



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

August 11, 2009

Amy Euliss
Division of Water Quality
585 Waughtown Street
Winston-Salem, NC 27107

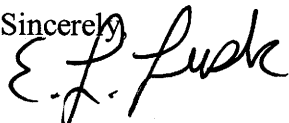
Subject: **Revised Permit Drawings and Calculations** for Improvements to SR 1733 (Weaver Dairy Road), from NC 86 (Martin Luther King, Jr. Boulevard) to SR 1734 (Erwin Road) Chapel Hill, Orange County, Division 7, Federal Aid No. STP-1733(11); State Project 8.2501601, TIP No. U-3306.

Reference: NCDOT Section 404 and Section 401 Individual permit application (March 25, 2009)

Dear Madam:

Enclosed are the calculations and the revised permit drawing sheets you requested. The hydraulic calculations show that rip rap was needed on the stream banks at Site 3 and revised drawings for Site 3 showing rip rap along the sides of the stream and not in the stream channel.

A copy of this additional permit application information will be posted on the NCDOT Website at: <http://www.ncdot.org/doh/preconstruct/pe/>. If you have any questions or need additional information, please call Sara Easterly at (919) 431-1605.

Sincerely,

for Gregory J. Thorpe, Ph.D.
Environmental Management Director,

cc:

w/attachment

Mr. Brian Wrenn, NCDWQ (5 Copies)
Ms. Kathy Matthews, USEPA
Mr. Andrew Williams, USACE

W/o attachment (see website for attachments)

Dr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. Victor Barbour, P.E., Project Services Unit
Mr. Mark Staley, Roadside Environmental
Mr. J. M. Mills, P.E., Division 7 Engineer
Mr. Jerry Parker, Division 7 Environmental Officer
Mr. Jay Bennett, P.E., Roadway Design
Mr. Majed Alghandour, P. E., Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Gene Tarascio, P. E., PDEA Engineer
Mr. Scott McLendon, USACE, Wilmington
Mr. Travis Wilson, NCWRC
Ms. Beth Harmon, EEP
Mr. Todd Jones, NCDOT External Audit Branch
Mr. Drew Joyner, PE, Human Environment Unit Head
Mr. Clarence W. Coleman, P.E., FHWA

Worksheet for u-3306 Site #3 78+00 to 80+00Lt

Project Description

Friction Method Manning Formula
 Solve For Normal Depth

Input Data

Roughness Coefficient 0.069
 Channel Slope 0.03860 ft/ft
 Left Side Slope 2.00 ft/ft (H:V)
 Right Side Slope 2.00 ft/ft (H:V)
 Bottom Width 3.00 ft
 Discharge 50.00 ft³/s

Results

Normal Depth 1.75 ft
 Flow Area 11.42 ft²
 Wetted Perimeter 10.85 ft
 Top Width 10.02 ft
 Critical Depth 1.48 ft
 Critical Slope 0.07695 ft/ft
 Velocity 4.38 ft/s
 Velocity Head 0.30 ft
 Specific Energy 2.05 ft
 Froude Number 0.72
 Flow Type Subcritical

GVF Input Data

Downstream Depth 0.00 ft
 Length 0.00 ft

Worksheet for u-3306 Site #3 78+00 to 80+00Lt

GVF Input Data

Number Of Steps 0

GVF Output Data

| | | |
|---------------------|----------|-------|
| Upstream Depth | 0.00 | ft |
| Profile Description | 0.00 | ft |
| Profile Headloss | Infinity | ft/s |
| Downstream Velocity | Infinity | ft/s |
| Upstream Velocity | 1.75 | ft |
| Normal Depth | 1.48 | ft |
| Critical Depth | 0.03860 | ft/ft |
| Channel Slope | 0.07695 | ft/ft |
| Critical Slope | | |

Messages

Notes

U-3306, Station 78+00 to 80+00 -L- Lt.

3ft base stream relocation with class I rip rap on banks only. Analyzed based on NCDEHNR Erosion and sediment control planning design manual.

