

**TIP PROJECT: U-2579BA**

**CONTRACT: C204533**

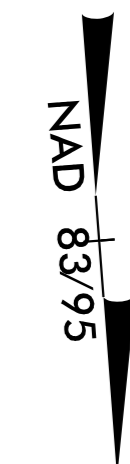
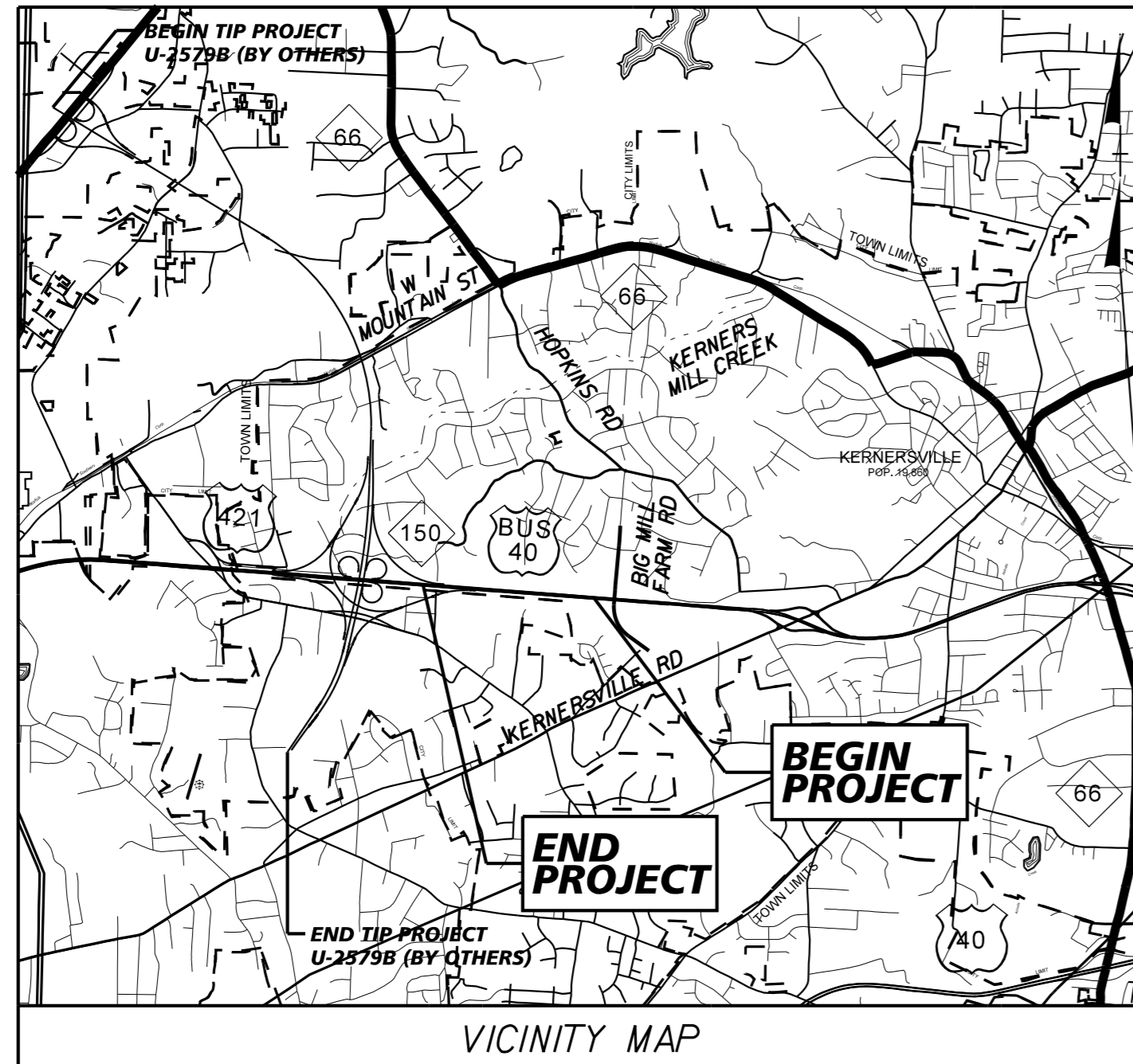
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.
N.C.	U-2579BA	STREAM-1
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
34839.1.10		P.E.
34839.3.11		CONST.

