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09.08/99

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

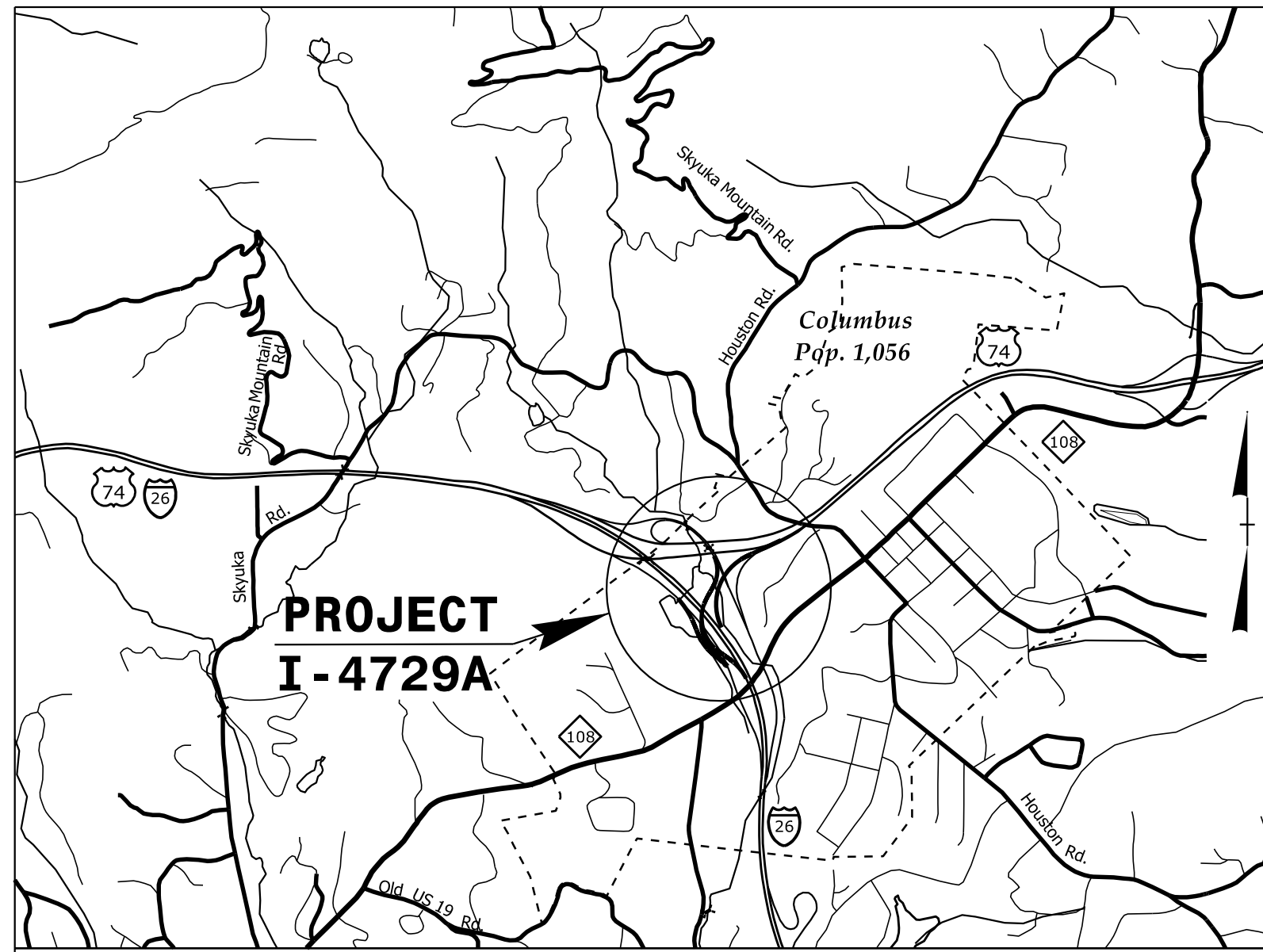
POLK COUNTY

LOCATION: I-26 /US 74 INTERCHANGE MODIFICATION IN THE TOWN OF COLUMBUS

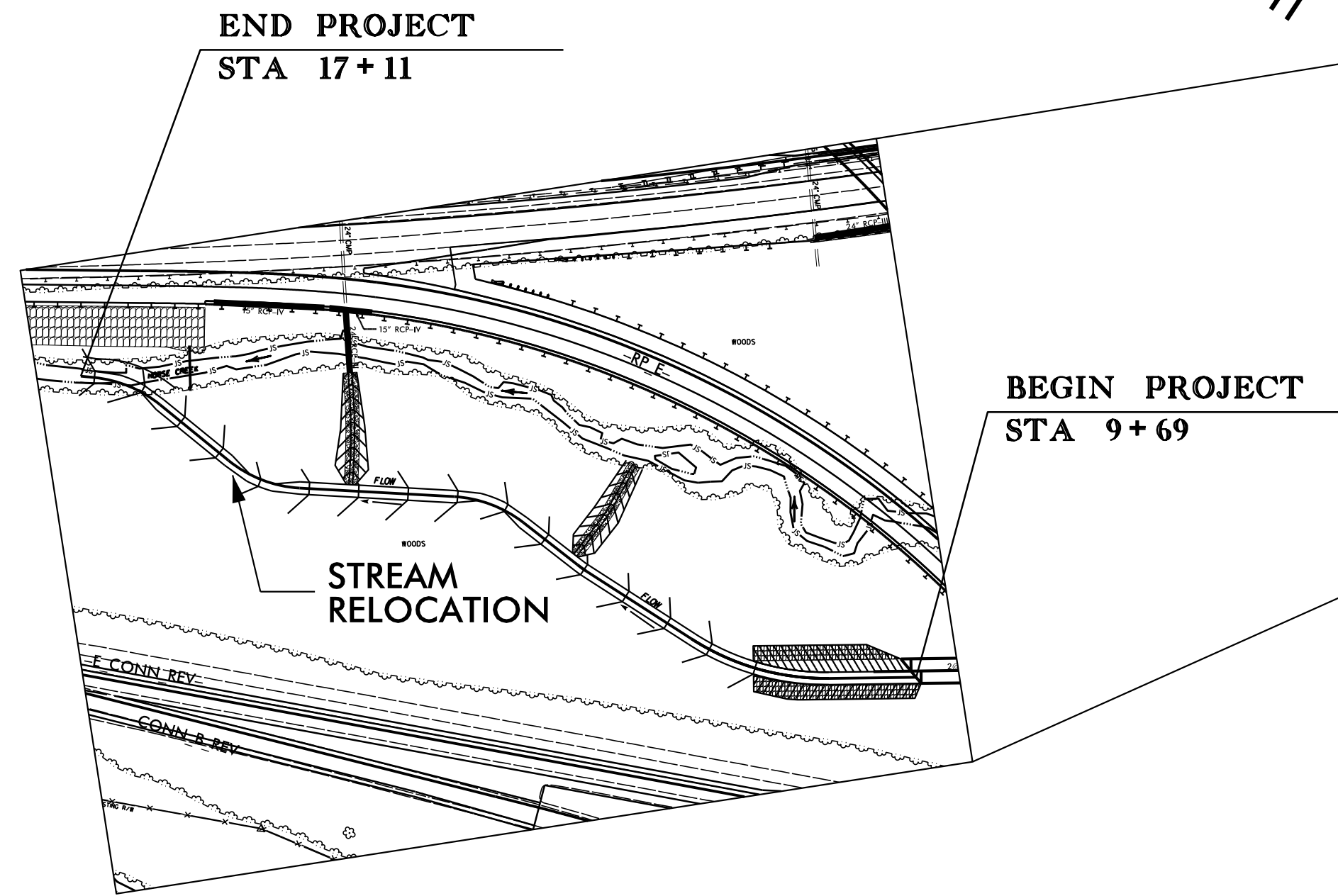
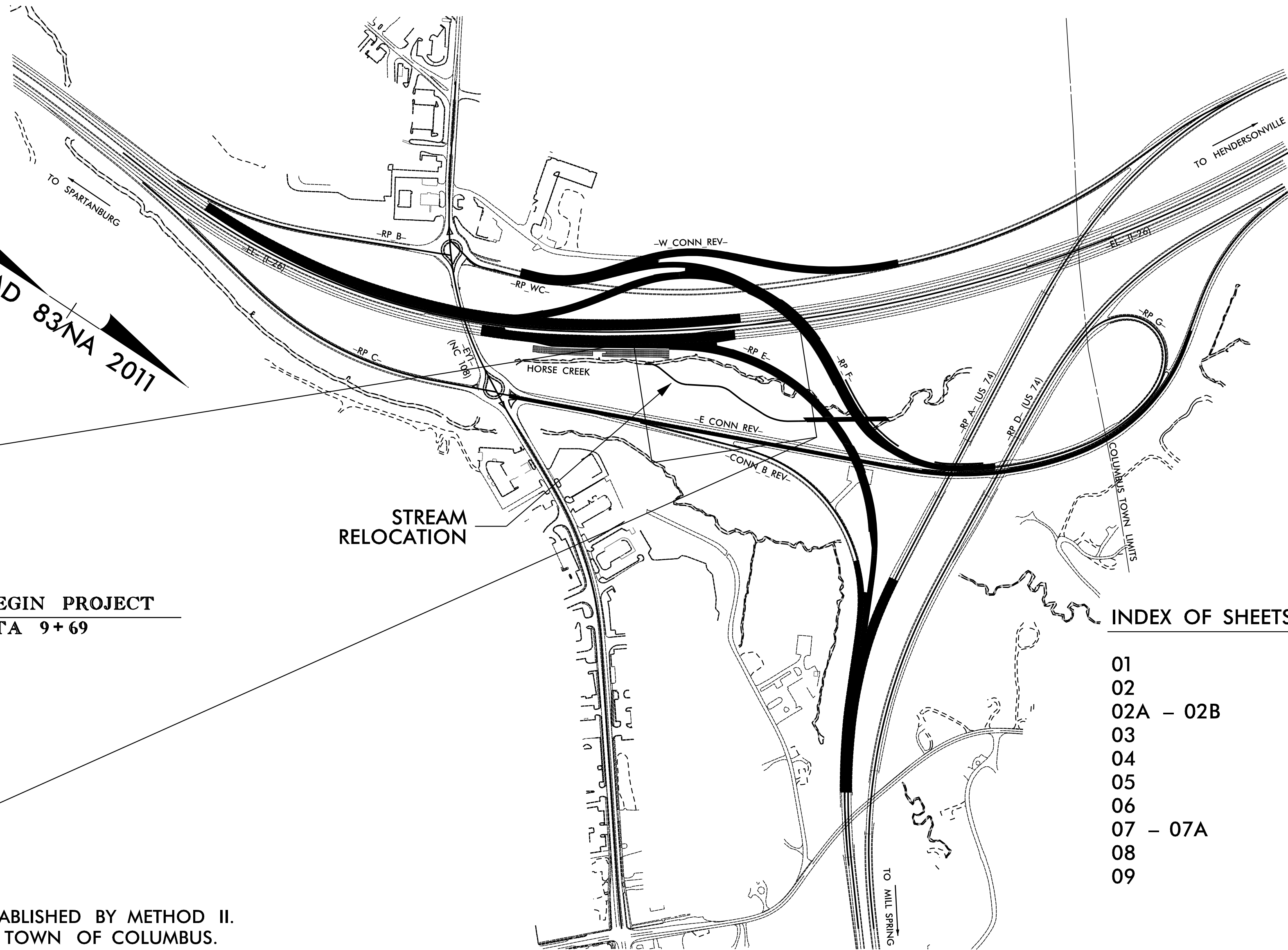
TYPE OF WORK: STREAM RELOCATION (GRADING & PLANTING)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.
N.C.	I-4729A	STRM 01
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34243.1.3	IMS-26-1(66)36	PE
34243.2.3	IMS-26-1(66)36	ROW
34243.3.3	IMS-26-1(66)36	CONST

TIP PROJECT: I-4729A



VICINITY MAP



INDEX OF SHEETS

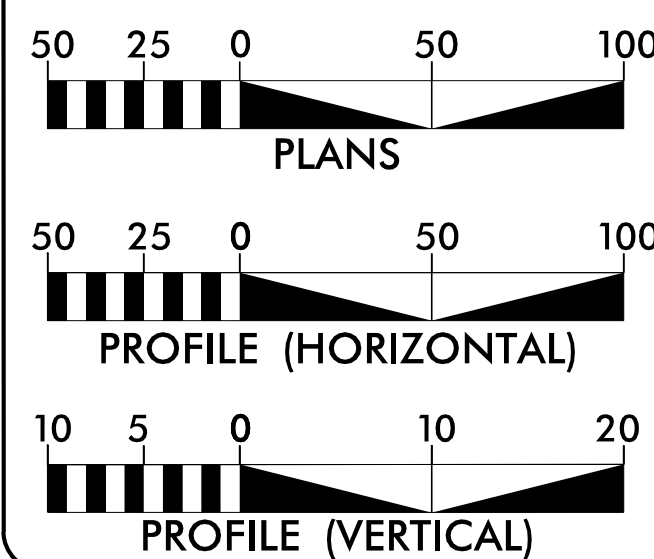
- 01 TITLE SHEET
- 02 TYPICALS
- 02A - 02B DETAILS
- 03 HORIZONTAL ALIGNMENT
- 04 PLAN
- 05 PROFILE
- 06 CROSS SECTIONS
- 07 - 07A PLANTING DETAILS
- 08 PLANTING PLAN
- 09 MONITORING PLAN

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II. THIS PROJECT IS LOCATED WITHIN THE MUNICIPAL BOUNDRIES OF THE TOWN OF COLUMBUS.

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CONTRACT:

GRAPHIC SCALES



PROJECT LENGTH

LENGTH OF TIP PROJECT I-4729A
STREAM RELOCATION= 742 LF (0.14 MI.)

