

VICINITY MAP  
NTS

# CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY (CONSTRUCTION PLANS)

## 03/23/07 AS BUILT DRAWINGS

Clearing, grading, erosion control, stream restoration, drainage, debris removal, landscaping, and other improvements as noted on the plans. This work will include of all items necessary to construct the stream, associated structures, landscaping, plantings, seeding, and live staking.

STATE CONSTRUCTION OFFICE ID# 01-05460-01

### INDEX OF DRAWINGS

C-1	TITLE SHEET
C-2	SUMMARY OF QUANTITIES
C-3	PLAN, GRADING, DRAINAGE AND EROSION CONTROL
C-4 THRU C-5	PROFILE SHEETS
C-6 THRU C-11	GENERAL DETAILS
L-1	LANDSCAPE PLAN
L-2 THRU L-4	LANDSCAPE DETAILS
X-01 THRU X-08	CROSS SECTIONS



### GENERAL NOTES

1. SURVEY INFORMATION PROVIDED BY 4D SITE SOLUTIONS, INC..
2. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES DATED JANUARY 2002 UNLESS OTHERWISE INDICATED ON THE PLANS.
3. CONTRACTOR SHALL CONDUCT HIS/HER OWN UNDERGROUND UTILITIES INVESTIGATION BEFORE COMMENCEMENT OF CONSTRUCTION.
4. EXISTING WATER RETENTION STRUCTURE ADJACENT TO PUMP STATION MAY BE UTILIZED DURING CONSTRUCTION FOR PUMP AROUND OPERATION.

### SITE DATA

Name of Project: CROSS CREEK RESTORATION  
 Address: 1619 MAIL SERVICE CENTER, RALEIGH, N.C. 27699-1619  
 Owner: NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM  
 Design Manager Contact: JASON GUIDRY Phone # 919-733-5311

DISTURBED AREA: 8.0 ACRES

### STREAM DATA

STREAM REACH	EXISTING LENGTH (FT)	PROP. CENTERLINE LENGTH (FT)	PROP. THALWEG LENGTH (FT)	PROPOSED STREAM CLASSIFICATION	AS BUILT THALWEG
SREV	1295	1367	1433	C	1455
TRIBUTARY	705	714	735	C	698
TOTAL	2000	2081	2168		2153

LOCATION	UNCL. EXCAVATION (C.Y.)	UNDERCUT (C.Y.)	EMBANKMENT (C.Y.)	BORROW (C.Y.)	WASTE (C.Y.)
SREV	18359	0	5499	0	12860
TRIBUTARY	7233	0	248	0	6985
TOTAL	25592	0	5747	0	19845

NO.	ISSUED FOR	DATE
1	ISSUED FOR BIDS	1/14/04
2	UPDATED STREAM DATA TABLE	1/14/04

NO.	REVISIONS

**EARTHTECH**

701 Corporate Center, Drive, Suite #475, Raleigh, NC 27607  
Phone: (919) 854-6200 Fax: (919) 854-6259

**CROSS CREEK STREAM RESTORATION  
CUMBERLAND COUNTY  
ECOSYSTEM ENHANCEMENT PROGRAM**

**TITLE SHEET**

DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	C-1
DRAWING NO	

# SUMMARY OF QUANTITIES

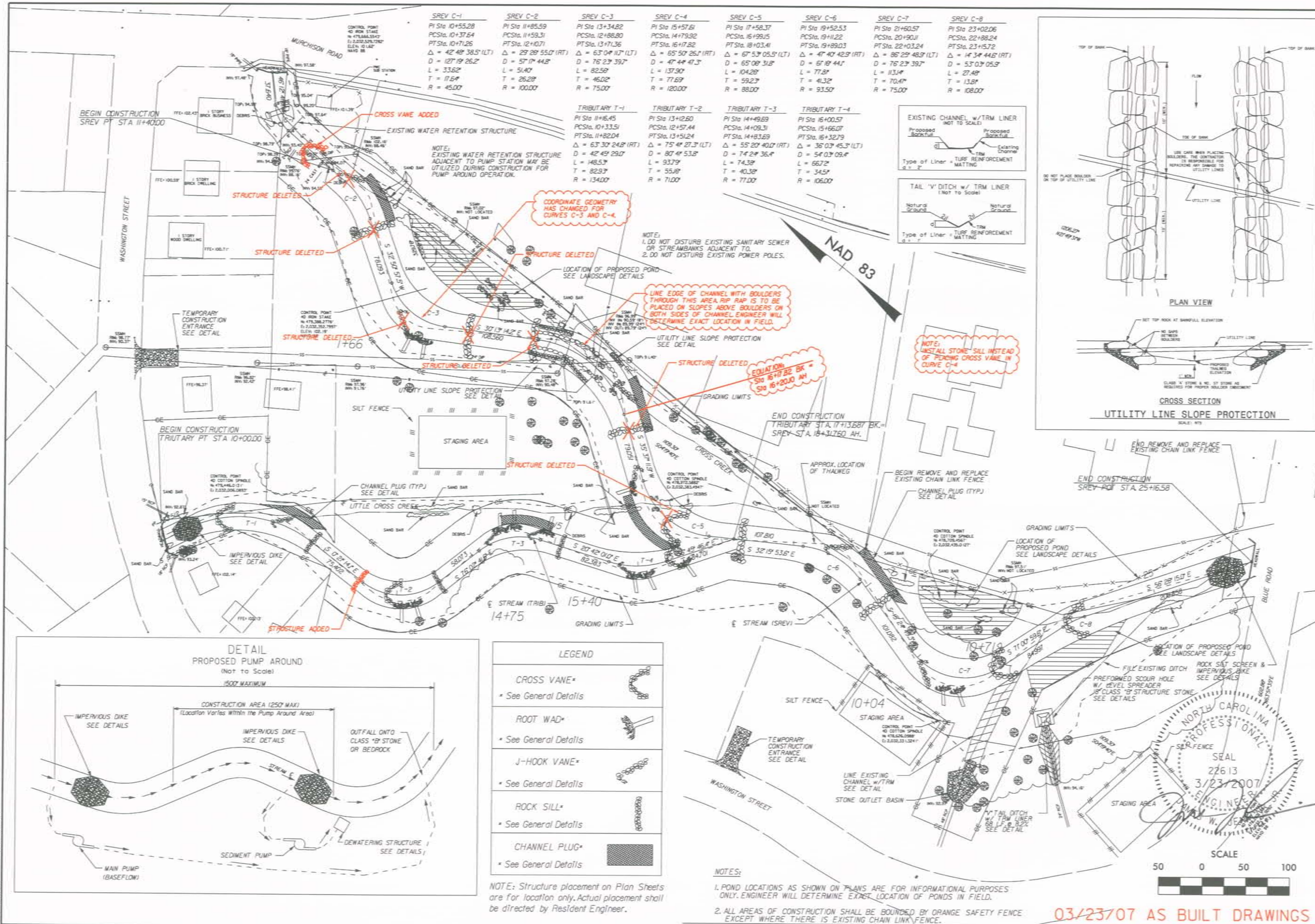
PAY ITEM	PAY ITEM DESCRIPTION	UNIT	QUANTITY
1	Temporary Silt Fence	LF	1,840
2	Temporary Construction Entrance	EA	2
3	Construction Surveying	LS	1
4	Chainlink Fencing	FT	480
5	Mowing	AC	8
6	Grading Operations	LS	1
7	Invasive Species Removal	AC	1
8	Impervious Select Material	CY	1,416
9	Coarse Aggregate, No. 57 Stone	TN	377
10	Structure Stone, Class A	TN	189
11	Structure Stone, Class B	TN	16
12	Structure Stone, Class I	TN	100
13	Structure Stone, Class Boulder	TN	2,032
14	Root Wads	EA	20
15	Filter Fabric for Drainage	SY	1,078
16	Coir Fiber Matting	SY	7,800
17	Turf Reinforcement Matting	SY	300
18	Temporary Mulching	AC	8
19	Seed for Temporary Seeding	LB	280
20	Fertilizer for Temporary Seeding	TN	2
21	Ripping	AC	8
22	Discing	AC	3
23	B & B Trees	EA	100
24	Container Vegetation	EA	1,035
25	Herbaceous Plugs	EA	2,200
26	Live Stakes	EA	2,600
27	Bare-root Seedlings	EA	1,500
28	Permanent Seed	LB	62
29	Park Lawn Seed	LB	148
30	Topsoil	CY	227
31	Safety Fence	LF	2,200
	PUMPING ALTERNATE		
1	Coarse Aggregate, No. 57 Stone	TN	31
2	Structure Stone, Class B	TN	25
3	Structure Stone, Class I	TN	175
4	Filter Fabric for Drainage	SY	83
5	Pumping	LS	1
6	Impervious Fabric	SY	77
7	Sediment Filter Bags	EA	5



03/23/07 AS BUILT DRAWINGS

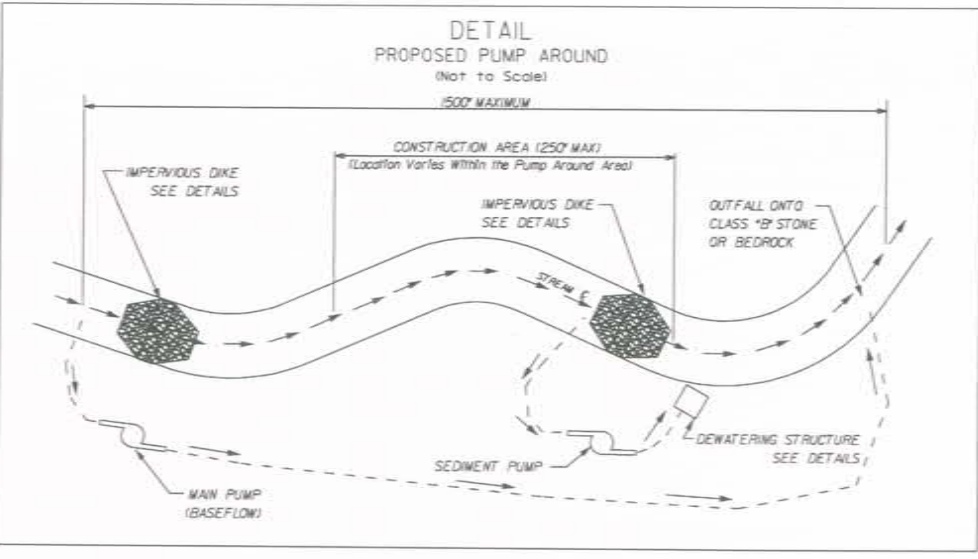
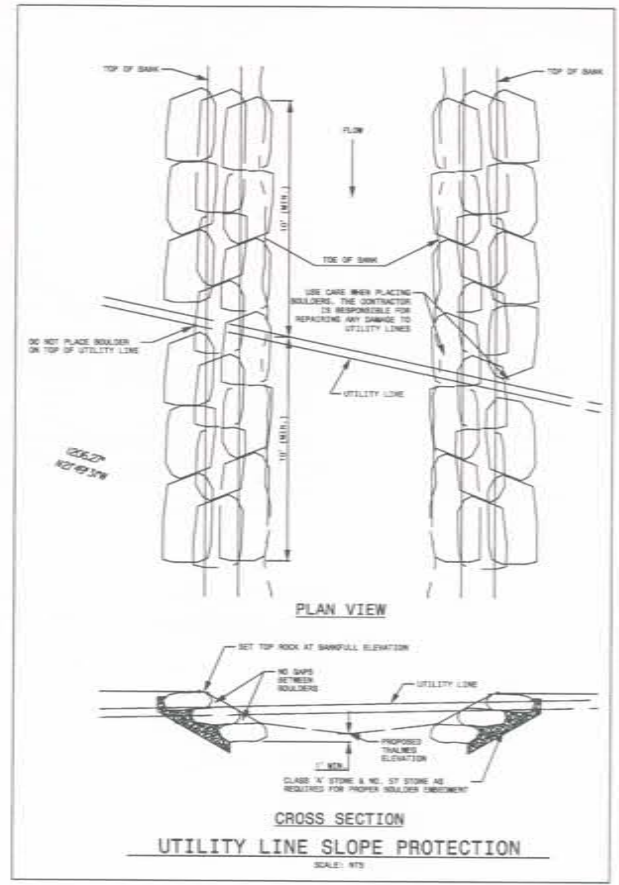
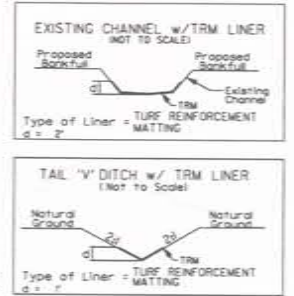
ISSUED FOR BIDS	JDN	JNJ	1/18/04
	DATE	CHK	DATE
NO	REV	DATE	DATE
 EARTH TECH 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607 Phone: (919) 857-6200 Fax: (919) 857-6259			
CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY ECOSYSTEM ENHANCEMENT PROGRAM		SUMMARY OF QUANTITIES	
DATE	3/23/2007		
PROJECT NO	57036		
FILENAME			
SHEET NO	C-2		
DRAWING NO			





SREV C-1	SREV C-2	SREV C-3	SREV C-4	SREV C-5	SREV C-6	SREV C-7	SREV C-8
PI Sta 10+55.28	PI Sta 11+85.59	PI Sta 13+34.82	PI Sta 15+57.81	PI Sta 17+58.37	PI Sta 19+52.53	PI Sta 21+60.57	PI Sta 23+02.06
PCSta 10+37.64	PCSta 11+59.31	PCSta 12+88.80	PCSta 14+79.92	PCSta 16+99.15	PCSta 19+11.22	PCSta 20+90.11	PCSta 22+88.24
PTSta 10+71.26	PTSta 12+10.71	PTSta 13+71.36	PTSta 16+17.82	PTSta 18+03.41	PTSta 19+89.03	PTSta 22+03.24	PTSta 23+15.72
$\Delta = 42^{\circ} 49' 38.5''$ (LT)	$\Delta = 29^{\circ} 28' 55.0''$ (RT)	$\Delta = 63^{\circ} 04' 17.7''$ (LT)	$\Delta = 65^{\circ} 50' 26.1''$ (RT)	$\Delta = 67^{\circ} 53' 05.5''$ (LT)	$\Delta = 47^{\circ} 40' 42.9''$ (RT)	$\Delta = 86^{\circ} 29' 48.9''$ (LT)	$\Delta = 14^{\circ} 34' 44.6''$ (RT)
D = 127' 19' 26.2"	D = 57' 17' 44.8"	D = 76' 23' 39.7"	D = 47' 44' 41.3"	D = 65' 09' 31.8"	D = 67' 19' 44.1"	D = 76' 23' 39.7"	D = 53' 03' 05.9"
L = 33.62'	L = 51.40'	L = 82.58'	L = 137.90'	L = 104.28'	L = 77.81'	L = 13.44'	L = 27.49'
T = 17.64'	T = 26.28'	T = 46.02'	T = 55.89'	T = 59.23'	T = 43.32'	T = 70.44'	T = 13.81'
R = 45.00'	R = 100.00'	R = 75.00'	R = 120.00'	R = 88.00'	R = 93.50'	R = 75.00'	R = 108.00'

TRIBUTARY T-1	TRIBUTARY T-2	TRIBUTARY T-3	TRIBUTARY T-4
PI Sta 11+86.45	PI Sta 13+12.60	PI Sta 14+49.69	PI Sta 16+00.57
PCSta 10+33.51	PCSta 12+57.44	PCSta 14+09.31	PCSta 15+66.07
PTSta 11+82.04	PTSta 13+51.24	PTSta 14+83.69	PTSta 16+32.79
$\Delta = 63^{\circ} 04' 24.8''$ (RT)	$\Delta = 75^{\circ} 41' 27.3''$ (LT)	$\Delta = 55^{\circ} 20' 40.0''$ (RT)	$\Delta = 36^{\circ} 03' 45.3''$ (LT)
D = 42' 49' 29.0"	D = 80' 41' 53.8"	D = 74' 24' 36.4"	D = 54' 03' 09.4"
L = 148.53'	L = 93.79'	L = 74.38'	L = 66.72'
T = 82.93'	T = 82.93'	T = 40.38'	T = 34.51'
R = 134.00'	R = 71.00'	R = 77.00'	R = 106.00'



LEGEND	
CROSS VANE*	
* See General Details	
ROOT WAD*	
* See General Details	
J-HOOK VANE*	
* See General Details	
ROCK SILL*	
* See General Details	
CHANNEL PLUG*	
* See General Details	

NOTE: Structure placement on Plan Sheets are for location only. Actual placement shall be directed by Resident Engineer.

- NOTES:
- POND LOCATIONS AS SHOWN ON PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. ENGINEER WILL DETERMINE EXACT LOCATION OF PONDS IN FIELD.
  - ALL AREAS OF CONSTRUCTION SHALL BE BOUNDED BY ORANGE SAFETY FENCE EXCEPT WHERE THERE IS EXISTING CHAIN LINK FENCE.

