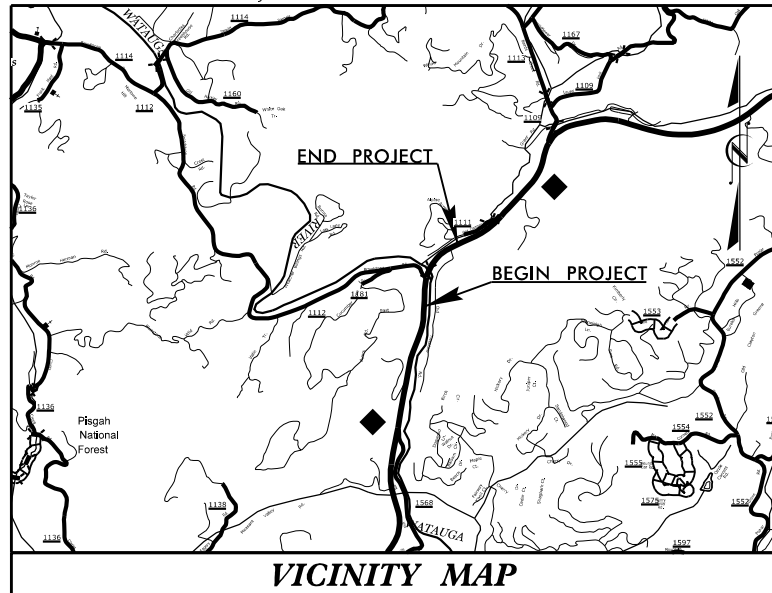


See Sheet 1A For Index of Sheets  
 See Sheet 1B For Conventional Plan Sheet Symbols  
 See Sheet 1C-1 For Survey Control Sheet



STATE OF NORTH CAROLINA  
 DIVISION OF HIGHWAYS

**WATAUGA COUNTY**

**LOCATION: NC 105 - CONSTRUCT NEW BRIDGE OVER WATAUGA RIVER AND LEFT-TURN LANE AT SR 1112 (BROADSTONE RD.) WITHIN THE LIMITS OF R-2566B**

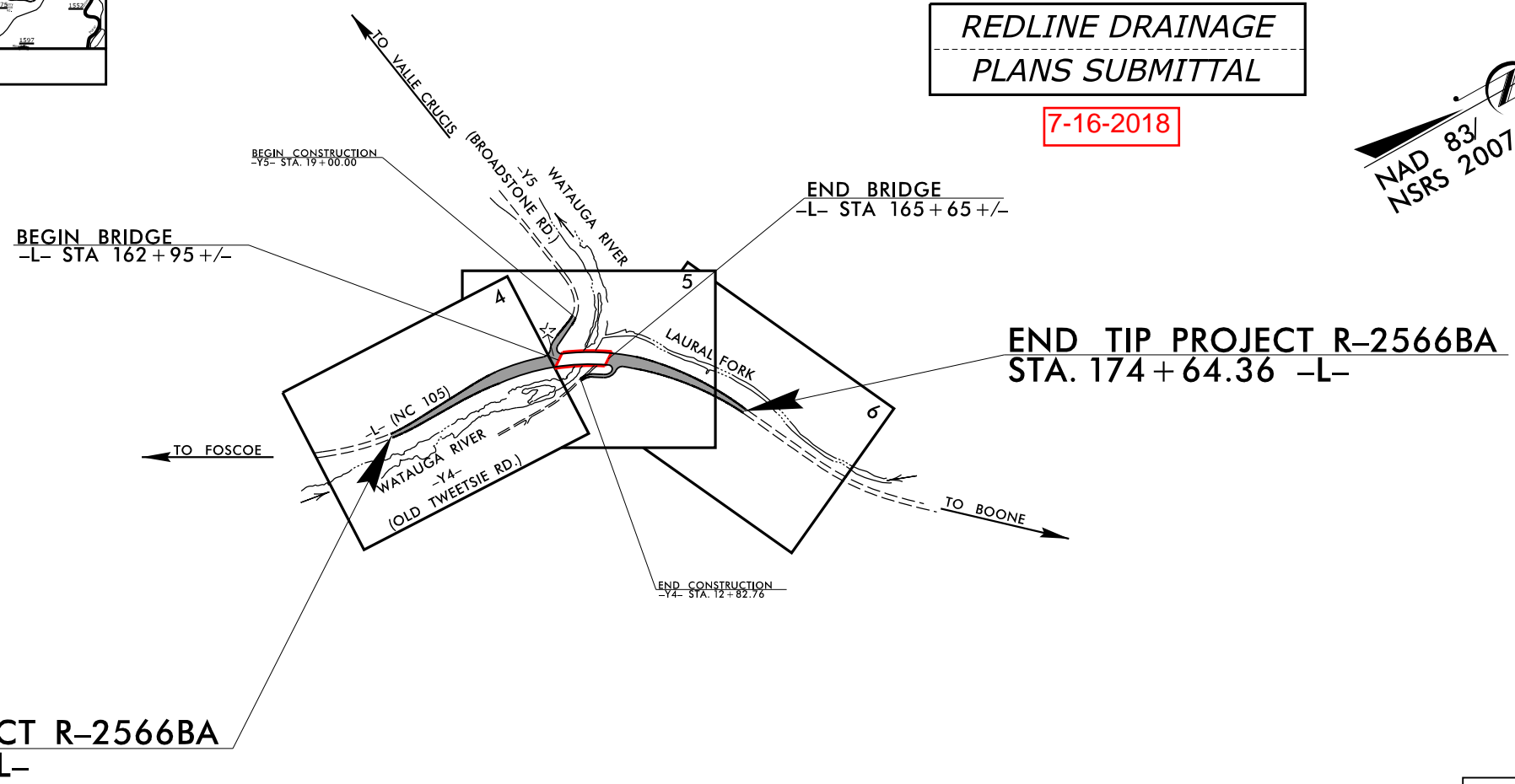
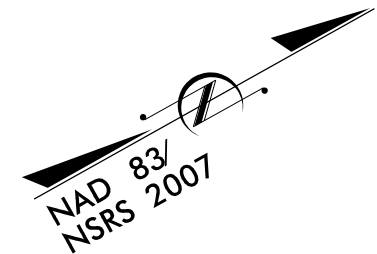
**TYPE OF WORK: DRAINAGE, GRADING, PAVING, SIGNAL & STRUCTURE**

