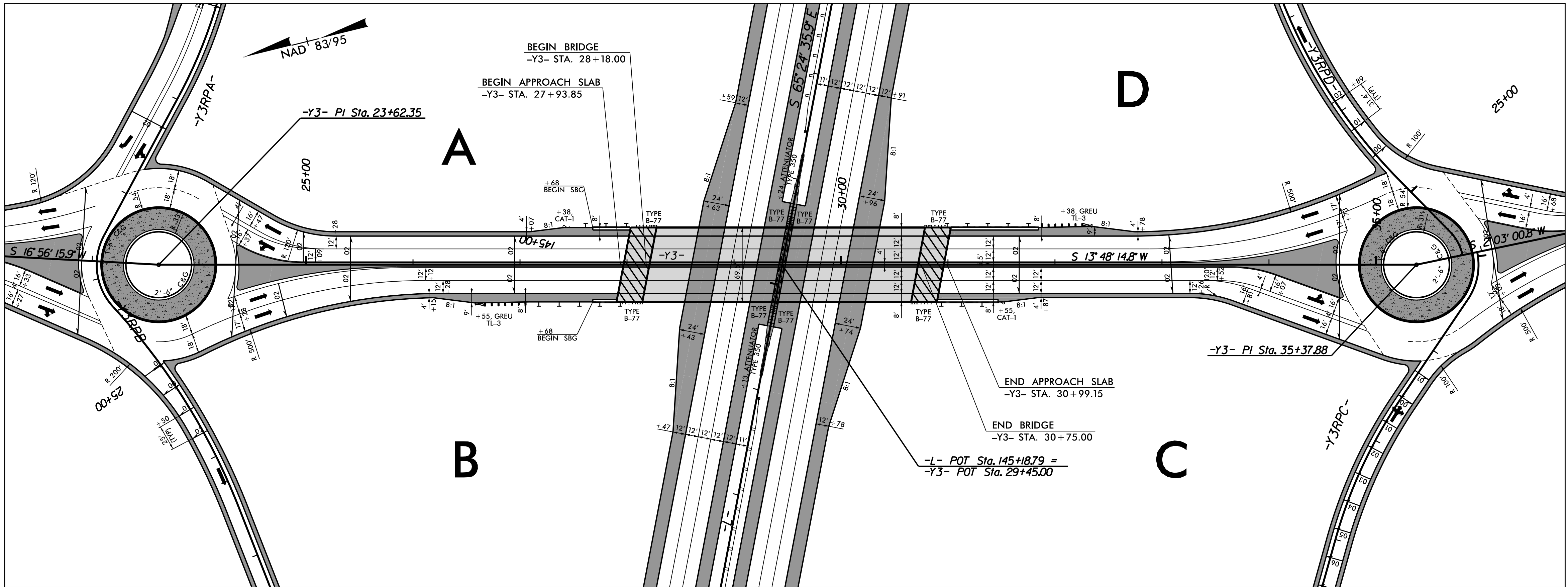


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N.C.B.E.L.S. License Number: F-0116

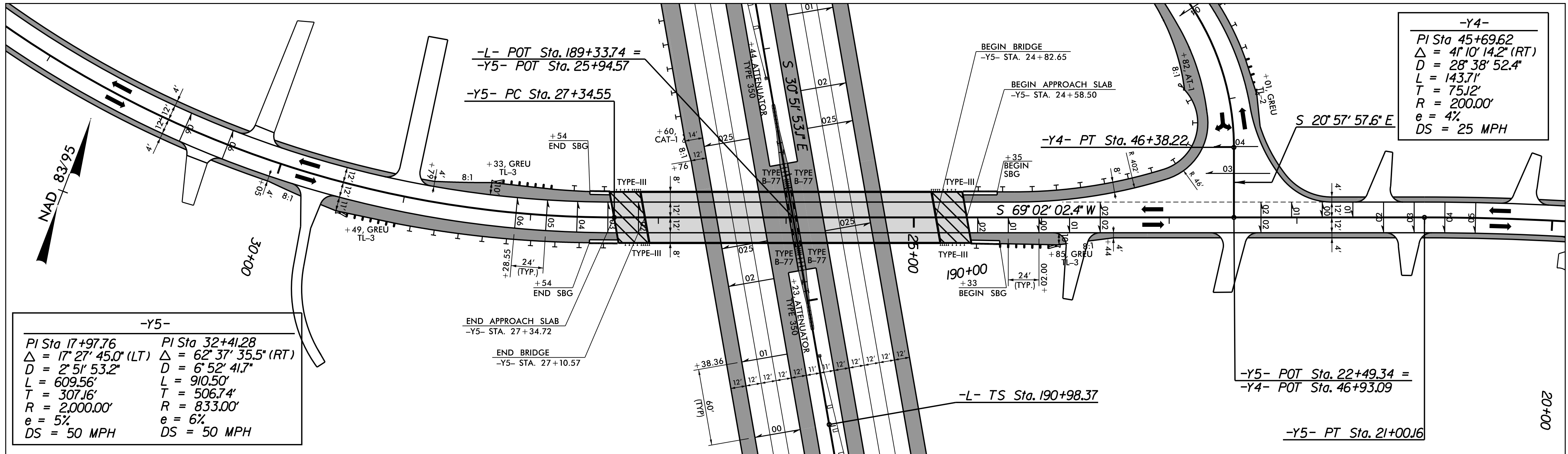


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|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PROJECT REFERENCE NO.                                                               | SHEET NO.                                                                           |
| U-2579D, E & F                                                                      | 2B-2                                                                                |
| RW SHEET NO.                                                                        |                                                                                     |
| ROADWAY DESIGN ENGINEER                                                             | HYDRAULICS ENGINEER                                                                 |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                    |                                                                                     |
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STRUCTURE SITE 3: -Y3- OVER -L- (SEE PLAN SHEET 11)  
NOT TO SCALE



STRUCTURE SITE 4: -Y5- OVER -L- (SEE PLAN SHEET 14)  
NOT TO SCALE

PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
USER: SHILTON  
FILE: Flatiron.Construction.Corp.NFlatiron-U-2579D.E.F.WS\6.0.CAD.BIM\6.2.WIP\U-2579DEF\Roadway\Proj\HDR\U2579DEF\_RDY\_STRUCTURE\_SKETCH\_HDR.dgn  
PENTABLE: NCDOT\_dshp.fltd  
TIME: 3:22:50 PM  
DATE: 11/16/2018

REVISIONS



REVISIONS

# BRIDGE SKETCHES

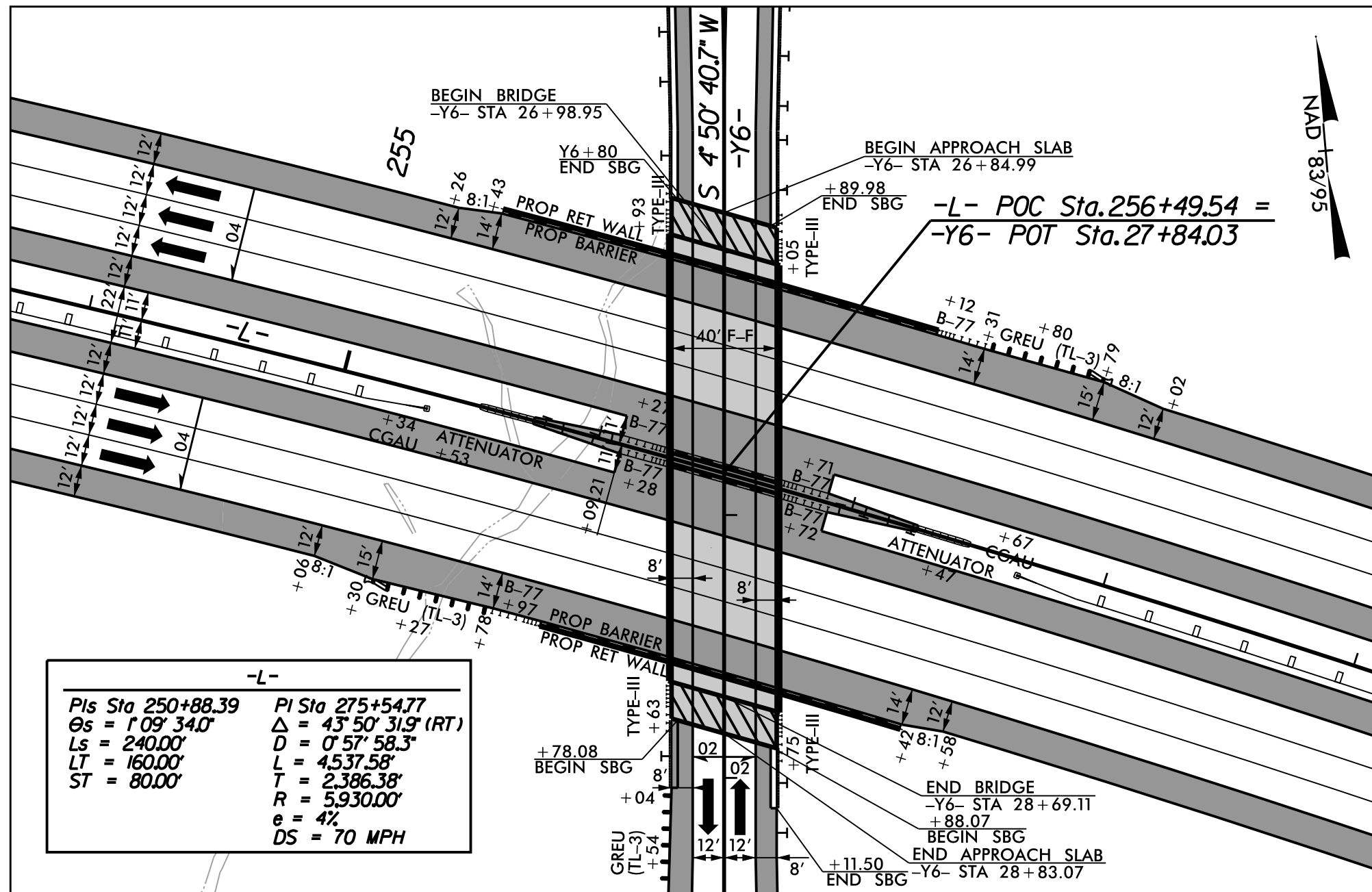


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555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

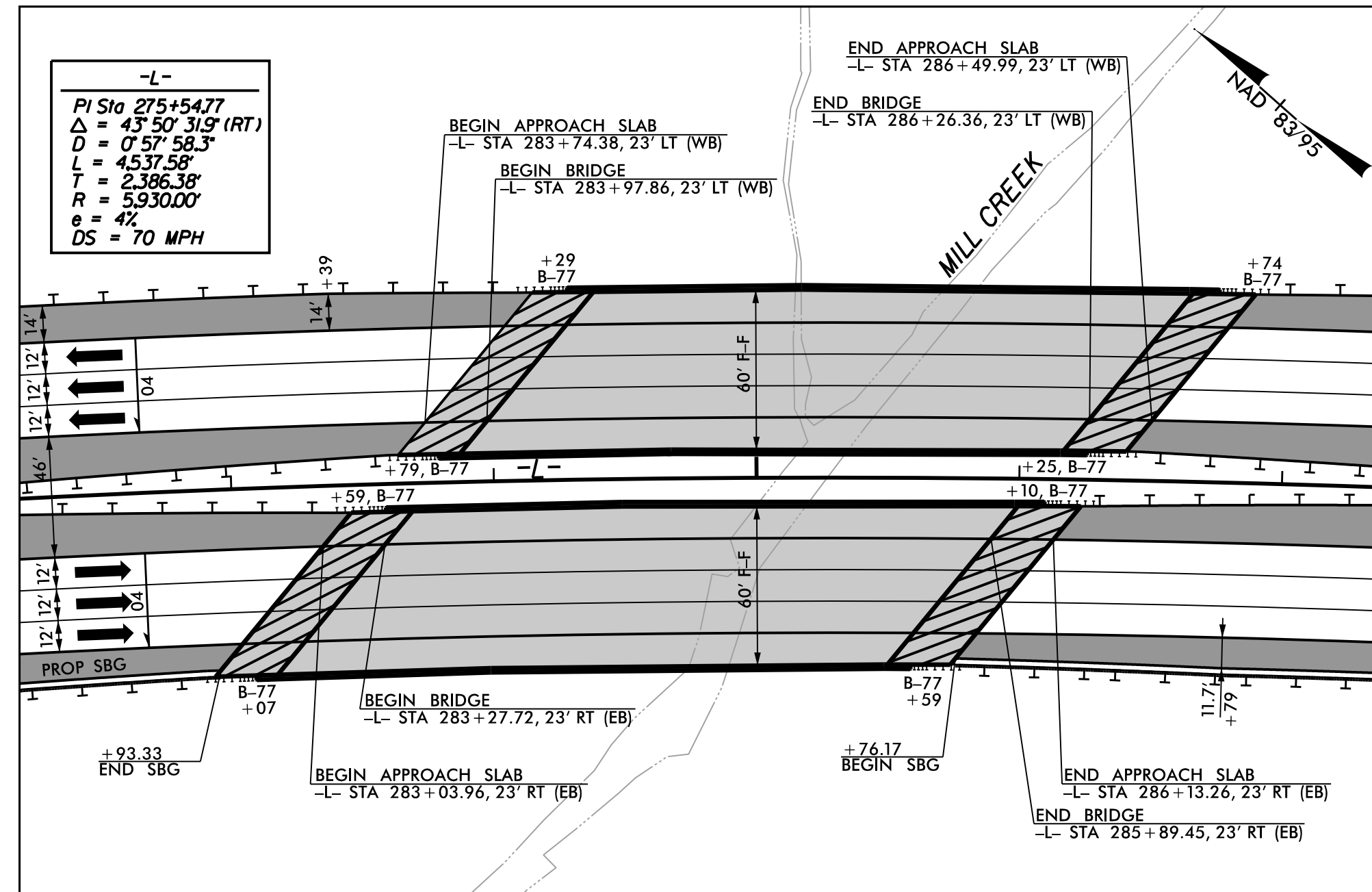


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300 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

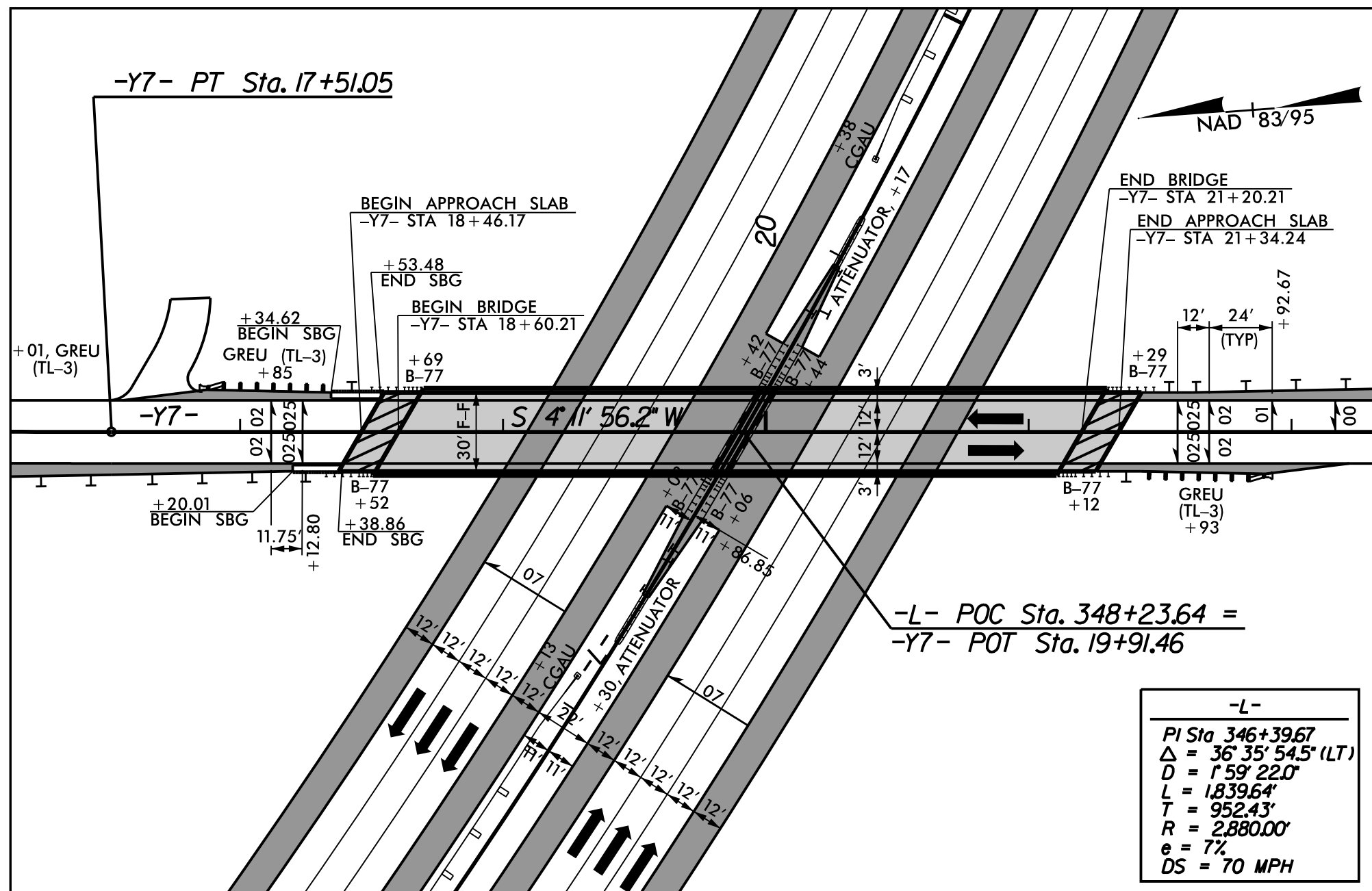
| PROJECT REFERENCE NO.      |  | SHEET NO.              |  |
|----------------------------|--|------------------------|--|
| U-2579D, E & F             |  | 2B-3                   |  |
| RW SHEET NO.               |  |                        |  |
| ROADWAY DESIGN<br>ENGINEER |  | HYDRAULICS<br>ENGINEER |  |
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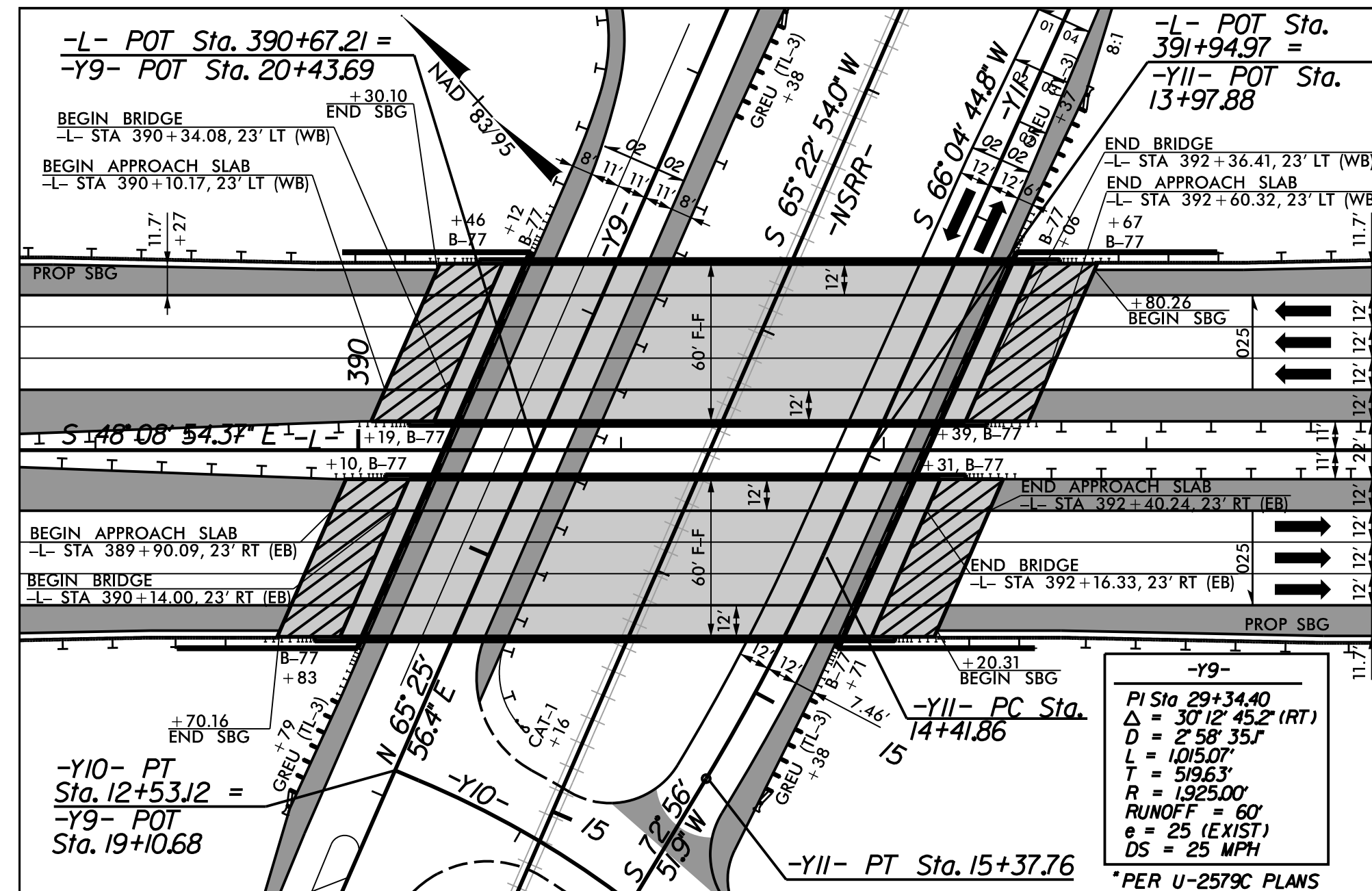
STRUCTURE SITE 5: -Y6- OVER -L- (SEE PLAN SHEET 19)  
NOT TO SCALE



STRUCTURE SITE 6: -L- OVER MILL CREEK (SEE PLAN SHEET 21)  
NOT TO SCALE

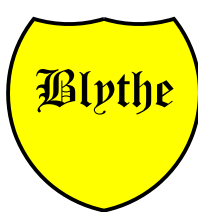


STRUCTURE SITE 7: -Y7- OVER -L- (SEE PLAN SHEET 25)  
NOT TO SCALE



STRUCTURE SITE 8: -L- OVER -Y9-, -NSRR-, AND -Y11-  
(SEE PLAN SHEET 29) NOT TO SCALE











DRY DETENTION BASIN

\*NOT TO SCALE\*

HDR

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STV

100 Years

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900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

FLATIRON

Wlythe

PROJECT REFERENCE NO.  
U-2579D, E & F

SHEET NO.  
2D-1

RW SHEET NO.

HYDRAULICS  
ENGINEER

NOTES:  
1. SEE PLANS FOR LOCATION AND BASIN DIMENSIONS.  
2. IF SEASONAL HIGH WATER TABLE (SHWT) IS WITHIN 2' OF THE MEDIA FILTER BOTTOM, CONTACT THE NCDOT HYDRAULIC UNIT PRIOR TO CONSTRUCTION.  
3. ALL DISTURBED BASIN SLOPES DRAINING INTO THE FILTRATION BASIN SHALL BE SODDED WITH FESCUE SOD.  
4. ACCESS BERM SHALL BE PROVIDED TO ACCESS CONTROL STRUCTURE ON ALL BASINS AS SHOWN IN DETAIL.

Diagram showing a typical section of a dry detention basin. Key features include: RIP RAP LINED FOREBAY, CLASS 'B' RIP RAP, 12" MIN THICK UNDERLAIN WITH IMPERMEABLE GEO-TEXTILE; TRANSITION BERM, 5' MIN; SLUICE GATE; TRASH RACK (SEE DETAIL 2D-4); MAINTENANCE BERM; TOP BERM, 10' MIN; EXISTING GROUND LINE; 2:1 SLOPE; 3:1 SLOPE; FILTER FABRIC; CLASS 'B' RIP RAP, 18" THICK; SUMP POOL, WIDTH OF STRUCTURE TO COLLECT SEDIMENT AND DEBRIS; PRIMARY ORIFICE; 1' MIN; 8" MAINTENANCE DRAIN ORIFICE, 1-FOOT BELOW BASIN BOTTOM ELEVATION; 2'x2'x4" CONCRETE PAD; OUTLET PIPE, SEE STRUCTURE TABLE FOR SIZE AND DOWNSTREAM STRUCTURE; VARIES, SEE PLAN; A, B, C, D, E labels for elevation points.

TYPICAL SECTION  
NTS

| TABLE 1<br>ELEVATIONS FOR DRY DETENTION BASIN |                             |                          |                           |                        |                       |
|-----------------------------------------------|-----------------------------|--------------------------|---------------------------|------------------------|-----------------------|
| STATION                                       | A<br>(INLET PIPE<br>INVERT) | B<br>(FOREBAY<br>BOTTOM) | C<br>(BOTTOM<br>OF BASIN) | D<br>(FOREBAY<br>BERM) | E<br>(TOP OF<br>BERM) |
| -Y1LPA- 15+00 RT                              | 879.00                      | 876.00                   | 875.00                    | 879.00                 | 881.20                |
| -Y1LPD- 14+50 RT                              | 898.00                      | 892.00                   | 891.00                    | 895.00                 | 897.30                |
| -L- 357+88 LT                                 | 929.50                      | 926.00                   | 926.00                    | 930.15                 | 932.00                |

OUTLET CONTROL STRUCTURE

\*NOT TO SCALE\*

Diagram showing detailed views of the outlet control structure. Key features include: TRASH RACK (SEE DETAILS SHEET 2-); TRASH RACK HINGES (THIS SIDE); TOP ELEV. CTL. STR.; PRIMARY ORIFICE; DRAWDOWN ORIFICE PLATE (ORIFICE TRASH RACK NOT SHOWN FOR CLARITY); MAINTENANCE DRAIN ORIFICE; BASIN ELEV.; 2'x2'x4" CONCRETE PAD, TYP.; STEPS @ 12" O.C. (STD. DRWG. 840.66); FILTER FABRIC; SUMP POOL, 6' L X 2' W FOR SEDIMENT AND DEBRIS COLLECTION, LINED W/ CLASS 'B' RIP RAP, 18" THICK; ORIFICE TRASH RACK; 2:1 SLOPE; 2'x2'x4" CONCRETE PAD; OUTLET PIPE (P); OUTFLOW; ACCESS BERM; SLUICE GATE; TRASH RACK (SEE DETAILS SHEET 2-); TRASH RACK HINGES (THIS SIDE); TOP ELEV. CTL. STR.; BASIN BOTTOM MIN. ELEV.; OUTLET PIPE (P); SIDE 1, SIDE 2, SIDE 3, SIDE 2 PLAN VIEW, TRASH RACK NOT SHOWN FOR CLARITY.

NOTES:

- NO BEDDING MATERIAL TO BE USED. THEREFORE, DO NOT FOLLOW STANDARD DRAWINGS FOR METHOD OF PIPE INSTALLATION FOR OUTLET PIPE THROUGH EMBANKMENT.
- 8" MIN. ORIFICE WITH SLUICE GATE IS FOR MAINTENANCE AND SHOULD REMAIN CLOSED DURING NORMAL OPERATION. A GATE VALVE MAY BE USED IN LIEU OF THE 8" SLUICE GATE.
- SLUICE GATE SHALL PROVIDE WATERTIGHT SEAL. PROVIDE ADEQUATE CLEARANCE FOR GATE OPERATION AND FOR PROPER SEATING OF GATE OVER PIPE.
- SELECT BOX STANDARD AS REQUIRED TO ACCOMMODATE SLUICE GATE AND ORIFICE TRASH RACK WIDTH.
- ENSURE TRASH RACK OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATE.
- FOOTER DIMENSION (B) IS ADJUSTED FOR ANTI-FLOTATION.
- WATER TIGHT SEALS ARE REQUIRED AT ALL PIPE CONNECTIONS TO STRUCTURE.

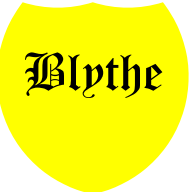
| MINIMUM DIMENSIONS FOR OUTLET CONTROL STRUCTURE |                  |                    |                    |                                 |                            |                              |                                  |                                |                               |                                |                                |                                 |                           |
|-------------------------------------------------|------------------|--------------------|--------------------|---------------------------------|----------------------------|------------------------------|----------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|---------------------------------|---------------------------|
| STATION                                         | STRUCTURE NUMBER | S (INCHES) 6" MIN. | B (INCHES) 6" MIN. | TOP ELEVATION CONTROL STRUCTURE | MAX. STORAGE DEPTH(D) FEET | CONTROL STRUCTURE INV. ELEV. | CTL. STR. DIMENSIONS (W x L x H) | OUTLET PIPE DIAMETER(P) INCHES | MAINTENANCE ORIFICE DIMENSION | MAINTENANCE ORIFICE INV. ELEV. | DRAWDOWN ORIFICE (O) DIMENSION | DRAWDOWN ORIFICE (O) INV. ELEV. | PRIMARY ORIFICE DIMENSION |
| -L- 357+88 LT                                   | 2611             | 6                  | 12                 | 930.15                          | 4.15                       | 925.00                       | 4 x 4 x 4.15                     | 36                             | 1@8" DIA                      | 925.00                         | 1@2" DIA                       | 926.00                          | -                         |
| -Y1LPA- 15+00 RT                                | 0598             | 6                  | 24                 | 880.00                          | 5.00                       | 872.00                       | 4 x 4 x 8.50                     | 36                             | 1@8" DIA                      | 874.00                         | 1@1.9" DIA                     | 874.00                          | 30"x24" REC               |
| -Y1LPD- 14+50 RT                                | 0590             | 6                  | 20                 | 896.30                          | 3.60                       | 888.50                       | 4 x 4 x 8.30                     | 30                             | 1@8" DIA                      | 890.00                         | 1@1.5" DIA                     | 890.00                          | 1@16" DIA                 |
|                                                 |                  |                    |                    |                                 |                            |                              |                                  |                                |                               |                                |                                |                                 |                           |
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PLOT DRIVER: NCDOT\_pdf\_color\_eng\_50.plt  
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PENTABLE: NCDOT\_pshp.fltd  
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DATE: 11/16/2018

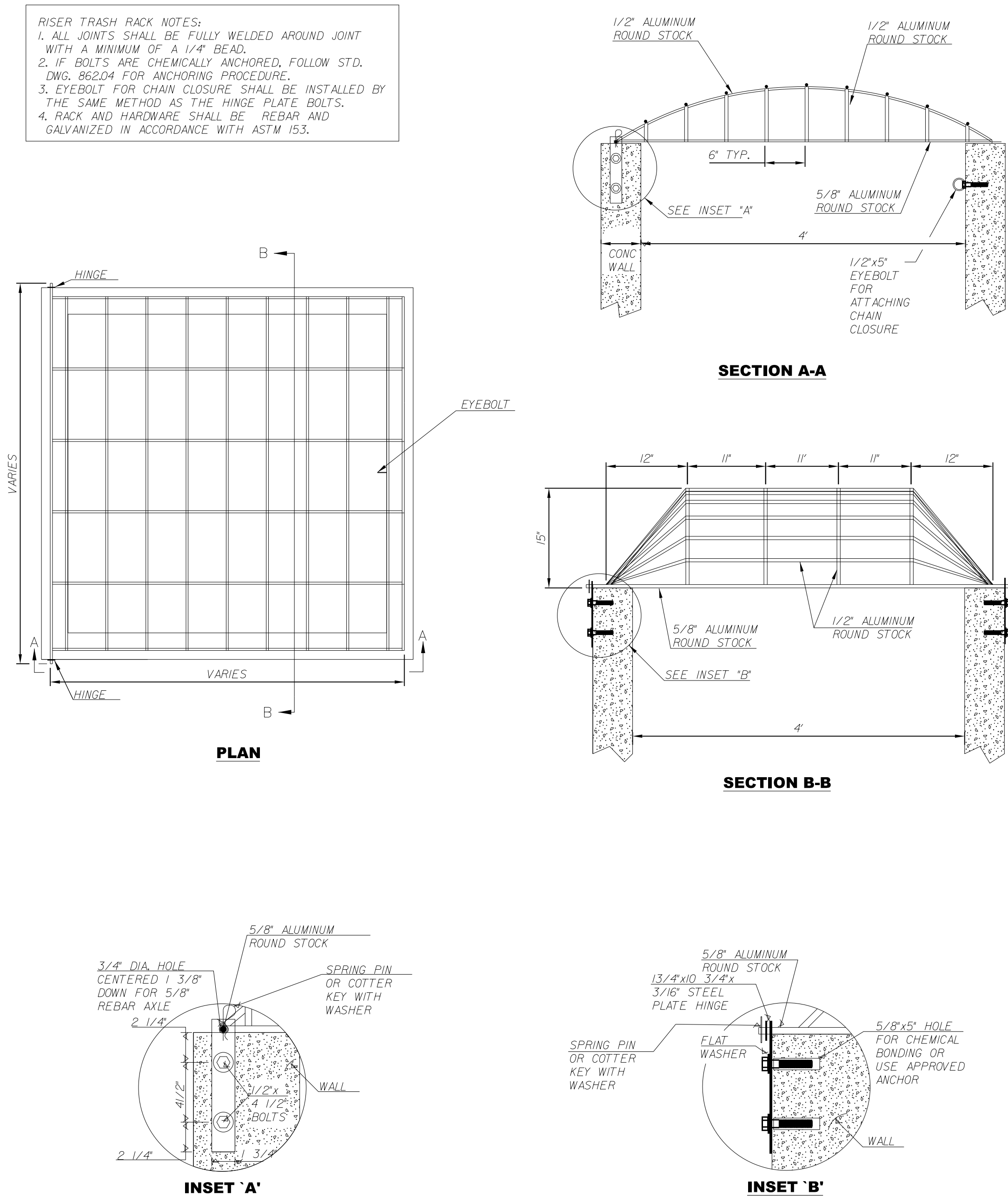
REVISIONS



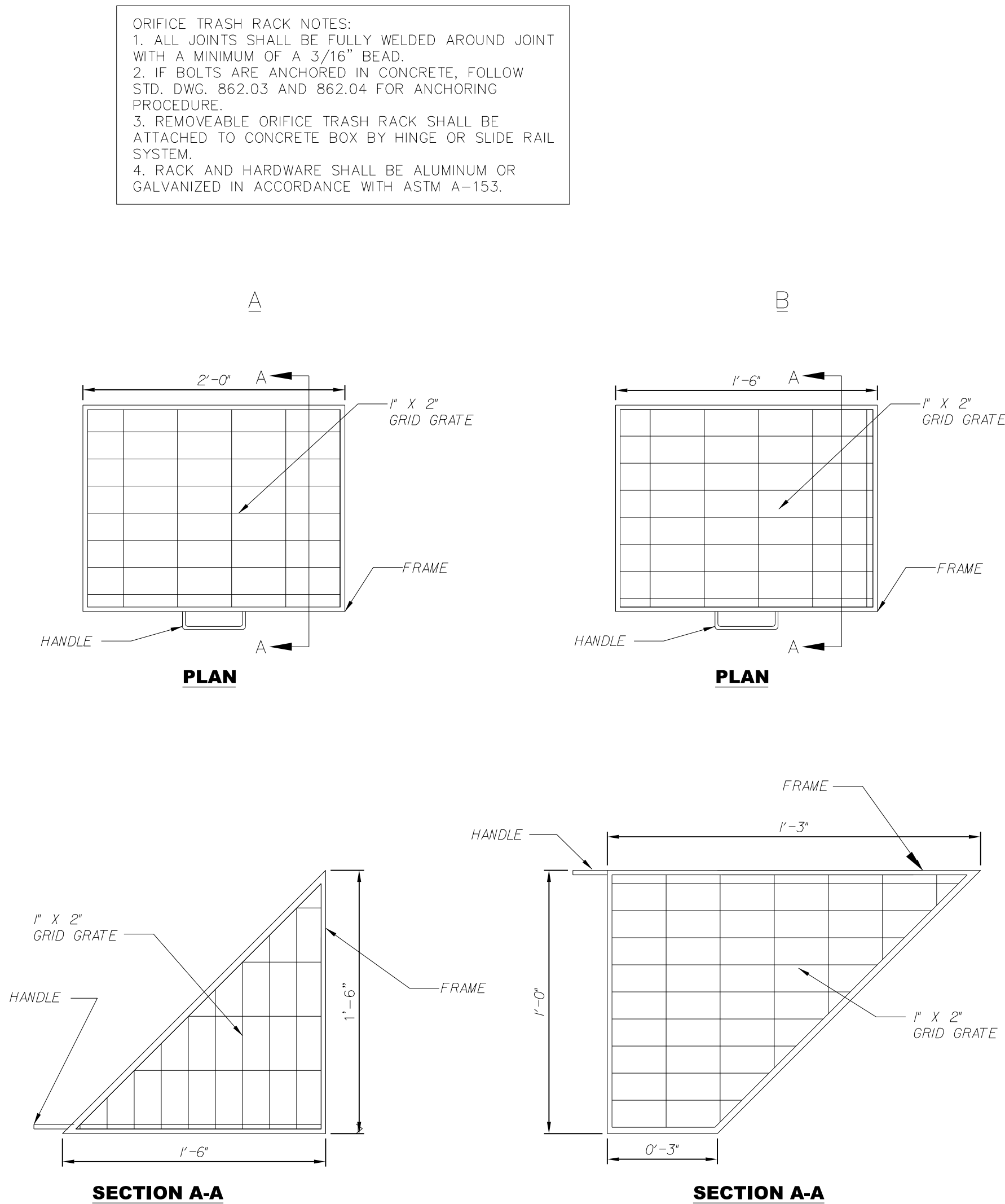
REVISIONS

|                                                                                                                                                                                                                                     |                                                                                     |  |           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|-----------|
|  <div>HDR Engineering, Inc. of the Carolinas<br/>555 Fayetteville St, Suite 900 Raleigh, N.C. 27601<br/>N.C.B.E.L.S. License Number: F-0116</div> | PROJECT REFERENCE NO.                                                               |  | SHEET NO. |
|                                                                                                                                                                                                                                     | U-2579D, E & F                                                                      |  | 2D-2      |
|                                                                                                                                                                                                                                     | RW SHEET NO.                                                                        |  |           |
|  <div>STV Engineers, Inc.<br/>900 West Trade St., Suite 715<br/>Charlotte, NC 28202<br/>NC License Number F-0991</div>                           | HYDRAULICS ENGINEER                                                                 |  |           |
|                                                                                                                                                  |  |  |           |

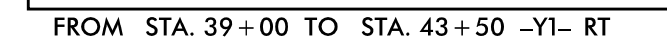
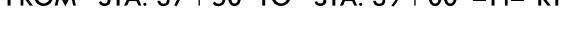
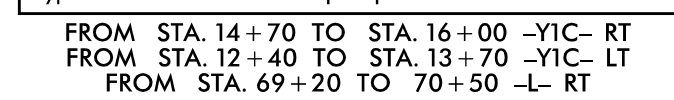
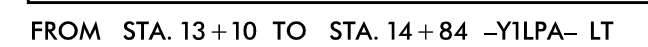
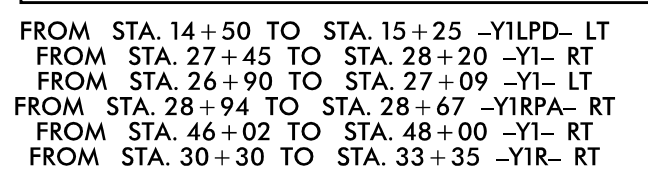
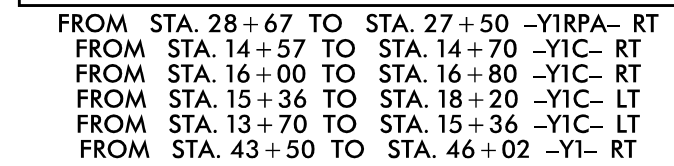
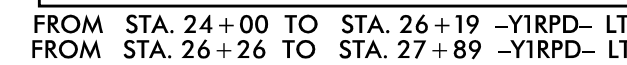
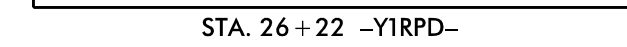
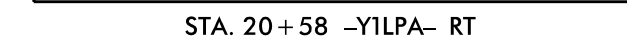
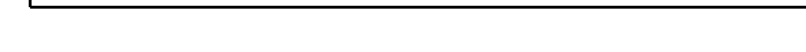
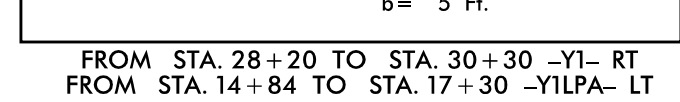
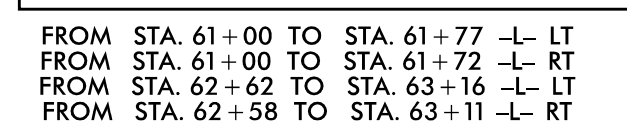
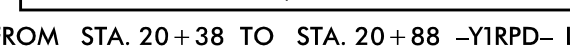
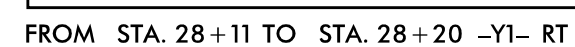
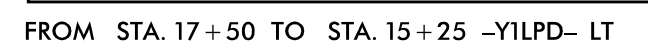
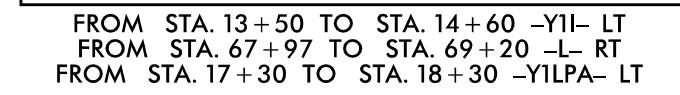
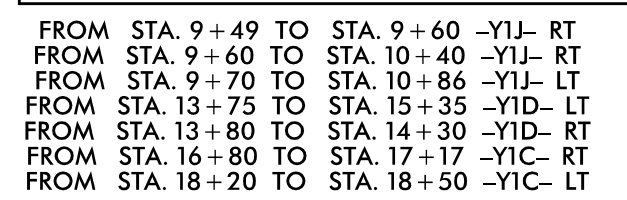
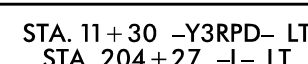
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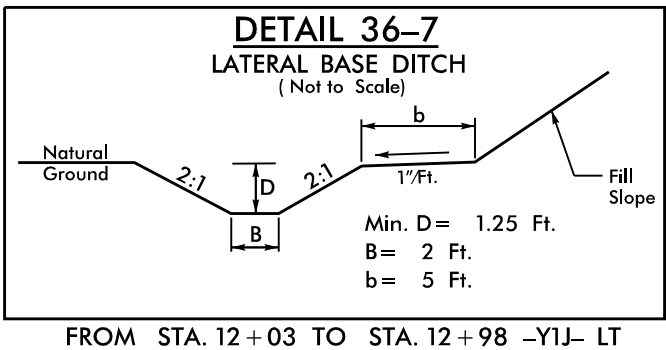
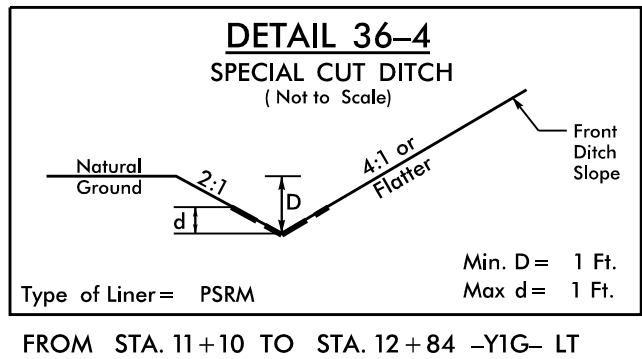
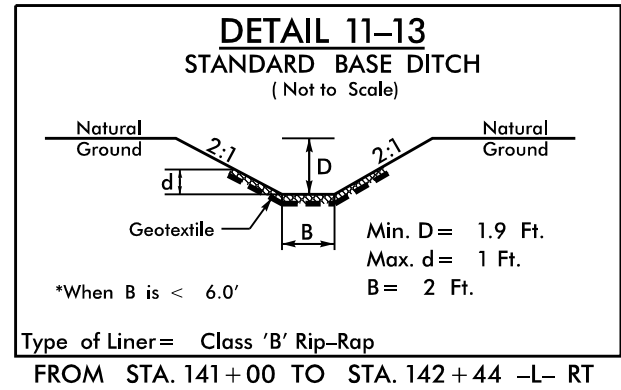
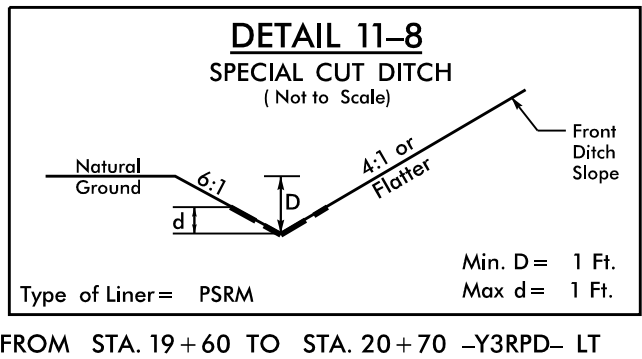
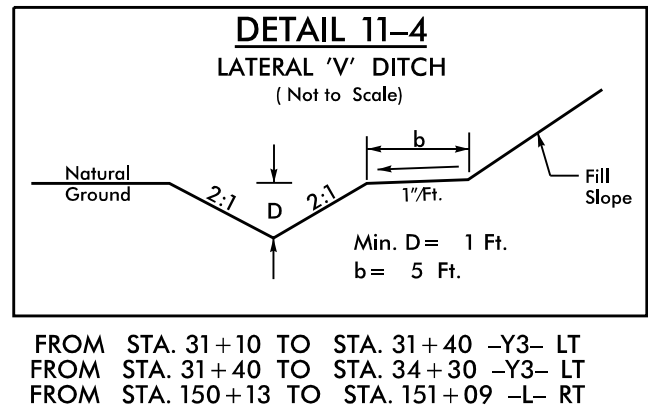
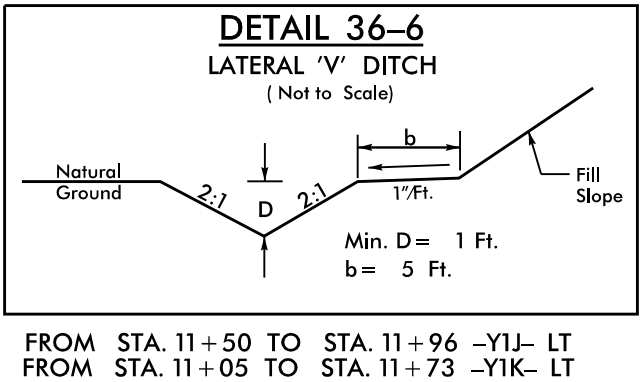
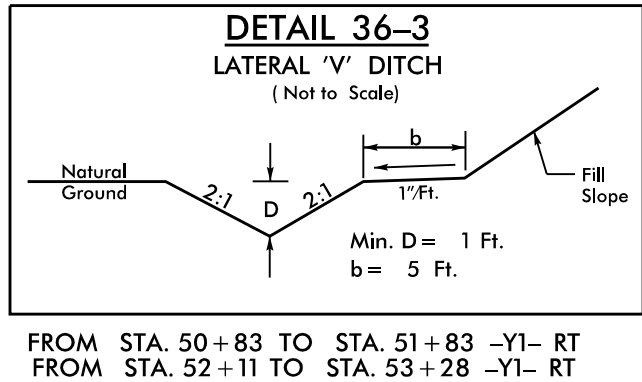
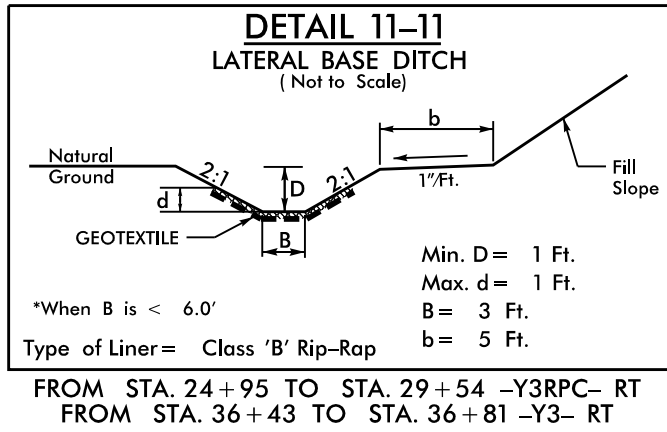
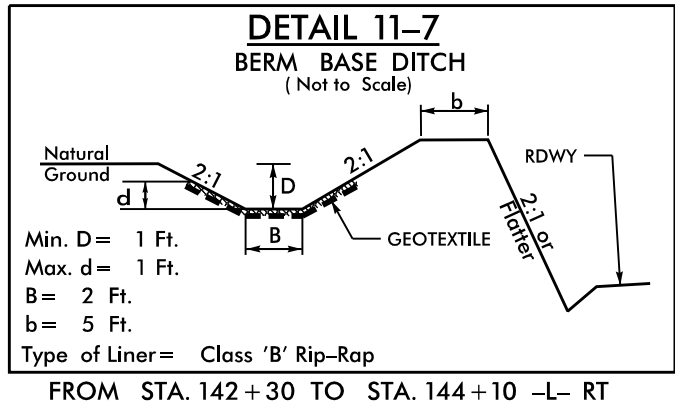
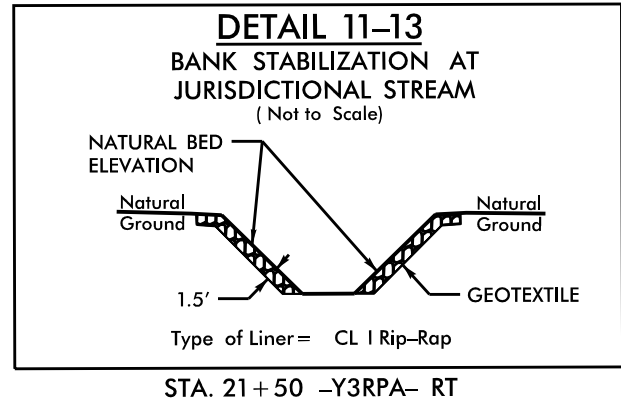
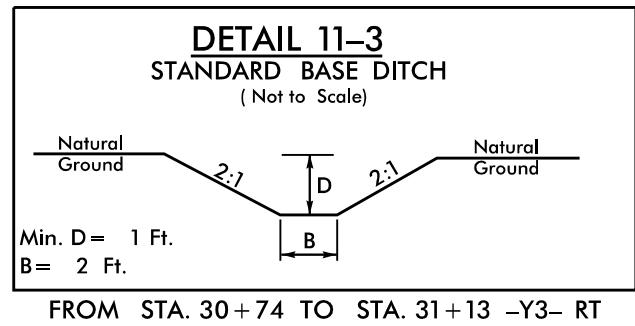
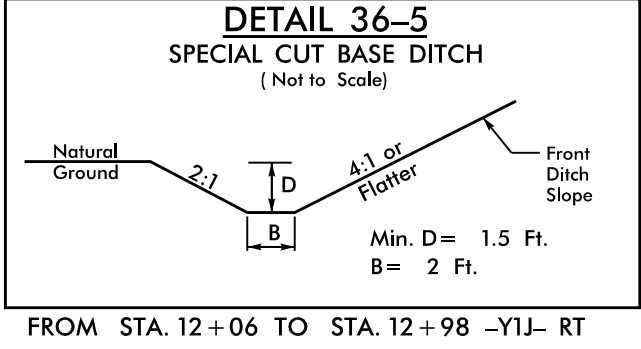
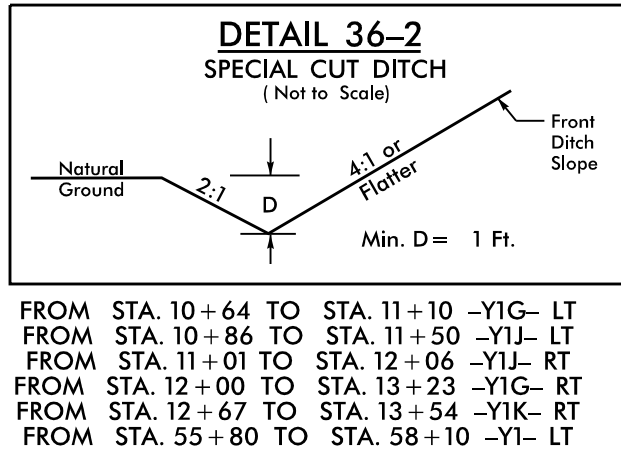
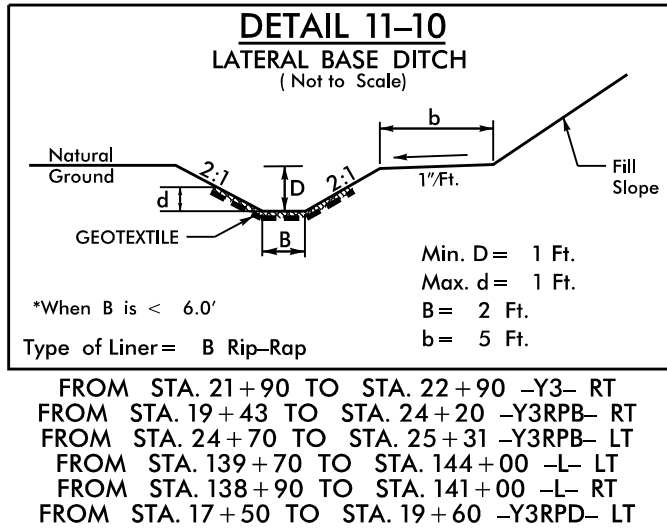
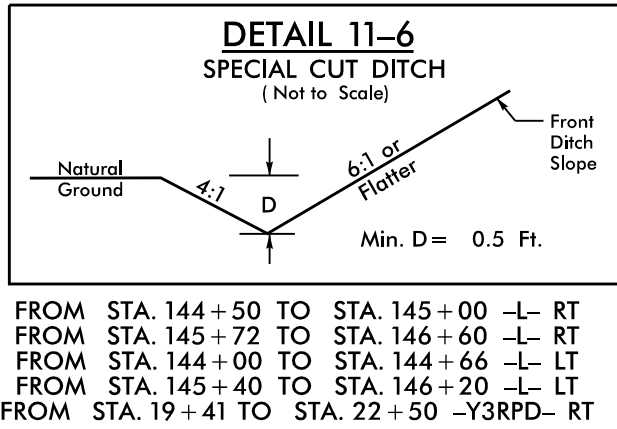
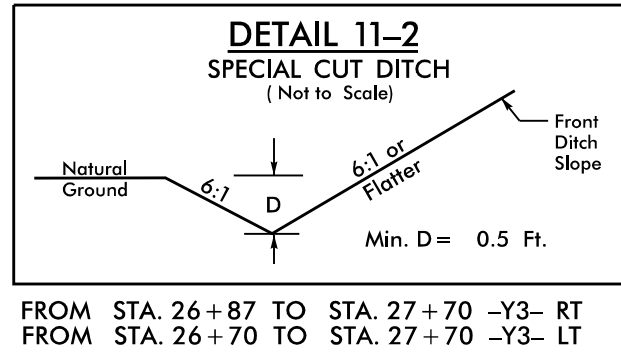
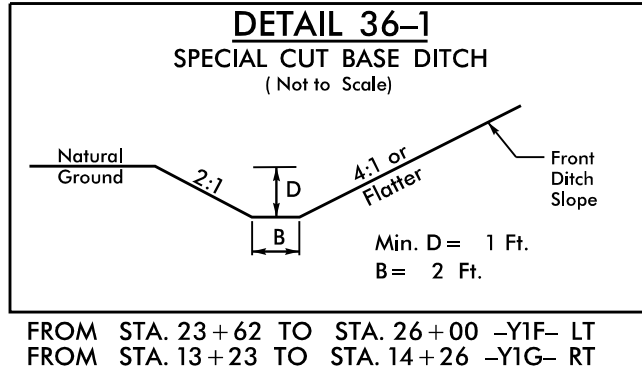
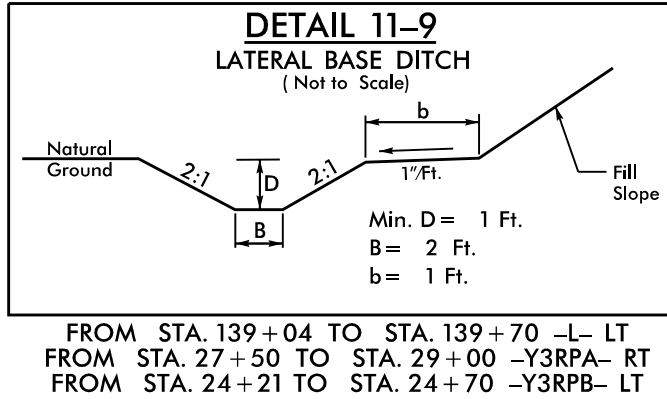
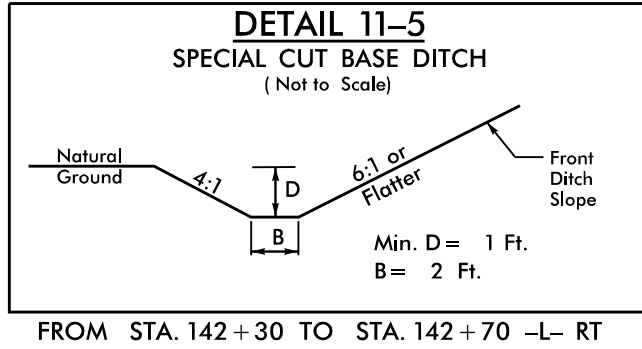
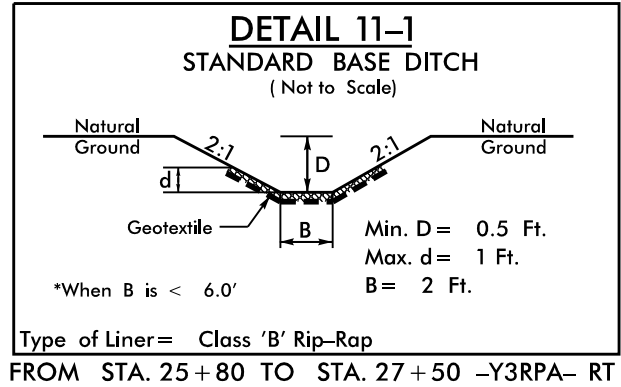




7/08



REVISIONS



**HDR** HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

**STV** STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                                  |                     |
|------------------------------------------------------------------|---------------------|
| PROJECT REFERENCE NO.                                            | SHEET NO.           |
| U-2579D, E & F                                                   | 2D-4                |
| RW SHEET NO.                                                     |                     |
| ROADWAY DESIGN ENGINEER                                          | HYDRAULICS ENGINEER |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |                     |
|                                                                  |                     |



STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

PARCEL INDEX SHEET

| PROJ. REFERENCE NO. | SHEET NO. |
|---------------------|-----------|
| U-2579D, E & F      | 3P-1      |

| PARCEL No. | SHEET No. | PROPERTY OWNER NAME                                     |
|------------|-----------|---------------------------------------------------------|
| 001        | 35        | DONALD G VADEN & KENNETH R VADEN                        |
| 002        | 35        | THURSTE LLC                                             |
| 003        | 35        | GEORGE H JONES                                          |
| 004        | 35        | THOMAS L. WHITE, JR.                                    |
| 005        | 35        | JACK M. KIGER AND WIFE BETTY S. KIGER                   |
| 006        | 35, 38    | GOLDIE S. SEYMORE                                       |
| 007        | 38        | BARBARA TAYLOR SNIPES                                   |
| 008        | 38        | WALTER H. KIMEL AND WIFE BONNIE KIMEL                   |
| 009        | 38        | KATIE WOOD GALYEAN                                      |
| 010        | 38        | MARTHA KIT WEBSTER BINKLEY                              |
| 011        | 38        | JANET B. CROMER                                         |
| 012        | 38        | SAMUAL P. BAKER AND WIFE SANDRA L. BAKER                |
| 013        | 38        | PATRICIA N. AYERS                                       |
| 014        | 5, 38     | GRACE S. ADKINS, HEIRS                                  |
| 015        | 38        | MARTHA KIT WEBSTER BINKLEY                              |
| 016        | 5         | LACY B. HEFTY                                           |
| 017        | 5         | ALLEN E. DUNNAGAN AND WIFE SHARON G. DUNNAGAN           |
| 018        | 5         | RAYMOND MABE, JR, AND WIFE WANDA MABE                   |
| 019        | 5         | ASHLEY N PRIDDY                                         |
| 020        | 5         | JOEL S FREEMAN                                          |
| 021        | 5         | SUSAN K ZILGAR                                          |
| 022        | 5         | ZIGLAR INVESTMENT CO                                    |
| 023        | 35        | WILLIAM DONALD HILL                                     |
| 024        | 35        | R. H. JOHNSON CONSTRUCTION COMPANY, INC.                |
| 025        | 5, 35     | NANCY K. ENGLAND                                        |
| 026        | 5, 35     | DALLAS TERRY ENGLAND G.D. ENGLAND HEIRS                 |
| 027        | 5         | THOMAS W. LUPER                                         |
| 028        | 5         | JOHN S. SLATE, JR. AND WIFE CAROLINE J. SLATE           |
| 029        | 5, 6      | PATRICK SHARPE                                          |
| 030        | 5         | THREE PROPERTIES, LLC                                   |
| 031        | 5         | AMANDA MICHELLE LAWSON                                  |
| 032        | 5         | LEON G. TAYLOR AND WIFE ELAINE Y. TAYLOR                |
| 033        | 5         | OLD TOWN TELEPHONE COMPANY                              |
| 034        | 5, 36     | D-2/DAIRIO, LLC                                         |
| 035        | 36        | LOIS S. PIKE HEIRS                                      |
| 036        | 36        | JEFFERY D. SPEAKS                                       |
| 037        | 36, 40    | RICHARD DAVID LANCASTER AND WIFE ELIZABETH M. LANCASTER |
| 038        | 36, 40    | DAVID J & YOSHIE M SHOUSE                               |
| 039        | 40        | CATHLEEN M VEGVARY                                      |
| 040        | 40        | WILLIAM E. COWPER                                       |
| 041        | 40        | HARRIETT EATON POWELL                                   |
| 042        | 40        | SUSAN G & RICHARD E HARTMAN JR                          |
| 043        | 40        | ERICA MAE HILL                                          |
| 044        | 40        | PERRY W. HEMMINGS AND WIFE MELBA H. HEMMINGS            |
| 045        | 5         | WILLIAM EUGENE HAMLIN AND WIFE LISA W. HAMLIN           |
| 046        | 6         | WILLIAM E HAMLIN                                        |
| 047        | 5,6       | WILLIAM E HAMLIN                                        |
| 048        | 5,6       | KENNETH J. WRAY AND WIFE WILMA WRAY                     |
| 049        | 36        | GRADY R. HAWKS AND WIFE MARY S. HAWKS                   |
| 050        | 36        | PARKER CHEVROLET, INC.                                  |
| 051        | 36        | THE FIRST BAPTIST CHURCH OF STANLEYVILLE                |
| 052        | 36        | DORIS & RICHARD LAWSON                                  |
| 053        | 36        | MELISSA GAIL WILSON TERRY DALE LAWSON                   |
| 054        | 36        | ELSIE MOSS & ROBERT RAY CREWS SR.                       |
| 055        | 36        | ROGER L. COOK                                           |
| 056        | 5         | CAROL D. COX, LLC                                       |
| 057        | 5         | MELISSA G WILSON & MARK E LAWSON                        |
| 058        | 5         | ROBERT L. SASSER AND WIFE REBECCA A. SASSER             |
| 059        | 5         | FREDERICK S. COOKE AND WIFE BEVERLIE K. COOKE           |
| 060        | 39        | V. E. VEACH                                             |

| PARCEL No. | SHEET No. | PROPERTY OWNER NAME                                                  |
|------------|-----------|----------------------------------------------------------------------|
| 061        | 39        | ROGER A. JOLLY AND WIFE GAYLE T. JOLLY                               |
| 062        | 4         | MELROSE R SMITH HEIRS                                                |
| 062A       | 4,5       | KELLY BLUE, LLC                                                      |
| 063        | 4         | REECE RENTAL PROPERTIES LLC                                          |
| 064        | 4         | AVA JOY CECIL                                                        |
| 065        | 4         | JERRY WAYNE TRIVETTE AND WIFE SADIE J. TRIVETTE                      |
| 65A        | 4         | REGINA M HUTSON                                                      |
| 65B        | 4         | MELISSA G WILSON & MARK E LAWSON                                     |
| 066        | 39        | SHIRLEY T. SMITH AND HUSBAND TOMMY L. SMITH                          |
| 067        | 39        | MICHAEL WAYNE MOSER AND WIFE TAMMY H. MOSER                          |
| 068        | 39        | PATRICK HENRY O'CONNER, JR.                                          |
| 069        | 36,39     | DEREK LEE LAWSON RICHARD BRET LAWSON                                 |
| 070        | 36        | RICHARD L. LAWSON AND WIFE DORIS LAWSON                              |
| 071        | 36        | MELISSA GAIL LAWSON AND HUSBAND TERRY DALE LAWSON                    |
| 072        | 36        | LARRY WAYNE EUBANKS AND WIFE SHANNON L. EUBANKS                      |
| 073        | 39        | MELISSA GAIL LAWSON AND HUSBAND TERRY DALE LAWSON                    |
| 074        | 36        | FIRST BAPTIST CHURCH OF STANLEYVILLE                                 |
| 075        | 6,7,41    | DANIEL JOHN WILLIARD                                                 |
| 075        | 6,7,41    | GARY D. CLODFELTER AND WIFE TONYA C. CLODFELTER                      |
| 075A       | 6,7,41    | KIMBERLY M. CUDA                                                     |
| 076        | 6,7       | CAROL SPARKS PERRYMAN HEIRS                                          |
| 077        | 6,7,42    | THOMAS R. STYERS, JR. AND WIFE JANET GROCE STYERS                    |
| 078        | 42        | IGLESIA BAUTISTA EI CALVARIO & IGLESIA BAUTISTA EI CALVARIO TRUSTEES |
| 079        | 7,8,42    | ALMA C. CLAYTON TRUST                                                |
| 081        | 41        | MARIE M. MCHONE                                                      |
| 082        | 7,41      | WARREN RENWICK AND WIFE PATRICIA P. WARREN                           |
| 083        | 8,9       | NOEL WAYNE CANNOY, JR AND WIFE BARBERA J. CANNOY.                    |
| 084        | 43        | NO NAME                                                              |
| 085        | 43        | KENNETH A. & NORMA BLAKELEY                                          |
| 086        | 43        | MARGIE F. GORDY & MARY R. NEELY                                      |
| 087        | 43        | CARL R. & SALLIE L. CROUSE                                           |
| 088        | 43        | THOMAS J. TURNER                                                     |
| 089        | 43        | RANJI M. PATEL                                                       |
| 090        | 43        | MELANIE V. WILLIAMS                                                  |
| 091        | 43        | CURTIS BOWEN                                                         |
| 092        | 43        | DAHNA R. MASSEY YOUNG & DIANA L. MASSEY ROSS                         |
| 093        | 43        | EMMET M. OGBURN                                                      |
| 094        | 43        | NANCY C. CARTER                                                      |
| 095        | 11,43     | LILA L. COATS                                                        |
| 096        | 11        | BILLY J. NUCKOLLS                                                    |
| 097        | 11        | BERNICE D. BYRD                                                      |
| 098        | 11        | THURMAN W. GARVEY, JR                                                |
| 099        | 11        | CARLOS A. & ETHEL Y. BONILLA                                         |
| 100        | 11        | BONNIE L. YOUNGER                                                    |
| 101        | 11        | TAMARA JO HILL                                                       |
| 102        | 11        | JAMES W. BEARD AND WIFE BOBBIE BEARD                                 |
| 103        | 11        | RONNIE L. MERRITT                                                    |
| 104        | 11        | CITY OF WINSTON-SALEM                                                |
| 105        | 11,12     | FRANCES HENDRIX                                                      |
| 106        | 44        | ROBERT W. & JOAN WOOD                                                |
| 107        | 44        | JAMES W. & ANN D. LAWSON                                             |
| 108        | 44        | JAN R. LITTELL                                                       |
| 109        | 44        | BARRY D. & DAWN S. HATCHER                                           |
| 110        | 44        | PAMELA H. BOWLES                                                     |
| 111        | 44        | NANCY W. DOWNING                                                     |
| 112        | 44        | GEORGE D. & SUSAN W. CARTER                                          |
| 113        | 44        | HERMAN D. & CARLEEN P. MARTIN                                        |
| 114        | 44        | CLAUDE A. WHITTINGTON                                                |
| 115        | 44        | GEORGE C. ELLIS, SR                                                  |
| 116        | 44        | JERRY L. & LILLIE I. McMILLIAN                                       |