03/23/07 AS BUILT DRAWINGS

ISSUED FOR BIDS	JUN 1/16/04	NO	DATE
CHANGED BEGIN CONST.	JUN 1/16/04	NO	DATE
ADDED UTILITY LINE SLOPE DETAIL & NOTES			
ADJUSTED CHAIN LINK FENCE NOTES			
REMOVED NOTE TO REPLACE CHAIN LINK GATE			

**EARTH TECH**

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 Phone 919.951.6200 Fax 919.854.6259

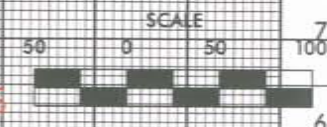
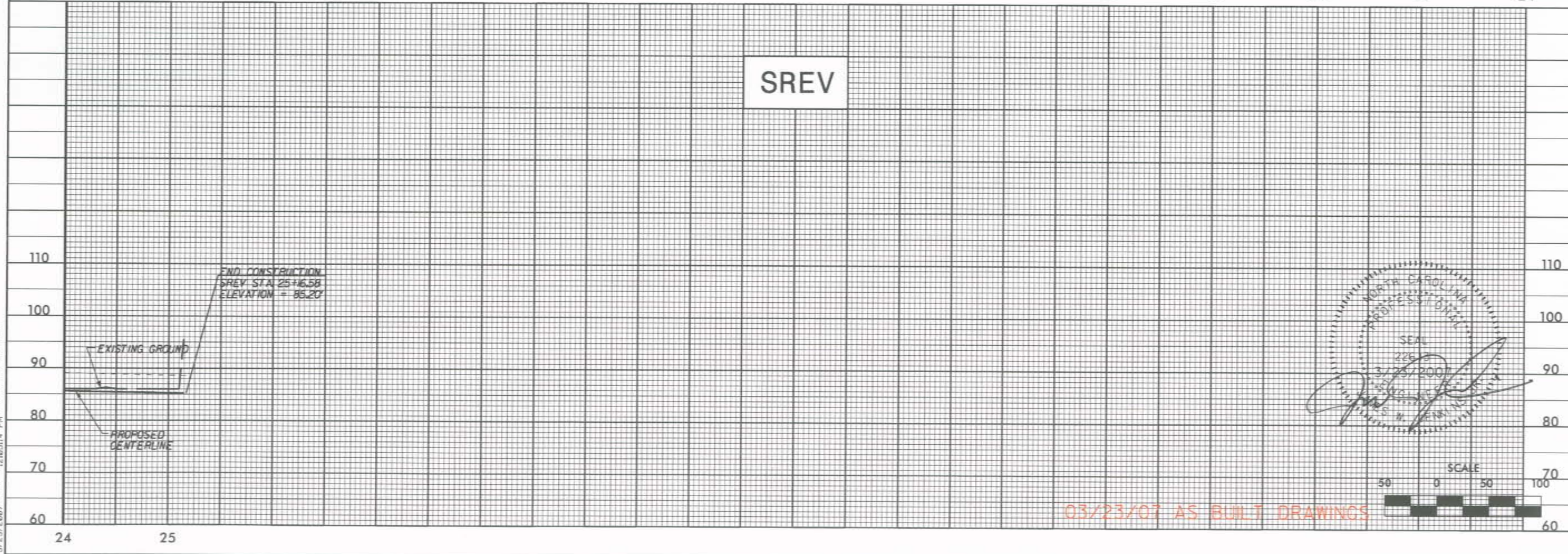
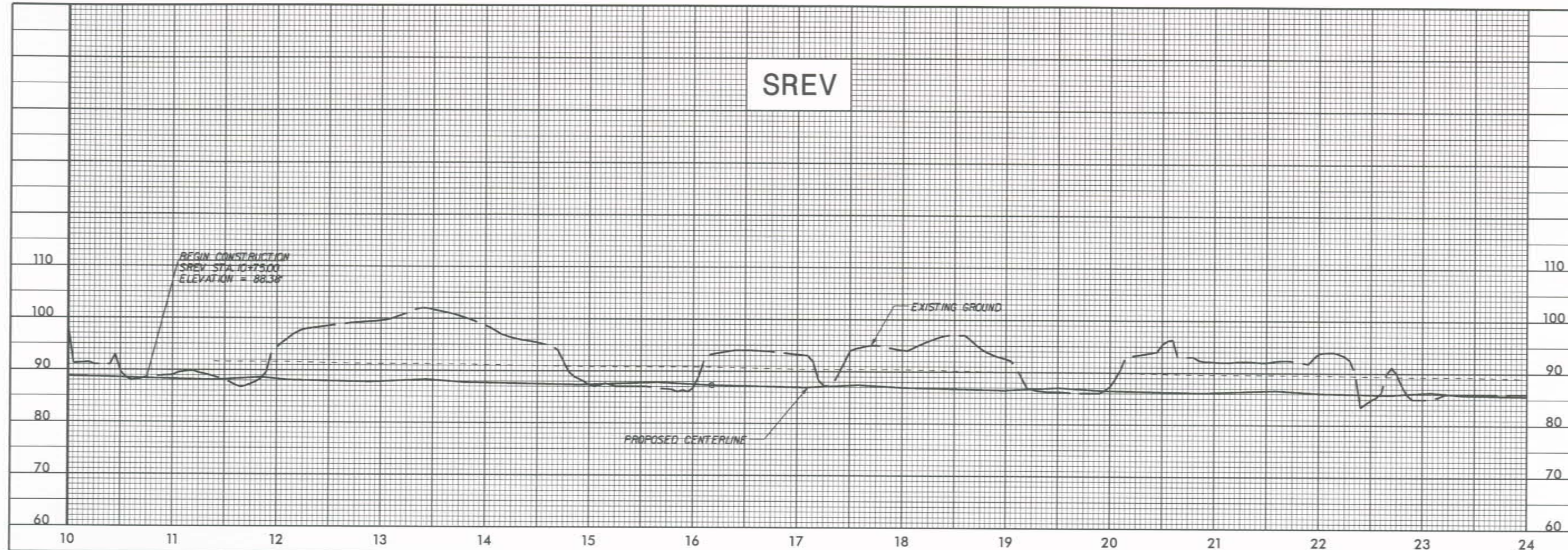
CROSS CREEK STREAM RESTORATION  
 CUMBERLAND COUNTY  
 ECOSYSTEM ENHANCEMENT PROGRAM

**PLAN, GRADING, DRAINAGE, AND EROSION CONTROL**

DATE: 3/23/2007  
 PROJECT NO: 57036  
 FILENAME:  
 SHEET NO: C-3  
 DRAWING NO:



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03/23/07 AS BUILT DRAWINGS

SREV

SREV

ISSUED FOR BIDS	JUN	JUN	1/14/04
NO			
REVISIONS			
NO			
	DRN	CHK	DATE

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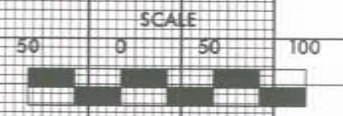
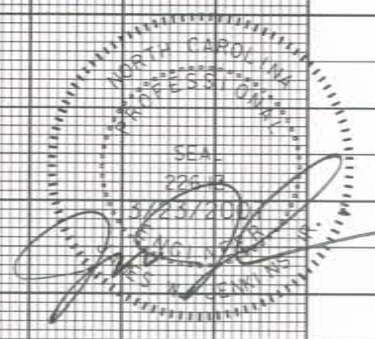
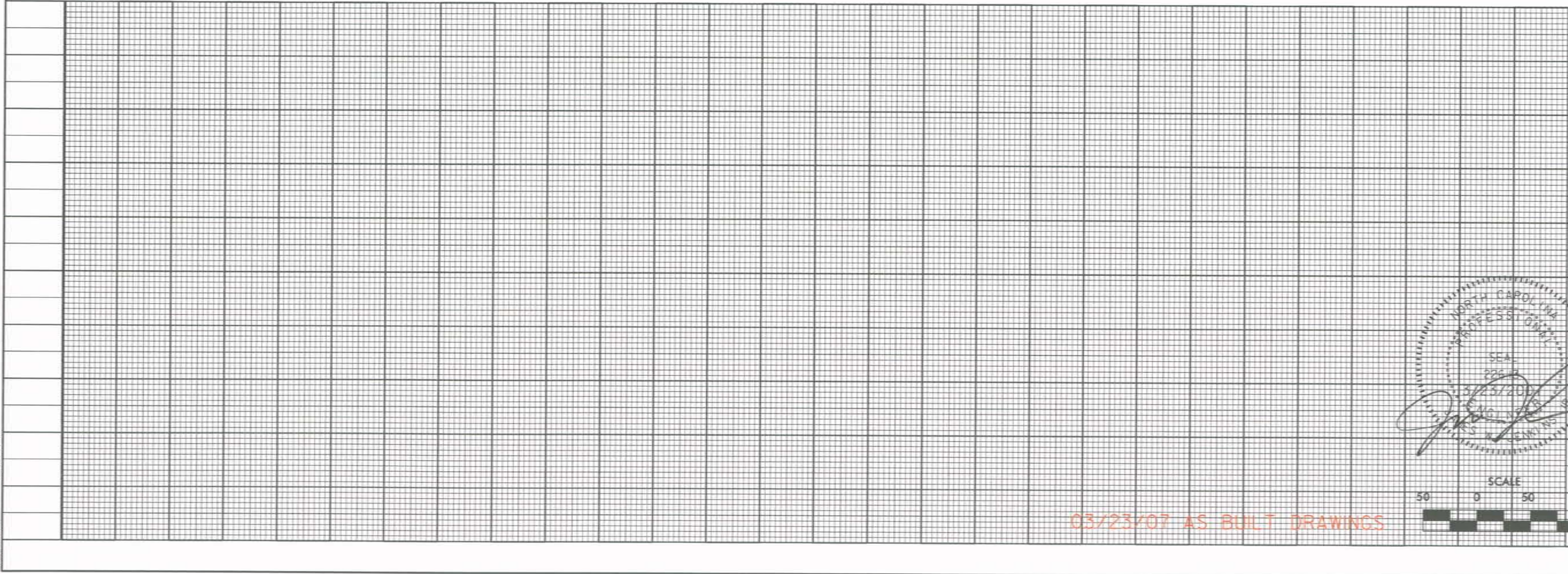
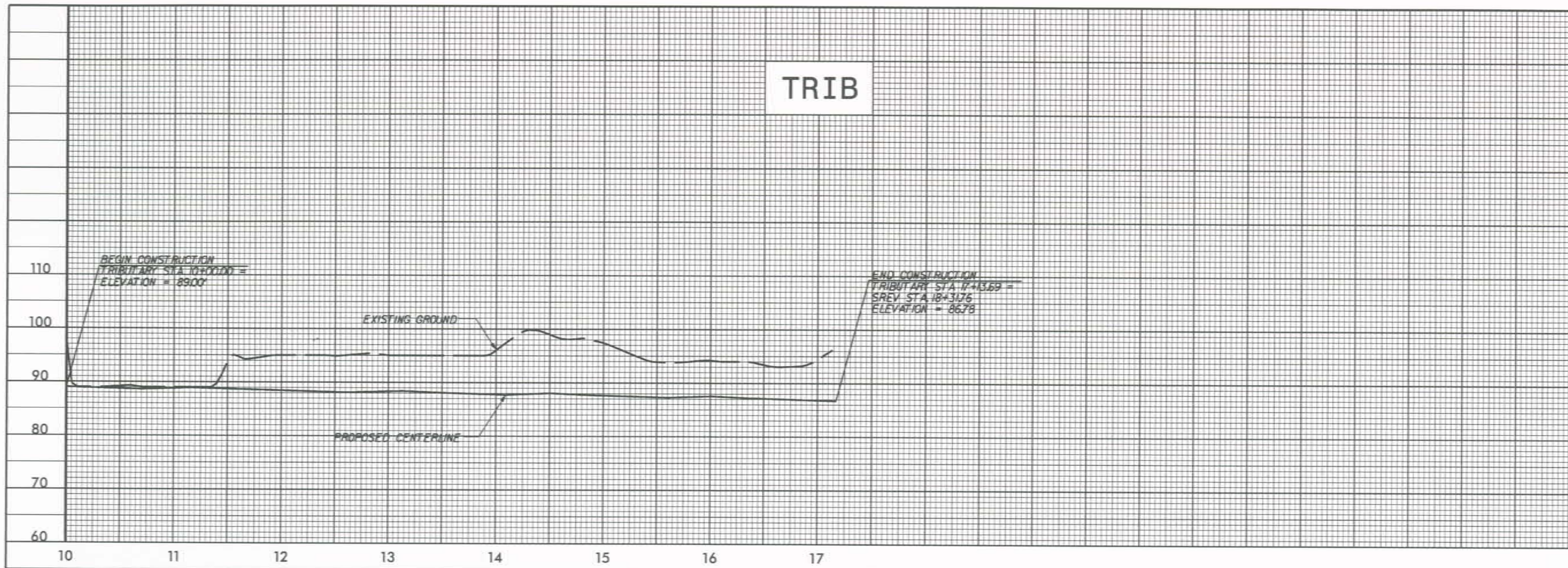
CROSS CREEK STREAM RESTORATION  
CUMBERLAND COUNTY  
ECOSYSTEM ENHANCEMENT PROGRAM

SREV PROFILE

DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	C-4
DRAWING NO	



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03/23/07 AS BUILT DRAWINGS

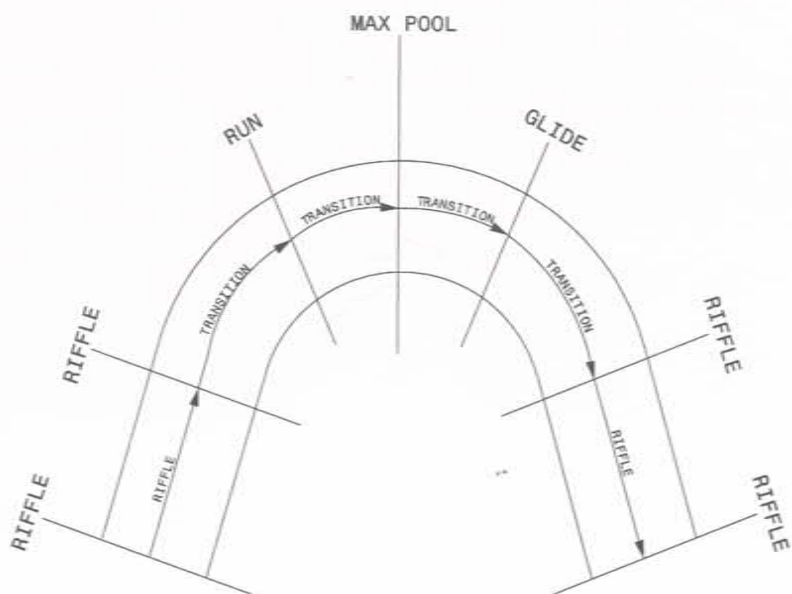
ISSUED FOR BIDS	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	DATE

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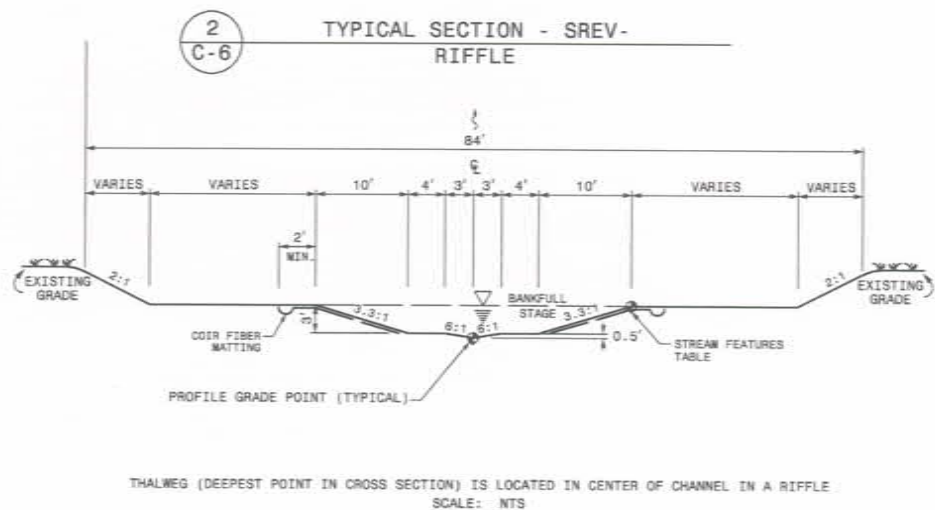
CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY ECOSYSTEM ENHANCEMENT PROGRAM	
<b>TRIBUTARY PROFILE</b>	
DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	C-5
DRAWING NO	



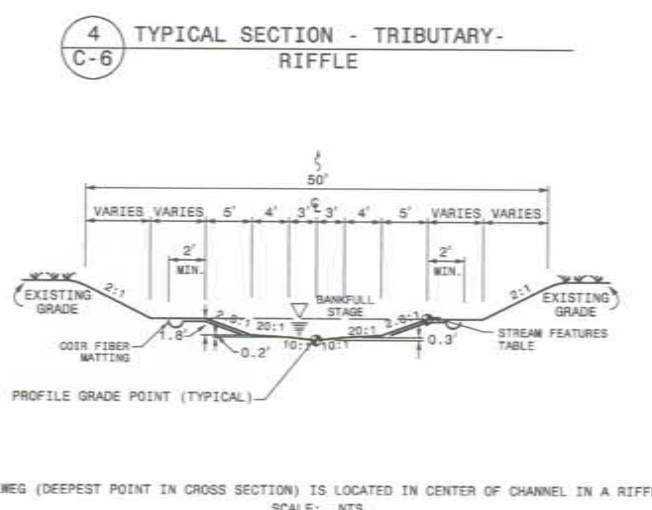


1 CROSS SECTION TRANSITION LOCATIONS  
SCALE: NTS

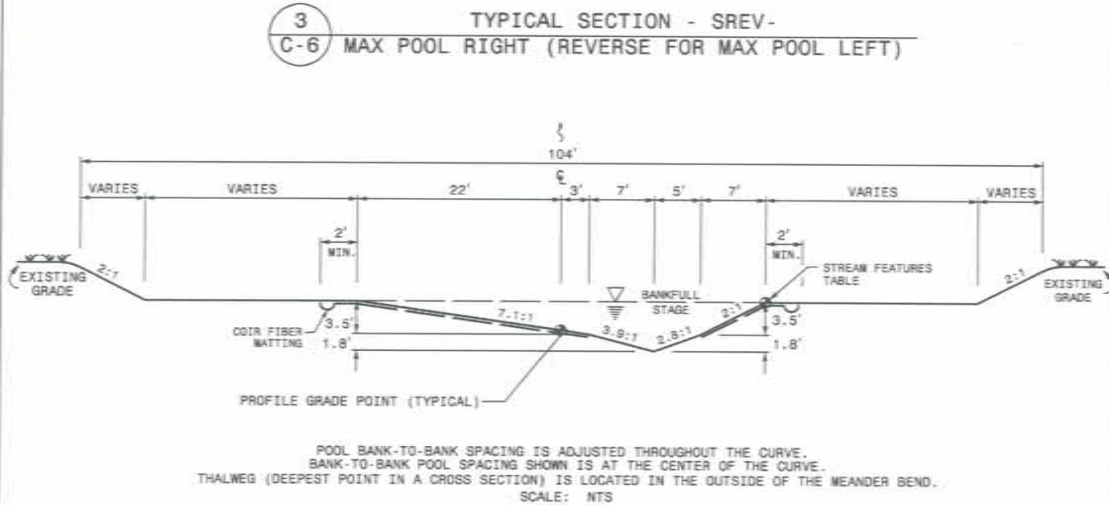
- NOTE:
1. AREAS IN BETWEEN LABELED FEATURES ARE TRANSITION AREAS.
  2. SEE TYPICALS AND STATIONING FOR MORE DETAIL.
  3. THE AREA BETWEEN THE CONCURRENT RIFFLE CROSS-SECTIONS ARE CONSIDERED THE RIFFLE SECTION.
  4. THE AREA BETWEEN THE DOWNSTREAM RIFFLE AND RUN CROSS-SECTION IS CONSIDERED THE RUN SECTION.
  5. THE AREA BETWEEN THE RUN AND GLIDE CROSS-SECTION IS CONSIDERED THE POOL SECTION.
  6. THE AREA BETWEEN THE GLIDE AND THE UPSTREAM RIFFLE CROSS-SECTION IS CONSIDERED THE GLIDE SECTION.