| STATE  | STATE PROJECT REFERENCE NO. | SHEET NO.   | TOTAL SHEETS |
|--|-----------------------------|-------------|--------------|
| N.C.   | R-2566BA                    | 1           |              |
| STATE PROJ. NO.  | F.A. PROJ. NO.              | DESCRIPTION |              |
| 37512.1.4  | NHP-0105(005)               | PE          |              |
|  |                             |             |              |
|  |                             |             |              |
|  |                             |             |              |
|  |                             |             |              |
| <b>DOCUMENT NOT CONSIDERED FINAL<br/>UNLESS ALL SIGNATURES COMPLETED</b> |                             |             |              |

**TIP PROJECT: R-2566BA**

**REDLINE DRAINAGE  
 PLANS SUBMITTAL**

**7-16-2018**



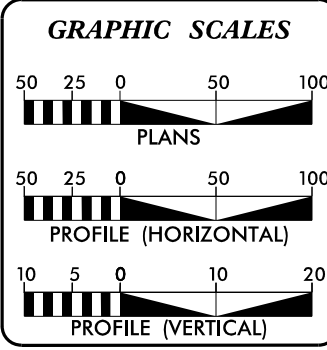
**BEGIN TIP PROJECT R-2566BA  
 STA. 151+99.34 -L-**

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

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.  
 CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_\_\_.

☆ EXISTING TRAFFIC SIGNAL TO BE RETROFITTED

**CONTRACT: R-2566BA**



**DESIGN DATA**

|                |              |
|----------------|--------------|
| ADT 2019 =     | 15,000       |
| ADT 2040 =     | 18,000       |
| K =            | 10 %         |
| D =            | 60 %         |
| T =            | 6 % *        |
| V =            | 60 MPH       |
| * TTST =       | 2% DUAL = 4% |
| FUNC CLASS =   | ARTERIAL     |
| STATEWIDE TIER |              |

**PROJECT LENGTH**

|                                       |   |             |
|---------------------------------------|---|-------------|
| LENGTH ROADWAY TIP PROJECT R-2566BA   | = | 0.373 MILES |
| LENGTH STRUCTURE TIP PROJECT R-2566BA | = | 0.056 MILES |
| TOTAL LENGTH OF TIP PROJECT R-2566BA  | = | 0.429 MILES |

**WETHERILL ENGINEERING**  
 1223 JONES FRANKLIN ROAD  
 Raleigh, N.C. 27606  
 License No. F-0377  
 Fax: 919 851 8077  
 Tel: 919 851 8007

Prepared for the North Carolina Department of Transportation in the Office of:

2018 STANDARD SPECIFICATIONS

**RIGHT OF WAY DATE:** EDWARD G. WETHERILL, PE  
 PROJECT ENGINEER  
 SEPTEMBER 21, 2018

**LETTING DATE:** BOB A. MAY, PE  
 PROJECT DESIGN ENGINEER  
 SEPTEMBER 17, 2019

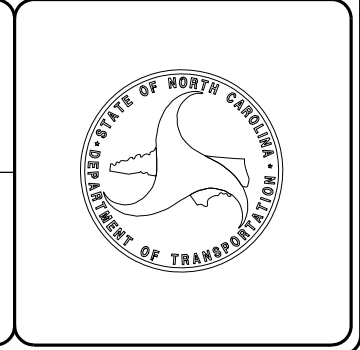
**NCDOT CONTACT:** NATHAN N. ADIMA, PE  
 ROADWAY DESIGN PROJECT ENGINEER

**HYDRAULICS ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.

**ROADWAY DESIGN ENGINEER**

SIGNATURE: \_\_\_\_\_ P.E.