STATE OF NORTH CAROLINA  
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PARCEL INDEX SHEET

| PROJ. REFERENCE NO. | SHEET NO. |
|---------------------|-----------|
| U-2579D, E & F      | 3P-2      |

| PARCEL No. | SHEET No. | PROPERTY OWNER NAME                           |
|------------|-----------|-----------------------------------------------|
| 117        | 11        | GARLAND J. GLASCOE                            |
| 118        | 11        | JASON E. SMITH                                |
| 119        | 12,46     | TIMOTHY R. LAUCK                              |
| 120        | 12,46     | MELVIN H. COOK                                |
| 121        | 12        | MAYE A. BOLES                                 |
| 122        | 46        | DEWEY JOE MEADOWS, JR.                        |
| 123        | 12,13     | RAY E. & NANNIE S. SMITH                      |
| 124        | 12,13,48  | JAMES W. SMITH                                |
| 125        | 13,46     | CHURCH REAL ESTATE INVESTMENTS, LLC           |
| 126        | 13,14,48  | BILL J. & NAOMI CROSIER                       |
| 127        | 13,14,48  | PHIL MONEY                                    |
| 128        | 13,14     | BETTY E. KOEHN                                |
| 129        | 12        | R.V. BOWERS                                   |
| 130        | 44        | C.W. MYERS TRADING POST, INC                  |
| 131        | 9,10      | HUBBARD REALTY OF WINSTON-SALEM, INC          |
| 132        | 48        | INEZ TUTTLE                                   |
| 133        | 48        | DEANNA H. PARNELL                             |
| 134        | 48        | CHARLES & SABRINA ATCHLEY                     |
| 135        | 48        | ERNESTO CORTES                                |
| 136        | 48        | MARGARET C. SIMMONS, HEIRS                    |
| 137        | 14,48     | LINDA B. & EDDIE W. CULLER                    |
| 138        | 14,48     | ERIC DAVIS                                    |
| 139        | 14,48     | XOB C. VANG & YENG YANG                       |
| 140        | 14        | WILLIAM B. MARTIN                             |
| 141        | 14,47     | JUNIOR R. LINEBERRY                           |
| 142        | 47        | ARLENE EASTER DUDLEY                          |
| 143        | 47        | BOBBIE B. MORRIS                              |
| 144        | 47        | RANDY P. HULL and, TRAVIS D. HULL             |
| 145        | 47        | PHYLLIS ROGERS                                |
| 146        | 47        | PATRICIA A.W. ESTES                           |
| 147        | 47        | IH2 PROPERTY NORTHCAROLINA LP                 |
| 148        | 15,16     | SARAH S. ROBERTS                              |
| 150        | 15        | DANNY L. & DARLA S. LOFLIN                    |
| 151        | 16        | ALBERTA D. HAYES                              |
| 152        | 18        | CARL MARSHALL                                 |
| 153        | 18,19     | WILLIAM G. BENNETT                            |
| 154        | 18        | SAMUAL R. & EMMA J. HURSH                     |
| 155        | 19        | RITA S. FRINZI                                |
| 156        | 19        | HERMAN W. BENNETT                             |
| 157        | 19        | PATRICIA J. BENNETT & WILLIAM G. BENNETT      |
| 158        | 19        | JOHN BAKER PLUMBING AND UTILITIES, INC.       |
| 159        | 19        | DONALD L. CUMMINGS                            |
| 160        | 19        | GODFREY REAL ESTATE, LLC                      |
| 161        | 19        | GWENDOLYN C. RICHARDSON                       |
| 162        | 18,19     | DIANE W. LAWSON                               |
| 163        | 19        | PERRY L. JONES                                |
| 164        | 19        | PHILLIP E. HOLT                               |
| 165        | 50        | LINDA LOU RUSH WILLIAMS & RICHARD L. WILLIAMS |
| 166        | 19,50     | SAMUEL A. & LYNDA D. GILLEY                   |
| 167        | 19,50     | RANDY L. PRIDDY                               |
| 168        | 19        | THOMAS LAWSON                                 |
| 169        | 19        | LINDA N. CARROLL                              |
| 170        | 19        | DAVID C.& DAPHINE B. SAMS                     |
| 171        | 19        | CURTIS M. BEAVER                              |
| 172        | 19        | LIGON ELECTRIC SUPPLY CO. INC.                |
| 173        | 19        | SILAS C. COOK                                 |
| 174        | 19        | CHARLES R. & JOY S. BEAVER                    |
| 175        | 19        | MARK EDWIN & MELISSA GAIL LAWSON              |
| 176        | 49        | MARGARET M. & CORNELIUS B. HANRAHAN           |
| 177        | 49        | BOBBY L. & SANDRA ARMSTRONG                   |

| PARCEL No. | SHEET No. | PROPERTY OWNER NAME                                 |
|------------|-----------|-----------------------------------------------------|
| 178        | 49        | GWENDOLYN RICHIEZ                                   |
| 179        | 49        | MARY M. & WILLIAM HOWELL, JR.                       |
| 179A       | 49        | EVERETTE L. MCGEE HEIRS                             |
| 180        | 19,20     | VICKY S. & LARRY C. BOTTOMS                         |
| 181        | 20        | ROBERT D. HOSKINS                                   |
| 182        | 20        | TIMOTHY WILLIAM & CHERYL SNYDER DINKINS             |
| 183        | 20        | PAUL D. & WANDA JONES                               |
| 184        | 20        | NORTHWEST MINISTRY SPECIAL INTEREST CENTER          |
| 185        | 51T       | STEPHEN L. & VICKIE M. SNEAD                        |
| 186        | 20        | LARRY H. & BETTY WELCH                              |
| 187        | 20        | VELNER A. SMITH HEIRS                               |
| 188        | 20,21     | DARYL W. & MARY G. CHAMBERLAIN                      |
| 189        | 24        | FRANKLIN R. & DOROTHY D. SMITH                      |
| 190        | 24,25     | GARY W. & PATRICIA PEGRAM                           |
| 190A       | 25,52     | CALVARY HILL CHURCH OF GREATER DELIVERANCE          |
| 191        | 24,25     | WELDON G. & CHERYL W. BRANNOCK                      |
| 191A       | 24        | CORNERSTONE HOME CONSTRUCTION                       |
| 192        | 24,25     | MICHAEL S. HAYNES & JAMES H. SMITH                  |
| 193        | 25        | JOHN MARTIN & BRITTANY LEIGH STOLTZ                 |
| 194        | 25,52     | WILLIAM E. & KAREN M. STOLTZ                        |
| 195        | 26        | JENIFER S. HAIRSTON                                 |
| 196        | 26,27,54  | AHMAD ABDULL DEEB & SIHAM I. RAHHAL                 |
| 197        | 27        | RANDY E. & VALINDA SIZEMORE                         |
| 198        | 25        | CEDAR GROUP, LLC                                    |
| 199        | 25        | HEATHER RIVERA                                      |
| 200        | 27        | LISA D. LANGLEY & HELEN K. DEAN                     |
| 201        | 27        | LISA D. LANGLEY & HELEN K. DEAN                     |
| 201A       | 27,28,54  | HB HOLDINGS GROUP, LLC                              |
| 202        | 53        | PAUL R. ELLIS                                       |
| 203        | 28,53     | DB 1488 PG 1025                                     |
| 204        | 28,29     | JULIA S. ELLIS                                      |
| 205        | 28        | SHERRELL D. WHICKER                                 |
| 206        | 28,54     | SHIRLEY W. NOAH                                     |
| 206A       | 28,29,54  | ERIC & CHARMAINE GAINES                             |
| 206B       | 29        | X                                                   |
| 206C       | 29        | X1                                                  |
| 207        | 28,55     | X2                                                  |
| 208        | 28,29,55  | X3                                                  |
| 209        | 28,29,55  | X4                                                  |
| 210        | 29,56     | LUTHERAN HOME WINSTON-SALEM PROPERTY, INC.          |
| 211        | 26,27     | CURTIS R. & BETTY S. COX                            |
| 212        | 4         | CAROLINA SIGNS & LIGHTING INC                       |
| 213        | 35        | BUNCE INVESTMENTS, LLC                              |
| 214        | 35        | JOE BILL NAYLOR, JR. AND WIFE VERONICA EAST NAYLOR  |
| 215        | 35        | MUZAFFAR BUNCLAWALA                                 |
| 216        | 36        | MICHELLE T. CHILTON                                 |
| 217        | 36        | 6253 UNIVERSITY PARKWAY LLC                         |
| 218        | 36        | OPAL D. MARION                                      |
| 219        | 36        | MICHAEL T. CLAY AND WIFE PATSY H. CLAY              |
| 220        | 36,37     | STANLEYVILLE, LLC                                   |
| 221        | 36,37     | JAMES H. GILLY, JR.                                 |
| 222        | 37        | ADVANCE STORES CO. INC.                             |
| 223        | 5,38      | SAMUEL & SANDRA BAKER                               |
| 224        | 44        | LAZARO FLORES-CASTAN & LORENZA S. HERNADEZ          |
| 225        | 45        | BETHANY BAPTIST CHURCH OF WINSTON, INC.             |
| 226        | 11,46     | RUTH S. DOWELL and husband, BENJAMIN F. DOWELL, JR. |
| 227        | 12        | LOUISE B. WELBORN                                   |
| 228        | 48        | BINH NGUYEN                                         |
| 230        | 19,49     | JOHN E. SMITH                                       |
| 231        | 20,51B    | JOSEPH H. & SHERRY DAVIS                            |

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS

# PARCEL INDEX SHEET

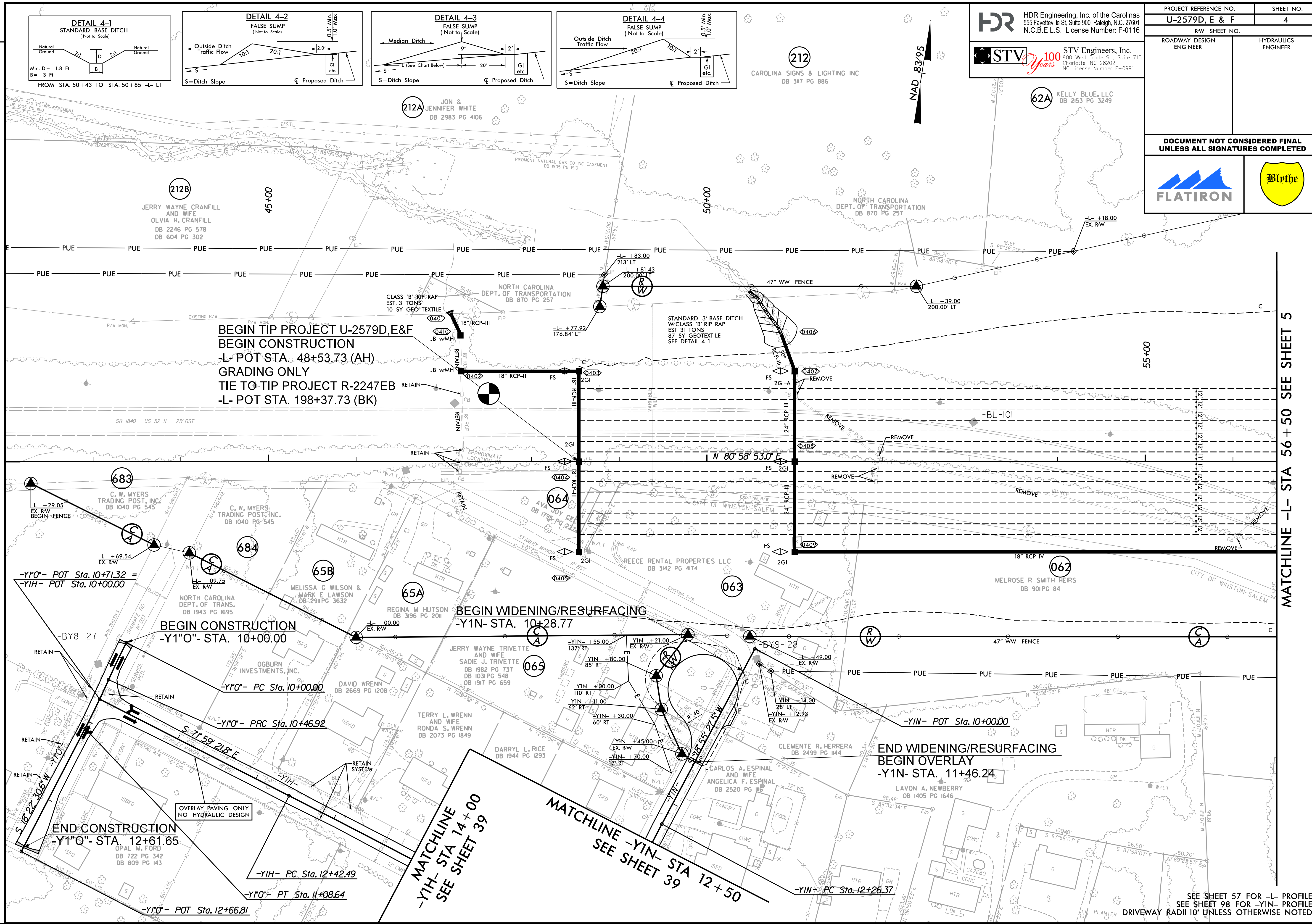
|                            |                  |
|----------------------------|------------------|
| <b>PROJ. REFERENCE NO.</b> | <b>SHEET NO.</b> |
| U-2579D, E & F             | 3P-3             |

| PARCEL No. | SHEET No. | PROPERTY OWNER NAME                              |
|------------|-----------|--------------------------------------------------|
| 232        | 25        | RAYMOND L. & NANCY S. GOSNELL                    |
| 233        | 25,52     | SUE P. WALLS HEIRS                               |
| 234        | 52        | JAMES E. LOWE & ANN W. LOWE                      |
| 235        | 28,54     | JEFFREY S. NOAH                                  |
| 601        | 27,28     | BILLIE JOE & CAROLYN N. BULLINS                  |
| 602        | 25        | DELORIS O. WATKINS                               |
| 603        | 27,53     | CARMIE J. PAUL                                   |
| 604        | 20,51B    | JOSEPH H. & SHERRY DAVIS                         |
| 605        | 19,20     | FRANK J. & CAROL GIRRARD                         |
| 606        | 20        | JEFFREY S. KISER, TRUSTEE                        |
| 608        | 25,26     | C.B. WESTMORELAND HEIRS                          |
| 609        | 27,53     | JANET L. SNOW                                    |
| 610        | 25        | JOHN M. & GAYLE L. CUNNINGHAM                    |
| 611        | 25        | MARK & LINDA HOLT                                |
| 613        | 19        | STEPHEN D. NELSON                                |
| 614        | 11,43     | EARL B. HIATT, JR                                |
| 615        | 47        | MICHAEL D. FULK                                  |
| 615A       | 9,10      | HUBBARD REALITY OF WINSTON-SALEM, INC            |
| 616        | 16,17     | PROVIDENCE MORAVIAN CHURCH                       |
| 617        | 19        | PAUL DAVIDSON BLANCHARD                          |
| 618        | 47        | FRANK R. DORN                                    |
| 619        | 47        | JARVIS R. FULP                                   |
| 620        | 19        | MARTY J. & REBECCA A. GUFFEY                     |
| 621        | 47        | CHRISTOPHER R. MITCHELL                          |
| 622        | 47        | KEN A. BLACKFORD                                 |
| 623        | 19        | CHARLES J. & BRENDA G. BENTLEY                   |
| 624        | 44,45     | BETHANY BAPTIST CHURCH                           |
| 625        | 18,19     | GLENN E. THRUSH                                  |
| 626        | 19        | HAROLD L. & MARGARET M. TUCKER                   |
| 627        | 19        | LINDA A. SMITH                                   |
| 628        | 17,18     | WILDON C. FLAKE, JR.                             |
| 629        | 44        | ROBERT N. & TERESA Y. BIAS                       |
| 630        | 47        | DARRELL J. & AMBER C. ROGERS                     |
| 631        | 43        | HOWARD L. & OZIAH HAWKS                          |
| 632        | 11,43     | ASHLEY R. STEWART                                |
| 633        | 44        | SHIRLEY T. COOK                                  |
| 633A       | 11,44     | SHIRLEY T. COOK                                  |
| 633B       | 11        | SHIRLEY T. COOK                                  |
| 634        | 11,12     | SAM B. & MILDRED G. SMITH                        |
| 634A       | 11        | SAM B. & MILDRED G. SMITH                        |
| 634B       | 11        | SAM B. SMITH                                     |
| 635        | 7,8,9     | ALMA C. CLAYTON TRUST                            |
| 636        | 11,44     | HENRY A. & REBECCA S. LEWIS                      |
| 637        | 5         | JAMES TURPIN MARJORIE T. HUTCHENS                |
| 638        | 36        | THOMAS & NANCY GRIFFIN                           |
| 639        | 5         | HARRY L. LOWRY AND WIFE SANDRA P. LOWRY          |
| 640        | 38        | LINDA G SMITH                                    |
| 641        | 11        | JOHN E. SUMNER                                   |
| 642        | 5         | GEORGE DA SILVA                                  |
| 643        | 11,43     | LB3,LLC                                          |
| 643A       | 11,43     | HILO ENTERPRISE LLC & RANDY D. SAPP              |
| 644        | 11        | TABITHA L. BEANE                                 |
| 645        | 5         | MARILYN E. WEBB                                  |
| 646        | 39        | PAUL R. KAUTZ AND WIFE CHRISTINE B. SHOUSE KAUTZ |
| 646A       | 5         | CHRISTINE B. SHOUSE KAUTZ                        |
| 646B       | 5         | CHRISTINE B. SHOUSE KAUTZ                        |
| 646C       | 5         | CHRISTINE BLAYLOCK SHOUSE                        |
| 647        | 6         | DANIEL JOHN WILLIARD                             |
| 648        | 36,39     | HOWARD C. CREWS AND WIFE RACHEL G. CREWS         |

[illegible]



MATCHLINE -L- STA 42 + 00 SEE SHEET 4A



MATCHLINE -Y1H- STA 14 + 00  
SEE SHEET 39

MATCHLINE -Y1N- STA 12 + 50  
SEE SHEET 39

SEE SHEET 57 FOR -L- PROFILE  
SEE SHEET 98 FOR -Y1N- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

|                                                                  |  |                       |  |
|------------------------------------------------------------------|--|-----------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>               |  | SHEET NO.<br><b>4</b> |  |
| RW SHEET NO.                                                     |  | HYDRAULICS ENGINEER   |  |
| ROADWAY DESIGN ENGINEER                                          |  | HYDRAULICS ENGINEER   |  |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |  |                       |  |
|                                                                  |  |                       |  |

**HDR** Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

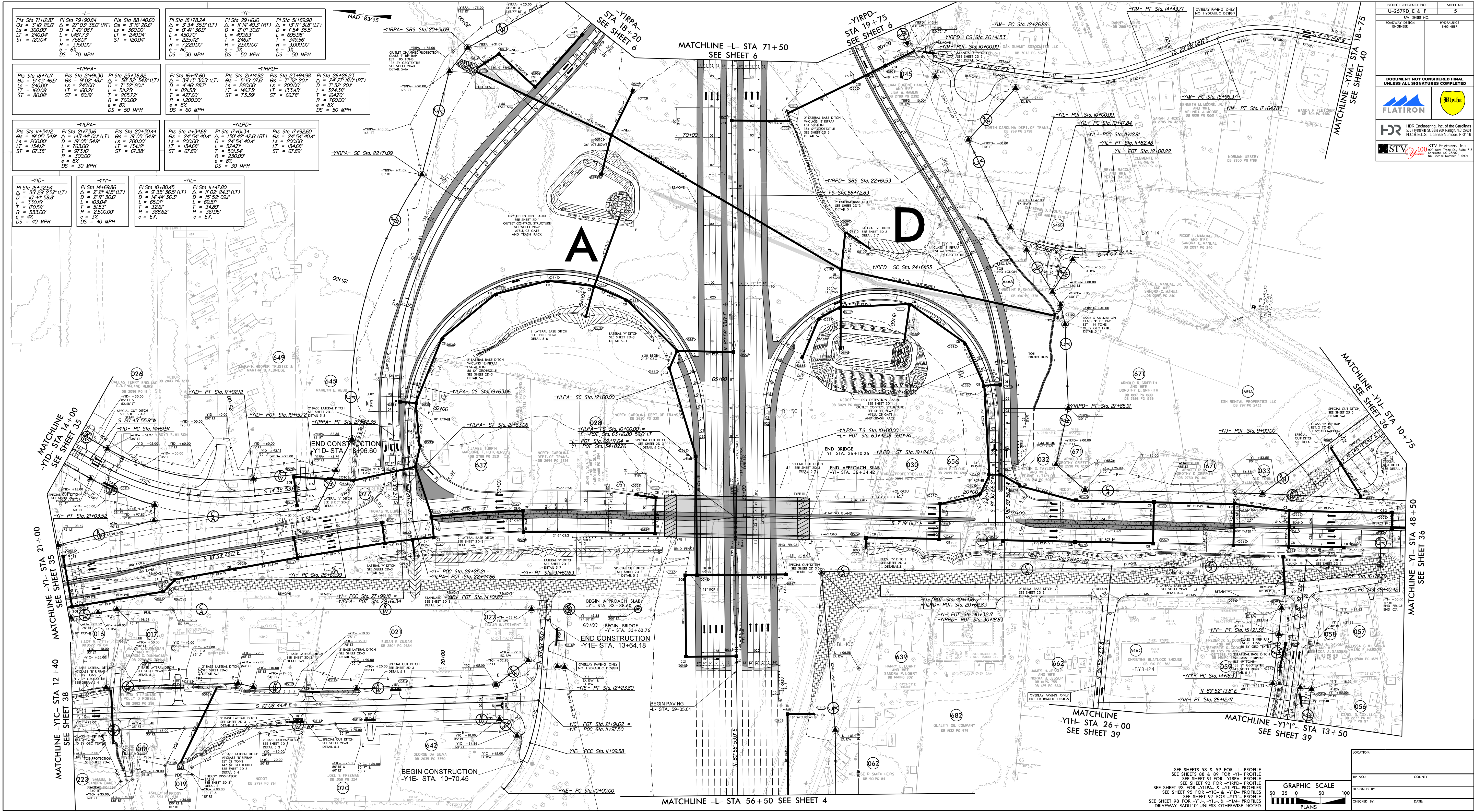
**STV** 100 Years  
STV Engineers, Inc.  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

**CAROLINA SIGNS & LIGHTING INC**  
DB 3117 PG 886

**KELLY BLUE, LLC**  
DB 2153 PG 3249

NAD 83 95





|                                                                                                                     |                                                                                                                           |                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>-L-</b><br>Sta 71+12.87<br>Δ = 3° 16' 26.6"<br>L = 360.00<br>L = 240.04<br>ST = 1200.4<br>e = 6.0<br>DS = 70 MPH | <b>-YI-</b><br>Sta 79+90.84<br>Δ = 2° 03' 30.0" (RT)<br>L = 360.00<br>L = 240.04<br>ST = 1200.4<br>e = 6.0<br>DS = 70 MPH | <b>-YI-</b><br>Sta 88+40.60<br>Δ = 3° 16' 26.6"<br>L = 360.00<br>L = 240.04<br>ST = 1200.4<br>e = 6.0<br>DS = 70 MPH |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|

|                                                                                                                        |                                                                                                                         |                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YIRPA-</b><br>Sta 18+71.07<br>Δ = 5° 41' 45.5"<br>L = 240.00<br>L = 160.00<br>ST = 80.00<br>e = 6.0<br>DS = 50 MPH | <b>-YIRPD-</b><br>Sta 21+90.84<br>Δ = 3° 16' 26.6"<br>L = 360.00<br>L = 240.04<br>ST = 1200.4<br>e = 6.0<br>DS = 50 MPH | <b>-YIRPA-</b><br>Sta 25+36.82<br>Δ = 3° 16' 26.6"<br>L = 360.00<br>L = 240.04<br>ST = 1200.4<br>e = 6.0<br>DS = 50 MPH |
|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                         |                                                                                                                         |                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YILPA-</b><br>Sta 11+34.12<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPD-</b><br>Sta 21+73.16<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPA-</b><br>Sta 21+30.44<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                        |                                                                                                                      |                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>-YID-</b><br>Sta 14+32.54<br>Δ = 10° 44' 58.8"<br>L = 330.05<br>L = 100.56<br>ST = 533.00<br>e = 4.0<br>DS = 40 MPH | <b>-YIT-</b><br>Sta 14+63.86<br>Δ = 2° 27' 30.5"<br>L = 63.04<br>L = 100.56<br>ST = 250.00<br>e = 4.0<br>DS = 40 MPH | <b>-YIT-</b><br>Sta 14+80.45<br>Δ = 2° 27' 30.5"<br>L = 63.04<br>L = 100.56<br>ST = 250.00<br>e = 4.0<br>DS = 40 MPH |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|

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|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YILPA-</b><br>Sta 11+34.12<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPD-</b><br>Sta 21+73.16<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPA-</b><br>Sta 21+30.44<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH |
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|                                                                                                                         |                                                                                                                         |                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YILPA-</b><br>Sta 11+34.12<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPD-</b><br>Sta 21+73.16<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPA-</b><br>Sta 21+30.44<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH |
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|                                                                                                                         |                                                                                                                         |                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YILPA-</b><br>Sta 11+34.12<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPD-</b><br>Sta 21+73.16<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPA-</b><br>Sta 21+30.44<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                         |                                                                                                                         |                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YILPA-</b><br>Sta 11+34.12<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPD-</b><br>Sta 21+73.16<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPA-</b><br>Sta 21+30.44<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                         |                                                                                                                         |                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>-YILPA-</b><br>Sta 11+34.12<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPD-</b><br>Sta 21+73.16<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH | <b>-YILPA-</b><br>Sta 21+30.44<br>Δ = 19° 05' 54.9"<br>L = 200.00<br>L = 134.12<br>ST = 67.38<br>e = 6.0<br>DS = 30 MPH |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|

PROJECT REFERENCE NO. **LI-2579D, E & F**

SHEET NO. **5**

ROADWAY DESIGN

HYDRAULICS ENGINEER

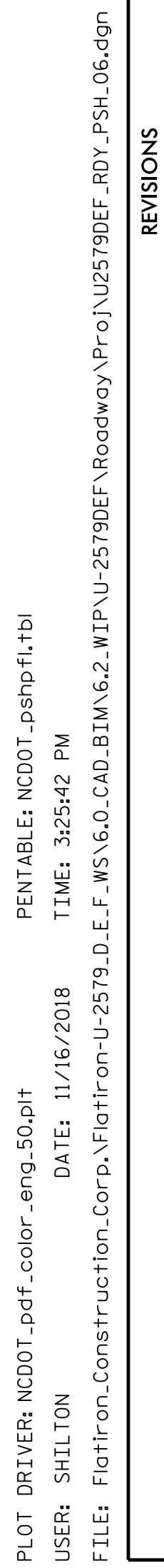
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

HER Engineering, Inc. of the Carolinas  
5575 Peachtree St. Suite 300, Raleigh, NC 27603  
N.C.B.E.L.S. License Number: F-0116

STV Engineers, Inc.  
800 West 10th St., Suite 715  
Durham, NC 27603  
N.C. License Number: F-0991

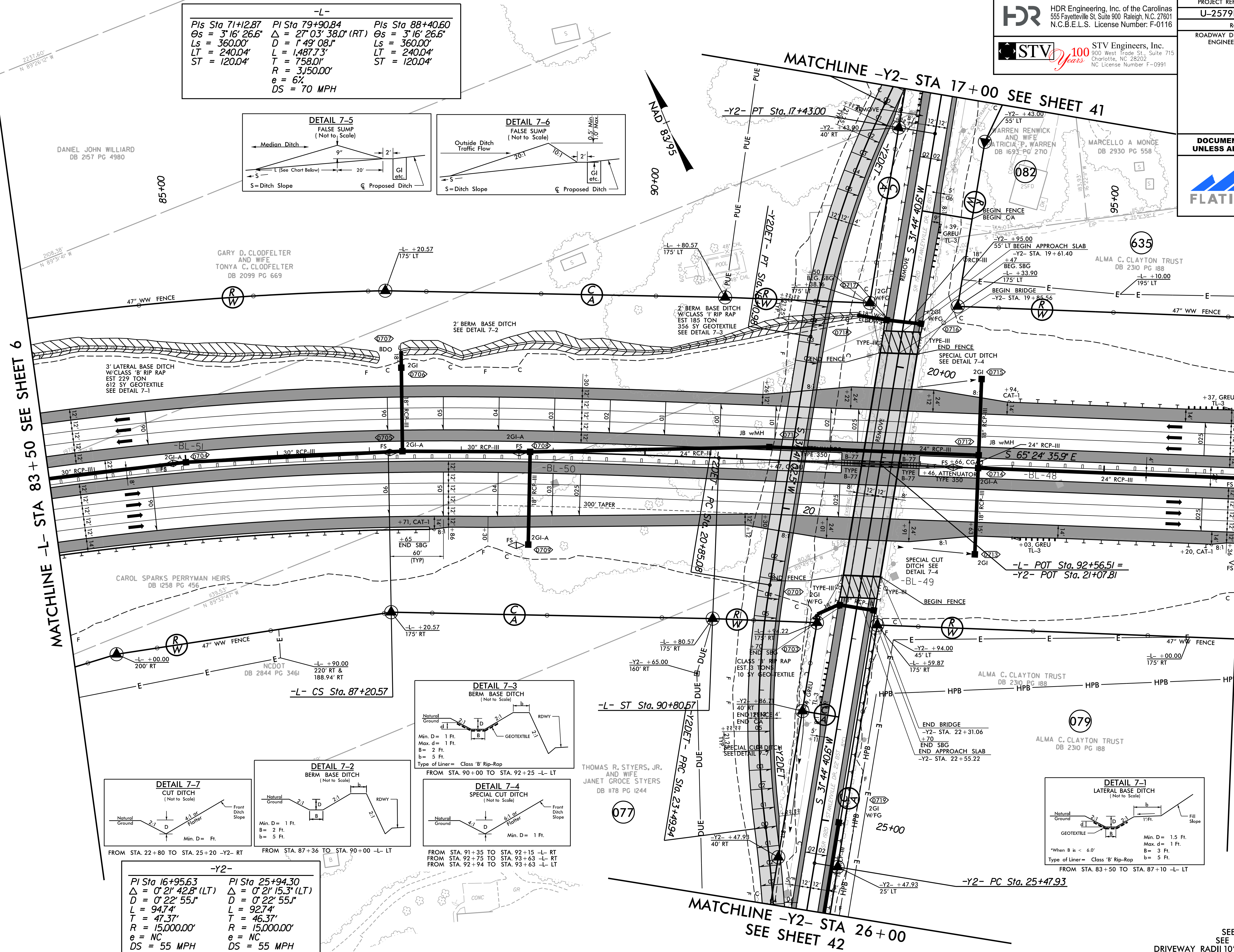
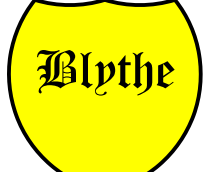
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PLOT: D:\PLOT\NCDOT\100441.dwg





SEE SHEETS 59 & 60 FOR -L- PROFILE  
SEE SHEET 91 FOR -Y1RPA- PROFILE  
SEE SHEET 92 FOR -Y1RPD- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED





SEE SHEET 60 FOR -L- PROFILE  
SEE SHEET 99 FOR -Y2- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED



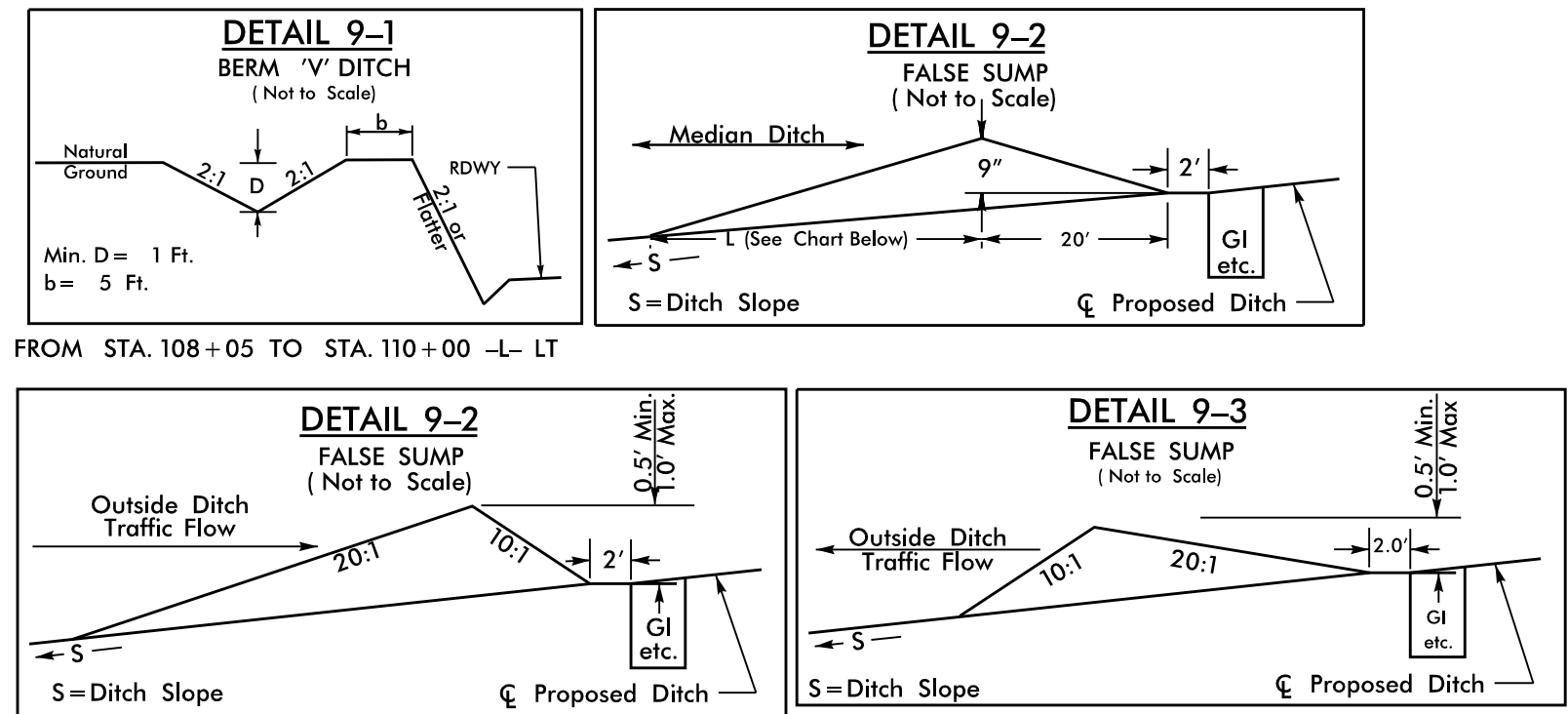




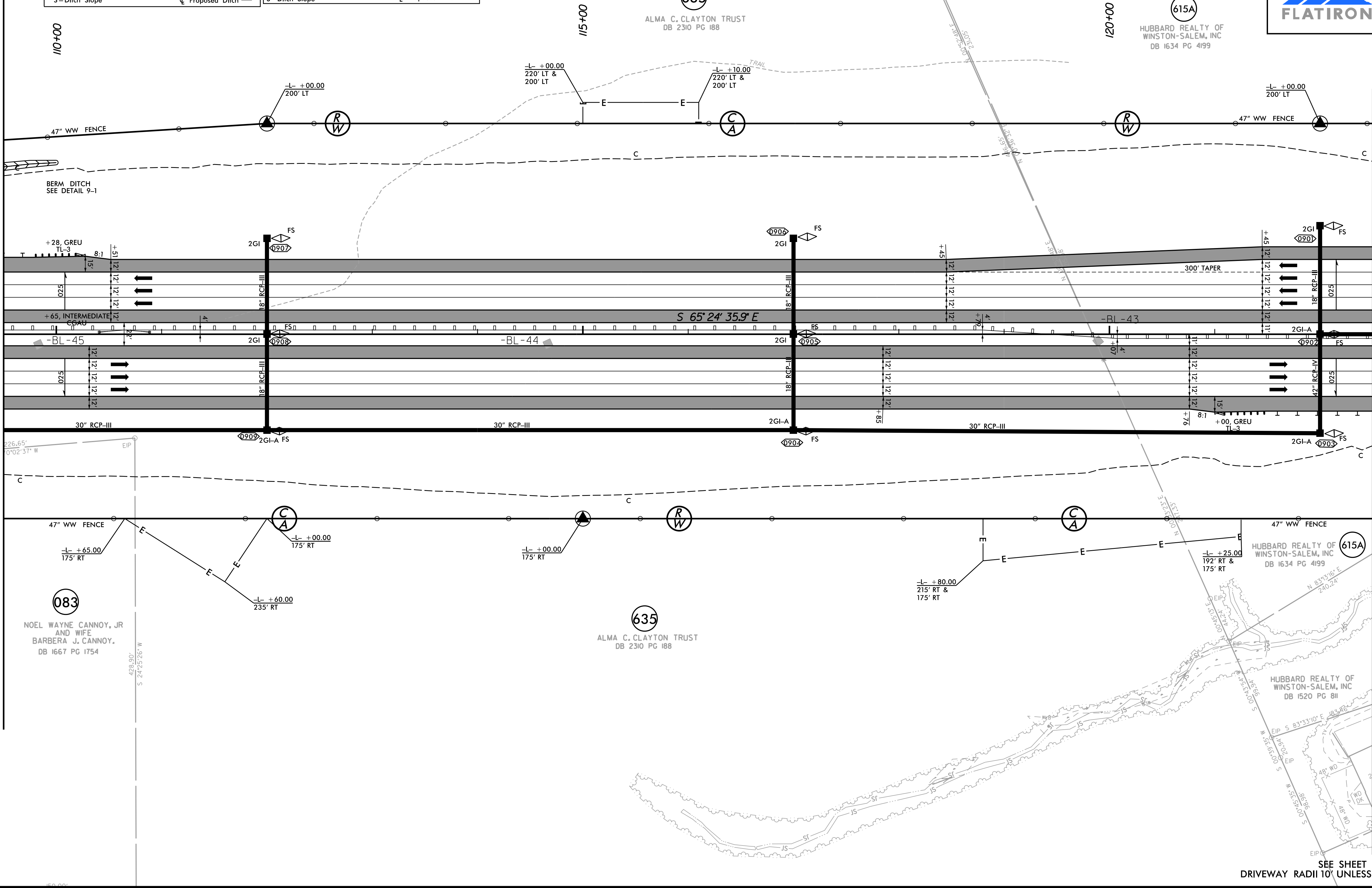
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DATE: 11/16/2018

REVISIONS

MATCHLINE -L- STA 109 + 50 SEE SHEET 8



FROM STA. 108+05 TO STA. 110+00 -L- LT



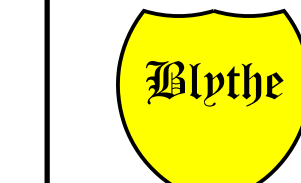
MATCHLINE -L- STA 122 + 50 SEE SHEET 10



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900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

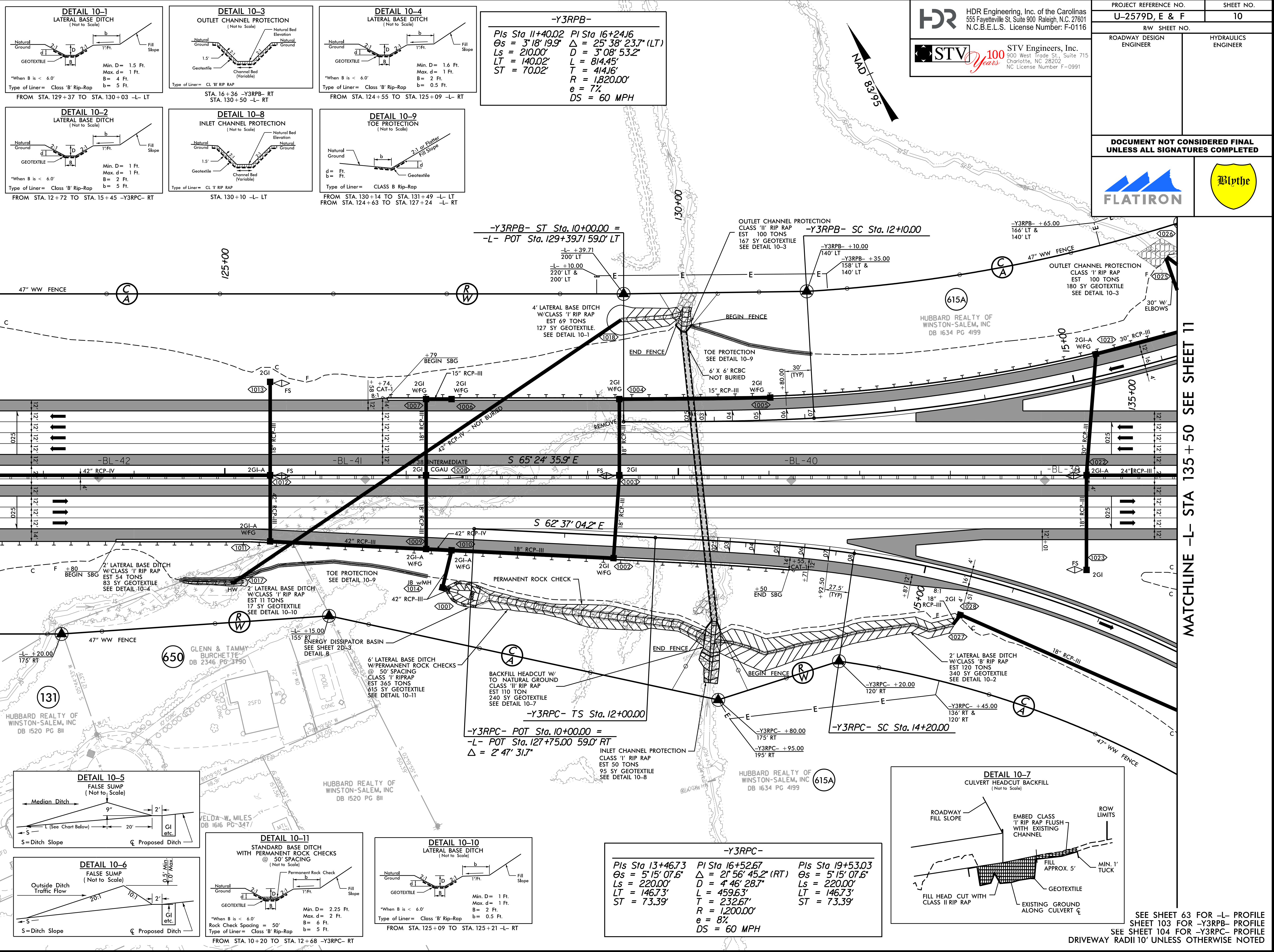
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| PROJECT REFERENCE NO.                                                                                  |  | SHEET NO.                                                                                            |
| U-2579D, E & F                                                                                         |  | 9                                                                                                    |
| RW SHEET NO.                                                                                           |  |                                                                                                      |
| ROADWAY DESIGN<br>ENGINEER                                                                             |  | HYDRAULICS<br>ENGINEER                                                                               |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b>                               |  |                                                                                                      |
| <br><b>FLATIRON</b> |  | <br><b>Blythe</b> |

SEE SHEET 62 FOR -L- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

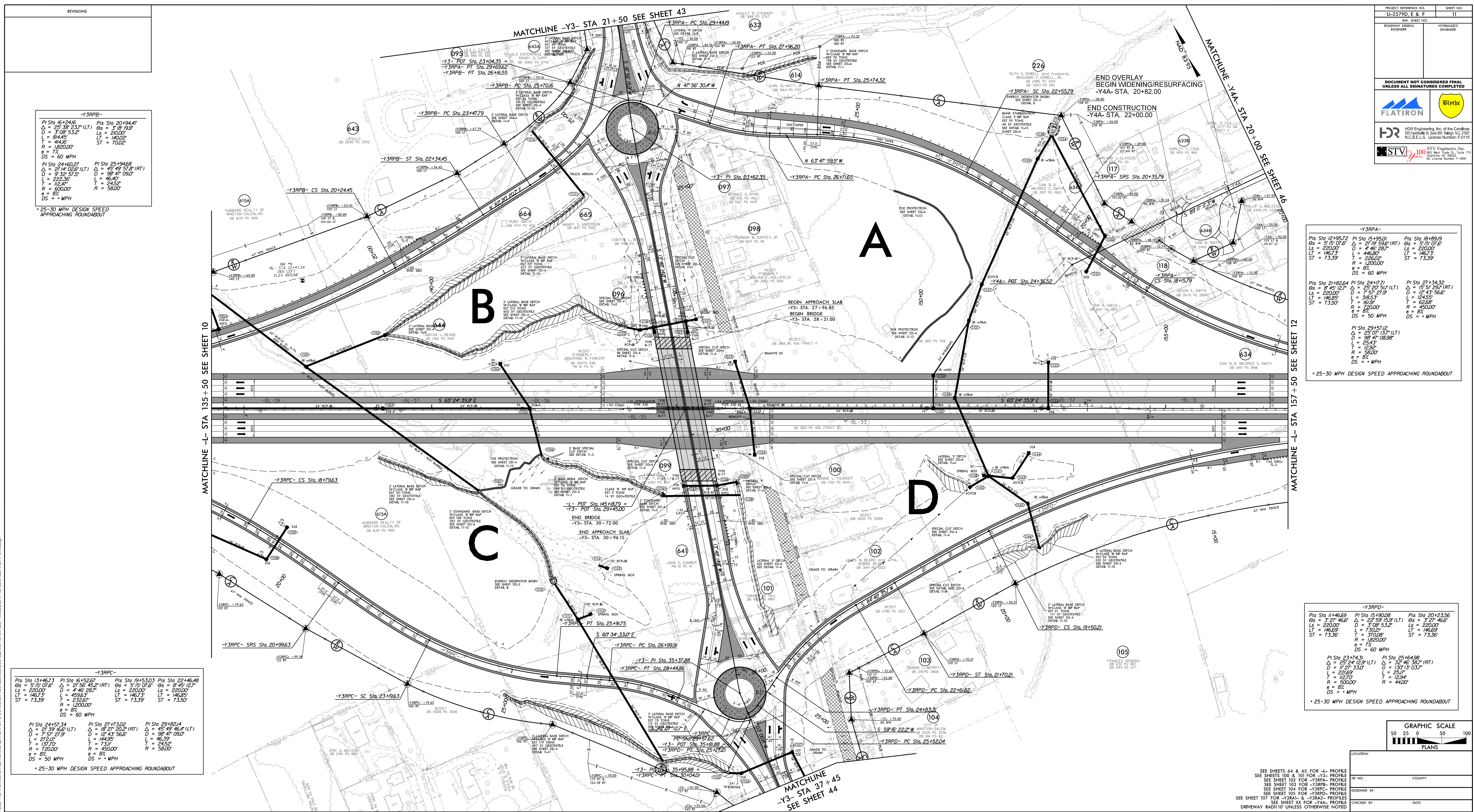


REVISIONS

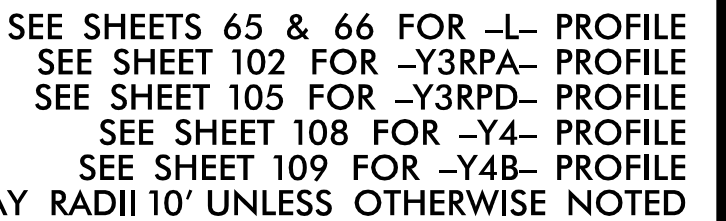
MATCHLINE -L- STA 122 + 50 SEE SHEET 9





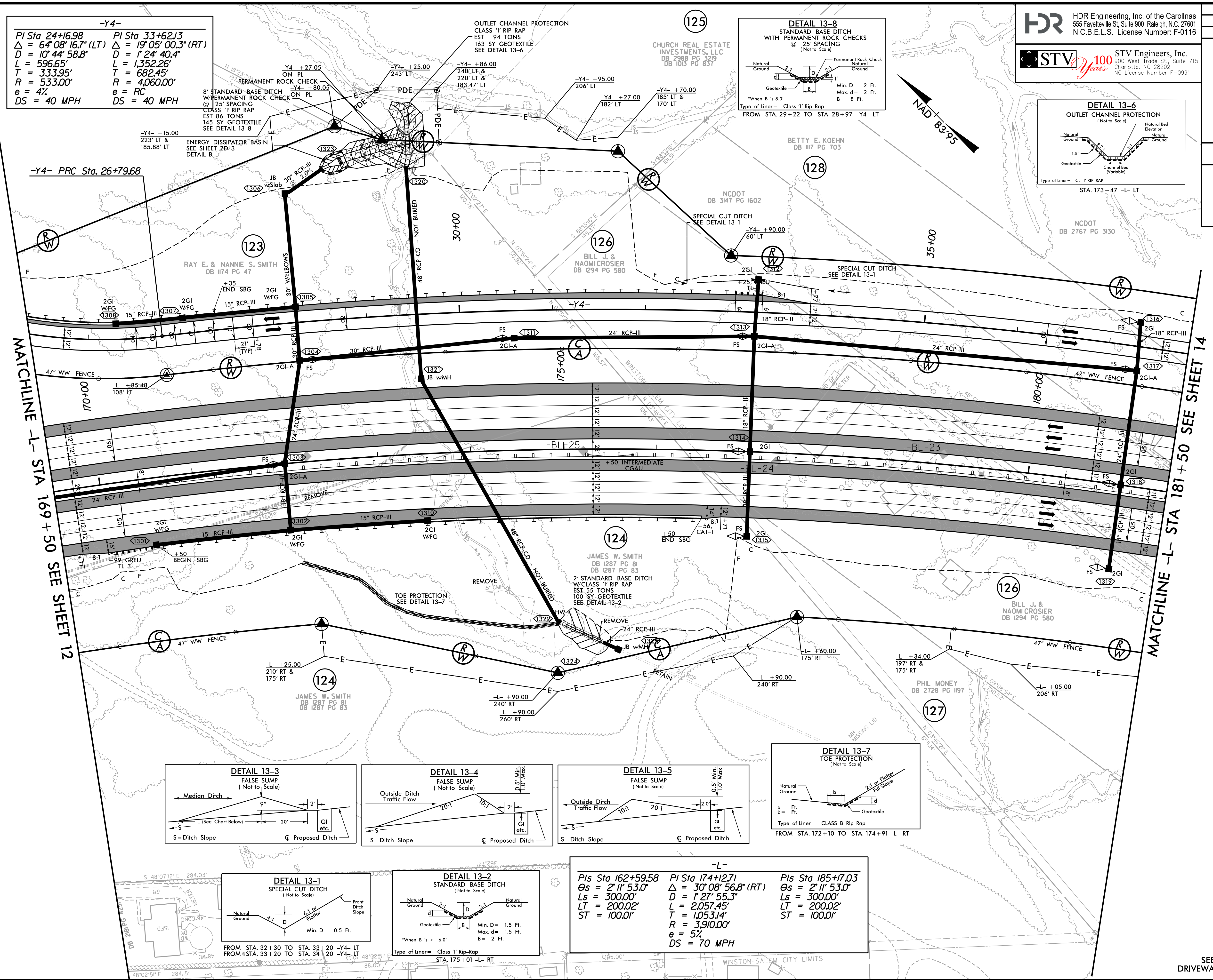






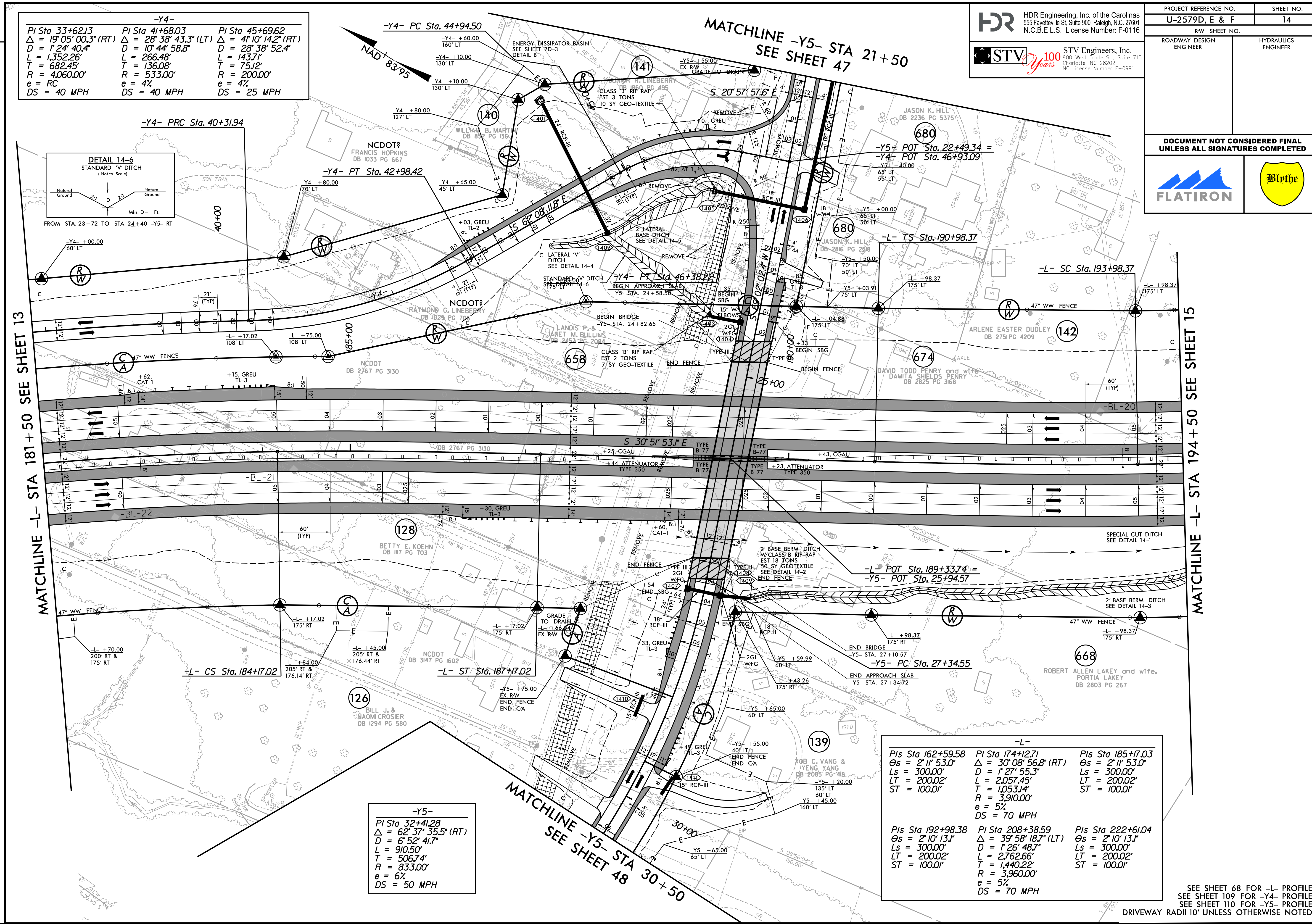
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REVISIONS



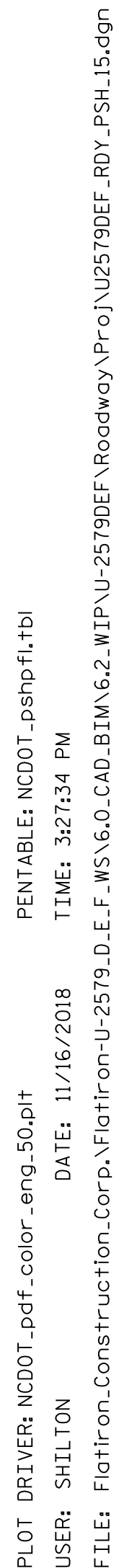
HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116

STV Engineers, Inc.  
100 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

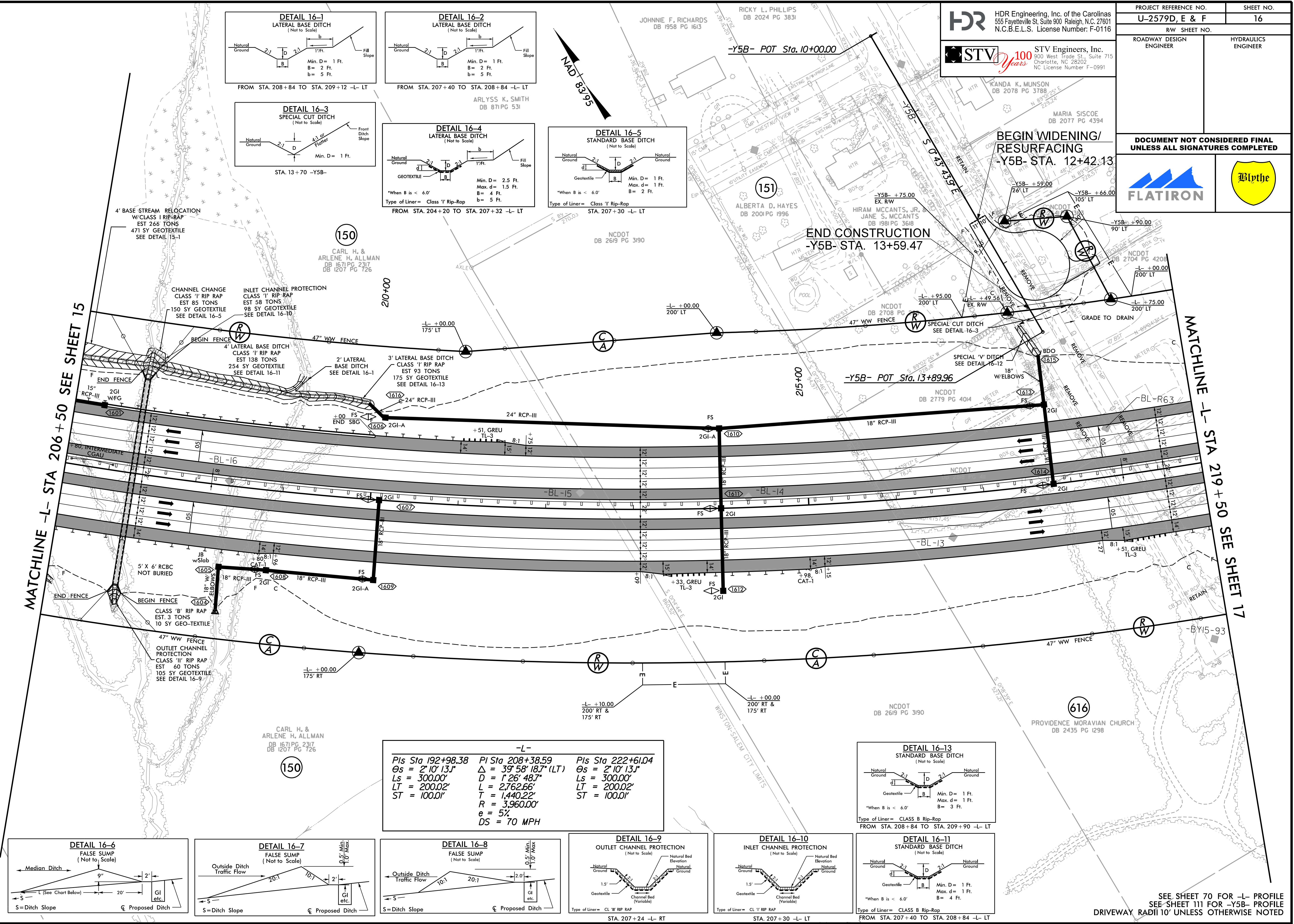
| PROJECT REFERENCE NO.   |  | SHEET NO.           |
|-------------------------|--|---------------------|
| U-2579D, E & F          |  | 14                  |
| RW SHEET NO.            |  | HYDRAULICS ENGINEER |
| ROADWAY DESIGN ENGINEER |  |                     |