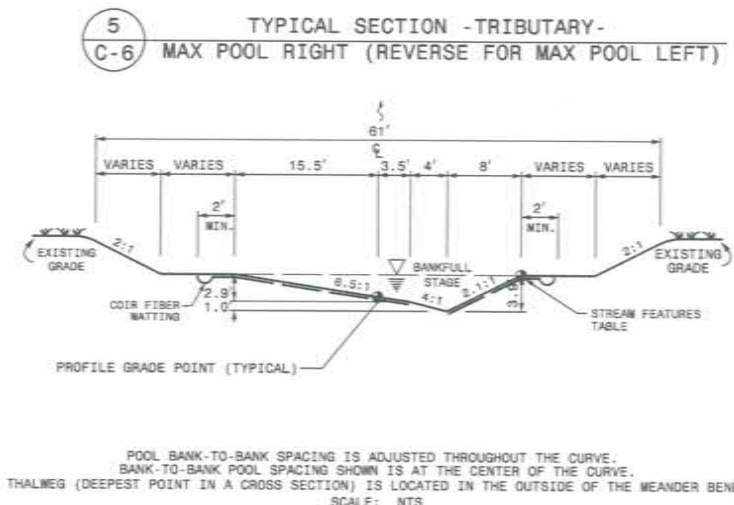
THALWEG (DEEPEST POINT IN CROSS SECTION) IS LOCATED IN CENTER OF CHANNEL IN A RIFFLE.  
SCALE: NTS



THALWEG (DEEPEST POINT IN CROSS SECTION) IS LOCATED IN CENTER OF CHANNEL IN A RIFFLE.  
SCALE: NTS



POOL BANK-TO-BANK SPACING IS ADJUSTED THROUGHOUT THE CURVE.  
BANK-TO-BANK POOL SPACING SHOWN IS AT THE CENTER OF THE CURVE.  
THALWEG (DEEPEST POINT IN A CROSS SECTION) IS LOCATED IN THE OUTSIDE OF THE MEANDER BEND.  
SCALE: NTS



POOL BANK-TO-BANK SPACING IS ADJUSTED THROUGHOUT THE CURVE.  
BANK-TO-BANK POOL SPACING SHOWN IS AT THE CENTER OF THE CURVE.  
THALWEG (DEEPEST POINT IN A CROSS SECTION) IS LOCATED IN THE OUTSIDE OF THE MEANDER BEND.  
SCALE: NTS

6 STREAM FEATURES TABLE  
C-6

SREV STATION	FEATURE	BANKFULL ELEVATION	THALWEG ELEVATION	CENTERLINE ELEVATION
10+00	Riffle	EXISTING	EXISTING	EXISTING
10+38	Riffle	EXISTING	EXISTING	EXISTING
10+55	Pool (C1)	EXISTING	EXISTING	EXISTING
10+71	Riffle	EXISTING	EXISTING	EXISTING
11+40	Riffle	91.90	88.10	88.10
11+85	Pool (C2)	91.59	86.29	86.59
12+11	Riffle	91.59	86.09	86.09
12+90	Riffle	91.27	87.77	87.77
13+43	Pool (C3)	91.26	85.96	86.26
13+80	Riffle	91.25	87.75	87.75
14+20	Riffle	90.81	87.31	87.31
15+66	Pool (C4)	90.80	85.50	87.80
16+16	Riffle	90.79	87.29	87.29
17+10	Riffle	90.42	86.92	86.92
17+58	Pool (C5)	90.41	85.11	87.41

SREV STATION	FEATURE	BANKFULL ELEVATION	THALWEG ELEVATION	CENTERLINE ELEVATION
18+03	Riffle	90.40	86.90	86.90
19+00	Riffle	90.01	86.51	86.51
19+53	Pool (C6)	90.00	84.70	87.00
19+95	Riffle	89.99	86.49	86.49
20+90	Riffle	89.61	86.11	86.11
21+81	Pool (C7)	89.60	84.30	86.60
22+03	Riffle	89.59	86.09	86.09
22+70	Riffle	89.32	85.82	85.82
23+10	Pool (C8)	89.32	84.02	86.32
23+40	Riffle	89.31	85.81	85.81
25+17	Riffle	88.60	85.10	85.20

TRIBUTARY STATION	FEATURE	BANKFULL ELEVATION	THALWEG ELEVATION	CENTERLINE ELEVATION
10+00	Riffle	91.30	89.00	89.00
10+70	Riffle	90.86	88.58	88.58
11+16	Pool (C1)	90.86	86.96	88.86
11+82	Riffle	90.85	88.55	88.55
12+60	Riffle	90.38	88.10	88.10
13+13	Pool (C2)	90.36	86.46	88.36
13+51	Riffle	90.35	88.05	88.05
14+09	Riffle	90.00	87.70	87.70
14+50	Pool (C3)	89.99	86.09	87.99
14+84	Riffle	89.98	87.68	87.68
15+80	Riffle	89.52	87.22	87.22
16+01	Pool (C4)	89.51	85.61	87.51
16+33	Riffle	89.50	87.20	87.20
17+14	Riffle	89.02	86.72	86.72

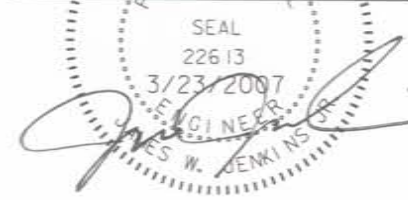
SREV	TRIBUTARY
CROSS STATION* ELEVATION	CROSS STATION* ELEVATION
-	10+66 88.80
17+50 85.41	12+87 87.26
21+83 85.56	16+33 87.20
22+92 84.83	

SREV	TRIBUTARY
CROSS STATION* ELEVATION	CROSS STATION* ELEVATION
11+50 87.69	11+31 87.32
13+19 86.78	14+22 87.19
15+86 86.18	14+70 87.02
16+81 87.03	15+75 86.63
19+36 85.28	
21+04 85.75	

	SREV	TRIBUTARY
BANK LENGTH	34'	25'
WING LENGTH	36.8' - 38.3'	26.6' - 28'
CROSS LENGTH	6'	6'
WING ANGLE	22° - 27°	29° - 27°
WING SLOPE	8% - 10%	5% - 10%
WING RISE	3.3' - 3.8'	1.7' - 2.6'

	SREV	TRIBUTARY
BANK LENGTH	34'	23'
WING LENGTH	36.9' - 38.9'	24.7' - 26.2'
CROSS LENGTH	6'	6'
WING ANGLE	23° - 29°	21° - 29°
WING SLOPE	8% - 10%	5% - 10%
WING RISE	3.0' - 3.7'	2.4'

SREV	TRIBUTARY
CROSS STATION* ELEVATION	CROSS STATION* ELEVATION
12+22 88.04	14+83 88.54
14+04 87.69	15+51 88.06
14+80 87.35	15+04 87.54
16+36 87.20	
18+45 86.53	
20+23 86.37	



ROCK CROSS VANE DESIGN DATA      ROCK J-HOOK VANE DESIGN DATA      STONE SILL DESIGN DATA

\* STATION INDICATES MOST UPSTREAM POINT OF THE STRUCTURE

03/23/07 AS BUILT DRAWINGS

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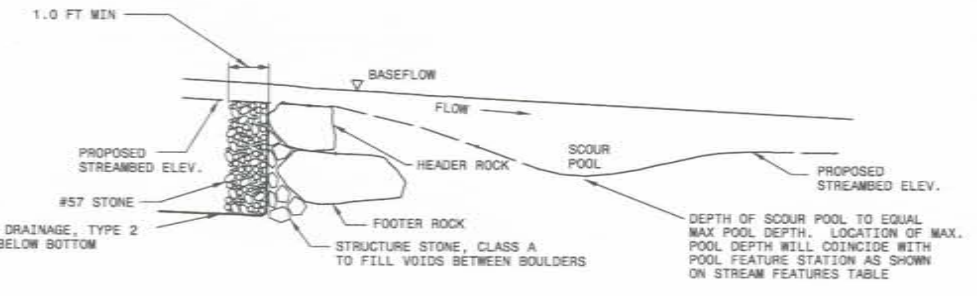
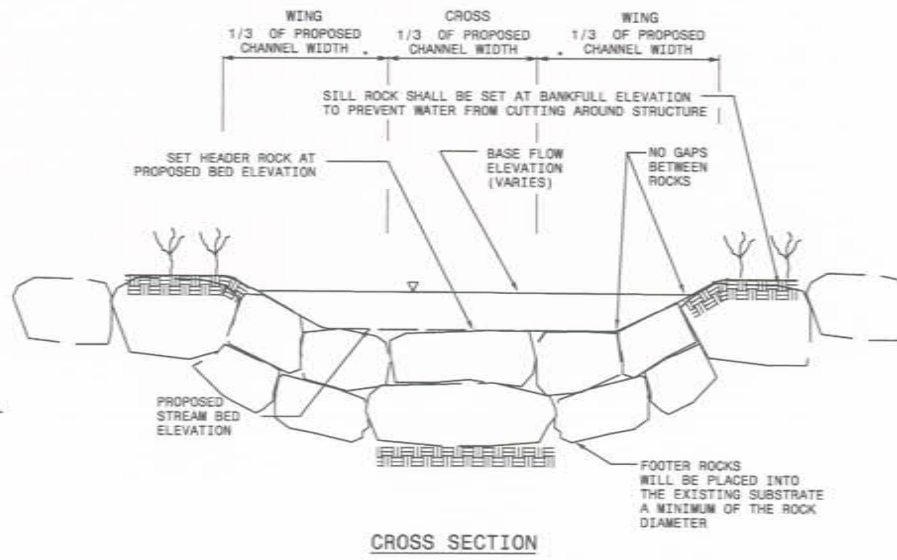
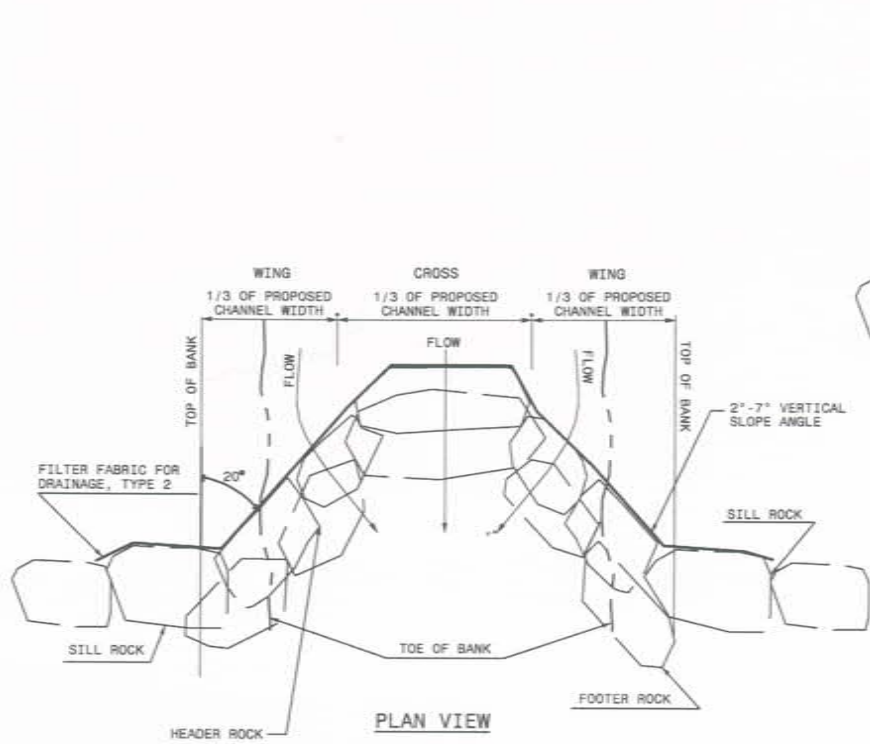
ISSUED FOR BIDS	NO.	REVISIONS	DATE

**EARTHTECH**

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Phone (919) 851-0200 Fax (919) 851-6259

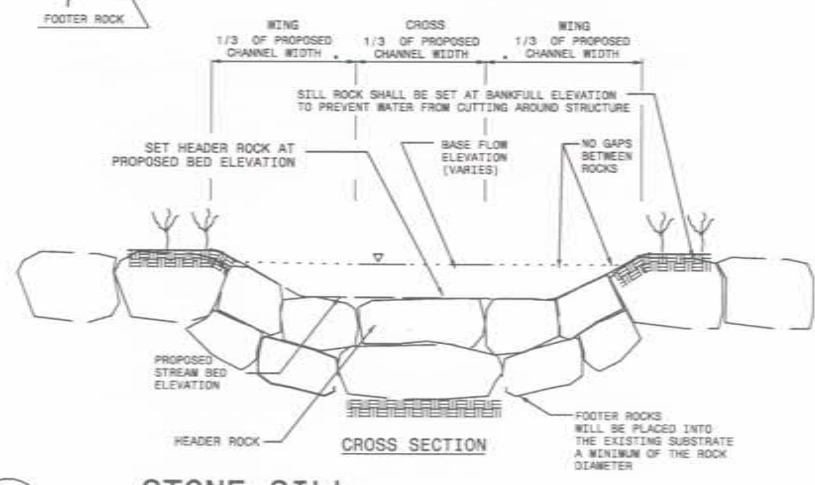
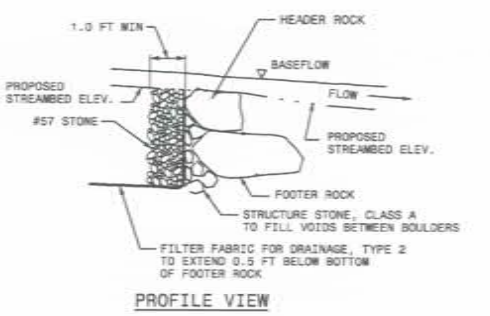
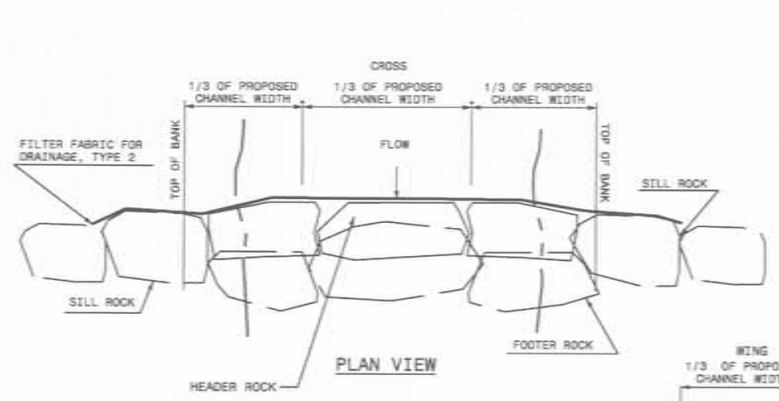
CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY ECOSYSTEM ENHANCEMENT PROGRAM	
GENERAL DETAILS	
DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	C-6
DRAWING NO	





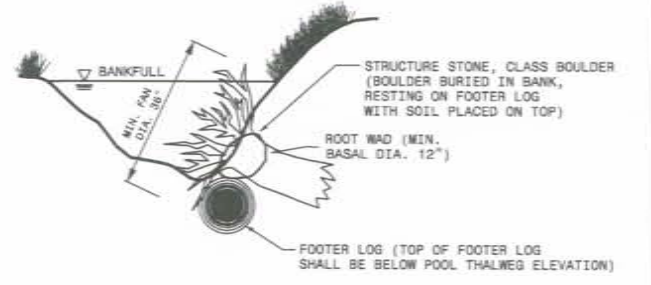
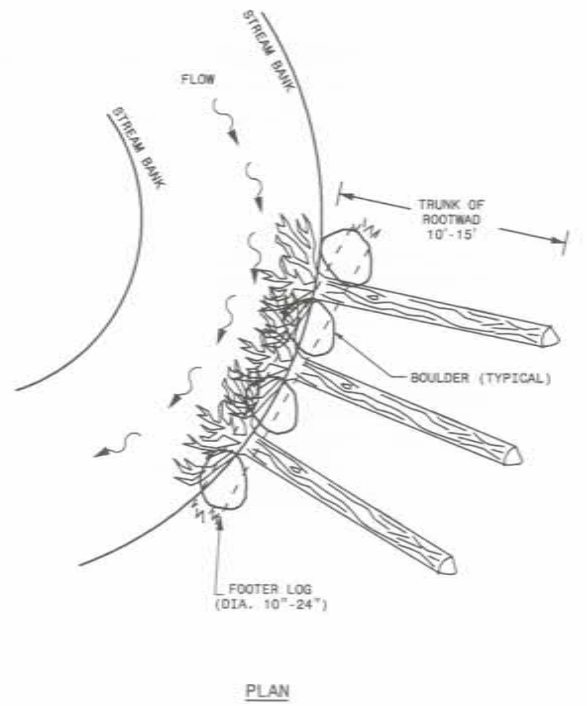
7  
C-7  
**ROCK CROSS VANE**  
SCALE: NTS

- NOTES
1. SCOUR POOL TO BE LOCATED PER TABLE OF STREAM FEATURES TABLE ON SHEET C-6.
  2. HEADER, FOOTER, AND SILLS ROCKS TO BE STRUCTURE STONE, CLASS BOULDER.