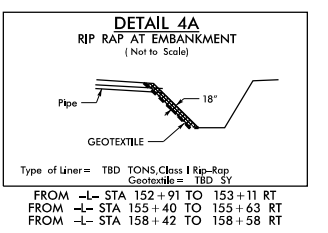
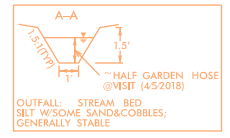
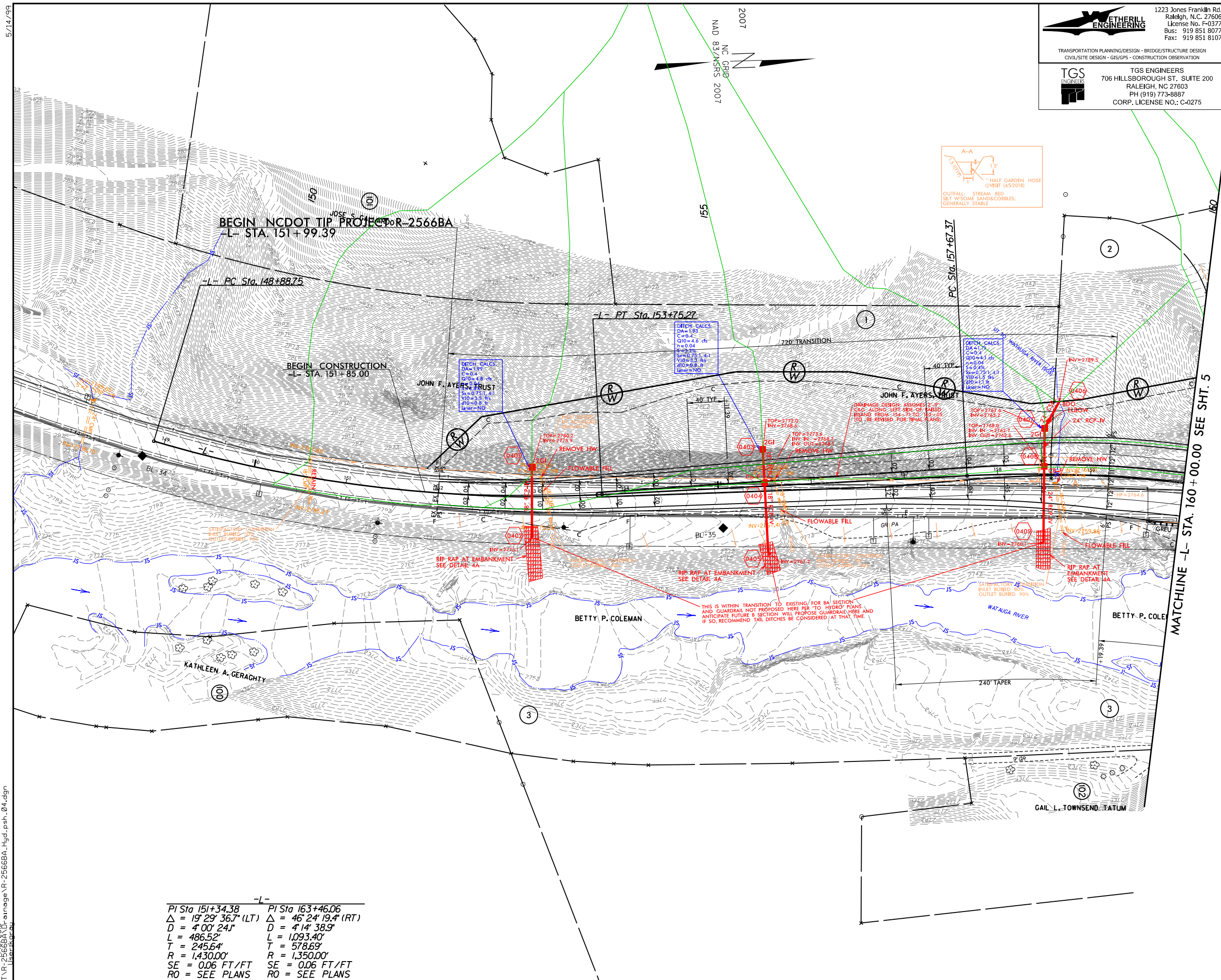
7/16/2018 X:\NCDOT\IR-2566BA\Drainage\IR-2566BA\_Hyd\_psh\_01.tsh.dgn User:tkgrdy

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 Fax: 919 851 8107

TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

**TGS ENGINEERS**  
 TGS ENGINEERS  
 706 HILLSBOROUGH ST., SUITE 200  
 RALEIGH, NC 27603  
 PH (919) 773-8887  
 CORP. LICENSE NO.: C-0275

|   |                       |
|---|-----------------------|
| PROJECT REFERENCE NO.<br><b>R-2566BA</b>                                | SHEET NO.<br><b>4</b> |
| R/W SHEET NO.   |                       |
| 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 |                       |

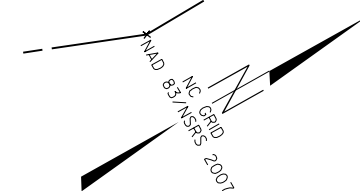


|                                       |                                       |
|---------------------------------------|---------------------------------------|
| PI Sta 151+34.38                      | PI Sta 163+46.06                      |
| $\Delta = 19^{\circ} 29' 36.7''$ (LT) | $\Delta = 46^{\circ} 24' 19.4''$ (RT) |
| D = 4' 00" 24.1"                      | D = 4' 14" 38.9"                      |
| L = 486.52'                           | L = 1,093.40'                         |
| T = 245.64'                           | T = 578.69'                           |
| R = 1,430.00'                         | R = 1,350.00'                         |
| SE = 0.06 FT/FT                       | SE = 0.06 FT/FT                       |
| RO = SEE PLANS                        | RO = SEE PLANS                        |