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS

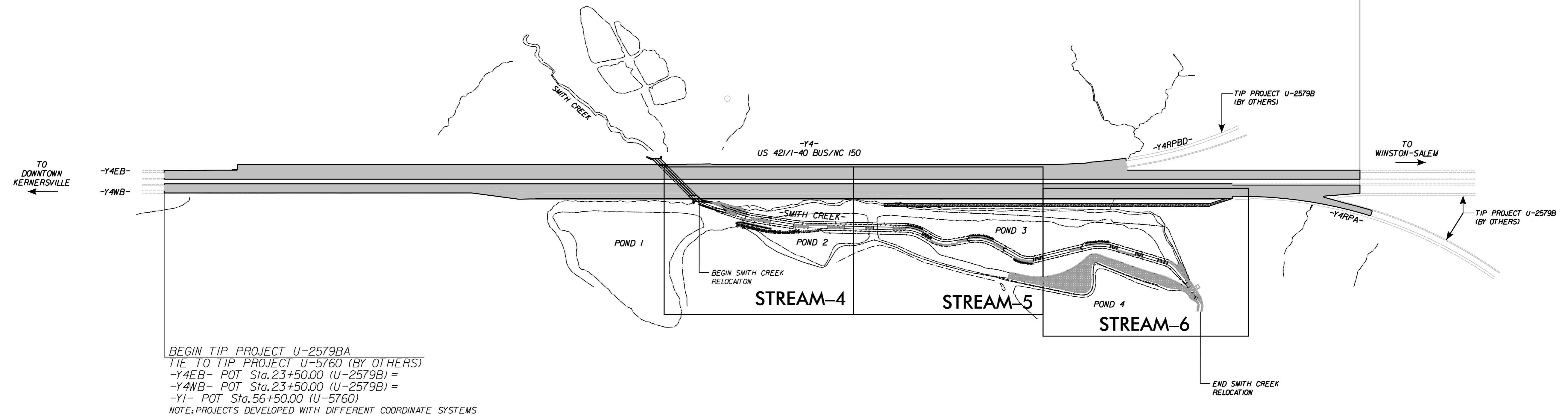
# FORSYTH COUNTY

**LOCATION: FUTURE I-74 FROM WINSTON-SALEM NORTHERN BELTWAY  
EASTERN SECTION US 42/NC 150/I-40 BUS TO US 158**

**TYPE OF WORK: STREAM RELOCATION (GRADING & PLANTING)**



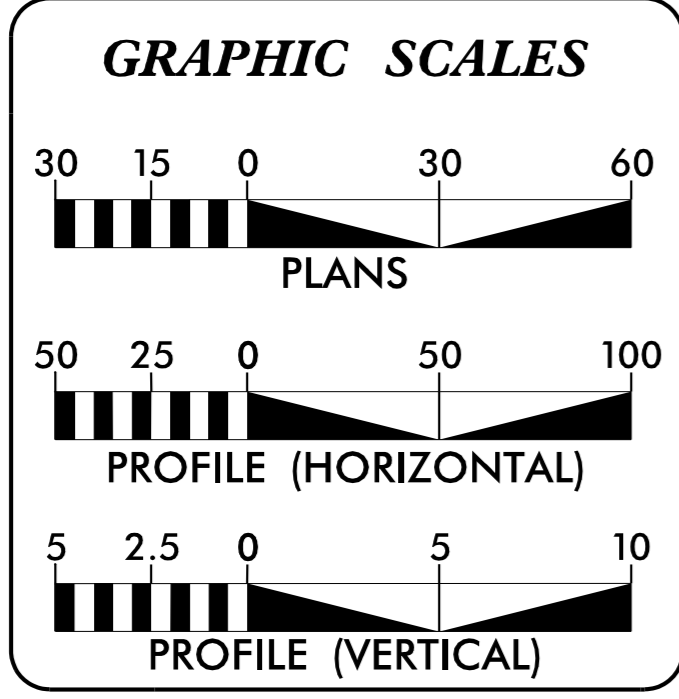
END TIP PROJECT U-2579BA  
TIE TO TIP PROJECT U-2579B (BY OTHERS)  
-Y4EB- POT Sta. 75+00.00 (U-2579BA) =  
-Y4EB- POT Sta. 75+00.00 (U-2579B)  
-Y4WB- POT Sta. 75+00.00 (U-2579BA) =  
-Y4WB- POT Sta. 75+00.00 (U-2579B)



BEGIN TIP PROJECT U-2579BA  
TIE TO TIP PROJECT U-5760 (BY OTHERS)  
-Y4EB- POT Sta. 23+50.00 (U-2579B) =  
-Y4WB- POT Sta. 23+50.00 (U-2579B) =  
-Y1- POT Sta. 56+50.00 (U-5760)  
NOTE: PROJECTS DEVELOPED WITH DIFFERENT COORDINATE SYSTEMS

THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS LIMITED TO POINTS AS SHOWN ON THE PLANS

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



**DESIGN DATA**

AADT 2020 =	57,600
AADT 2040 =	77,900
K =	9%
D =	65%
T =	7%*
V =	65 MPH
* (TTST 4% + DUAL 3%)	
FUNCTIONAL CLASSIFICATION:	
URBAN FREEWAY	
REGIONAL TIER	

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT U-2579BA	=	0.975 MILES
TOTAL LENGTH TIP PROJECT U-2579BA	=	0.975 MILES
LENGTH SMITH CREEK RELOCATION	=	0.403 MILES
LENGTH TRIBUTARY SMITH CREEK RELOCATION	=	0.065 MILES
TOTAL STREAM RELOCATION	=	0.468 MILES

PLANS PREPARED FOR THE NCDOT BY: **Kimley»Horn**

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NA

LETTING DATE: APRIL 21, 2020

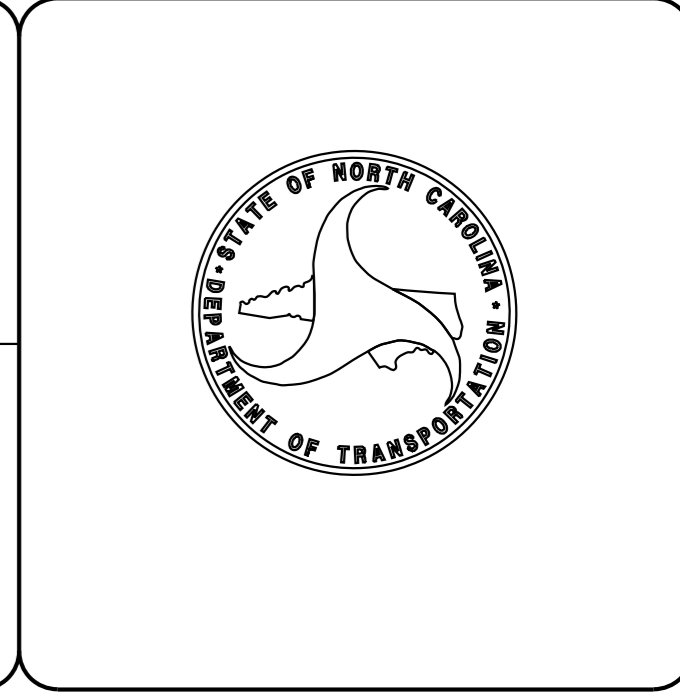
<b>DAN ROBINSON, P.E.</b> PROJECT ENGINEER
<b>RHODES S. HUNT, P.E.</b> PROJECT DESIGN ENGINEER
<b>JESSICA EARLEY, P.E.</b> PROJECT EXECUTIVE NCDOT PRIORITY PROJECTS TEAM