8  
C-7  
**STONE SILL**  
SCALE: NTS

NOTE:  
HEADER, FOOTER, AND SILLS ROCKS TO BE  
STRUCTURE STONE, CLASS BOULDER



NORTH CAROLINA  
PROFESSIONAL  
SEAL  
22613  
3/23/2007  
JAMES W. JENKINS  
3/23/07 11:45 BUILT DRAWINGS

9  
C-7  
**ROOT WAD**  
SCALE: NTS

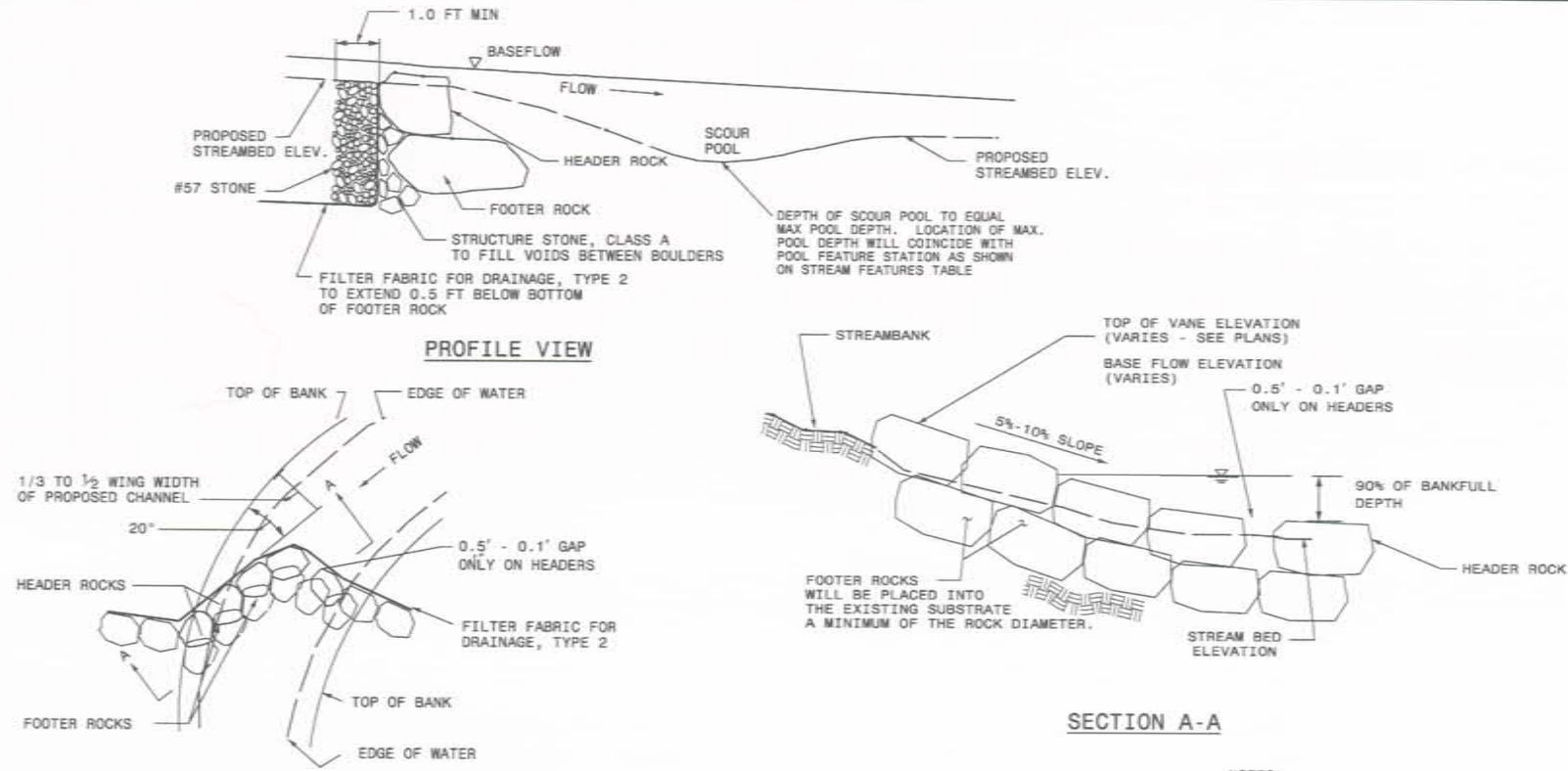
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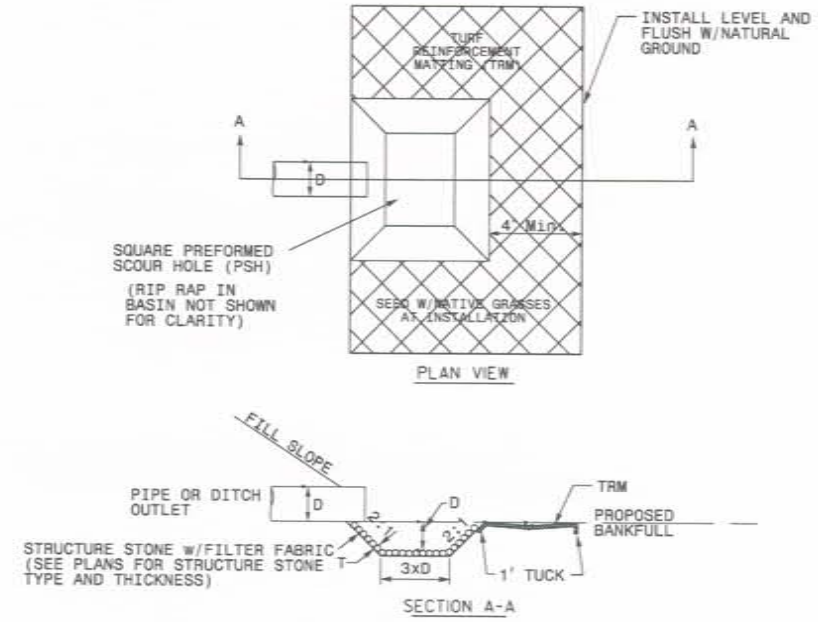
<b>EARTHTECH</b> <small>70 Corporate Center Drive, Suite 475 Raleigh, NC 27607 Phone: (919) 854-6200 Fax: (919) 854-6259</small>		CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY ECOSYSTEM ENHANCEMENT PROGRAM	GENERAL DETAILS
		PROJECT NO: S7036	
		FILENAME:	
		SHEET NO: C-7	
		DRAWING NO:	





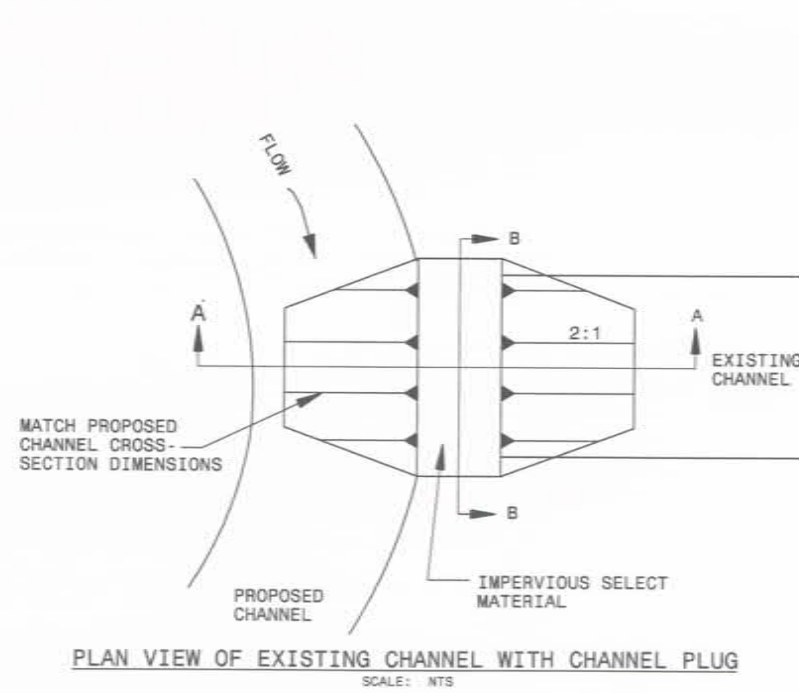
10  
C-8 J-HOOK ROCK VANE  
SCALE: NTS

- NOTES
1. SCOUR POOL TO BE LOCATED PER TABLE OF STREAM FEATURES TABLE ON SHEET C-6.
  2. HEADER, FOOTER, AND SILL ROCKS TO BE STRUCTURE STONE, CLASS BOULDER.

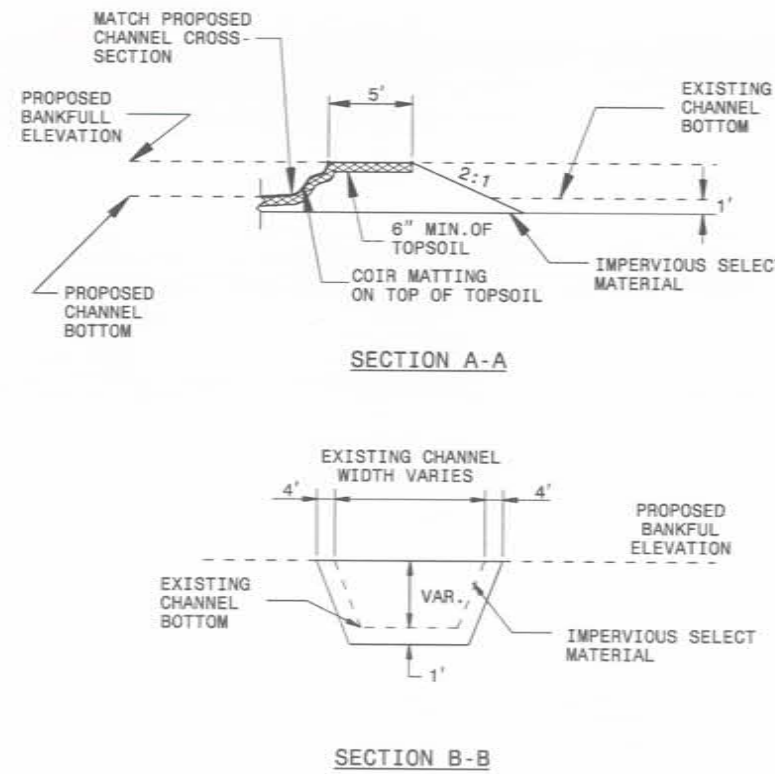


11  
C-8 PREFORMED SCOUR HOLE WITH LEVEL SPREADER  
SCALE: NTS

NOTE: LEVEL SPREADER MAINTAINS SAME ELEVATION AROUND PREFORMED SCOUR HOLE

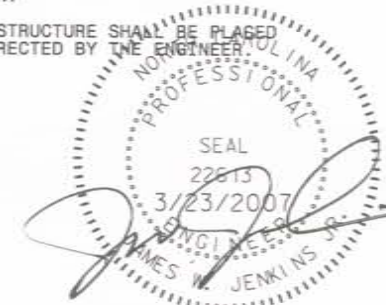


PLAN VIEW OF EXISTING CHANNEL WITH CHANNEL PLUG  
SCALE: NTS



12  
C-8 CHANNEL PLUG  
SCALE: NTS

- NOTES
1. CHANNEL PLUGS TO BE LOCATED AS SHOWN ON THE PLANS AND AT OTHER LOCATIONS AS DIRECTED BY THE ENGINEER.
  2. 90% COMPACTION RATE IS REQUIRED ON CHANNEL PLUG OR AS APPROVED BY THE ENGINEER.
  3. SIDE SLOPE THAT IS ADJACENT TO PROPOSED STREAM NEEDS TO MATCH PROPOSED CROSS SECTION IN THAT REGION.
  4. THIS STRUCTURE SHALL BE PLACED AS DIRECTED BY THE ENGINEER.



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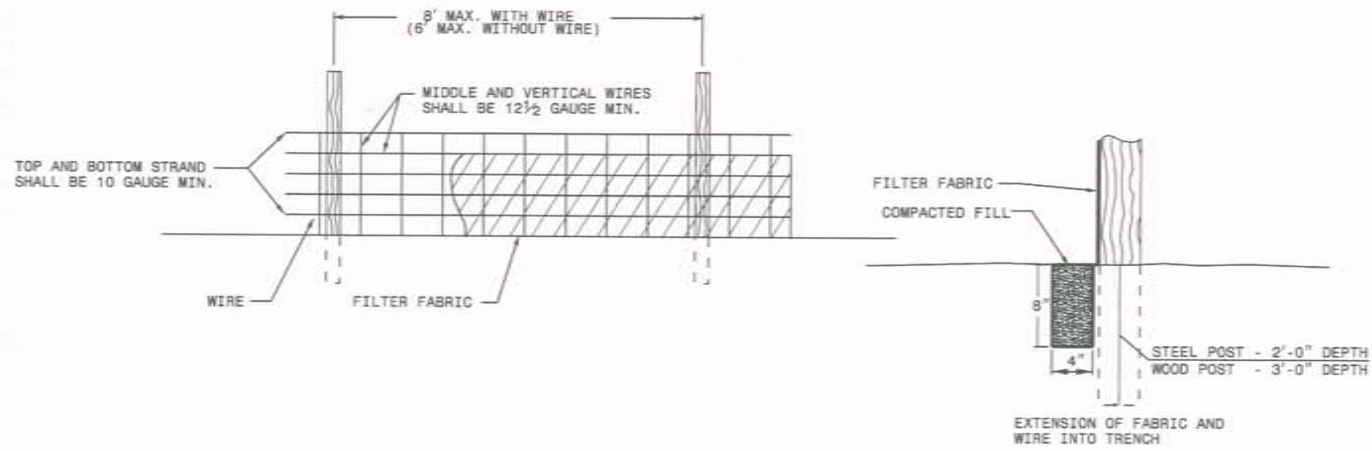
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GENERAL DETAILS

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FILENAME	
SHEET NO	C-8
DRAWING NO	





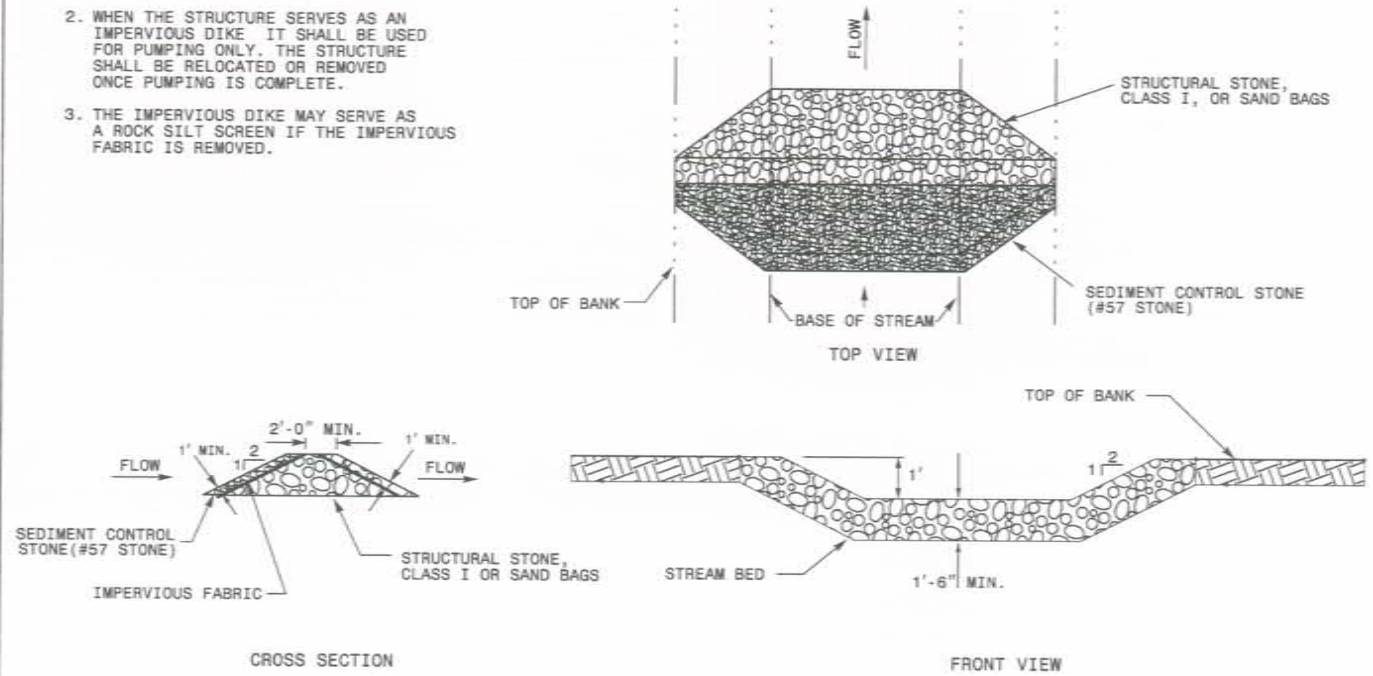
NOTES:

1. WIRE SHALL BE A MINIMUM OF 32" IN WIDTH AND SHALL HAVE A MINIMUM OF 6 LINE WIRES WITH 12" STAY SPACING.
2. FILTER FABRIC SHALL BE A MINIMUM OF 36" IN WIDTH AND SHALL BE FASTENED ADEQUATELY TO THE WIRE AS DIRECTED BY THE ENGINEER.
3. STEEL POSTS SHALL BE 5'-0" IN HEIGHT AND BE OF THE SELF-FASTENER ANGLE STEEL TYPE.
4. WOOD POST SHALL BE 6'-0" IN HEIGHT AND 3" IN DIAMETER.