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



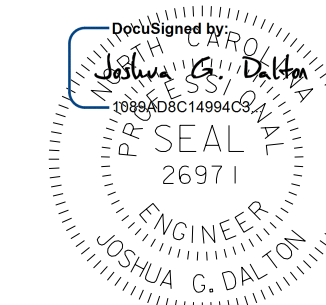
2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JULY 14, 2017

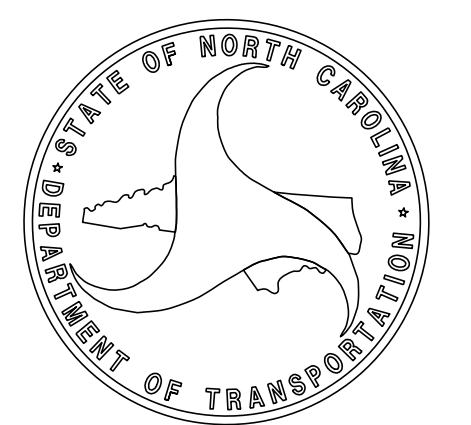
LETTING DATE:
SEPTEMBER 19, 2017

JOSHUA G. DALTON, PE
PROJECT ENGINEER

HYDRAULICS ENGINEER

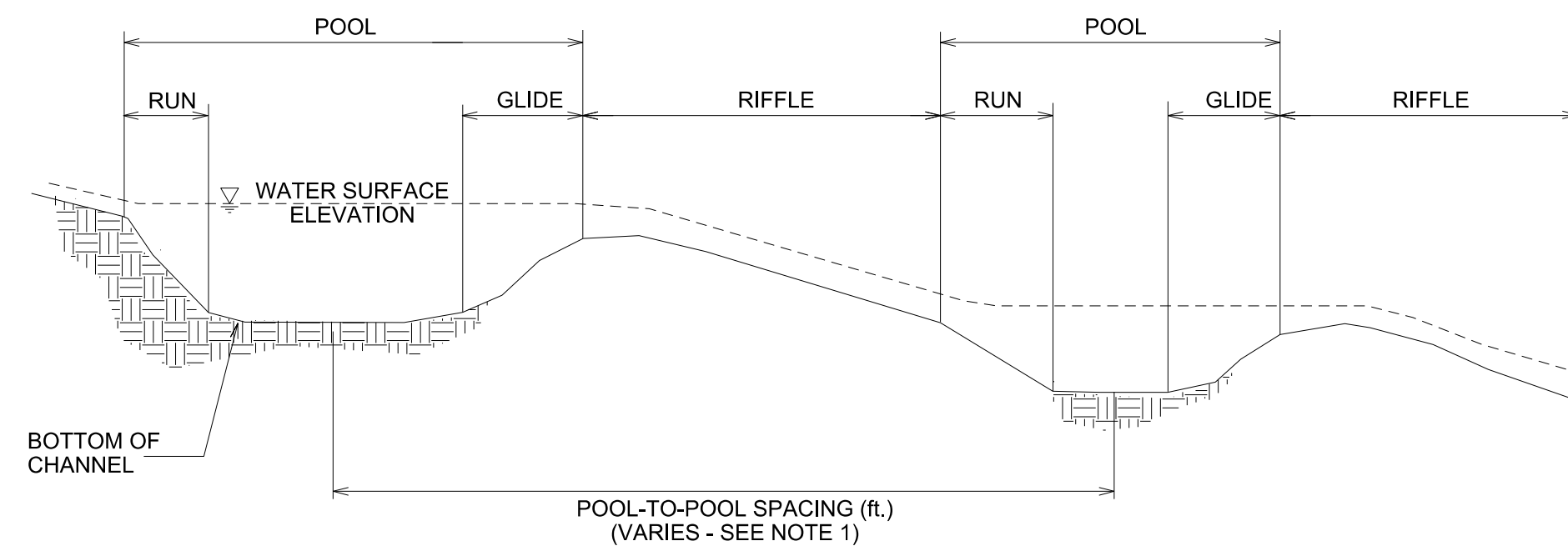


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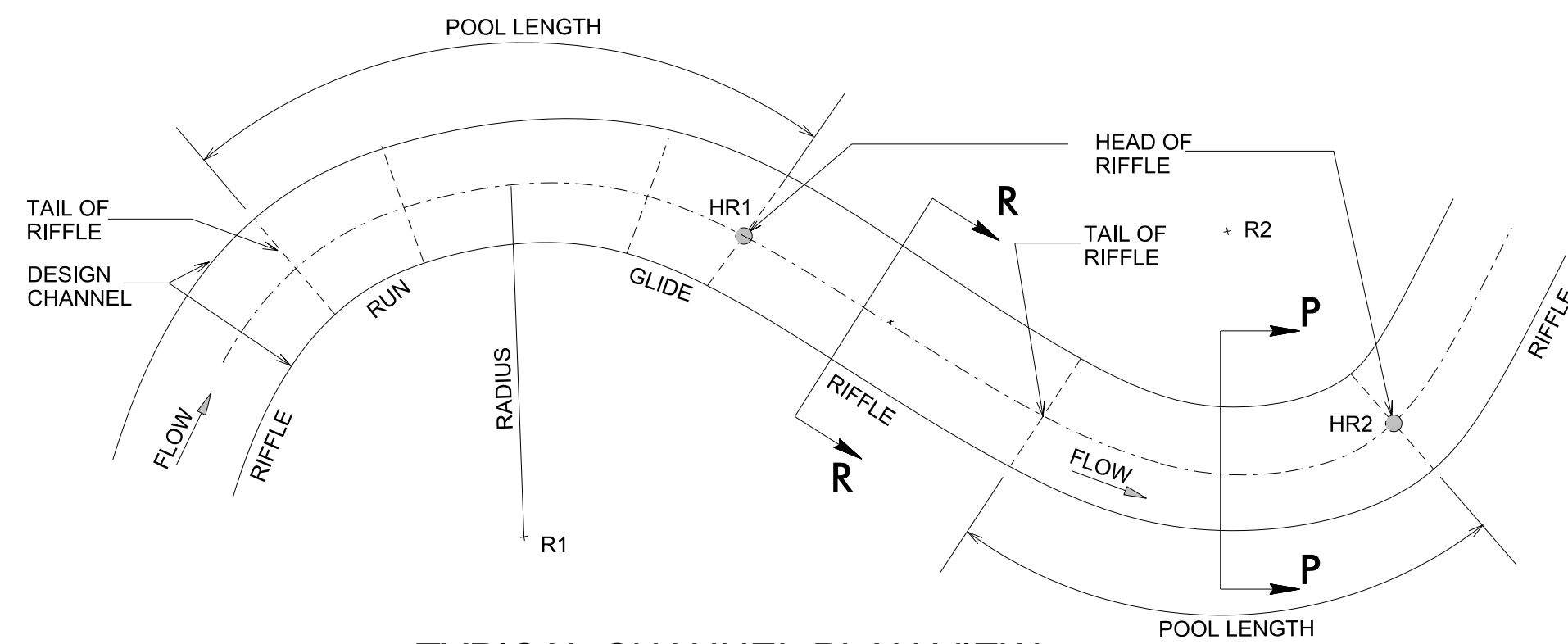
PROJECT REFERENCE NO. 1-4729A	SHEET NO. STRM 02
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



TYPICAL CHANNEL PROFILE

NOTES:

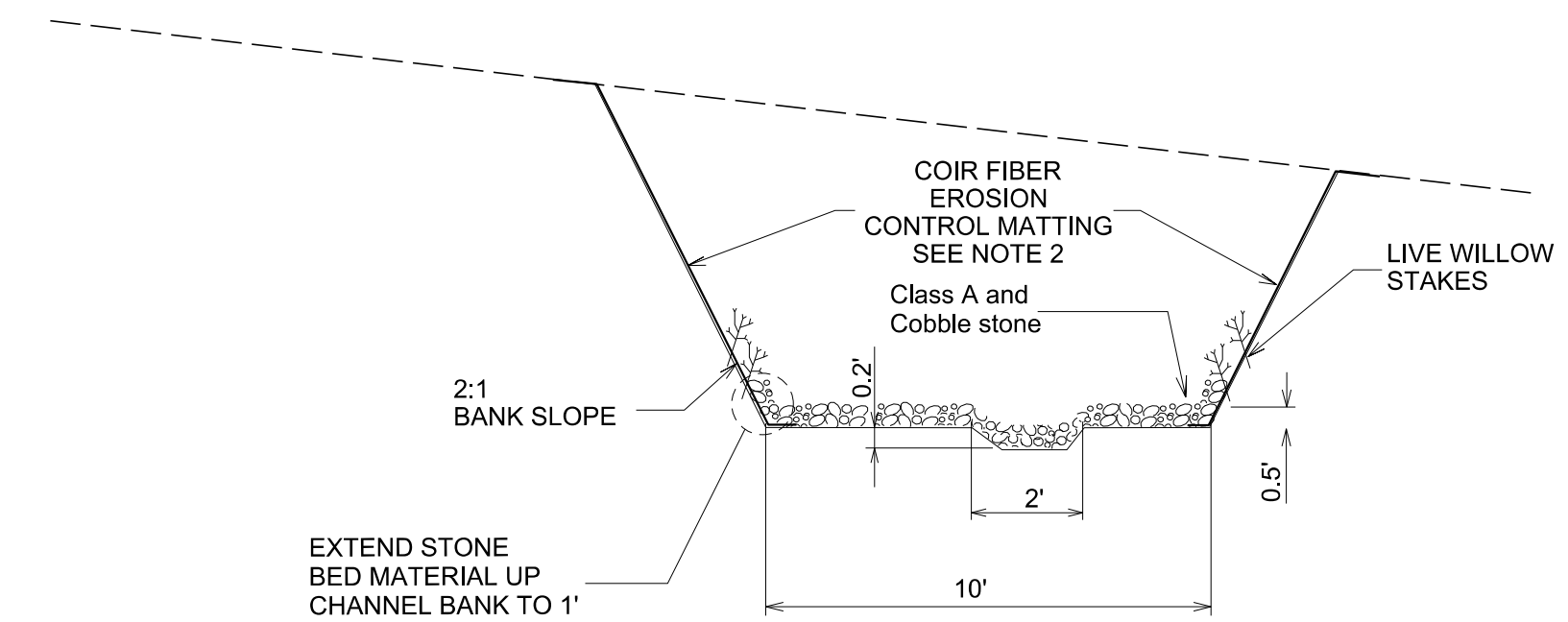
1. POOL-TO-POOL SPACING IS MEASURED FROM CENTER OF POOL BEND TO CENTER OF POOL BEND.



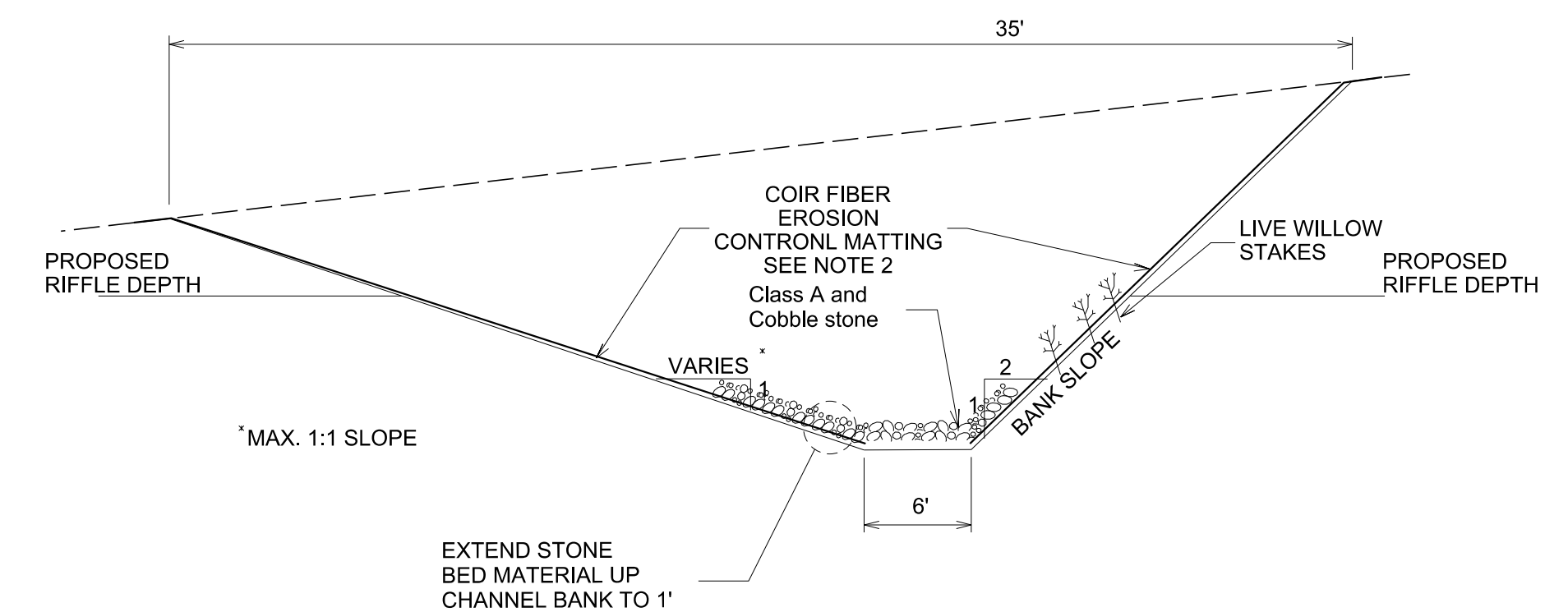
TYPICAL CHANNEL PLAN VIEW

CHANNEL PLAN VIEW NOTES:

1. THE CONTRACTOR SHALL LAYOUT THE CHANNEL ALIGNMENT BY LOCATING THE RADII AND SCRIBING THE CENTER LINE FOR EACH POOL BEND. THE CONNECTING TANGENT SECTIONS SHALL COMPLETE THE LAYOUT OF THE CHANNEL.
2. FIELD ADJUSTMENTS OF THE ALIGNMENT MAY BE REQUIRED TO SAVE TREES OR AVOID OBSTACLES. THE STAKE-OUT SHALL BE APPROVED BY THE CONSTRUCTION MANAGER BEFORE CONSTRUCTION OF THE CHANNEL.



TYPICAL RIFFLE CROSS-SECTION (R-R)