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED













**MATCHLINE -L- STA 232 + 50 SEE SHEET 18**

SEE SHEET 71 FOR -L- PROFILE  
DRIVEWAY RADII 10' UNLESS  
OTHERWISE NOTED

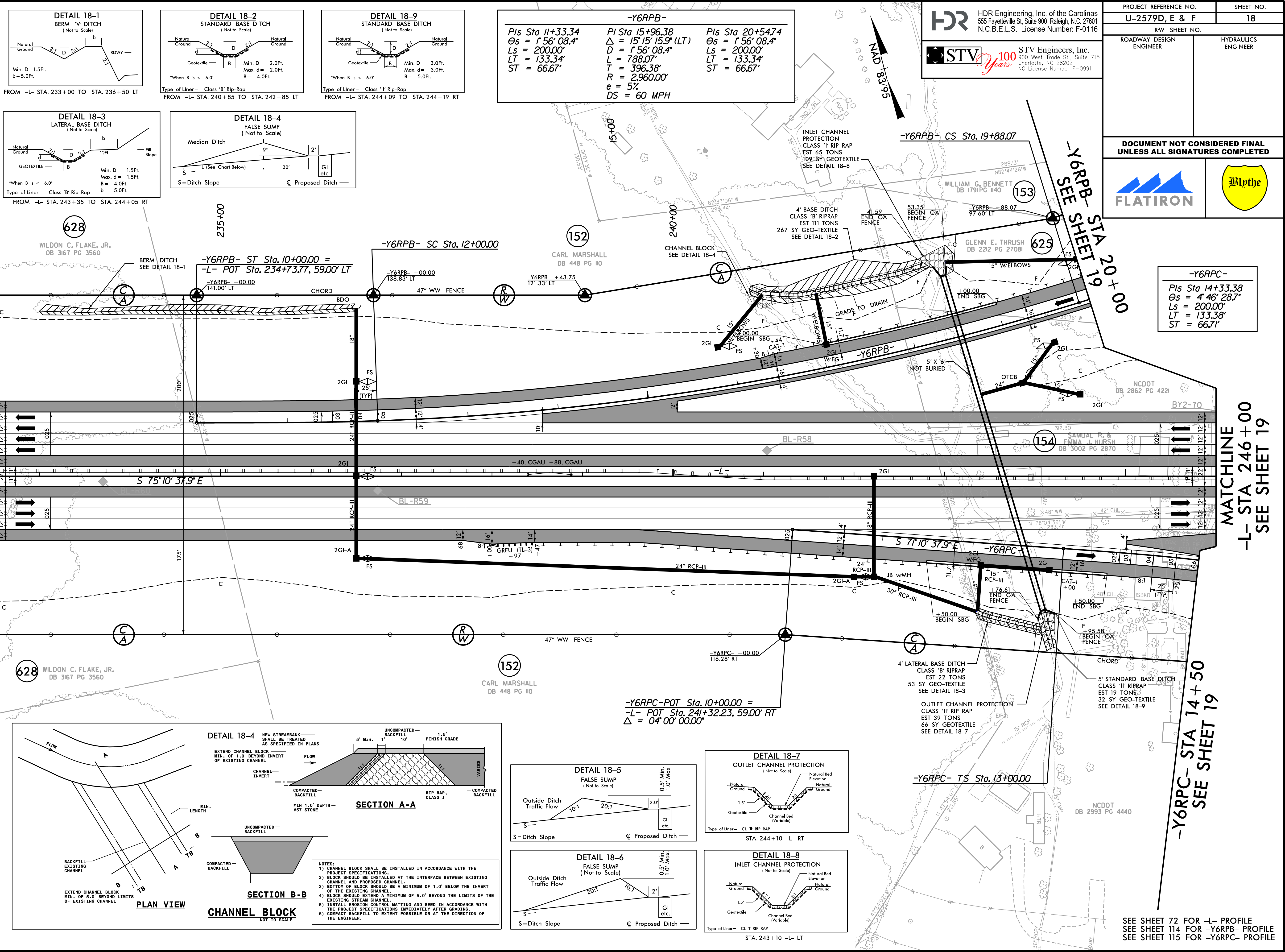
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## REVISIONS

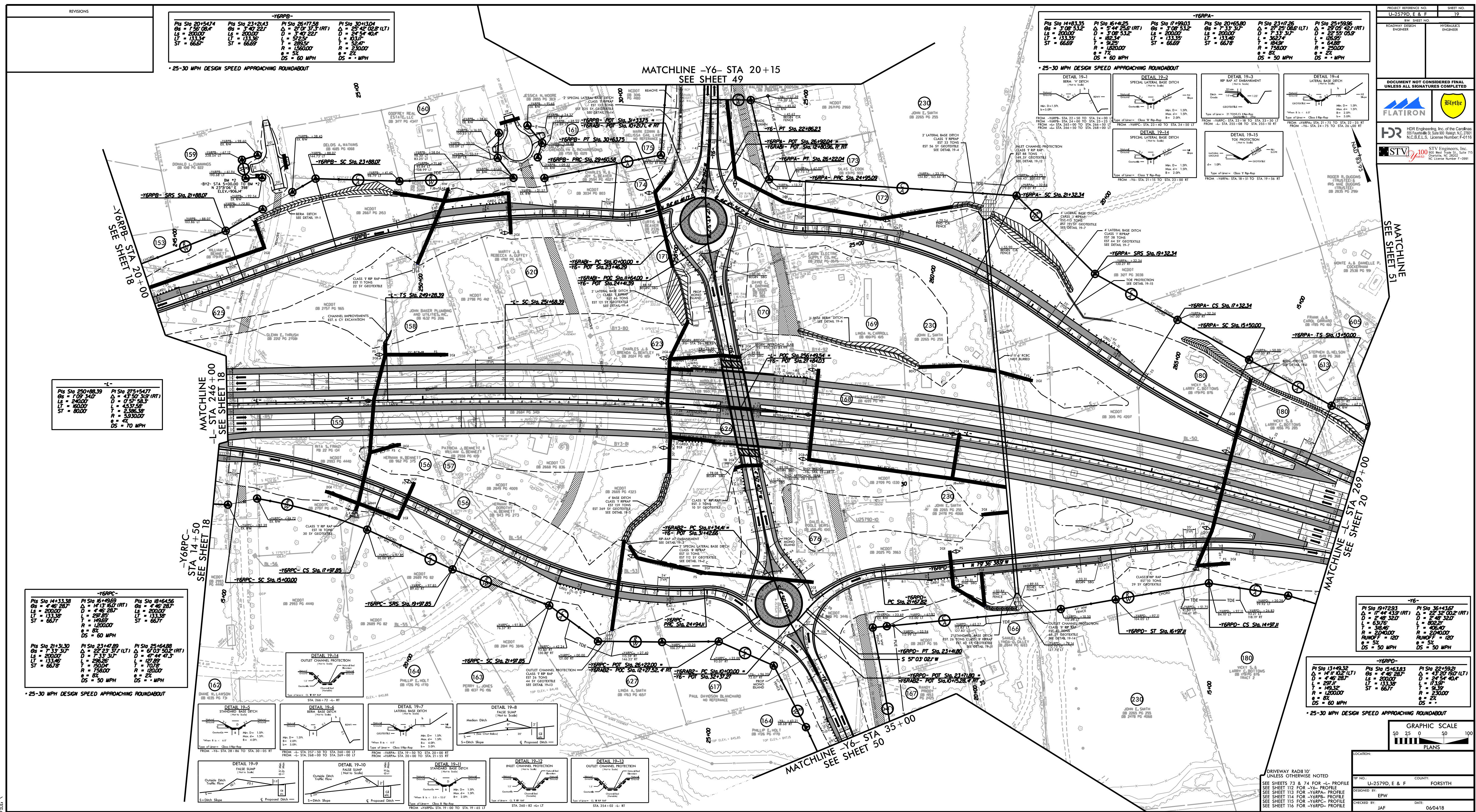


REVISIONS

MATCHLINE -L- STA 232+50  
SEE SHEET 17









PLOT DRIVER: NCDOT.pdf\_color\_eng\_50.plt  
PENTABLE: NCDOT.dshp.fltd  
USER: wrightep  
DATE: 11/16/2018  
TIME: 11:17:04 AM  
FILE: \

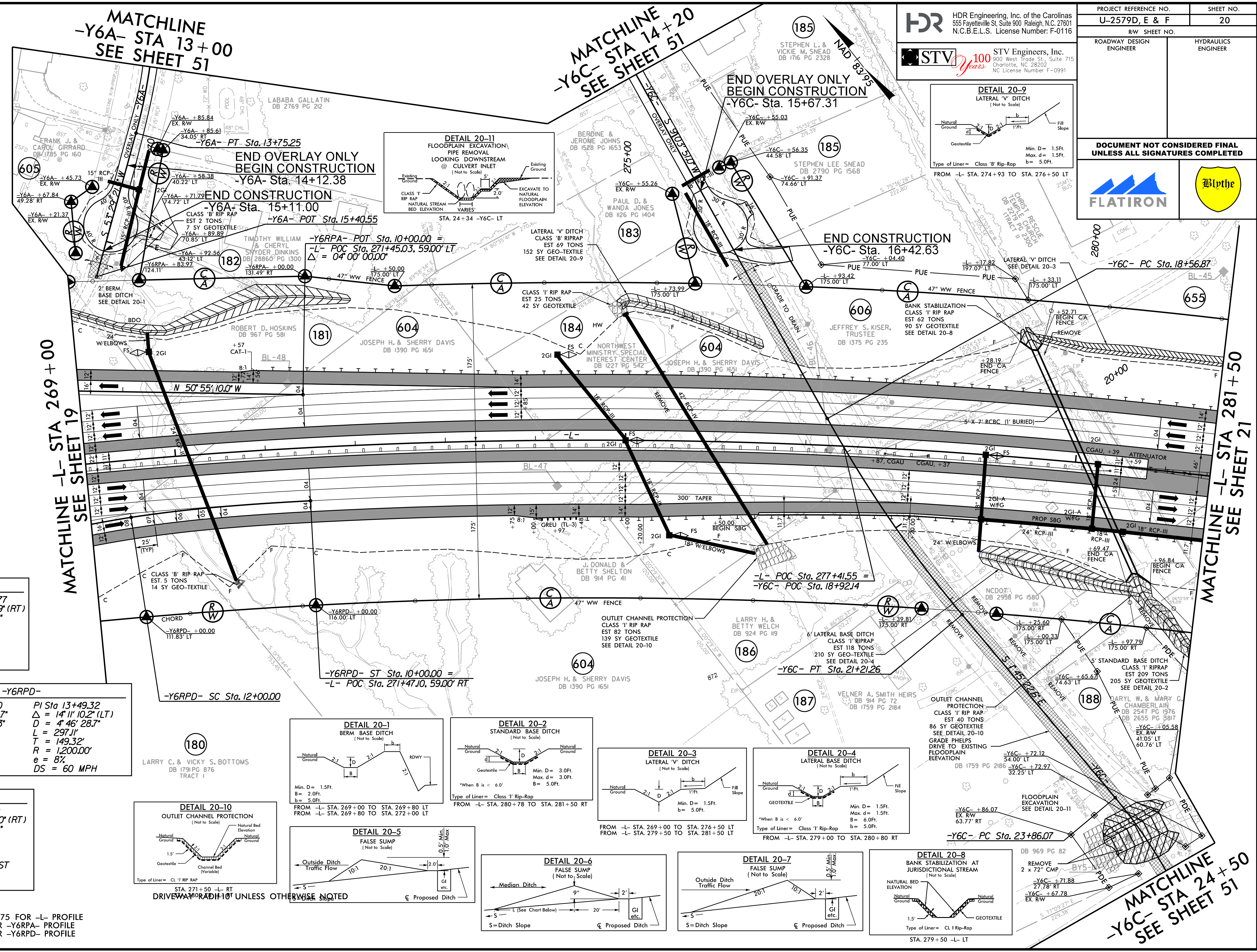
REVISIONS

**-L-**  
PI Sta 275+54.77  
 $\Delta = 43^{\circ} 50' 31.9" (RT)$   
 $D = 0^{\circ} 57' 58.3"$   
 $L = 4,537.58'$   
 $T = 2,386.38'$   
 $R = 5,930.00'$   
 $e = 4\%$   
 $DS = 70 MPH$

**-Y6RPD-**  
PIs Sta 11+22.10  
 $\Delta_s = 0^{\circ} 58' 30.7"$   
 $\Delta_s = 4^{\circ} 46' 31.3"$   
 $L_s = 200.00'$   
 $LT = 122.10'$   
 $ST = 78.05'$   
PI Sta 13+49.32  
 $\Delta = 14^{\circ} 11' 10.2" (LT)$   
 $D = 4^{\circ} 46' 28.7"$   
 $L = 297.11'$   
 $T = 149.32'$   
 $R = 1,200.00'$   
 $e = 8\%$   
 $DS = 60 MPH$

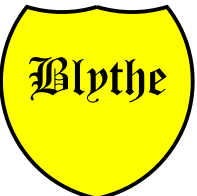
**-Y6A-**  
PI Sta 13+07.60  
 $\Delta = 12^{\circ} 58' 33.0" (RT)$   
 $D = 9^{\circ} 32' 57.5"$   
 $L = 135.88'$   
 $T = 68.23'$   
 $R = 600.00'$   
 $RUNOFF = EXIST$   
 $e = EXIST$   
 $DS = EXIST$

SEE SHEETS 74 & 75 FOR -L- PROFILE  
SEE SHEET 113 FOR -Y6RPA- PROFILE  
SEE SHEET 116 FOR -Y6RPD- PROFILE



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|                                                                                     |  |                                                                                     |
|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|
| PROJECT REFERENCE NO.<br>U-2579D, E & F                                             |  | SHEET NO.<br>20                                                                     |
| RW SHEET NO.                                                                        |  |                                                                                     |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | HYDRAULICS<br>ENGINEER                                                              |
|                                                                                     |  |                                                                                     |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b>            |  |                                                                                     |
|  |  |  |

MATCHLINE -Y6C- STA 24+50  
SEE SHEET 51





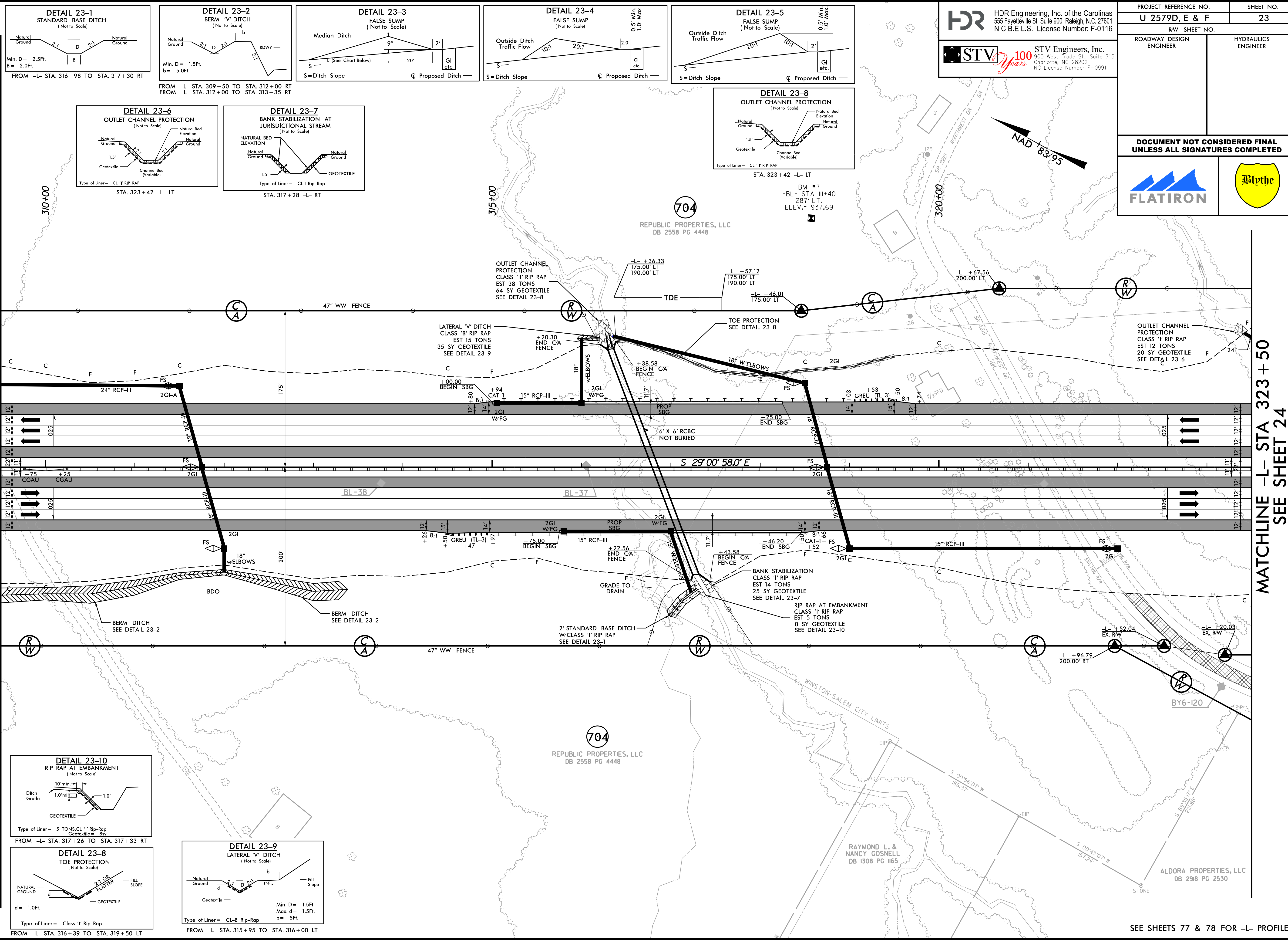






REVISIONS

MATCHLINE -L- STA 309 + 50  
SEE SHEET 22



SEE SHEETS 77 & 78 FOR -L- PROFILE

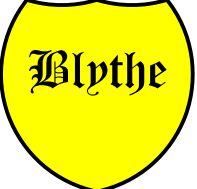
MATCHLINE -L- STA 323 + 50  
SEE SHEET 24

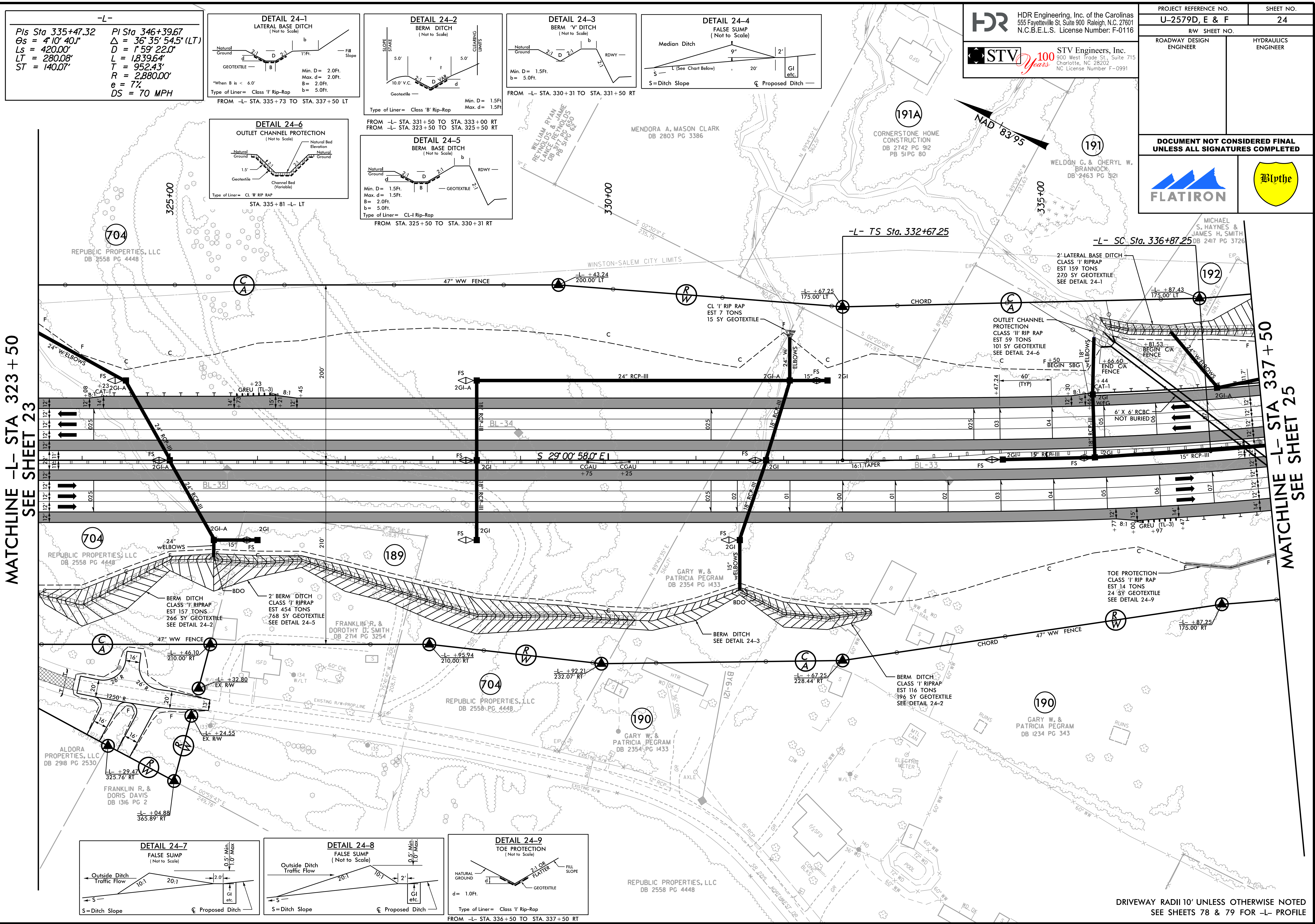
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|--------------------------------------------------------------------------|--|------------------------|--|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                       |  | SHEET NO.<br><b>23</b> |  |
| RW SHEET NO.                                                             |  | HYDRAULICS ENGINEER    |  |
| ROADWAY DESIGN ENGINEER                                                  |  | HYDRAULICS ENGINEER    |  |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b> |  |                        |  |
|                                                                          |  |                        |  |

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|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PROJECT REFERENCE NO.                                                               | SHEET NO.                                                                           |
| U-2579D, E & F                                                                      | 24                                                                                  |
| R/W SHEET NO.                                                                       |                                                                                     |
| ROADWAY DESIGN<br>ENGINEER                                                          | HYDRAULICS<br>ENGINEER                                                              |
| <p><b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b></p>     |                                                                                     |
|  |  |



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USER: wrighthouse
DATE: 11/16/2018
TIME: 11:17:16 AM
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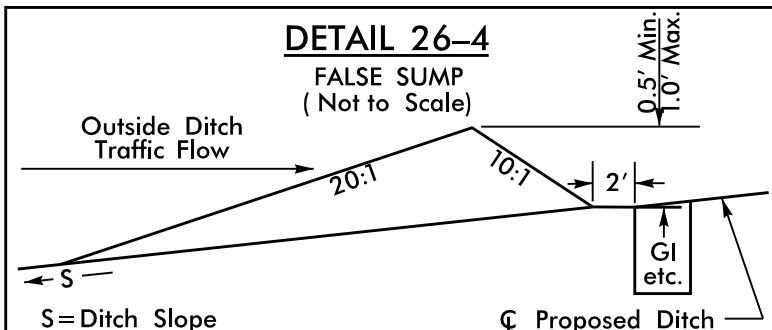
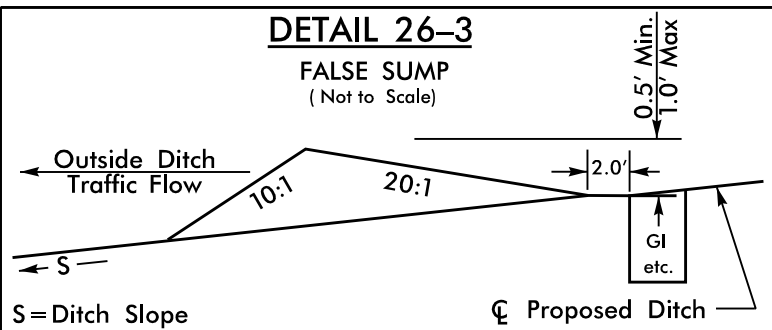
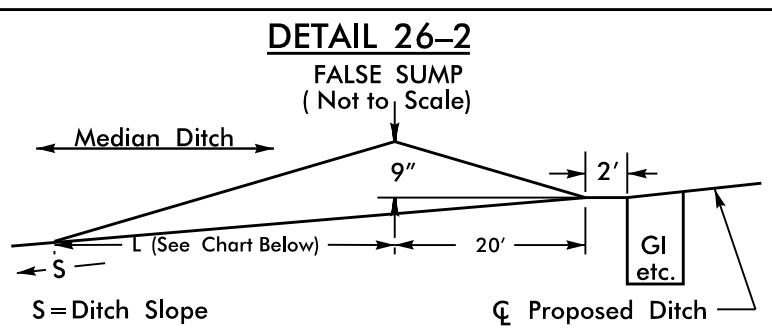
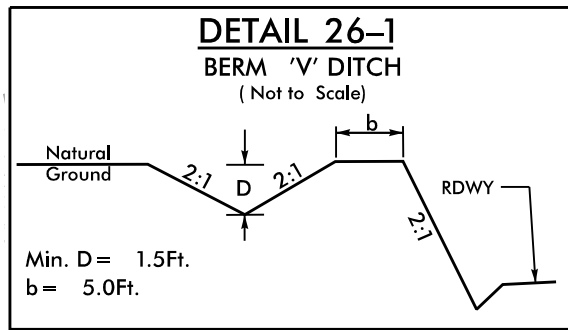






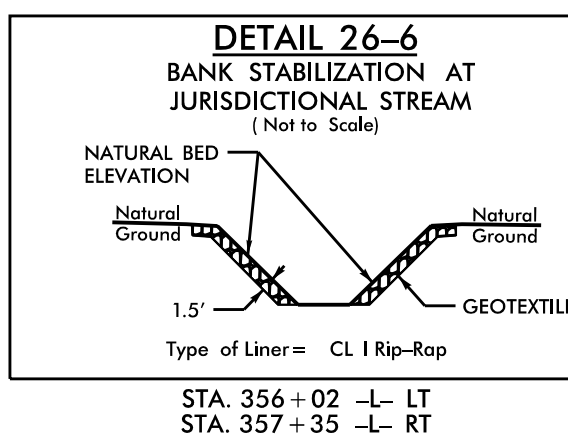
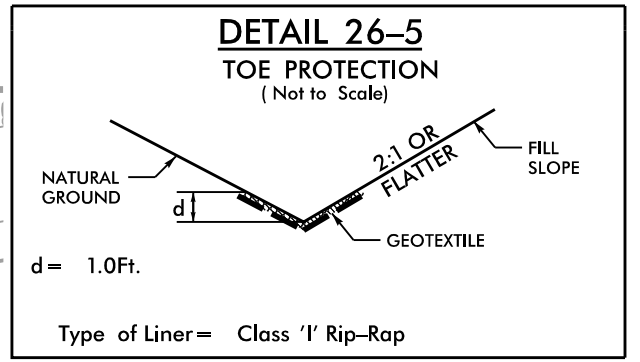
-BDRI-  
PI Sta 10+62.78  
 $\Delta = 86^\circ 38' 46.9" (RT)$   
 $D = 229' 10" 59.2"$   
 $L = 37.8'$   
 $T = 23.58'$   
 $R = 25.00'$   
 $e = N/A$   
 $DS = N/A$

PI Sta 11+57.47  
 $\Delta = 29^\circ 34' 01.5" (LT)$   
 $D = 57' 17" 44.8"$   
 $L = 51.60'$   
 $T = 26.39'$   
 $R = 100.00'$   
 $e = N/A$   
 $DS = N/A$



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Charlotte, NC 28202  
NC License Number F-0991

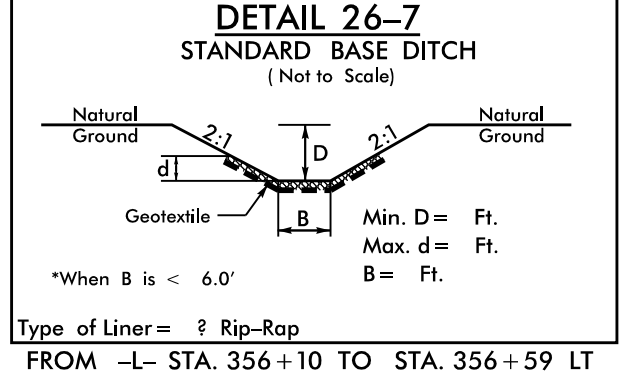
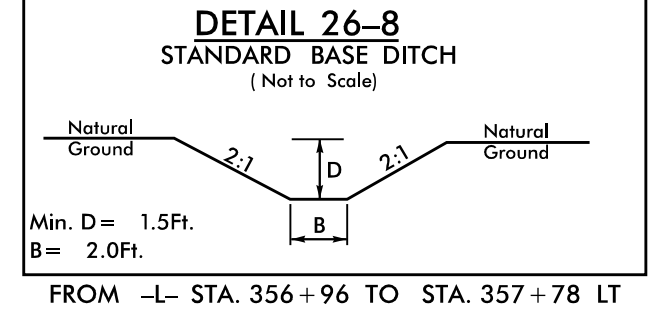


MATCHLINE  
-L- STA 351+50 SEE SHEET 25

MATCHLINE  
SEE SHEET 52

-L-  
PI Sta 346+39.67  
 $\Delta = 36^\circ 35' 54.5" (LT)$   
 $D = 1^\circ 59' 22.0"$   
 $L = 1.839.64'$   
 $T = 952.43'$   
 $R = 2,880.00'$   
 $e = 7\%$   
 $DS = 70 MPH$

PIs Sta 356+66.96  
 $\Theta s = 4^\circ 10' 40.1"$   
 $Ls = 420.00'$   
 $LT = 280.08'$   
 $ST = 140.07'$



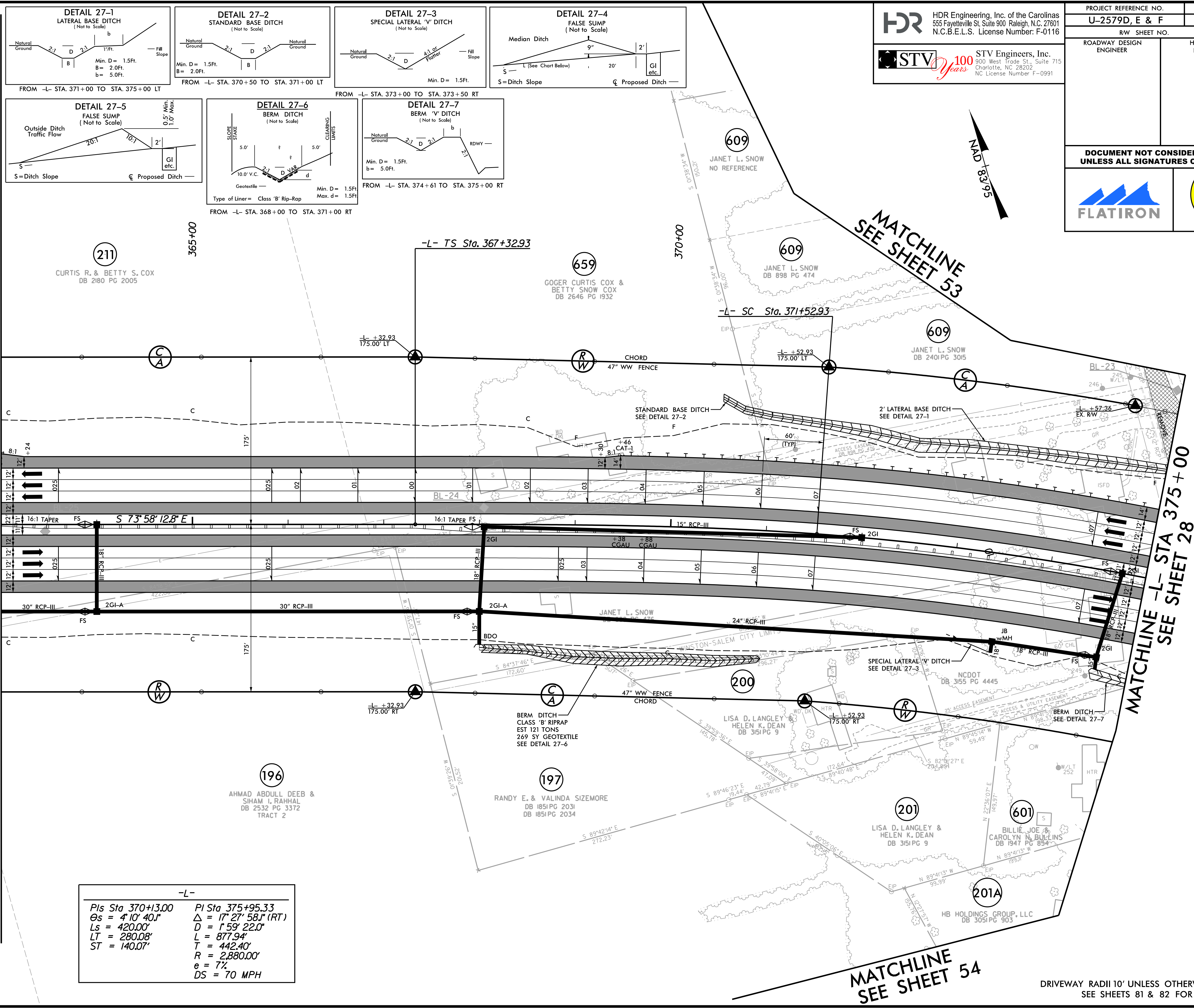
SEE SHEETS 80 & 81 FOR -L- PROFILE

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USER: wrfghtep  
PENTABLE: NCDOT\_dshp.fltd  
DATE: 11/16/2018  
TIME: 11:17:22 AM  
FILE: \



REVISIONS

MATCHLINE -L- STA 363+00 SEE SHEET 26



| -L-               |                        |
|-------------------|------------------------|
| PI Sta 370+13.00  | PI Sta 375+95.33       |
| Os = 4' 10' 40.1" | Δ = 17' 27' 58.1" (RT) |
| Ls = 420.00'      | D = 1' 59' 22.0"       |
| LT = 280.08'      | L = 877.94'            |
| ST = 140.07'      | T = 442.40'            |
|                   | R = 2,880.00'          |
|                   | e = 7%                 |
|                   | DS = 70 MPH            |

MATCHLINE SEE SHEET 54

DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED  
SEE SHEETS 81 & 82 FOR -L- PROFILE

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PROJECT REFERENCE NO.  
**U-2579D, E & F**

SHEET NO.  
**27**

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

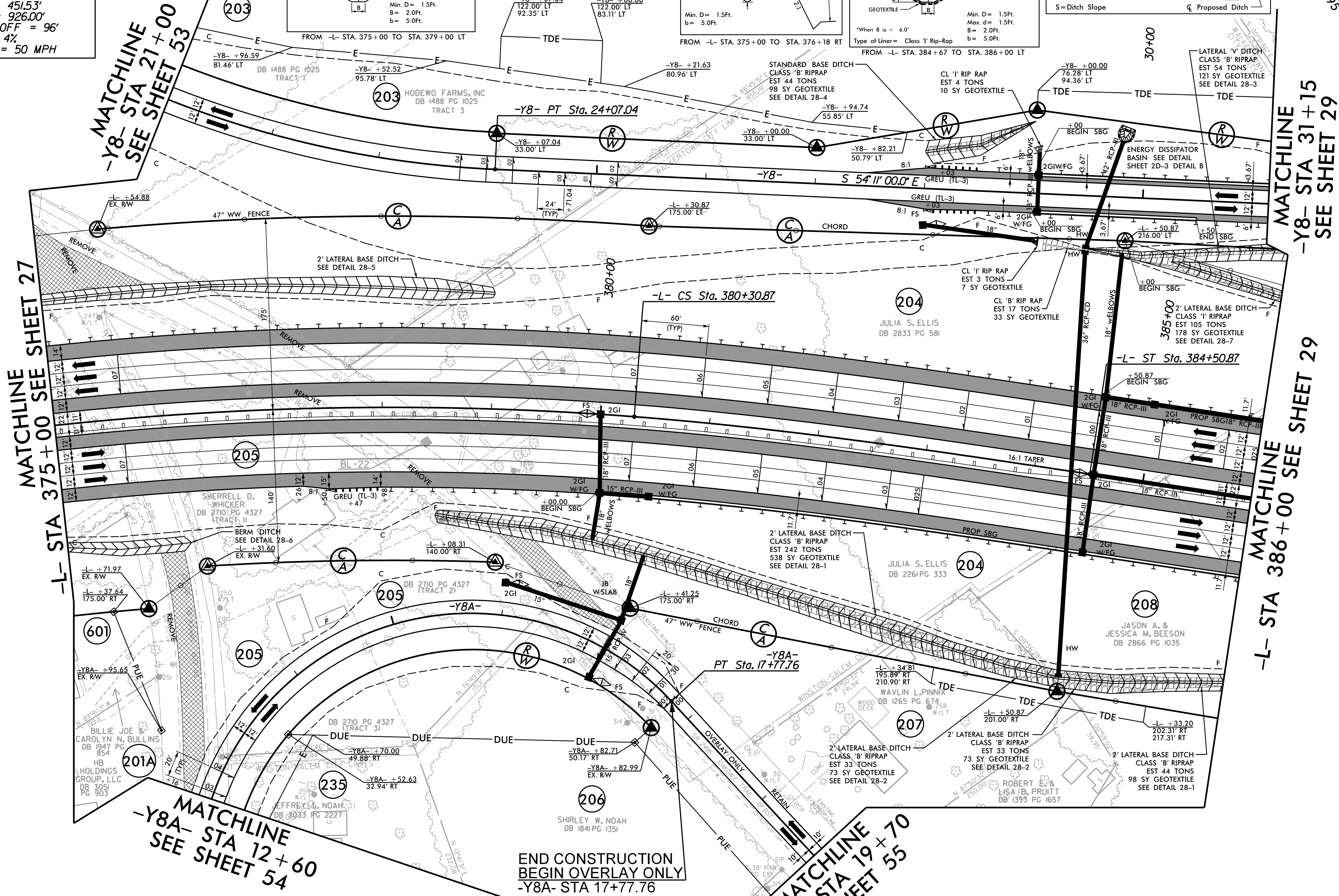
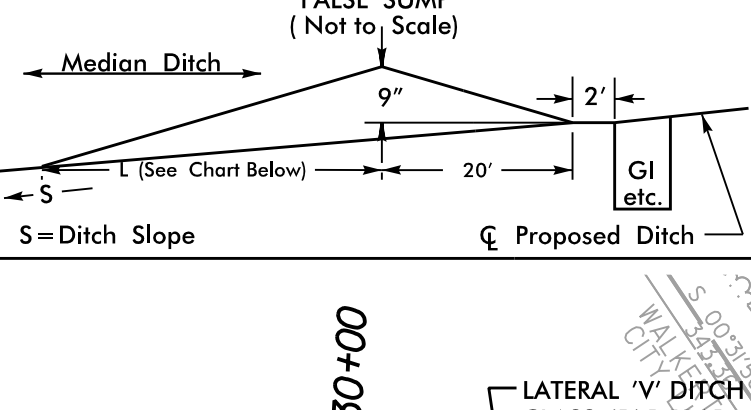
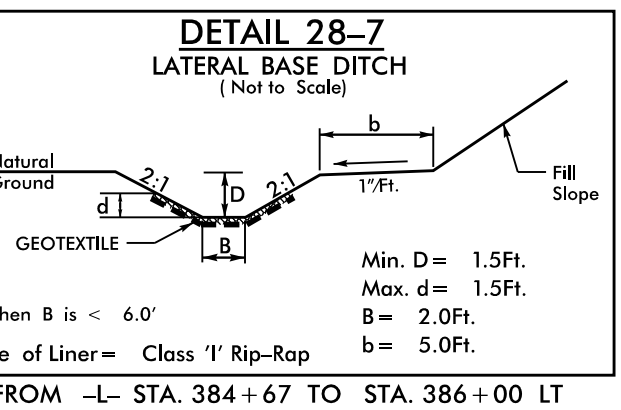
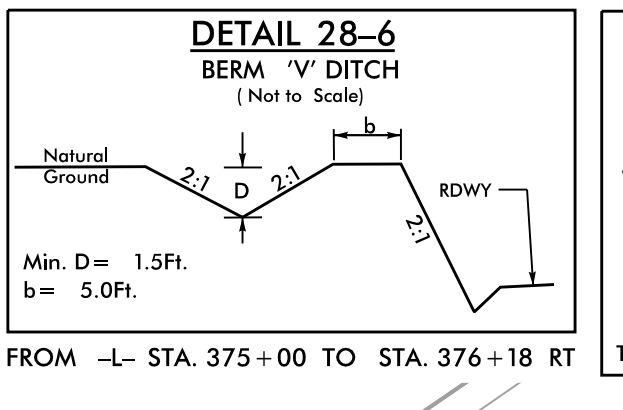
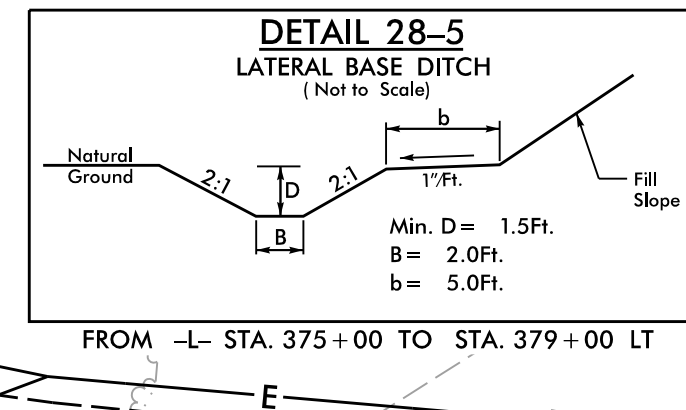
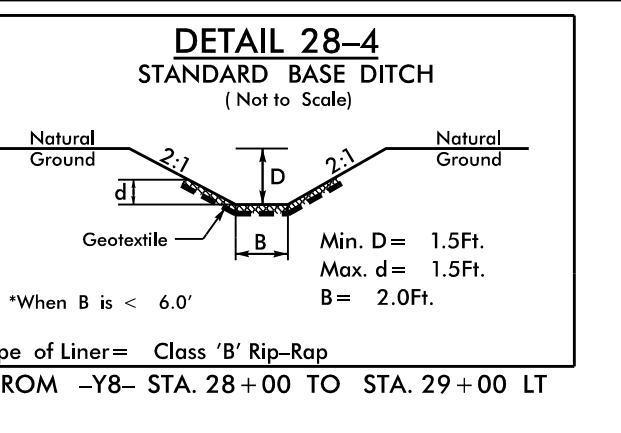
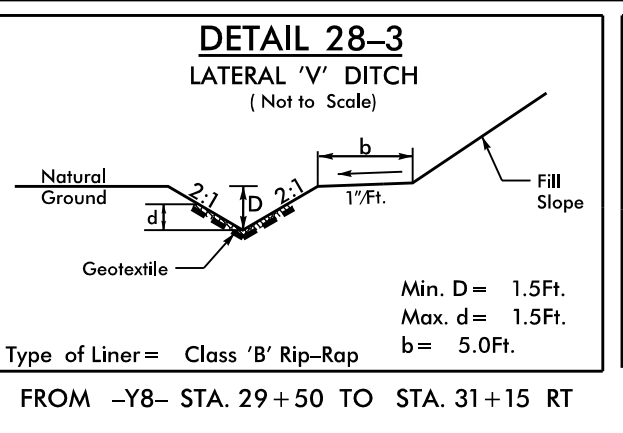
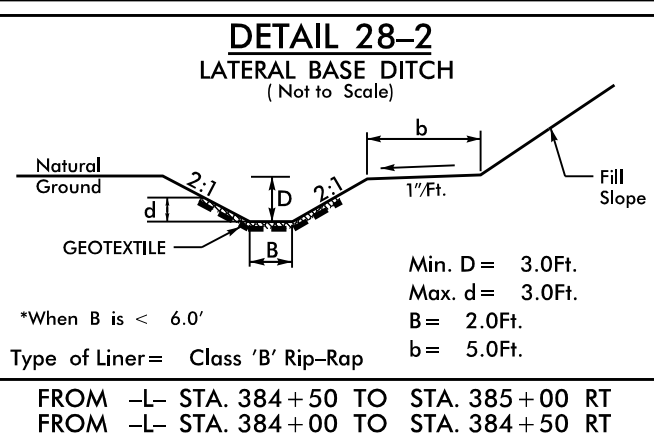
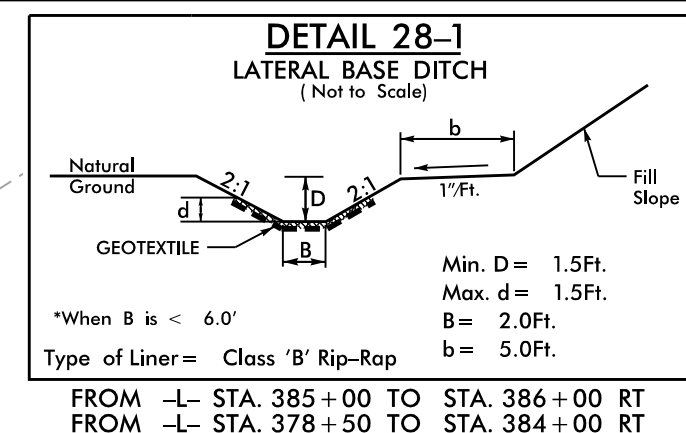
**FLATIRON**  
**Blithe**



-L-  
PI Sta 375+95.33  
 $\Delta = 17' 27" 58.1" (RT)$   
 $D = 1' 59" 22.0"$   
 $L = 877.94'$   
 $T = 442.40'$   
 $R = 2,880.00'$   
 $e = 7\%$   
 $DS = 70 MPH$

PIs Sta 381+70.94  
 $\Delta_s = 4' 10' 40.1"$   
 $L_s = 420.00'$   
 $LT = 280.08'$   
 $ST = 140.07'$

-Y8-  
PI Sta 20+18.34  
 $\Delta = 5' 59' 19.2" (LT)$   
 $D = 6' 11' 14.8"$   
 $L = 840.23'$   
 $T = 451.53'$   
 $R = 926.00'$   
 $RUNOFF = 96'$   
 $e = 4\%$   
 $DS = 50 MPH$



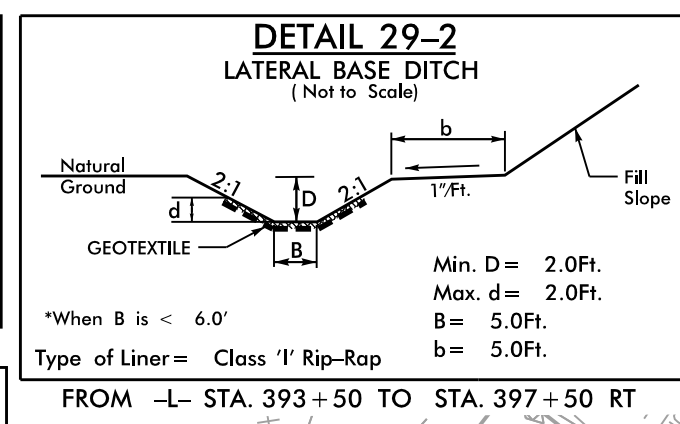
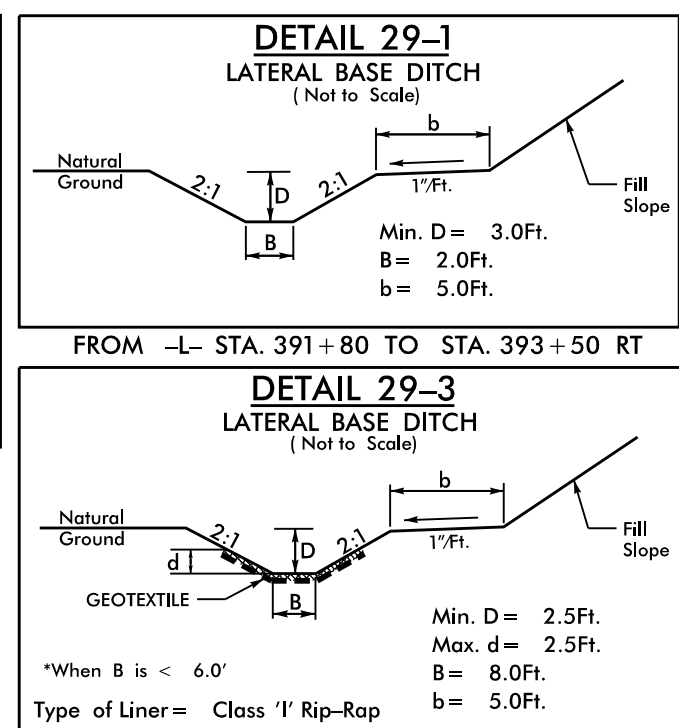
-Y8A-  
PI Sta 18+24.12  
 $\Delta = 137' 46' 42.1" (RT)$   
 $D = 22' 55' 05.9"$   
 $L = 601.7'$   
 $T = 647.53'$   
 $R = 250.00'$   
 $RUNOFF = 80'$   
 $e = 4\%$   
 $DS = 30 MPH$

DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED  
SEE SHEETS 82 & 83 FOR -L- PROFILE  
SEE SHEET 118 FOR -Y8- PROFILE  
SEE SHEET 119 FOR -Y8A- PROFILE

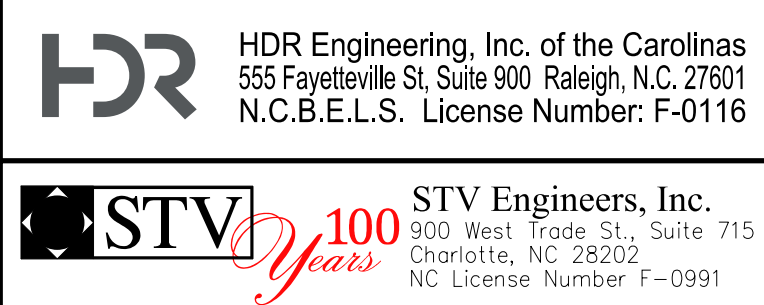


REVISIONS

-Y8-  
PI Sta 34+53.9  
 $\Delta = 29' 36" 56.4" (RT)$   
 $D = 14' 19" 26.2"$   
 $L = 206.76'$   
 $T = 105.74'$   
 $R = 400.00'$   
RUNOFF = 96'  
 $e = 4\%$   
DS = 50 MPH



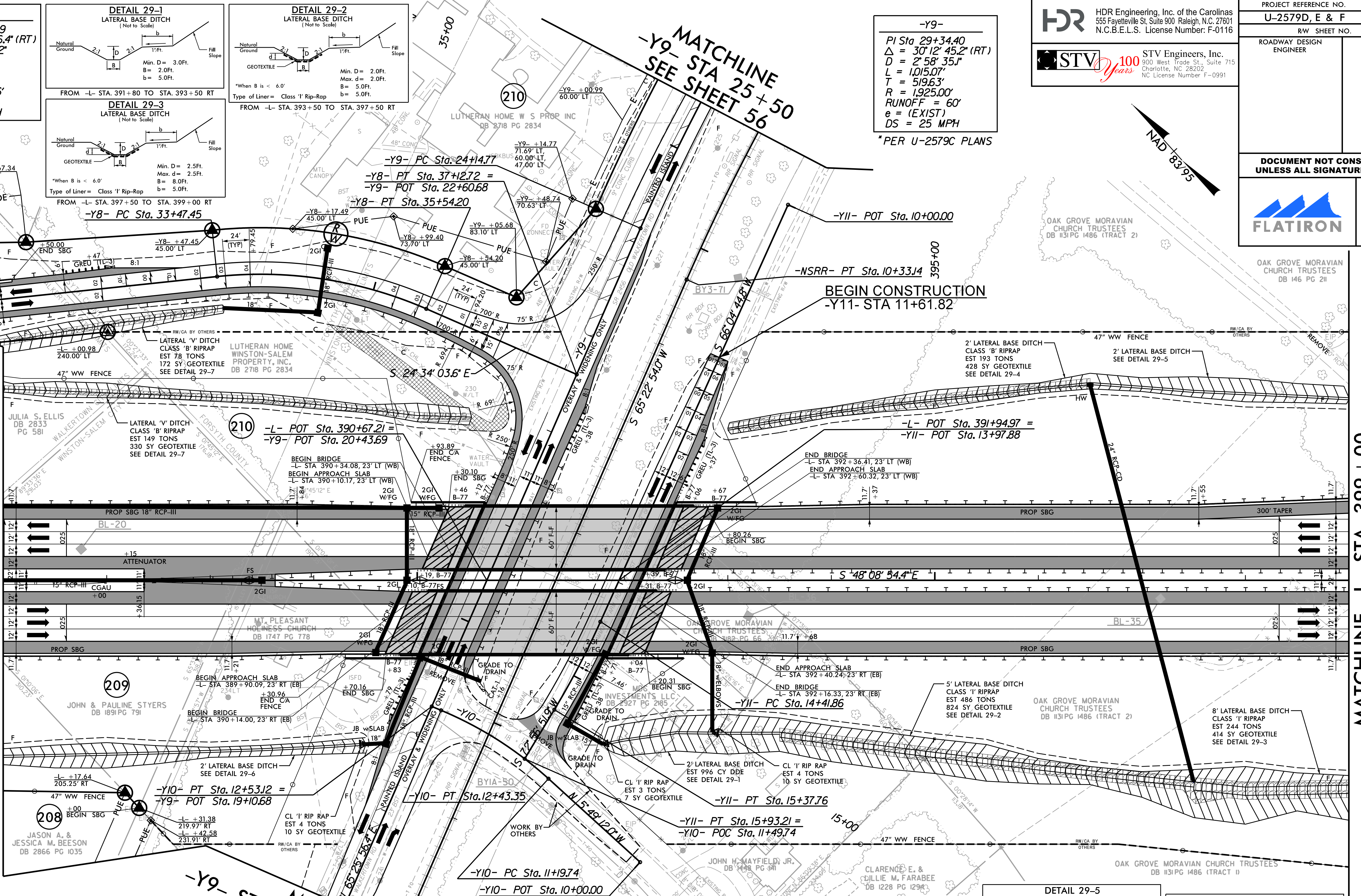
-Y9-  
PI Sta 29+34.40  
 $\Delta = 30' 12" 45.2" (RT)$   
 $D = 2' 58" 35.1"$   
 $L = 1,015.07'$   
 $T = 519.63'$   
 $R = 1,925.00'$   
RUNOFF = 60'  
 $e = (EXIST)$   
DS = 25 MPH  
\*PER U-2579C PLANS



|                                                                  |                     |
|------------------------------------------------------------------|---------------------|
| PROJECT REFERENCE NO.                                            | SHEET NO.           |
| U-2579D, E & F                                                   | 29                  |
| RW SHEET NO.                                                     |                     |
| ROADWAY DESIGN ENGINEER                                          | HYDRAULICS ENGINEER |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED |                     |
| FLATIRON                                                         | Blythe              |

MATCHLINE  
-Y8- STA 31+15  
SEE SHEET 28

MATCHLINE  
-L- STA 386+00  
SEE SHEET 28

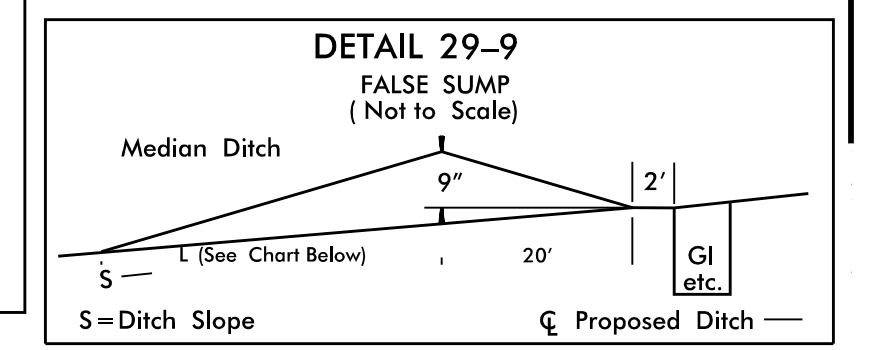
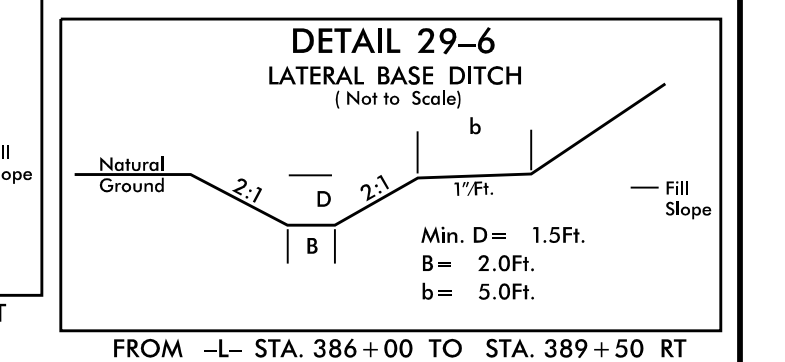
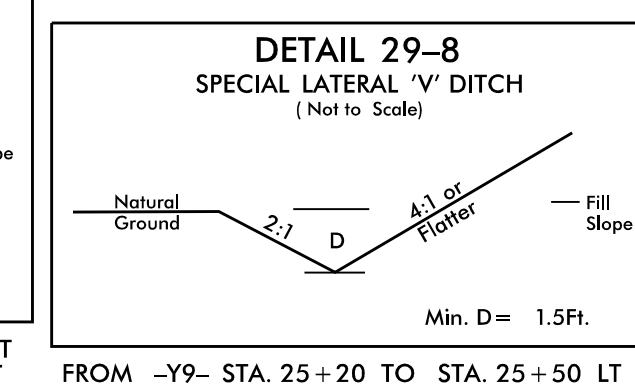
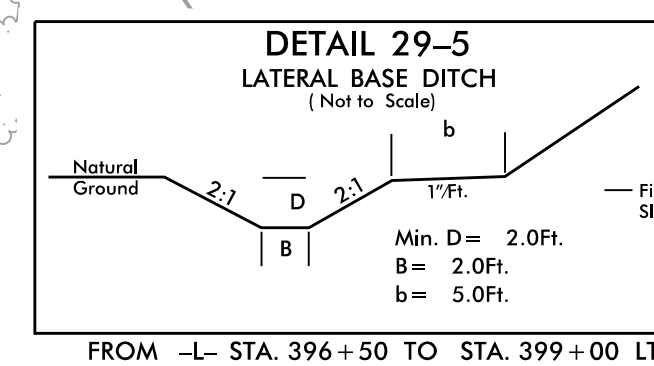
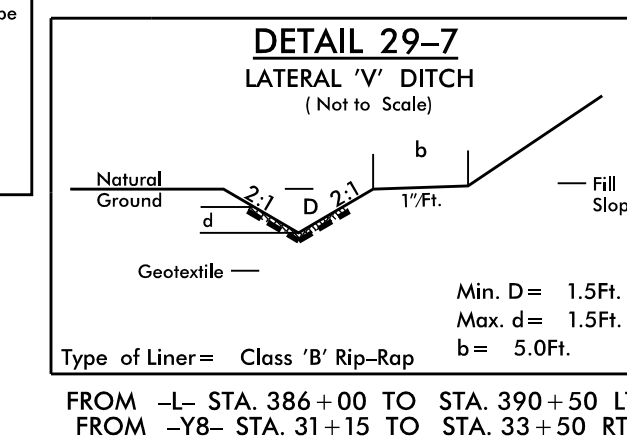
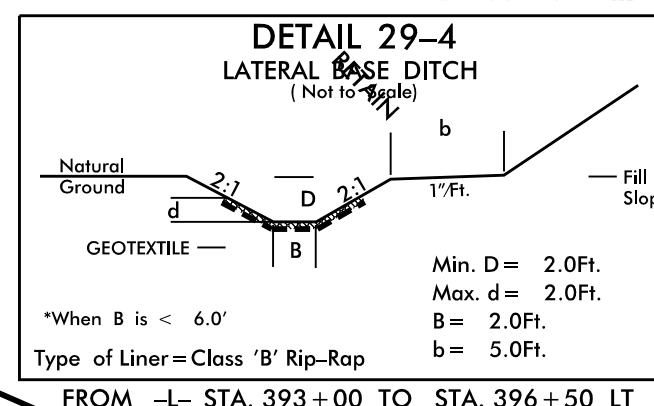


-Y10-  
PI Sta 14+82.16  
 $\Delta = 19' 40" 26.4" (LT)$   
 $D = 15' 54" 55.8"$   
 $L = 123.62'$   
 $T = 62.42'$   
 $R = 360.00'$

-Y11-  
PI Sta 14+89.87  
 $\Delta = 6' 52" 07.1" (RT)$   
 $D = 7' 09" 43.1"$   
 $L = 95.90'$   
 $T = 48.01'$   
 $R = 800.00'$   
RUNOFF = 84'  
 $e = 4\%$   
DS = 40 MPH

-Y9- STA 17+00  
MATCHLINE  
SEE SHEET 55

DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED  
SEE SHEETS 83 & 84 FOR -L- PROFILE  
SEE SHEET 118 FOR -Y8- PROFILE  
SEE SHEET 120 FOR -Y9- PROFILE  
SEE SHEET 121 FOR -Y11- PROFILE



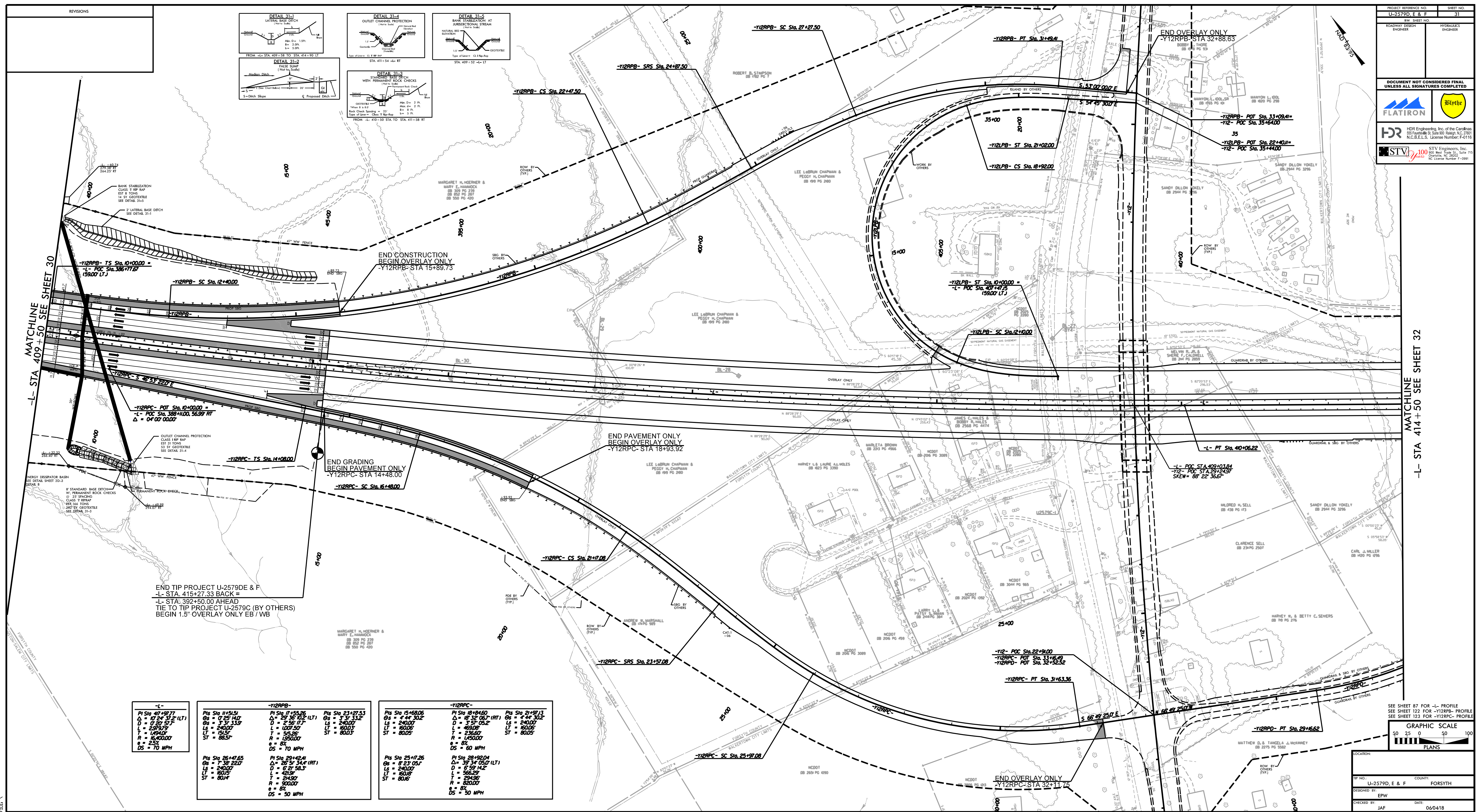
MATCHLINE -L- STA 399+00  
SEE SHEET 30





|                                     |
|-------------------------------------|
| -L-                                 |
| PI Sta 417+97.77                    |
| $\Delta = 10^\circ 24' 37.2''$ (LT) |
| $D = 0^\circ 20' 57.7''$            |
| $L = 2,979.79'$                     |
| $T = 1,494.01'$                     |
| $R = 16,400.00'$                    |
| $e = 2.5\%$                         |
| $DS = 70$ MPH                       |