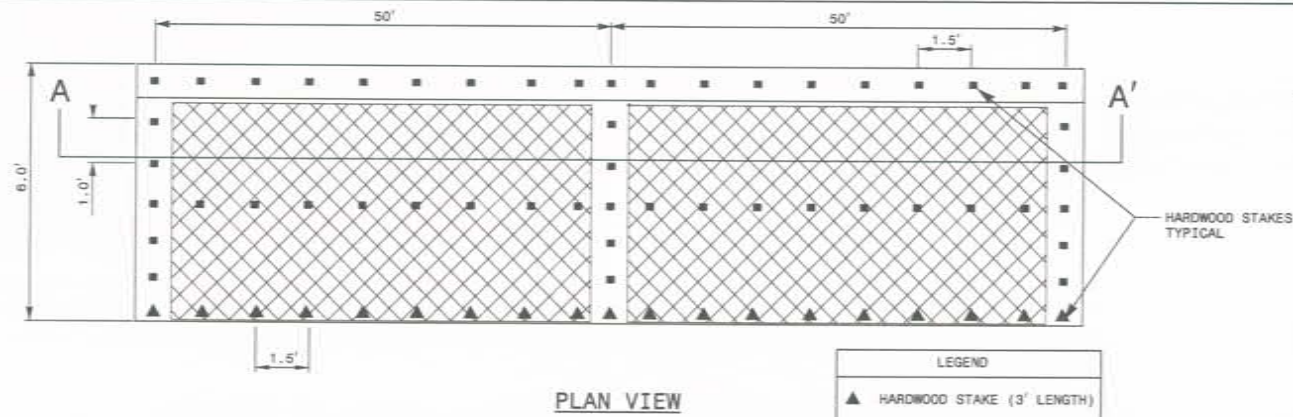
13 TEMPORARY SILT FENCE  
SCALE: NTS

NOTES:

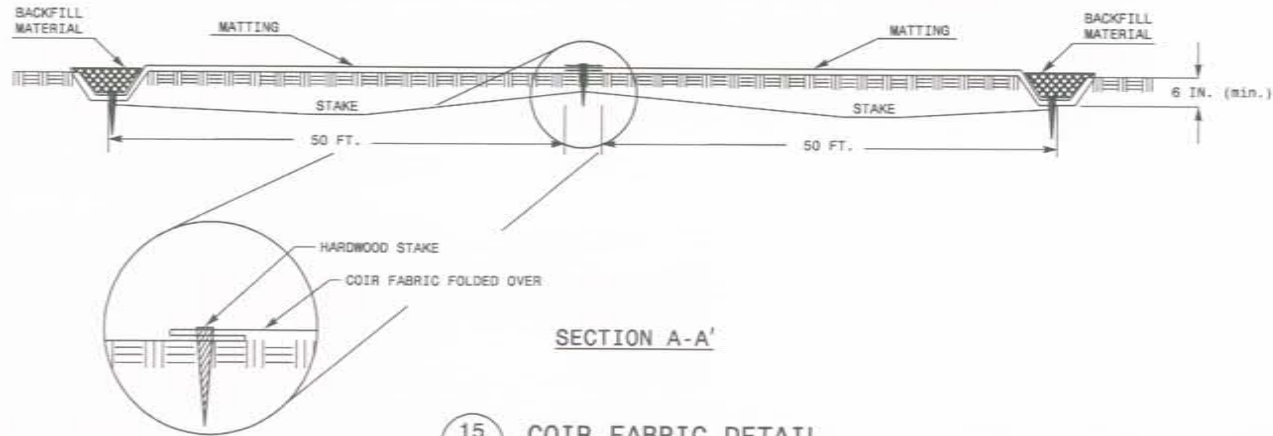
1. REMOVE SEDIMENT WHEN THE SEDIMENT LEVEL REACHES 1/2 THE DEPTH BEHIND THE STRUCTURE.
2. WHEN THE STRUCTURE SERVES AS AN IMPERVIOUS DIKE IT SHALL BE USED FOR PUMPING ONLY. THE STRUCTURE SHALL BE RELOCATED OR REMOVED ONCE PUMPING IS COMPLETE.
3. THE IMPERVIOUS DIKE MAY SERVE AS A ROCK SILT SCREEN IF THE IMPERVIOUS FABRIC IS REMOVED.



14 IMPERVIOUS DIKE/ROCK SILT SCREEN  
SCALE: NTS

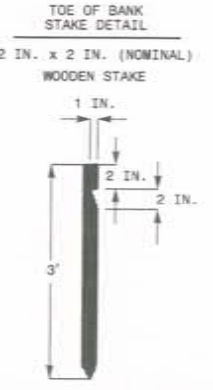
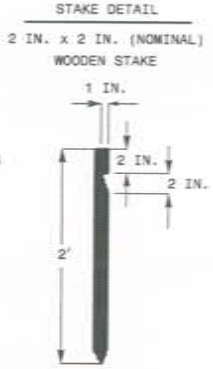


PLAN VIEW



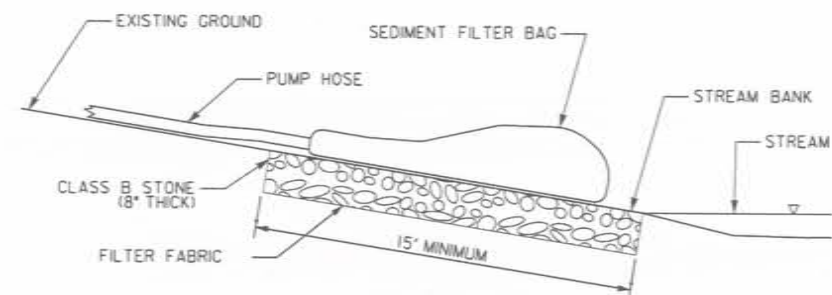
SECTION A-A'

15 COIR FABRIC DETAIL  
SCALE: NTS



STAKE DETAIL

TOE OF BANK STAKE DETAIL



NOTES:

- AT THE ENGINEER'S DISCRETION, ALTERNATE DEWATERING STRUCTURES MAY BE USED (I.E. SEDIMENT TANKS, FILTER BOX, STRAW BALE SILT FENCE, ETC.). HOWEVER, REGARDLESS OF THE DEWATERING STRUCTURE USED, ALL MUST BE SIZED AND OPERATED TO ALLOW ALL PUMPED WATER TO BE FILTERED TO PREVENT SEDIMENTS FROM ERODING AND MOVING OFF SITE.



16 DEWATERING STRUCTURE  
SCALE: NTS

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1	ISSUED FOR BIDS	1/19/04		

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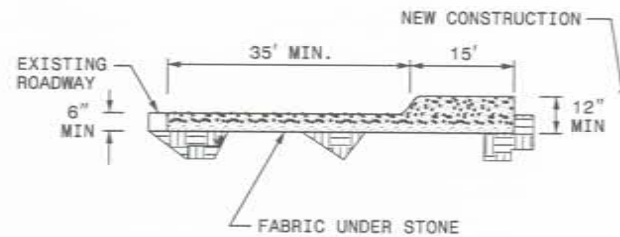
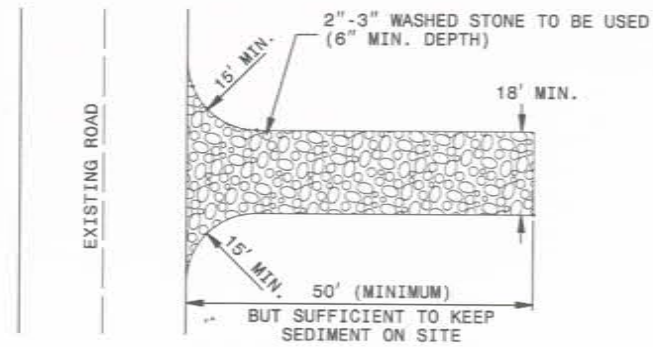
**GENERAL DETAILS**

CROSS CREEK STREAM RESTORATION  
CUMBERLAND COUNTY  
ECOSYSTEM ENHANCEMENT PROGRAM

DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	C-9
DRAWING NO	

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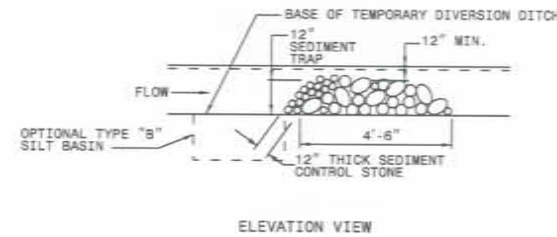
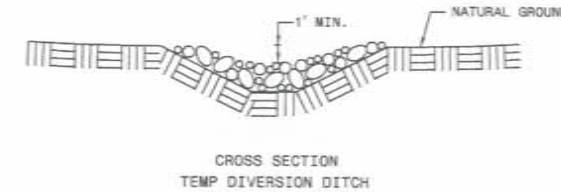
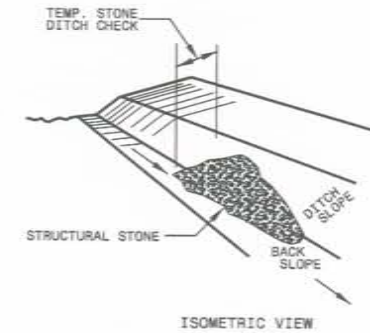




**GENERAL NOTES:**

1. PUT SILT FENCE OR TREE PROTECTION FENCE UP TO ENSURE CONSTRUCTION ENTRANCE IS USED
2. A 6" TO 12" MINIMUM STABILIZED PAD OF WASHED STONE SHALL BE LOCATED WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM A PUBLIC STREET. THE STONE SHALL BE PLACED ON TOP OF FILTER FABRIC FOR A DISTANCE OF 50 FEET MINIMUM.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.
4. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC STREETS MUST BE REMOVED IMMEDIATELY.
5. IF CONSTRUCTION ON THE SITES ARE SUCH THAT THE MUD IS NOT REMOVED BY THE VEHICLE TRAVELING OVER THE STONE, THEN THE TIRES OF THE VEHICLES MUST BE WASHED BEFORE ENTERING THE PUBLIC ROAD. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN.
6. ADDITIONAL GRADING SHALL BE REQUIRED TO CONNECT THE STONE ENTRANCE TO THE EXISTING GROUND. UPON COMPLETION OF THE PROJECT, THE ROAD SHALL BE RETURNED TO A CONDITION THAT MEETS OR EXCEEDS THE PRE-EXISTING CONDITIONS.

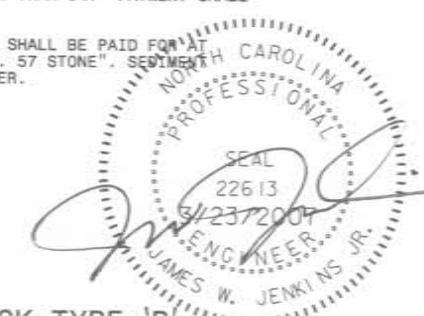
**17** TEMPORARY CONSTRUCTION ENTRANCE  
**C-10** SCALE: NTS



**NOTES:**

1. STRUCTURAL STONE SHALL BE STRUCTURE STONE, CLASS "B" AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER TON 'STRUCTURE STONE, CLASS "B"'.
2. THE ENGINEER MAY DIRECT THE OPTION OF CLASS "A" STONE FOR SITES HAVING LESS THAN ONE (1) ACRE DRAINAGE AREA AND A DITCH GRADE LESS THAN 3%. PAYMENT SHALL BE UNIT PRICE PER TON 'STRUCTURE STONE, CLASS "A"'.
3. SEDIMENT CONTROL STONE SHALL BE NO. 5 OR 57 STONE AND SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER TON 'COARSE AGGREGATE, NO. 57 STONE'. SEDIMENT CONTROL STONE SHALL BE USED AS DIRECTED BY THE ENGINEER.

**18** TEMPORARY ROCK SILT CHECK TYPE 'B'  
**C-10** SCALE: NTS



03/23/07 AS BUILT DRAWINGS

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1	ISSUED FOR BIDS	1/14/04

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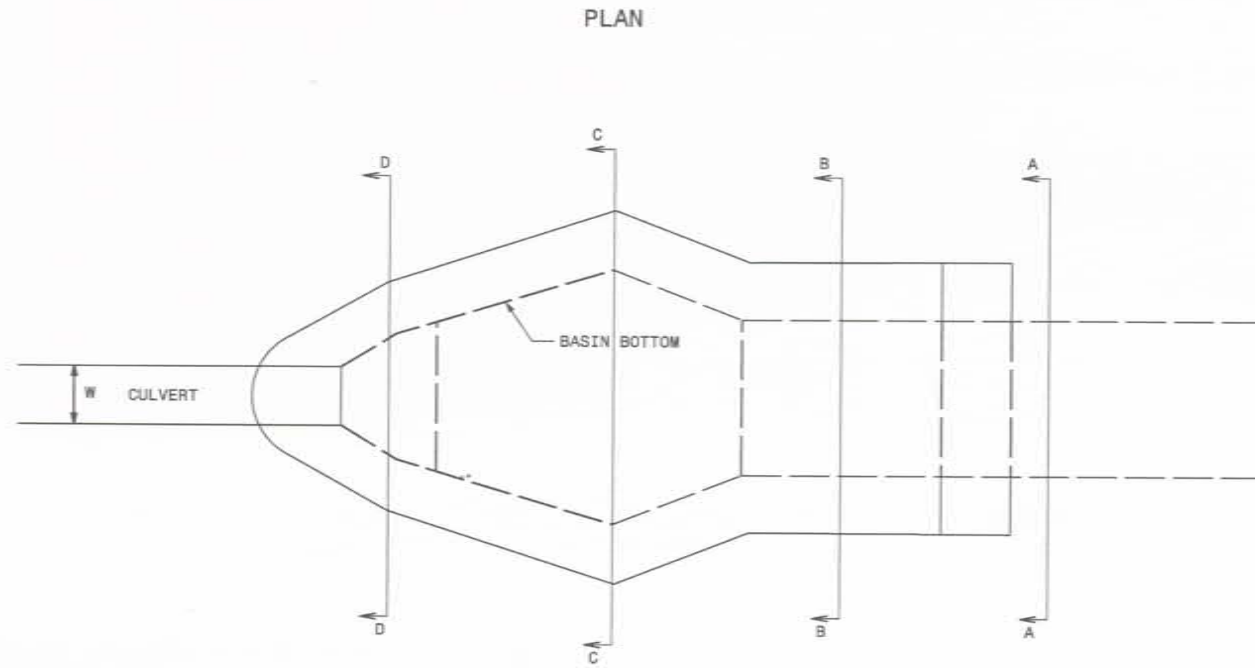
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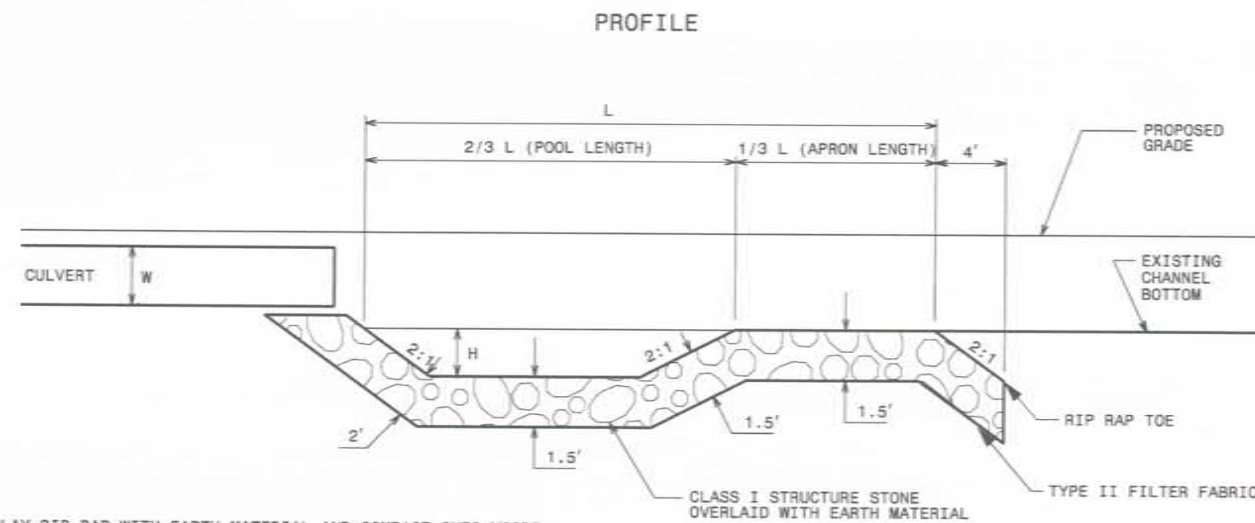
**GENERAL DETAILS**

DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	C-10
DRAWING NO	



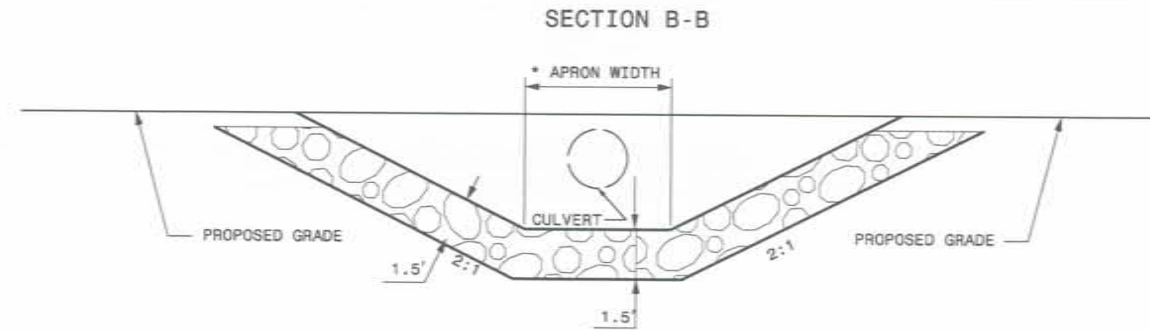
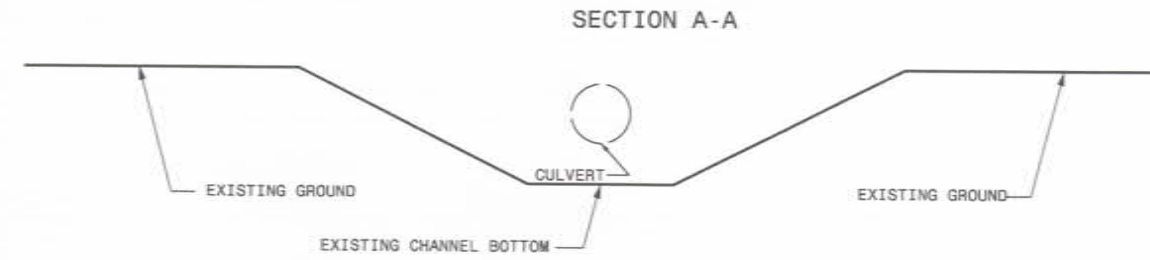


NOTE: CLASS I STONE NOT SHOWN  
IN PLAN VIEW FOR CLARITY

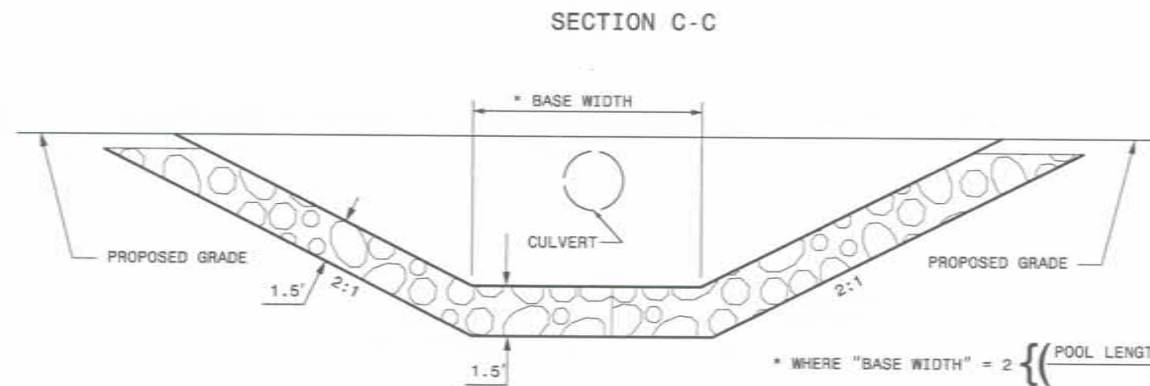


OVERLAY RIP RAP WITH EARTH MATERIAL AND COMPACT INTO VOIDS.  
SEED ACCORDING TO SEEDING SCHEDULE.