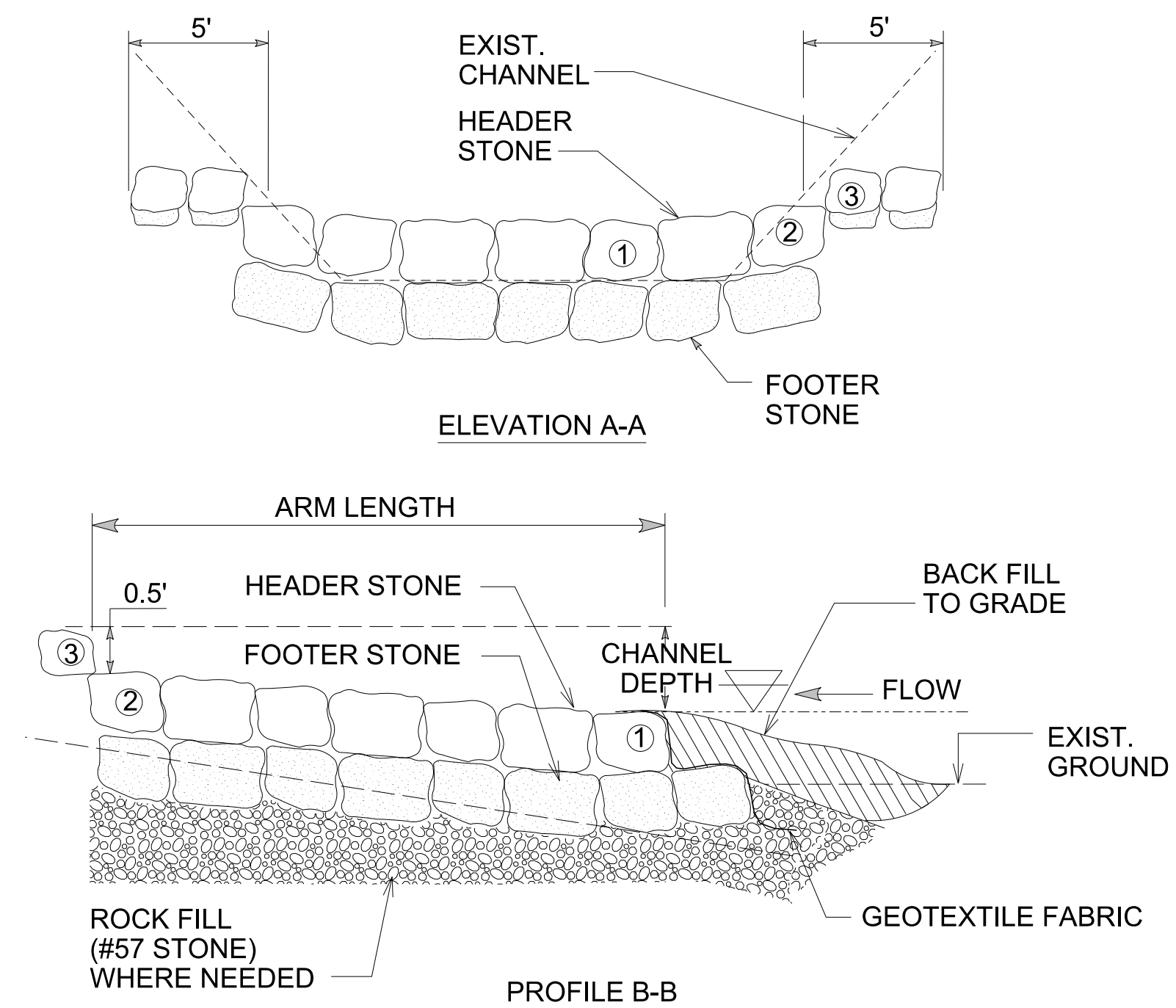
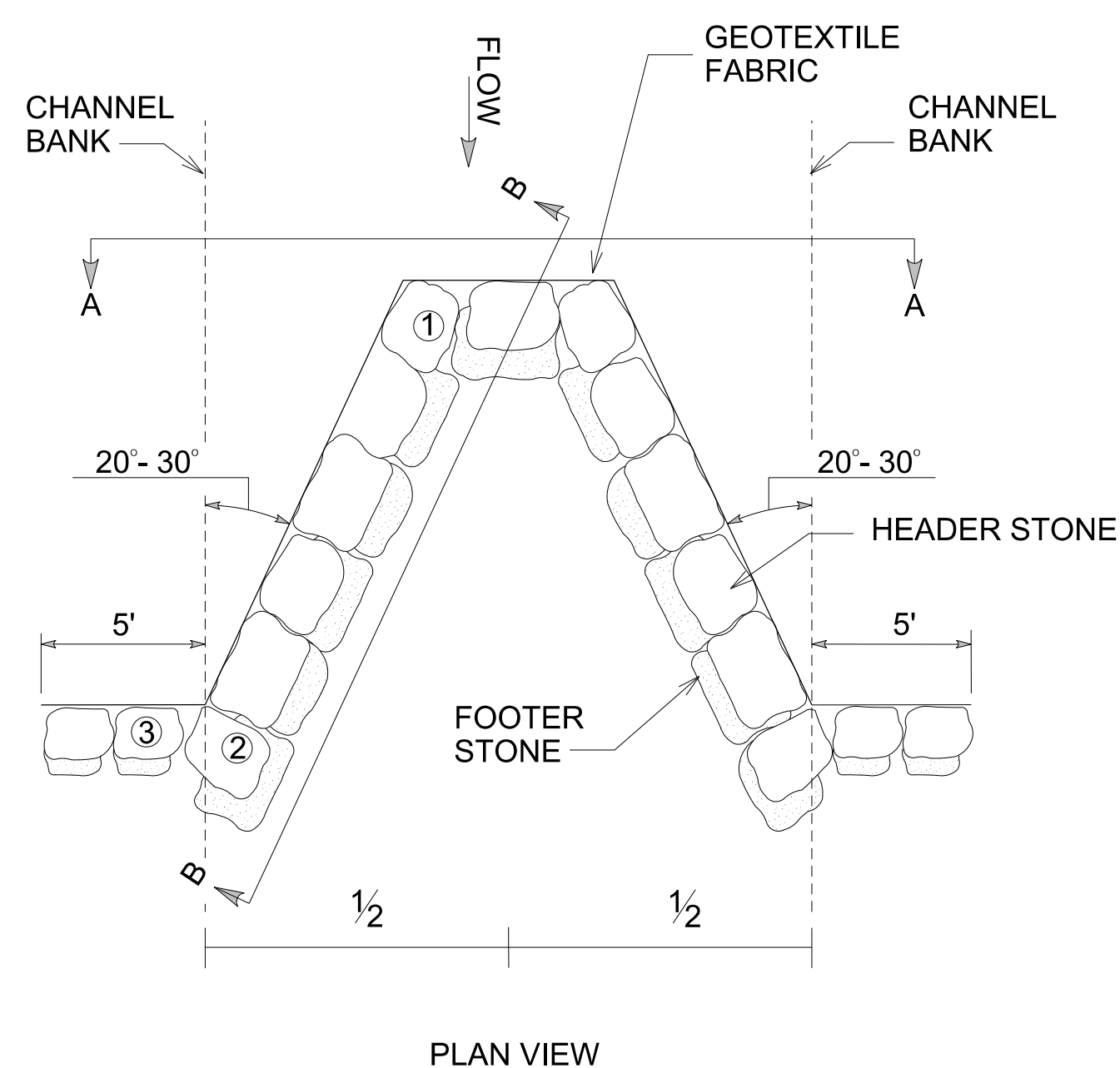


TYPICAL POOL CROSS-SECTION (P-P)

CHANNEL CONSTRUCTION NOTES:

1. MATERIAL EXCAVATED FROM CHANNEL AND FLOODPLAIN SHALL BE USED TO BACKFILL EXISTING CHANNEL.
2. BANK PROTECTION SHALL CONSIST OF MEDIUM WEIGHT WOVEN COIR FIBER MATTING, AND PLACED TO THE TOP OF BANK. (SEE DETAIL COIR FIBER MATTING, SHEET STRM 07A)
3. THE CONTRACTOR SHALL SUPPLY NATURAL BED MATERIAL FOR THE ENTIRE BED LENGTH OF EACH RIFFLE AND POOL SECTION. NATURAL BED MATERIAL SHALL CONSIST OF COBBLE-SIZED (2"-6") MATERIAL MIXED WITH GRAVEL-SIZED (0.6"-1.0") MATERIAL AND CLASS "B"-SIZED (5"-12") MATERIAL, OR AN EQUIVALENT MIX OF MATERIAL.

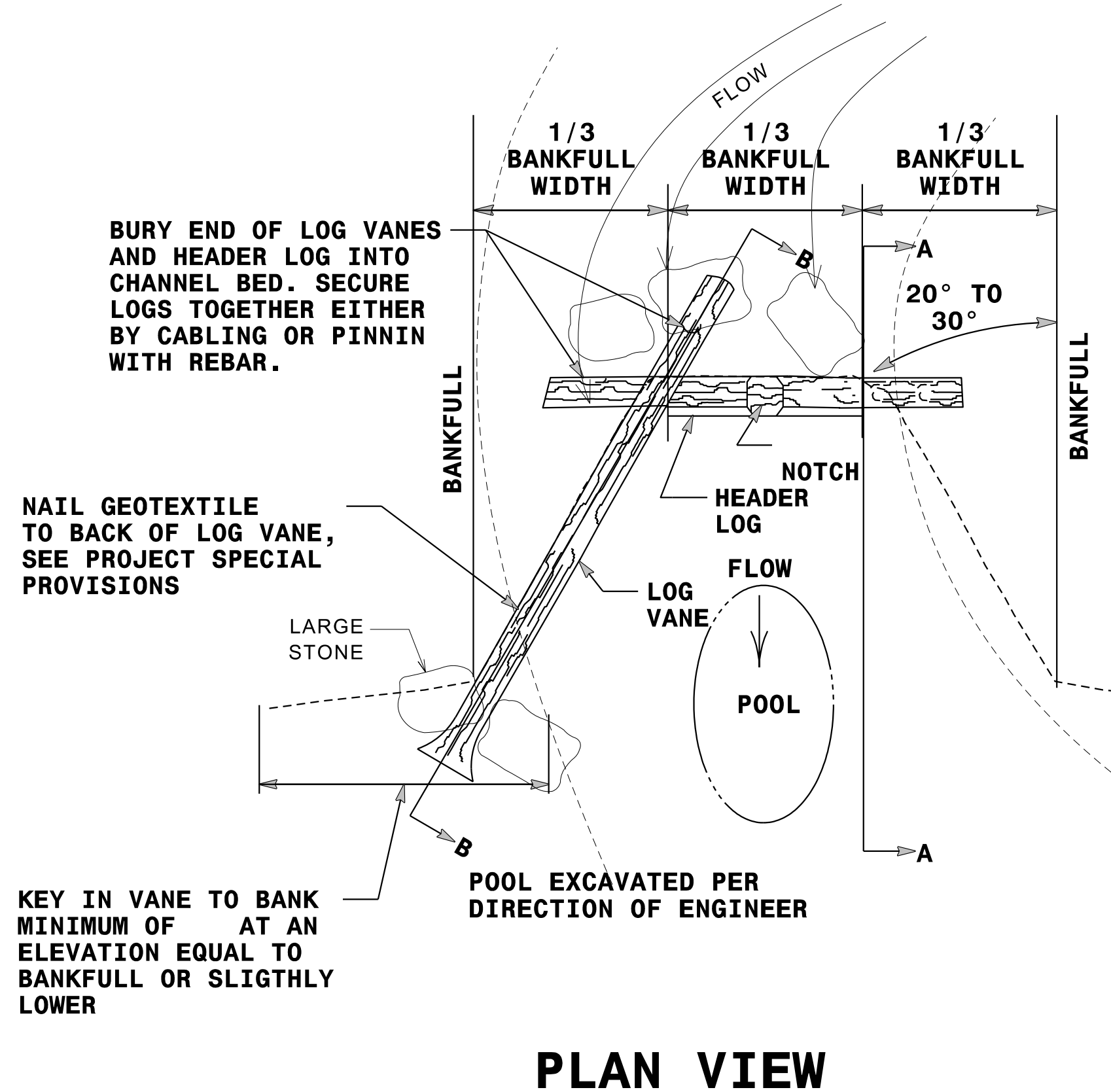
NOTE:
HEADER AND FOOTER STONES ARE LARGE, ANGULAR BOULDERS
MEASURING A MINIMUM OF 24" ALONG THE SHORTEST DIMENSION.



NOTE:
GEOTEXTILE FABRIC TOED IN AND DRAPED
ON UPSTREAM SIDE OF LOG VANE
PRIOR TO BACKFILL.

TYPICAL CROSS-VANE

PROJECT REFERENCE NO. 1-4729A	SHEET NO. STRM 02A
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



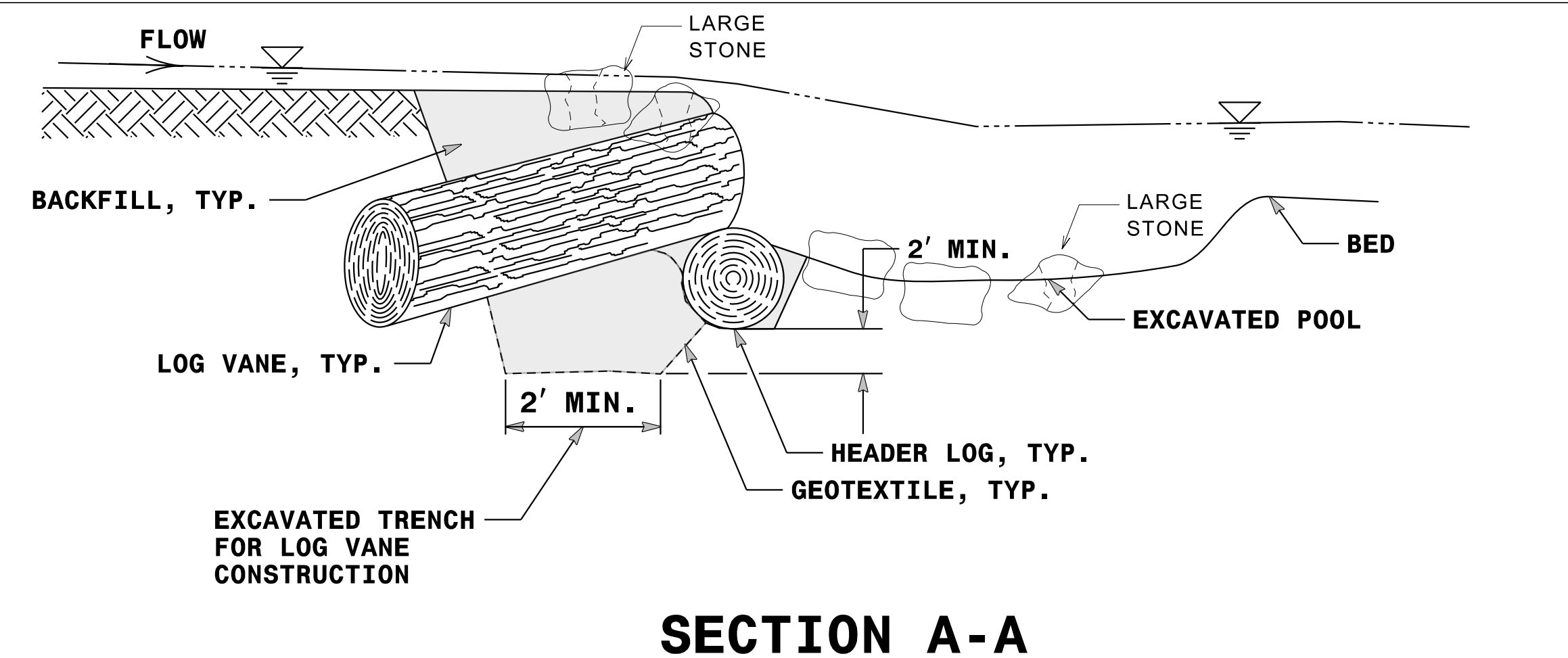
BURY END OF LOG VANES
AND HEADER LOG INTO
CHANNEL BED. SECURE
LOGS TOGETHER EITHER
BY CABLING OR PINNIN
WITH REBAR.

NAIL GEOTEXTILE
TO BACK OF LOG VANE,
SEE PROJECT SPECIAL
PROVISIONS

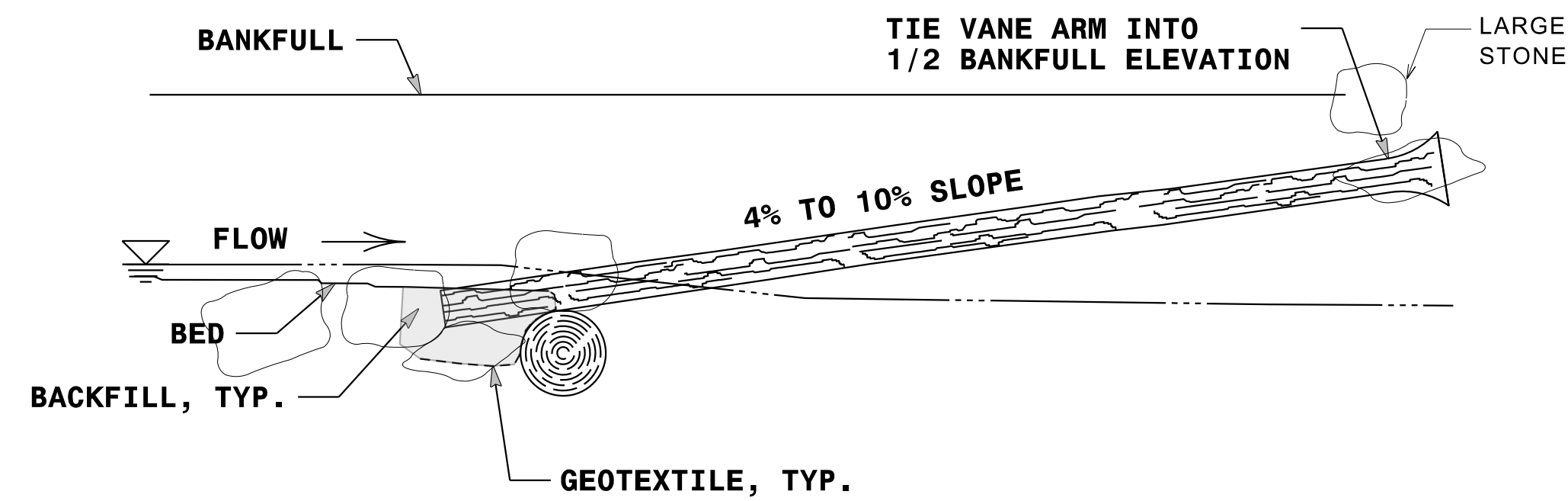
KEY IN VANE TO BANK
MINIMUM OF AT AN
ELEVATION EQUAL TO
BANKFULL OR SLIGHTLY
LOWER

POOL EXCAVATED PER
DIRECTION OF ENGINEER

PLAN VIEW



SECTION A-A



SECTION B-B

- NOTES:
- 1) DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO BANKFULL.
 - 2) DO NOT EXCAVATE POOL TOO CLOSE TO FOOTER BOULDERS.
 - 3) CLASS "A" STONE CAN BE USED TO REDUCE VOIDS BETWEEN HEADERS AND FOOTERS.
 - 4) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.
 - 5) POOL DEPTH SHOULD BE 2 TO 3 TIMES BANKFULL DEPTH.