SEE SHT. 7 FOR -L- PROFILE

7/16/2018 3:02:05 PM TGS

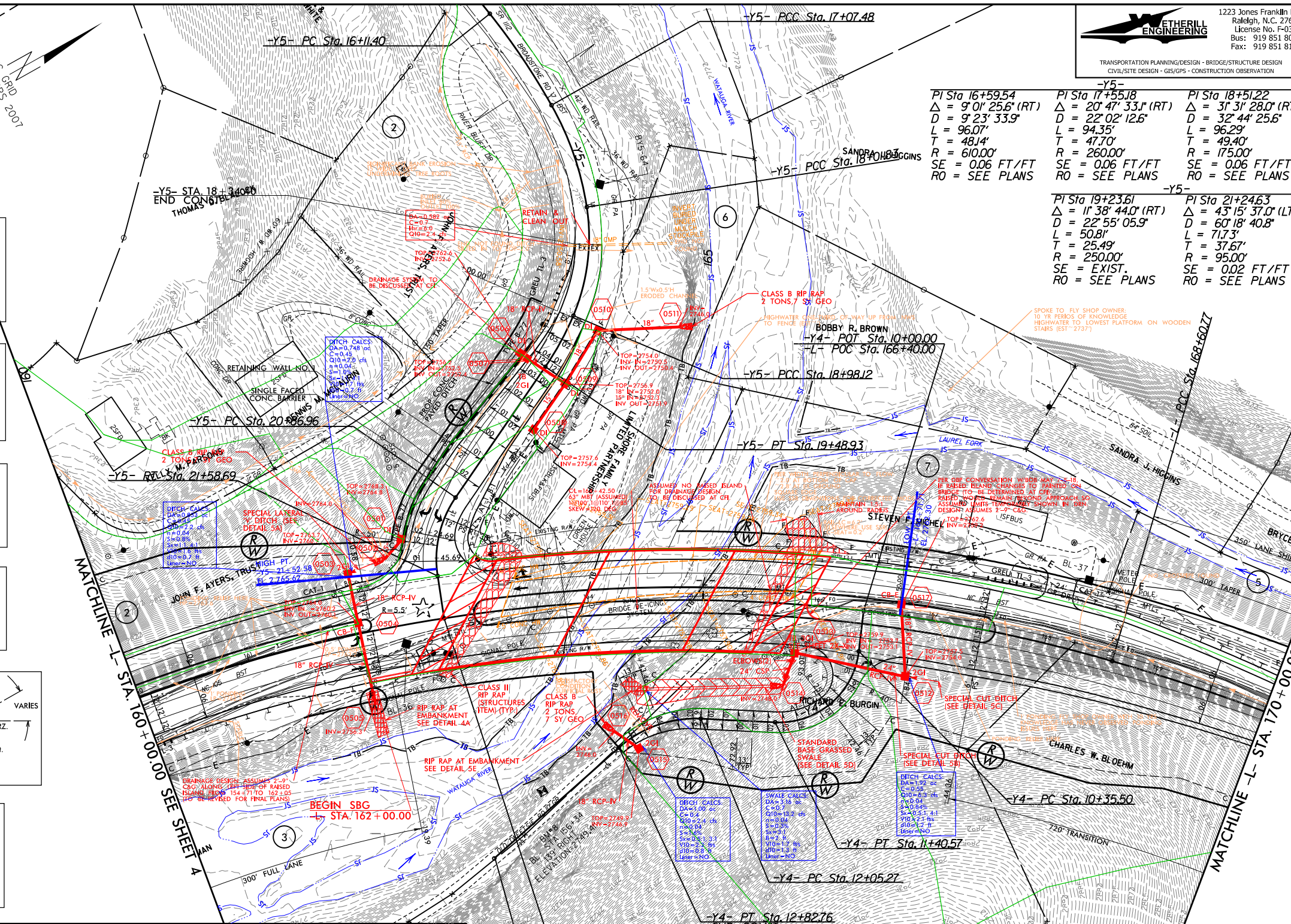
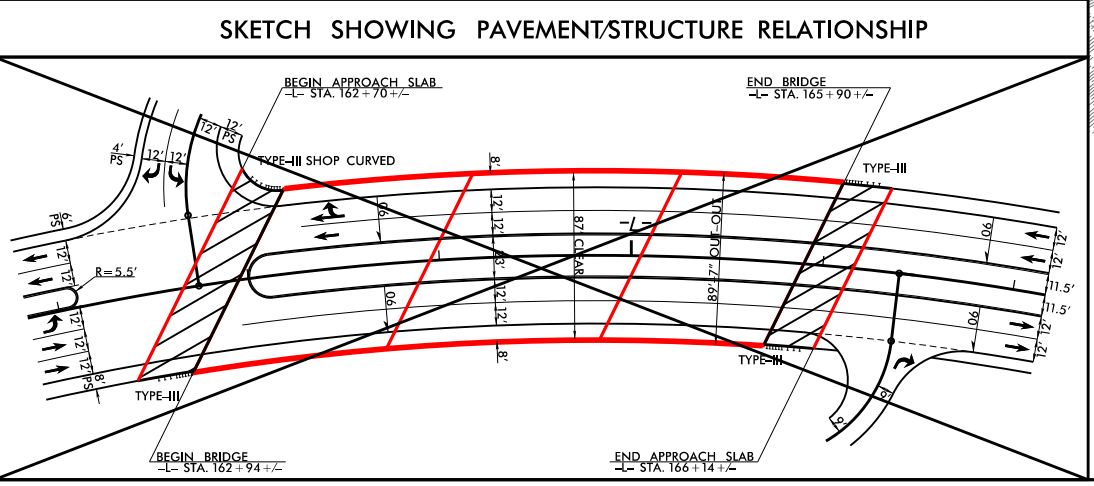
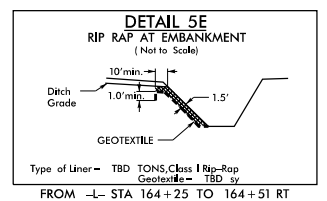
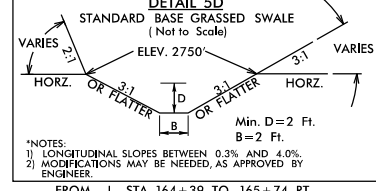
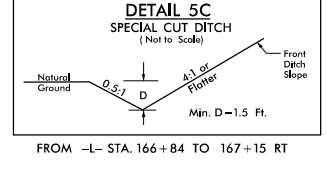
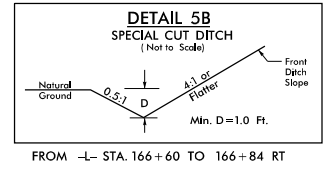
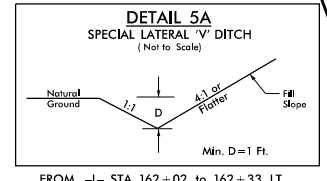
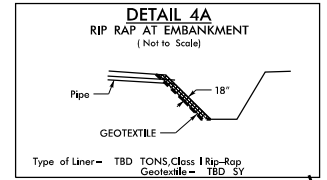
5/14/99