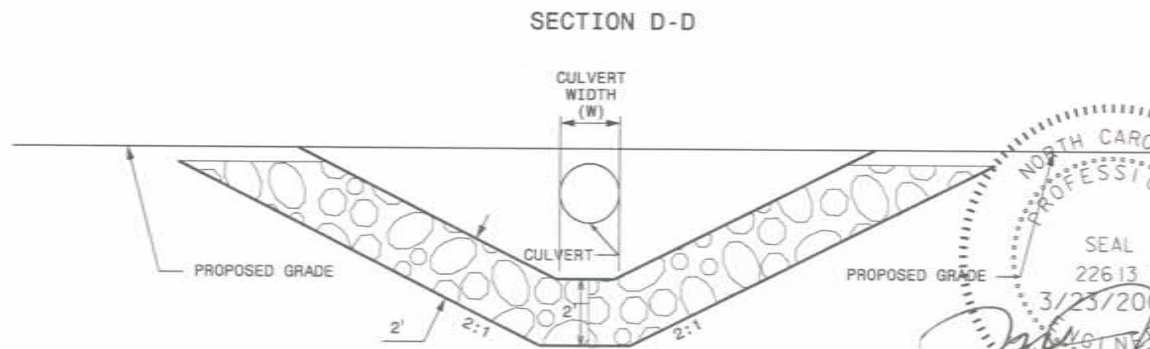
BASIN	L (feet)	POOL LENGTH (feet)	APRON LENGTH (feet)	BASE WIDTH (feet)	APRON WIDTH (feet)	H (feet)
#1	45	30	15	20	8	3



\* WHERE "APRON WIDTH" = "BASE WIDTH" - (4\*H)



\* WHERE "BASE WIDTH" =  $2 \left\{ \frac{\text{POOL LENGTH} - (2*H)}{3} \right\} + \frac{W}{2}$   
MINIMUM "BASE WIDTH" = 10'



03/23/07 AS BUILT DRAWINGS

19  
C-11

STONE OUTLET BASIN  
SCALE: NTS

ISSUED FOR BIDS	NO	DATE	1/14/04
DRN	CHK	DATE	
REVISIONS			

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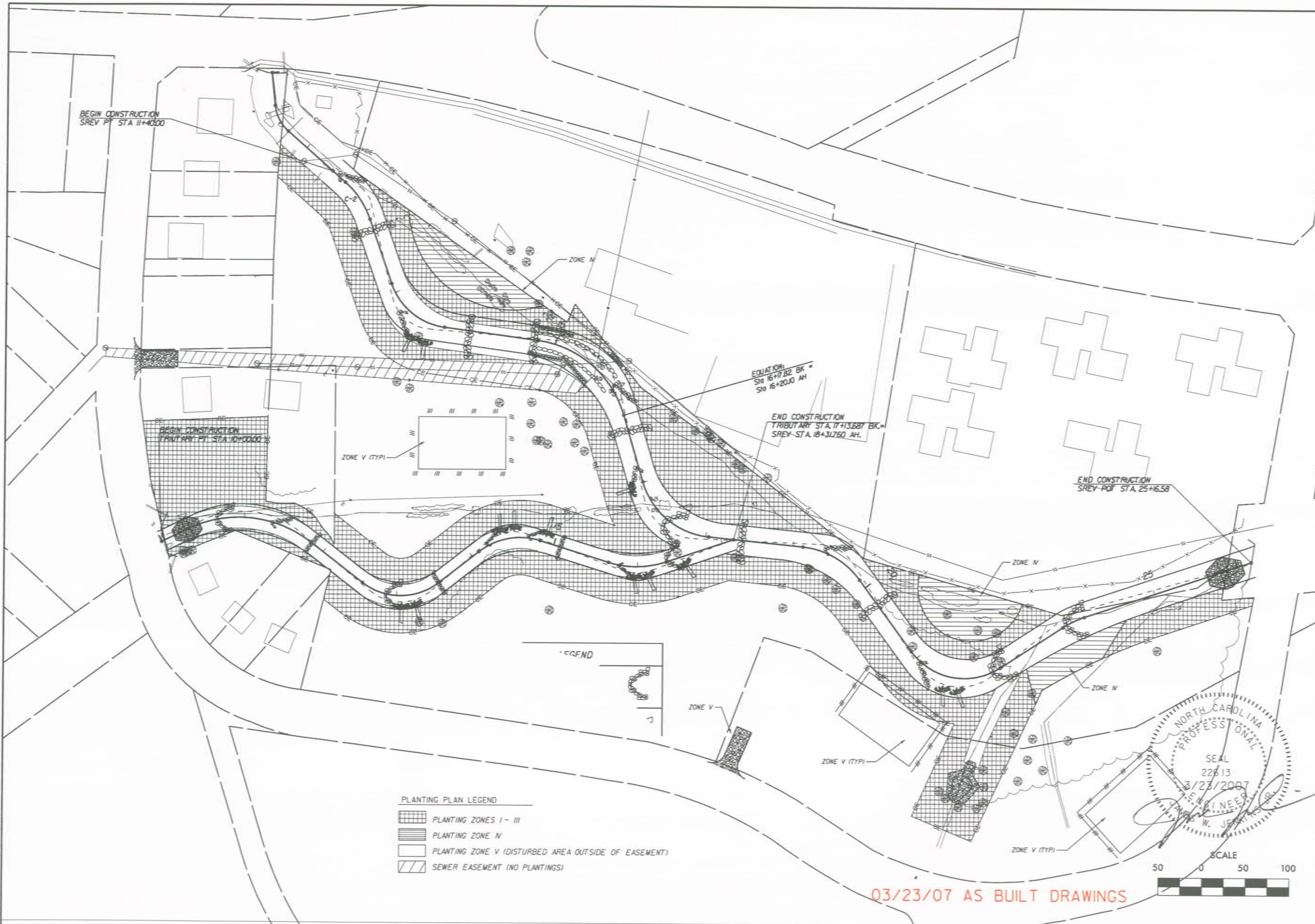
CROSS CREEK STREAM RESTORATION  
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ECOSYSTEM ENHANCEMENT PROGRAM

DATE 3/23/2007  
PROJECT NO 57036  
FILENAME  
SHEET NO C-11  
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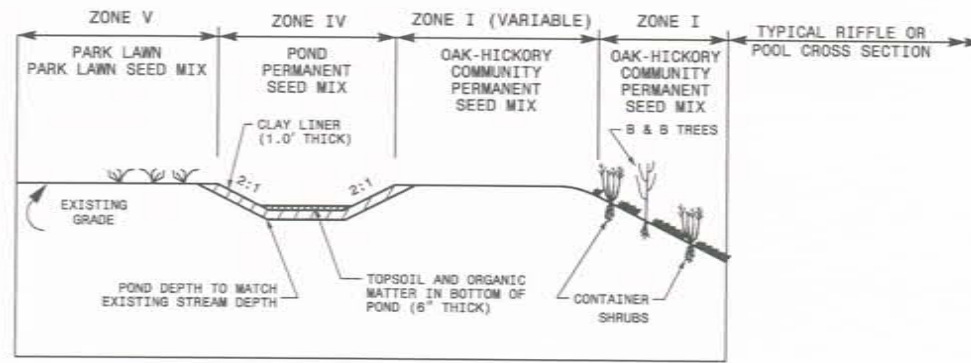
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 CUMBERLAND COUNTY  
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**PLANTING PLAN**

DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	L-1
DRAWING NO	

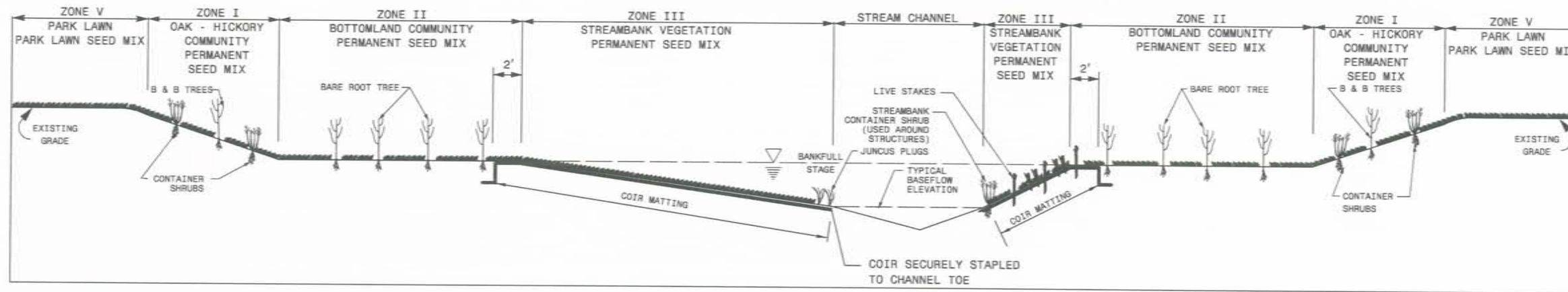
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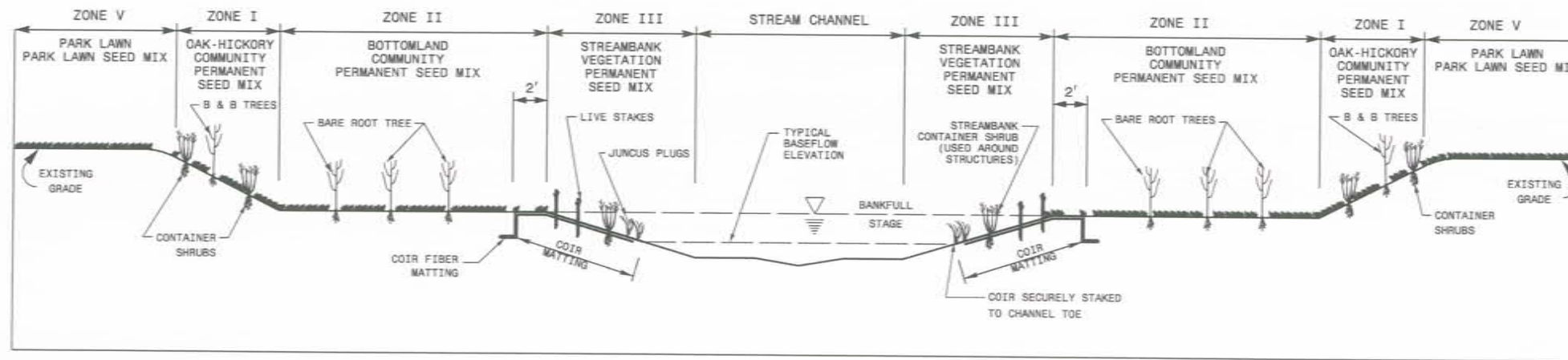
VEGETATION ZONE DETAIL- POND

SCALE: NTS



VEGETATION ZONE DETAIL- POOL

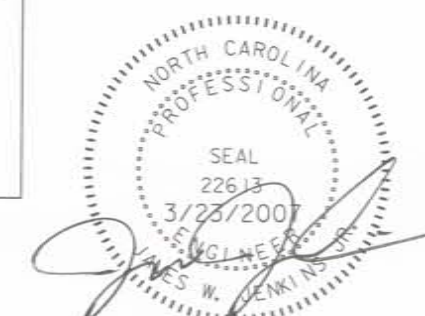
SCALE: NTS



VEGETATION ZONE DETAIL- RIFFLE

SCALE: NTS

1  
L-2 VEGETATION ZONE DETAIL



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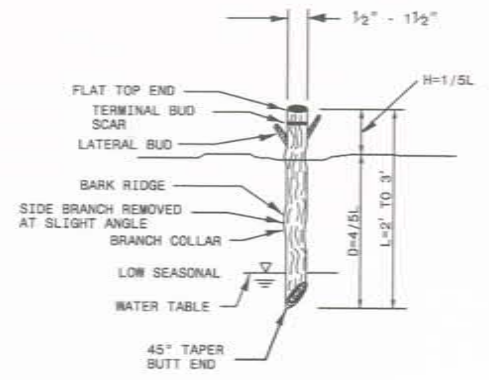
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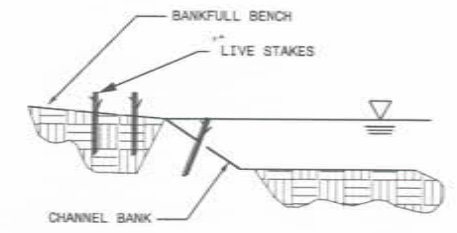
CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY ECOSYSTEM ENHANCEMENT PROGRAM	
VEGETATION DETAILS	
DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	L-2
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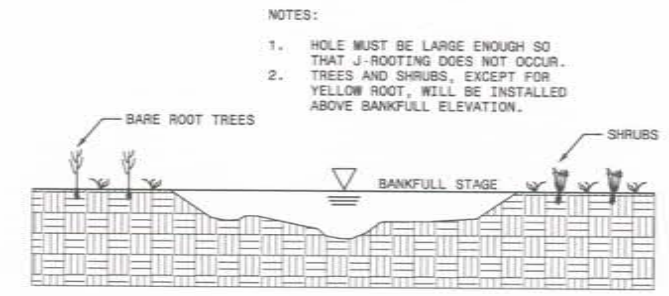




- NOTES:
1. ALL LATERAL BRANCHES SHALL BE TRIMMED TO AVOID DAMAGE TO THE BARK RIDGE AND BRANCH COLLAR.
  2. A MINIMUM OF TWO BUDS (ONE LATERAL PLUS ONE TERMINAL OR TWO TERMINAL) SHALL BE ABOVE THE PLANTING DEPTH.



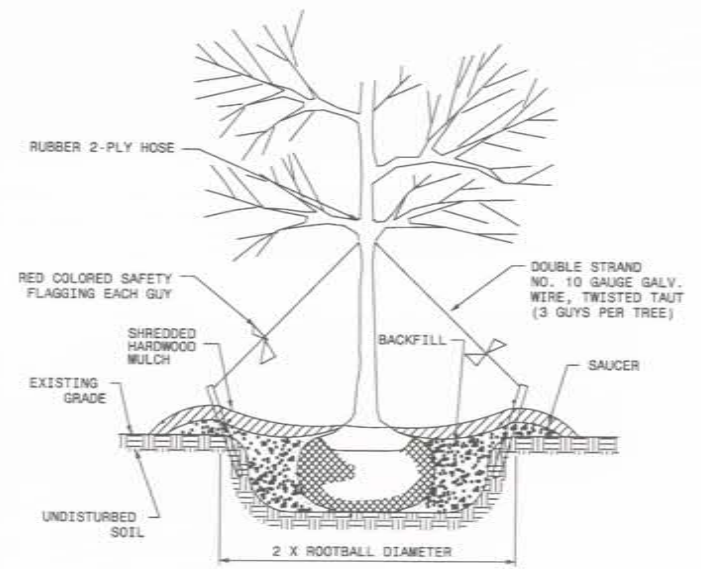
**2**  
L-3  
**LIVE STAKE**  
SCALE: NTS



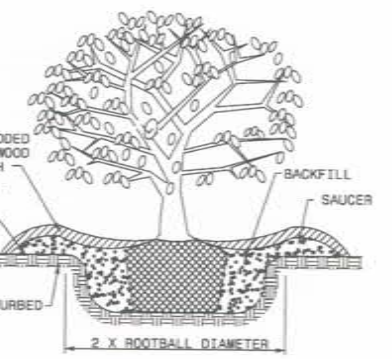
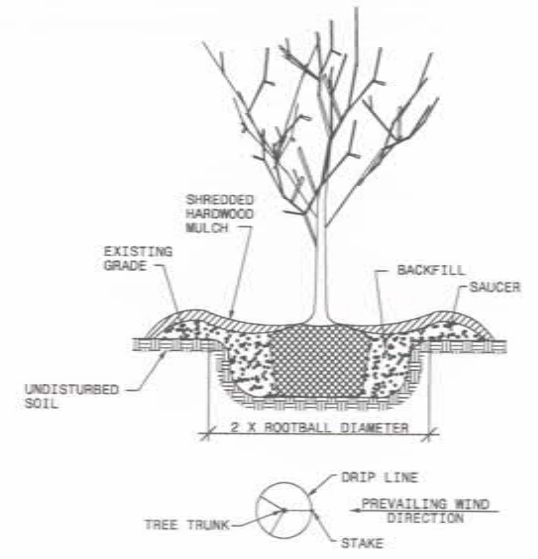
**3**  
L-3  
**BARE ROOT TREE AND SHRUB VEGETATION**  
SCALE: NTS

INSTALLATION OF BARE ROOT TREES AND SHRUBS

BARE ROOT TREES AND SHRUBS SHALL BE INSTALLED IN DESIGNATED AREAS ALONG THE STREAMBANK AS DIRECTED BY THE SPECIFICATIONS. SOIL IN THE AREA OF SHRUB AND TREE PLANTINGS SHALL BE LOOSENED TO A DEPTH OF AT LEAST 5 INCHES. THIS IS NECESSARY ONLY ON COMPACTED SOIL. BARE ROOT VEGETATION MAY BE PLANTED IN HOLES MADE BY A MATTOCK, DIBBLE, PLANTING BAR, OR OTHER MEANS APPROVED BY THE ENGINEER. ROOT STOCK SHALL BE PLANTED IN A VERTICAL POSITION WITH THE ROOT COLLAR APPROXIMATELY 0.5 INCHES BELOW THE SOIL SURFACE. THE PLANTING TRENCH OR HOLE SHALL BE DEEP AND WIDE ENOUGH TO PERMIT THE ROOTS TO SPREAD OUT AND DOWN WITHOUT J-ROOTING. THE PLANT STEM SHALL REMAIN UPRIGHT. SOIL SHALL BE REPLACED AROUND THE TRANSPLANTED VEGETATION AND TAMPED AROUND THE SHRUB OR TREE FIRMLY TO ELIMINATE AIR POCKETS.