TYPICAL LOG VANE

PROJECT REFERENCE NO. 1-4729A	SHEET NO. STRM 02B
RW SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

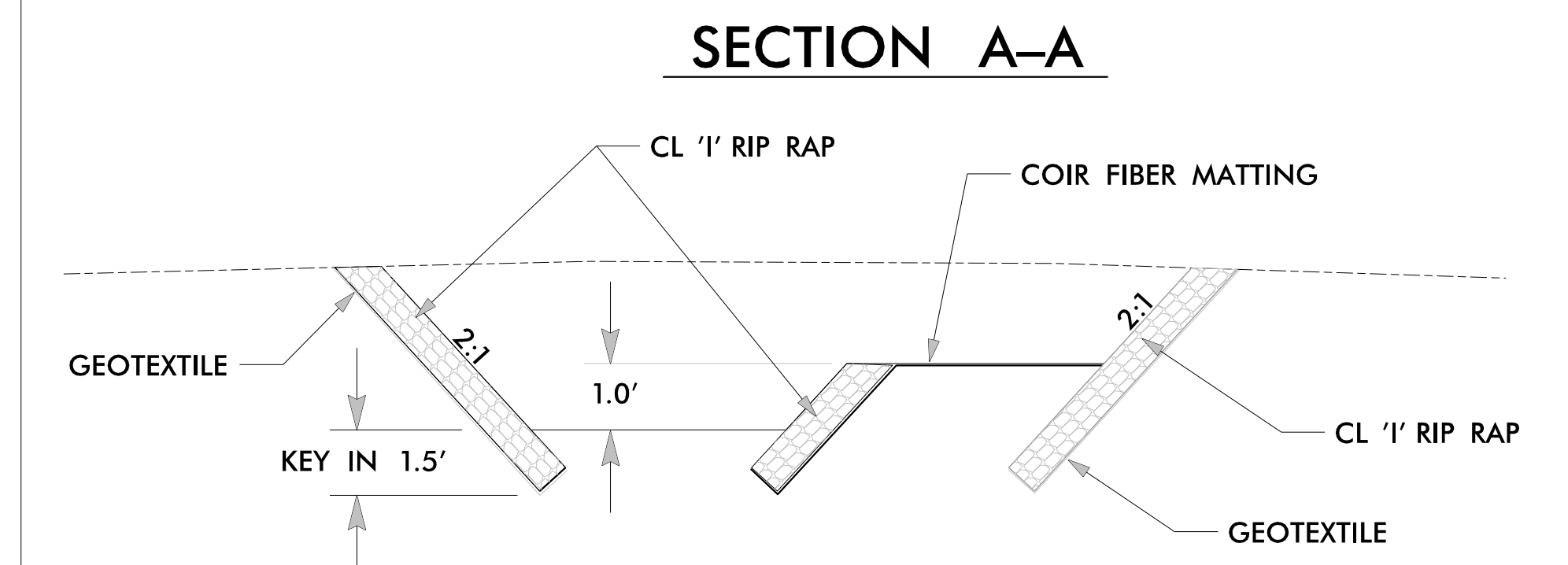
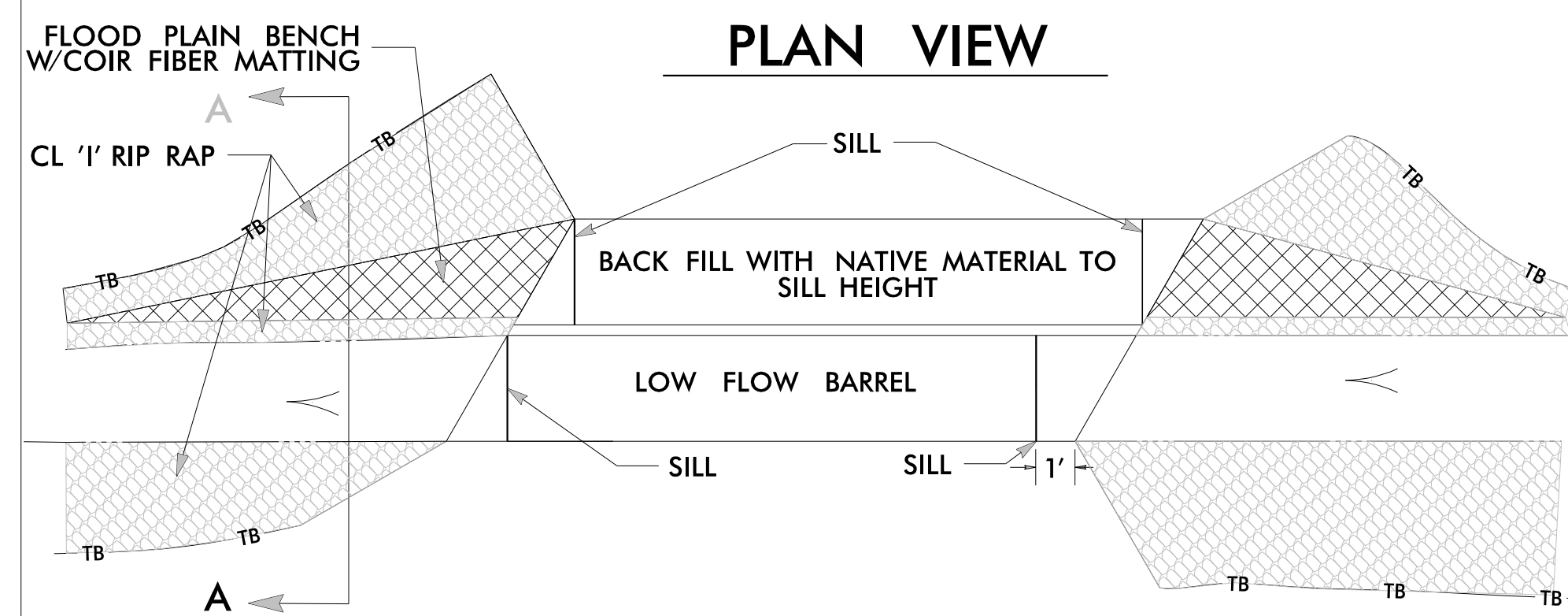
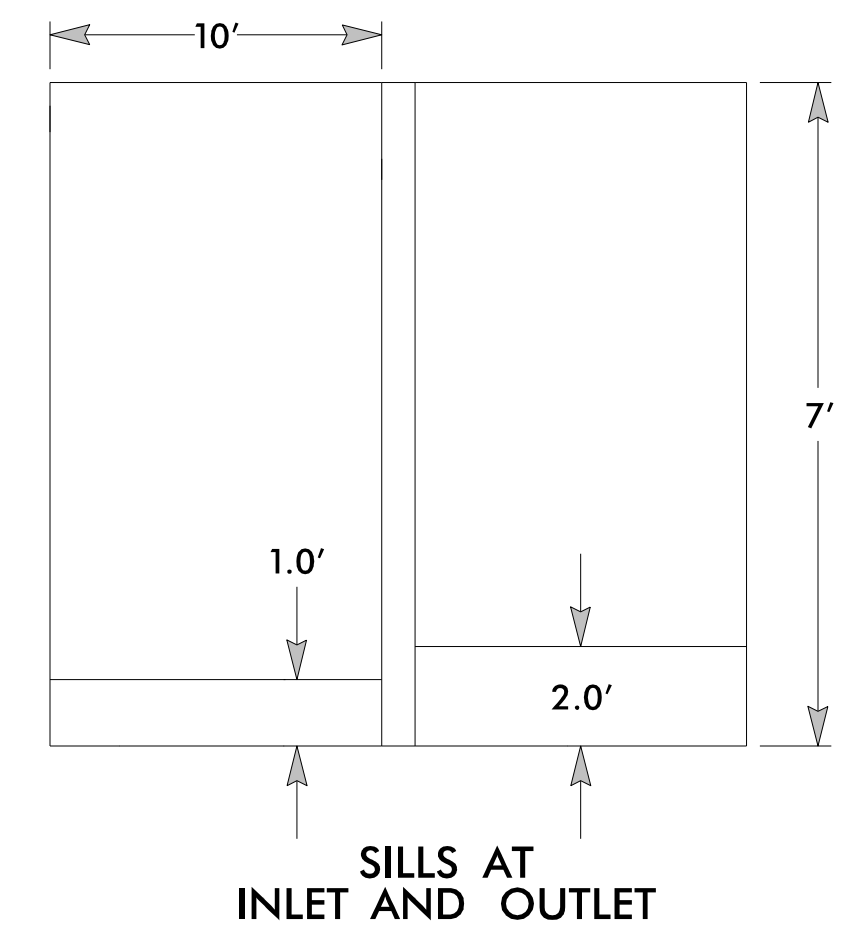
DETAIL #13

(NOT TO SCALE)

SKEWED MULTI-BARREL CULVERT LOW FLOW CHANNEL, SILLS AND FLOOD PLAIN

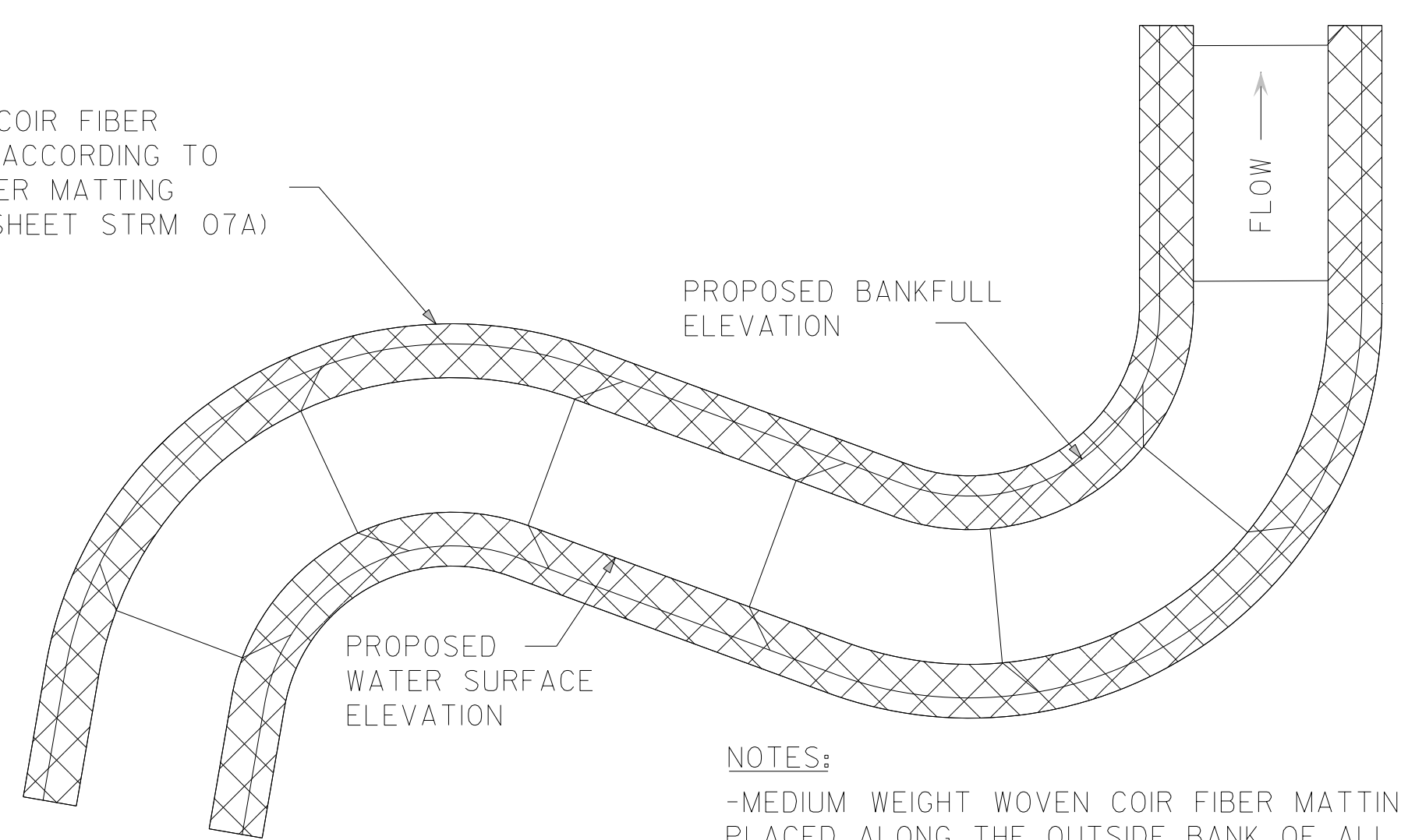
***NOTES:**

- 1) NATIVE MATERIAL BETWEEN SILLS IN THE CULVERT SHALL PROVIDE A CONTINUOUS LOW FLOW CHANNEL. NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE THE STREAM OR FLOODPLAIN AT THE PROJECT SITE DURING CONSTRUCTION. ONLY MATERIAL THAT IS EXCAVATED FROM THE STREAM BED MAY BE USED TO LINE THE LOW FLOW CULVERT BARREL. RIP-RAP MAY BE USED TO SUPPLEMENT THE NATIVE MATERIAL IN THE HIGH FLOW CULVERT BARREL(S). IF RIP-RAP IS USED TO LINE THE HIGH FLOW CULVERT BARREL(S), NATIVE MATERIAL SHOULD BE PLACED ON TOP TO FILL VOIDS AND PROVIDE A FLAT SURFACE FOR ANIMAL PASSAGE. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.
- 2) SILLS ARE TO BE 1.0 FT. WIDE, CAST SEPARATELY AND ATTACHED BY DOWELS.
- 3) TOP OF LOW FLOW SILLS SHOULD MATCH STREAM BED ELEVATION IN LOW FLOW CHANNEL OF STREAM. (THALWEG)
- 4) DO NOT SET ELEVATION OF HIGH SILLS ABOVE BANK FULL.
- 5) COIR FIBER MATTING SHALL BE SECURED ON THE BENCHES AND PLACED BEHIND RIP RAP TO PREVENT WASHOUT OF SEDIMENT THROUGH GAPS.