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 License No. F-0377  
 Bus: 919 851 8077  
 Fax: 919 851 8107

TRANSPORTATION DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

|   |   |
|---|---|
| PROJECT REFERENCE NO.<br><b>R-2566BA</b>                                | SHEET NO.<br><b>5</b>   |
| RW SHEET NO.  |   |
| 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 |   |
| <b>TGS</b>  | TGS ENGINEERS<br>706 HILLSBOROUGH ST., SUITE 200<br>RALEIGH, NC 27603<br>PH (919) 773-8887<br>CORP. LICENSE NO.: C-0275 |

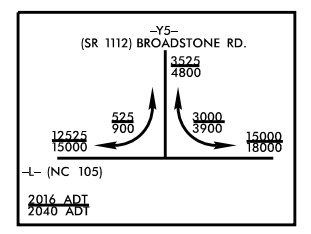
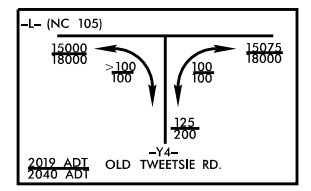


|   |   |   |
|---|---|---|
| <b>-Y5-</b><br>PI Sta 16+59.54<br>Δ = 9° 01' 25.6" (RT)<br>D = 9' 23' 33.9"<br>L = 96.07'<br>T = 48.14'<br>R = 610.00'<br>SE = 0.06 FT/FT<br>RO = SEE PLANS | <b>-Y5-</b><br>PI Sta 17+55.18<br>Δ = 20° 47' 33.1" (RT)<br>D = 22' 02' 12.5"<br>L = 94.35'<br>T = 47.70'<br>R = 260.00'<br>SE = 0.06 FT/FT<br>RO = SEE PLANS | <b>-Y5-</b><br>PI Sta 18+51.22<br>Δ = 31° 31' 28.0" (RT)<br>D = 32' 44' 25.6"<br>L = 96.29'<br>T = 49.40'<br>R = 175.00'<br>SE = 0.06 FT/FT<br>RO = SEE PLANS |
|---|---|---|

|   |  |
|---|--|
| <b>-Y5-</b><br>PI Sta 19+23.61<br>Δ = 11° 38' 44.0" (RT)<br>D = 22' 55' 05.9"<br>L = 50.81'<br>T = 25.49'<br>R = 250.00'<br>SE = EXIST.<br>RO = SEE PLANS | <b>-Y5-</b><br>PI Sta 21+24.63<br>Δ = 43° 15' 37.0" (LT)<br>D = 60' 18' 40.8"<br>L = 171.3'<br>T = 37.67'<br>R = 95.00'<br>SE = 0.02 FT/FT<br>RO = SEE PLANS |
|---|--|

|   |   |
|---|---|
| <b>-Y4-</b><br>PI Sta 11+00.77<br>Δ = 85° 59' 49.7" (RT)<br>D = 81' 51' 04.0"<br>L = 105.07'<br>T = 65.27'<br>R = 70.00'<br>SE = 0.04 FT/FT<br>RO = SEE PLANS | <b>-Y4-</b><br>PI Sta 12+46.08<br>Δ = 44° 23' 57.2" (LT)<br>D = 57' 17' 44.8"<br>L = 77.49'<br>T = 40.81'<br>R = 100.00'<br>SE = 0.04 FT/FT<br>RO = SEE PLANS |
|---|---|

|   |   |
|---|---|
| <b>-Y4-</b><br>PI Sta 163+46.06<br>Δ = 46° 24' 19.4" (RT)<br>D = 4' 14' 38.9"<br>L = 1,093.40'<br>T = 578.69'<br>R = 1,350.00'<br>SE = 0.06 FT/FT<br>RO = SEE PLANS | <b>-Y4-</b><br>PI Sta 171+65.43<br>Δ = 19° 12' 46.1" (RT)<br>D = 3' 10' 59.2"<br>L = 603.59'<br>T = 304.65'<br>R = 1,800.00'<br>SE = 0.06 FT/FT<br>RO = SEE PLANS |
|---|---|



★ EXISTING TRAFFIC SIGNAL TO BE RETROFITTED

SEE SHT. 7 FOR -L- PROFILE  
SEE SHT. 8 FOR -Y4- PROFILE  
SEE SHT. 8 FOR -Y5- PROFILE  
SEE SHTS. 8-1 THRU S-2 FOR STRUCTURE PLANS  
SEE SHTS. 2A-4 FOR RETAINING WALL

7/16/2016 10:08:00 AM C:\p001\p-r-2566ba\Hyd\_psh\_05.dgn

5/14/99

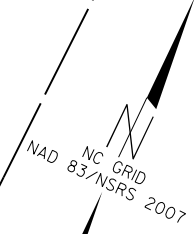
**ETHERILL ENGINEERING**  
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 Raleigh, N.C. 27606  
 License No. F-0377  
 Bus: 919 851 8077  
 Fax: 919 851 8107