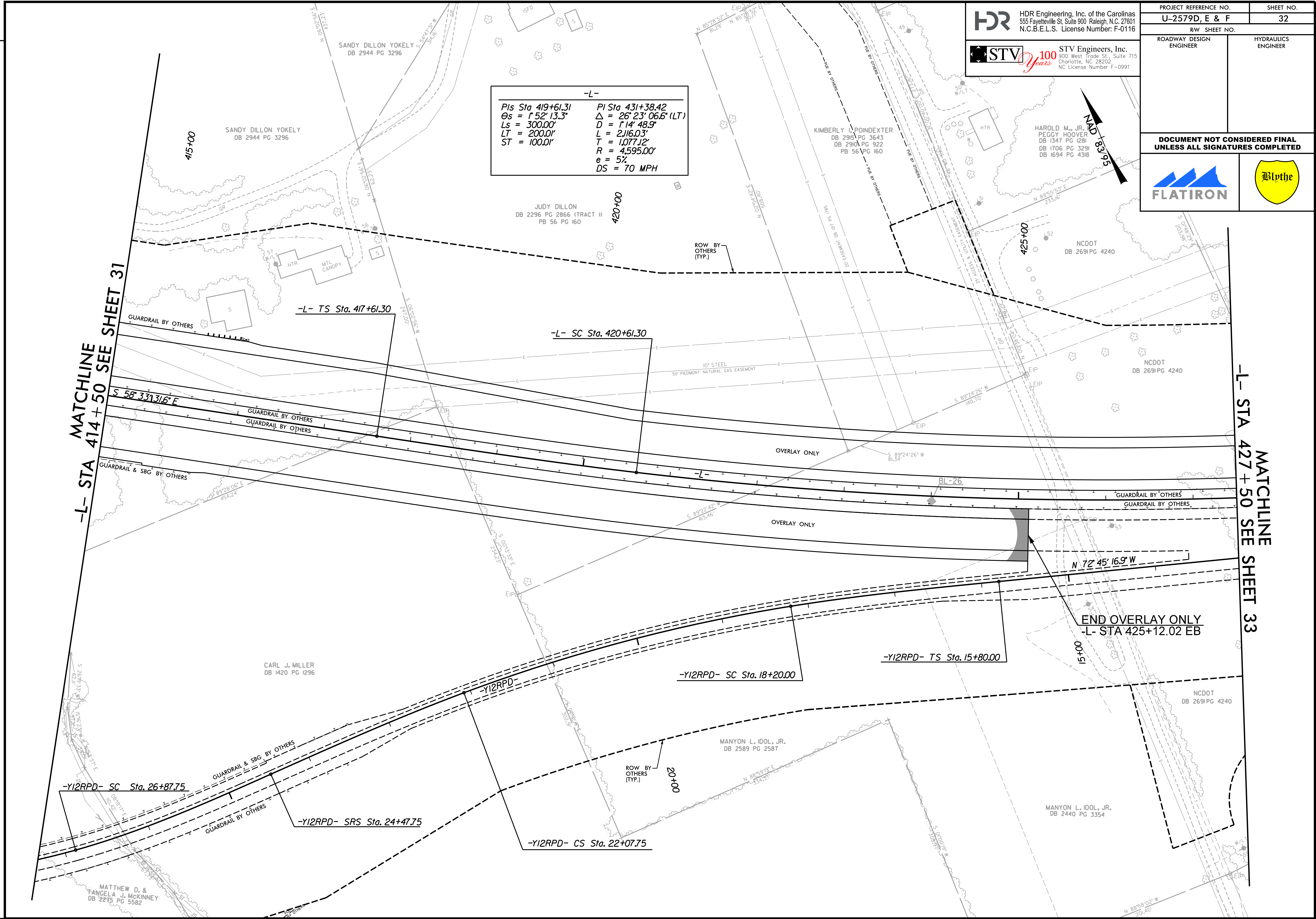




|                                                                                                                                    |  |                                                                                                           |  |
|------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------------------|--|
| PROJECT DESCRIPTION: No.                                                                                                           |  | SHEET No.                                                                                                 |  |
| U-2579/D E & F                                                                                                                     |  | 31                                                                                                        |  |
| DATE: SHEET NO.                                                                                                                    |  |                                                                                                           |  |
| ROADWAY DESIGN<br>ENGINEER                                                                                                         |  | HYDRAULICS<br>ENGINEER                                                                                    |  |
| <p><b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b></p>                                                    |  |                                                                                                           |  |
|                                                 |  |                        |  |
|                                                 |  |                        |  |
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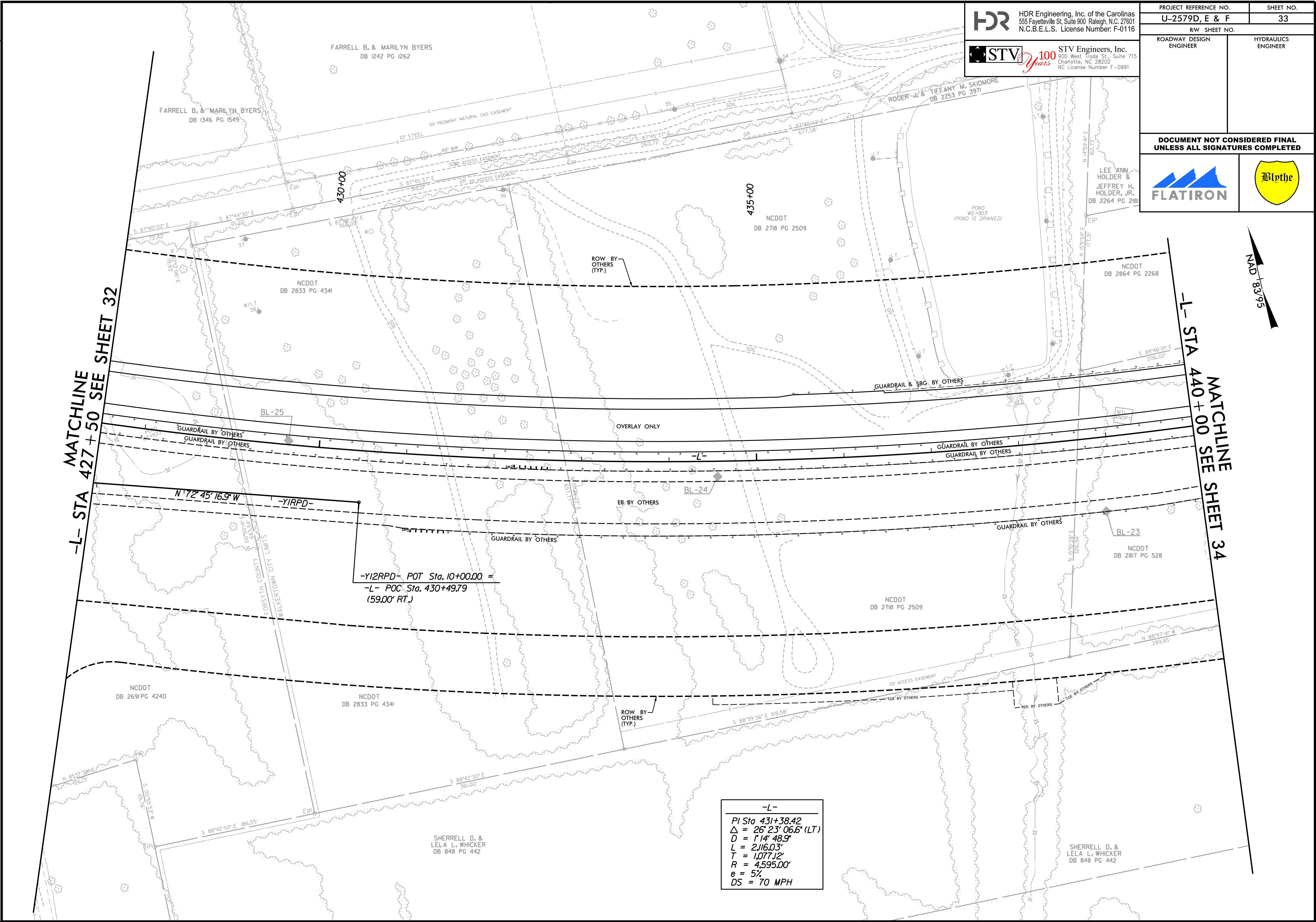
REVISIONS



|                                                                                                                                                |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>HDR</b> HDR Engineering, Inc. of the Carolinas<br>555 Fayetteville St, Suite 900 Raleigh, N.C. 27601<br>N.C.B.E.L.S. License Number: F-0116 |                     |
| <b>STV</b> STV Engineers, Inc.<br>900 West Trade St., Suite 715<br>Charlotte, NC 28202<br>NC License Number F-0991                             |                     |
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                                                                                             |                     |
| SHEET NO.<br><b>32</b>                                                                                                                         |                     |
| ROADWAY DESIGN ENGINEER                                                                                                                        | HYDRAULICS ENGINEER |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                                                                               |                     |
| <b>FLATIRON</b>                                                                                                                                | <b>Blythe</b>       |



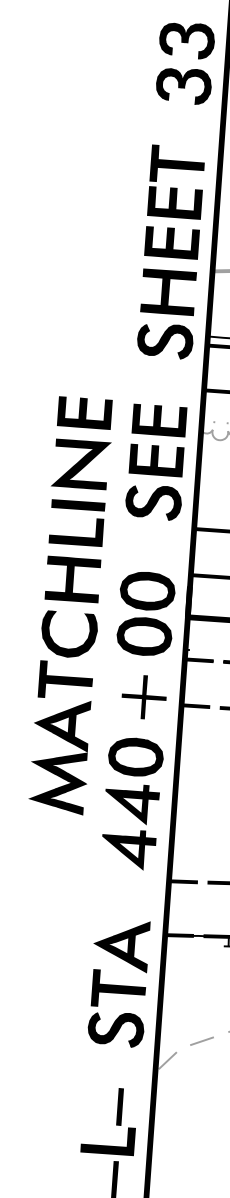
REVISIONS



|                                                                                                                                                |                     |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
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| <b>STV</b> STV Engineers, Inc.<br>300 West Trade St., Suite 715<br>Charlotte, NC 28202<br>NC License Number F-0991                             |                     |
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                                                                                             |                     |
| SHEET NO.<br><b>33</b>                                                                                                                         |                     |
| RW SHEET NO.                                                                                                                                   |                     |
| ROADWAY DESIGN ENGINEER                                                                                                                        | HYDRAULICS ENGINEER |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                                                                               |                     |
| <b>FLATIRON</b>                                                                                                                                | <b>Blythe</b>       |







ROW BY  
OTHERS  
(TYP.)

SHERRELL D. &  
LELA L. WHICKER  
DB 848 PG 442

-L- ST Sta. 444+77.34

-L- CS Sta. 441+77.34

25+00  
445+00  
NCDOT  
2700 PG 2276

$$\frac{-Y13 - POT \text{ STA. } 21+27.27}{-L - POT \text{ STA. } 447+07.91}$$

$$SKEW = 98^{\circ} 49' 32.3''$$

END OVERLAY ONLY  
-L- STA 447+90.00 WB

-L- TS Sta. 448+86.48

-L- SC Sta. 453+06.48

| -L-                                |                                |
|------------------------------------|--------------------------------|
| PI Sta 431+38.42                   | Pls Sta 442+77.35              |
| $\Delta = 26^\circ 23' 06.6"$ (LT) | $\Theta s = 1^\circ 52' 13.3"$ |
| D = 1' 14" 48.9"                   | Ls = 300.00'                   |
| L = 2,116.03'                      | LT = 200.01'                   |
| T = 1,077.12'                      | ST = 100.01'                   |
| R = 4,595.00'                      |                                |
| e = 5%                             |                                |
| DS = 70 MPH                        |                                |



**DETAIL 35-1**  
SPECIAL CUT DITCH  
(Not to Scale)

Natural Ground  
4:1 or Flatter  
D  
Front Ditch Slope  
Min. D = 1 Ft.

FROM STA. 9+62 TO STA. 10+30 -Y1- LT

**DETAIL 35-2**  
SPECIAL CUT DITCH  
(Not to Scale)

Natural Ground  
5:1 or Flatter  
D  
Front Ditch Slope  
Min. D = 1 Ft.

FROM STA. 10+30 TO STA. 10+80 -Y1- LT

**DETAIL 35-3**  
SPECIAL CUT DITCH  
(Not to Scale)

Natural Ground  
2:1 or Flatter  
D  
Front Ditch Slope  
Min. D = 1 Ft.

FROM STA. 10+70 TO STA. 11+00 -Y1B- LT  
FROM STA. 11+00 TO STA. 11+60 -Y1B- LT  
FROM STA. 13+10 TO STA. 13+80 -Y1D- LT  
FROM STA. 13+80 TO STA. 14+30 -Y1D- RT



|                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                         |                            |                        |                |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------------|----------------|----|
| <p>HDR Engineering, Inc. of the Carolinas<br/>         555 Fayetteville St, Suite 900 Raleigh, N.C. 27601<br/>         N.C.B.E.L.S. License Number: F-0116</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">PROJECT REFERENCE NO.</td> <td style="width: 50%; text-align: center;">SHEET NO.</td> </tr> <tr> <td style="text-align: center; font-size: 1.2em;">U-2579D, E &amp; F</td> <td style="text-align: center; font-size: 1.2em;">35</td> </tr> </table> | PROJECT REFERENCE NO.      | SHEET NO.              | U-2579D, E & F | 35 |
| PROJECT REFERENCE NO.                                                                                                                                          | SHEET NO.                                                                                                                                                                                                                                                                                                                                                               |                            |                        |                |    |
| U-2579D, E & F                                                                                                                                                 | 35                                                                                                                                                                                                                                                                                                                                                                      |                            |                        |                |    |
| RW SHEET NO.                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                         |                            |                        |                |    |
| <p>STV Engineers, Inc.<br/>         900 West Trade St., Suite 715<br/>         Charlotte, NC 28202<br/>         NC License Number F-0991</p>                   | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; padding: 5px;">ROADWAY DESIGN<br/>ENGINEER</td> <td style="width: 50%; text-align: center; padding: 5px;">HYDRAULICS<br/>ENGINEER</td> </tr> <tr> <td style="height: 150px;"></td> <td style="height: 150px;"></td> </tr> </table>                   | ROADWAY DESIGN<br>ENGINEER | HYDRAULICS<br>ENGINEER |                |    |
| ROADWAY DESIGN<br>ENGINEER                                                                                                                                     | HYDRAULICS<br>ENGINEER                                                                                                                                                                                                                                                                                                                                                  |                            |                        |                |    |
|                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                         |                            |                        |                |    |

**D CONSTRUCTION**  
**B- STA. 14+99.10**

11' 2" 16.6' E

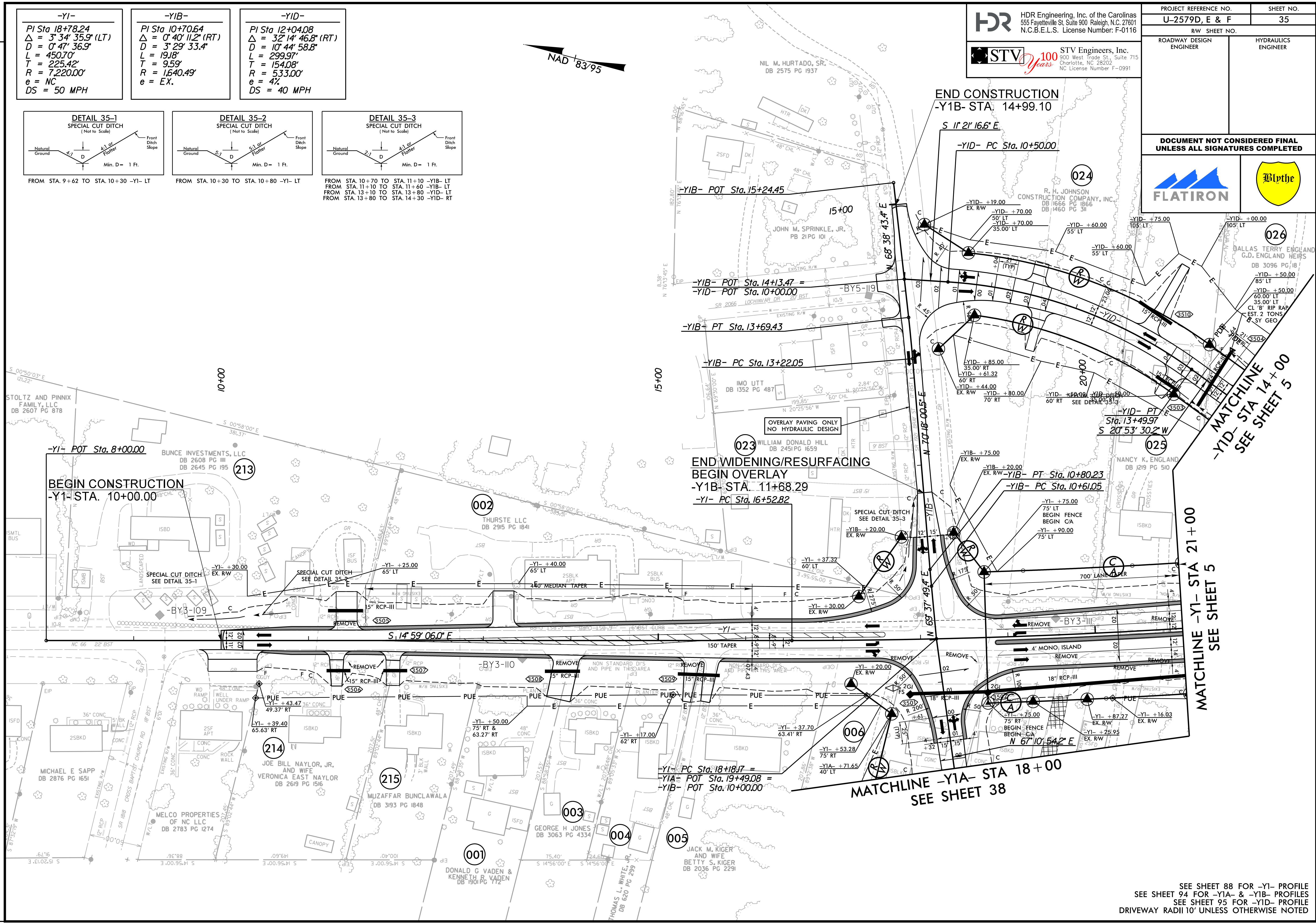
-YID- PC Sta. 10+50.00

-YID- +19.00  
 EX. RW YID +70.00

R. H. JOHNSON  
 CONSTRUCTION COMPANY, INC.  
 DB 1/66 PG 18/66  
 DB 1/66 PG 3/1

**FLATIRON**

**Blythe**



SEE SHEET 88 FOR -Y1- PROFILE  
SEE SHEET 94 FOR -Y1A- & -Y1B- PROFILES  
SEE SHEET 95 FOR -Y1D- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

PLOT DRIVER: NC00T\_pdf\_color\_eng-50.plt      PENTABLE: NC00T\_pshpfl.tbl  
USER: SHILTON      DATE: 11/16/2018      TIME: 3:28:17 PM  
FILE: Flatiron-Construction-Corp.NFlatiron-U-2579.D.E.F.WS6.0.CAD.BIM6.2.WIP\U-2579DEF\Roadway\Proj\U25790DEF\_ROY\_PSH\_35.dgn



REVISIONS

MATCHLINE  
-YIF- STA 16+50  
SEE SHEET 39

MATCHLINE -YIJ- STA 10+10  
SEE SHEET 5

MATCHLINE -YI- STA 48+50  
SEE SHEET 5

MATCHLINE -YIG- STA 14+00  
SEE SHEET 40

-YI-  
PI Sta 51+89.98  
 $\Delta = 13' 17" 31.8" (LT)$   
 $D = 1' 54' 35.5"$   
 $L = 695.98'$   
 $T = 349.56'$   
 $R = 3,000.00'$   
 $e = 3\%$   
 $DS = 50 MPH$

PI Sta 60+64.70  
 $\Delta = 9' 39' 26.5" (RT)$   
 $D = 2' 59' 59.2"$   
 $L = 321.94'$   
 $T = 161.35'$   
 $R = 1,910.00'$   
 $e = 4\%$   
 $DS = 50 MPH$

-YIG-  
PI Sta 14+21.44  
 $\Delta = 15' 41' 13.8" (RT)$   
 $D = 4' 46' 28.7"$   
 $L = 328.55'$   
 $T = 165.31'$   
 $R = 1,200.00'$   
 $e = 6\%$   
 $DS = 40 MPH$

-YIJ-  
PI Sta 11+55.81  
 $\Delta = 8' 59' 18.8" (LT)$   
 $D = 8' 26' 13.3"$   
 $L = 106.54'$   
 $T = 53.38'$   
 $R = 679.10'$   
 $e = 2\%$   
 $DS = 20 MPH$

PI Sta 12+50.86  
 $\Delta = 45' 27' 18.7" (RT)$   
 $D = 57' 17' 44.8"$   
 $L = 79.33'$   
 $T = 41.89'$   
 $R = 100.00'$   
 $e = 2\%$   
 $DS = 20 MPH$

-YIF-  
PI Sta 16+29.17  
 $\Delta = 11' 33' 10.2" (LT)$   
 $D = 6' 17' 21.6"$   
 $L = 136.69'$   
 $T = 92.16'$   
 $R = 911.00'$   
 $e = 5\%$   
 $DS = 40 MPH$

PI Sta 17+88.99  
 $\Delta = 1' 09' 32.9" (RT)$   
 $D = 0' 50' 55.8"$   
 $L = 136.56'$   
 $T = 68.28'$   
 $R = 6,750.00'$   
 $e = NC$   
 $DS = 40 MPH$

PI Sta 19+07.05  
 $\Delta = 0' 50' 55.8" (LT)$   
 $D = 0' 50' 55.8"$   
 $L = 99.57'$   
 $T = 49.79'$   
 $R = 6,750.00'$   
 $e = NC$   
 $DS = 40 MPH$

PI Sta 22+69.58  
 $\Delta = 0' 49' 42.6" (LT)$   
 $D = 0' 50' 55.8"$   
 $L = 97.02'$   
 $T = 48.51'$   
 $R = 6,750.00'$   
 $e = NC$   
 $DS = 40 MPH$

PI Sta 23+96.18  
 $\Delta = 1' 50' 00.6" (RT)$   
 $D = 1' 10' 26.7"$   
 $L = 156.16'$   
 $T = 78.09'$   
 $R = 4,880.00'$   
 $e = RC$   
 $DS = 40 MPH$

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NC License Number F-0991

PROJECT REFERENCE NO.  
U-2579D, E & F

SHEET NO.  
36

ROADWAY DESIGN  
ENGINEER

HYDRAULICS  
ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



NAD 83/95

(218)

OPAL D. MARION  
DB 973 PG 330

(217)

MICHELLE T. CHILTON  
DB 2105 PG 1768

(216)

6253 UNIVERSITY  
PARKWAY LLC  
DB 3039 PG 4087

(219)

MICHAEL T. CLAY  
AND WIFE  
PATSY H. CLAY  
DB 1830 PG 2647

(220)

STANLEYVILLE, LLC  
DB 1945 PG 312

(221)

JAMES H. GILLY, JR.  
DB 2317 PG 3795

END WIDENING/RESURFACING  
BEGIN OVERLAY  
-Y1K- STA. 11+45.03  
OVERLAY PAVING ONLY  
NO HYDRAULIC DESIGN

END CONSTRUCTION  
-Y1K- STA. 15+25.92

-Y1K- POT Sta. 15+28.55

SEE SHEET 89 FOR -Y1- PROFILE  
SEE SHEET 96 FOR -YIF- PROFILE  
SEE SHEET 97 FOR -YIJ- & -YIK- PROFILES  
SEE SHEET 98 FOR -Y1- & -YIK- PROFILES  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED



WATCHLINE -Y1- STA 61+00 SEE SHEET 36

END CONSTRUCTION  
-Y1- STA. 63+55.00

-Y/-

PI Sta 60+64.70  
 $\Delta = 9^{\circ} 39' 26.5" (RT)$   
 $D = 2^{\circ} 59' 59.2"$   
 $L = 321.94'$   
 $T = 161.35'$   
 $R = 1,910.00'$   
 $e = 4\%$   
 $DS = 50 \text{ MPH}$

$PI Sta = 63+44.69$   
 $\Delta = 13^{\circ} 09' 44.4" (RT)$   
 $D = 5' 32" 09.0"$   
 $L = 237.77'$   
 $T = 119.41'$   
 $R = 1,035.00'$   
 $e = 4\%$   
 $DS = 50 MPH$

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USER: SHILTON      DATE: 11/16/2018      TIME: 3:28:46 PM  
FILE: Flatiron.Construction.Corp.\Flatiron-U-2579.D.E.F.WS6.CAD.BITMAPS.2.WTP\U-2579DEF.Roadway\Pro\U2579DEF\_RDV\_PSH\_37.dgn

## REVISIONS

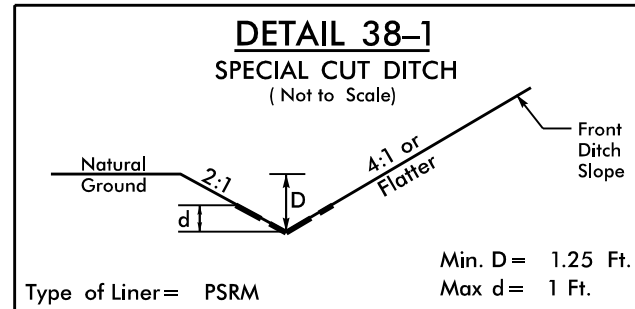
SEE SHEET 90 FOR -Y1- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED



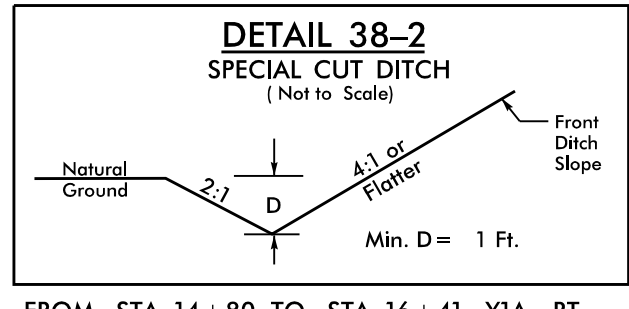
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TIME: 3:29:00 PM  
DATE: 11/16/2018  
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REVISIONS

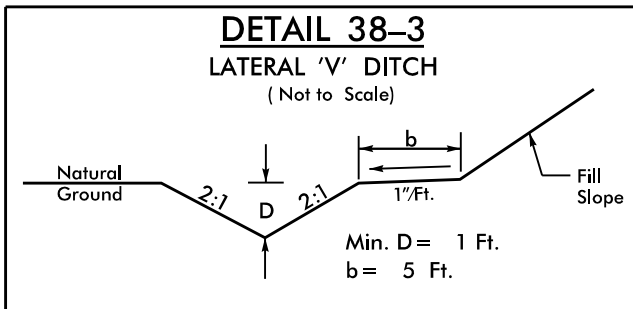
| -Y1A-                        |                               |
|------------------------------|-------------------------------|
| PI Sta 11+16.00              | PI Sta 14+99.96               |
| $\Delta = 1' 11" 51.1" (LT)$ | $\Delta = 22' 46' 56.0" (LT)$ |
| $D = 0' 30' 58.2"$           | $D = 4' 18' 28.6"$            |
| $L = 232.00'$                | $L = 528.84'$                 |
| $T = 116.00'$                | $T = 267.96'$                 |
| $R = 11,000.00'$             | $R = 1,330.00'$               |
| $e = NC$                     | $e = 6\%$                     |
| $DS = 60 MPH$                | $DS = 60 MPH$                 |



FROM STA. 14+80 TO STA. 10+80 -Y1A- LT

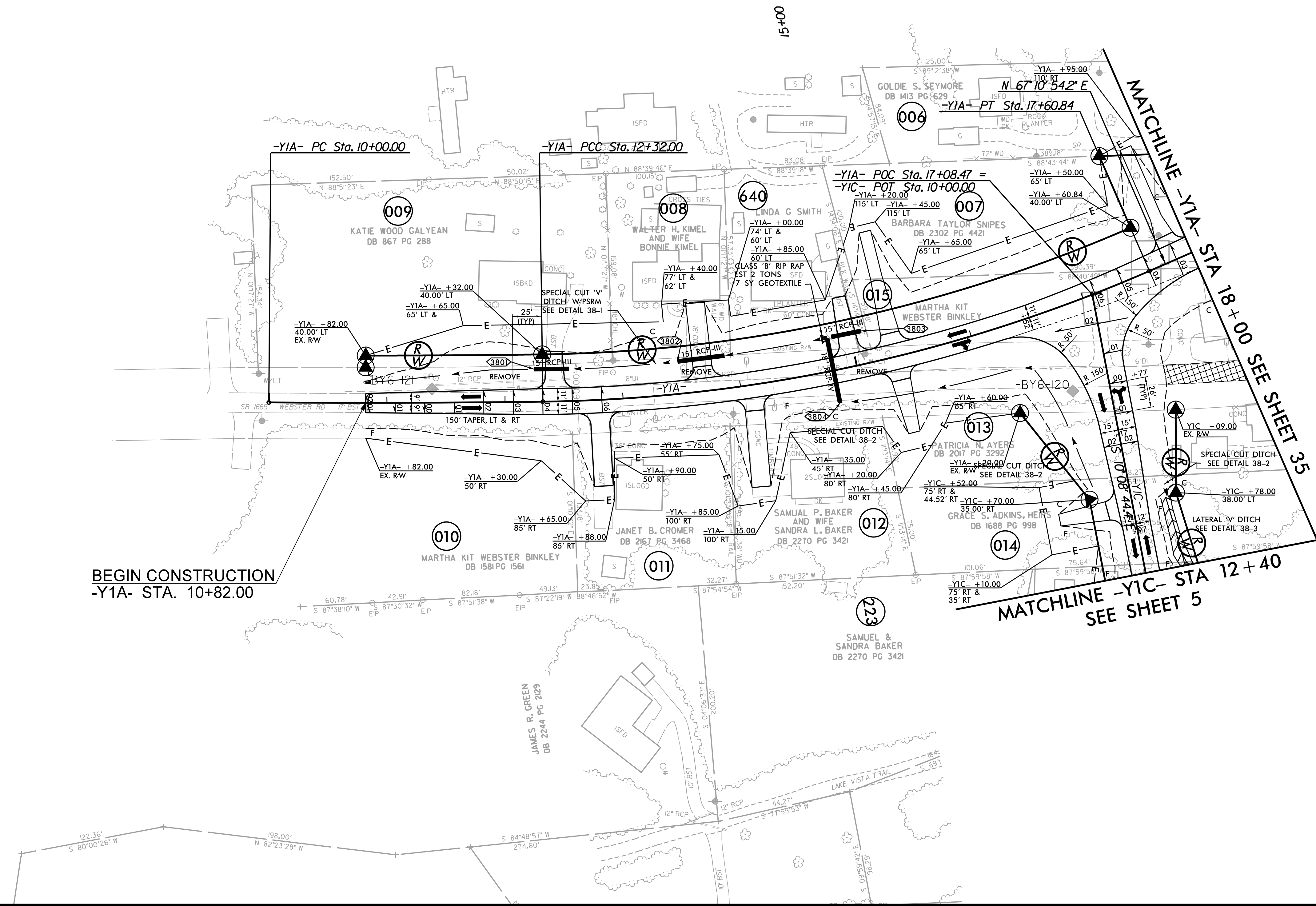
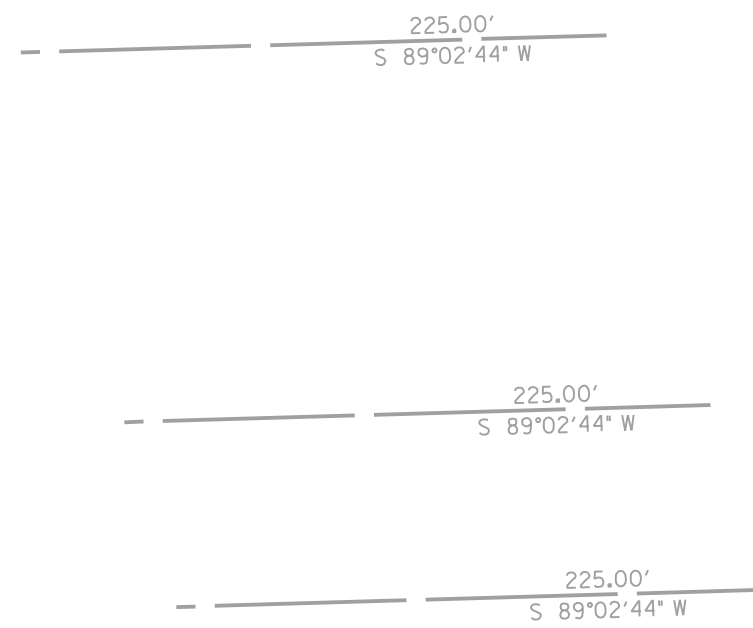


FROM STA. 14+80 TO STA. 16+41 -Y1A- RT  
FROM STA. 10+59 TO STA. 11+60 -Y1C- RT  
FROM STA. 11+69 TO STA. 11+80 -Y1C- LT



FROM STA. 11+80 TO STA. 12+40 -Y1C- LT

NAD 83/95



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Charlotte, NC 28202  
NC License Number F-0991

PROJECT REFERENCE NO. SHEET NO.

U-2579D, E & F 38

RW SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



SEE SHEET 94 FOR -Y1A- PROFILE  
SEE SHEET 95 FOR -Y1C- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED



SEE SHEET 96 FOR -Y1F- PROFILE  
SEE SHEET 97 FOR -Y1I"- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

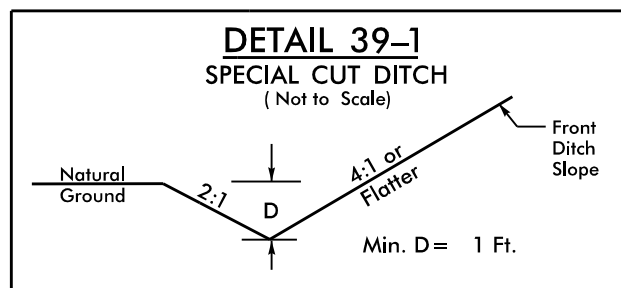
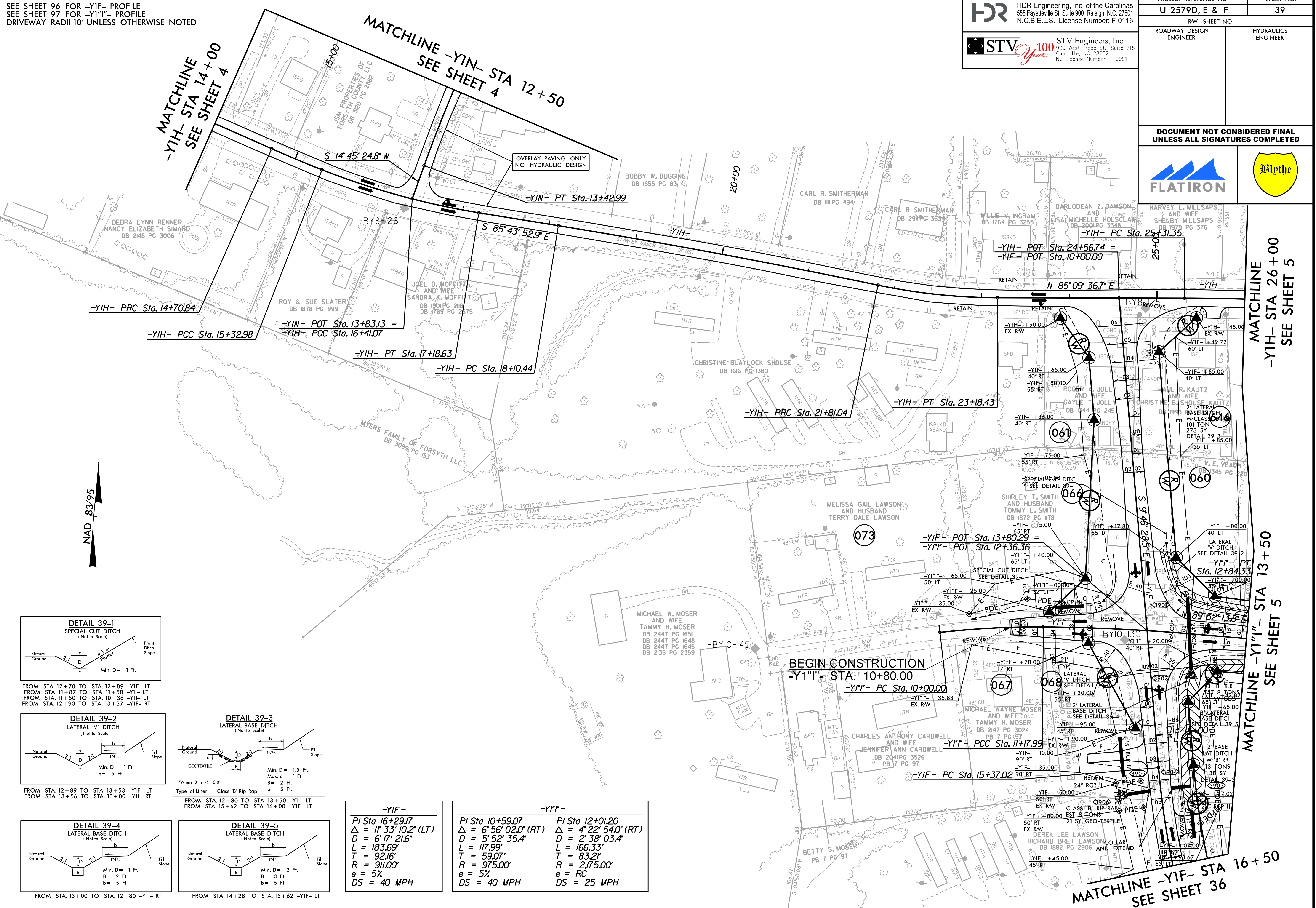
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STV 100 Years STV Engineers, Inc.  
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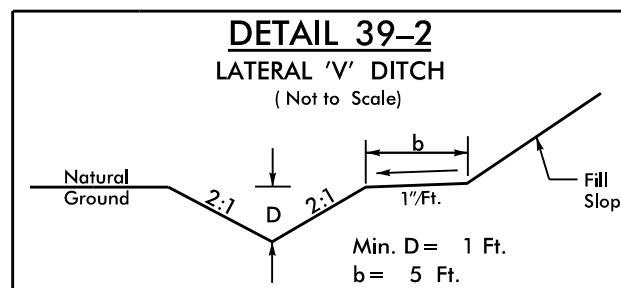
PROJECT REFERENCE NO. SHEET NO.  
U-2579D, E & F 39

RW SHEET NO.  
ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

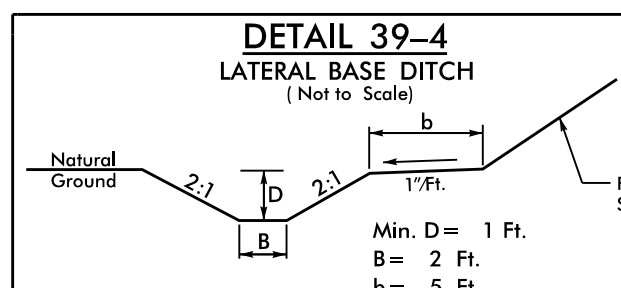
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



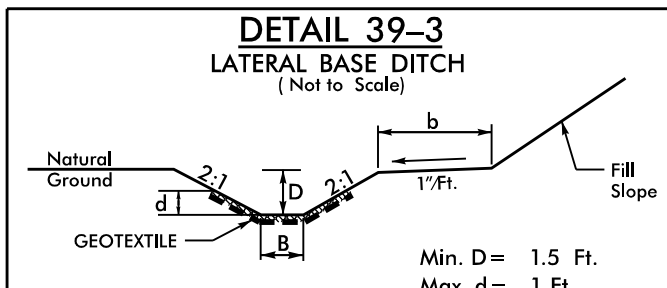
FROM STA. 12+70 TO STA. 12+89 -Y1F- LT  
FROM STA. 11+87 TO STA. 11+50 -Y1I- LT  
FROM STA. 11+50 TO STA. 10+36 -Y1I- LT  
FROM STA. 12+90 TO STA. 13+37 -Y1I- RT



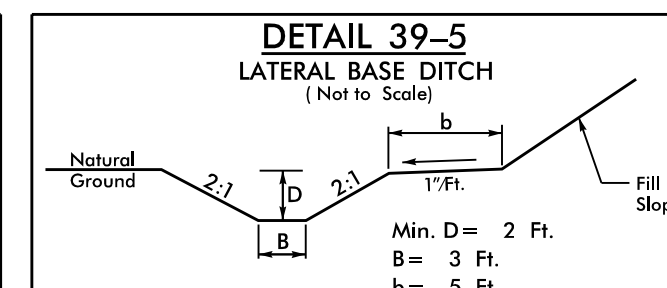
FROM STA. 12+89 TO STA. 13+53 -Y1F- LT  
FROM STA. 13+56 TO STA. 13+00 -Y1I- RT



FROM STA. 13+00 TO STA. 12+80 -Y1I- RT



FROM STA. 12+80 TO STA. 13+50 -Y1I- LT  
FROM STA. 15+62 TO STA. 16+00 -Y1F- LT



FROM STA. 14+28 TO STA. 15+62 -Y1I- LT

-Y1F-  
PI Sta 16+29.7  
 $\Delta = 11^{\circ} 33' 10.2''$  (LT)  
D = 6' 17" 21.6"  
L = 183.69'  
T = 92.16'  
R = 911.00'  
e = 5%  
DS = 40 MPH

-Y1I"-  
PI Sta 10+59.07  
 $\Delta = 6^{\circ} 56' 02.0''$  (RT)  
D = 5' 52" 35.4"  
L = 117.99'  
T = 59.07'  
R = 975.00'  
e = 5%  
DS = 40 MPH

PI Sta 12+01.20  
 $\Delta = 4^{\circ} 22' 54.0''$  (RT)  
D = 2' 38" 03.4"  
L = 166.33'  
T = 83.21'  
R = 2,175.00'  
e = RC  
DS = 25 MPH



~~NAD 83/95~~

OVERLAY PAVING ONLY  
NO HYDRAULIC DESIGN

-YIM- PC Sta. 19+27.14

X-YIM- PT Sta. 19+98.05

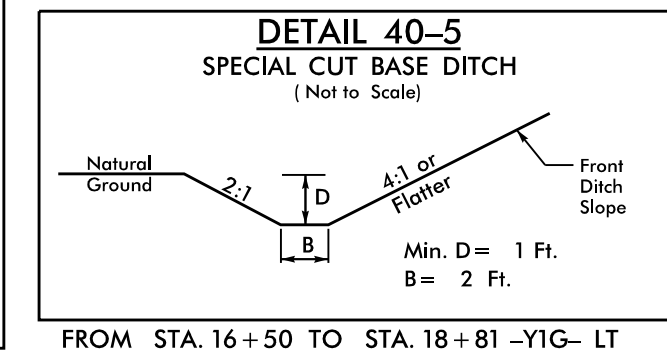
-YIG- POT Sta. 19+79.43

END CONSTRUCTION  
-Y1G- STA. 19+37.98

$\frac{-YIM - POT \text{ Sta. } 22+87.65}{-YIG - POT \text{ Sta. } 19+09.02}$

END WIDENING/RESURFACING  
BEGIN OVERLAY  
-Y1G- STA. 18+80.00

|                        |  |
|------------------------|--|
| -YIG- PT Sta. 15+84.68 |  |
|------------------------|--|

[illegible]

SEE SHEET 97 FOR -YIG- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

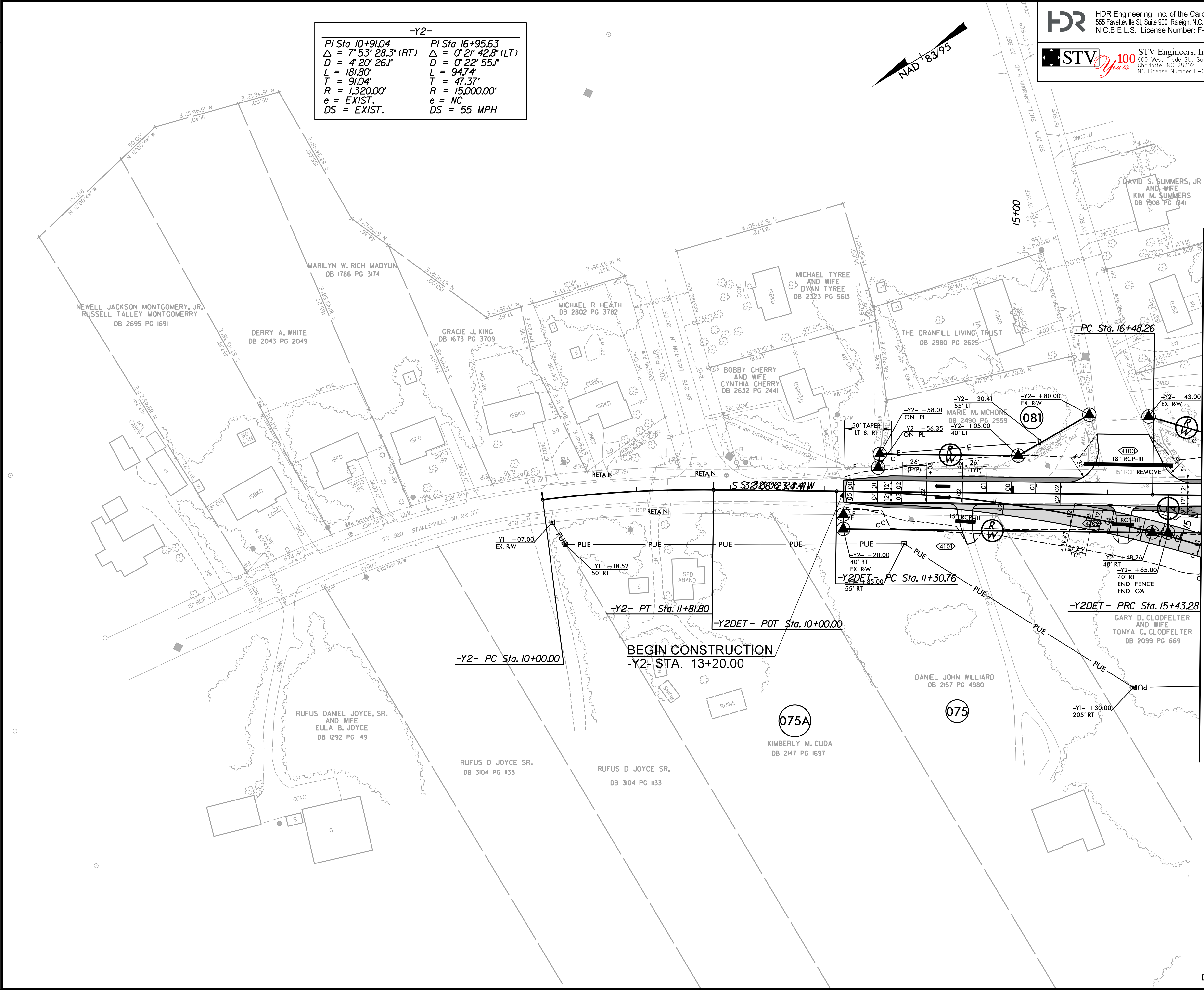
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USER: SHILTON  
DATE: 11/16/2018  
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FTFILE: Flatiron-Construction.Corp.\Flatiron-U-2579.D\F.WS6.0-CAD\_BITMAP.2-WIP\U-2579DEF\_RDY\_PSH\_40.dgn



PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
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PENTABLE: NCDOT\_pshp.fltd  
TIME: 3:29:44 PM  
DATE: 11/16/2018

REVISIONS



| -Y2-                                |                                     |
|-------------------------------------|-------------------------------------|
| PI Sta 10+91.04                     | PI Sta 16+95.63                     |
| $\Delta = 7^{\circ} 53' 28.3" (RT)$ | $\Delta = 0^{\circ} 21' 42.8" (LT)$ |
| $D = 4^{\circ} 20' 26.1"$           | $D = 0^{\circ} 22' 55.1"$           |
| $L = 181.80'$                       | $L = 94.74'$                        |
| $T = 91.04'$                        | $T = 47.37'$                        |
| $R = 1,320.00'$                     | $R = 15,000.00'$                    |
| $e = EXIST.$                        | $e = NC$                            |
| $DS = EXIST.$                       | $DS = 55 MPH$                       |

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100 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

|                                                    |                        |
|----------------------------------------------------|------------------------|
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b> | SHEET NO.<br><b>41</b> |
| RW SHEET NO.                                       |                        |
| ROADWAY DESIGN ENGINEER                            | HYDRAULICS ENGINEER    |

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

MATCHLINE -Y2- STA 17+00 SEE SHEET 7

SEE SHEET 99 FOR -Y2- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

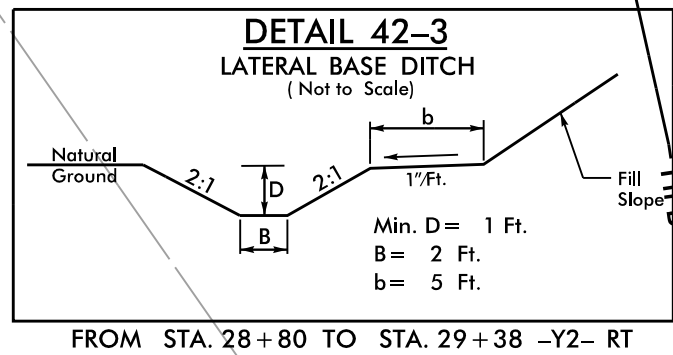
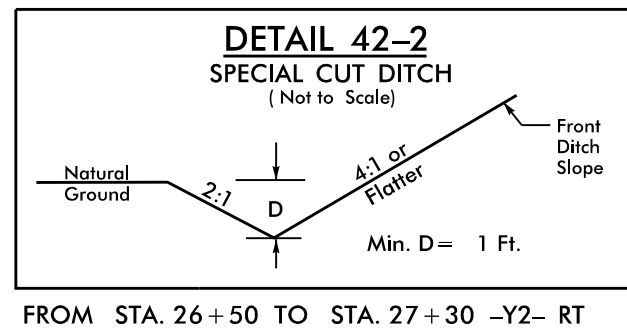
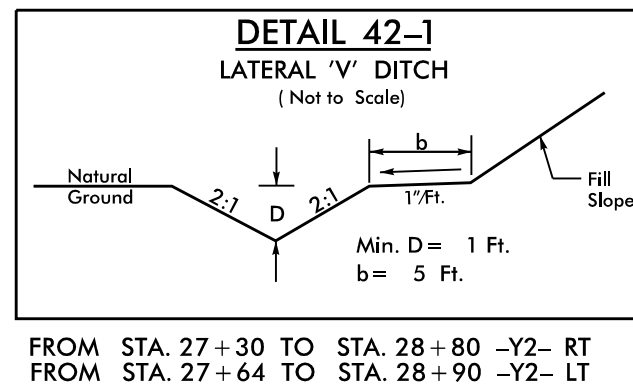


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USER: SHILTON  
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PENTABLE: NCDOT\_dshp.fltd  
TIME: 3:29:58 PM  
DATE: 11/16/2018

REVISIONS

MATCHLINE -Y2- STA 26+00 SEE SHEET 7

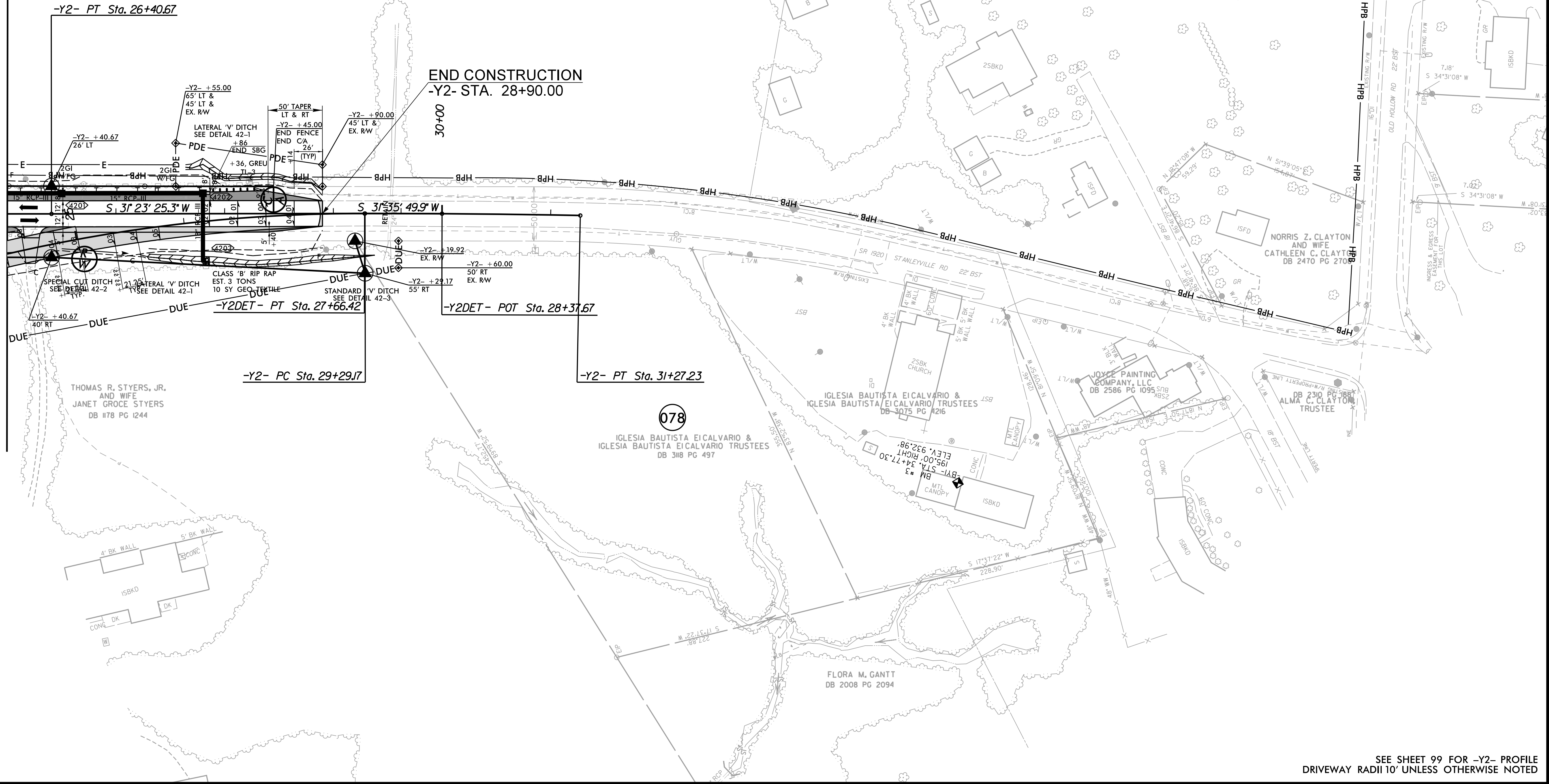
| -Y2-                                                                                                                                                             |                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PI Sta 25+94.30<br>$\Delta = 0^\circ 21' 15.3" (LT)$<br>$D = 0^\circ 22' 55.1"$<br>$L = 92.74'$<br>$T = 46.37'$<br>$R = 15,000.00'$<br>$e = NC$<br>$DS = 55 MPH$ | PI Sta 30+28.20<br>$\Delta = 1^\circ 12' 21.4" (RT)$<br>$D = 0^\circ 36' 32.0"$<br>$L = 198.06'$<br>$T = 99.03'$<br>$R = 9,410.00'$<br>$e = EXIST.$<br>$DS = EXIST.$ |



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Charlotte, NC 28202  
NC License Number F-0991

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| PROJECT REFERENCE NO.      |  | SHEET NO.              |  |
| U-2579D, E & F             |  | 42                     |  |
| R/W SHEET NO.              |  |                        |  |
| ROADWAY DESIGN<br>ENGINEER |  | HYDRAULICS<br>ENGINEER |  |
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SEE SHEET 99 FOR -Y2- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED





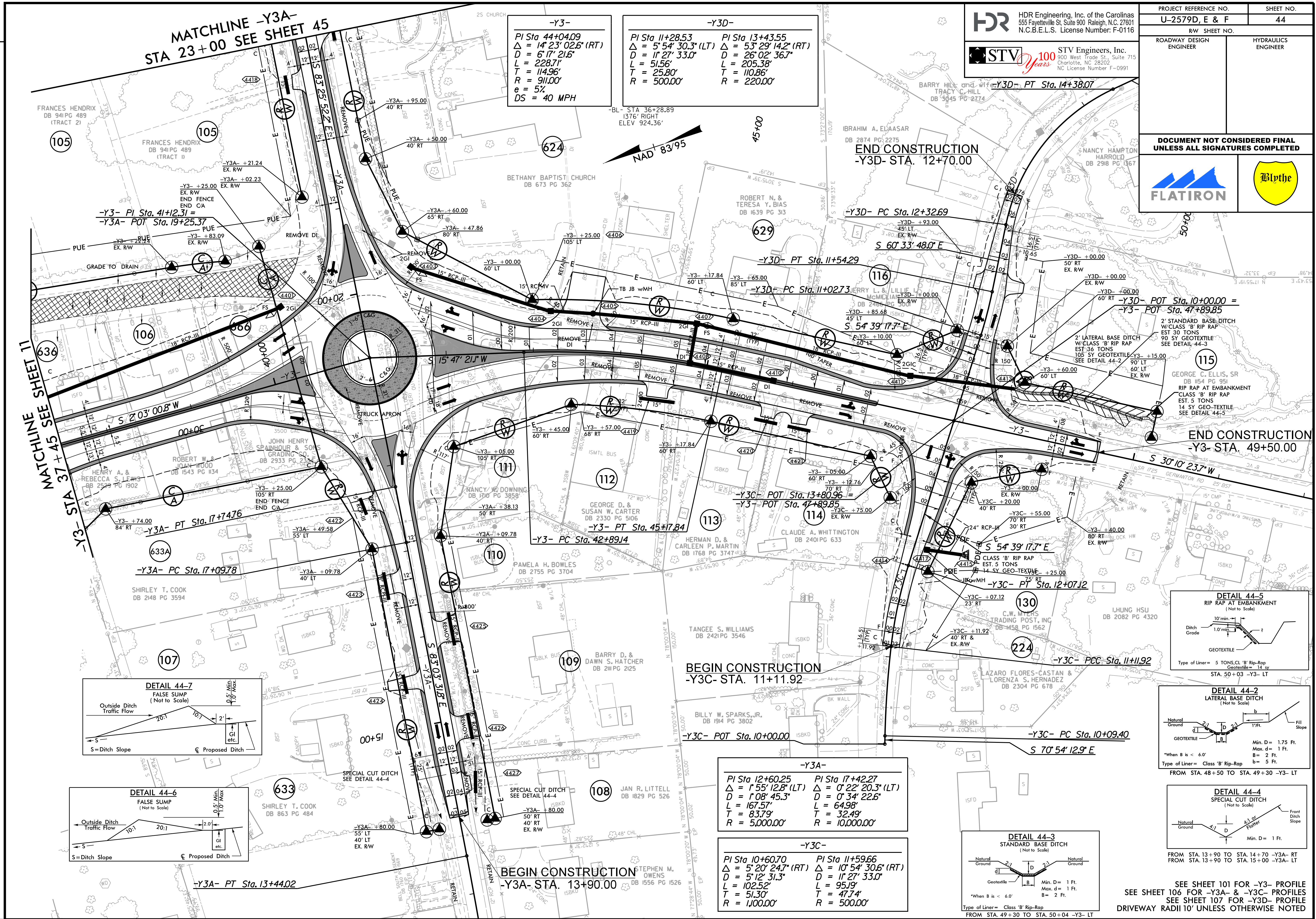
SEE SHEET 100 FOR -Y3- PROFILE  
SEE SHEET 106 FOR -Y3B- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

PLOT DRIVER: NC00T\_pdf\_color\_eng\_50.plt      PENTABLE: NC00T\_pspstfi.tbl  
USER: SHILTON      DATE: 11/16/2018      TIME: 3:30:14 PM  
FILE: Flatiron-Construction.Corp.\Flatiron-U-2579.D.E.\MS6.0-CAD\_BITMAP.2-WIP\U-2579DEF\_RDV\_PSH\_43.dgn

PENTABLE: NCDOT\_pshpfl.tbi  
TIME: 3:30:14 PM

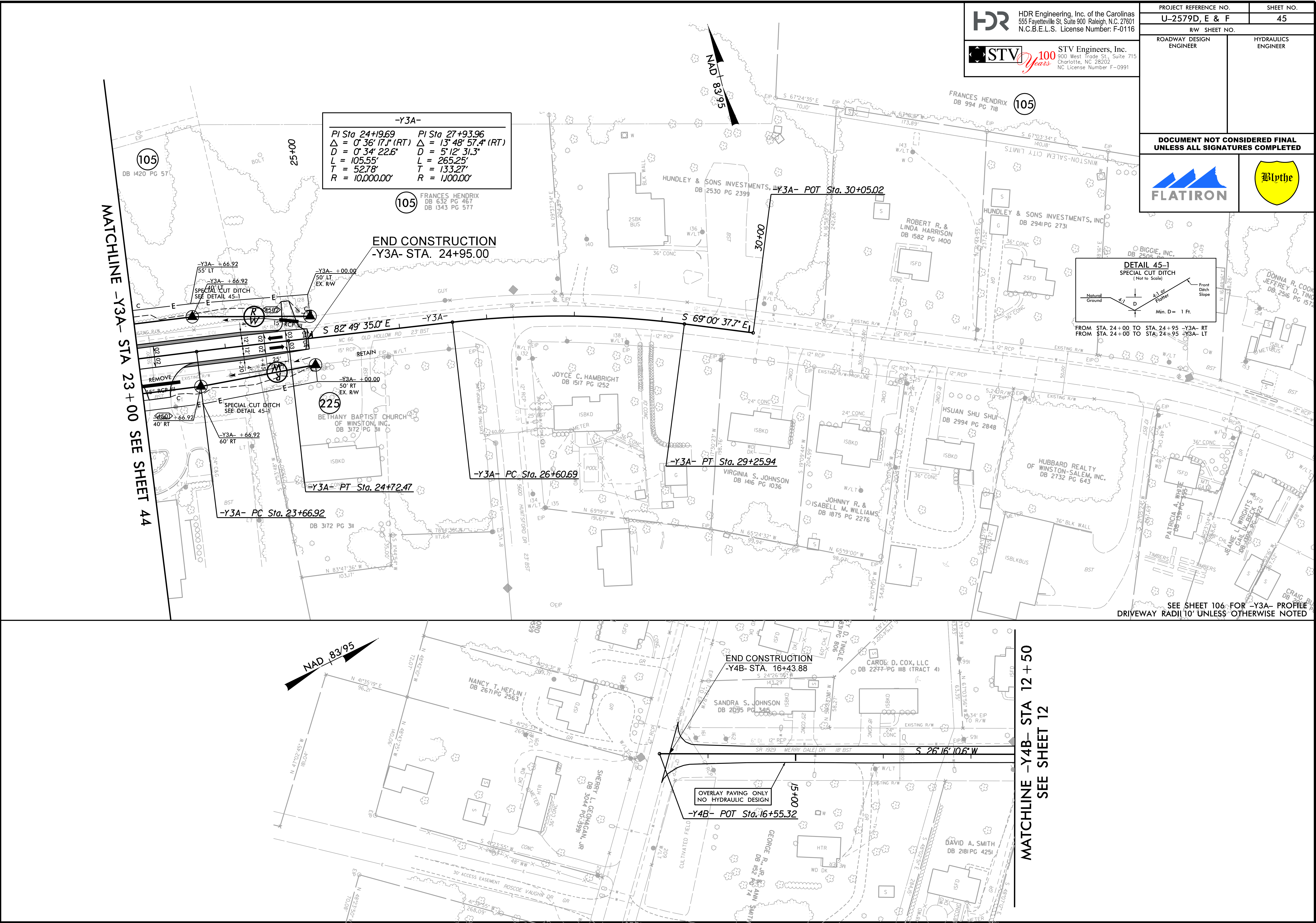
PLOT DRIVER: NCDOT\_pdf\_color\_eng\_50.plt  
USER: SHILTON DATE: 11/16/2018