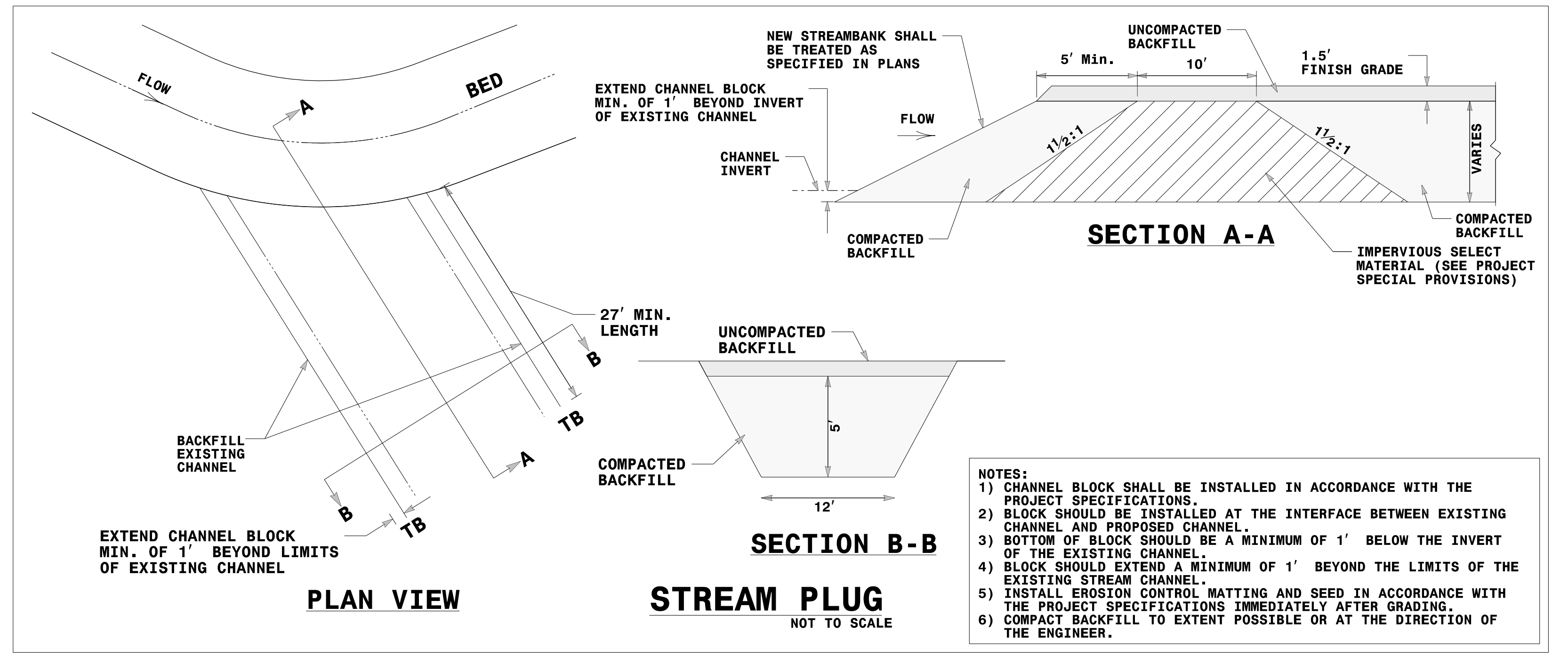
TYPICAL MATTING LOCATION

INSTALL COIR FIBER MATTING ACCORDING TO 'COIR FIBER MATTING DETAIL' (SHEET STRM 07A)



NOTES:

- MEDIUM WEIGHT WOVEN COIR FIBER MATTING SHALL BE PLACED ALONG THE OUTSIDE BANK OF ALL BENDS AND ALONG BOTH SIDES OF THE CHANNEL IN TANGENT AREAS.
- FIELD ADJUSTMENTS TO MATTING LOCATION MAY BE MADE AT THE DESIGNERS OR CONTRACTORS DISCRETION AS NECESSARY.



NOTES:

- 1) CHANNEL BLOCK SHALL BE INSTALLED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
- 2) BLOCK SHOULD BE INSTALLED AT THE INTERFACE BETWEEN EXISTING CHANNEL AND PROPOSED CHANNEL.
- 3) BOTTOM OF BLOCK SHOULD BE A MINIMUM OF 1' BELOW THE INVERT OF THE EXISTING CHANNEL.
- 4) BLOCK SHOULD EXTEND A MINIMUM OF 1' BEYOND THE LIMITS OF THE EXISTING STREAM CHANNEL.
- 5) INSTALL EROSION CONTROL MATTING AND SEED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS IMMEDIATELY AFTER GRADING.
- 6) COMPACT BACKFILL TO EXTENT POSSIBLE OR AT THE DIRECTION OF THE ENGINEER.

REVISIONS

8/17/99

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1/18/2017 10:58:11 AM

REVISIONS

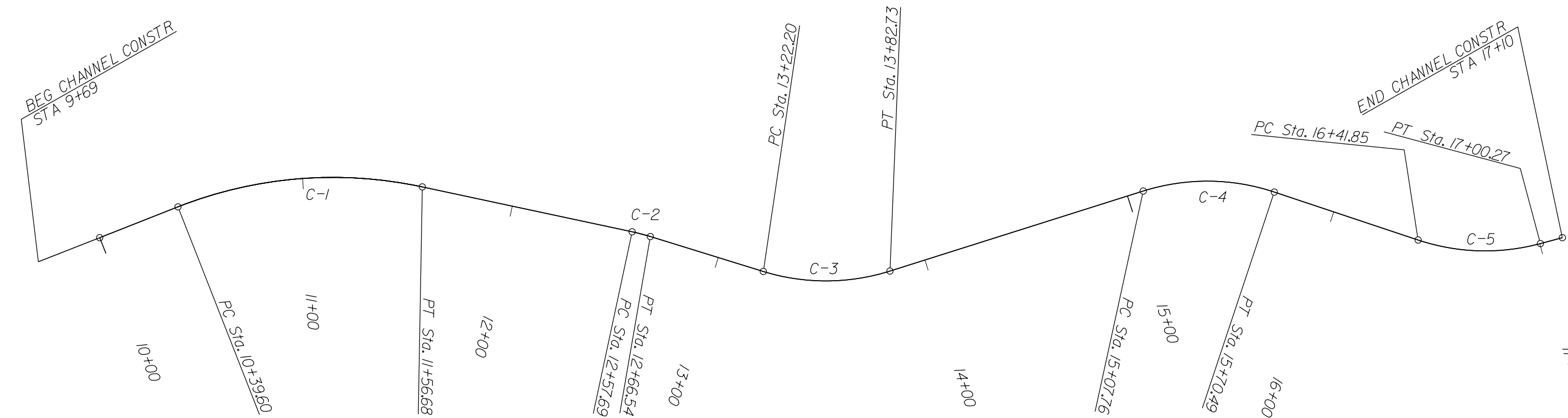
C-1
 PI Sta. 10+99.87
 $\Delta = 33^\circ 32' 29.0"$ (RT)
 D = 28' 38" 52.4"
 L = 117.08'
 T = 60.27'
 R = 200.00'

C-2
 PI Sta. 12+62.12
 $\Delta = 51^\circ 04' 11.7"$ (RT)
 D = 57' 17" 44.8"
 L = 8.85'
 T = 4.43'
 R = 100.00'

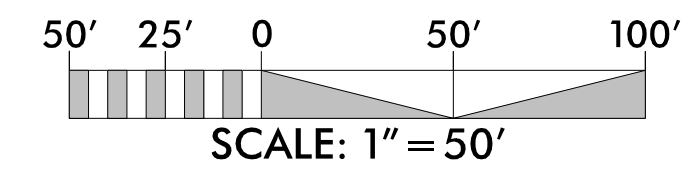
C-3
 PI Sta. 13+53.42
 $\Delta = 34^\circ 40' 43.4"$ (LT)
 D = 57' 17" 44.8"
 L = 60.53'
 T = 31.22'
 R = 100.00'

C-4
 PI Sta. 15+40.20
 $\Delta = 35^\circ 56' 21.5"$ (RT)
 D = 57' 17" 44.8"
 L = 62.73'
 T = 32.43'
 R = 100.00'

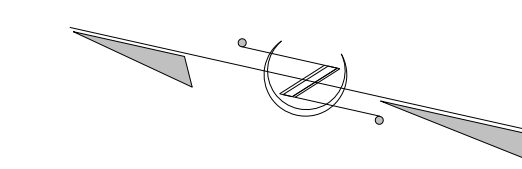
C-5
 PI Sta. 16+71.92
 $\Delta = 33^\circ 28' 09.7"$ (LT)
 D = 57' 17" 44.8"
 L = 58.42'
 T = 30.07'
 R = 100.00'

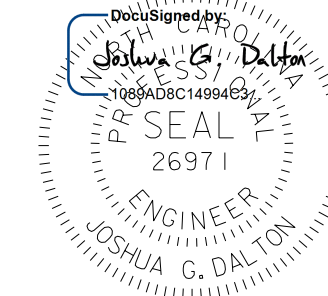


CULVERT OUTLET CHANNEL ALIGNMENT DATA			
STATION	LENGTH	NORTHING	EASTING
969.00		POT 561,155.0622	1,042,643.4550
L1	70.60		S 34d 04' 08" E
CH1	115.42		S 17d 17' 53" E
L2	101.01		S 00d 31' 39" E
CH2	8.85		S 02d 00' 27" W
L3	55.66		S 05d 32' 33" W
CH3	59.61		S 12d 47' 49" E
L4	125.04		S 30d 08' 10" E
CH4	61.70		S 12d 09' 59" E
L5	71.36		S 05d 48' 11" W
CH5	57.59		S 10d 55' 53" E
L6	10.72		S 27d 39' 58" E
1710.00		POT 560,457.4427	1,042,811.1968

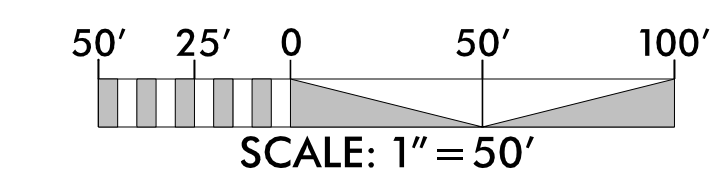
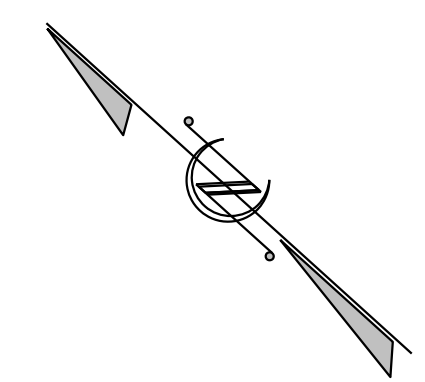


PROJECT REFERENCE NO. 1-4729A	SHEET NO. STRM 03
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
8/14/2017	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



PROJECT REFERENCE NO. 1-4729A	SHEET NO. STRM 04
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	
8/14/2017	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

STRUCTURE LOCATIONS				
STR. TYPE	STATION	OFFSET	NORTHING	EASTING
ROCK CROSS VANE	11+01.6	0	561,040.9327	1,042,709.2159
DOUBLE LOG VANE	13+22.2	0	560,821.0519	1,042,713.5327
DOUBLE LOG VANE	15+07.8	0	560,654.7900	1,042,789.5108
ROCK CROSS VANE	17+00.3	0	560,466.9352	1,042,806.2202



SEE PSH STRM 05
FOR CHANNEL PROFILE

REVISIONS

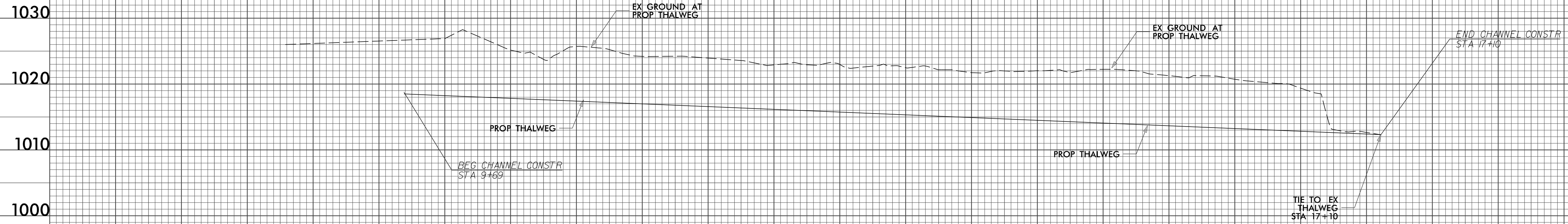


 FILL EXISTING CHANNEL

5/14/99

PROJECT REFERENCE NO. 1-4729A	SHEET NO. STRM 05
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER Seamus G. Dalton Professional Seal 26971 ENGINEER SEAMUS G. DALTON 8/16/2017

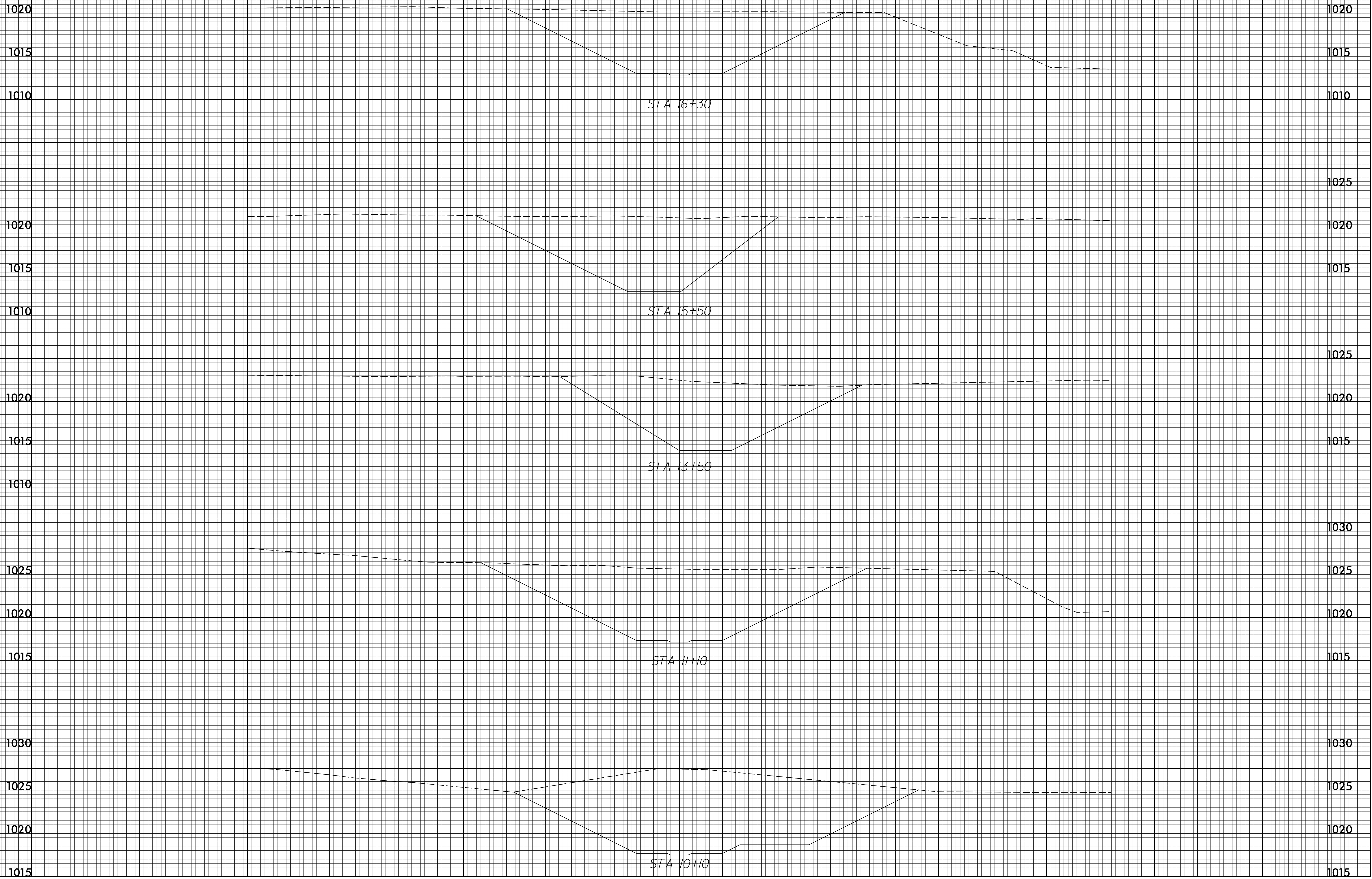
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



	sta	slope	elev diff	cl bed elev	thalweg elev
top riffle	969.00	0.0087	0.09	1018.51	1018.31
bot riffle	1257.69	0.0087	2.51	1016.18	1015.98
top riffle	1266.54	0.0087		1016.19	1015.99
bot riffle	1322.20	0.0087	0.48	1015.70	1015.50
top riffle	1382.73	0.0087		1015.18	1014.98
bot riffle	1507.76	0.0087	1.09	1014.09	1013.89
top riffle	1570.49	0.0087		1013.55	1013.35
bot riffle	1641.85	0.0087	0.62	1012.92	1012.72
top riffle	1700.27	0.0087		1012.42	1012.22
	1710.00		0.08	1012.33	1012.13