**HYDRAULICS ENGINEER**

**ROADWAY DESIGN ENGINEER**

3/3/2020

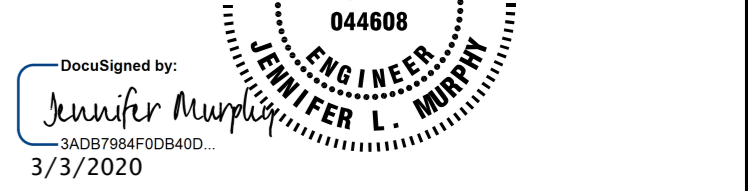
3/3/2020



5/14/99

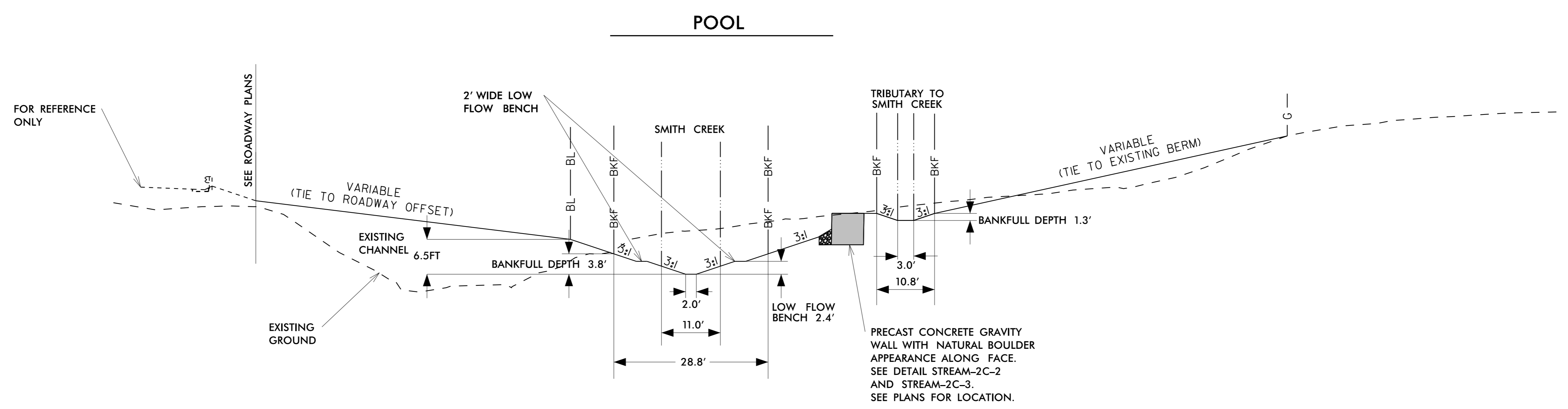
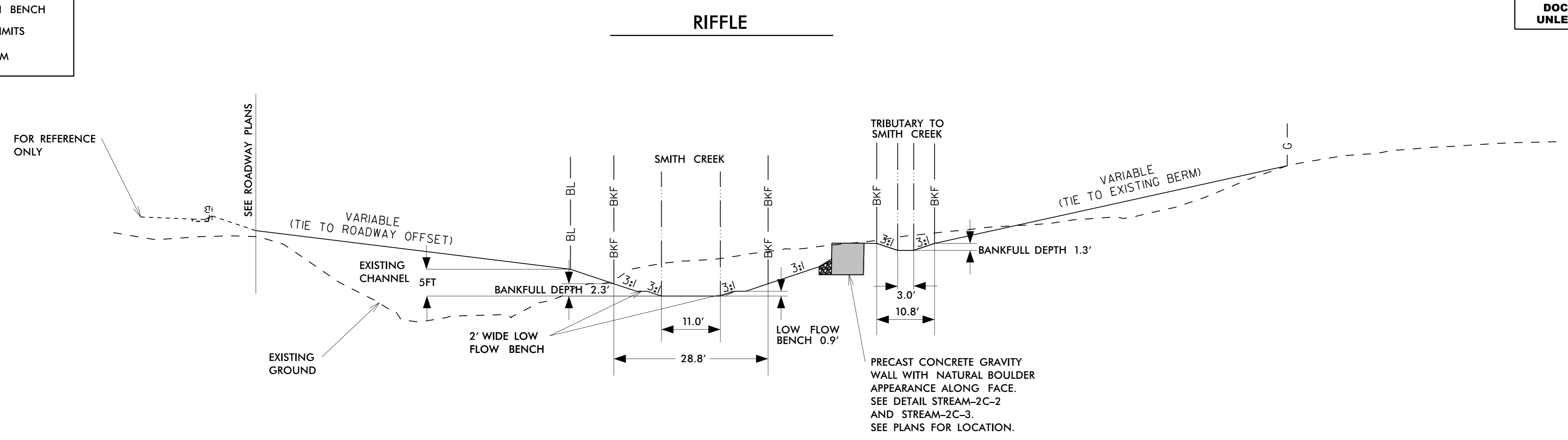
**Kimley Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601

PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM - 2A-1
HYDRAULICS ENGINEER	



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

LEGEND	
--- ---	CHANNEL TOE
—BKF—	BANKFULL
—BL—	GRADE BREAK POINT
—FP—	BACK OF FLOODPLAIN BENCH
—G—	GRADING LIMITS
—B—	TOP OF BERM