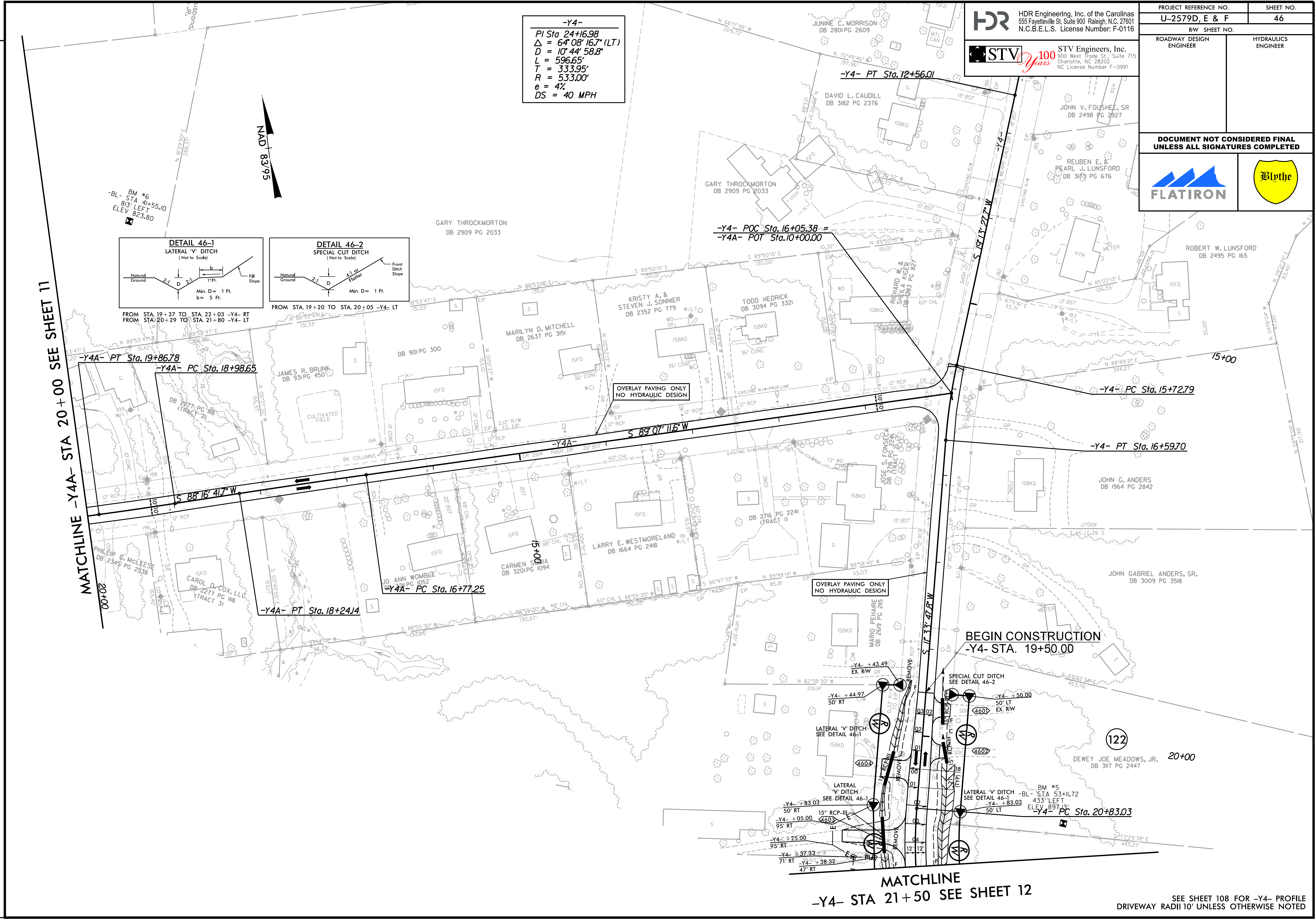
REVISIONS



|                                                                                                                                                |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
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| <b>STV</b> STV Engineers, Inc.<br>800 West Trade St., Suite 715<br>Charlotte, NC 28202<br>NC License Number F-0991                             |                        |
| PROJECT REFERENCE NO.<br><b>U-2579D, E &amp; F</b>                                                                                             |                        |
| SHEET NO.<br><b>45</b>                                                                                                                         |                        |
| RW SHEET NO.                                                                                                                                   |                        |
| ROADWAY DESIGN<br>ENGINEER                                                                                                                     | HYDRAULICS<br>ENGINEER |
| DOCUMENT NOT CONSIDERED FINAL<br>UNLESS ALL SIGNATURES COMPLETED                                                                               |                        |
| <b>FLATIRON</b>                                                                                                                                | <b>Blythe</b>          |



REVISIONS





PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
USER: SHILTON  
FILE: Flatiron.Construction.Corp.\Flatiron-U-2579.D.E.F.WS\6.0.CAD.BTM  
PENTABLE: NCDOT\_color\_eng\_50.plt  
TIME: 3:31:17 PM  
DATE: 11/16/2018  
WIP-U-2579DEF.Roadway\Project\U2579DEF.\_RDY\_PSH\_47.dgn

REVISIONS

| -Y5-                              |                                    |
|-----------------------------------|------------------------------------|
| PI Sta 12+90.18                   | PI Sta 17+97.76                    |
| $\Delta = 8^{\circ}31'18.6"$ (LT) | $\Delta = 17^{\circ}27'45.0"$ (LT) |
| D = 2'07'19.4"                    | D = 2'51'53.2"                     |
| L = 401.58'                       | L = 609.56'                        |
| T = 201.16'                       | T = 307.16'                        |
| R = 2,700.00'                     | R = 2,000.00'                      |
| e = 4%                            | e = 5%                             |
| DS = 50 MPH                       | DS = 50 MPH                        |

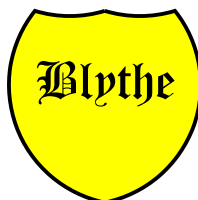
NAD 83/95

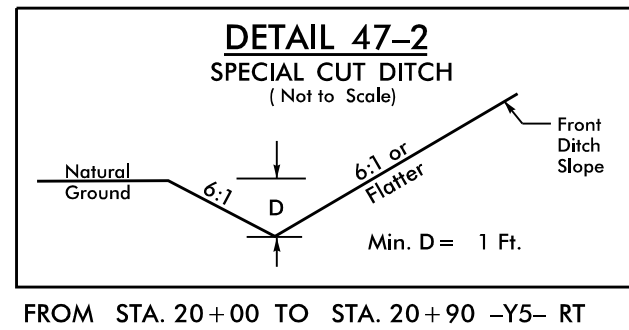
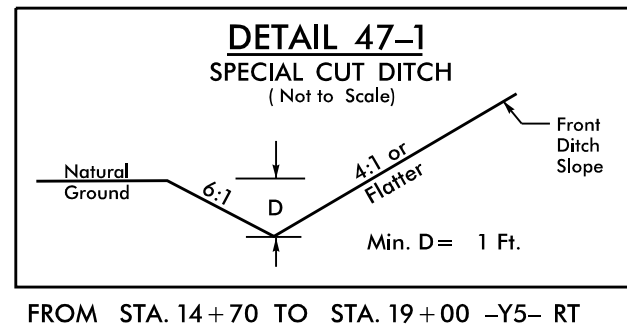
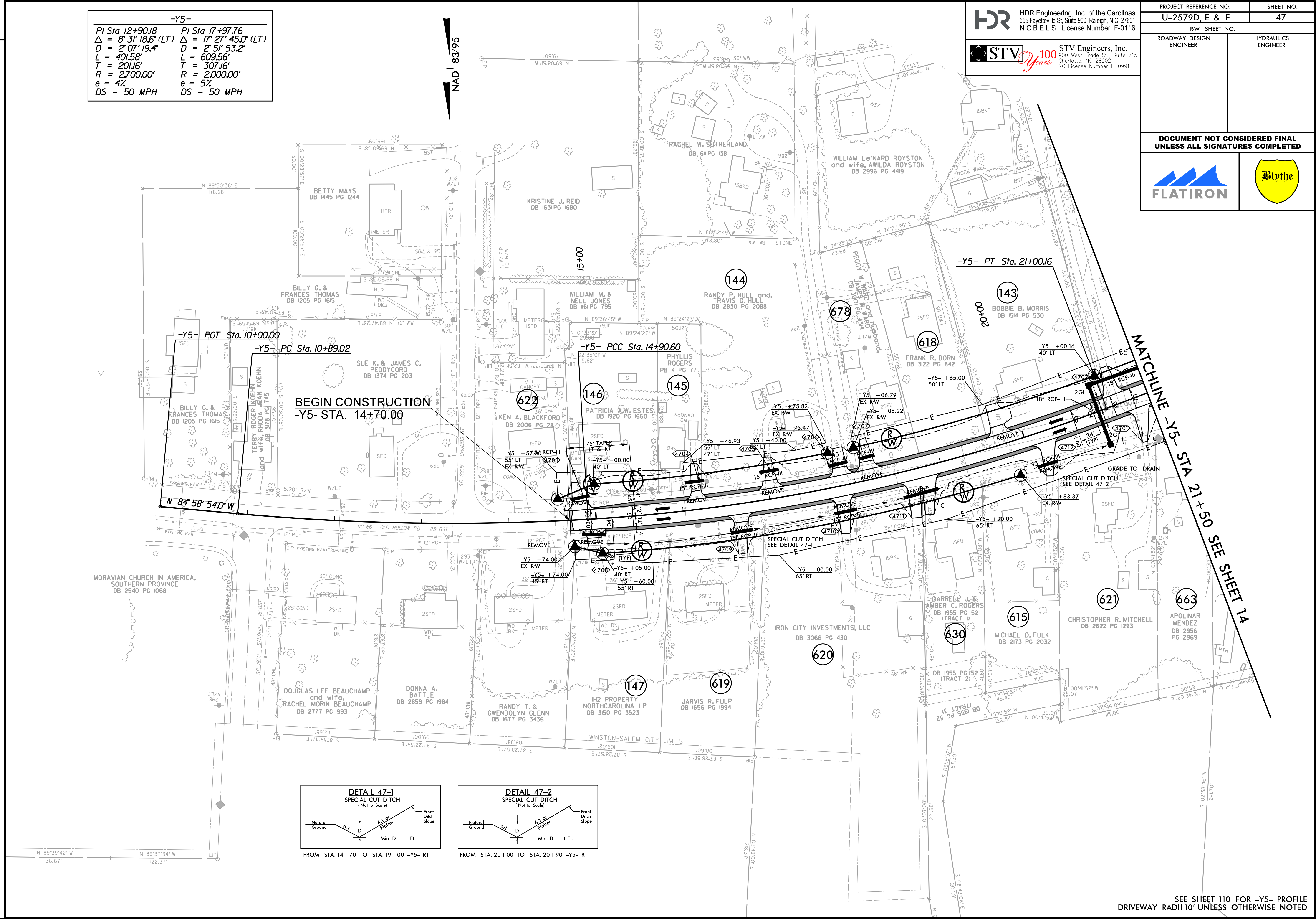


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|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                           |  |
| U-2579D, E & F                                                                      |  | 47                                                                                  |  |
| R/W SHEET NO.                                                                       |  |                                                                                     |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | HYDRAULICS<br>ENGINEER                                                              |  |
| <div>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</div>        |  |                                                                                     |  |
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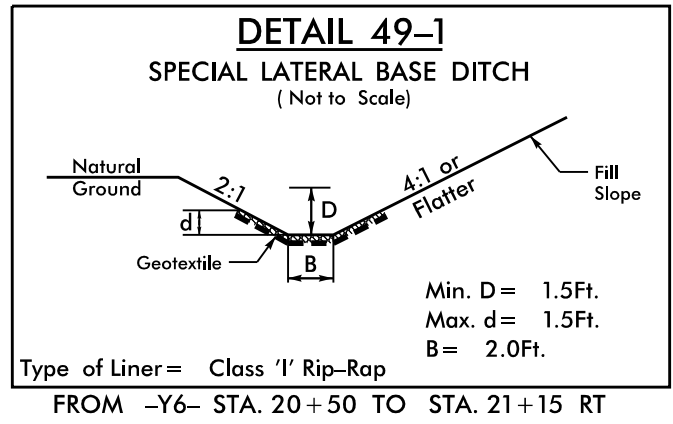


SEE SHEET 110 FOR -Y5- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED







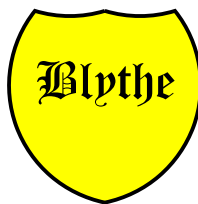


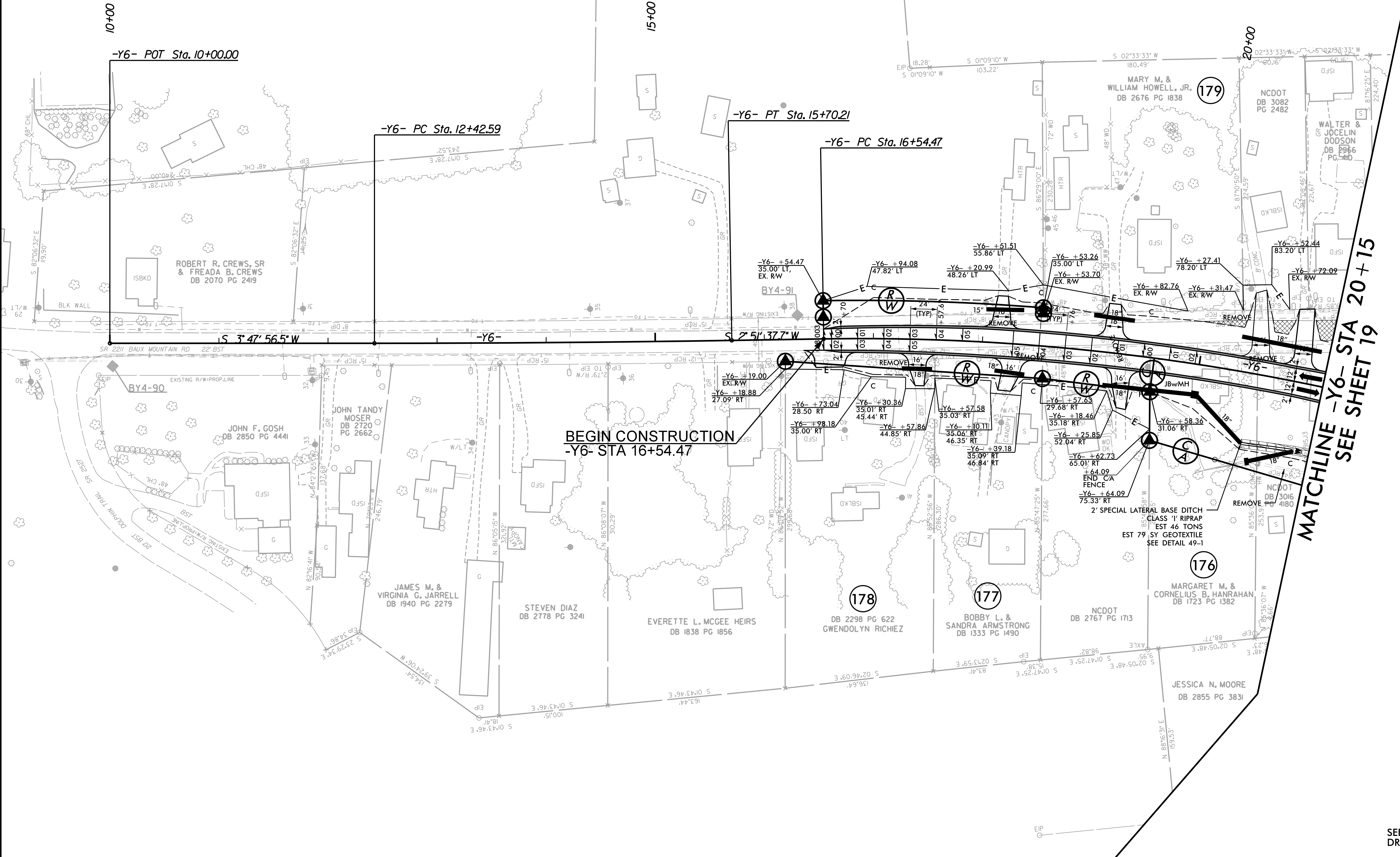
| -Y6-                                 |                                       |
|--------------------------------------|---------------------------------------|
| PI Sta 14+06.40                      | PI Sta 19+72.93                       |
| $\Delta = 0^{\circ} 56' 18.8''$ (LT) | $\Delta = 17^{\circ} 44' 43.9''$ (RT) |
| D = 0' 17' 11.3"                     | D = 2' 48' 32.0"                      |
| L = 327.62'                          | L = 631.76'                           |
| T = 163.81'                          | T = 318.46'                           |
| R = 20,000.00'                       | R = 2,040.00'                         |
| e = NC                               | RUNOFF = 120'                         |
| DS = 50 MPH                          | e = 5%                                |
|                                      | DS = 50 MPH                           |

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NC License Number F-0991



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|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| PROJECT REFERENCE NO.                                                               |  | SHEET NO.                                                                           |  |
| U-2579D, E & F                                                                      |  | 49                                                                                  |  |
| RW SHEET NO.                                                                        |  |                                                                                     |  |
| ROADWAY DESIGN<br>ENGINEER                                                          |  | HYDRAULICS<br>ENGINEER                                                              |  |
| <div>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</div>        |  |                                                                                     |  |
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SEE SHEET 112 FOR -Y6- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED

REVISIONS



REVISIONS

MATCHLINE -Y6- STA 35+00  
SEE SHEET 19

| -Y6-                                |                                     |
|-------------------------------------|-------------------------------------|
| PI Sta 36+43.67                     | PI Sta 45+08.48                     |
| $\Delta = 22^\circ 32' 00.2''$ (RT) | $\Delta = 17^\circ 09' 35.4''$ (LT) |
| $D = 2^\circ 48' 32.0''$            | $D = 5^\circ 18' 25.4''$            |
| $L = 802.21'$                       | $L = 323.34'$                       |
| $T = 406.40'$                       | $T = 162.95'$                       |
| $R = 2,040.00'$                     | $R = 1,080.00'$                     |
| $RUNOFF = 120'$                     | $RUNOFF = 168'$                     |
| $e = 5\%$                           | $e = 7\%$                           |
| $DS = 50$ MPH                       | $DS = 50$ MPH                       |

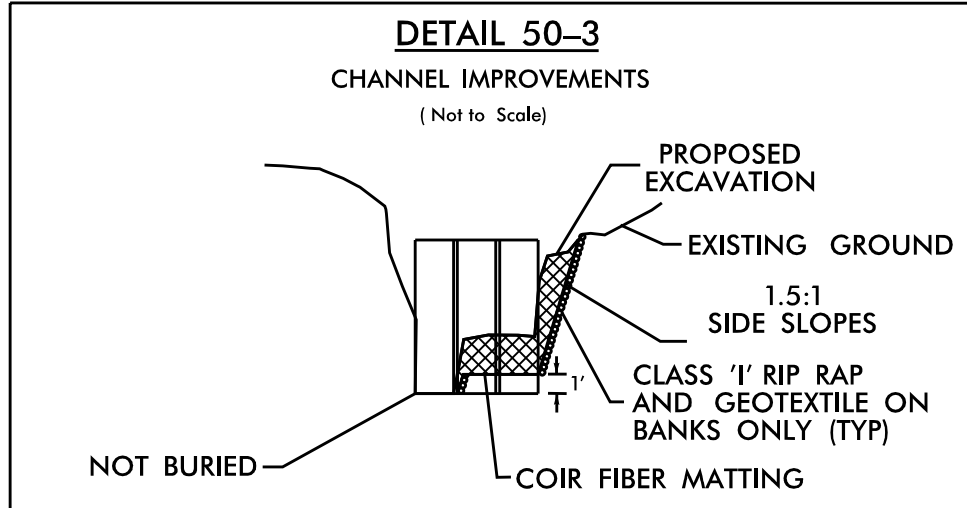
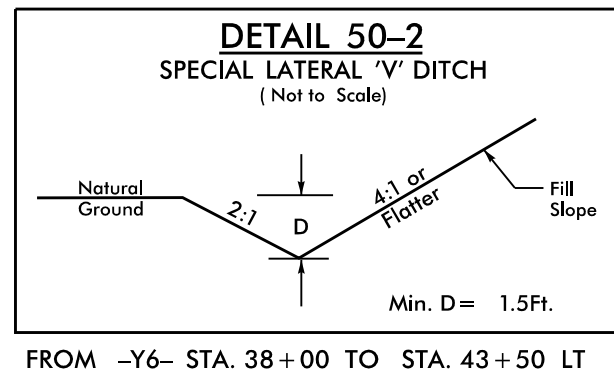
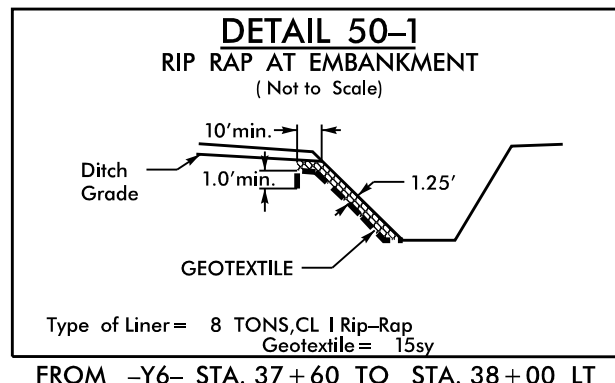
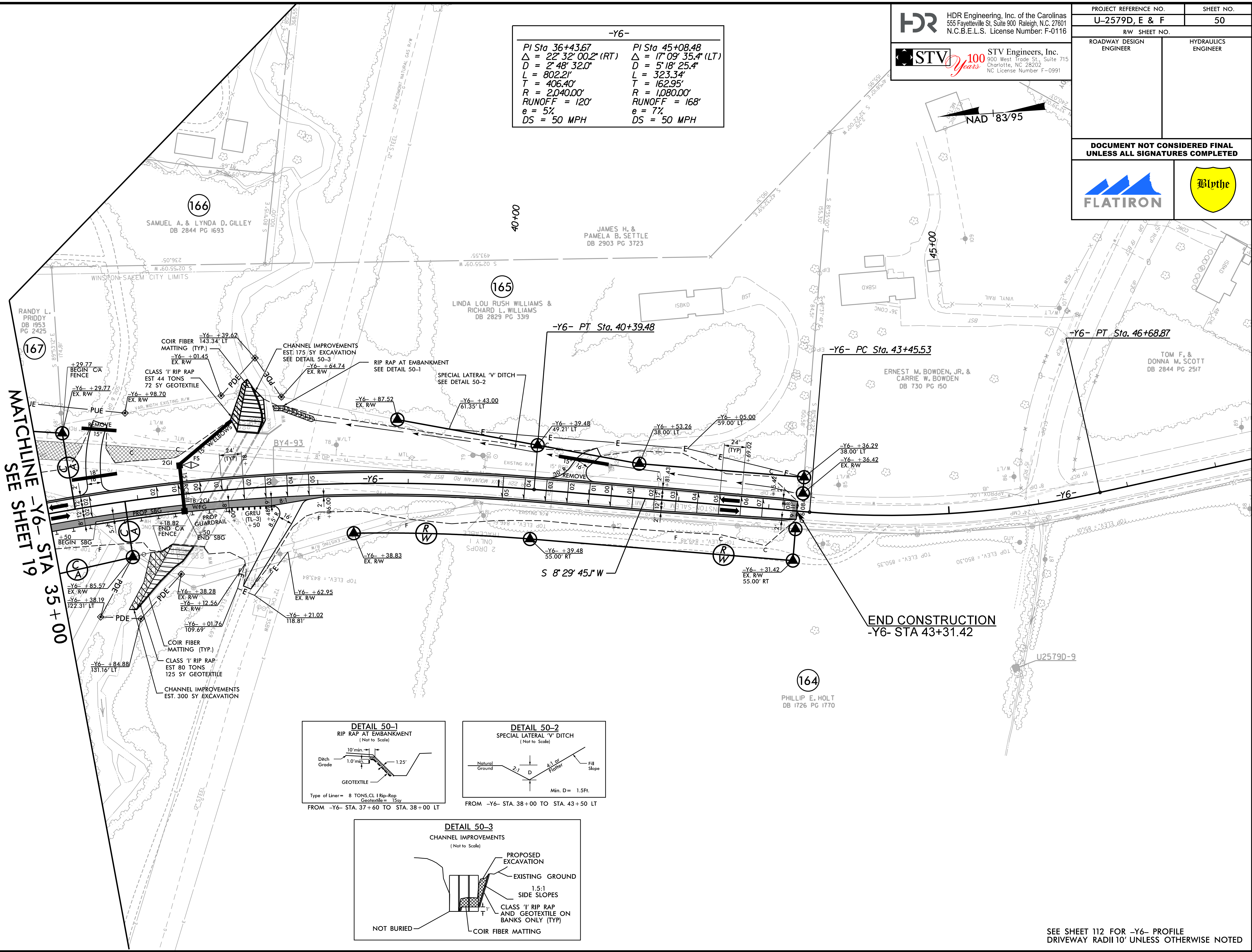


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Charlotte, NC 28202  
NC License Number F-0991

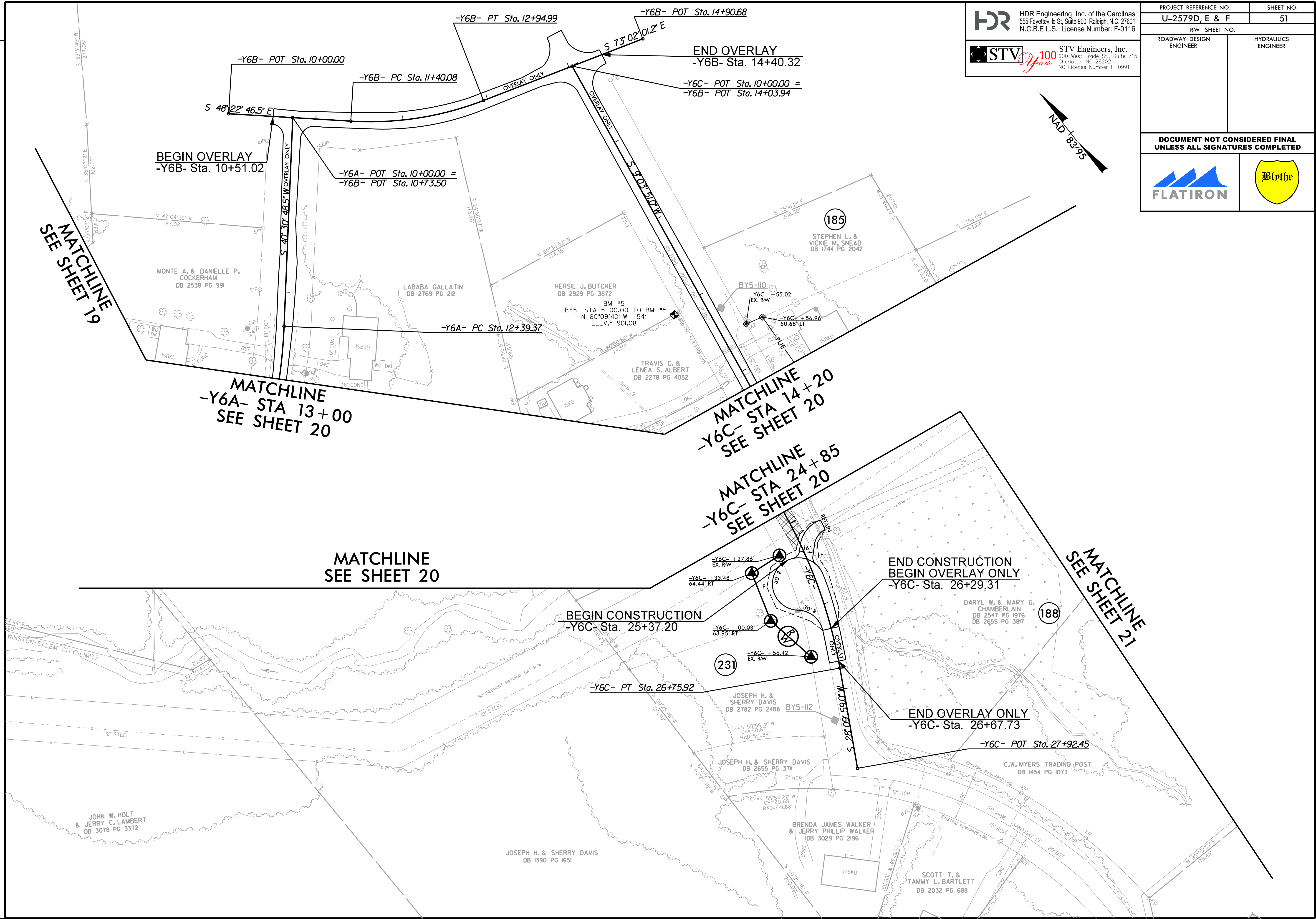
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| PROJECT REFERENCE NO.      |  | SHEET NO.              |  |
| U-2579D, E & F             |  | 50                     |  |
| RW SHEET NO.               |  |                        |  |
| ROADWAY DESIGN<br>ENGINEER |  | HYDRAULICS<br>ENGINEER |  |
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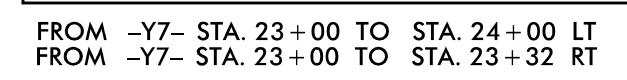
SEE SHEET 112 FOR -Y6- PROFILE  
DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED



REVISIONS





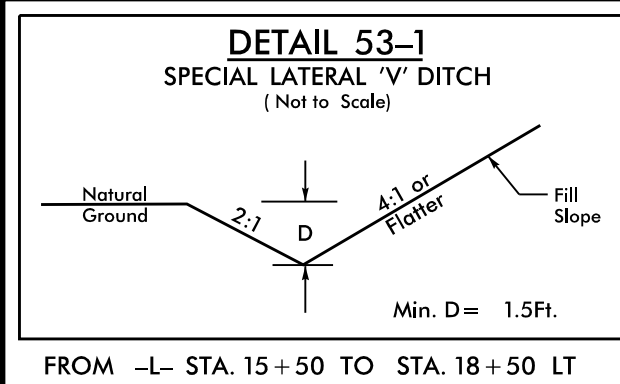


$PI\ Sta\ 24+45.46$   
 $\Delta = 32^\circ 36' 42.0'' (RT)$   
 $D = 8^\circ 03' 30.5''$   
 $L = 404.69'$   
 $T = 207.99'$   
 $R = 711.00'$   
 $RUNOFF = 96'$   
 $e = 4\%$   
 $DS = 45\ MPH$



```
USER: wrightep
FILE: \
```





| -Y8-                               |                                   | -Y8DRI-                            |
|------------------------------------|-----------------------------------|------------------------------------|
| PI Sta 13+35.08                    | PI Sta 20+18.34                   | PI Sta 10+68.97                    |
| $\Delta = 16^{\circ}42'59.5"$ (LT) | $\Delta = 5^{\circ}59'19.2"$ (LT) | $\Delta = 29^{\circ}13'01.2"$ (RT) |
| D = 3'34'51.6"                     | D = 6'11'14.8"                    | D = 38'11'49.9"                    |
| L = 466.81'                        | L = 840.23'                       | L = 76.49'                         |
| T = 235.08'                        | T = 451.53'                       | T = 39.10'                         |
| R = 1,600.00'                      | R = 926.00'                       | R = 150.00'                        |
| RUNOFF = N/A                       | RUNOFF = 96'                      | RUNOFF = NA                        |
| e = EXIST                          | e = 4%                            | e = NC                             |
| DS = 50 MPH                        | DS = 50 MPH                       | DS = NA                            |



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Charlotte, NC 28202  
NC License Number F-0991

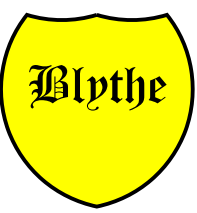
PROJECT REFERENCE NO.  
**U-2579D, E & F**

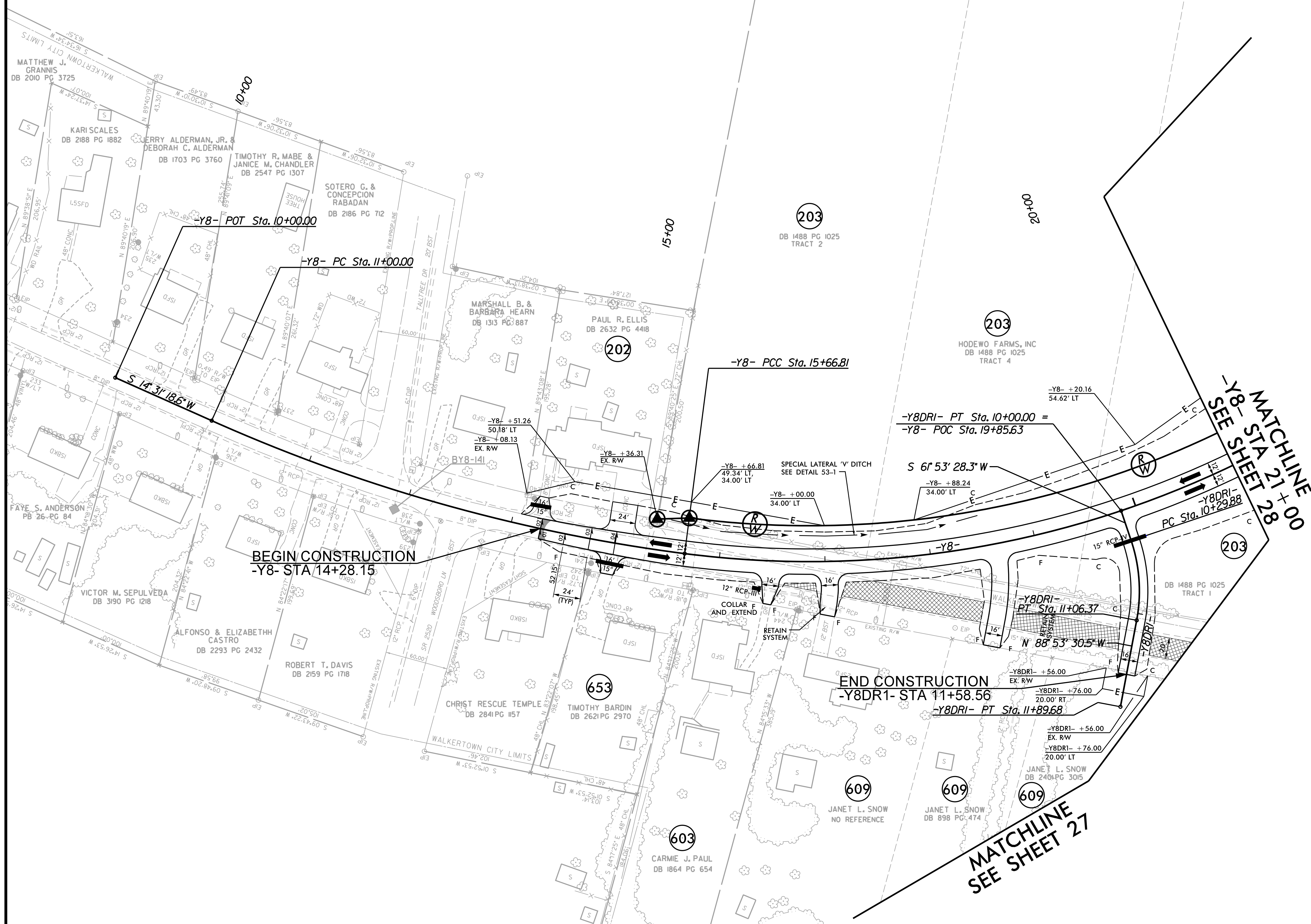
SHEET NO.  
**53**

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED





PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
USER: wrightep  
FILE: \

PENTABLE: NCDOT\_color\_eng\_50.plt  
DATE: 11/16/2018  
TIME: 11:17:59 AM

DRIVEWAY RADII 10' UNLESS OTHERWISE NOTED  
SEE SHEET 118 FOR -Y8- PROFILE



PI Sta 18+24.12  
 $\Delta = 137^{\circ} 46' 42''$  (RT)  
 $D = 22^{\circ} 55' 05.9''$   
 $L = 601.17'$   
 $T = 647.53'$   
 $R = 250.00'$   
 $RUNOFF = 80'$   
 $e = 4\%$   
 $DS = 30 \text{ MPH}$

NAD 83/95

**MATCHLINE  
SEE SHEET 27**

AHMAD A. DEEB &  
SIHAM RAHHAL  
DB 2790 PG 1100

10+01

-Y8A- PC Sta. II+76.59

-10A-

SHIRLEY W. NOAH  
DB 1841 PG 1351

235

REY S. NOAH  
2033 PG 2227

**MATCHLINE**  
**-Y8A- STA 12 + 60**  
**SEE SHEET 28**

**MATCHLINE**  
**SEE SHEET 55**

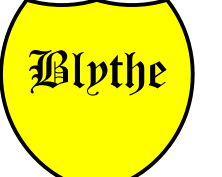
## REVISIONS

PENTABLE: NCDOT\_pshpfl.tb  
TIME: 11:18:02 AM

ng\_50.plt  
DATE: 11/16/2018

PLOT DRIVER: NCDOT\_pdf\_color\_eng\_50.plt  
USER: wrightep      DATE: 11/





|                                                                                                                                                                                                                            |                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>PI Sta</i> 22+39.49<br>$\Delta = 8^{\circ} 23' 44.1''$ (RT)<br><i>D</i> = 5' 43" 46.5"<br><i>L</i> = 146.53'<br><i>T</i> = 73.40"<br><i>R</i> = 1,000.00'<br><i>RUNOFF</i> = N/A<br><i>e</i> = EXIST<br><i>DS</i> = N/A | <i>PI Sta</i> 25+44.87<br>$\Delta = 23^{\circ} 34' 16.1''$ (LT)<br><i>D</i> = 22' 55" 05.9"<br><i>L</i> = 102.85'<br><i>T</i> = 52.16"<br><i>R</i> = 250.00'<br><i>RUNOFF</i> = N/A<br><i>e</i> = EXIST<br><i>DS</i> = N/A |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**MATCHLINE**  
**-Y9- STA 17+00 SEE SHEET 29**

SEE SHEET 120 FOR -Y9- PROFILE

```
PLOT DRIVER: NC00T_pdf_color_eng_50.plt
PENTABLE: NC00T_pshpf.tbl
USER: wrightep
DATE: 11/16/2018
TIME: 11:18:05 AM
FILE: \
```

## REVISIONS

**MATCHLINE  
SEE SHEET 54**

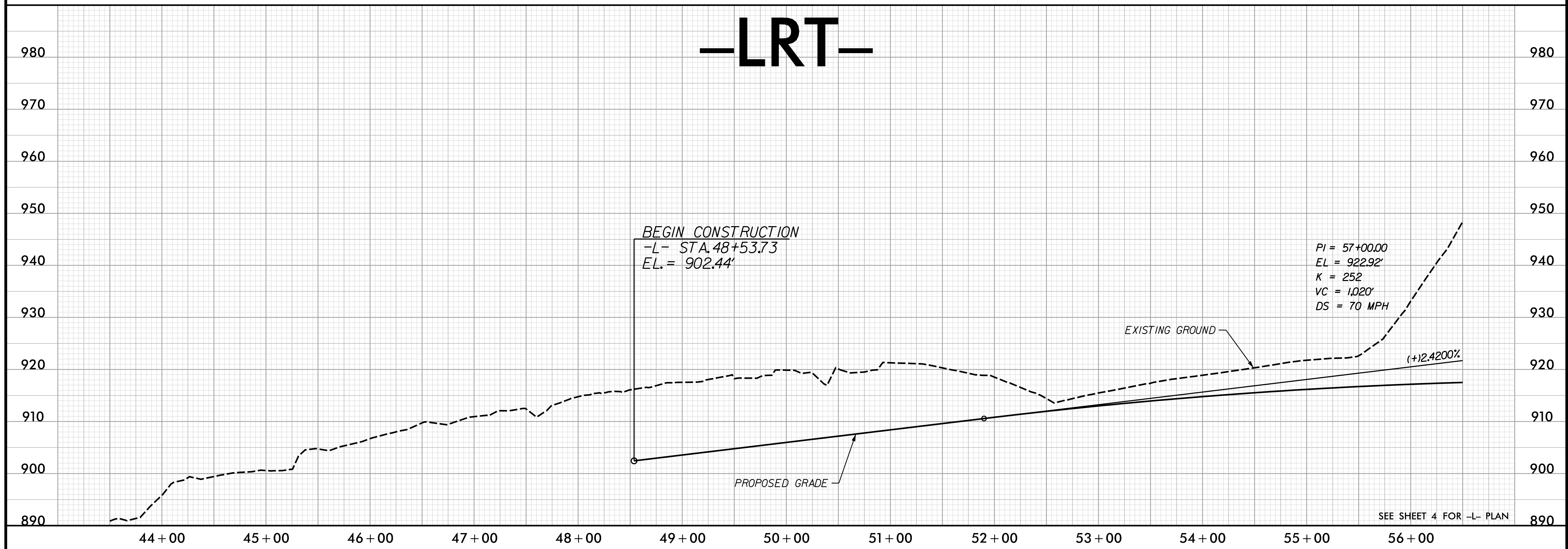
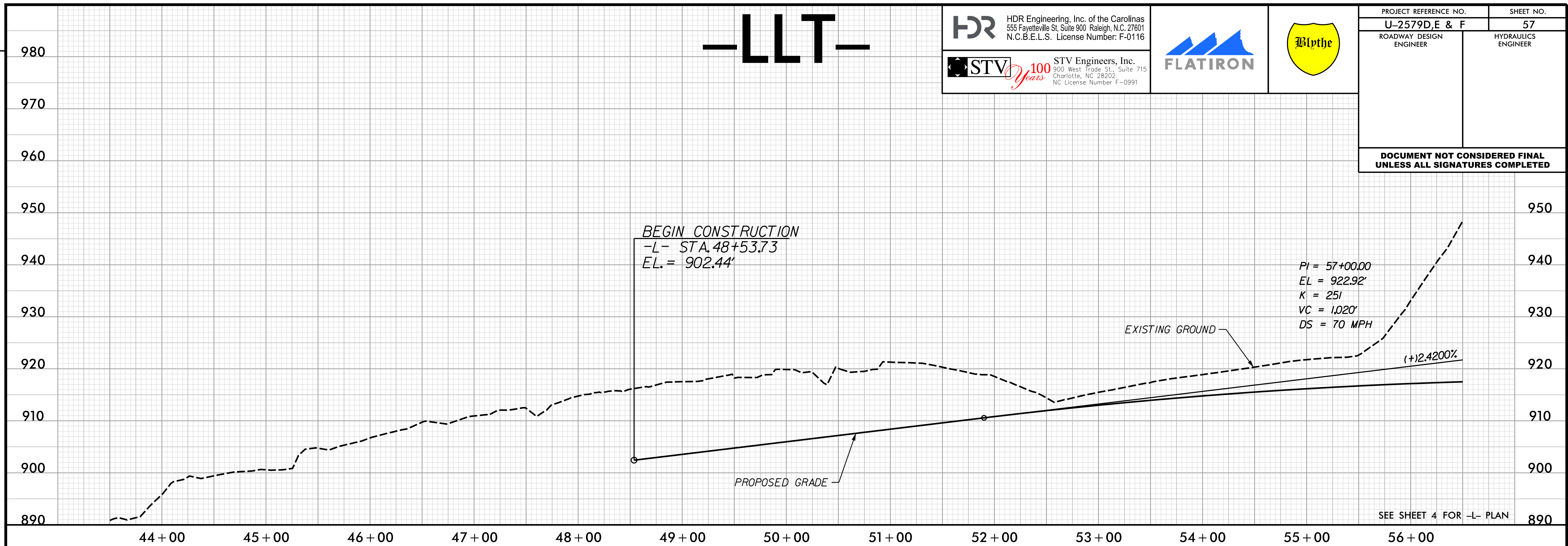
**MATCHLINE**  
-Y8A- STA 19+70  
SEE SHEET 28

NAD 83/95



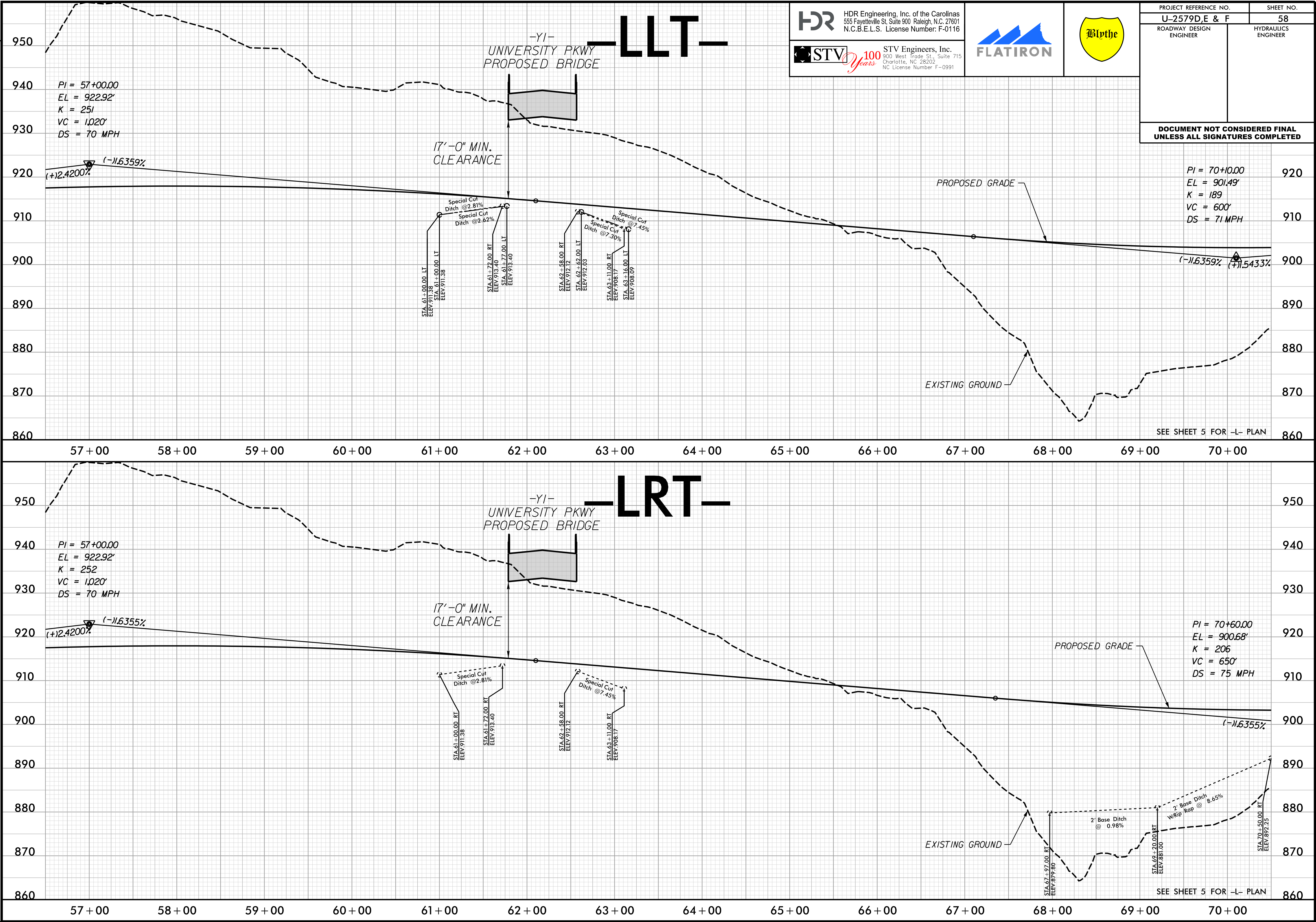




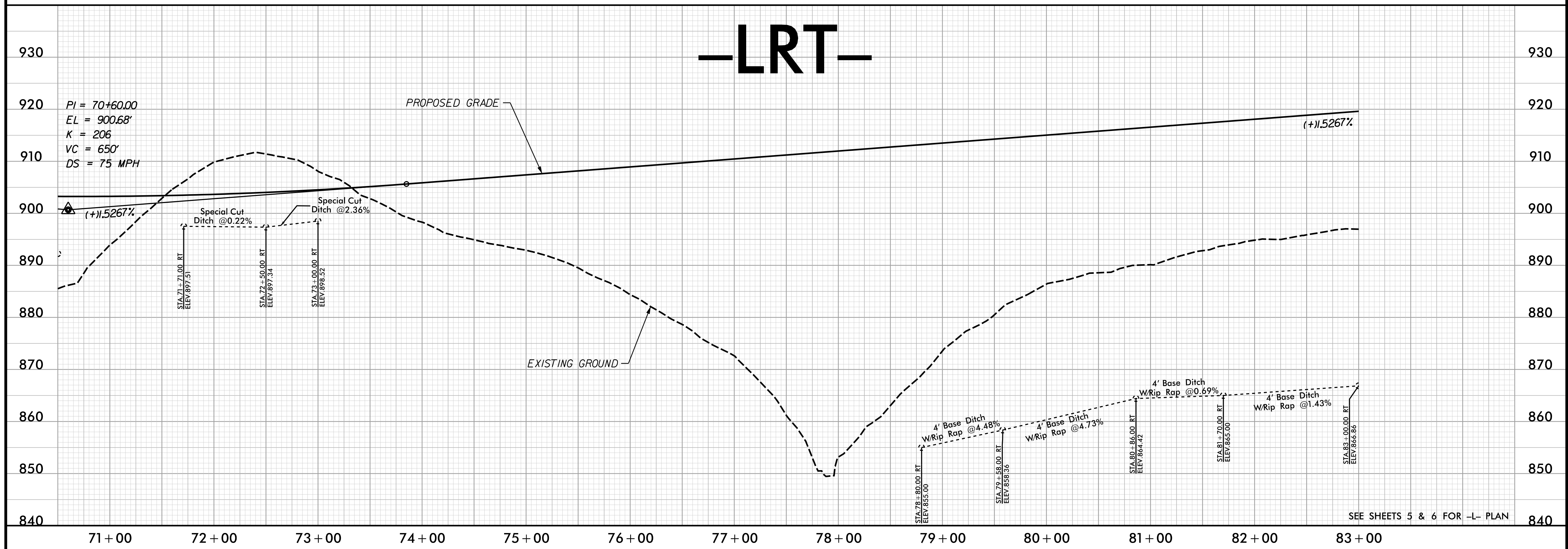
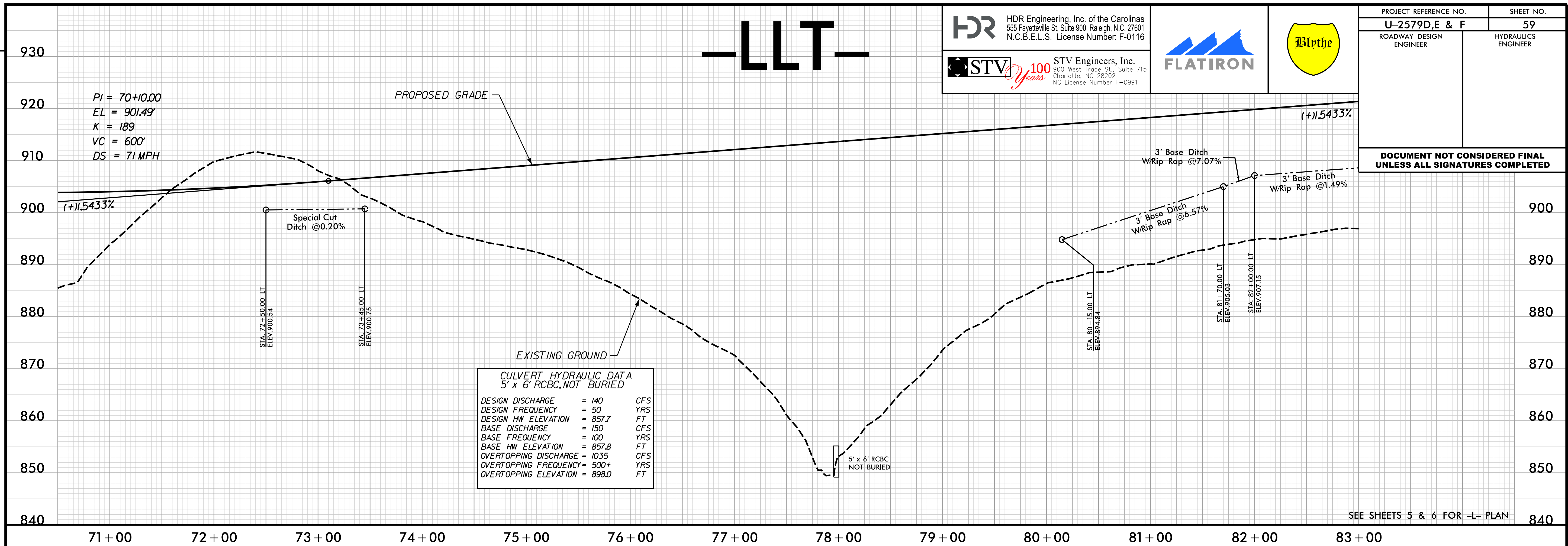




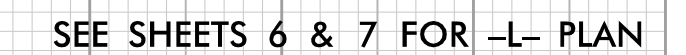
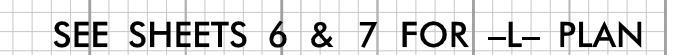
REVISIONS



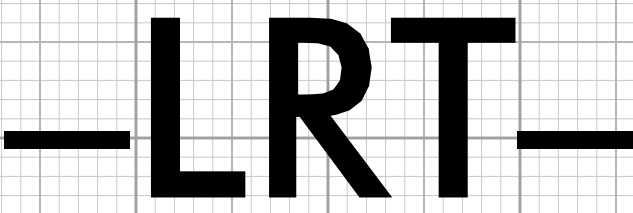




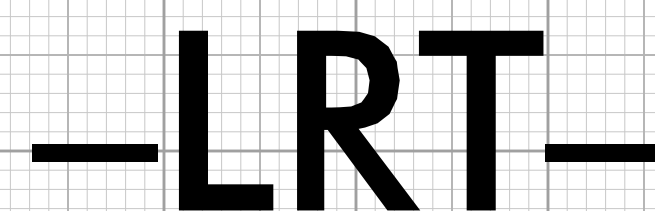
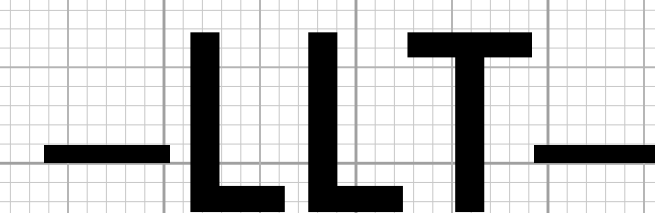




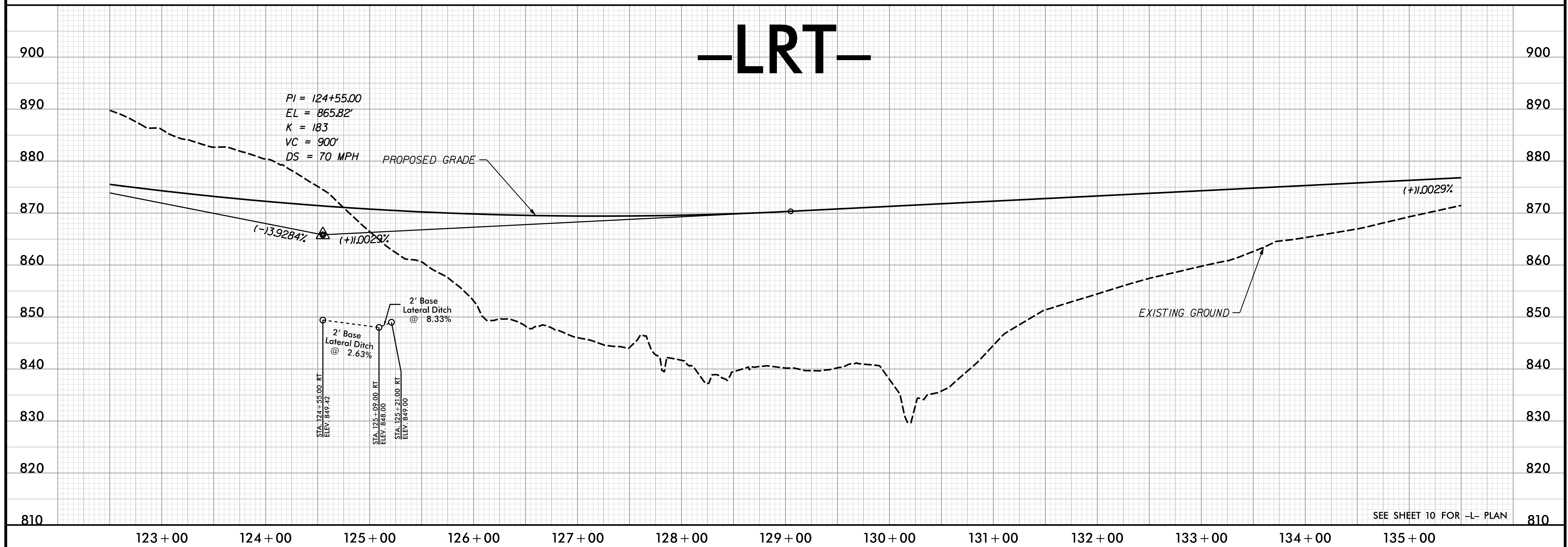
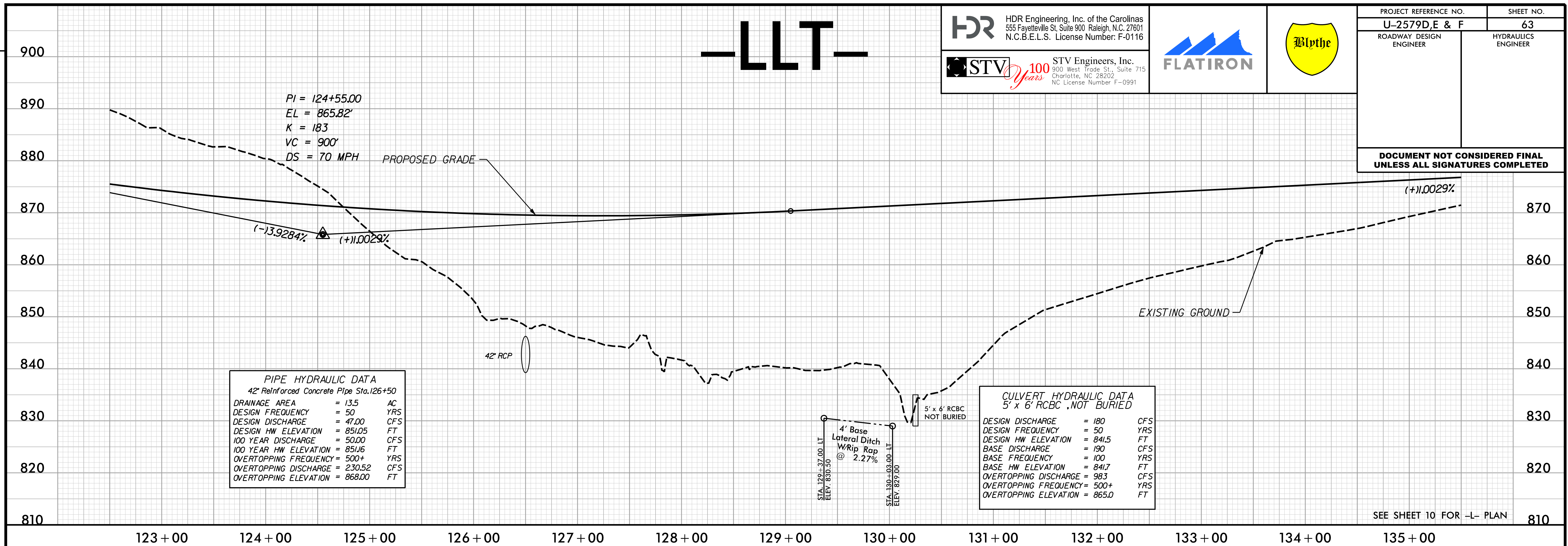




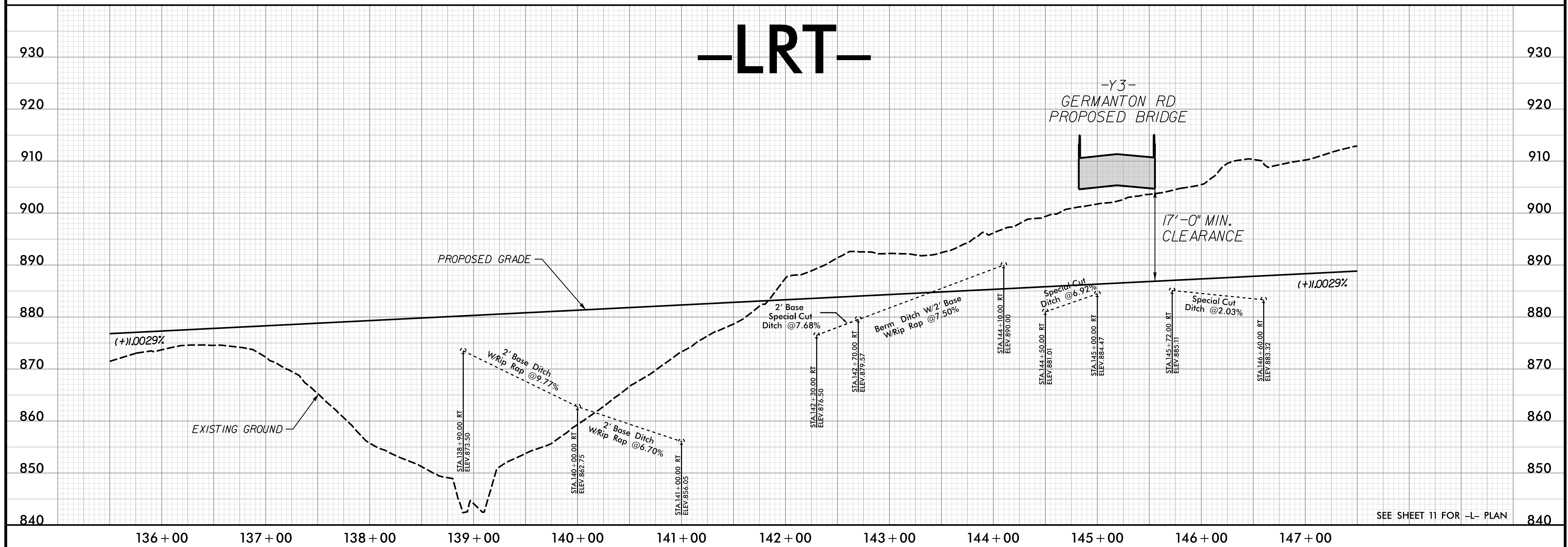
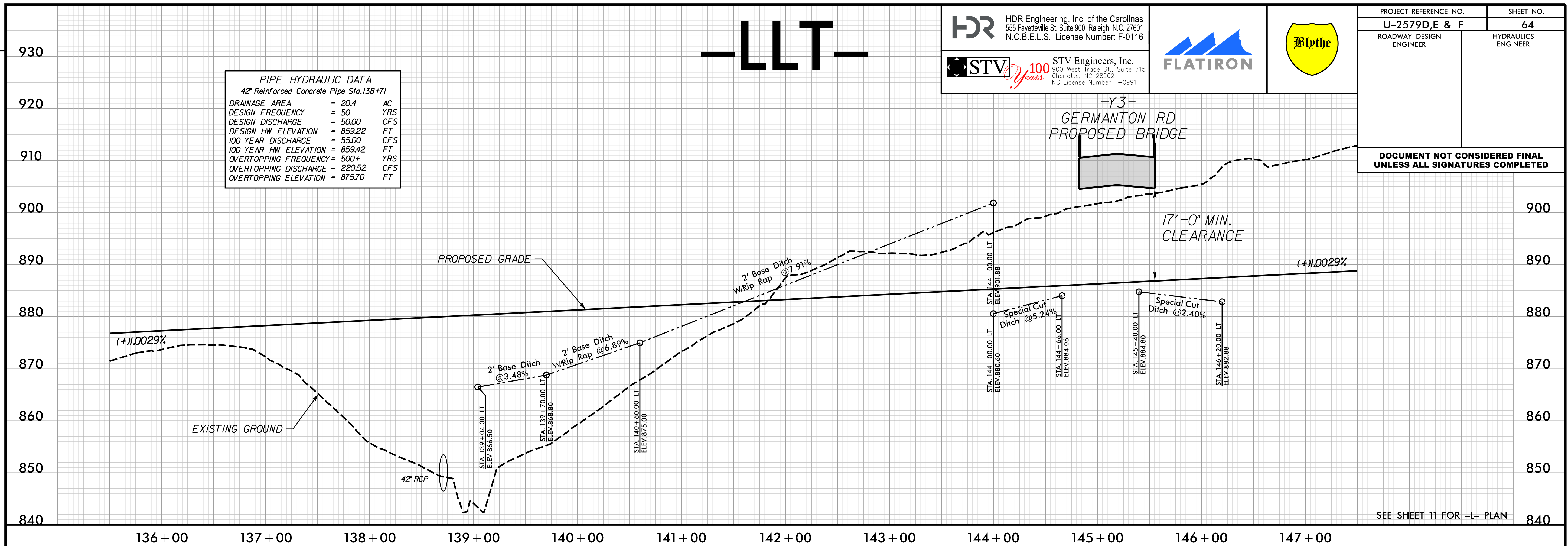