TRANSPORTATION DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

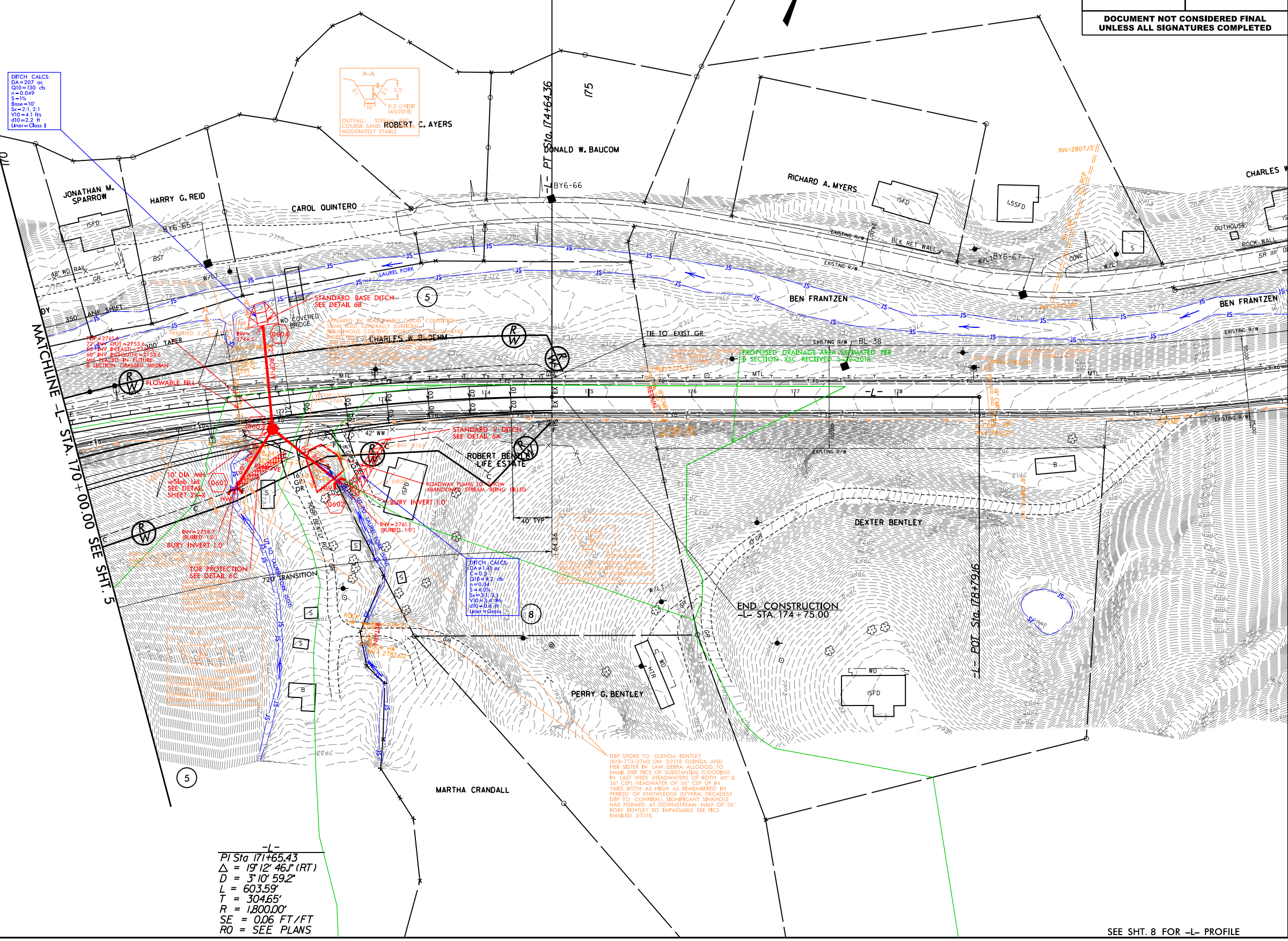
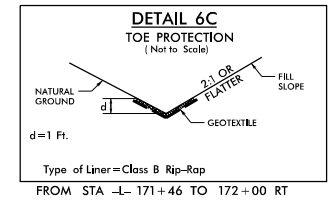
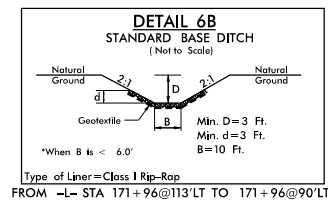
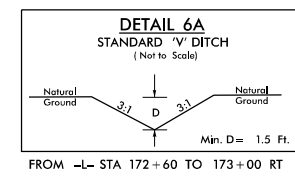
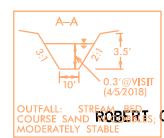
**TGS ENGINEERS**  
 TGS ENGINEERS  
 706 HILLSBOROUGH ST., SUITE 200  
 RALEIGH, NC 27603  
 PH (919) 773-8887  
 CORP. LICENSE NO.: C-0275

|   |                       |
|---|-----------------------|
| PROJECT REFERENCE NO.<br><b>R-2566BA</b>                                | SHEET NO.<br><b>6</b> |
| RW SHEET NO.  | HYDRAULICS ENGINEER   |
| ROADWAY DESIGN ENGINEER   |                       |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION               |                       |
| <b>DOCUMENT NOT CONSIDERED FINAL</b><br>UNLESS ALL SIGNATURES COMPLETED |                       |

**END NCDOT TIP PROJECT R-2566BA**  
 -L- STA. 174+64.36



**DITCH CALCS.**  
 DA=207 cfs  
 Q10=130 cfs  
 n=0.049  
 S=1%  
 Base=10'  
 S=2.1, 2.1  
 V10=4.1 fts  
 d10=2.2 ft  
 Liner=Class I



-L-  
 PI Sta 171+65.43  
 $\Delta = 19' 12' 46.1'' (RT)$   
 $D = 3' 10' 59.2''$   
 $L = 603.59'$   
 $T = 304.65'$   
 $R = 1,800.00'$   
 $SE = 0.06 FT/FT$   
 $RO = SEE PLANS$

DBP SPOKE TO GLENDA BENTLEY (828-773-3760) ON 5/21/18. GLENDA AND HER SISTER IN LAW, DEBRA, ALIGNED TO SMALL DBP PICS OF SUBSTANTIAL FLOODING IN LAST WEEK (HEADWATERS OF BOTH 60' & 36' CSP; HEADWATER OF 36' CSP UP IN YARD, BOTH AS HIGH AS REMEMBERED IN PERIOD OF KNOWLEDGE SEVERAL DECADES). DBP TO CONFIRM SIGNIFICANT SPINHOLES HAS FORMED AT DOWNSTREAM HALF OF 36' ROBY BENTLEY RD. IMPASSABLE SEE PICS EMAILED 5/21/18.