Drainage area 35 acres. Q10 discharge= 50 cfs, (ncdot urban charts avg development)

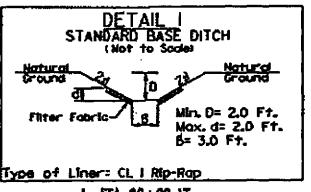
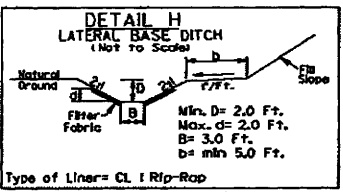
Shear stress calculations

T=yds
 $T = (62.4 \text{ lb/cuft})(1.75 \text{ ft})(.0386 \text{ ft/ft})$
 T=4.21

requires d50 stone size of 13", use class I rip rap

| | |
|--|---------------------|
| PROJECT REFERENCE NO. | SHEET NO. |
| U-3306 | 9 |
| RDW SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |
| PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION | |

REVISED 7/28/09
Permit Drawing
Sheet 9 of 13



Type of Liner = CL I Rip-Rap
-L- STA 78+00 - 80+00 LT
EST DDE = 11 CY

Type of Liner = CL I Rip-Rap
-L- STA 80+00 LT
EST DDE = 6 CY

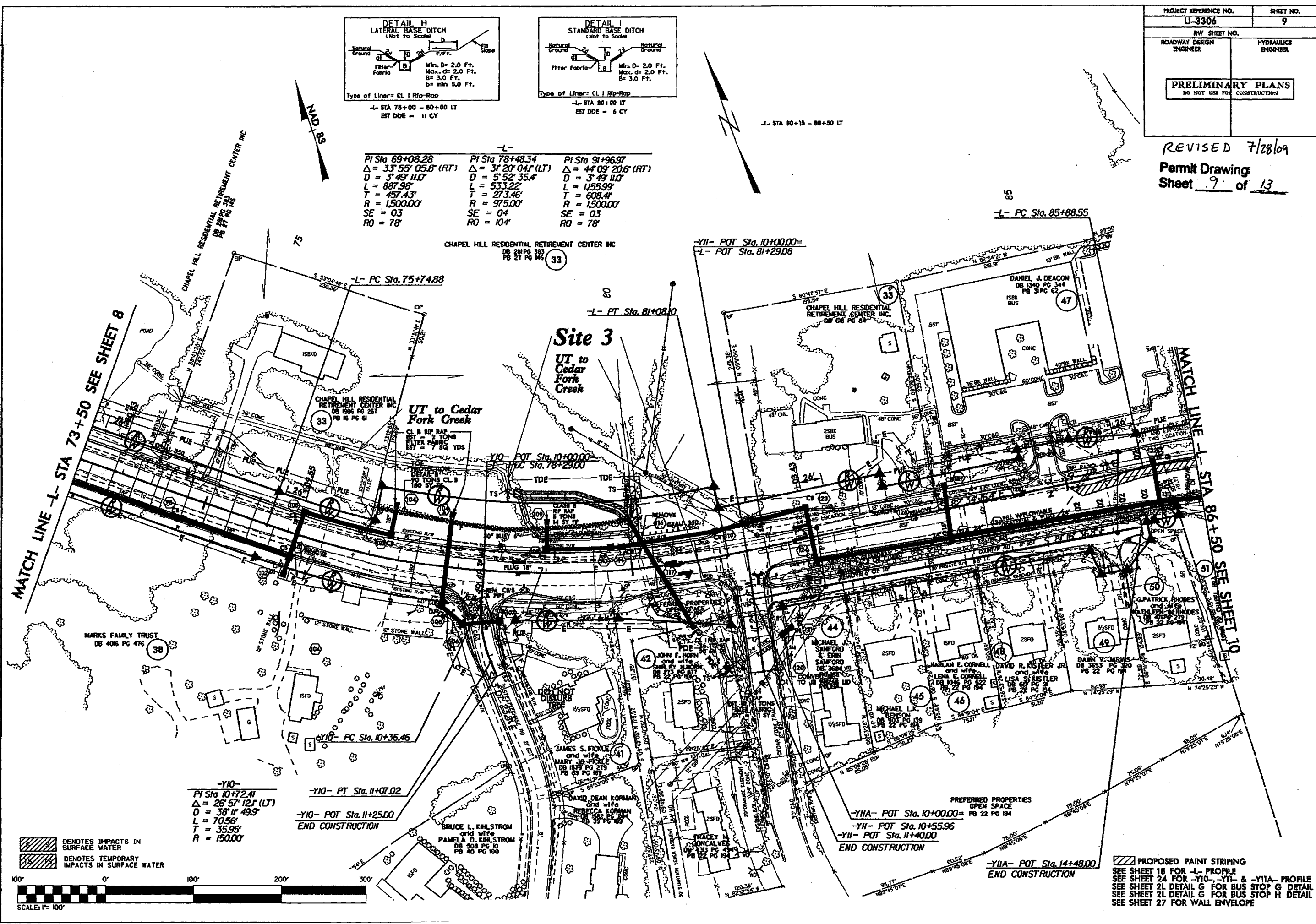
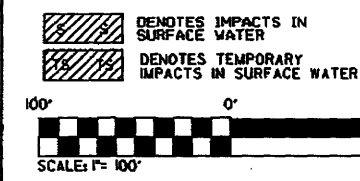
-L- STA 80+15 - 80+50 LT