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1-4729A-Hydr-PSH-Strm-05.pfl.dgn
bbl

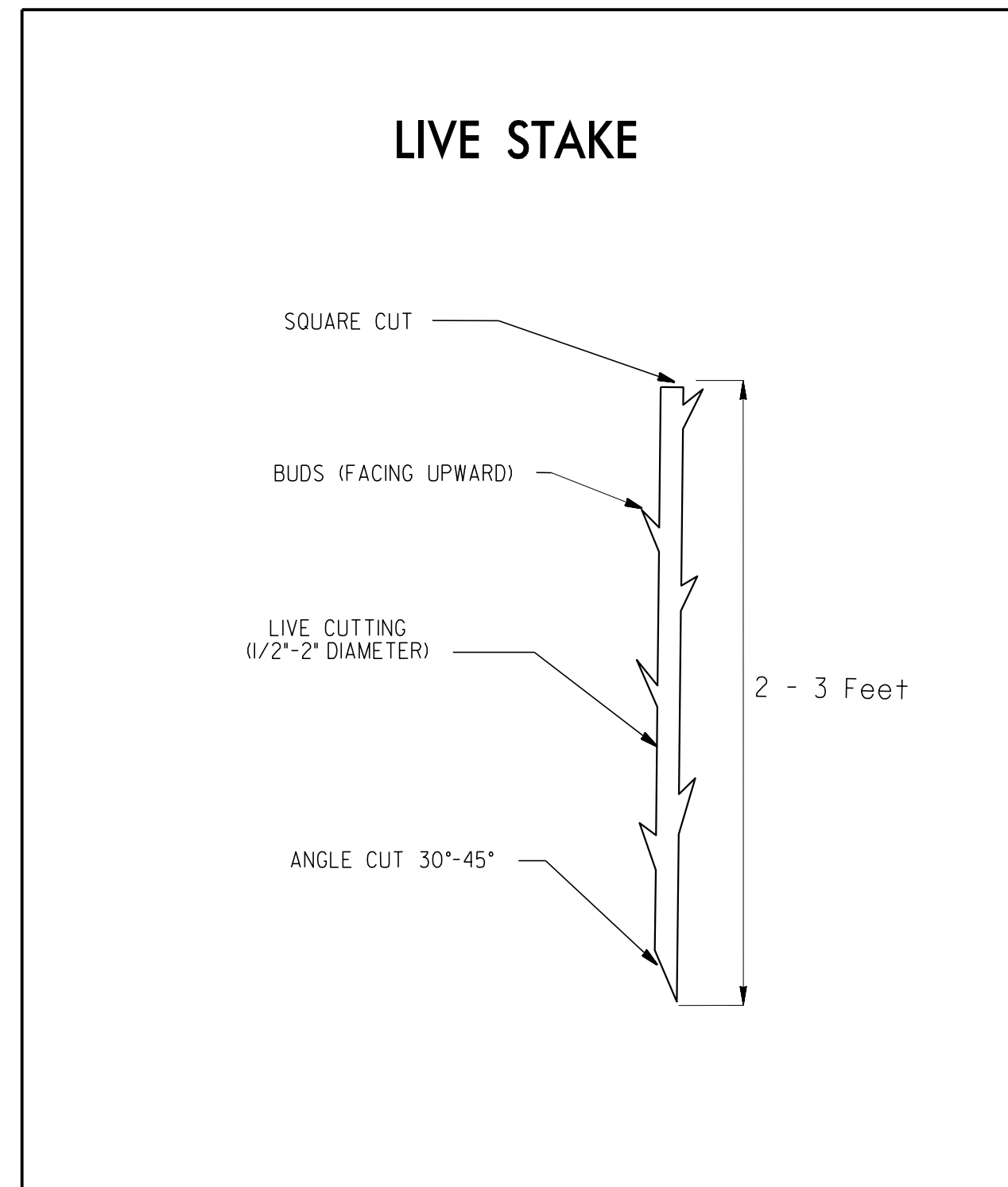
9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00



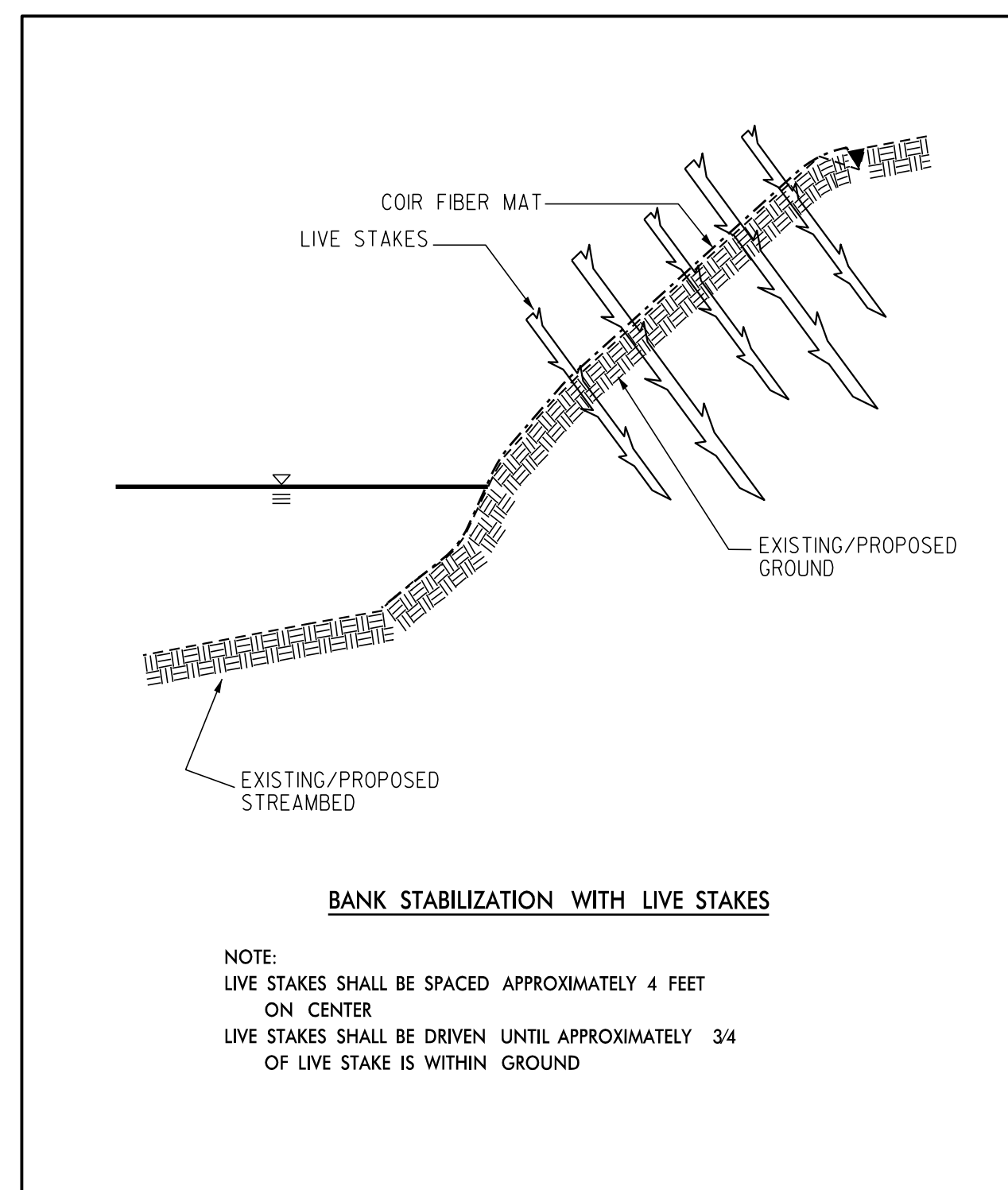
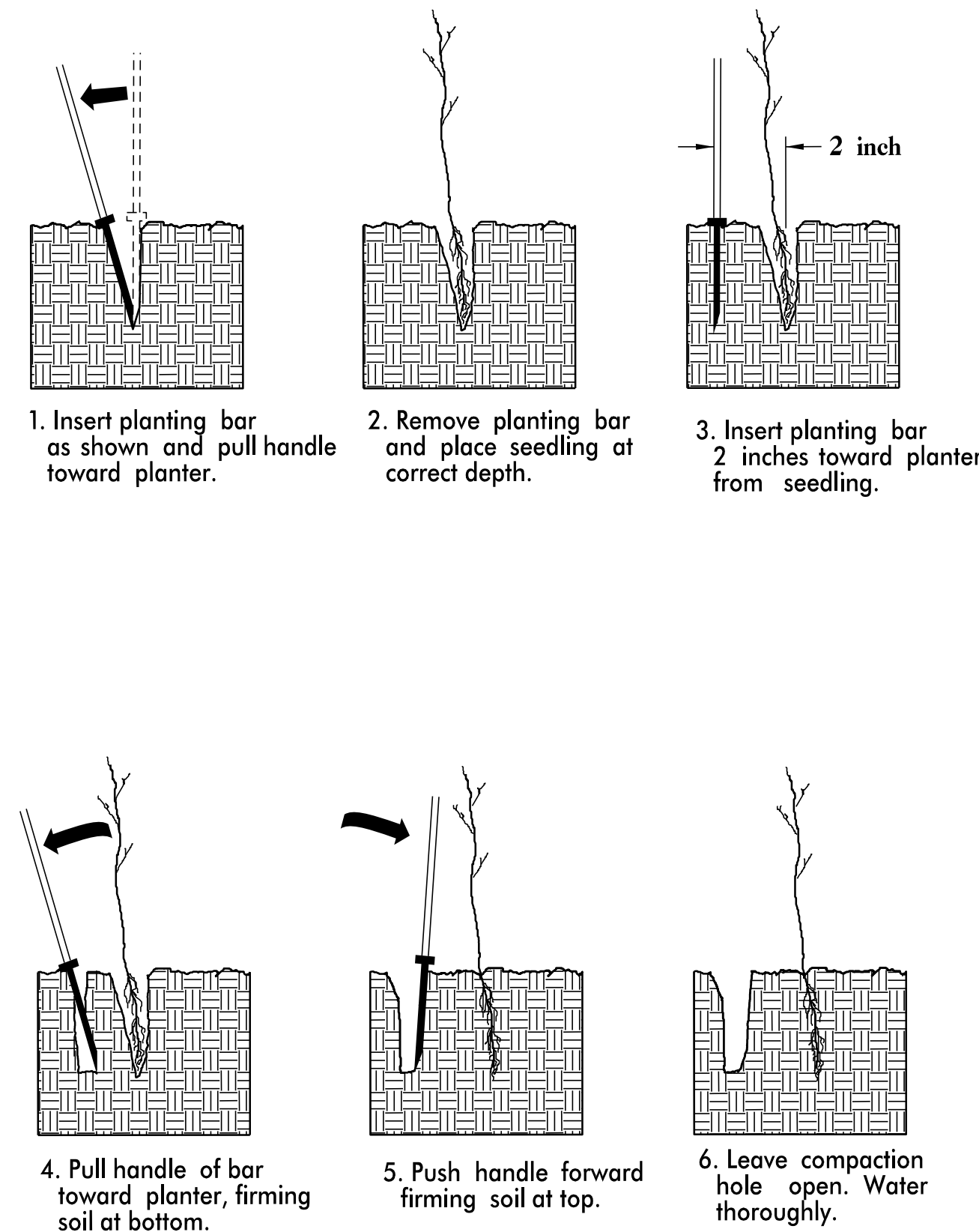
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1-4729A	STRM 07
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

PLANTING DETAILS

LIVE STAKES PLANTING DETAIL



BAREROOT PLANTING DETAIL DIBBLE PLANTING METHOD USING THE KBC PLANTING BAR

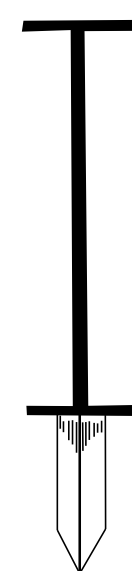


PLANTING NOTES:

PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.