**DECIDUOUS TREE PLANTING DETAIL**



**SHRUB PLANTING DETAIL**

- NOTE:
- 1) B&B AND CONTAINER STOCK SHALL MEET THE CRITERIA FOR SIZE, SHAPE AND QUALITY AS PER THE AMERICAN STANDARD FOR NURSERY STOCK BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
  - 2) SHREDDED HARDWOOD MULCH 3 IN. DEEP EXCEPT AT CROWN OF PLANT. FLARE AT CROWN SHOULD BE REVEALED.
  - 3) BACKFILL SHALL CONSIST OF THOROUGHLY BROKEN UP NATIVE SOIL. TOTAL VOLUME OF BACKFILL SHALL BE AMENDED WITH UP TO 1/3 PINE BARK MULCH. PINE BARK MULCH PIECES SHALL BE NO LARGER THAN WHAT PASSES THROUGH A 1 IN. SCREEN. IF ADDITIONAL SOIL IS REQUIRED FOR BACKFILL DUE TO DETRIMENTAL SUBSOIL DRAINAGE CONDITIONS, USE SOIL SIMILAR TO EXISTING NATIVE SOIL. ADDITIONAL SOIL TO BE APPROVED BY GROUNDS MANAGEMENT.
  - 4) MAXIMUM SAUCER HEIGHT IS 6 IN.
  - 5) TOP OF ROOTBALL TO BE RAISED 2-3 IN. ABOVE EXISTING GRADE. FOR B&B PLANTS, NATURAL FIBER BURLAP SHALL BE TURNED DOWN BY 1/3 TOTAL HEIGHT OF ROOTBALL. PLASTIC FIBER BURLAP AND WIRE BASKETS SHALL BE REMOVED TO 2/3 OF TOTAL HEIGHT OF ROOTBALL.
  - 6) CONTRACTOR IS RESPONSIBLE FOR KEEPING THE TREE UPRIGHT AND PLUMB THROUGHOUT THE WARRANTY PERIOD. IF STABILIZATION IS NECESSARY, USE WHITE ARBOR TAPE AND 18-24 IN. WOODEN STAKES WITH HOLES AT TOP TO SECURE TAPE. USING A BOWLINE KNOT, ATTACH TAPE TO THE CROTCH OF THE FIRST SUBSTANTIAL LIMB. INSURE VISIBILITY OF NEW TREE, ORANGE FLAGGING TAPE SHALL BE ATTACHED TO ARBOR TAPE. TAPE SHALL BE REMOVED BY CONTRACTOR AT END OF 1-YR WARRANTY PERIOD OR AS DIRECTED BY GROUNDS MANAGEMENT.
  - 7) USE "BIO-BARRIER" OR EQUIVALENT ACCORDING TO MANUFACTURER'S RECOMMENDATION FOR TREES THAT WILL BE PLANTED WITHIN 10 FT. OF PAVEMENT.
  - 8) CONTRACTOR SHALL WATER AS NEEDED THROUGHOUT THE WARRANTY PERIOD.

SEAL  
2013  
3/23/2007  
ENGINEER  
JAMES W. JENKINS JR.

**4**  
L-3  
**BALL & BURLAP TREE AND CONTAINER SHRUB VEGETATION**  
SCALE: NTS

03/23/07 AS BUILT DRAWINGS

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ISSUED FOR BIDS	JUN	JUL	1/15/04	DATE
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<b>CROSS CREEK STREAM RESTORATION        CUMBERLAND COUNTY        ECOSYSTEM ENHANCEMENT PROGRAM</b>				
<b>VEGETATION DETAILS</b>				
DATE	3/23/2007			
PROJECT NO	57036			
FILENAME				
SHEET NO	L-3			
DRAWING NO				



PLANTING SCHEDULE  
SCALE: NTS

		SCIENTIFIC NAME	COMMON NAME	LS	BR	B&B/ CONT	PLUG	SEED %	REMARKS		
ZONE 1	OAK-HICKORY COMMUNITY	TREES	<i>Quercus falcata</i>	Southern red oak				10	Balled and burlapped or container trees, minimum 1.5" caliper, randomly distributed on 30-ft centers.		
			<i>Quercus alba</i>	White oak				10			
			<i>Quercus velutina</i>	Black oak						10	
			<i>Quercus margarettiae</i>	Sand post oak						10	
			<i>Carya pallida</i>	Sand hickory						10	
		<i>Sassafras albidum</i>	Sassafras					25			
		<i>Cornus florida</i>	Flowering dogwood					25		Randomly place between trees in groups of 3, 5, or 7 on 3 ft centers as directed by engineer. 1 - 3 gallon containers.	
		<i>Symplocos tinctoria</i>	Sweetleaf					160			
		<i>Vaccinium stamineum</i>	Deerberr					160			
		<i>Myrica cerifera</i>	Wax myrtle					160			
<i>Kalmia angustifolia</i>	Sheep-kill					160					
ZONE 2	BOTTOMLAND COMMUNITY	TREES	<i>Lyonia mariana</i>	Stagger-bush				160	Bare root 1/0 seedlings randomly placed on 8-ft centers.		
			<i>Rhododendron atlanticum</i>	Dwarf azalea				160			
			<i>Quercus lyrata</i>	Overcup oak		100					
			<i>Quercus laurifolia</i>	Laurel oak		100					
			<i>Taxodium distichum</i>	Bald cypress		100					
			<i>Populus heterophylla</i>	Swamp cottonwood		100					
			<i>Fraxinus pennsylvanicum</i>	Green ash		100					
			<i>Quercus phellos</i>	Willow oak		100					
			<i>Ulmus americana</i>	American elm		100					
			<i>Ilex decidua</i>	Possumhaw		200					
ZONE 3	STREAMBANK VEGETATION	LIVE STAKES	<i>Carpinus caroliniana</i>	Ironwood				200	One stake per 3 linear feet in rows spaced one foot apart. Pools 3 rows, outside bend only. Riffles, 2 rows, both banks. Random species distribution.		
			<i>Diospyros virginiana</i>	Persimmon				100			
			<i>Comus amomum</i>	Silky dogwood	650						
			<i>Viburnum dentatum</i>	Arrowwood	650						
		SHRUBS	<i>Sambucus canadensis</i>	Elderberry	650						Install upstream and downstream of rock structures where sill intersects bank. 1-3 gallon containers.
			<i>Salix caroliniana</i>	Carolina willow	650						
			<i>Alnus serrulata</i>	Tag alder			25				
		PLUGS	<i>Leucothoe axillaris</i>	Dog-hobble			25				Plugs at baseflow elevation on 1ft centers in riffle sections.
			<i>Sambucus canadensis</i>	Elderberry			25				
		ZONE 4	POND	TREES	<i>Juncus acuminatus</i>	a rush				1100	
<i>Juncus effusus</i>	Soft rush						1100				
<i>Taxodium distichum</i>	Bald cypress					100					
ZONE 5	PARK LAWN	SEED	<i>Fraxinus pennsylvanicum</i>	Green ash			100		Apply at 40 lbs/acre to disturbed areas outside of easement (apply Mar - Sept for best survival)		
			<i>Nyssa biflora</i>	Swamp blackgum		100					
			<i>Erremochloa sp.</i>	Centipede grass							
ZONE 1	PERMANENT SEED MIX A	<i>Panicum virgatum</i>	Switchgrass				33	Apply at 15 lbs/acre in Zone 1.			
		<i>Panicum amarum var. amarulum</i>	Coastal panic grass				33				
		<i>Eragrostis curvula</i>	Weeping lovegrass				33				
ZONES 2-4	PERMANENT SEED MIX B	<i>Saururus cernuus</i>	Lizard's-tail				20	Apply at 15 lbs/acre in Zones 2, 3, & 4.			
		<i>Boehmeria cylindrica</i>	False stinging-nettle				20				
		<i>Chasmanthium laxum</i>	Slender spikegrass				20				
		<i>Polygonum persicaria</i>	Lady's thumb				20				
		<i>Sagittaria latifolia</i>	Arrowhead				20				
ZONES 1-5	TEMP SEED MIX. WINTER	<i>Hordeum sp.</i>	Barley				50	Winter - Apply at 30 lbs/acre to all disturbed areas in Zones 1-5.			
		<i>Secale cereale</i>	Winter rye				50				
	TEMP SEED MIX. SUMMER	<i>Panicum ramosum</i>	Brown-top millet				50		Summer - Apply at 30 lbs/acre to all disturbed areas in Zones 1-5.		
		<i>Pennisetum glaucum</i>	pearl millet				50				



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NO	ISSUED FOR	DATE
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**EARTH TECH**  
 70 Corporate Center Drive, Suite 475 Raleigh, NC 27607  
 Phone: (919) 854-6200 Fax: (919) 854-6259

CROSS CREEK STREAM RESTORATION CUMBERLAND COUNTY ECOSYSTEM ENHANCEMENT PROGRAM	
<b>VEGETATION DETAILS</b>	
DATE	3/23/2007
PROJECT NO	57036
FILENAME	
SHEET NO	L-4
DRAWING NO	



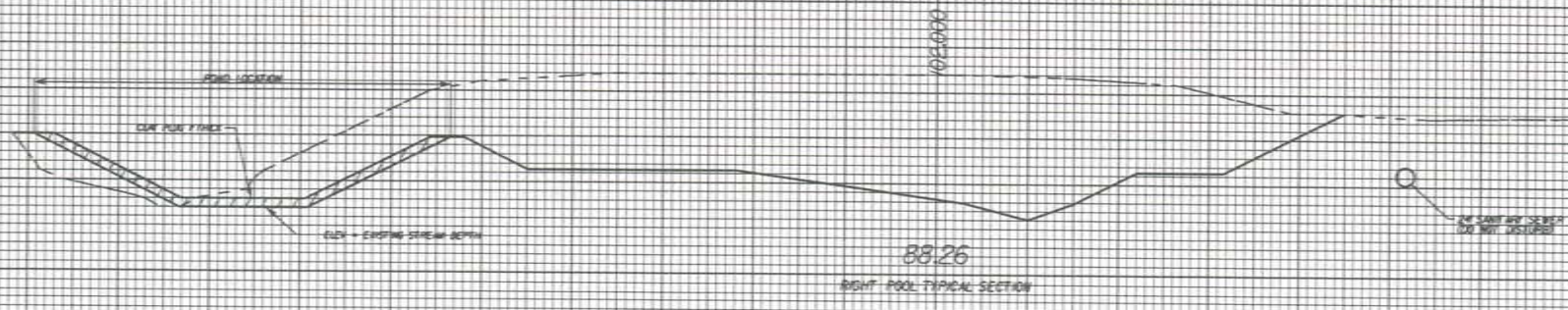
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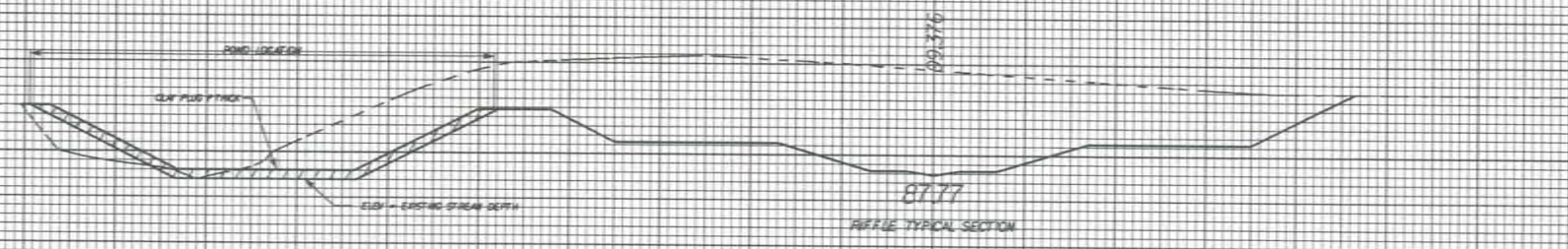
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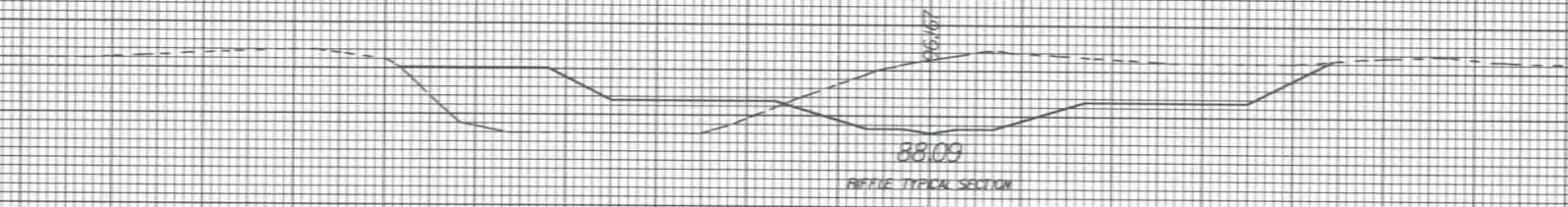
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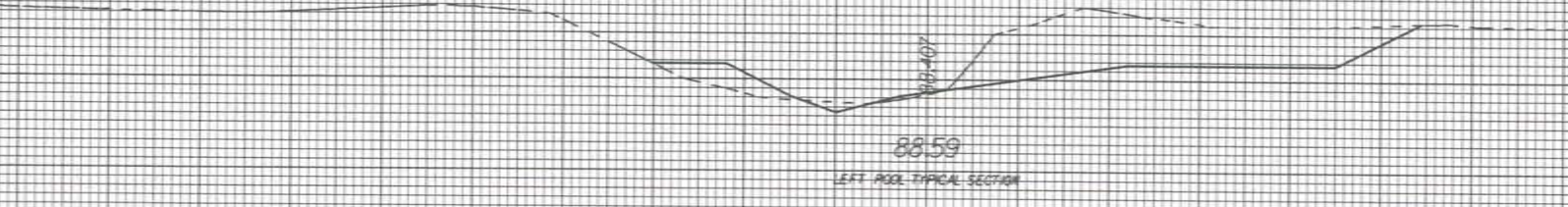
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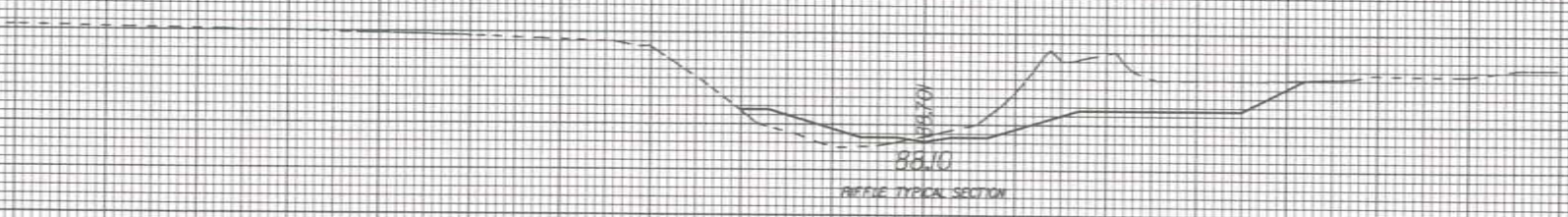
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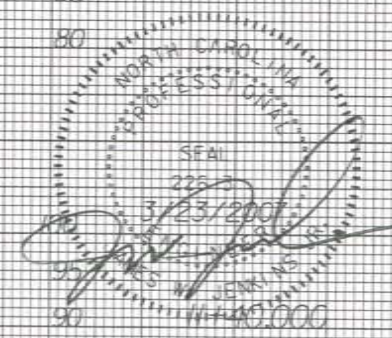
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11+40.000