| -L- | | |
|---------------------------------------|---------------------------------------|---------------------------------------|
| PI Sta 69+08.28 | PI Sta 78+48.34 | PI Sta 91+96.97 |
| $\Delta = 33^{\circ} 55' 05.8''$ (RT) | $\Delta = 31^{\circ} 20' 04.1''$ (LT) | $\Delta = 44^{\circ} 09' 20.6''$ (RT) |
| D = 3' 49' 11.0" | D = 5' 52' 35.4" | D = 3' 49' 11.0" |
| L = 887.98' | L = 533.22' | L = 1455.99' |
| T = 457.43' | T = 273.46' | T = 608.41' |
| R = 1500.00' | R = 975.00' | R = 1500.00' |
| SE = 03 | SE = 04 | SE = 03 |
| RO = 78 | RO = 104 | RO = 78 |

8/17/99

ROW REVISION 7/30/08 JCL ADDED PUE'S TO PARCELS 33, 38, 41 AND 47. REVISED TCE'S ON PARCELS 33, 38, 41 AND 47.

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-Y10-
PI Sta 10+72.41
 $\Delta = 26^{\circ} 57' 12.1''$ (LT)
D = 70.56'
L = 35.95'
R = 150.00'

-Y10- PT Sta. 11+07.02
-Y10- POT Sta. 11+25.00
END CONSTRUCTION

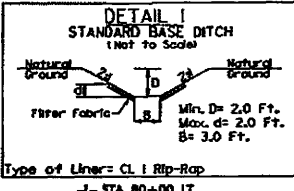
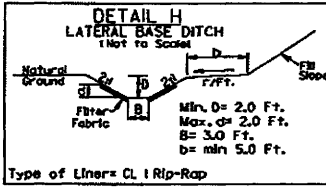
-Y11A- POT Sta. 10+00.00 =
-Y11- POT Sta. 10+55.96
-Y11- POT Sta. 11+40.00
END CONSTRUCTION