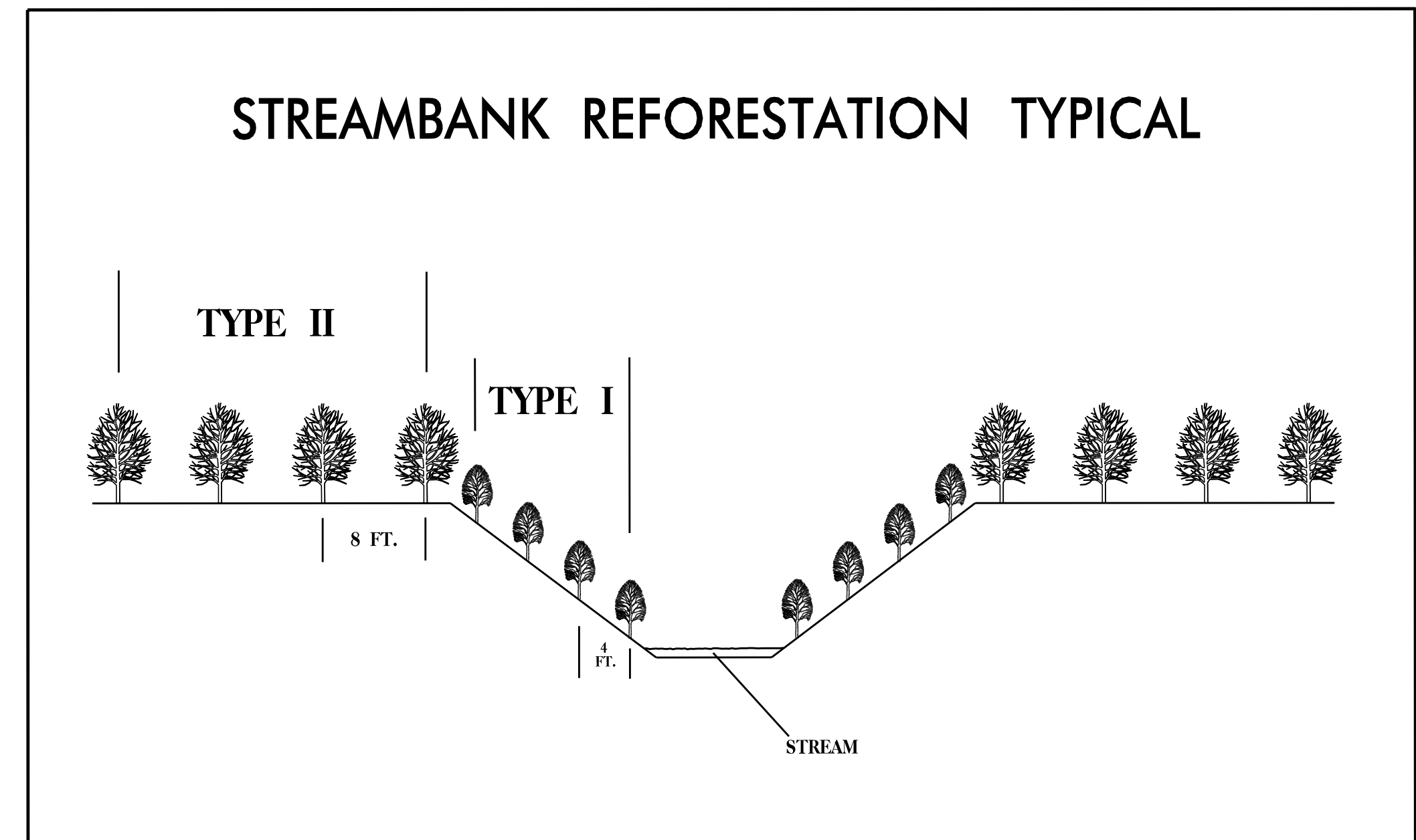
KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.



ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

- TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.
- TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.
- NOTE: TYPE 1 AND TYPE 2 STREAMBANK REFORESTATION SHALL BE PAID FOR AS "STREAMBANK REFORESTATION"

STREAMBANK REFORESTATION TYPICAL



STREAMBANK REFORESTATION

MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

TYPE 1

50% SALIX NIGRA	BLACK WILLOW	2 ft - 3 ft LIVE STAKES
50% CORNUS AMOMUM	SILKY DOGWOOD	2 ft - 3 ft LIVE STAKES

TYPE 2

25% LIRIODENDRON TULIPIFERA	TULIP POPLAR	12 in - 18 in BR
25% PLATANUS OCCIDENTALIS	SYCAMORE	12 in - 18 in BR
25% FRAXINUS PENNSYLVANICA	GREEN ASH	12 in - 18 in BR
25% BETULA NIGRA	RIVER BIRCH	12 in - 18 in BR

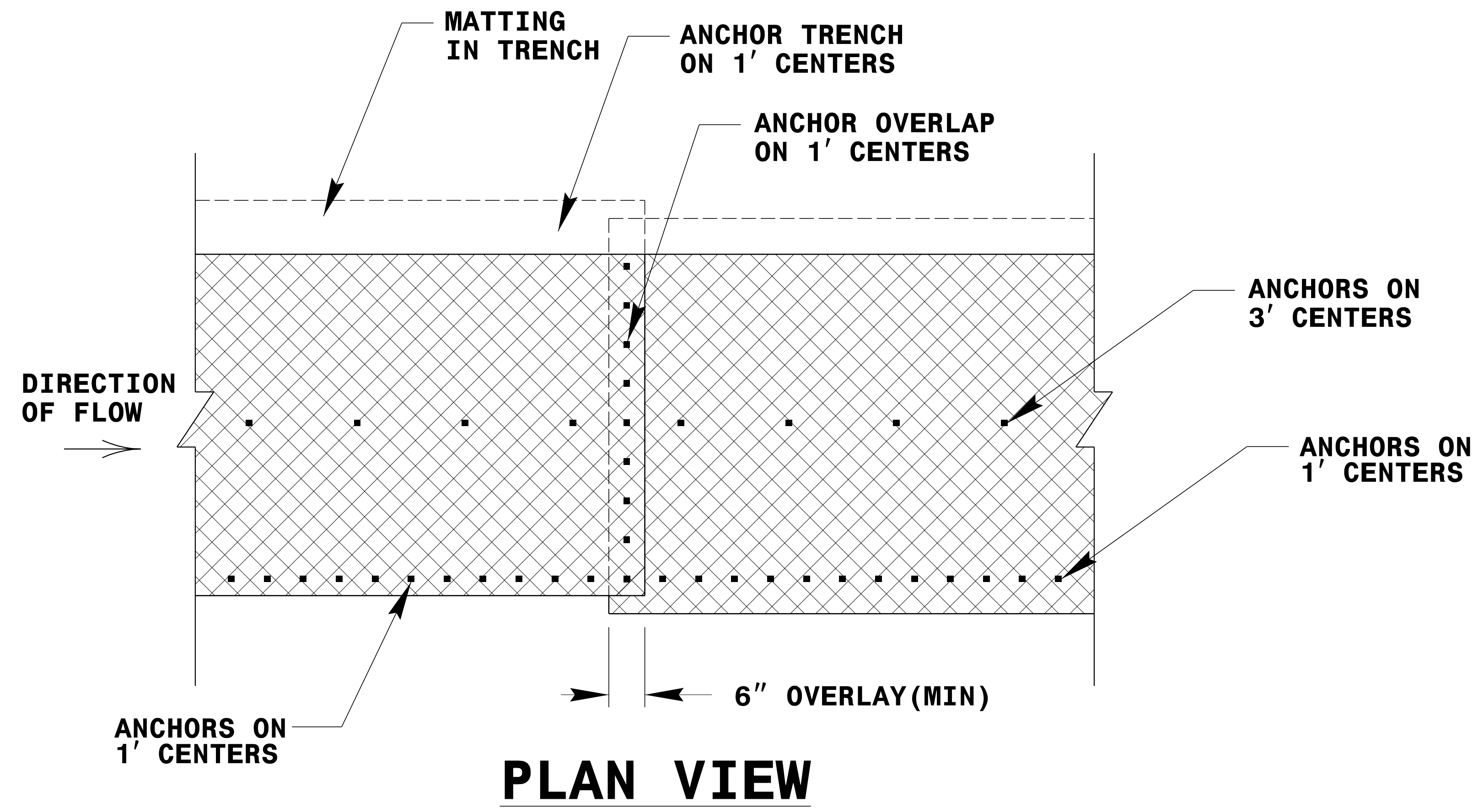
- SEE PLAN SHEETS FOR AREAS TO BE PLANTED

STREAMBANK REFORESTATION

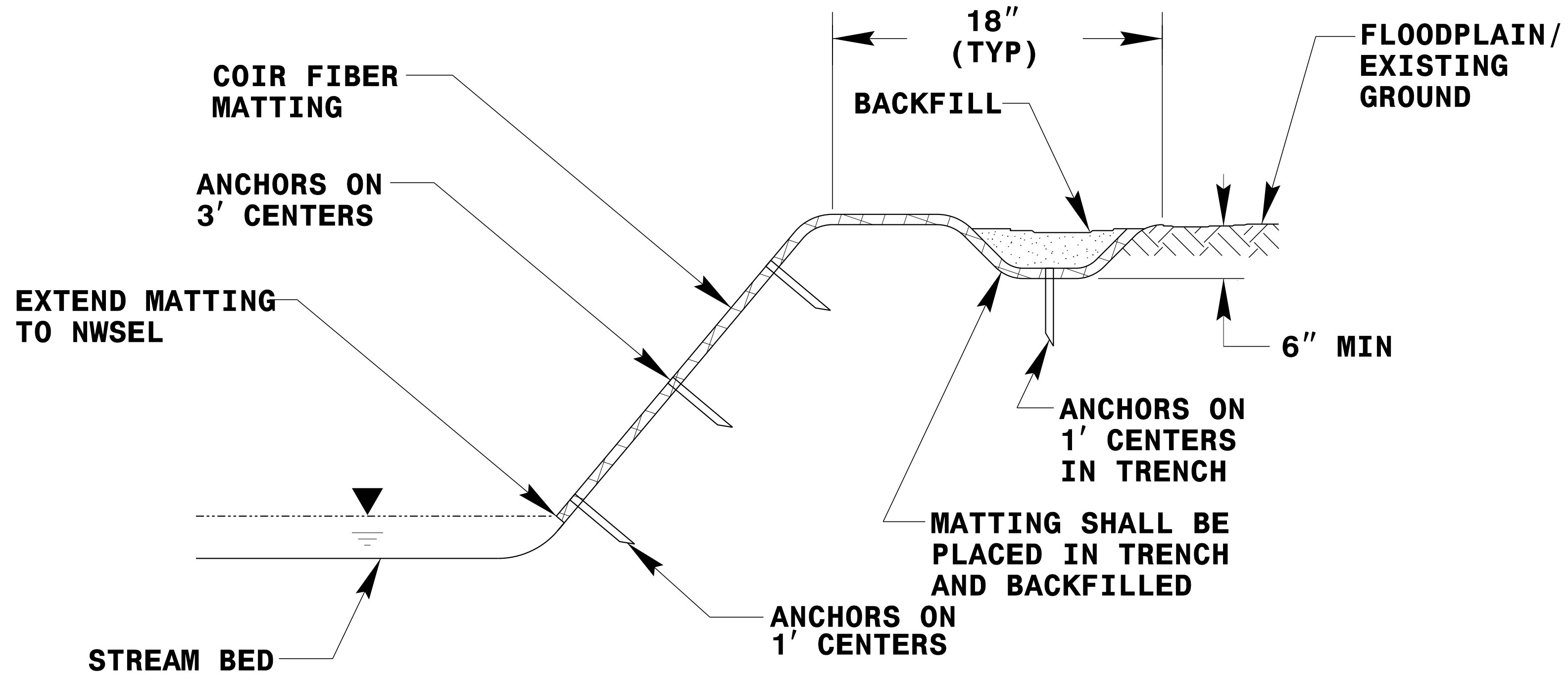
REVISIONS

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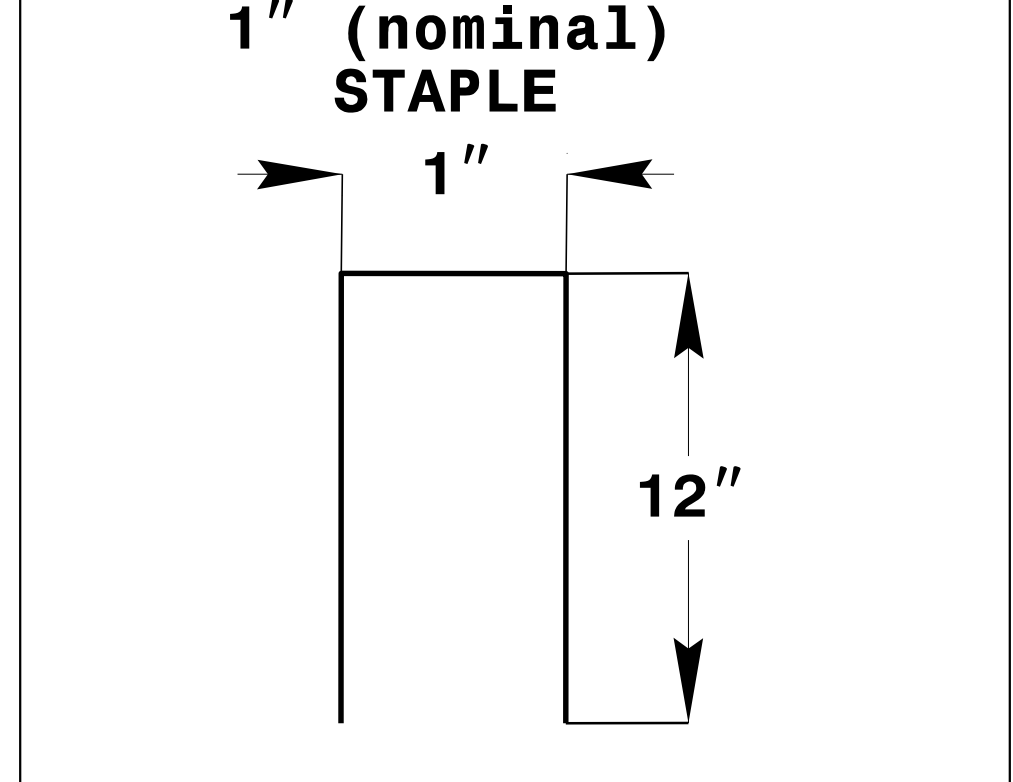
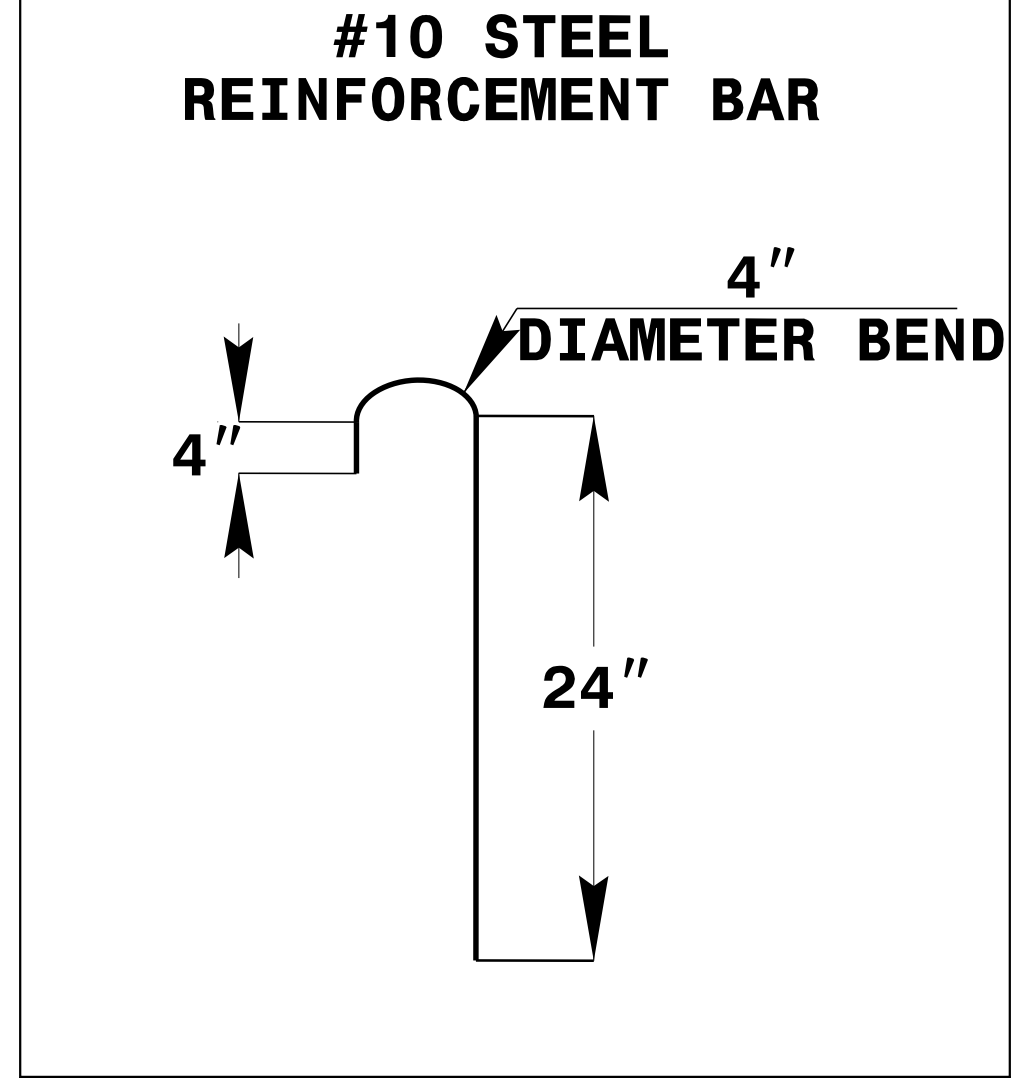
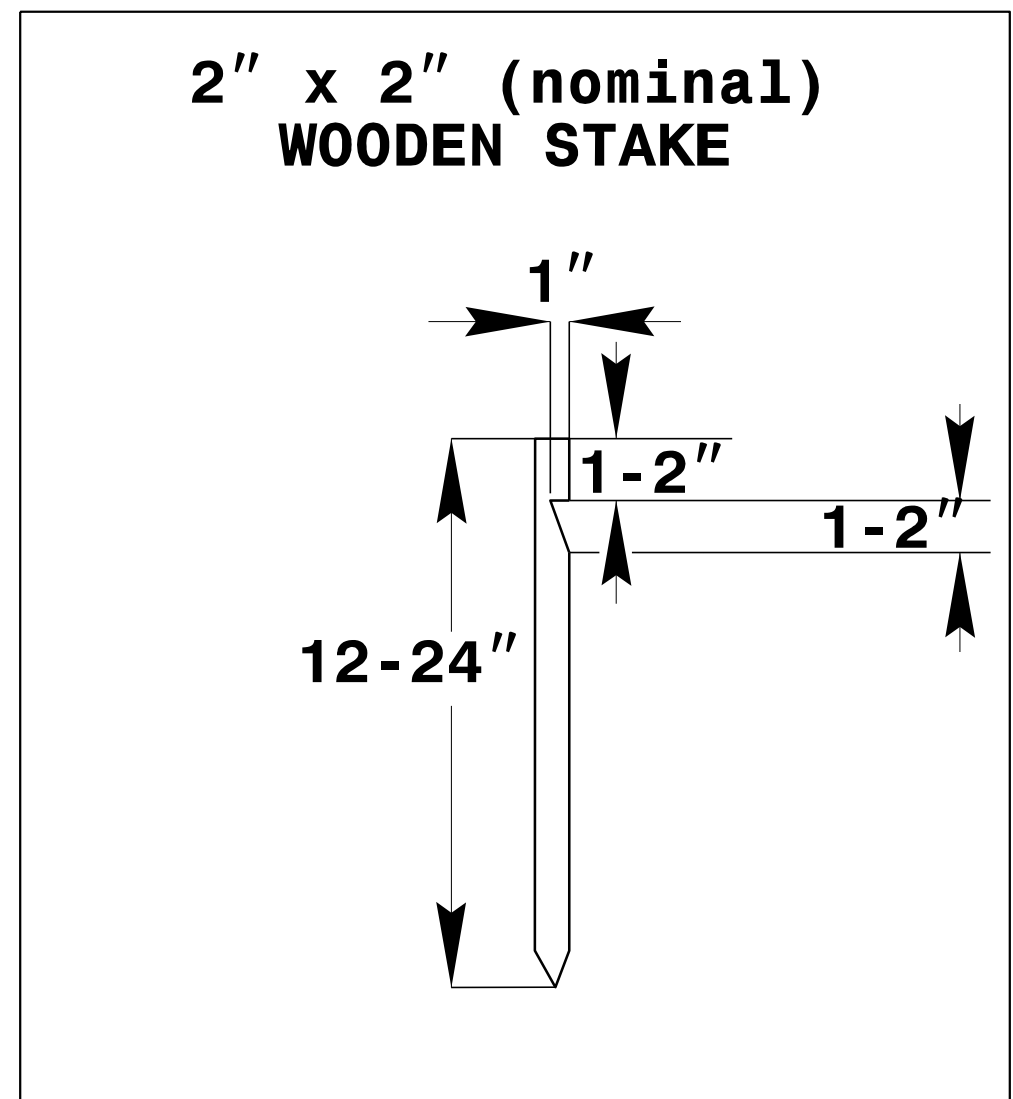
PROJECT REFERENCE NO.	SHEET NO.
1-4729A	STRM 07A
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