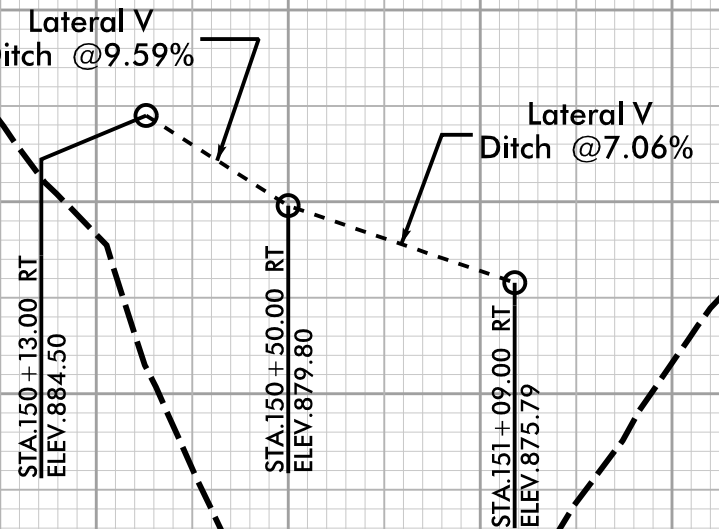
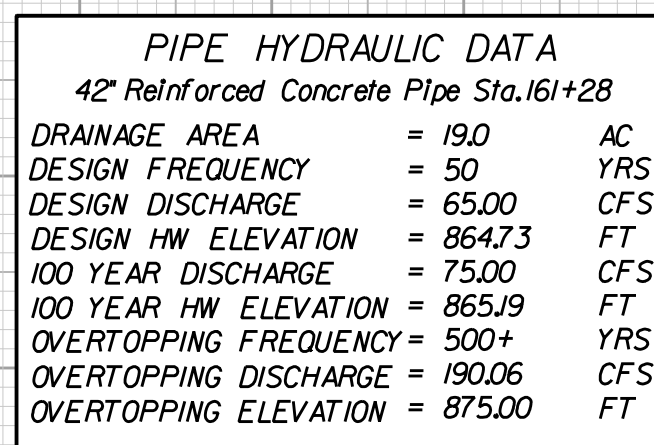








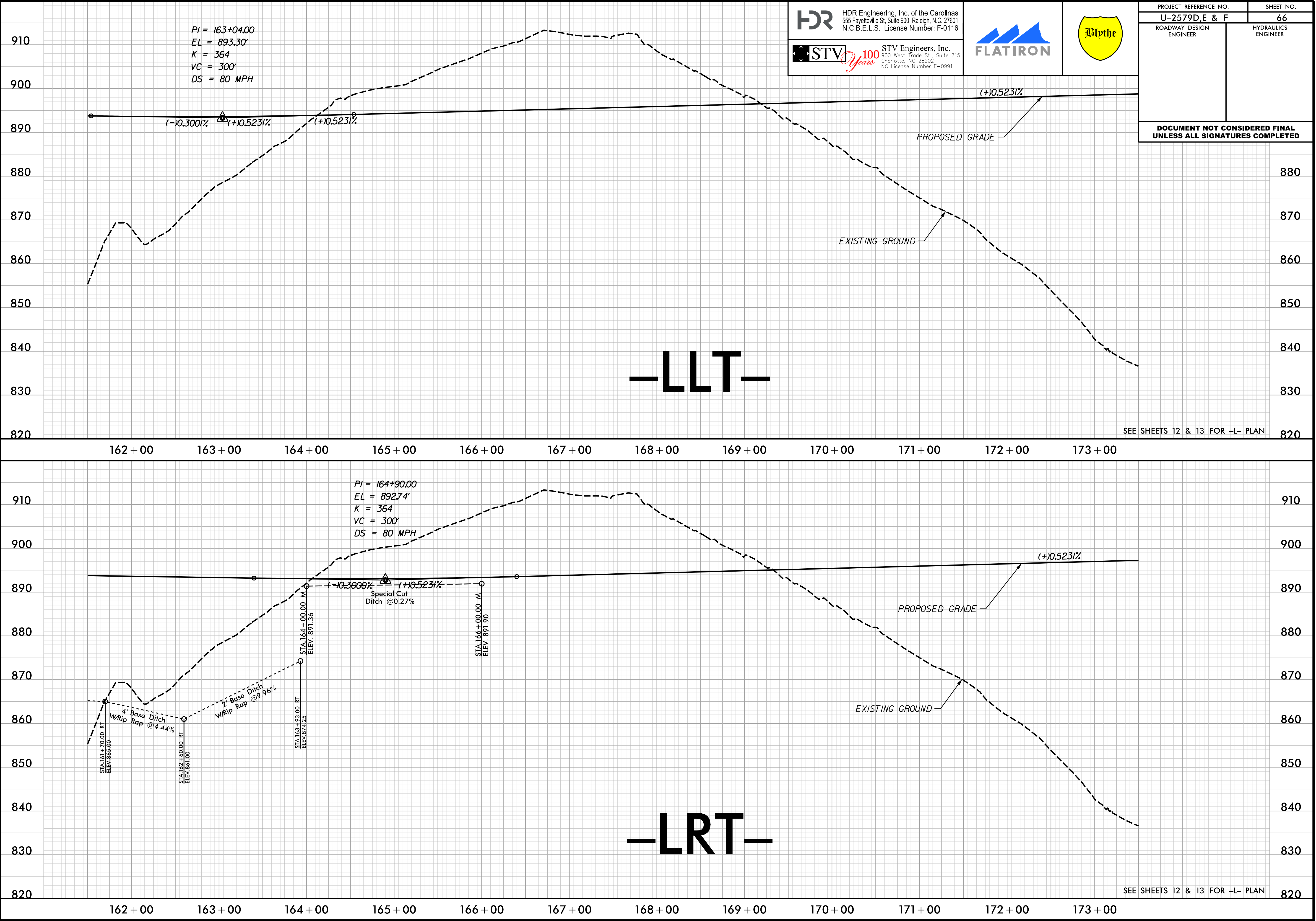




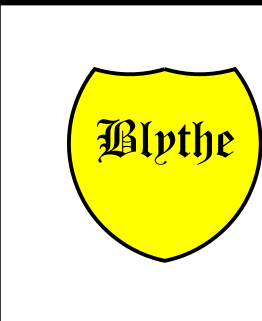


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USER: Charri's  
DATE: 10/24/2018  
TIME: 6:01:14 PM  
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REVISIONS







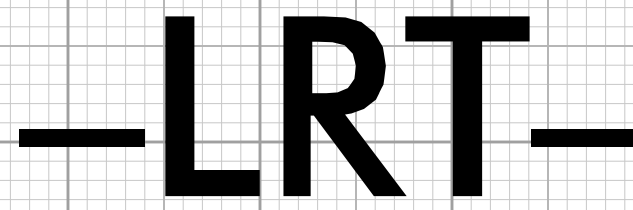
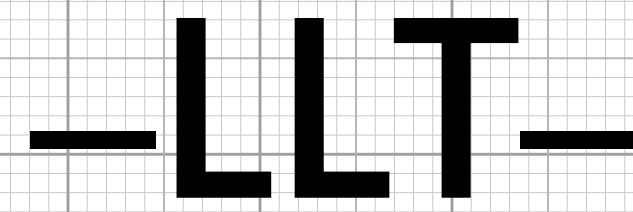
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|------------------------------------------------------------------------------------------------|------------------------|
| PROJECT REFERENCE NO.                                                                          | SHEET NO.              |
| U-2579D,E & F                                                                                  | 67                     |
| ROADWAY DESIGN<br>ENGINEER                                                                     | HYDRAULICS<br>ENGINEER |
| <p align="center"><b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b></p> |                        |

|                           |  |  |     |
|---------------------------|--|--|-----|
|                           |  |  | 880 |
|                           |  |  | 870 |
|                           |  |  | 860 |
|                           |  |  | 850 |
|                           |  |  | 840 |
|                           |  |  | 830 |
| SEE SHEET 13 FOR -L- PLAN |  |  | 820 |

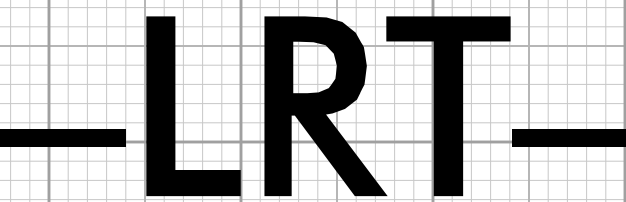
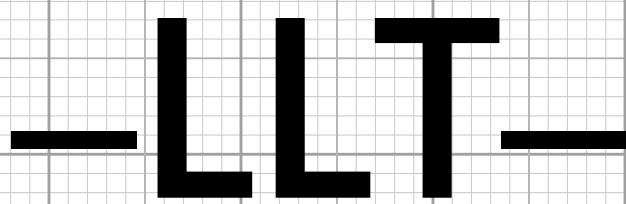


|                           |  |  |  |     |
|---------------------------|--|--|--|-----|
|                           |  |  |  | 910 |
|                           |  |  |  | 900 |
|                           |  |  |  | 890 |
|                           |  |  |  | 880 |
|                           |  |  |  | 870 |
|                           |  |  |  | 860 |
|                           |  |  |  | 850 |
|                           |  |  |  | 840 |
|                           |  |  |  | 830 |
| SEE SHEET 13 FOR -L- PLAN |  |  |  | 820 |

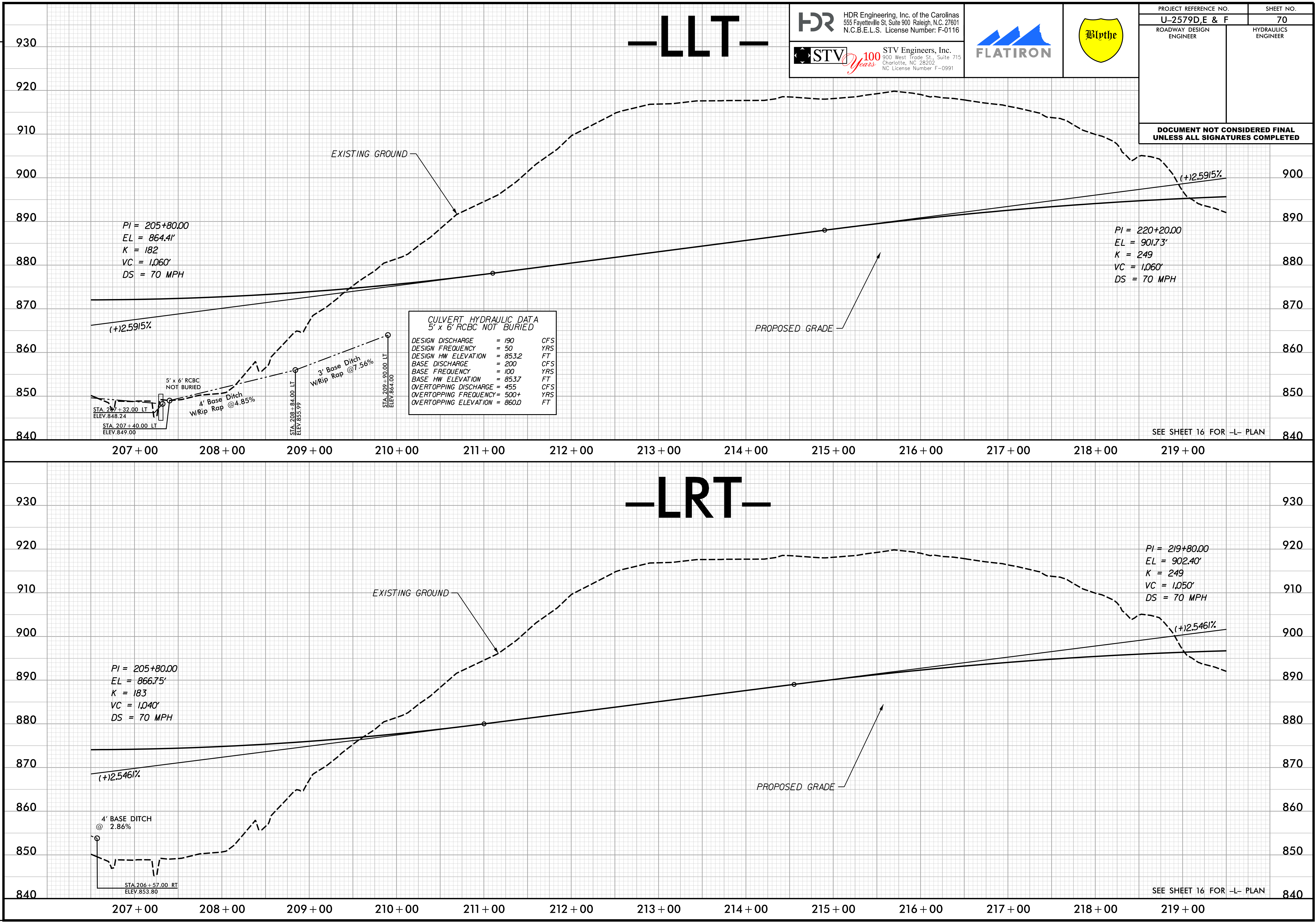














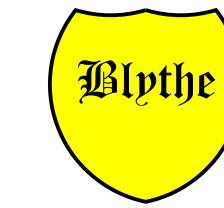
# LLT



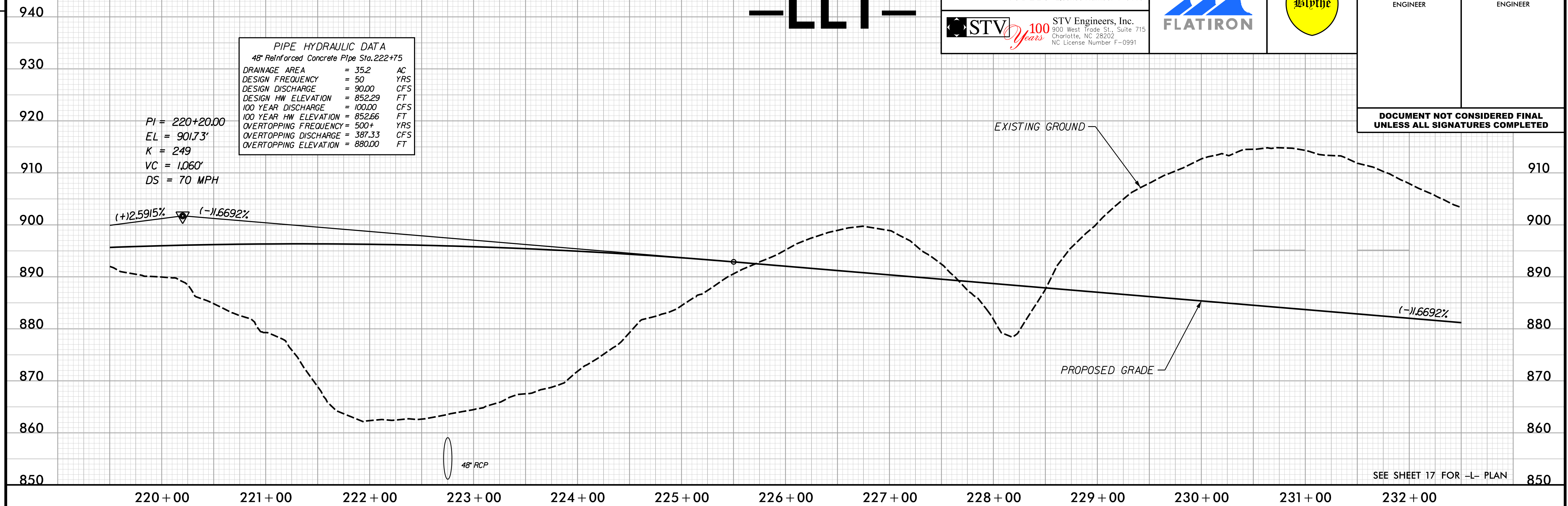
HDR Engineering, Inc. of the Carolinas  
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601  
N.C.B.E.L.S. License Number: F-0116



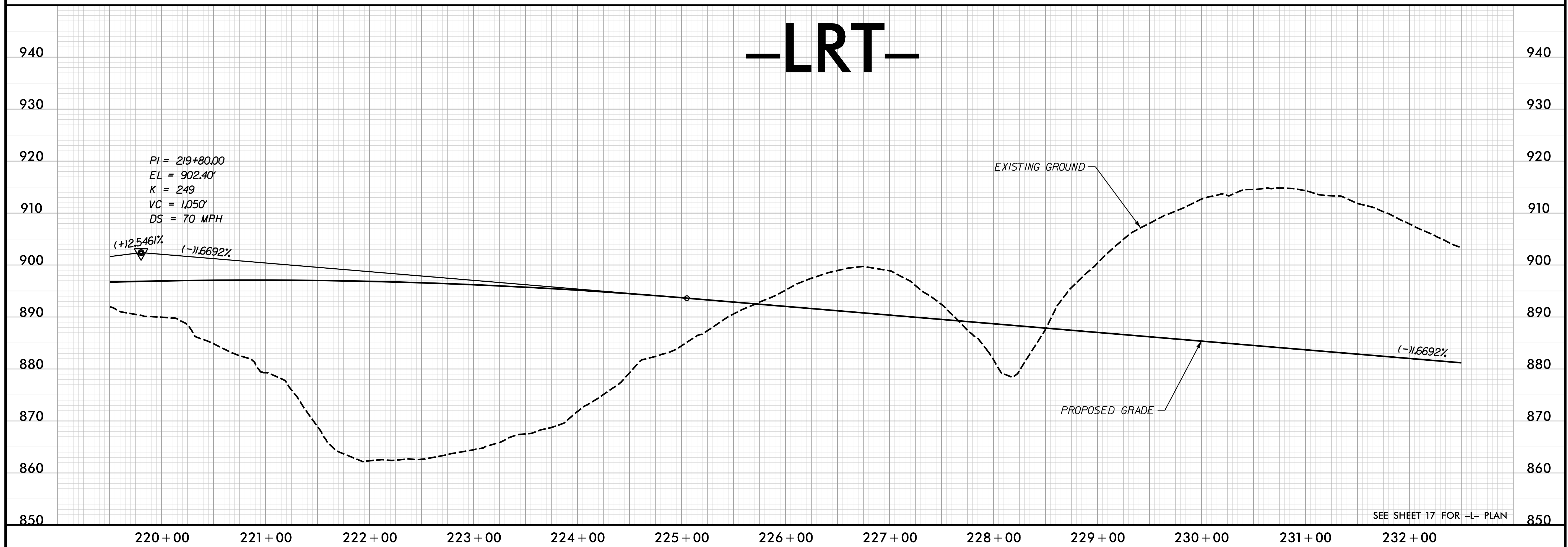
**V** *100 Years* **STV Engineers, Inc.**  
900 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991



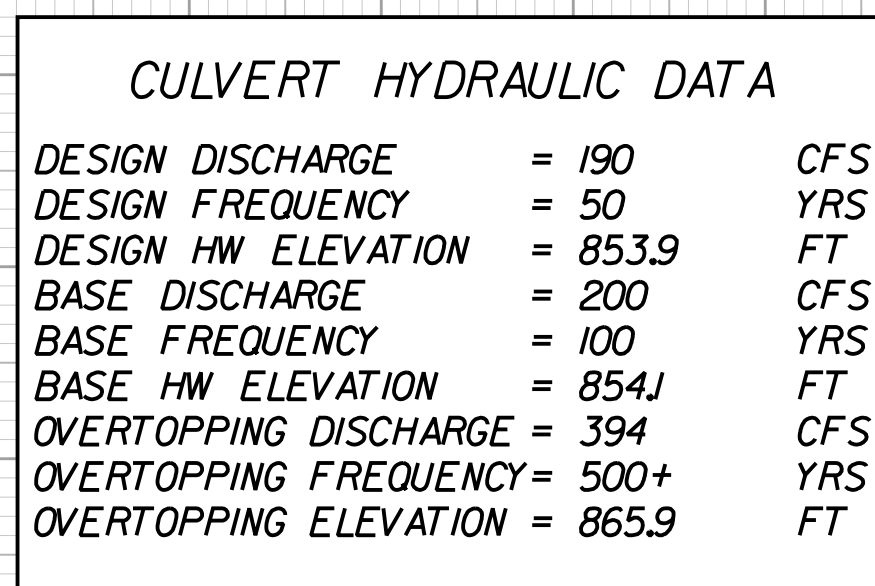
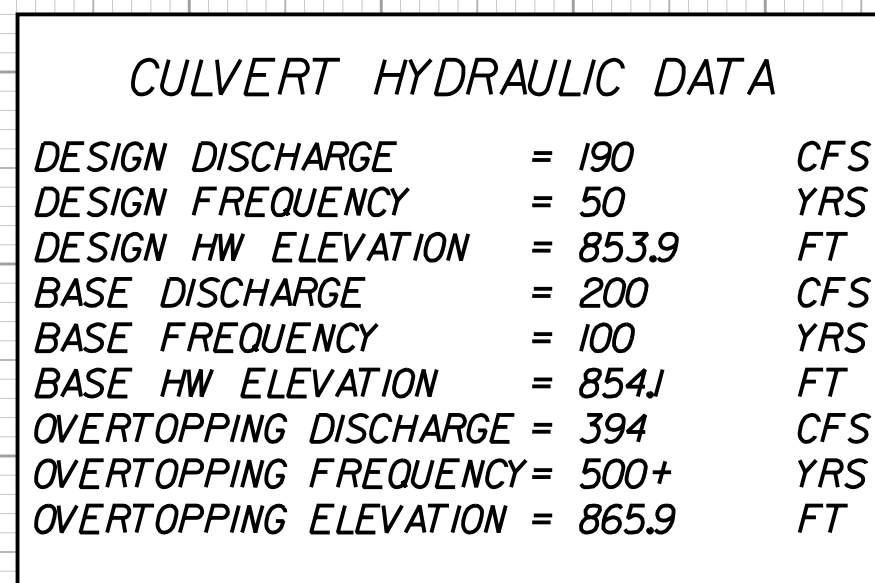
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| PROJECT REFERENCE NO.                                                                          |  | SHEET NO.              |  |
| U-2579D,E & F                                                                                  |  | 71                     |  |
| ROADWAY DESIGN<br>ENGINEER                                                                     |  | HYDRAULICS<br>ENGINEER |  |
| <p align="center"><b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b></p> |  |                        |  |



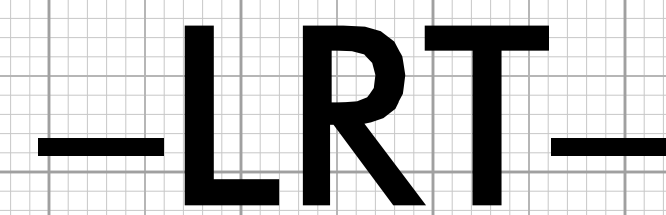
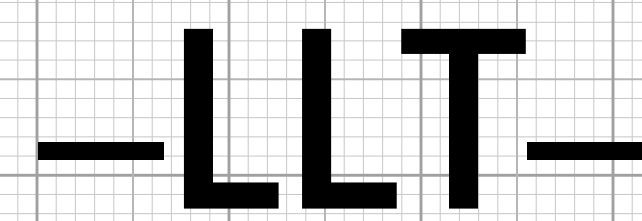
—LRT—











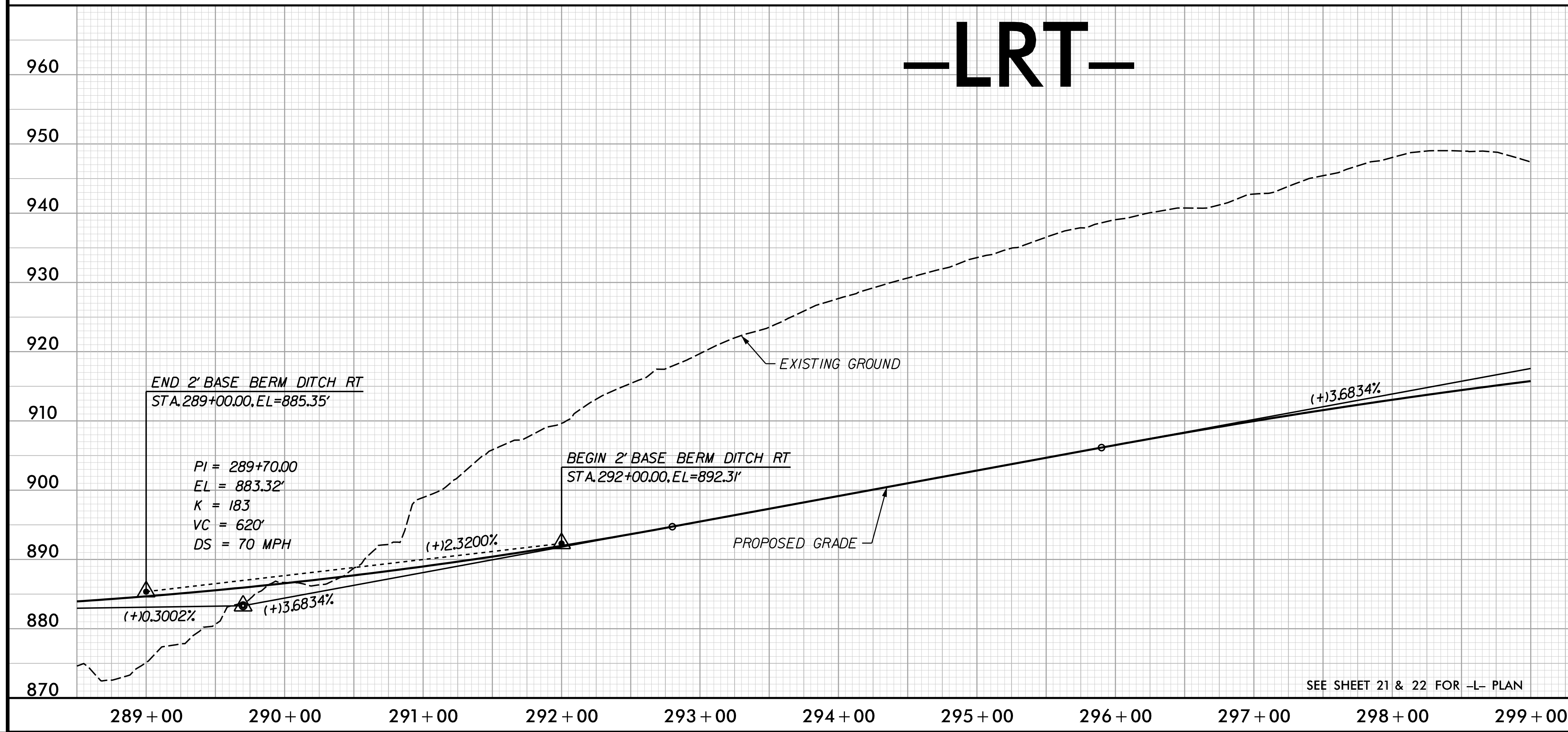




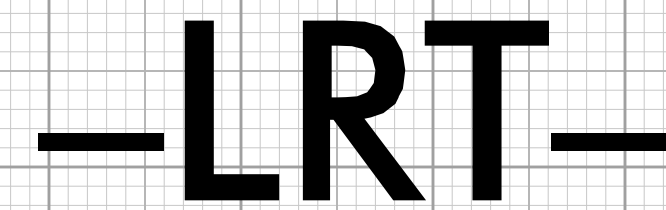
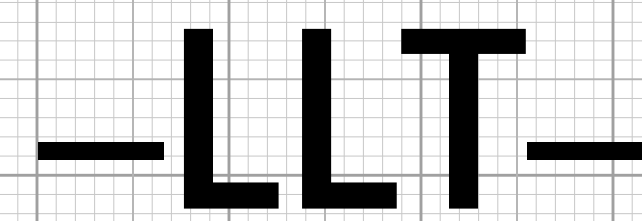














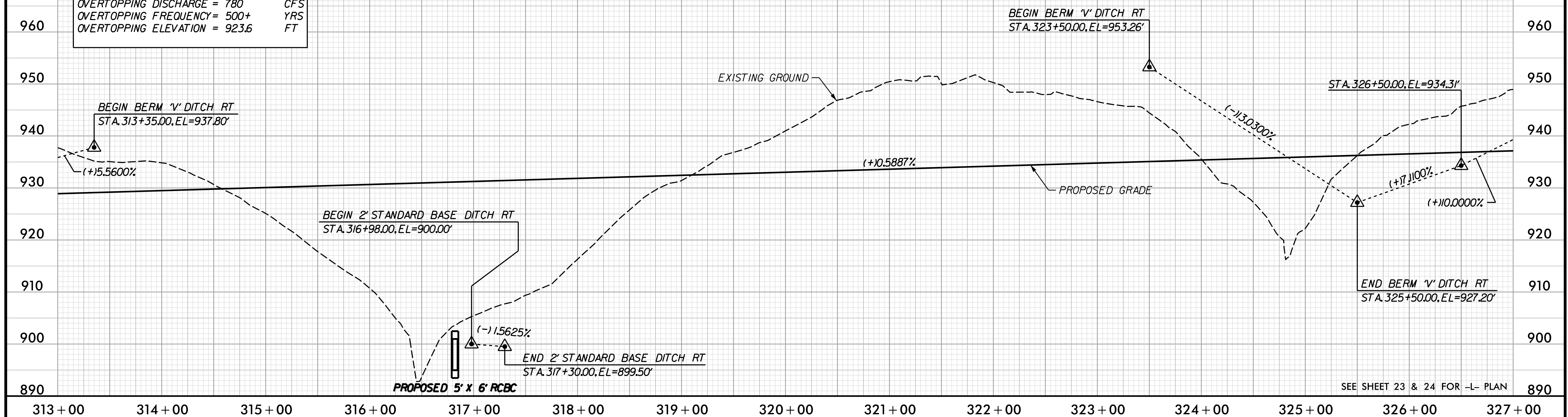
|                       |   |       |     |
|-----------------------|---|-------|-----|
| DESIGN DISCHARGE      | = | 150   | CFS |
| DESIGN FLOW FREQUENCY | = | 50    | YRS |
| DESIGN HW ELEVATION   | = | 901.2 | FT  |
| BASE DISCHARGE        | = | 170   | CFS |
| BASE FLOW FREQUENCY   | = | 100   | YRS |
| BASE HW ELEVATION     | = | 901.6 | FT  |
| OVERTOPPING DISCHARGE | = | 780   | CFS |
| OVERTOPPING FREQUENCY | = | 500+  | YRS |
| OVERTOPPING ELEVATION | = | 923.6 | FT  |

**-LLT-**



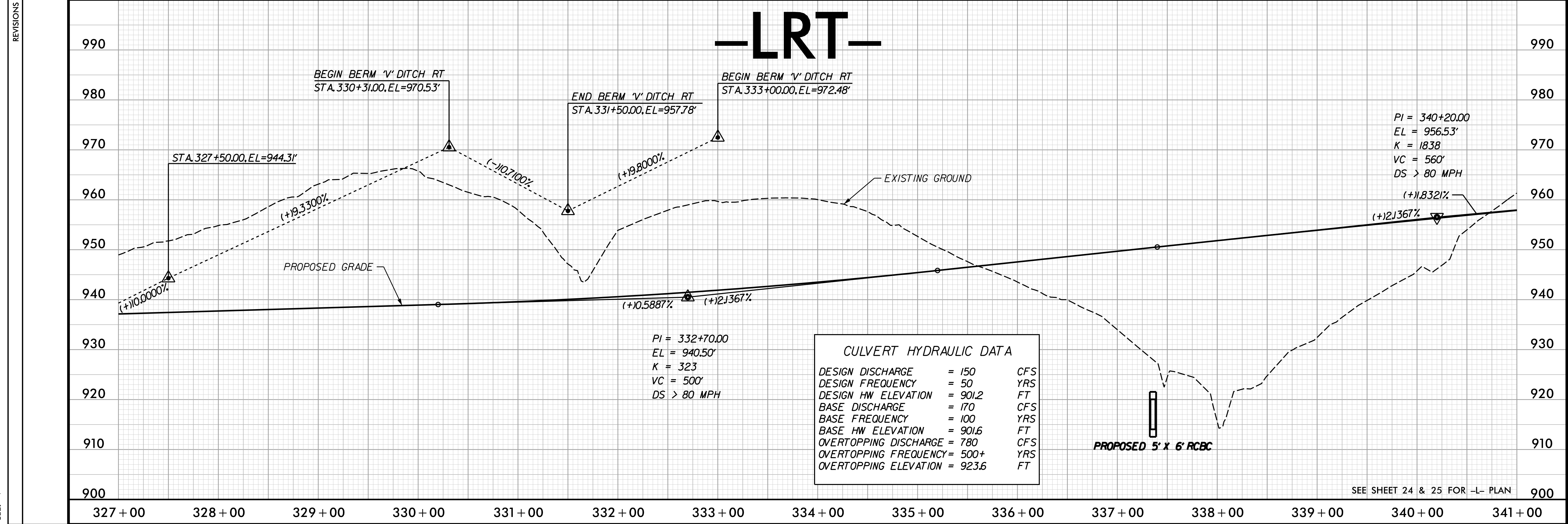
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|-----------------------|---|-------|-----|
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| DESIGN FLOW FREQUENCY | = | 50    | YRS |
| DESIGN HW ELEVATION   | = | 901.2 | FT  |
| BASE DISCHARGE        | = | 170   | CFS |
| BASE FLOW FREQUENCY   | = | 100   | YRS |
| BASE HW ELEVATION     | = | 901.6 | FT  |
| OVERTOPPING DISCHARGE | = | 780   | CFS |
| OVERTOPPING FREQUENCY | = | 500+  | YRS |
| OVERTOPPING ELEVATION | = | 923.6 | FT  |

# -LRT-

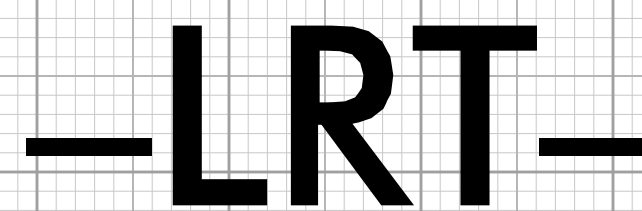
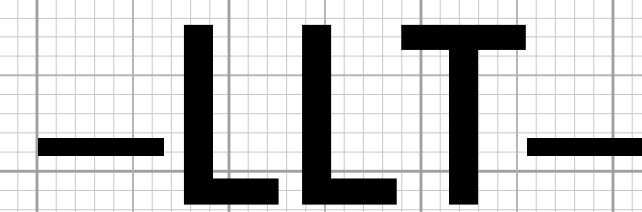


## REVISIONS

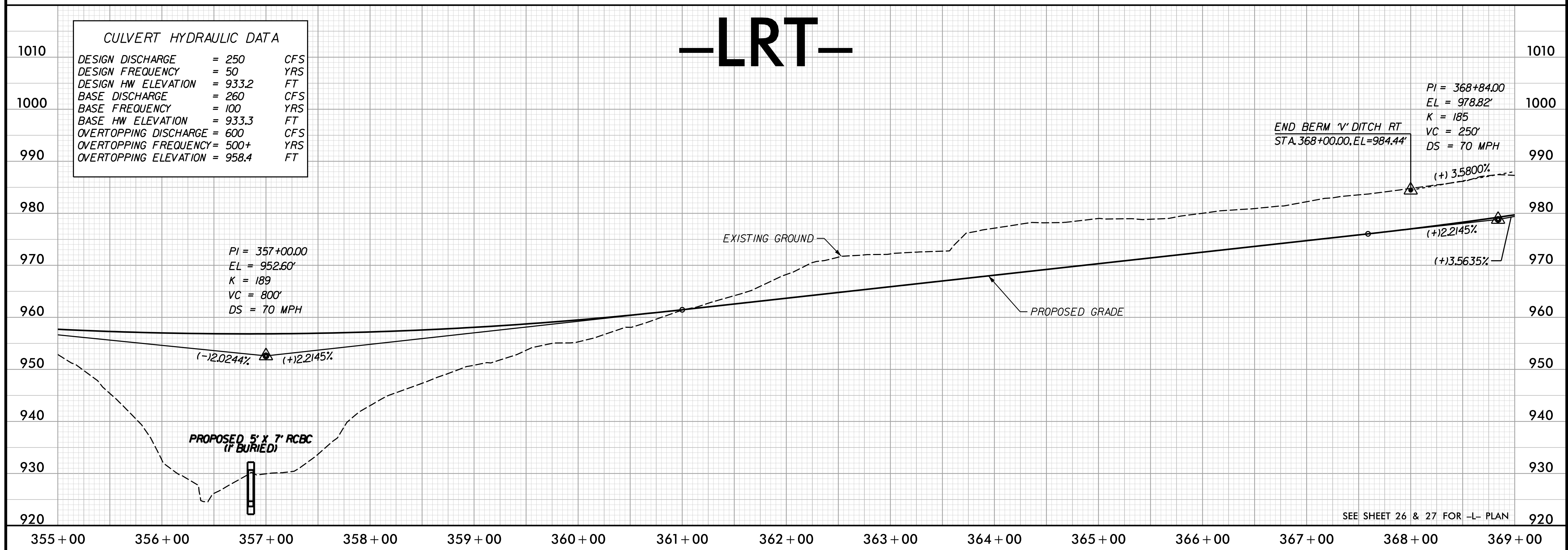
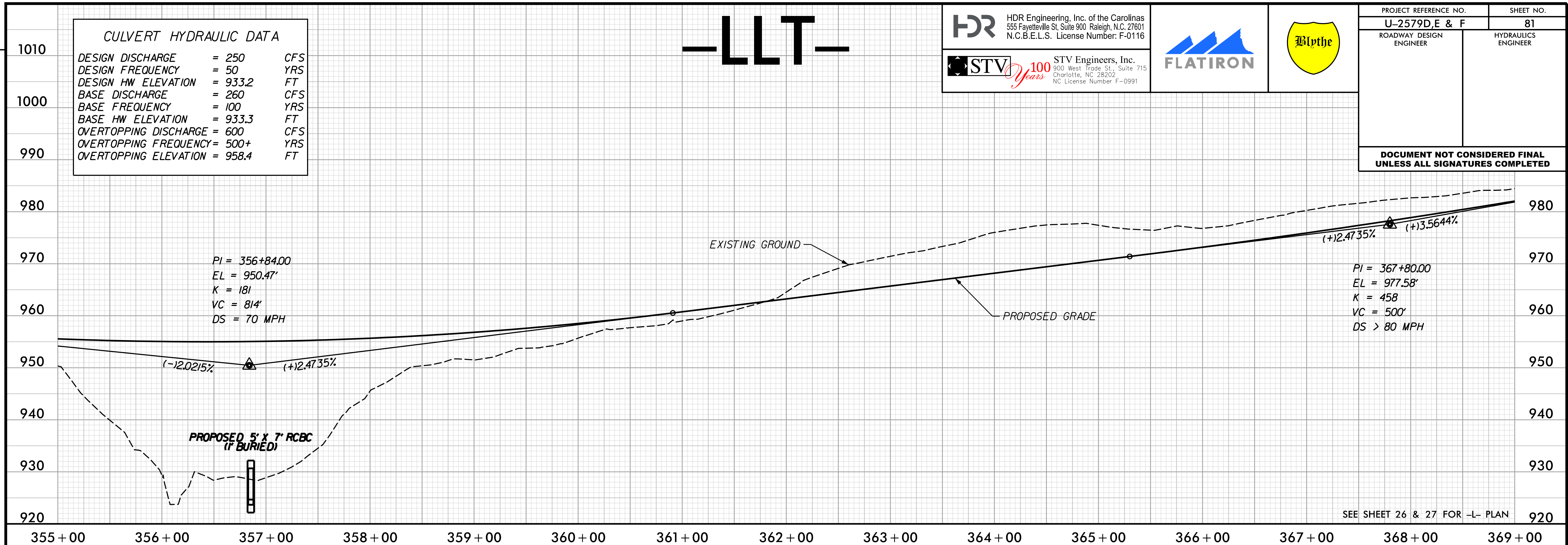




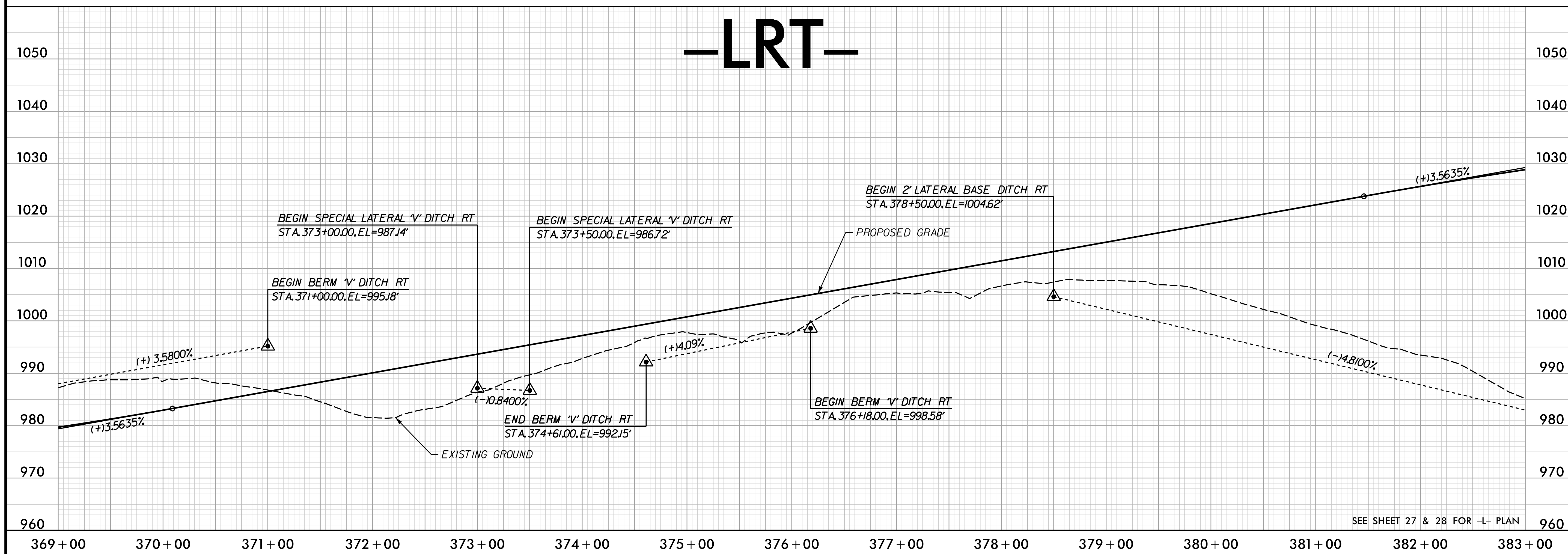
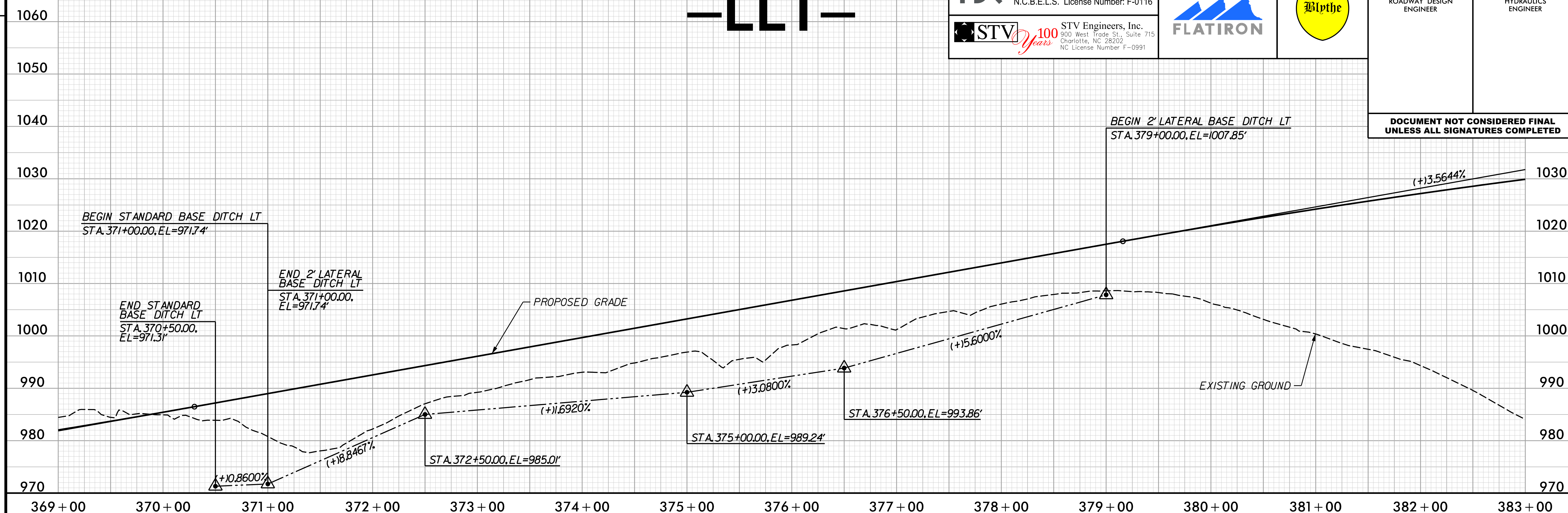










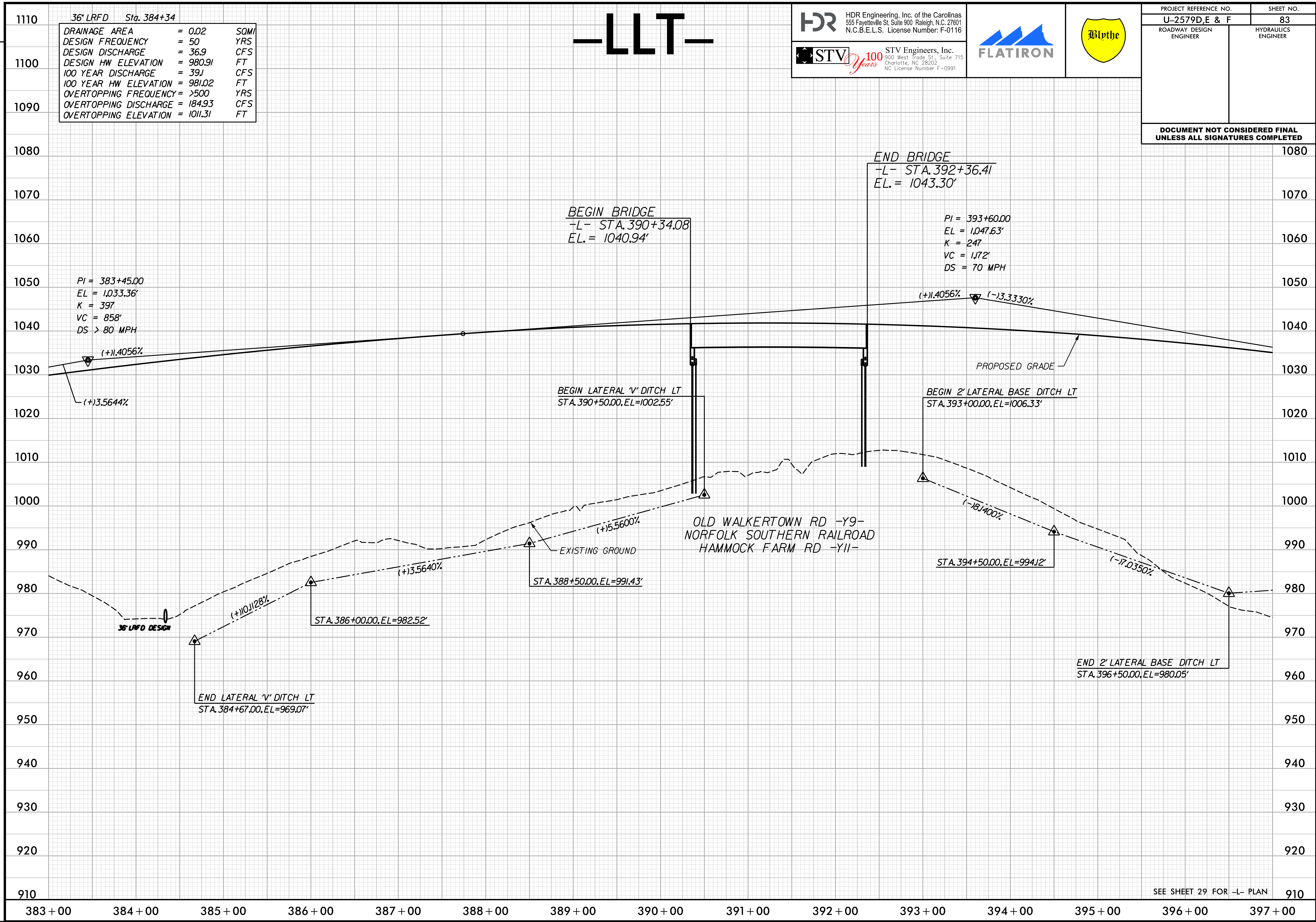


## REVISIONS



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PENTABLE: NCDOT\_pshp.fltd  
USER: wrightep  
DATE: 10/24/2018  
TIME: 11:18:26 AM  
FILE: \

REVISIONS





36" LRFD Sta. 384+34

|                       |   |         |     |
|-----------------------|---|---------|-----|
| DRAINAGE AREA         | = | 0.02    | SQM |
| DESIGN FREQUENCY      | = | 50      | YRS |
| DESIGN DISCHARGE      | = | 36.9    | CFS |
| DESIGN HW ELEVATION   | = | 980.91  | FT  |
| 100 YEAR DISCHARGE    | = | 39.1    | CFS |
| 100 YEAR HW ELEVATION | = | 981.02  | FT  |
| OVERTOPPING FREQUENCY | = | >500    | YRS |
| OVERTOPPING DISCHARGE | = | 184.93  | CFS |
| OVERTOPPING ELEVATION | = | 1011.31 | FT  |

$$\begin{aligned} PI &= 384 + 60.00 \\ EL &= 1,034.98' \\ K &= 291 \\ VC &= 628' \\ DS &= 70 \text{ MPH} \end{aligned}$$

BEGIN BRIDGE  
-L- STA. 390+14.00  
EL. = 1040.61'

END BRIDGE  
-L- STA. 392+16.33  
EL. = 1043.1'

$PI = 393 + 60.00$   
 $EL = 1,047.63'$   
 $K = 247$   
 $VC = 1,172'$   
 $DS = 70 \text{ MPH}$

(+)1.4056%  (-)13.3330%

7 (-13.3330%

PROPOSED GRADE

OLD WALKERTOWN RD -Y9-  
NORFOLK SOUTHERN RAILROAD  
HAMMOCK FARM RD -Y11-

BEGIN 2' LATERAL BASE DITCH RT  
STA. 389+50.00, EL=1000.22'

$(-0.3000\%$

STA. 384+00.00, EL=978.16'

(+)2.8514%

— EXISTING GROUND

BEGIN 2' LATERAL BASE  
STA. 391+80.00, EL=1006.30'

|                                |
|--------------------------------|
| BEGIN 5' LATERAL BASE DITCH RT |
| STA. 393+50.00, EL=1005.79'    |

END 2' LATERAL BASE DITCH RT  
STA. 393+50.00, EL=1005.79'

**36" LRFD DESIGN**

END 2' LATERAL  
BASE DITCH RT  
STA. 384+50.00.  
EL=977.54'

STA. 385+00.00, EL=980.49

STA. 386+00.00, EL=990.24

SEE SHEET 29 FOR -L- PLAN 910

## REVISIONS

PENTABLE: NCDOT\_pshp.fl.tbi  
TIME: 11:18:28 AM

ng\_50.plt  
DATE: 10/24/2018

PLOT DRIVER: NCDOT\_pdf\_color\_enq\_50.plt

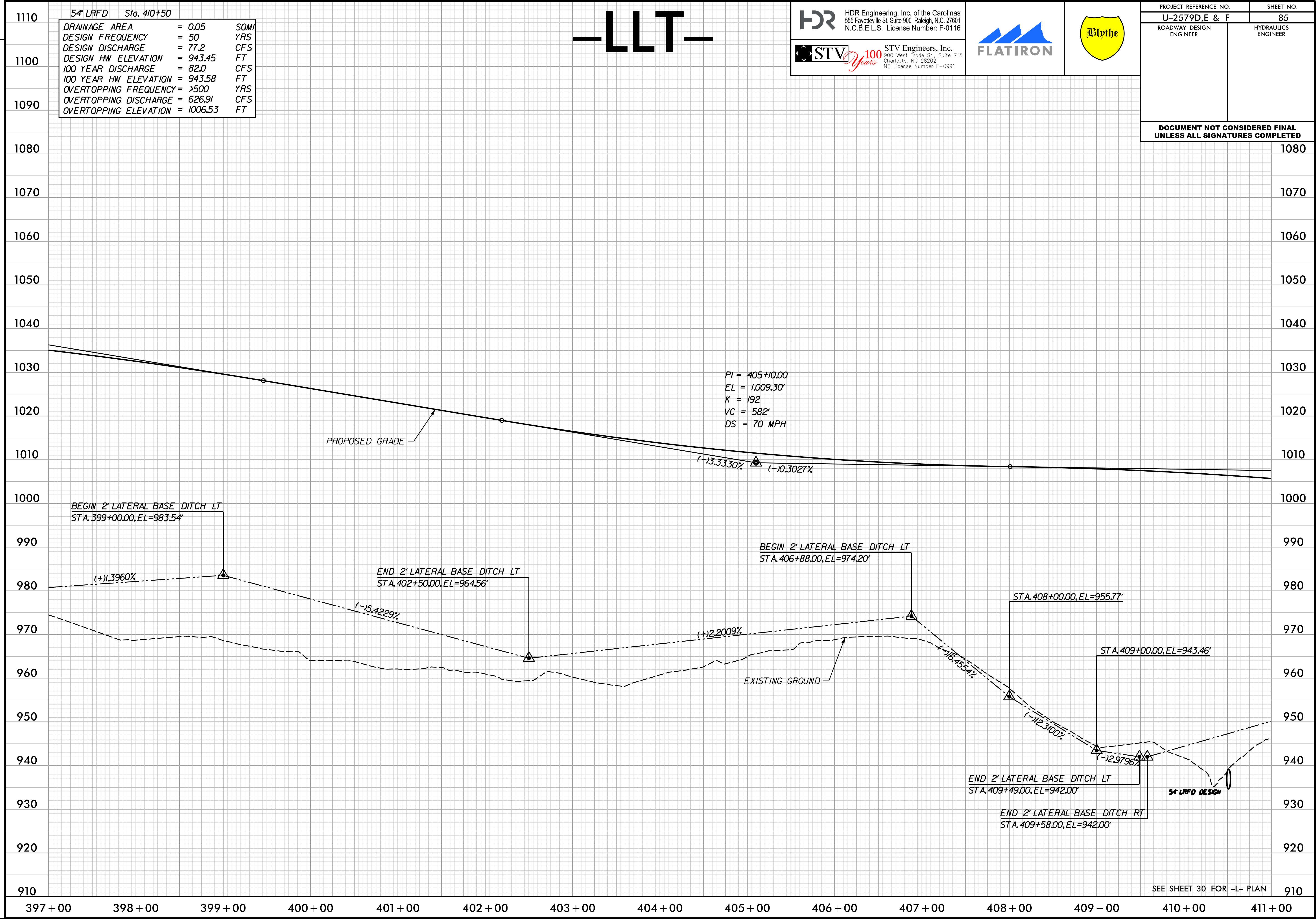
USER: wrightep

FILE: /



PLOT DRIVER: NCDOT\_color\_eng\_50.plt  
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USER: wrightep  
DATE: 10/24/2018  
TIME: 11:18:30 AM  
FILE: \

REVISIONS

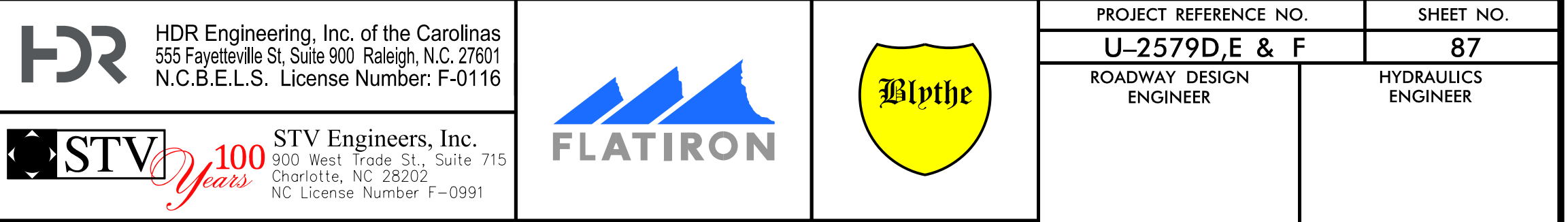




|                                                                                                                                                                                                                         |  |                                                                                    |  |                                                                                    |  |                                                                          |  |                        |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------|--|------------------------|--|
|  HDR Engineering, Inc. of the Carolinas<br>555 Fayetteville St. Suite 900 Raleigh, N.C. 27601<br>N.C.B.E.L.S. License Number: F-01116 |  |  |  |  |  | PROJECT REFERENCE NO.                                                    |  | SHEET NO.              |  |
|  STV Engineers, Inc.<br>900 West Trade St., Suite 715<br>Charlotte, NC 28202<br>NC License Number F-0991                             |  |                                                                                    |  |                                                                                    |  | U-2579D,E & F                                                            |  | 86                     |  |
|                                                                                                                                                                                                                         |  |                                                                                    |  |                                                                                    |  | ROADWAY DESIGN<br>ENGINEER                                               |  | HYDRAULICS<br>ENGINEER |  |
|                                                                                                                                                                                                                         |  |                                                                                    |  |                                                                                    |  | <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b> |  |                        |  |

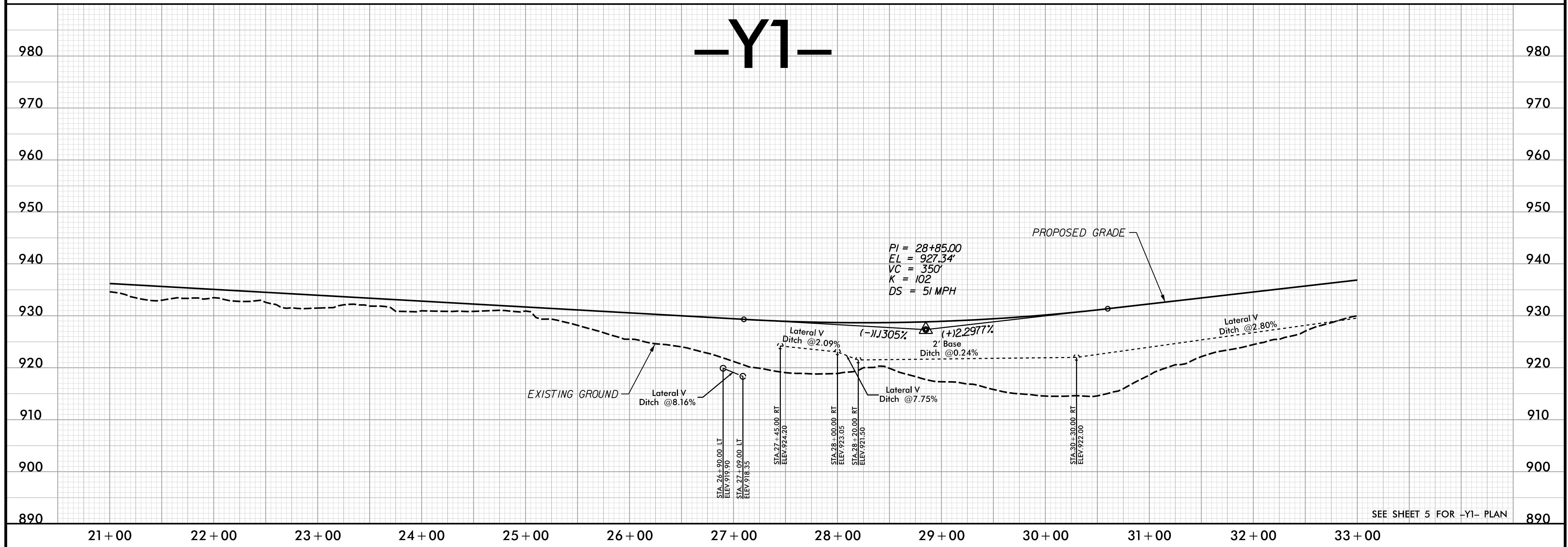
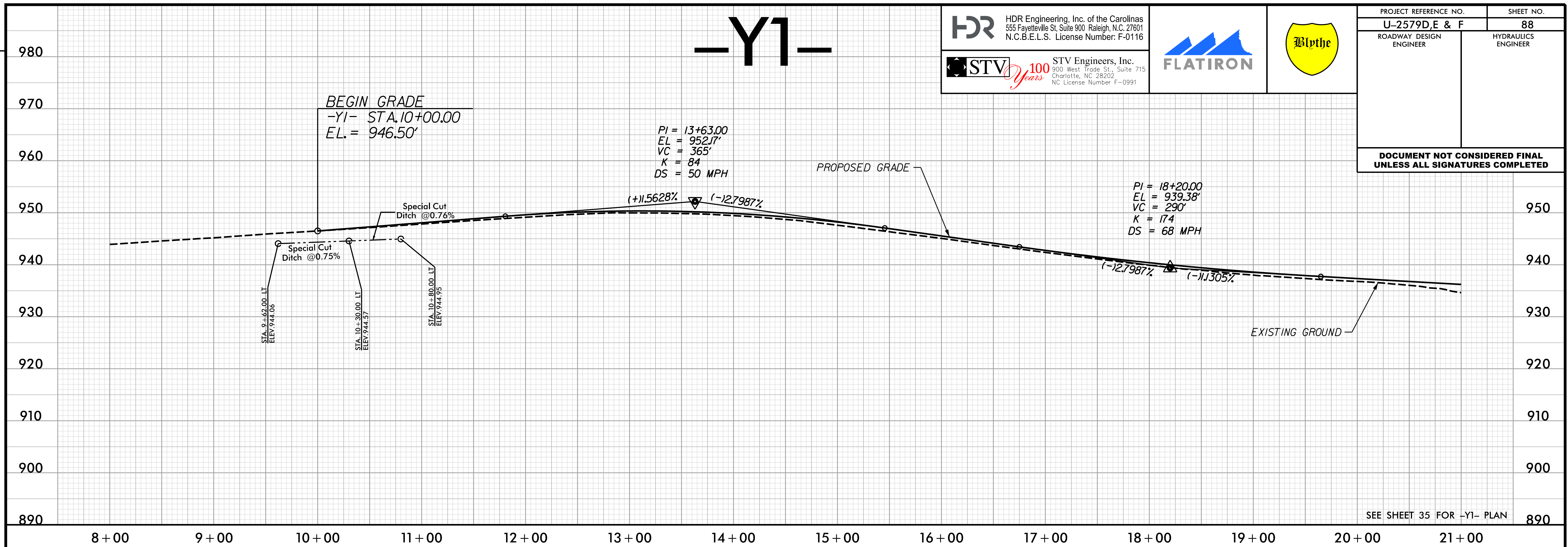