-Y11A- POT Sta. 14+48.00
END CONSTRUCTION

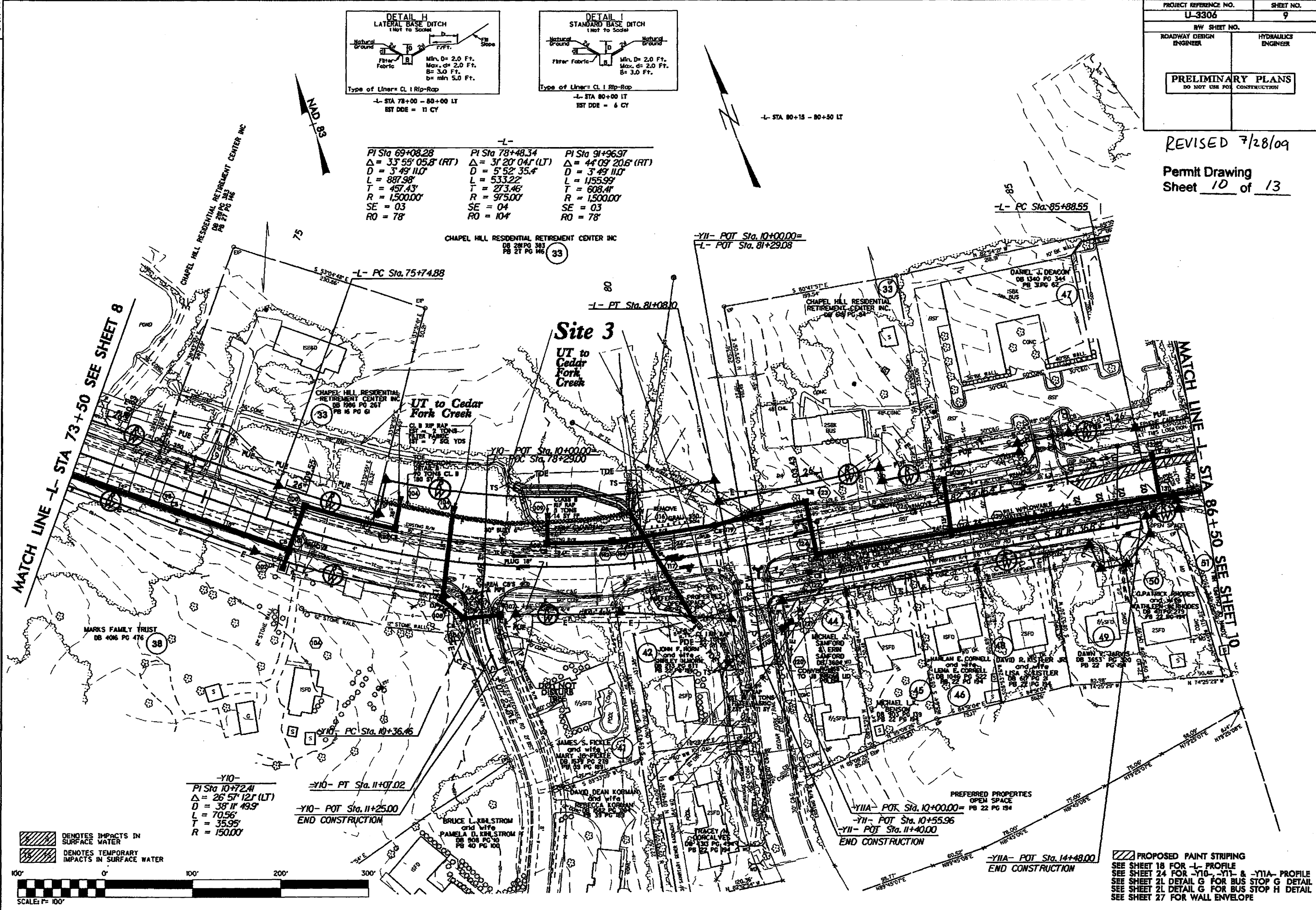
PROPOSED PAINT STRIPING
SEE SHEET 18 FOR -L- PROFILE
SEE SHEET 24 FOR -Y10-, -Y11- & -Y11A- PROFILE
SEE SHEET 21 FOR BUS STOP G DETAIL
SEE SHEET 21 DETAIL G FOR BUS STOP H DETAIL
SEE SHEET 27 FOR WALL ENVELOPE

| | |
|---|------------------------|
| PROJECT REFERENCE NO. U-3306 | SHEET NO. 9 |
| RW SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |
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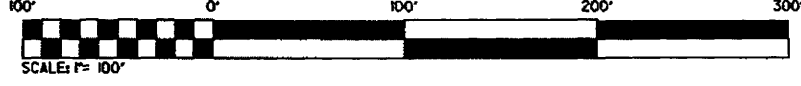
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Permit Drawing
Sheet 10 of 13



| -L- | | |
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- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER



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Site 3 Enlargement

Site 3

UT to Cedar Fork Creek

UT to Cedar Fork Creek

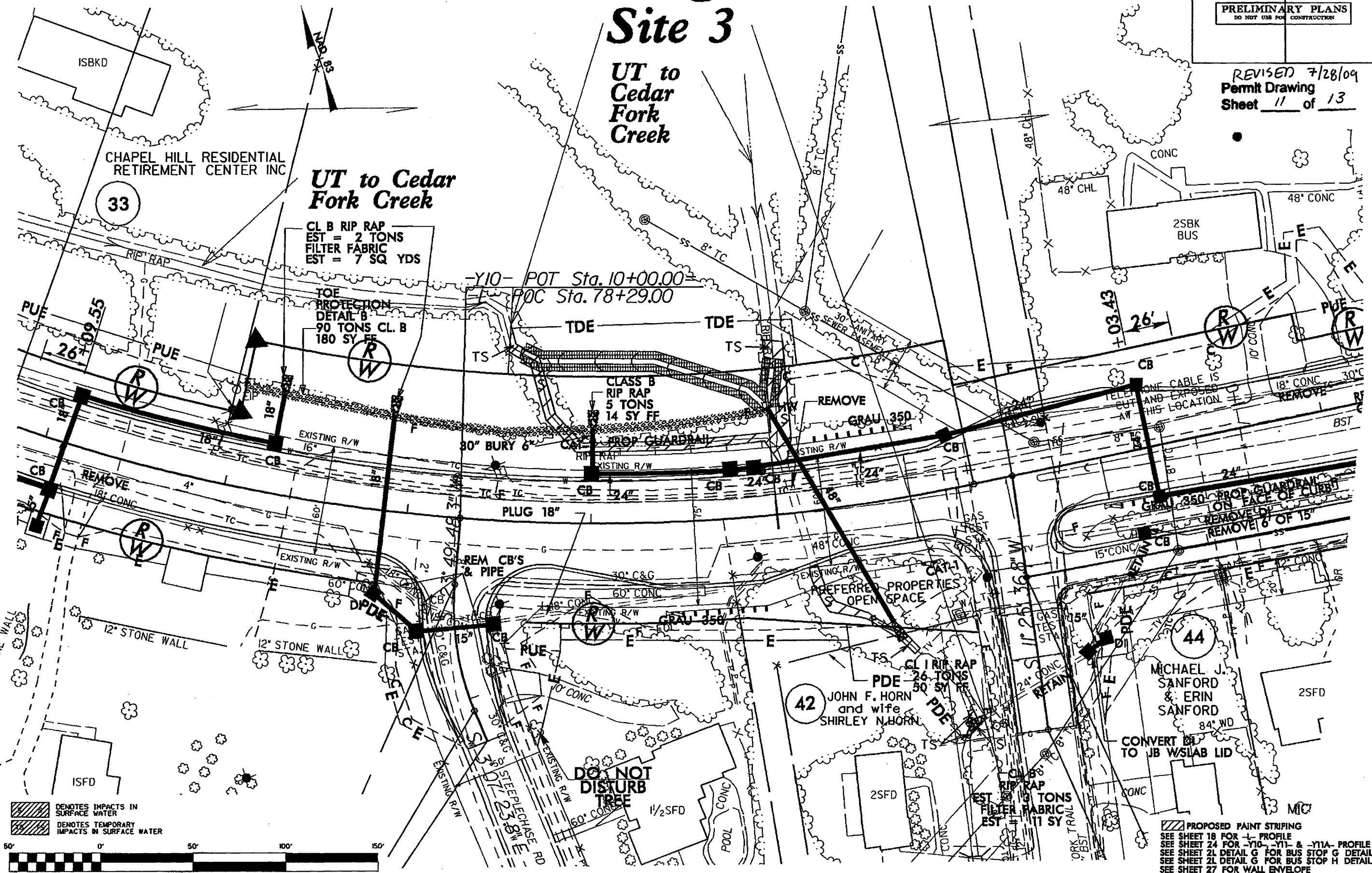
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|--|---------------------|
| PROJECT REFERENCE NO. U-3306 | SHEET NO. 9 |
| MW SHEET NO. | HYDRAULICS ENGINEER |
| ROADWAY DESIGN ENGINEER | |
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REVISED 7/28/09
Permit Drawing
Sheet 11 of 13

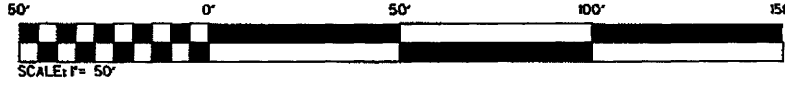
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REVISIONS
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DENOTES IMPACTS IN SURFACE WATER
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