PLAN VIEW



TYPICAL CROSS SECTION



ANCHOR OPTIONS

COIR FIBER MATTING DETAIL

NOT TO SCALE

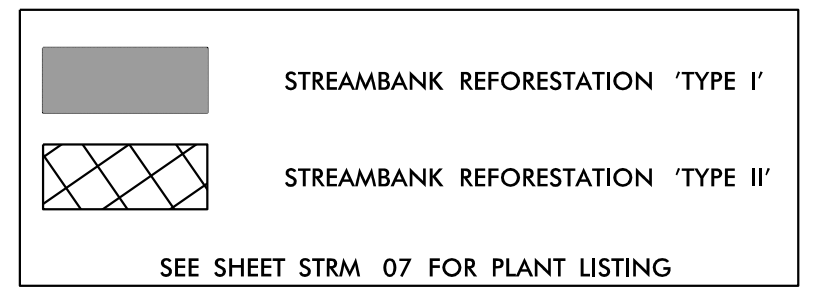
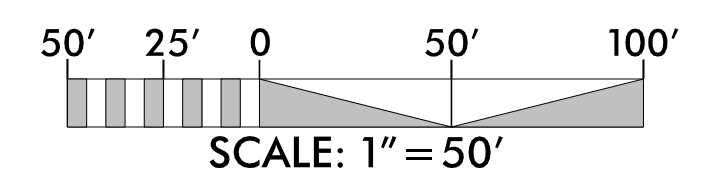
STREAMBANK REFORESTATION

8/17/99

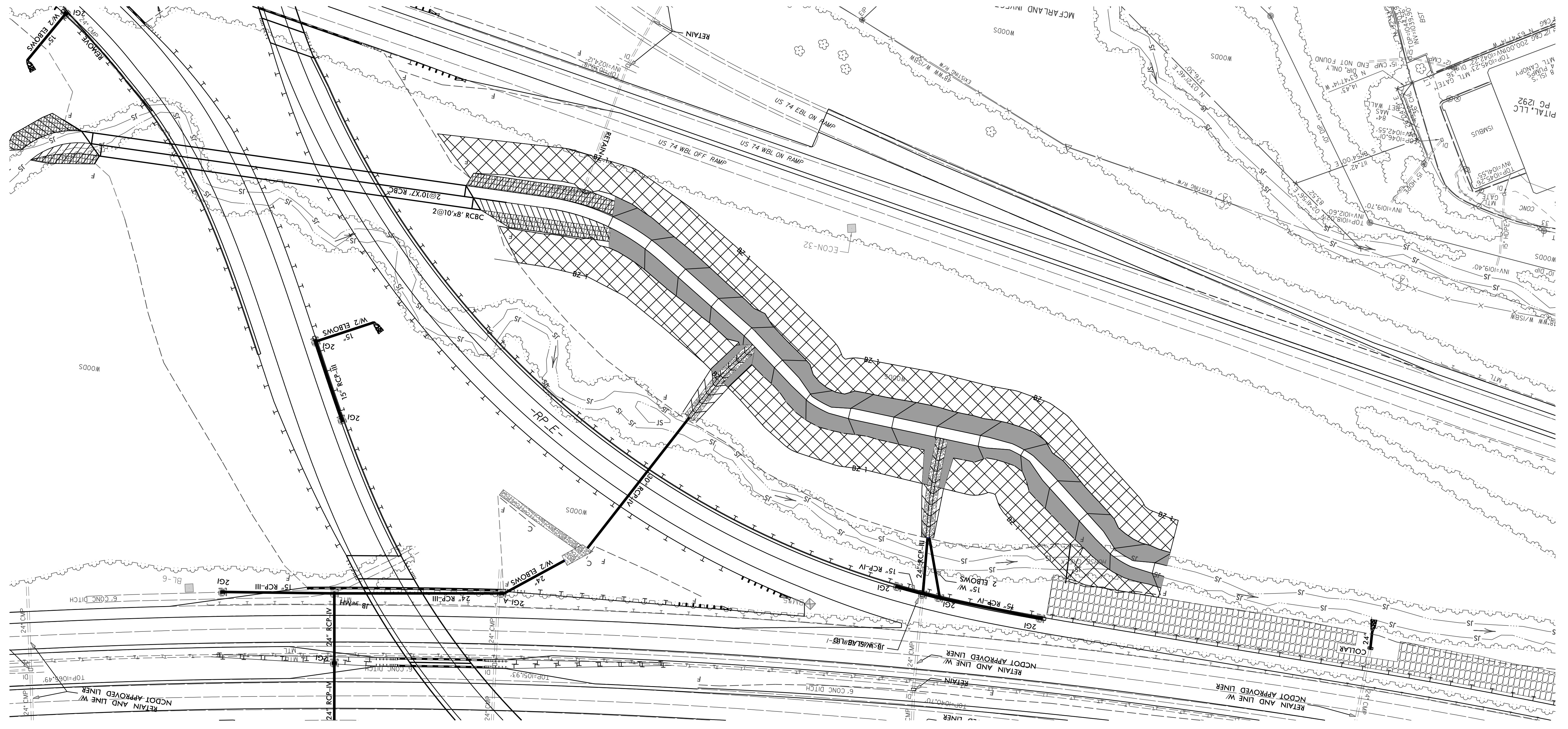
REVISIONS

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10/26/17

PROJECT REFERENCE NO.	SHEET NO.
1-4729A	STRM 08
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



REVISIONS

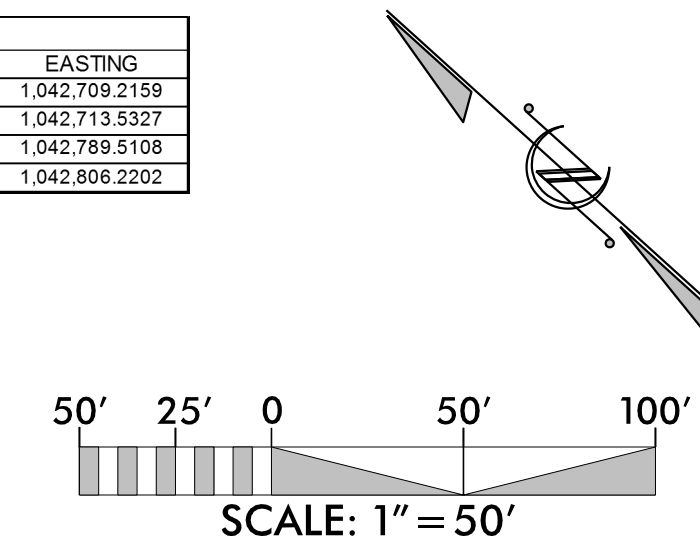


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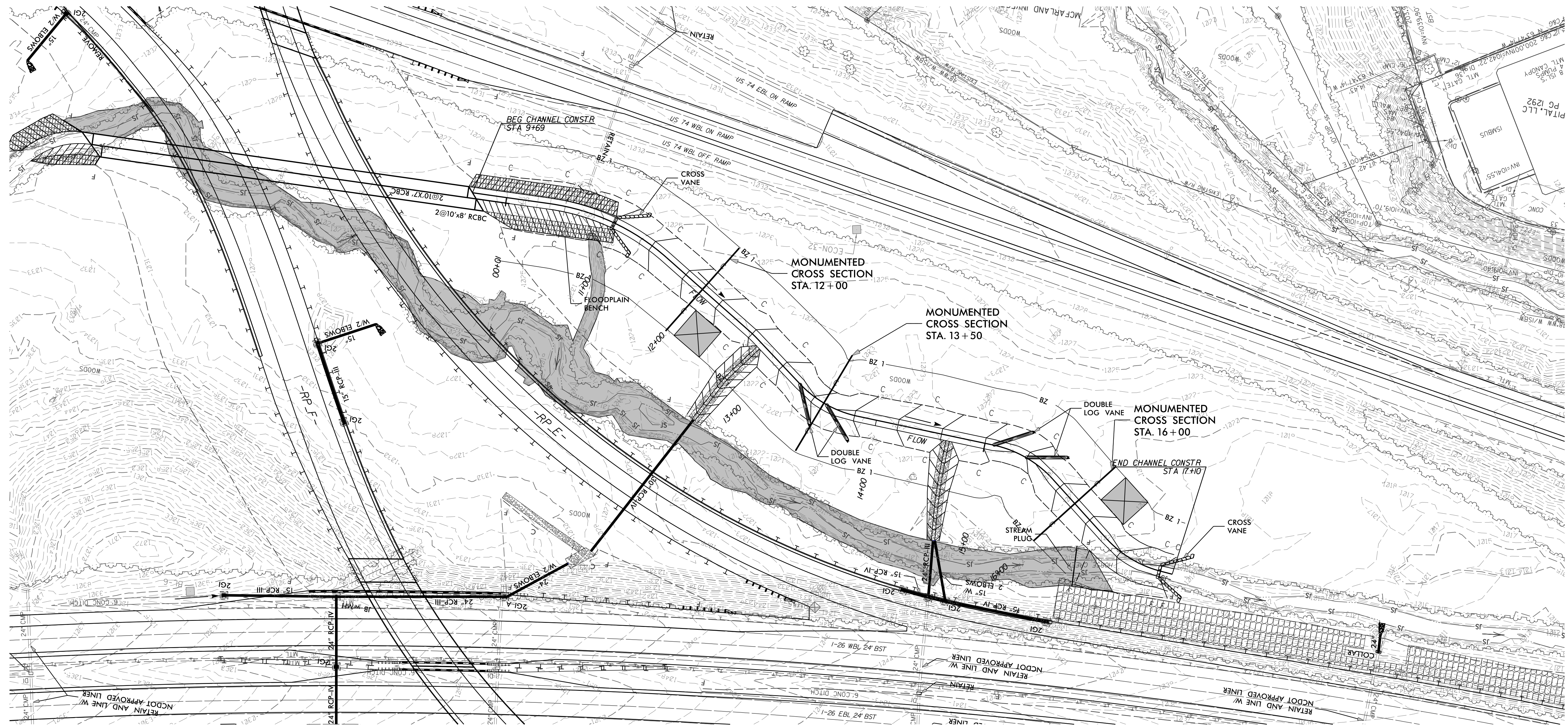
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PROJECT REFERENCE NO.	SHEET NO.
1-4729A	STRM 09
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

STRUCTURE LOCATIONS				
STR. TYPE	STATION	OFFSET	NORTHING	EASTING
ROCK CROSS VANE	11+01.6	0	561,040.9327	1,042,709.2159
DOUBLE LOG VANE	13+22.2	0	560,821.0519	1,042,713.5327
DOUBLE LOG VANE	15+07.8	0	560,654.7900	1,042,789.5108
ROCK CROSS VANE	17+00.3	0	560,466.9352	1,042,806.2202



STREAM RELOCATION MONITORING PLAN



REVISIONS

	FILL EXISTING CHANNEL
	MONUMENTED CROSS SECTION
	VEGETATION MONITORING PLOT