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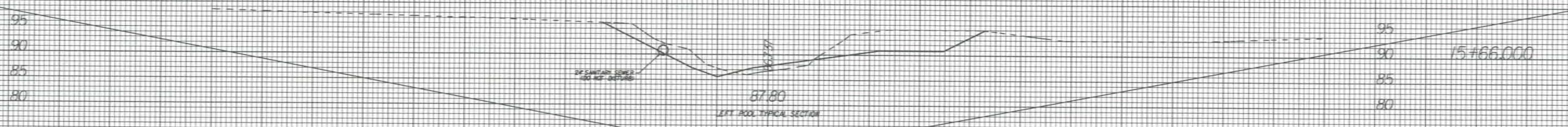
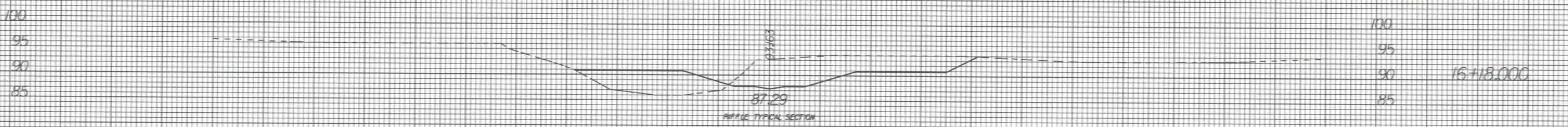
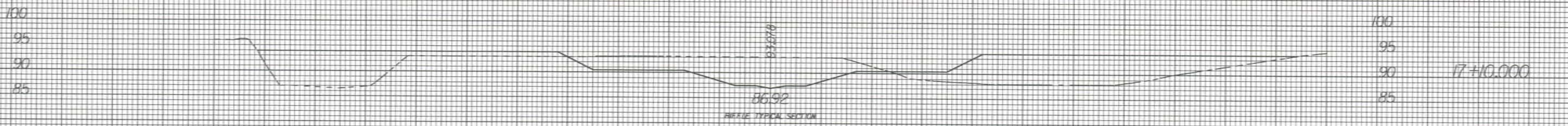
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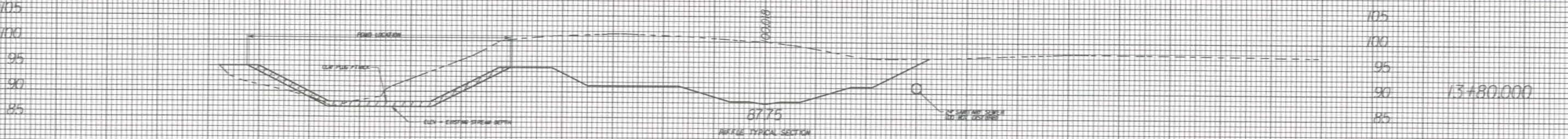
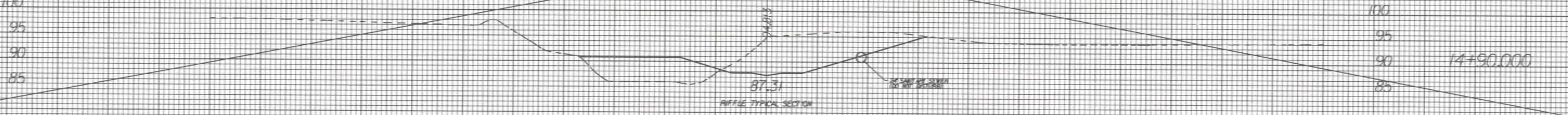


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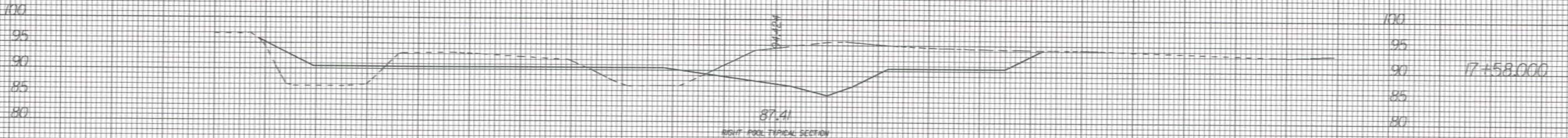
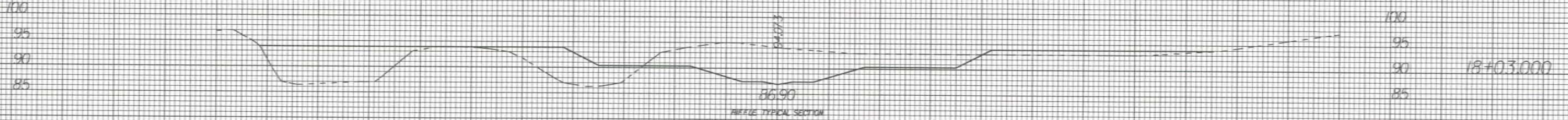
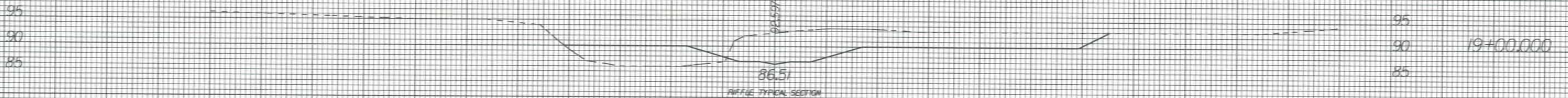
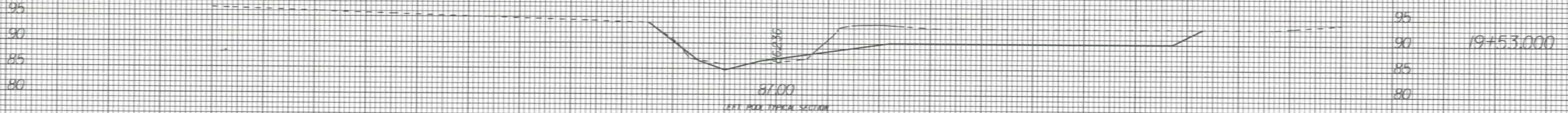
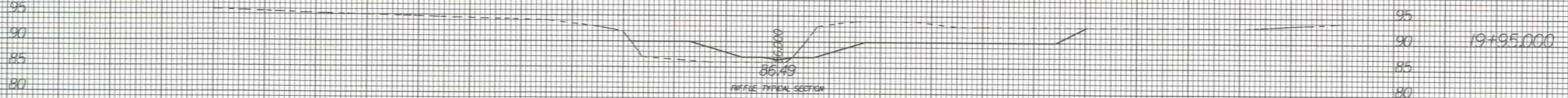
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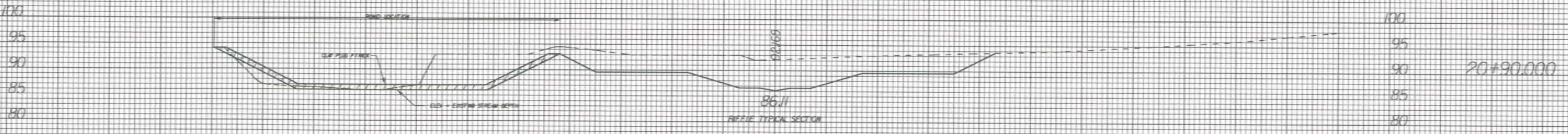
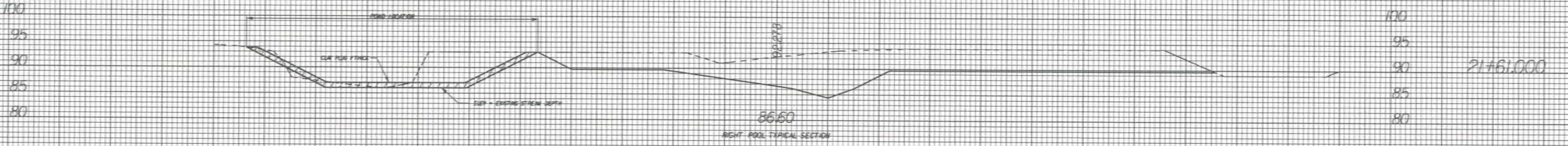
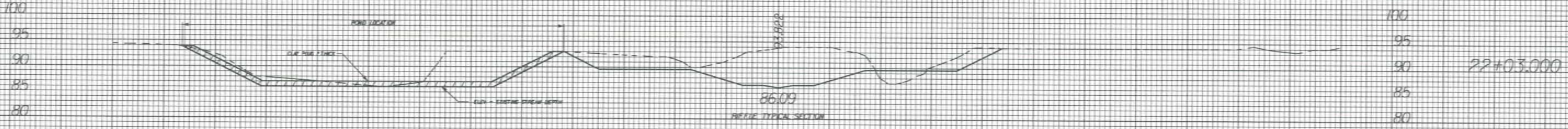
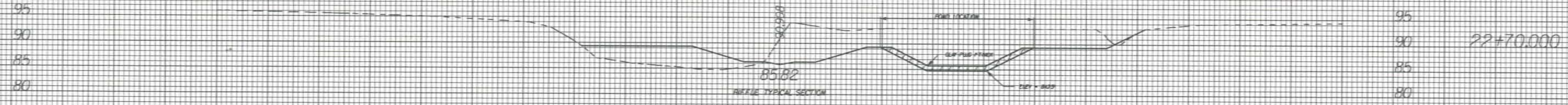
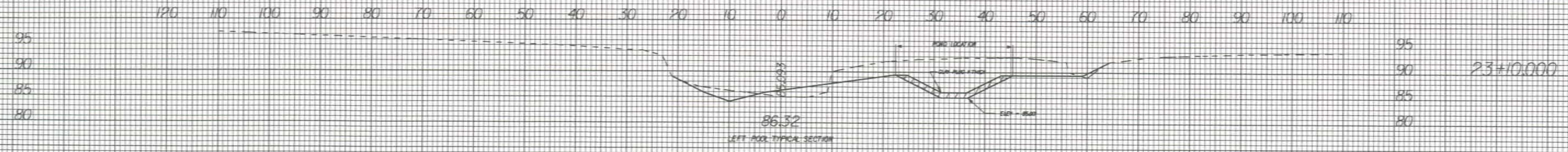
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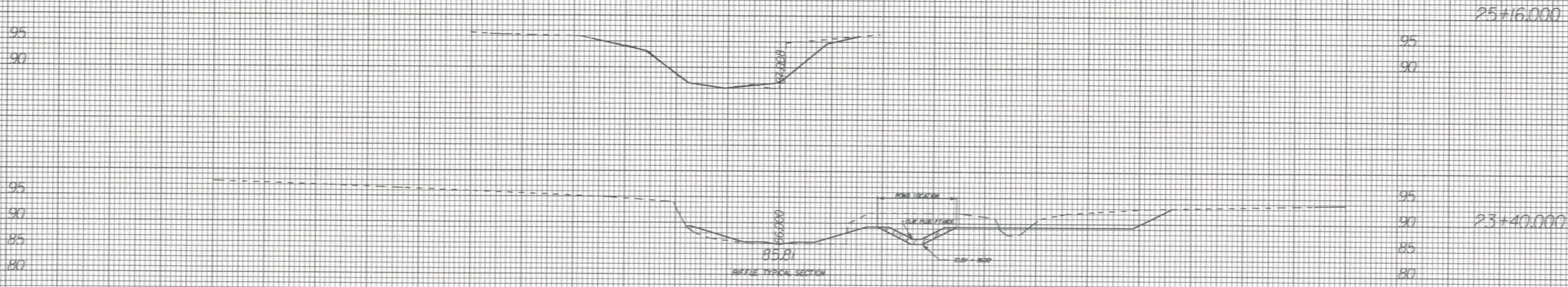
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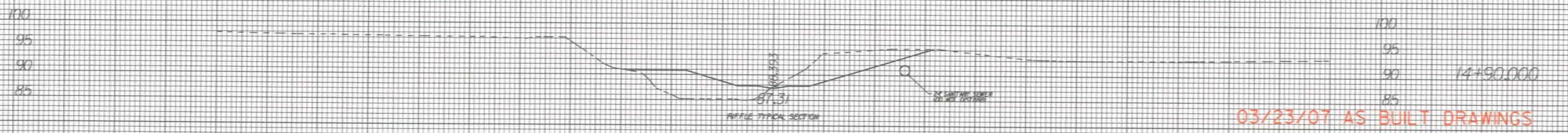
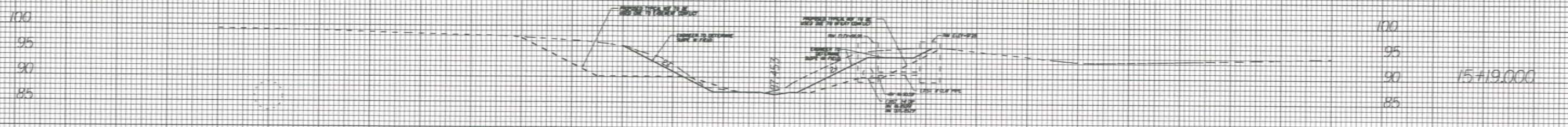
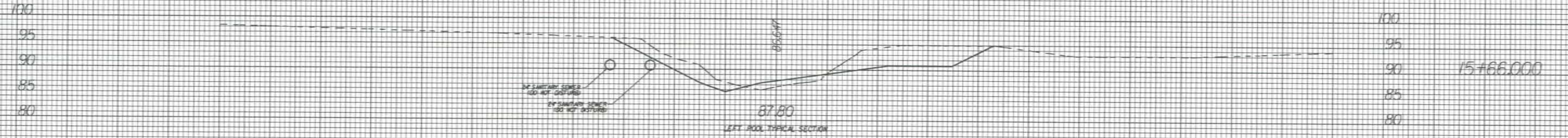
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100  
95  
90  
85

12+60.000

85.621  
88.10  
RIFFLE TYPICAL SECTION

100  
95  
90  
85

100  
95  
90  
85

11+82.000

84.667  
88.55  
RIFFLE TYPICAL SECTION

100  
95  
90  
85  
80

100  
95  
90  
85  
80

11+16.000

89.900  
88.87  
LEFT POOL TYPICAL SECTION

100  
95  
90  
85

100  
95  
90  
85

10+70.000

89.000  
88.59  
RIFFLE TYPICAL SECTION

100  
95  
90  
85

100  
95  
90  
85

10+00.000

89.000  
RIFFLE TYPICAL SECTION

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100  
95  
90  
85  
80

105  
100  
95  
90  
85  
80

14+50.000

88.01  
LEFT POOL TYPICAL SECTION

100  
95  
90  
85

100  
95  
90  
85

14+09.000

87.72  
RIGHT POOL TYPICAL SECTION

100  
95  
90  
85

100  
95  
90  
85

13+51.000

88.06  
RIGHT POOL TYPICAL SECTION

105  
100  
95  
90  
85  
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105  
100  
95  
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13+13.000

88.38  
RIGHT POOL TYPICAL SECTION

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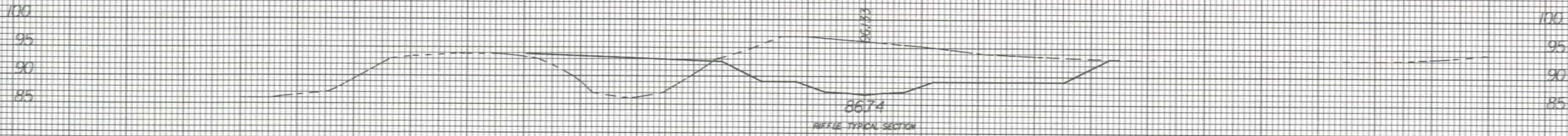
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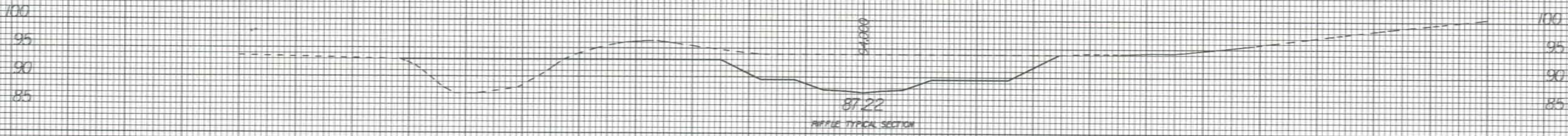


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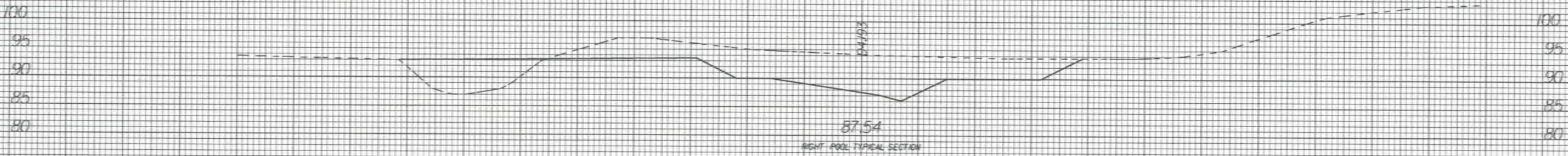
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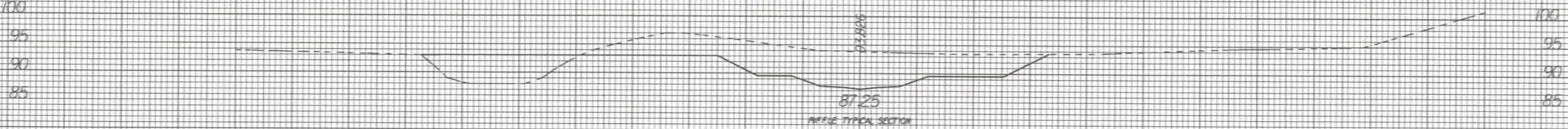
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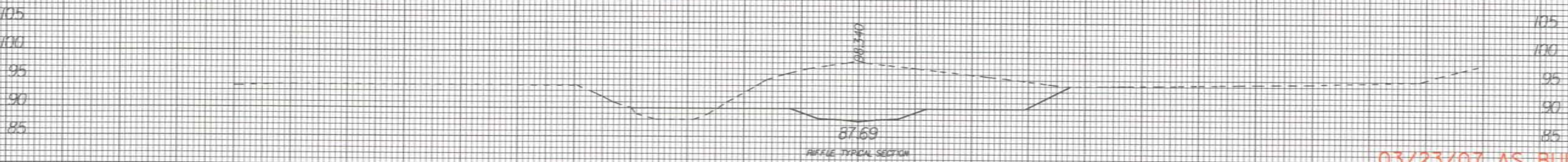
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16+01.000



15+60.000



14+84.000

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