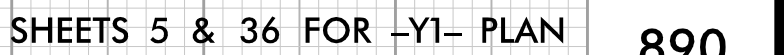
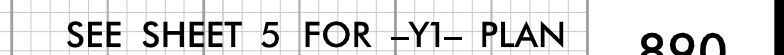


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PENTABLE: NCDOT_pshpf.tbl
USER: wrightep
DATE: 10/24/2018
TIME: 11:18:34 AM
FILE: \
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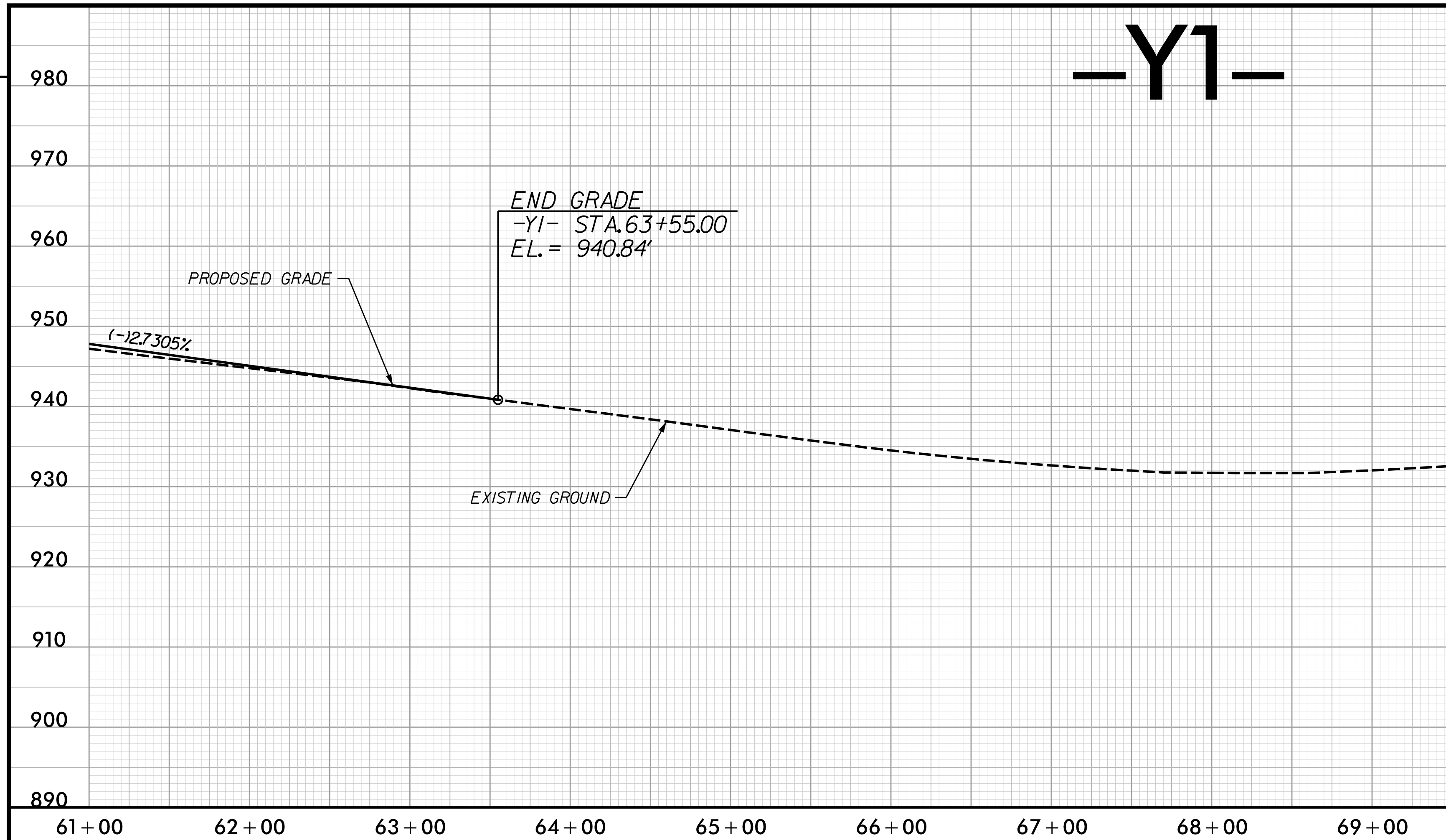






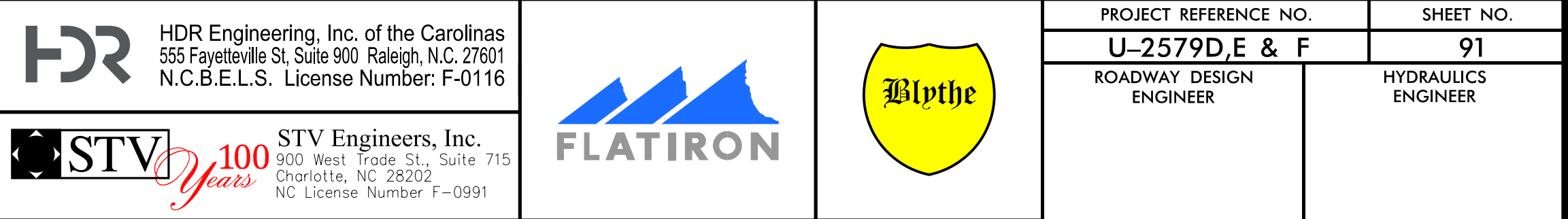


## REVISIONS

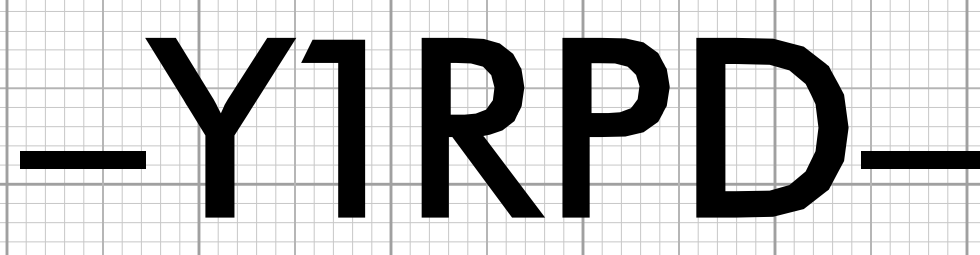


|                                                                          |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |
|--------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|------------------------|--|--|--|--|--|--|--|--|--|
| PROJECT REFERENCE NO.                                                    |  |  |  |  |  |  |  |  |  | SHEET NO.              |  |  |  |  |  |  |  |  |  |
| U-2579D,E & F                                                            |  |  |  |  |  |  |  |  |  | 90                     |  |  |  |  |  |  |  |  |  |
| ROADWAY DESIGN<br>ENGINEER                                               |  |  |  |  |  |  |  |  |  | HYDRAULICS<br>ENGINEER |  |  |  |  |  |  |  |  |  |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b> |  |  |  |  |  |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |
|                                                                          |  |  |  |  |  |  |  |  |  | 950                    |  |  |  |  |  |  |  |  |  |
|                                                                          |  |  |  |  |  |  |  |  |  | 940                    |  |  |  |  |  |  |  |  |  |
|                                                                          |  |  |  |  |  |  |  |  |  | 930                    |  |  |  |  |  |  |  |  |  |
|                                                                          |  |  |  |  |  |  |  |  |  | 920                    |  |  |  |  |  |  |  |  |  |
|                                                                          |  |  |  |  |  |  |  |  |  | 910                    |  |  |  |  |  |  |  |  |  |
|                                                                          |  |  |  |  |  |  |  |  |  | 900                    |  |  |  |  |  |  |  |  |  |
| SEE SHEET 37 FOR -Y1- PLAN                                               |  |  |  |  |  |  |  |  |  | 890                    |  |  |  |  |  |  |  |  |  |





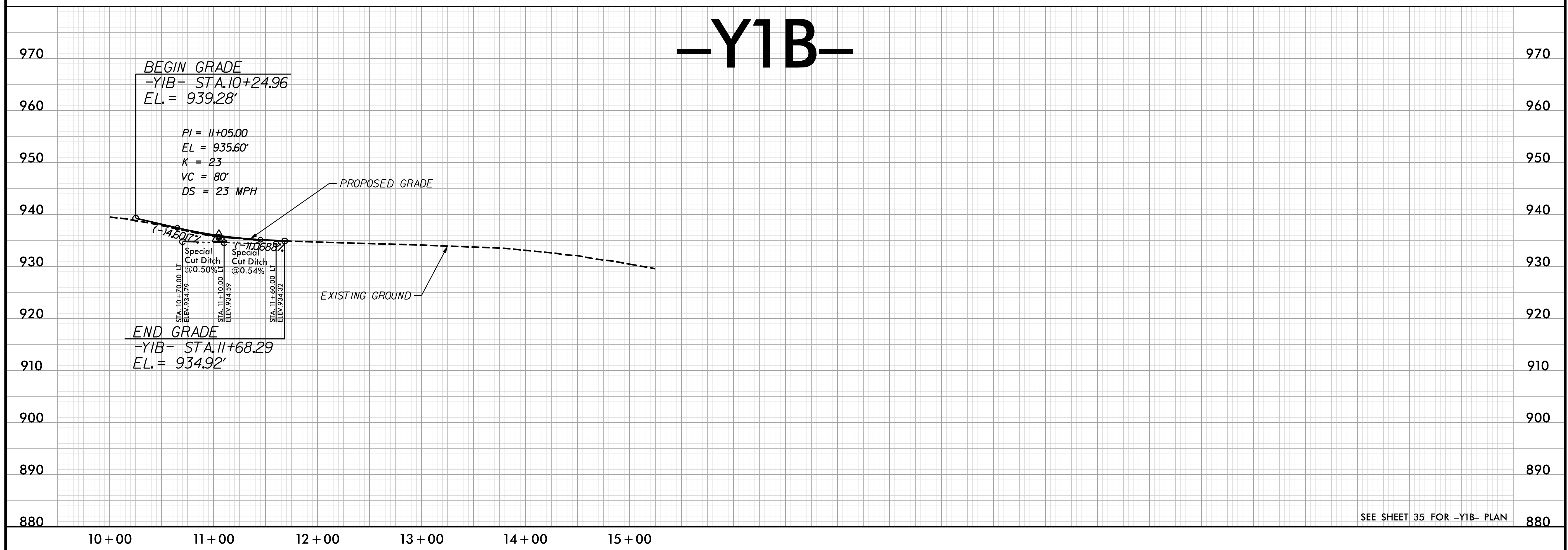
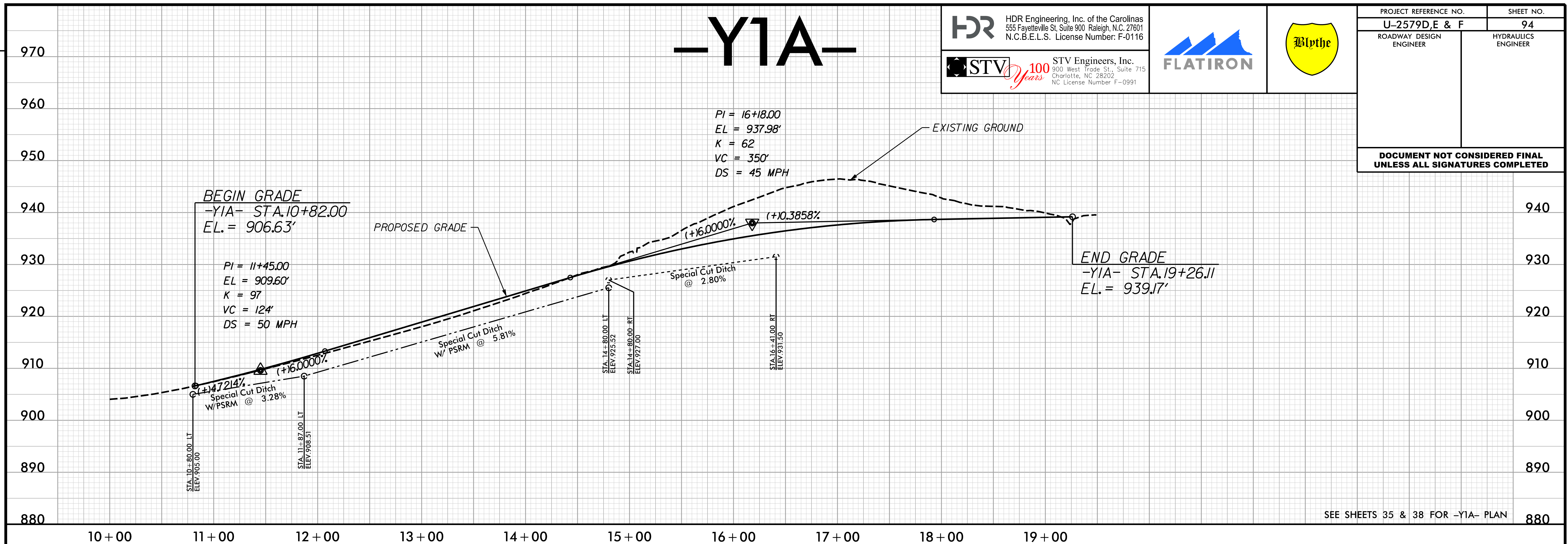








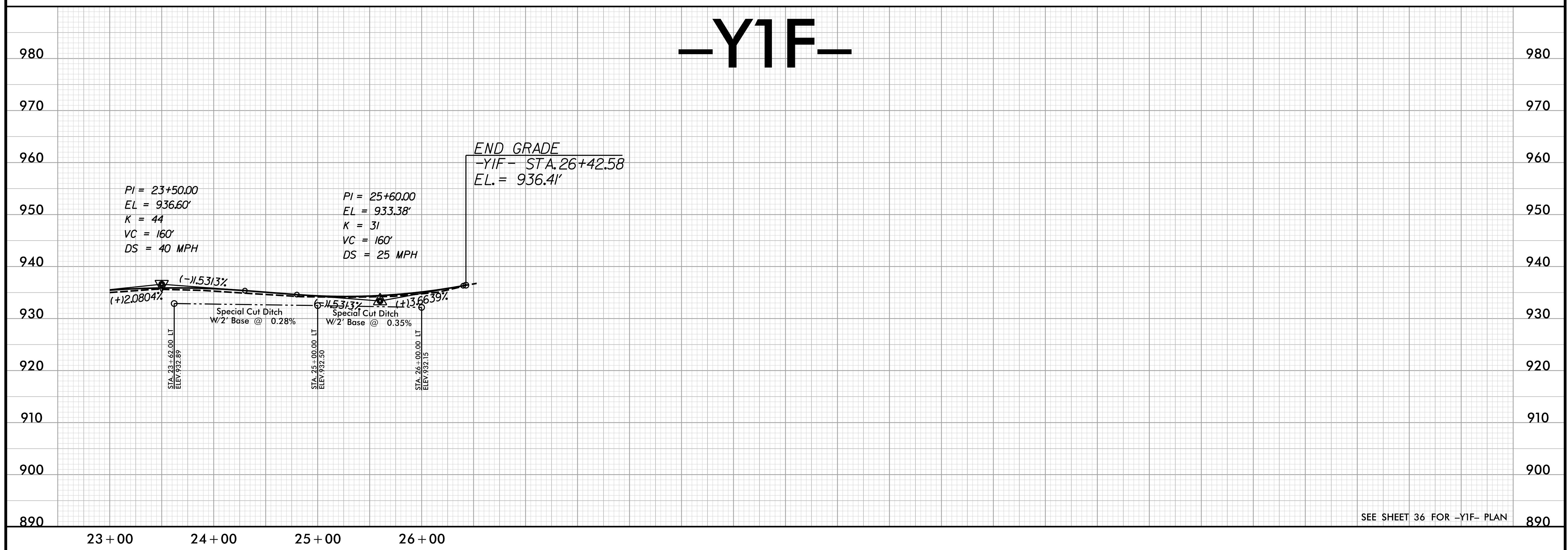
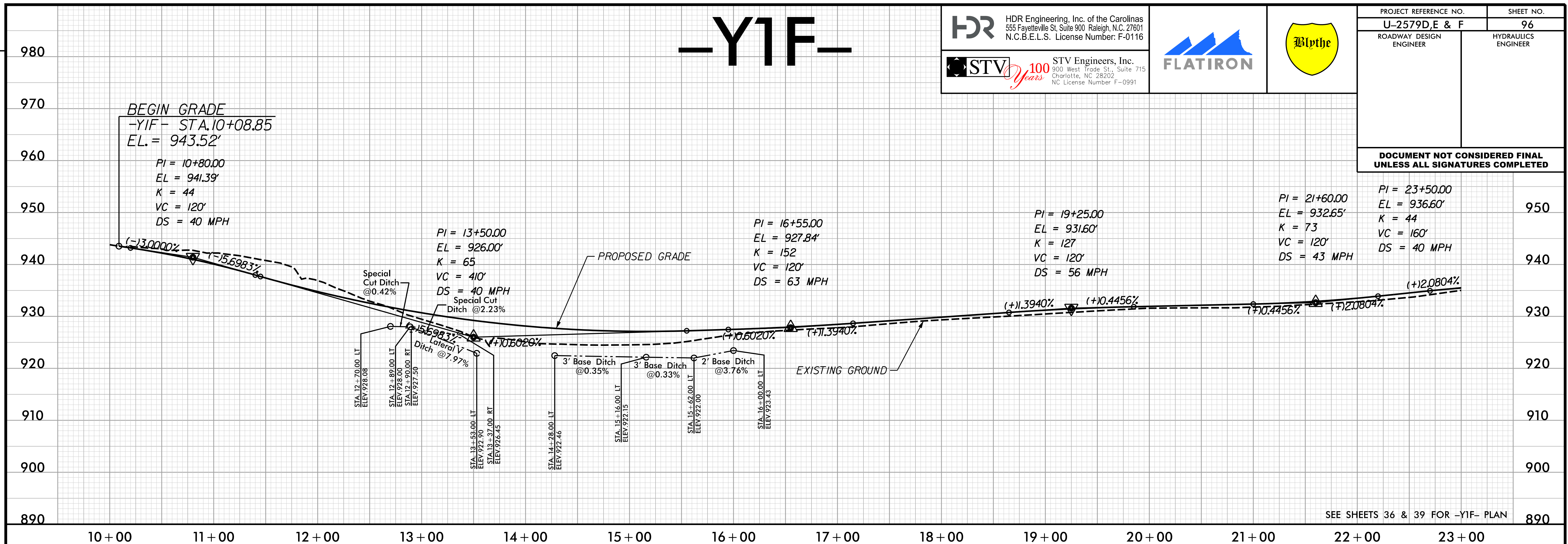




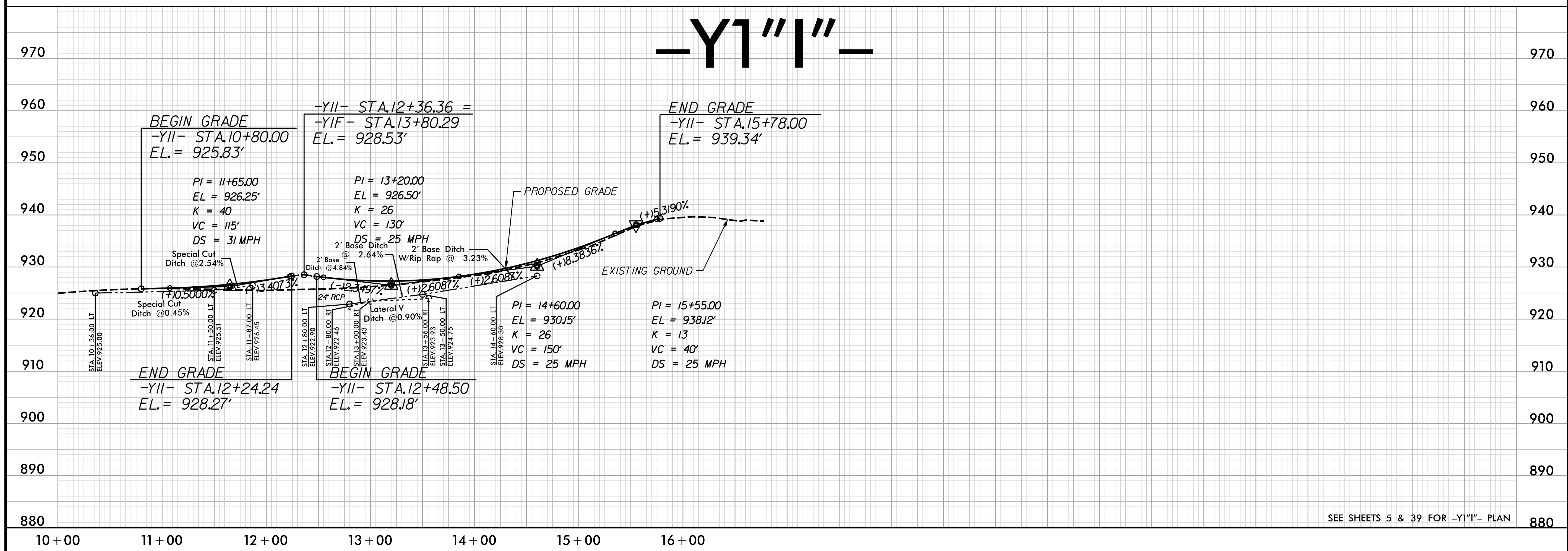
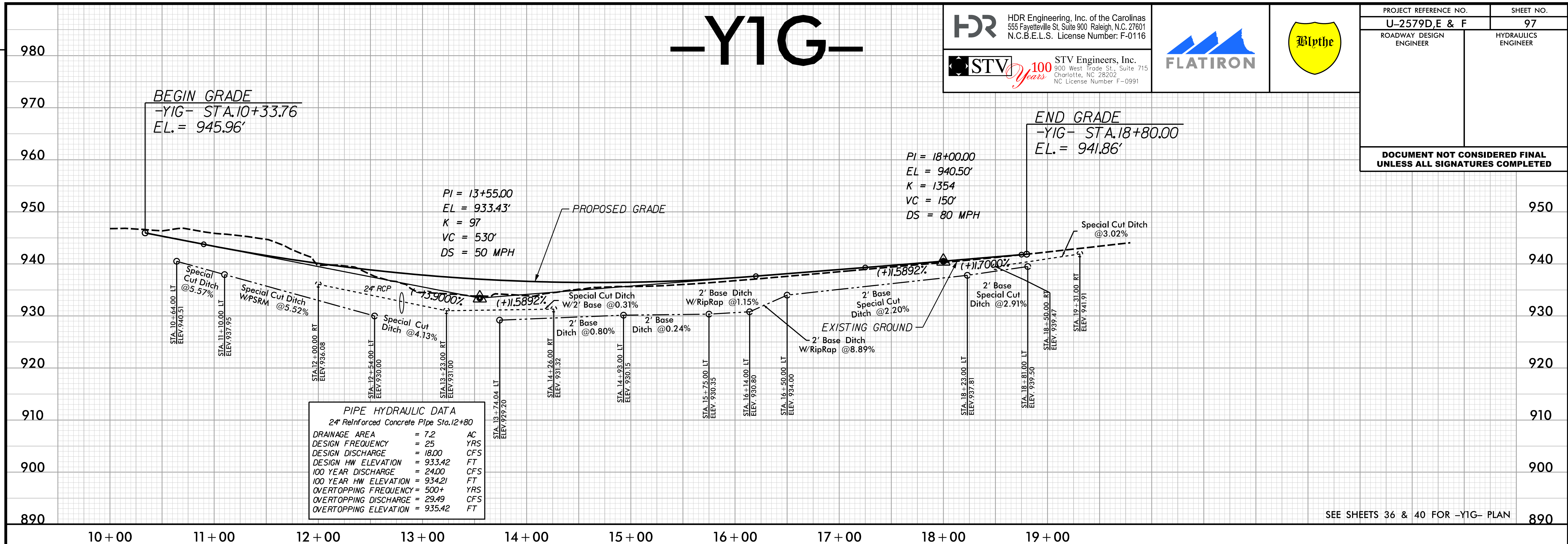




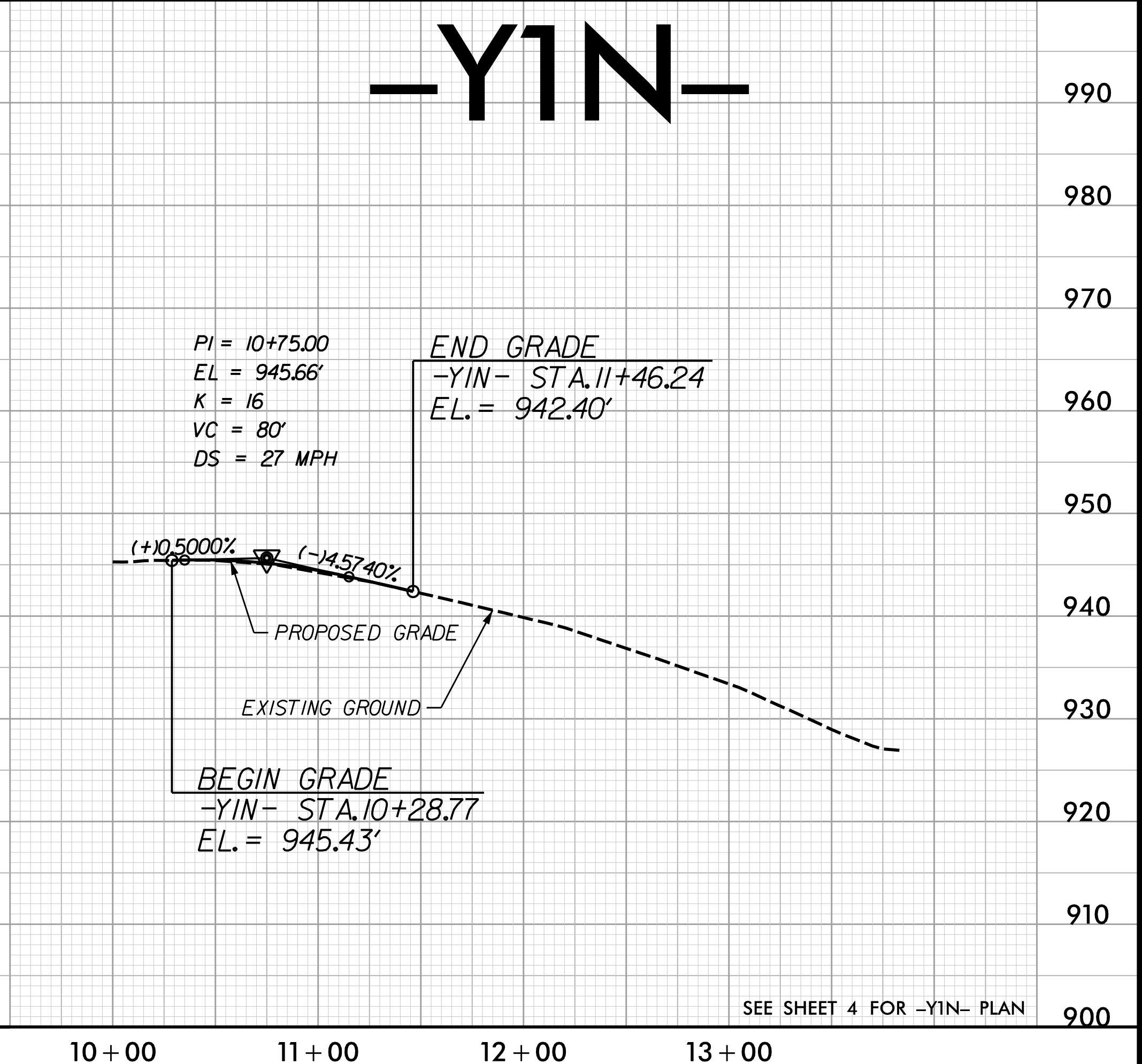
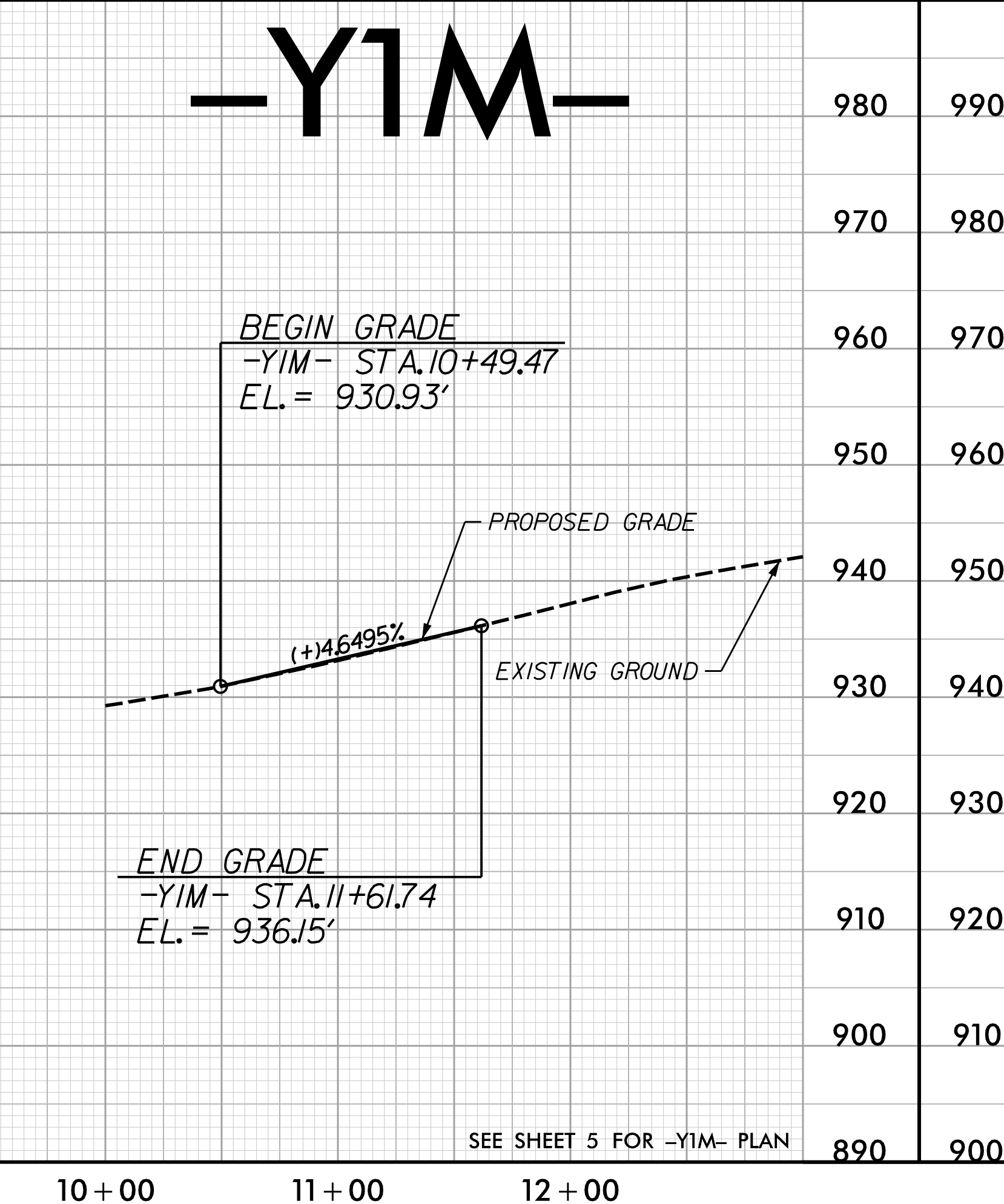
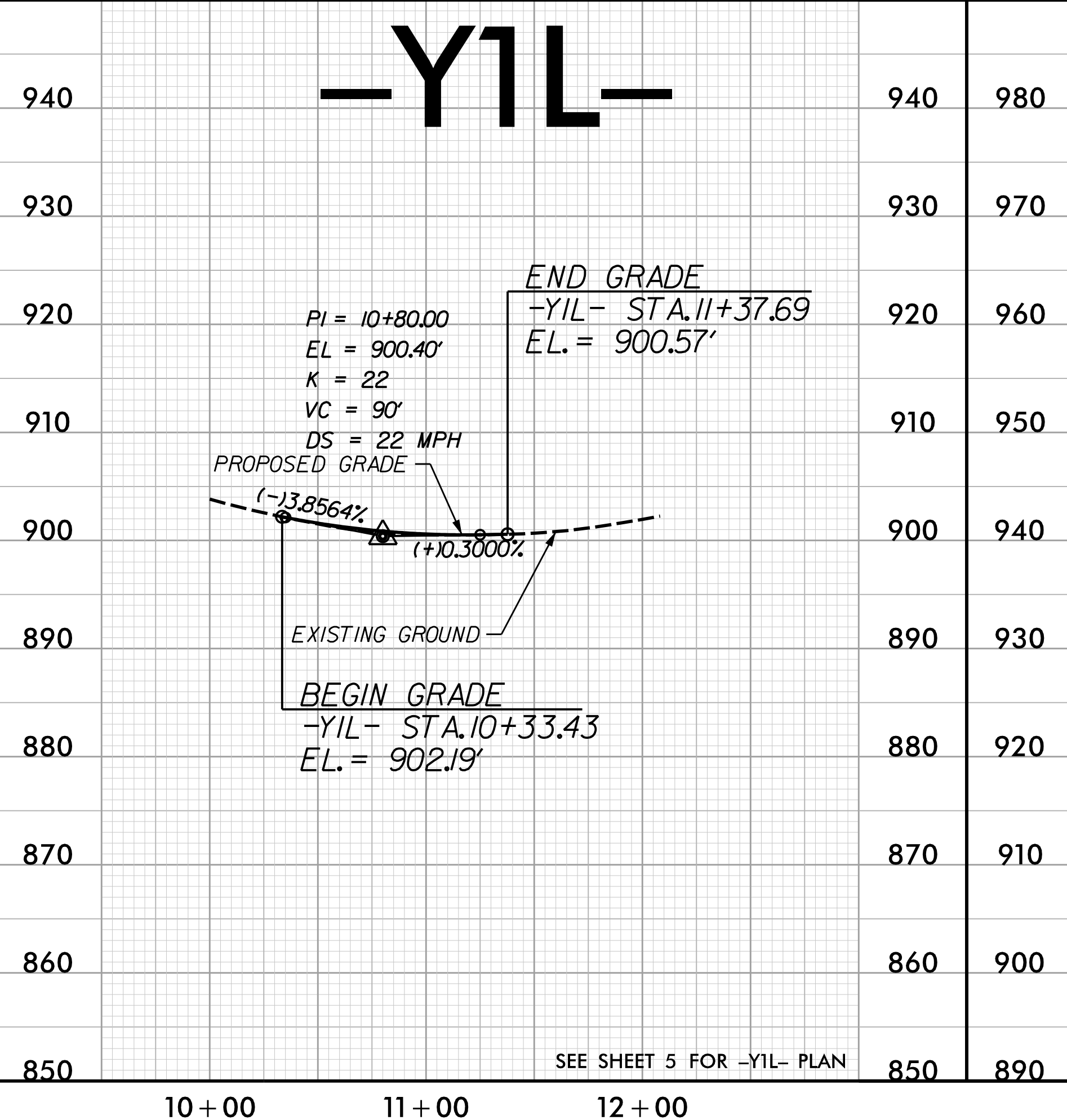
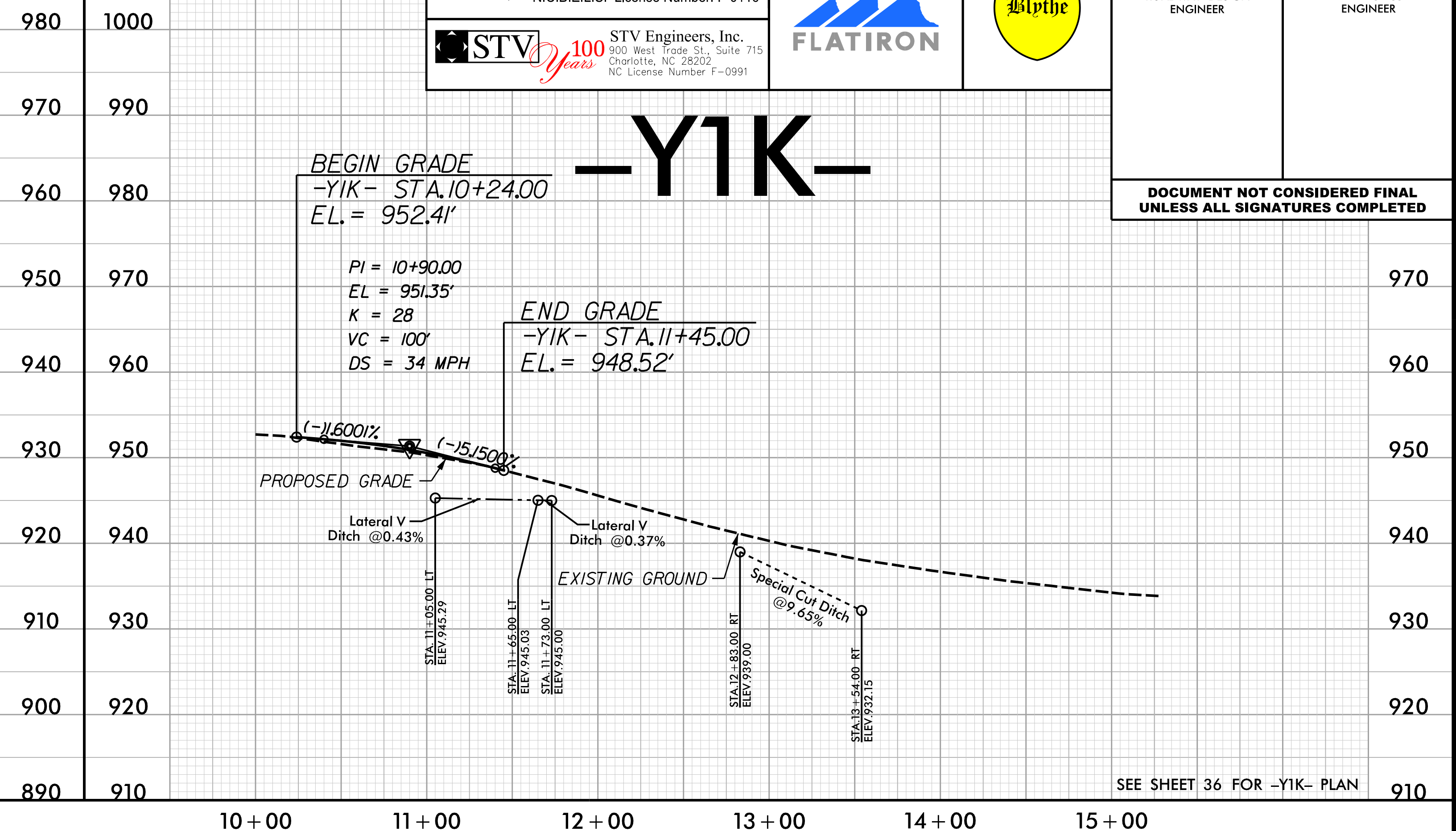
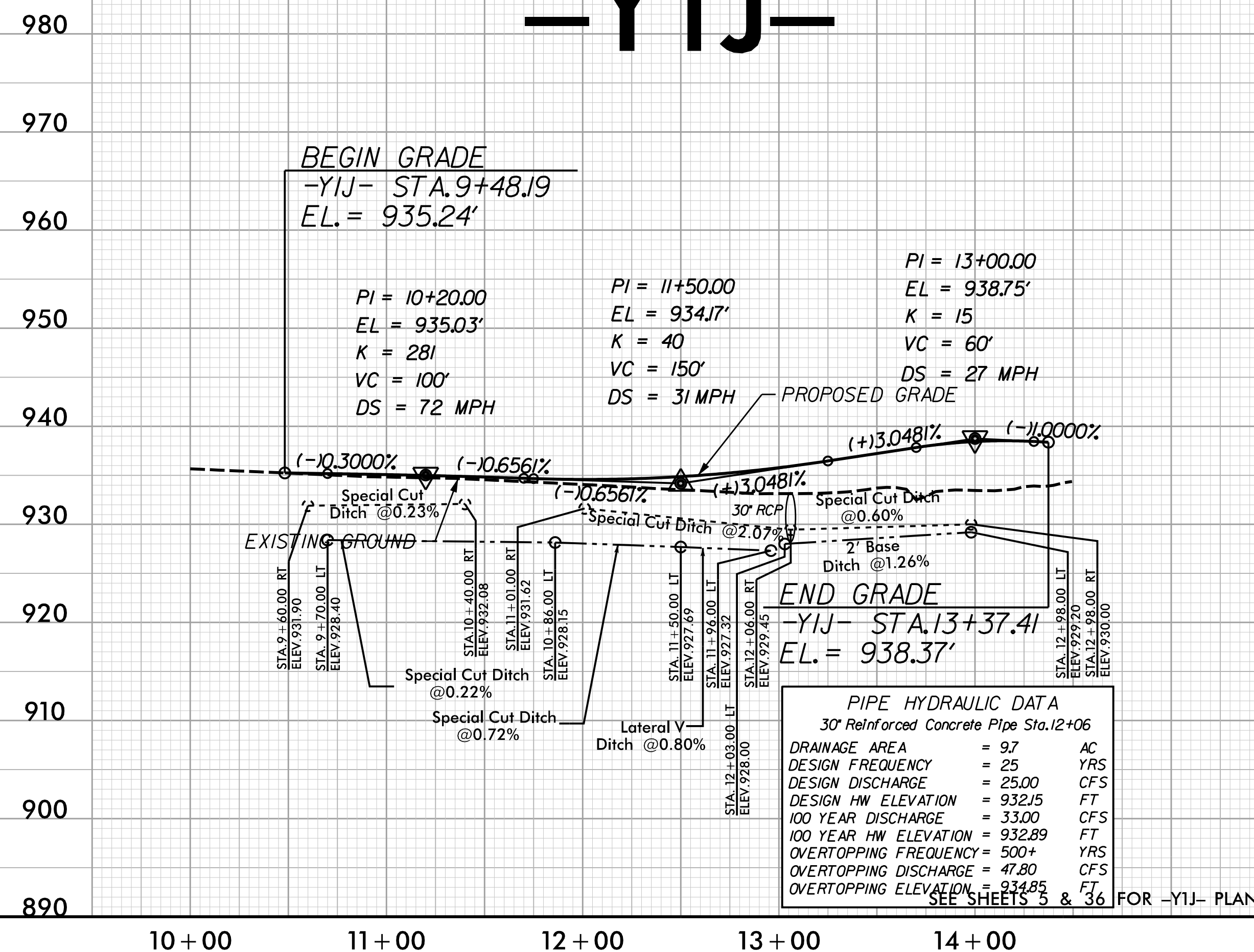




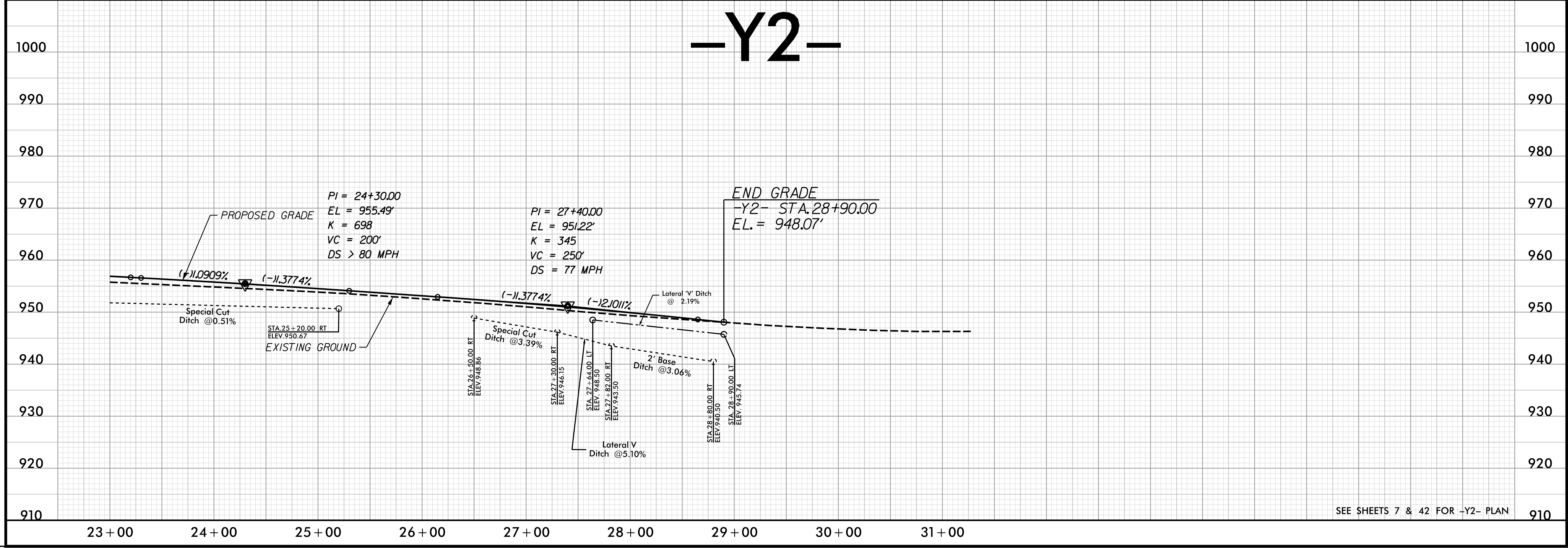
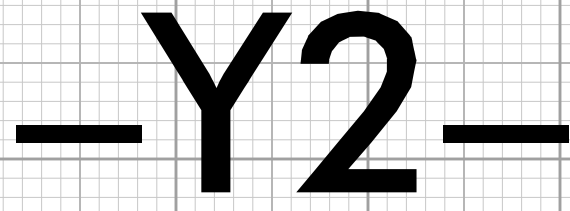








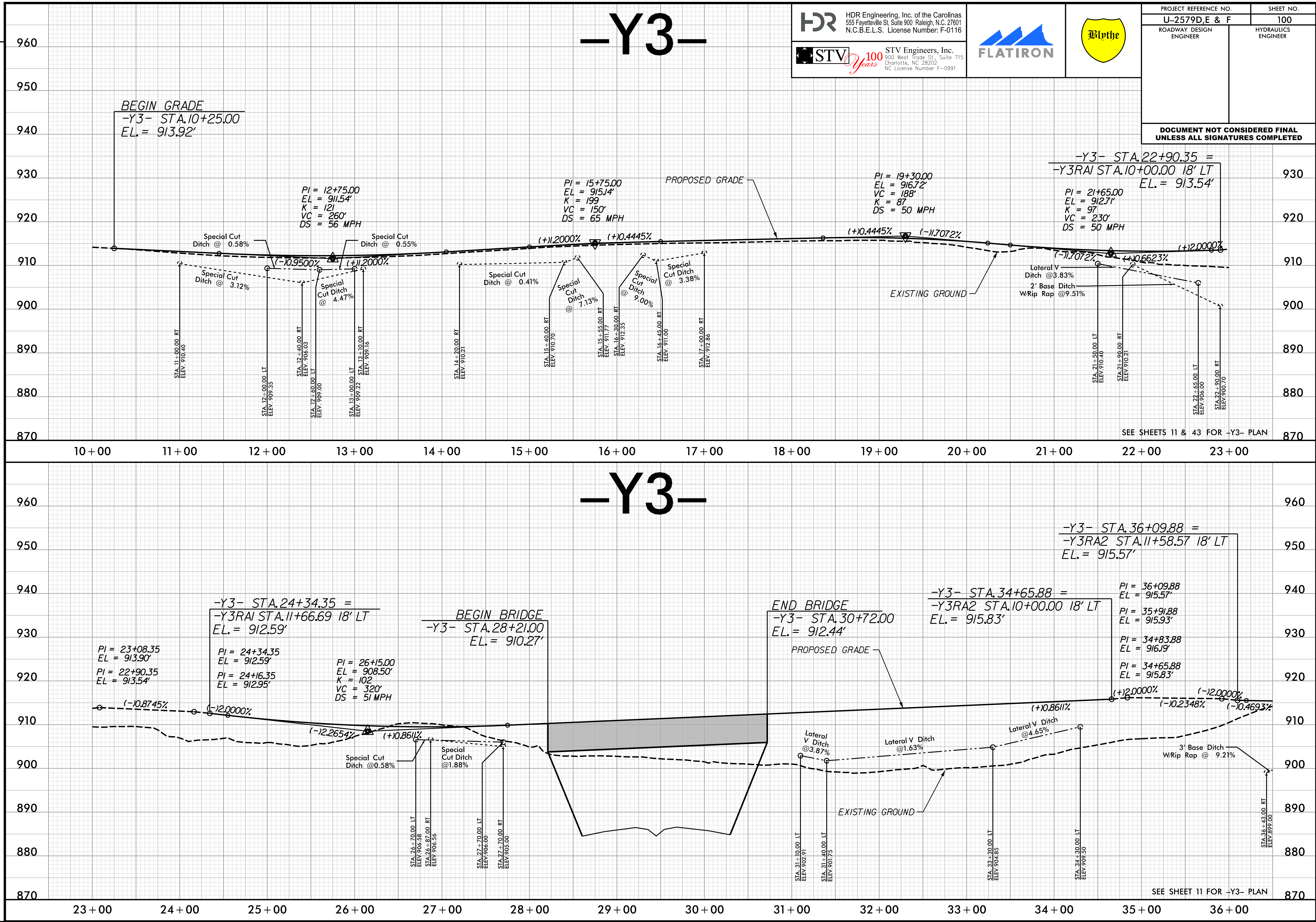






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USER: Charri's  
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REVISIONS



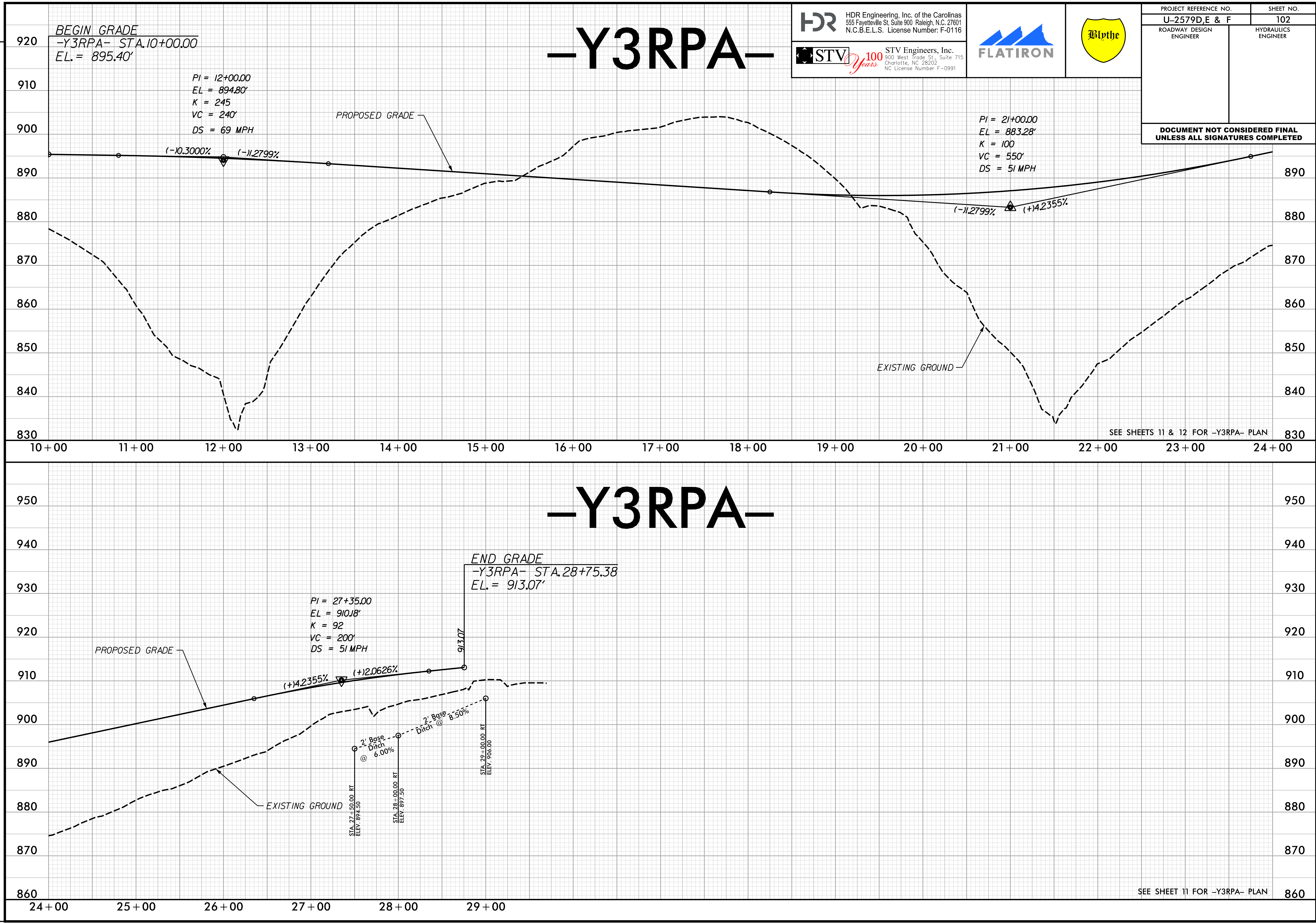






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TIME: 6:05:08 PM  
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REVISIONS



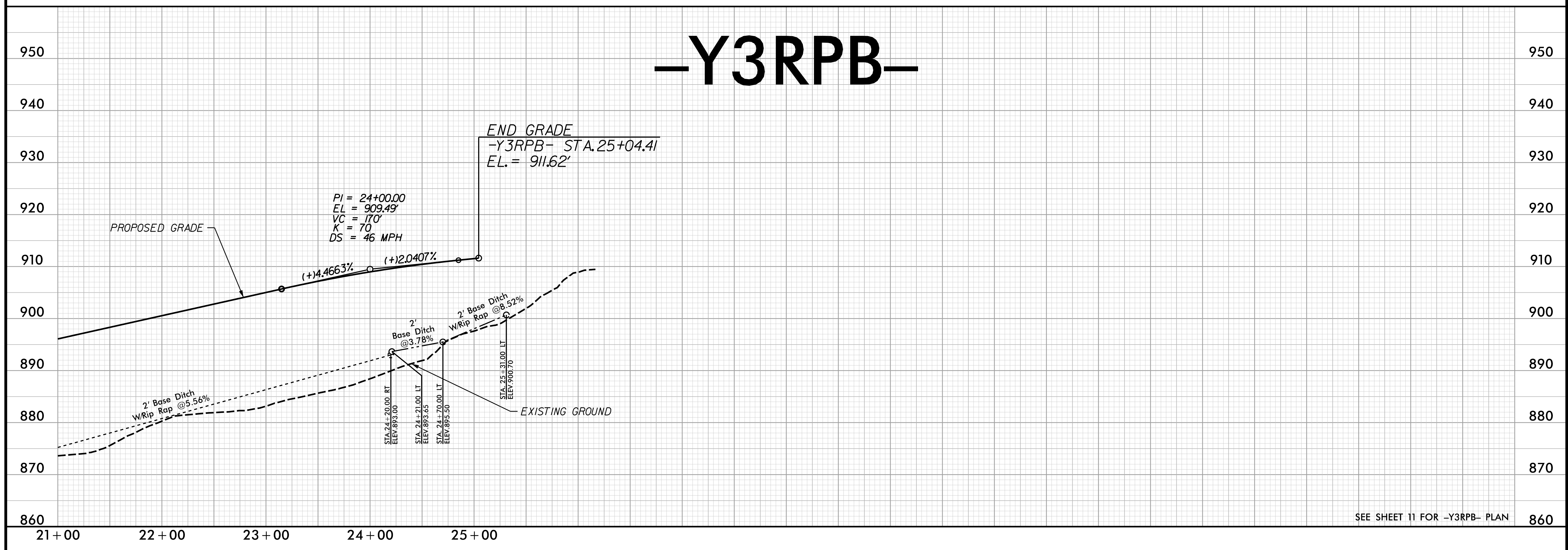
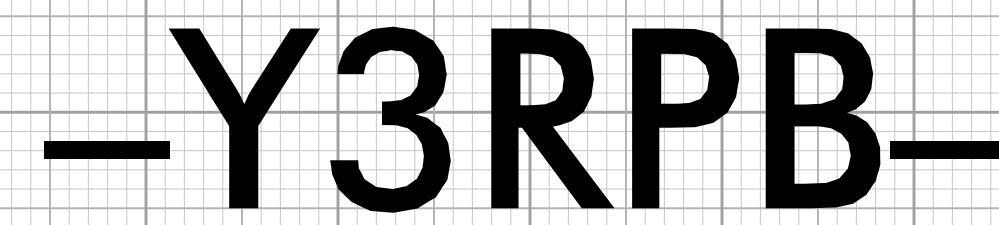
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N.C.B.E.L.S. License Number: F-0116

STV Engineers, Inc.  
800 West Trade St., Suite 715  
Charlotte, NC 28202  
NC License Number F-0991

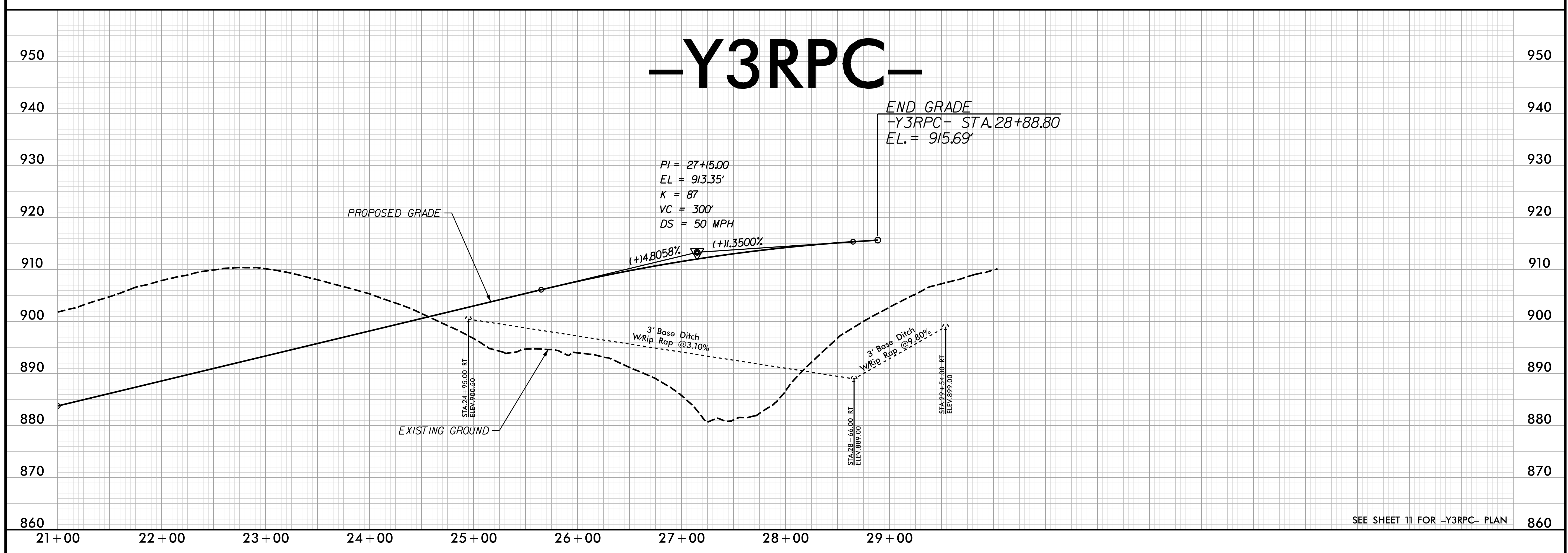
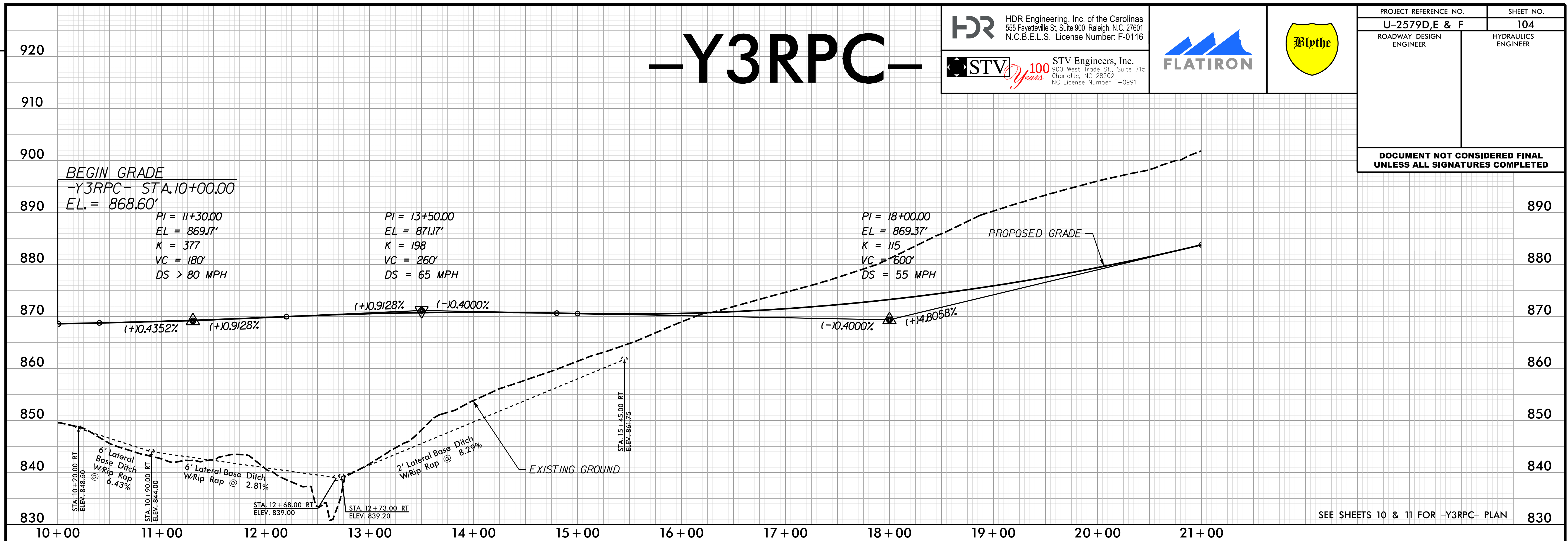
FLATIRON

|                                                                          |  |                         |
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| ROADWAY DESIGN<br>ENGINEER                                               |  | HYDRAULICS<br>ENGINEER  |
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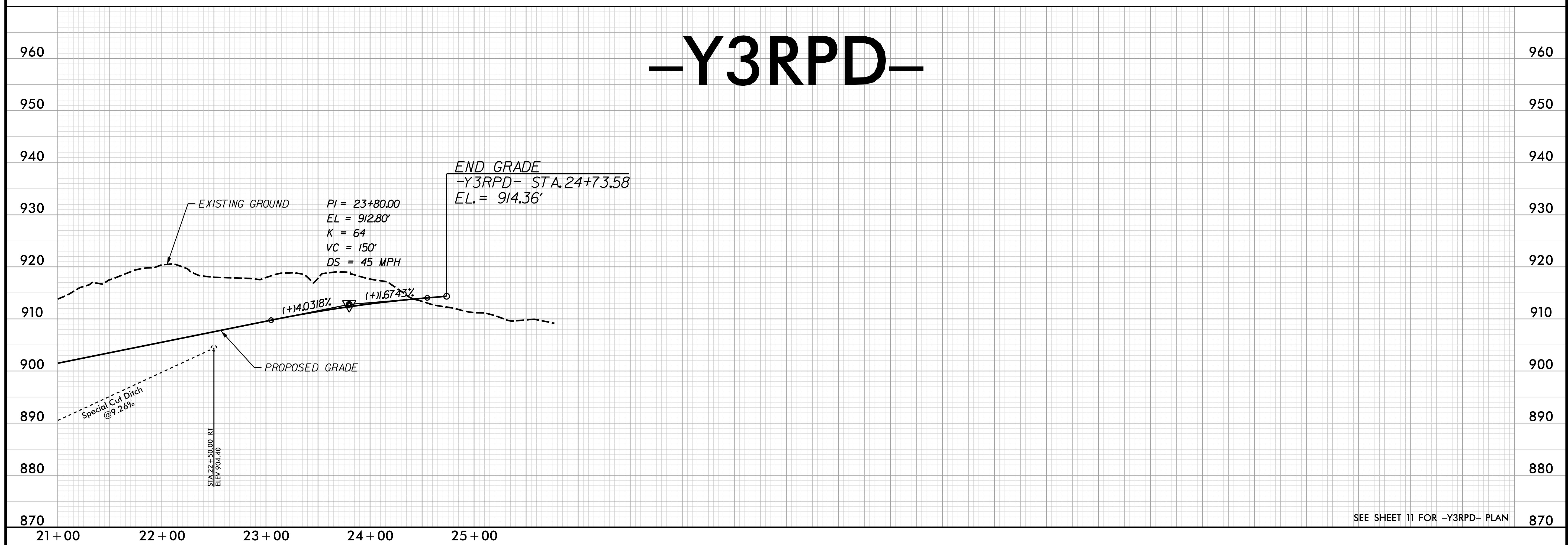
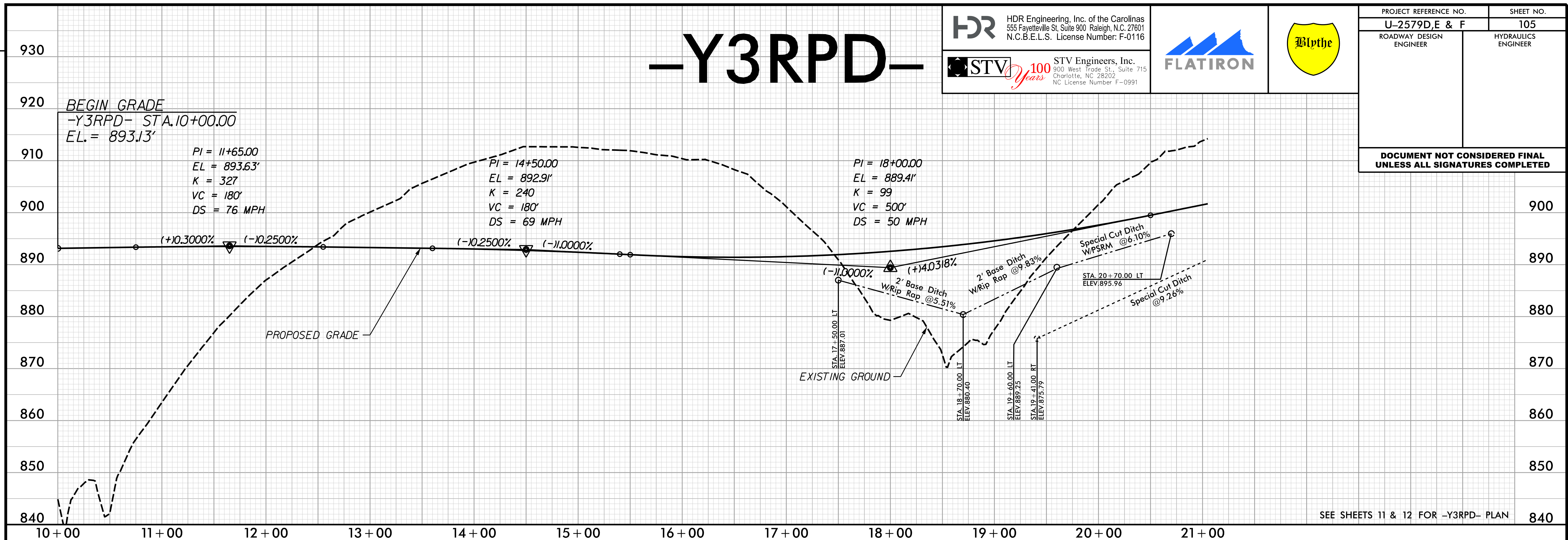