SEE SHT. 8 FOR -L- PROFILE

NCDOT\R-2566BA\Drawings\Hyd\psh\_06.dgn  
 7/16/2018 3:04:07 PM TGS

5/28/99

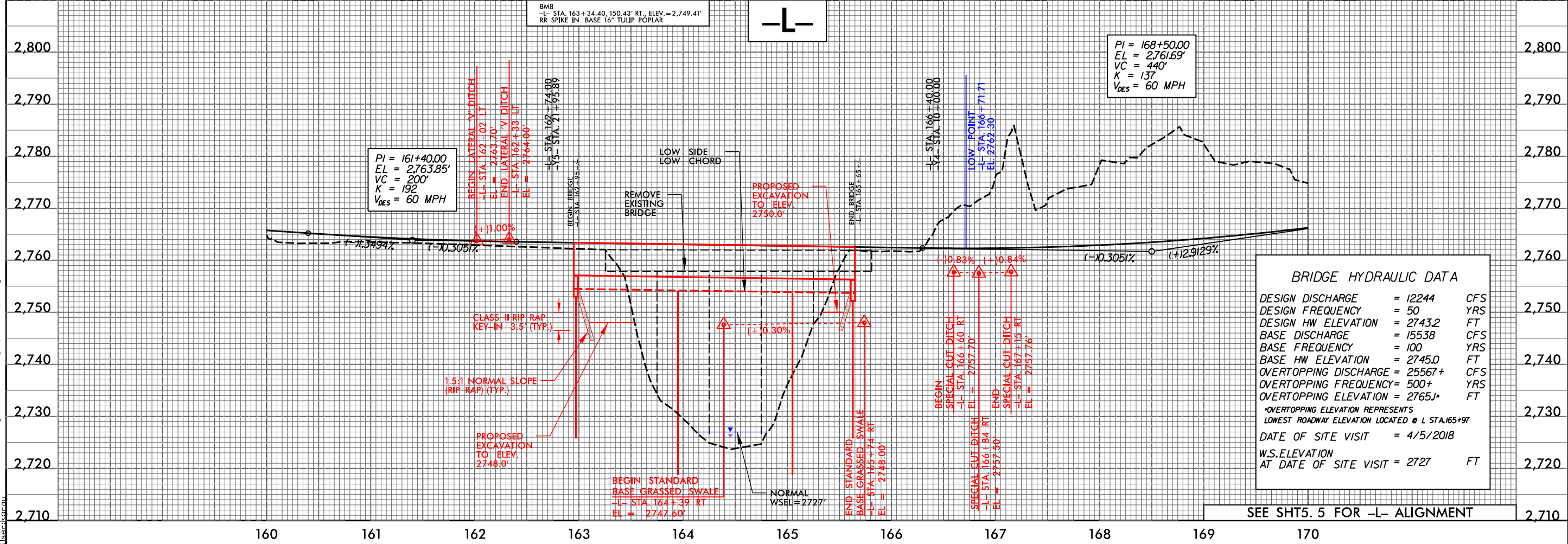
BM7  
N 899.026 E 1,189.650 ELEV. = 2,817.94'  
RR SPIKE IN BASE OF 24" DBL TULIP POPLAR

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TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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RALEIGH, NC 27603  
PH (919) 773-8887  
CORP. LICENSE NO.: C-0275

|  |                       |
|--|-----------------------|
| PROJECT REFERENCE NO.<br><b>R-2566BA</b>                             | SHEET NO.<br><b>7</b> |
| ROADWAY DESIGN ENGINEER  | HYDRAULICS ENGINEER   |
| <b>INCOMPLETE PLANS</b><br>DO NOT USE FOR R/W ACQUISITION            |                       |
| 2,810  |                       |
| <b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b> |                       |



**BRIDGE HYDRAULIC DATA**

|                       |          |     |
|-----------------------|----------|-----|
| DESIGN DISCHARGE      | = 12244  | CFS |
| DESIGN FREQUENCY      | = 50     | YRS |
| DESIGN HW ELEVATION   | = 2743.2 | FT  |
| BASE DISCHARGE        | = 15538  | CFS |
| BASE FREQUENCY        | = 100    | YRS |
| BASE HW ELEVATION     | = 2745.0 | FT  |
| OVERTOPPING DISCHARGE | = 25567+ | CFS |
| OVERTOPPING FREQUENCY | = 500+   | YRS |
| OVERTOPPING ELEVATION | = 2765.1 | FT  |