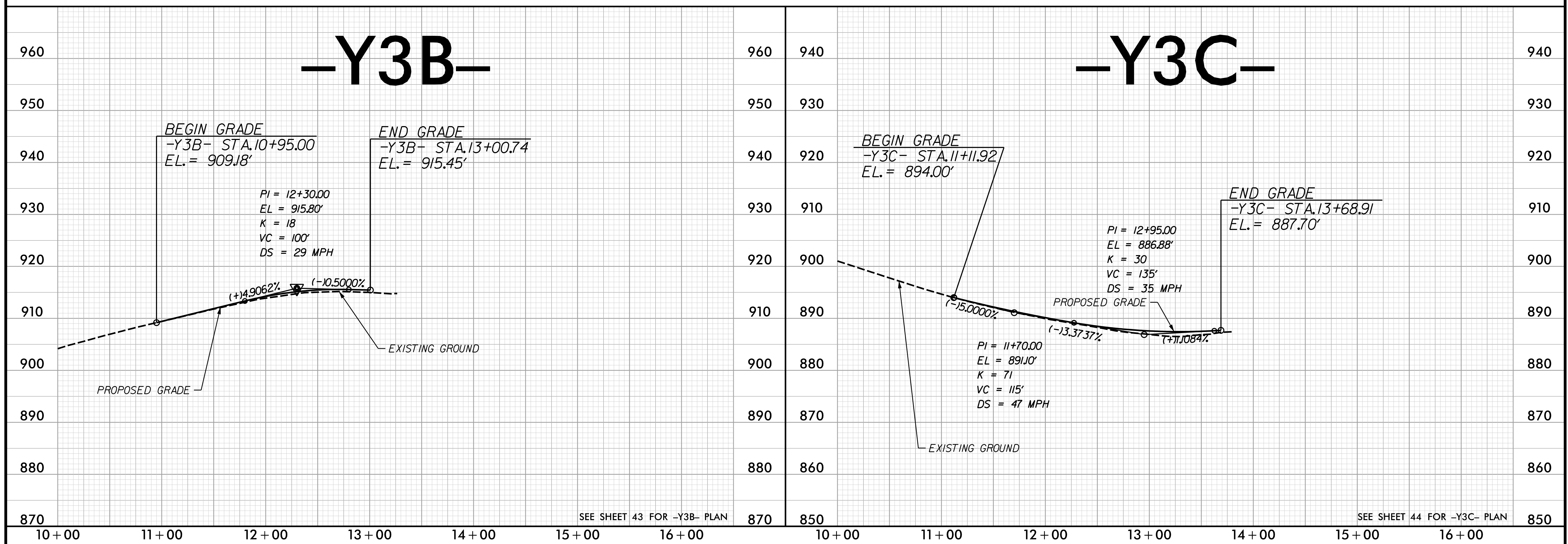
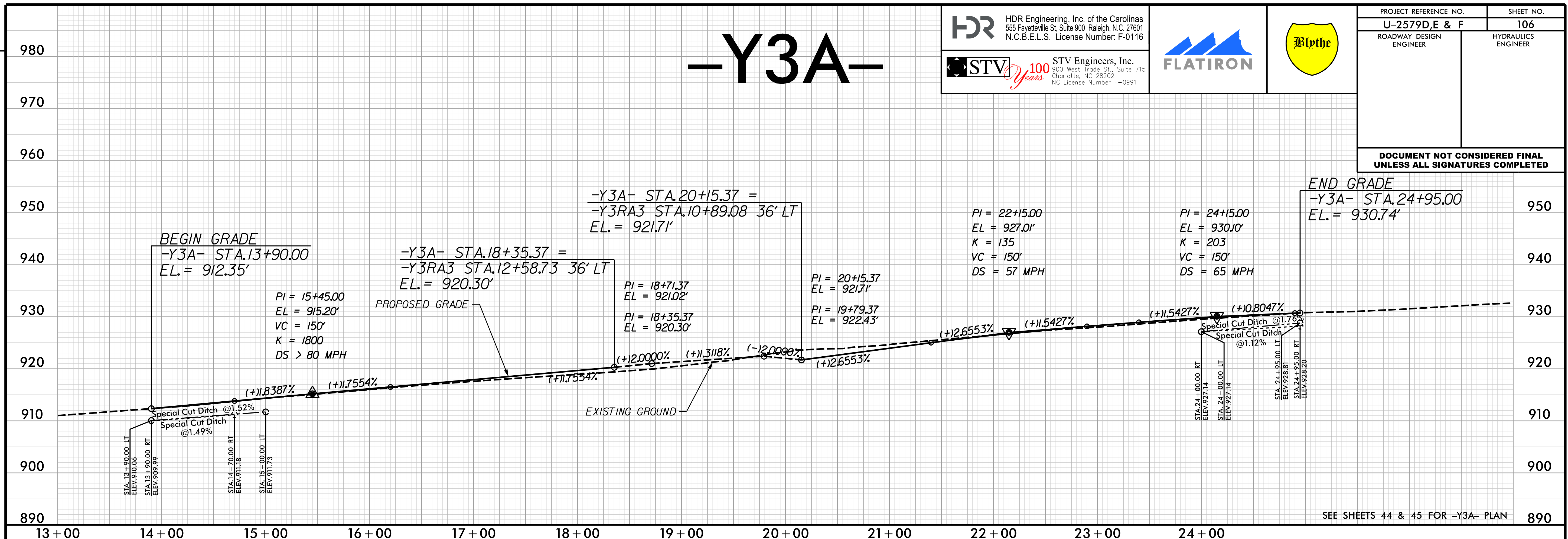






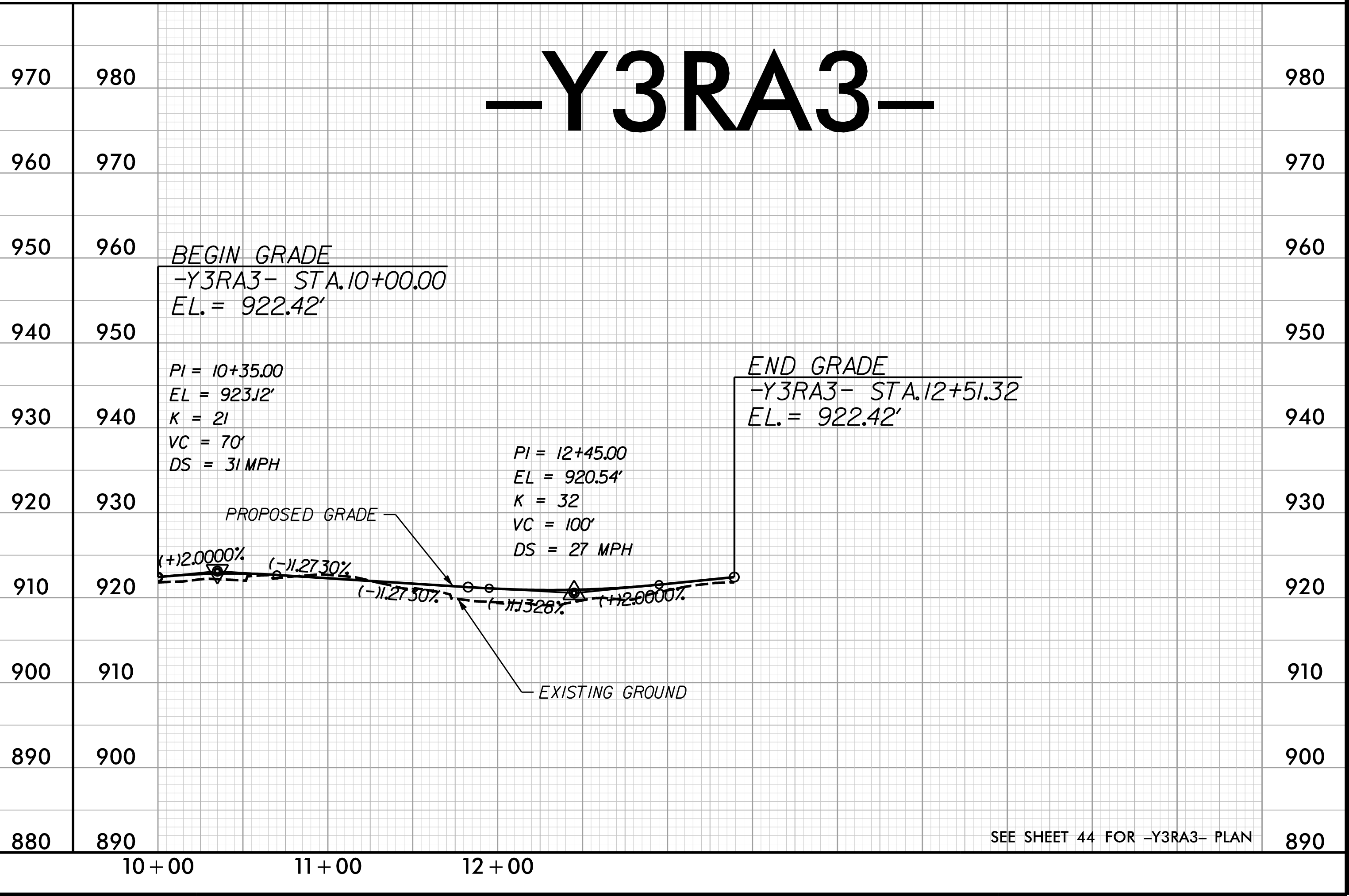
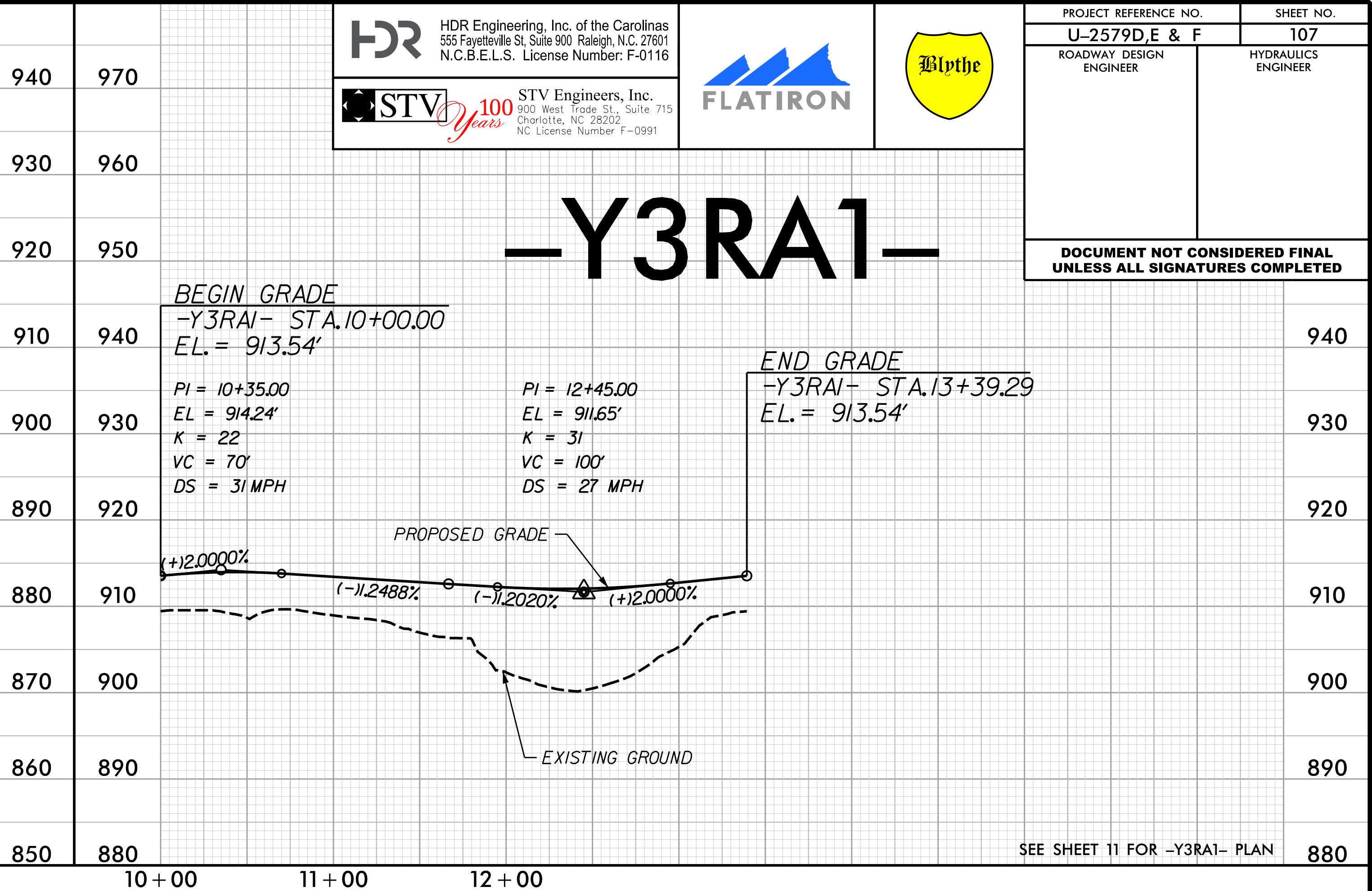
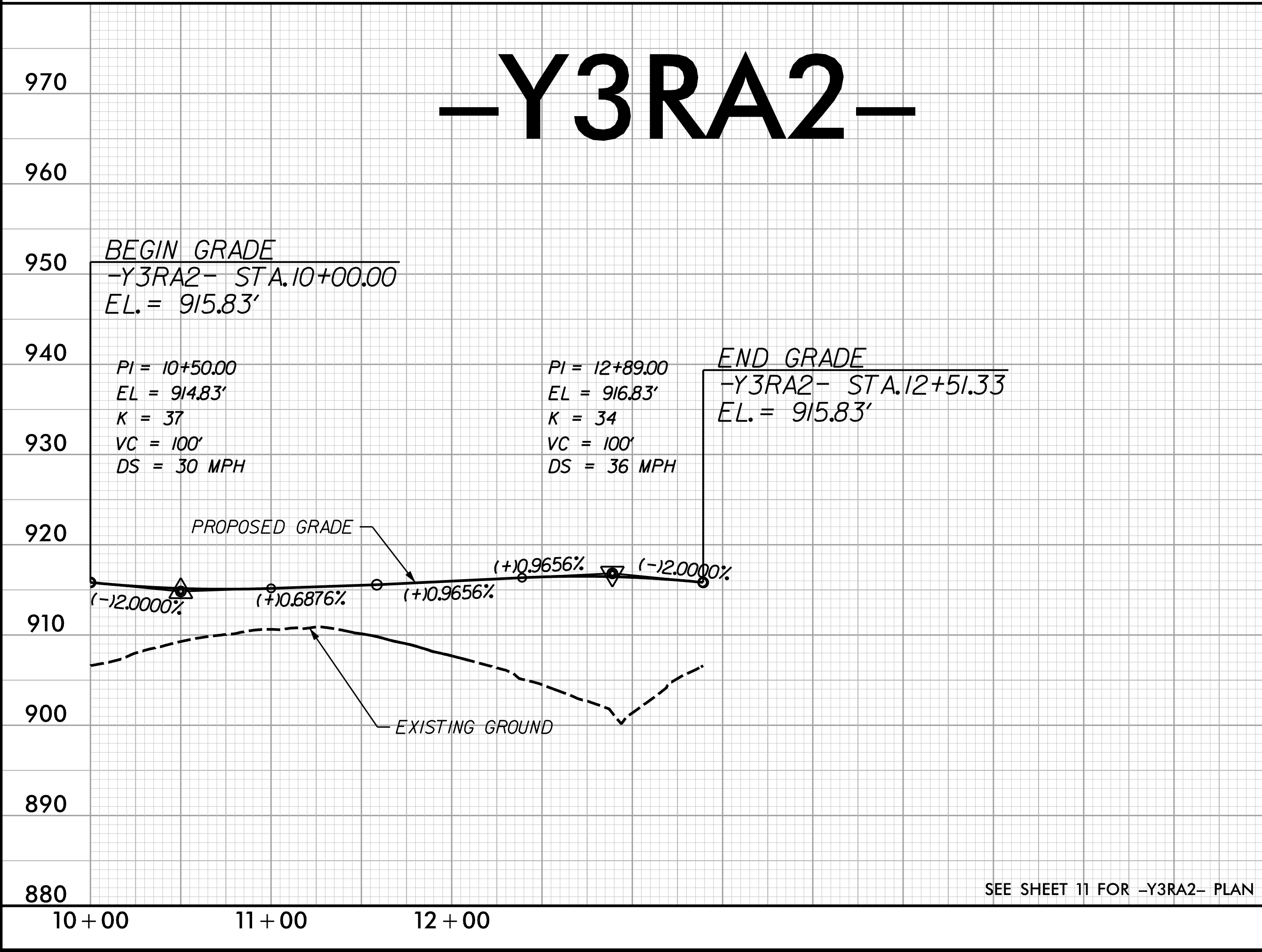
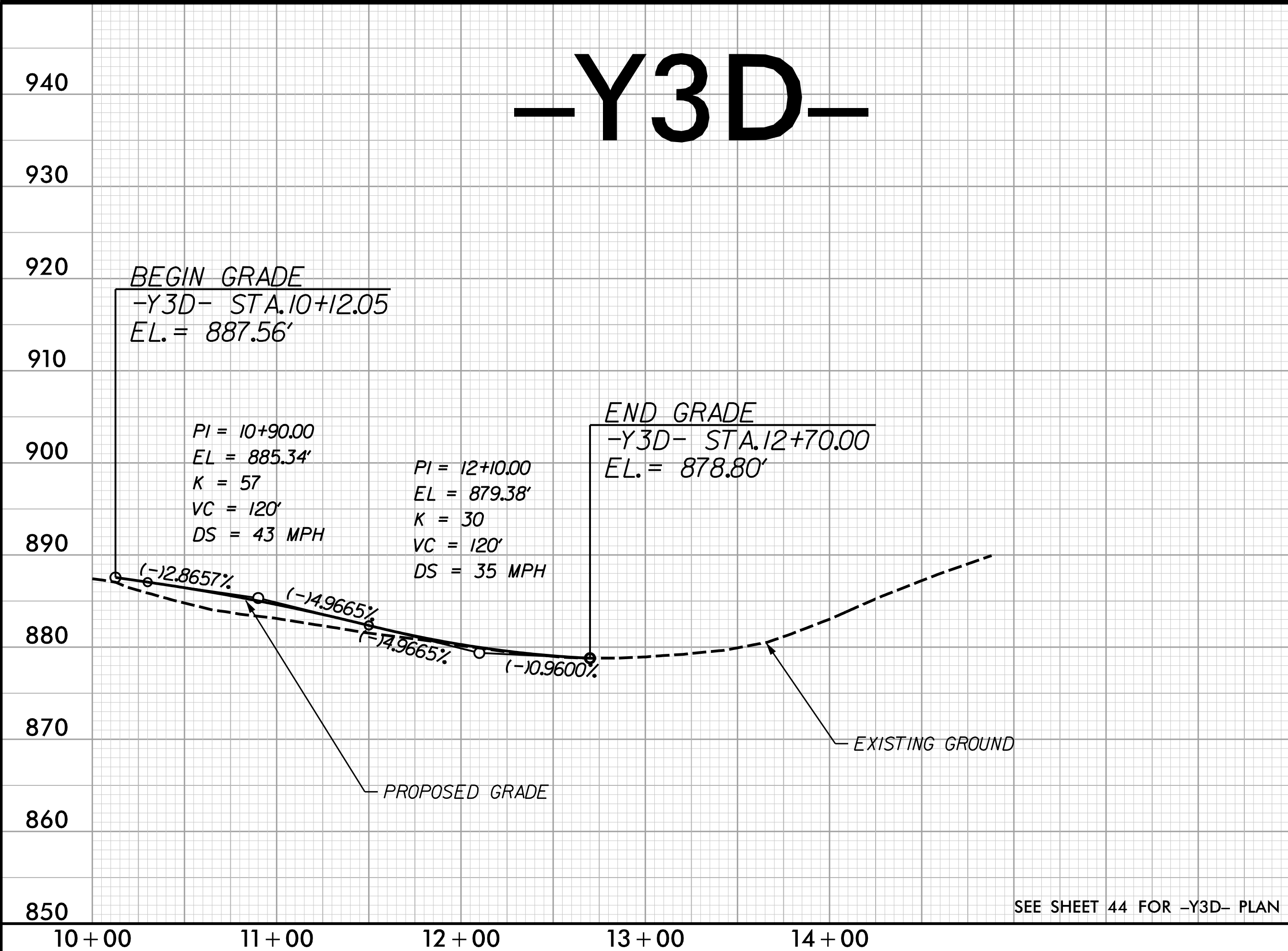








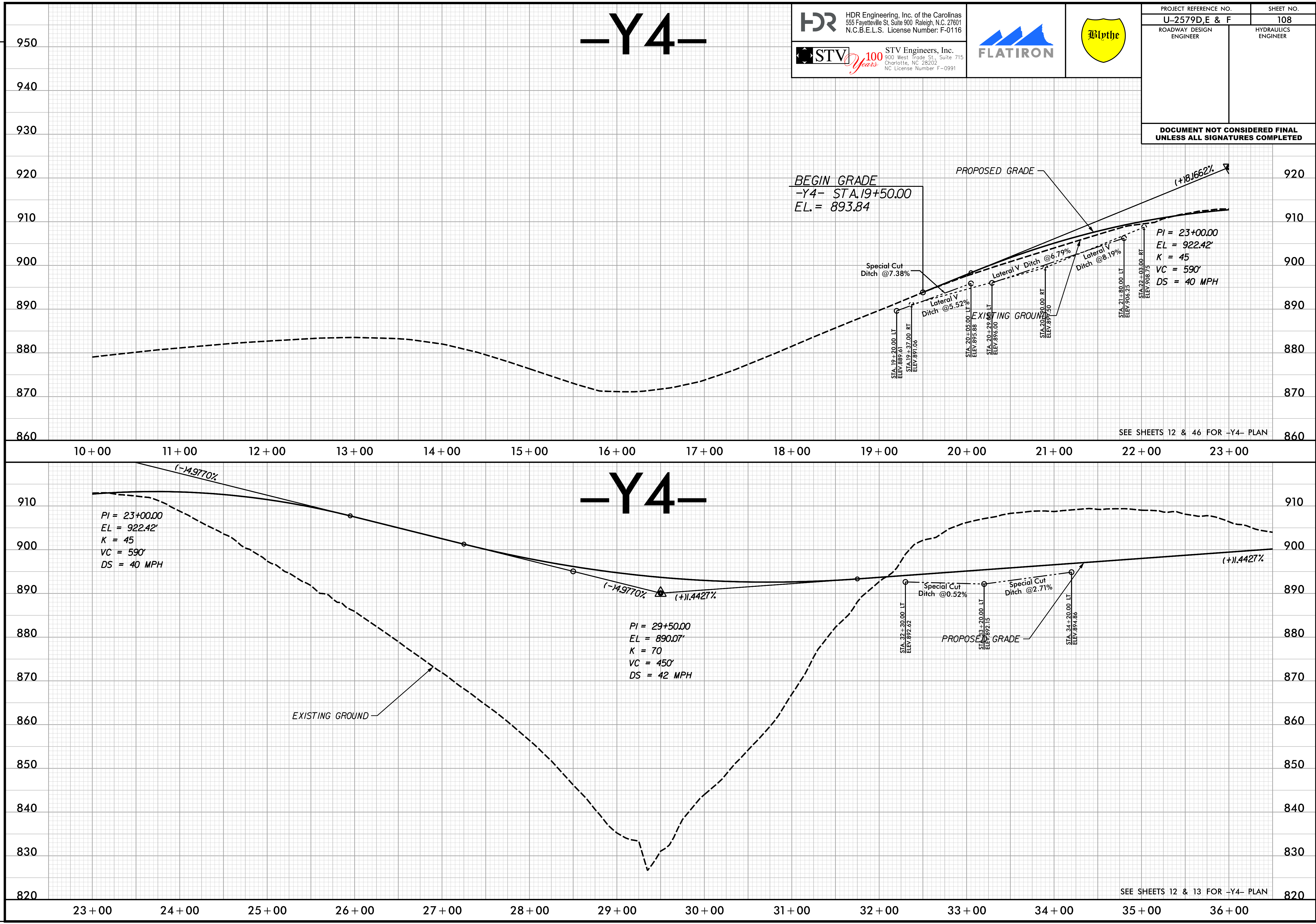
REVISIONS





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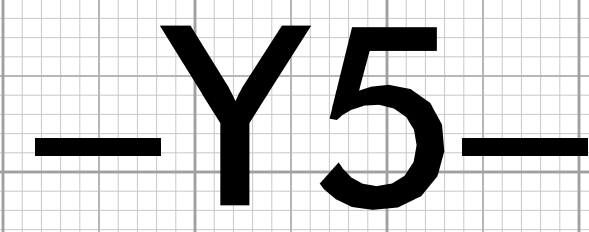
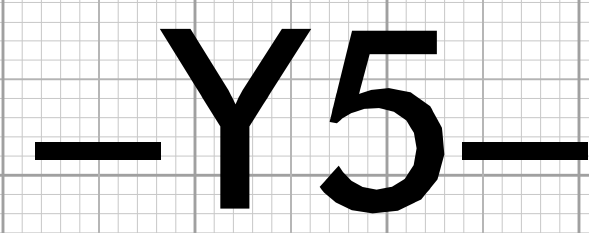
FLATIRON

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| PROJECT REFERENCE NO.<br><b>U-2579D,E &amp; F</b>                |  | SHEET NO.<br><b>108</b> |
| ROADWAY DESIGN<br>ENGINEER                                       |  | HYDRAULICS<br>ENGINEER  |
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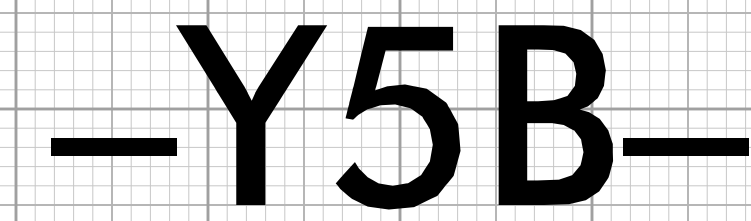
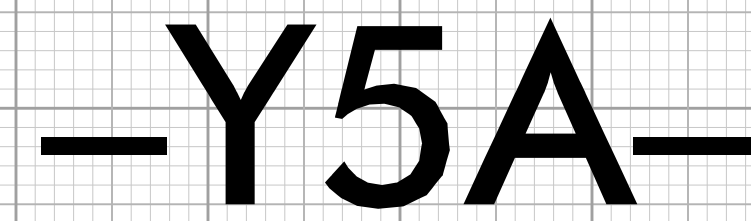








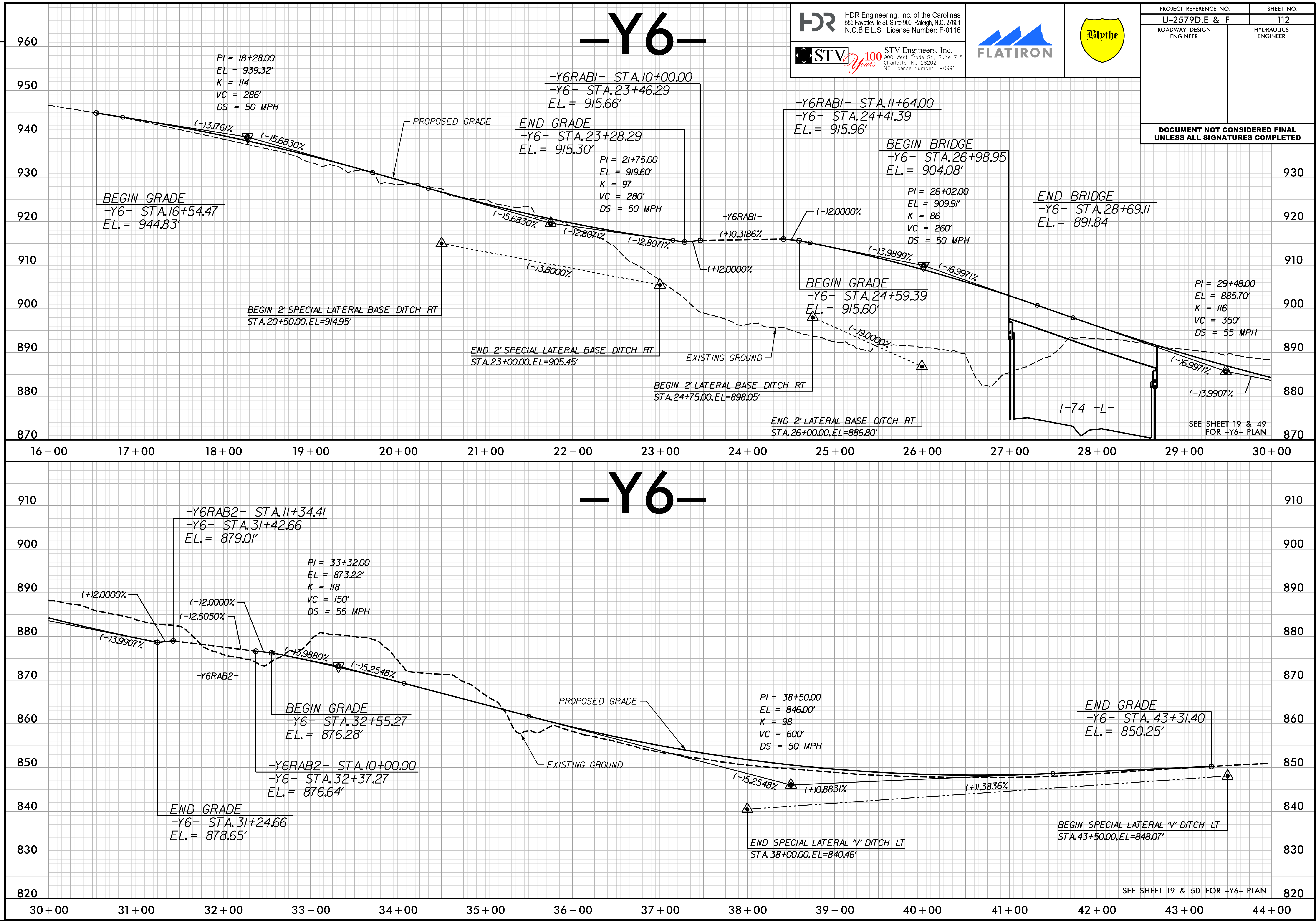






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DATE: 10/24/2018  
TIME: 11:18:36 AM  
FILE: \

REVISIONS





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FILE: \

REVISIONS

# -Y6RPA-

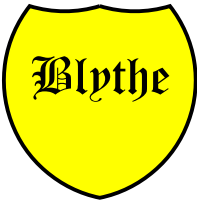


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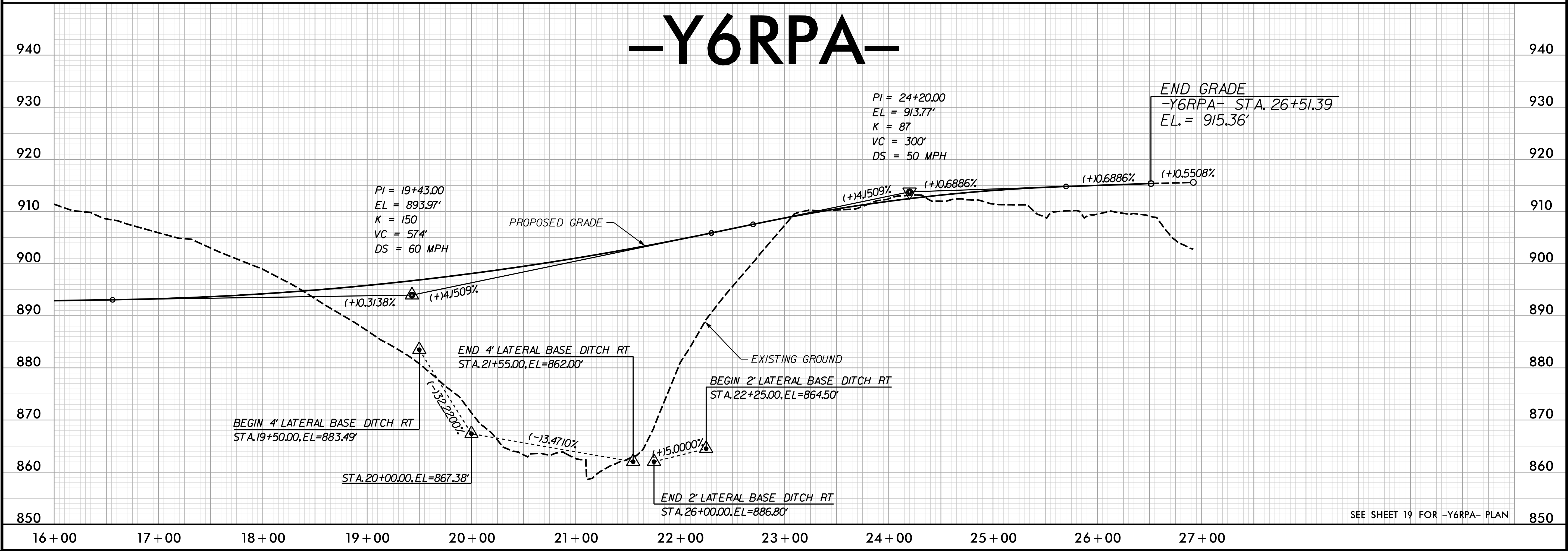
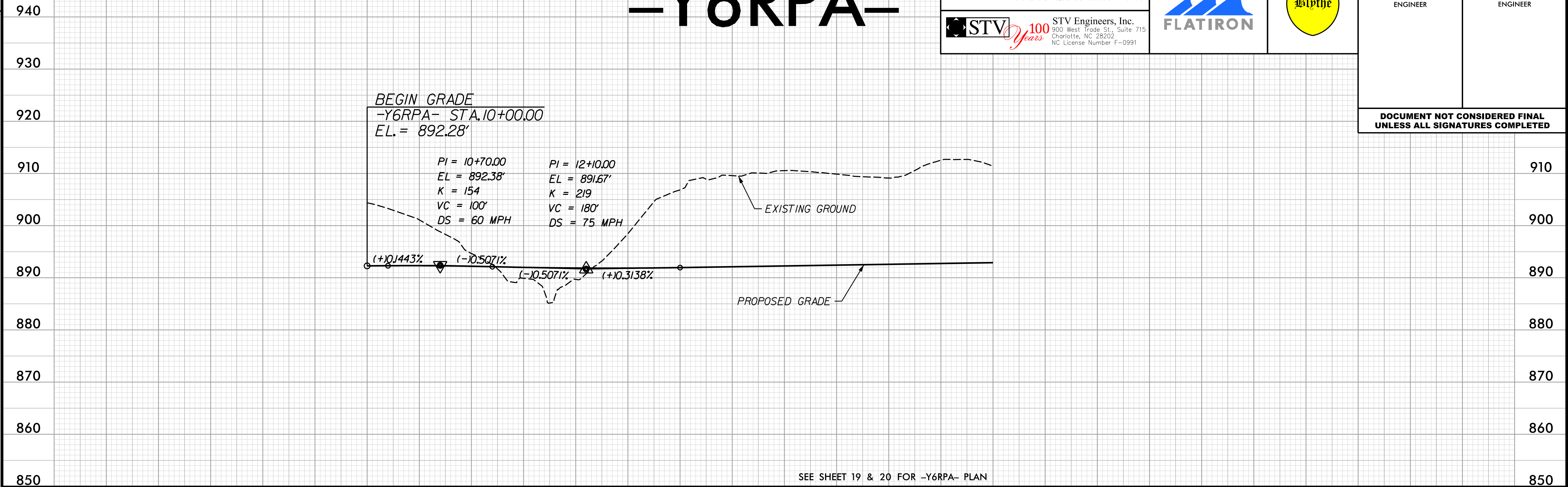
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| PROJECT REFERENCE NO.   |  | SHEET NO.           |  |
| U-2579D,E & F           |  | 113                 |  |
| ROADWAY DESIGN ENGINEER |  | HYDRAULICS ENGINEER |  |

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TIME: 11:18:41 AM  
FILE: \

REVISIONS

# -Y6RPB-

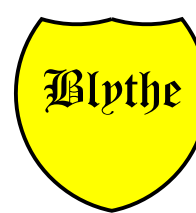


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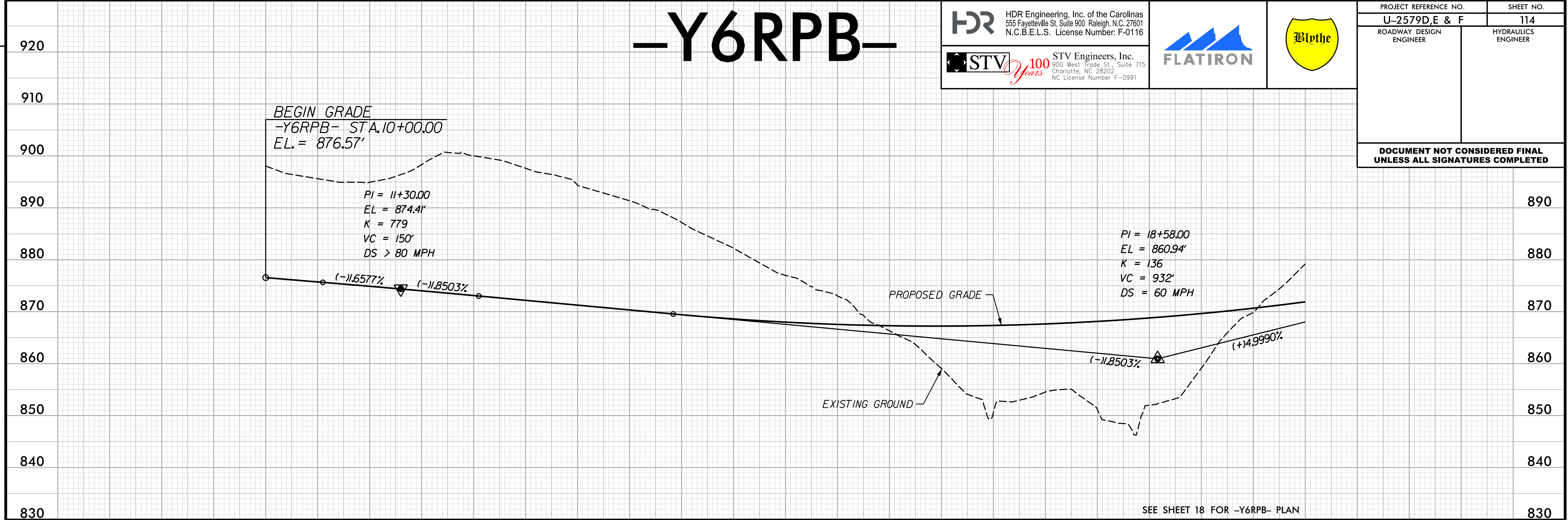
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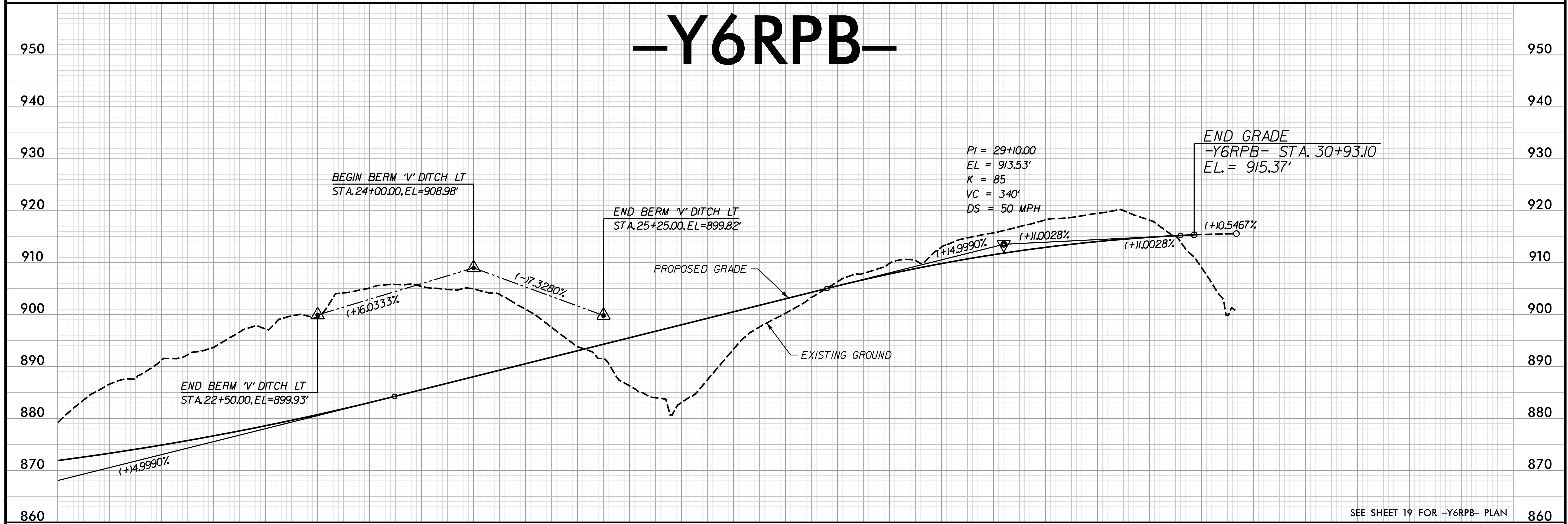


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| U-2579D,E & F           |                     | 114       |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |           |

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# -Y6RPB-





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-Y6RPD-

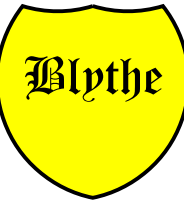


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N.C.B.E.L.S. License Number: F-0116



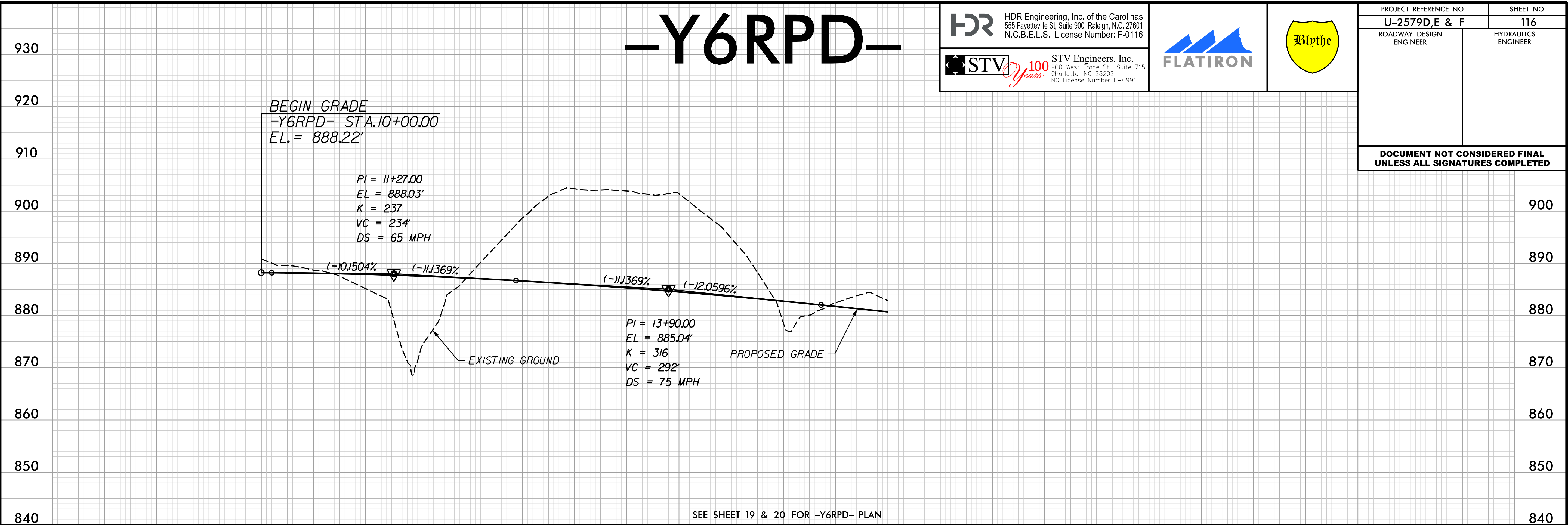
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Charlotte, NC 28202  
NC License Number F-0991



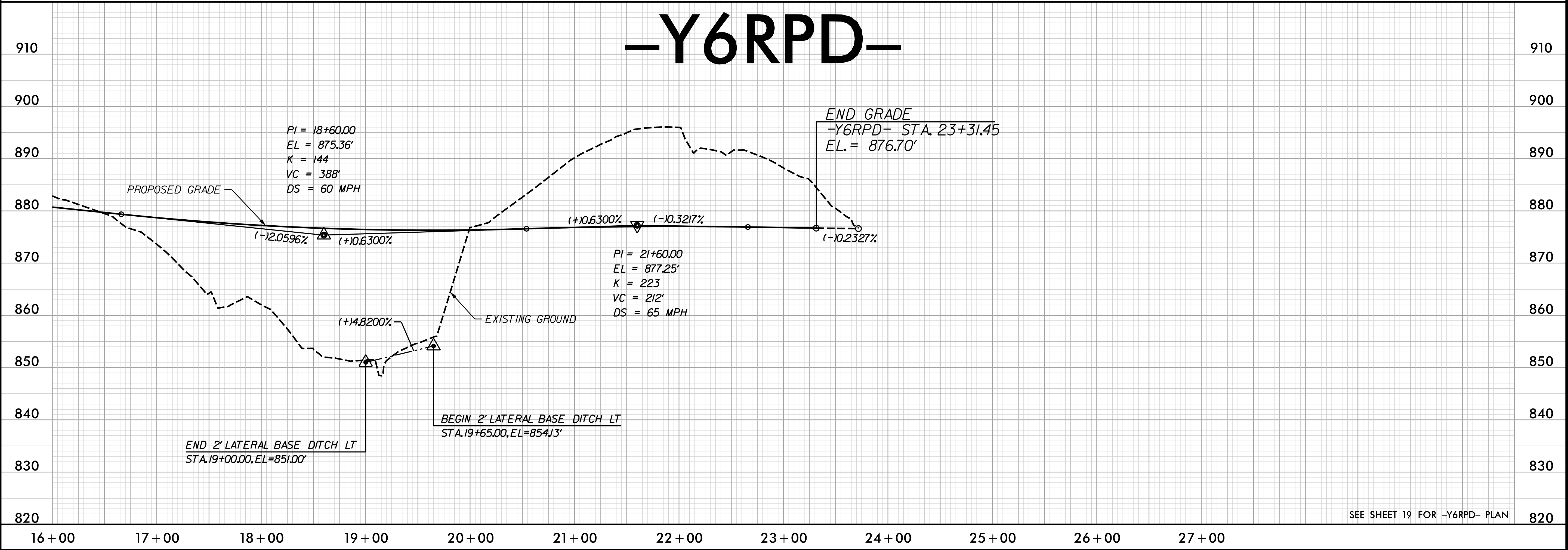


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| PROJECT REFERENCE NO.   |  | SHEET NO.           |  |
| U-2579D,E & F           |  | 116                 |  |
| ROADWAY DESIGN ENGINEER |  | HYDRAULICS ENGINEER |  |

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-Y6RPD-



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USER: wrightep  
FILE: \

PENTABLE: NCDOT\_pshp.fltd  
DATE: 10/24/2018  
TIME: 11:18:45 AM

REVISIONS



# -Y6RAB1-

## BEGIN GRADE

-Y6RAB1- STA.10+00.00  
EL.= 915.66'

|               |               |               |
|---------------|---------------|---------------|
| PI = 10+00.00 | PI = 11+50.79 | PI = 13+01.59 |
| EL = 915.52'  | EL = 916.07'  | EL = 915.52'  |
| K = 208       | K = 156       | K = 208       |
| VC = 152'     | VC = 114'     | VC = 152'     |
| DS = 75 MPH   | DS = 60 MPH   | DS = 75 MPH   |

## END GRADE

-Y6RAB1- STA.13+01.59  
EL.= 915.66'

(+10.3662% (-10.3662% (-10.3662%

PROPOSED GRADE  
EXISTING GROUND

-Y6RAB1- STA.11+64.00  
-Y6- STA.24+41.39  
EL.= 915.96'

SEE SHEET 19 FOR -Y6RAB1- PLAN

# -Y6RAB2-

## BEGIN GRADE

-Y6RAB2- STA.10+00.00  
EL.= 876.64'

PI = 10+00.00  
EL = 875.54'  
K = 26  
VC = 152'  
DS = 25 MPH

-Y6RAB2- STA.11+34.41  
-Y6- STA.31+42.66  
EL.= 879.01'

PI = 11+50.80  
EL = 879.91'  
K = 20  
VC = 115'  
DS = 30 MPH

PI = 13+01.59  
EL = 875.54'  
K = 26  
VC = 152'  
DS = 25 MPH

## END GRADE

-Y6RAB2- STA.13+01.59  
EL.= 876.64'

(+12.8979% (-12.8979% (-12.8979%

PROPOSED GRADE  
EXISTING GROUND

SEE SHEET 19 FOR -Y6RAB2- PLAN

# -Y7-

## BEGIN BRIDGE

-Y7- STA.18+60.21  
EL.= 987.35'

## BEGIN GRADE

-Y7- STA.15+60.00  
EL.= 980.60'

PI = 17+00.00  
EL = 982.44'  
K = 160  
VC = 280'  
DS = 65 MPH

EXISTING GROUND

(+11.3162% (+13.0672%

## END BRIDGE

-Y7- STA.21+20.21  
EL.= 995.33'

STA.23+00.00,EL=996.98'

PI = 23+40.00  
EL = 1,002.07'  
K = 84  
VC = 336'  
DS = 50 MPH

PROPOSED GRADE

END LATERAL 'V' DITCH RT  
STA.21+68.00,EL=991.36'

END LATERAL 'V' DITCH LT  
STA.22+00.00,EL=995.44'

END LATERAL 'V' DITCH RT  
STA.22+80.00,EL=996.19'

BEGIN LATERAL 'V' DITCH RT  
STA.22+33.00,EL=995.38'

BEGIN LATERAL 'V' DITCH RT  
STA.23+32.00,EL=996.35'

STA.23+00.00,EL=996.25'

BEGIN LATERAL 'V' DITCH LT  
STA.24+00.00,EL=998.51'

END GRADE  
-Y7- STA.26+42.16  
EL.= 999.26'

SEE SHEET 25 & 52 FOR -Y7- PLAN

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FLATIRON

Blythe

PROJECT REFERENCE NO.

U-2579D,E & F

ROADWAY DESIGN  
ENGINEER

SHEET NO.

117

HYDRAULICS  
ENGINEER

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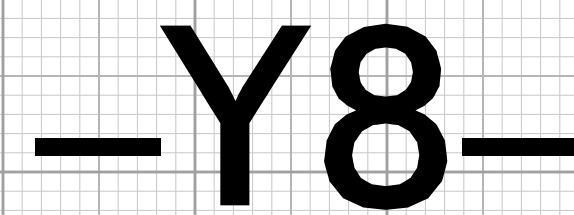
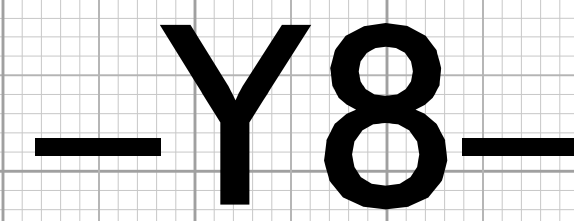
REVISIONS

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DATE: 10/24/2018  
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FILE: \

13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00



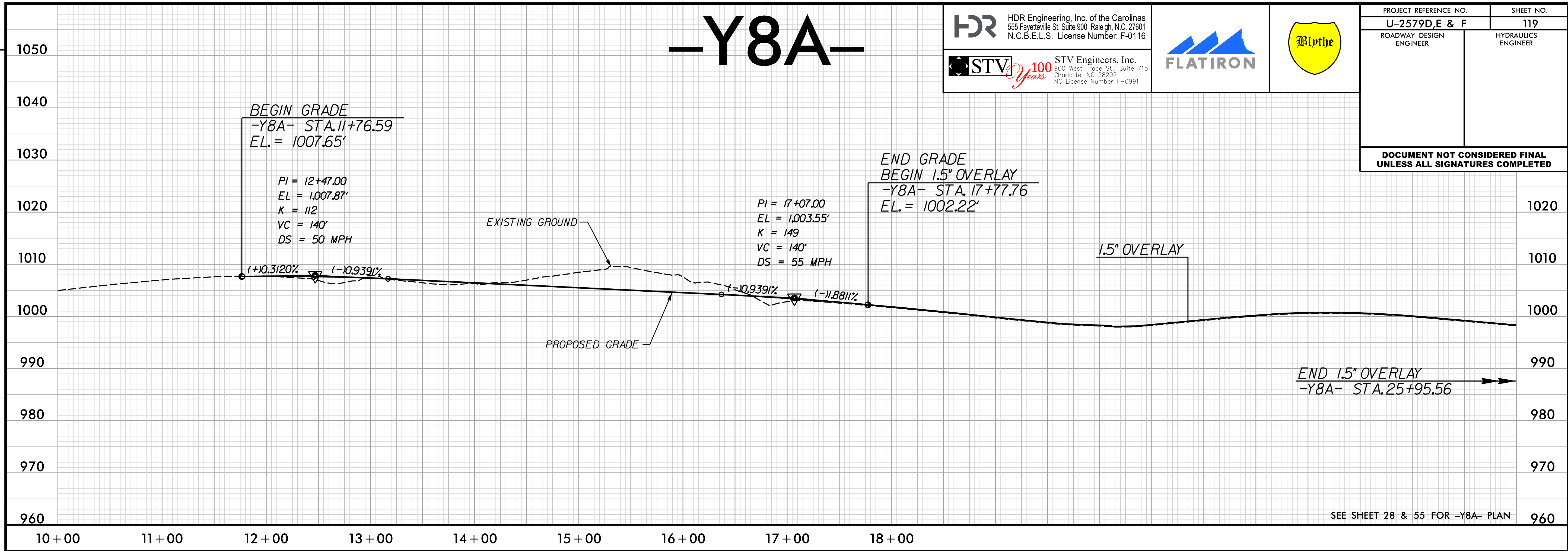


|                        |          |     |
|------------------------|----------|-----|
| 42" RCP-III Sta. 29+65 |          |     |
| DRAINAGE AREA          | = 0.04   | SOM |
| DESIGN FREQUENCY       | = 50     | YRS |
| DESIGN DISCHARGE       | = 60.3   | CFS |
| DESIGN HW ELEVATION    | = 971.80 | FT  |
| 100 YEAR DISCHARGE     | = 63.9   | CFS |
| 100 YEAR HW ELEVATION  | = 971.96 | FT  |
| OVERTOPPING FREQUENCY  | = >500   | YRS |
| OVERTOPPING DISCHARGE  | = 194.73 | CFS |
| OVERTOPPING ELEVATION  | = 982.94 | FT  |

## REVISIONS

```
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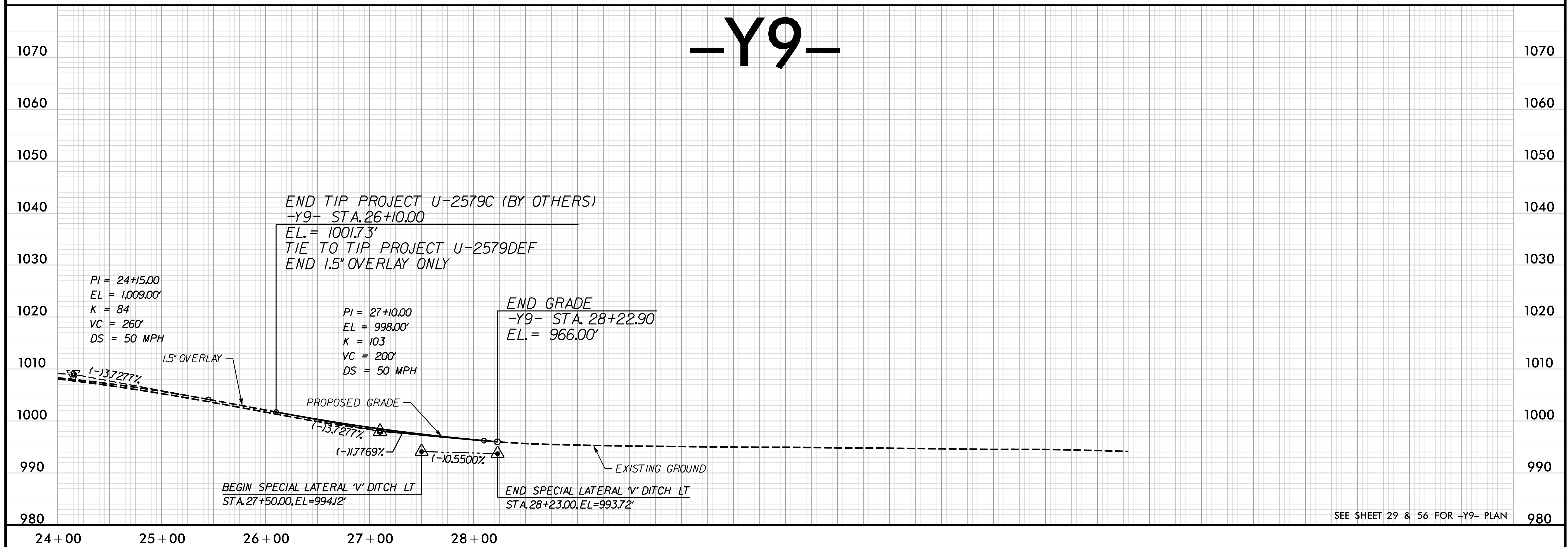
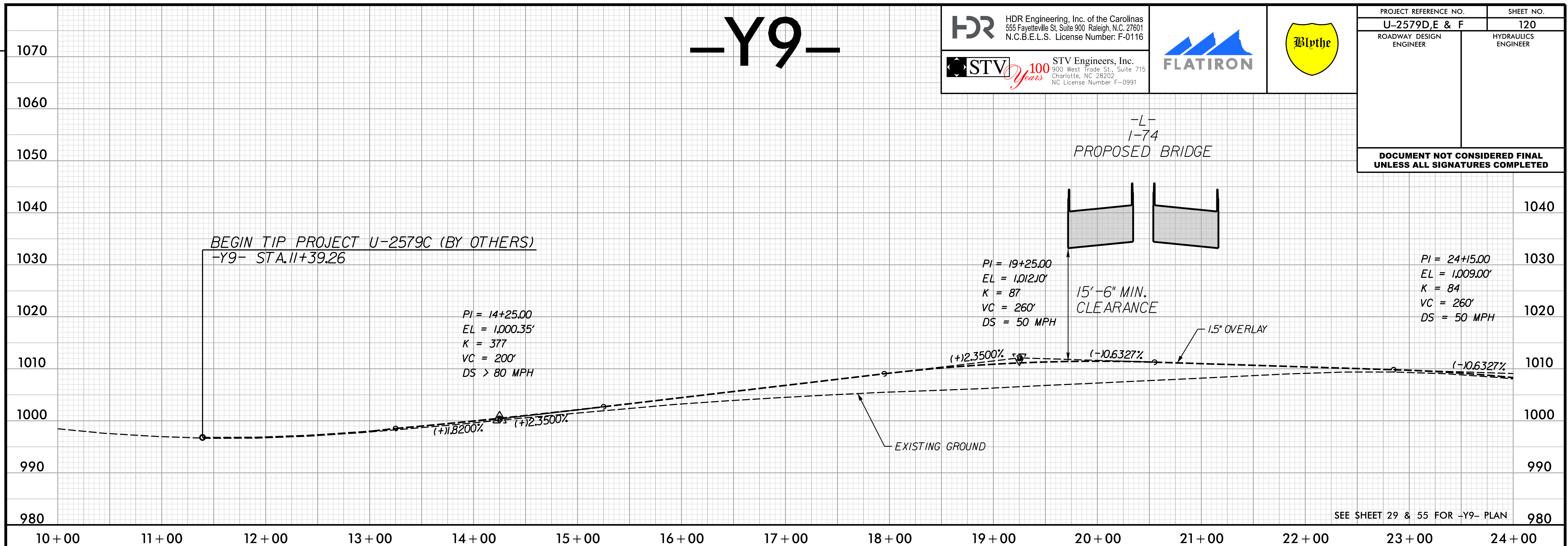




SEE SHEET 28 & 55 FOR -Y8A- PLAN

## REVISIONS











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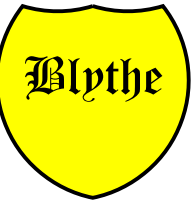


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PROJECT REFERENCE NO.  
U-2579D,E & F

ROADWAY DESIGN  
ENGINEER

SHEET NO.  
124

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