\*OVERTOPPING ELEVATION REPRESENTS LOWEST ROADWAY ELEVATION LOCATED @ L STA. 165+97

DATE OF SITE VISIT = 4/5/2018  
W.S. ELEVATION AT DATE OF SITE VISIT = 2727 FT

7/13/2018 R-2566BA-Drainage-R-2566BA-Hyd-psh.07.pfl.dgn User:korou

5/28/99

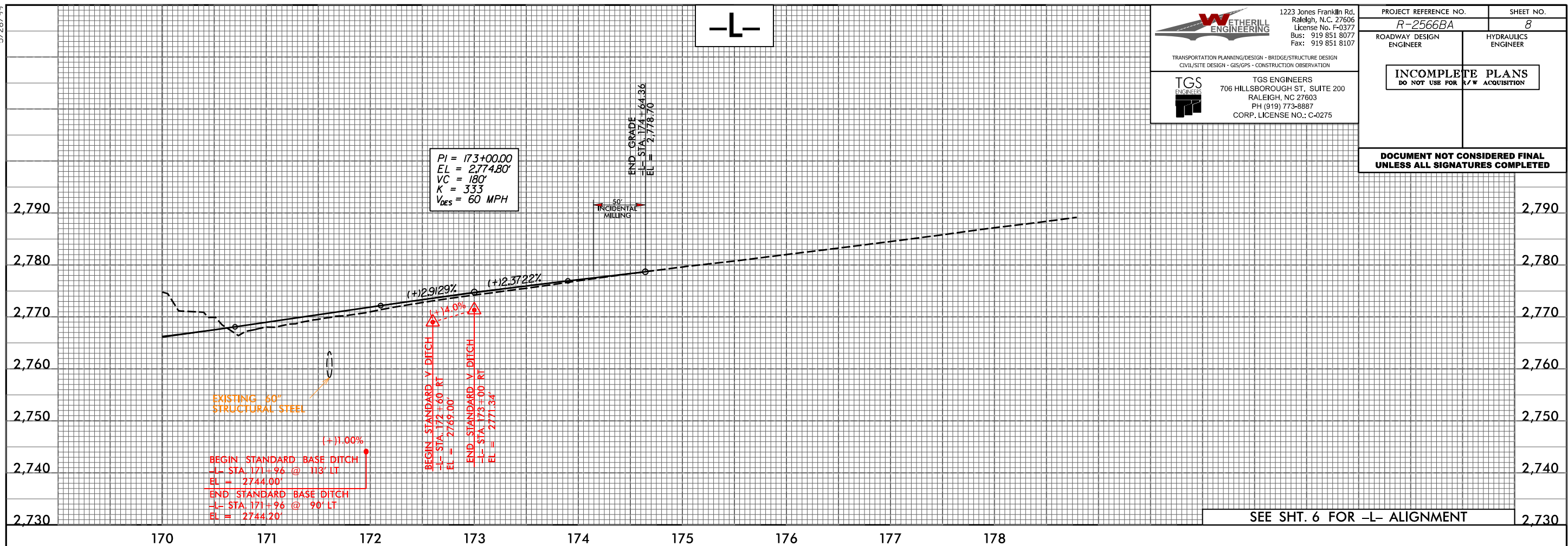
-L-

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 Raleigh, N.C. 27606  
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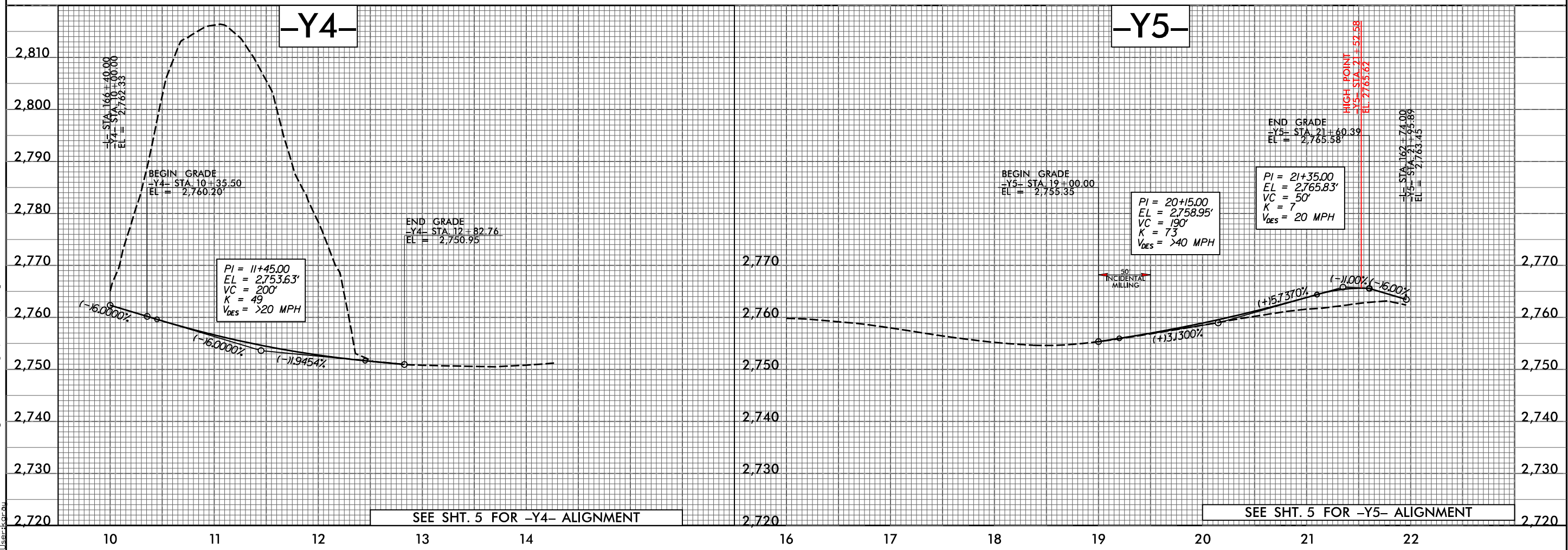
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN  
 CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

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|   |                       |
|---|-----------------------|
| PROJECT REFERENCE NO.<br><b>R-2566BA</b>                                | SHEET NO.<br><b>8</b> |
| 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 |                       |



SEE SHT. 6 FOR -L- ALIGNMENT



SEE SHT. 5 FOR -Y4- ALIGNMENT

SEE SHT. 5 FOR -Y5- ALIGNMENT

7/13/2018 R-2566BA-Drainage\R-2566BA\_Hyd\_psh\_08.pfl.dgn User:korou