## STREAM TYPICAL SECTION NO. 1

DRAWING NOT TO SCALE

-SMITH CREEK- STA 10+00.00 TO 14+81.00

-Y4WB- STA 47+24.00 TO 51+91.00 RT

SEE STREAM-7 THRU STREAM-9 FOR RIFFLE AND POOL LOCATIONS

REVISIONS

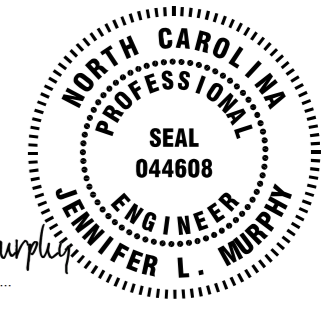
5/14/99

REVISIONS

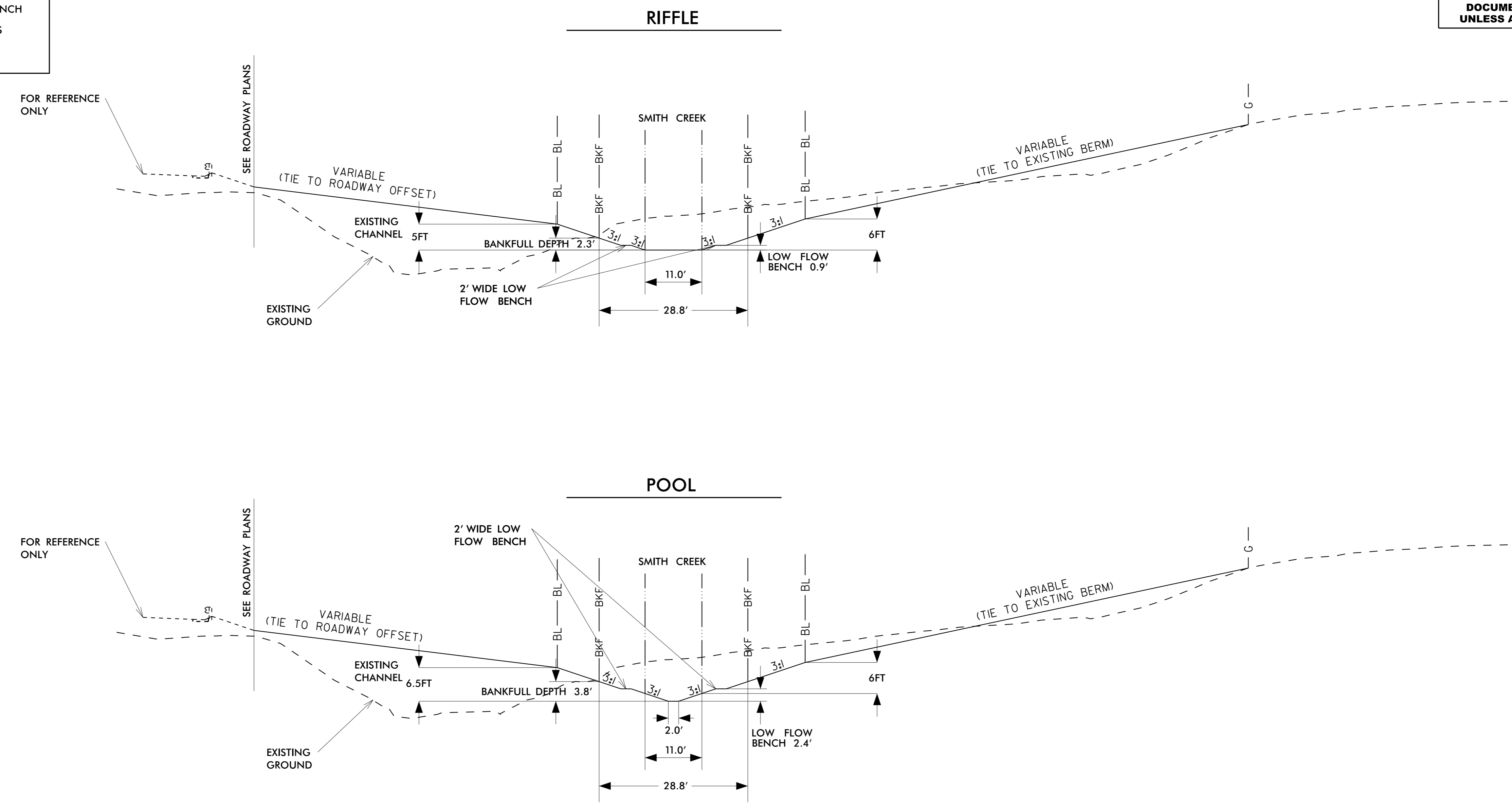
LEGEND	
-----	CHANNEL TOE
—BKF—	BANKFULL
—BL—	GRADE BREAK POINT
—FP—	BACK OF FLOODPLAIN BENCH
—G—	GRADING LIMITS
—B—	TOP OF BERM

PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM - 2A-2
HYDRAULICS ENGINEER	
421 FAYETTEVILLE STREET, SUITE 600 RALEIGH, NC 27601	
RIGHT-OF-WAY REV. CONST. REV.	

DocuSigned by:  
Jennifer Murphy  
3ADB784F0DB40D  
3/3/2020



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



## STREAM TYPICAL SECTION NO. 2

DRAWING NOT TO SCALE

-SMITH CREEK- STA 14+81.00 TO 17+38.00

-Y4WB- STA 51+91.00 TO 54+50.00 RT

SEE STREAM-7 THRU STREAM-9 FOR RIFFLE AND POOL LOCATIONS

5/14/99

REVISIONS

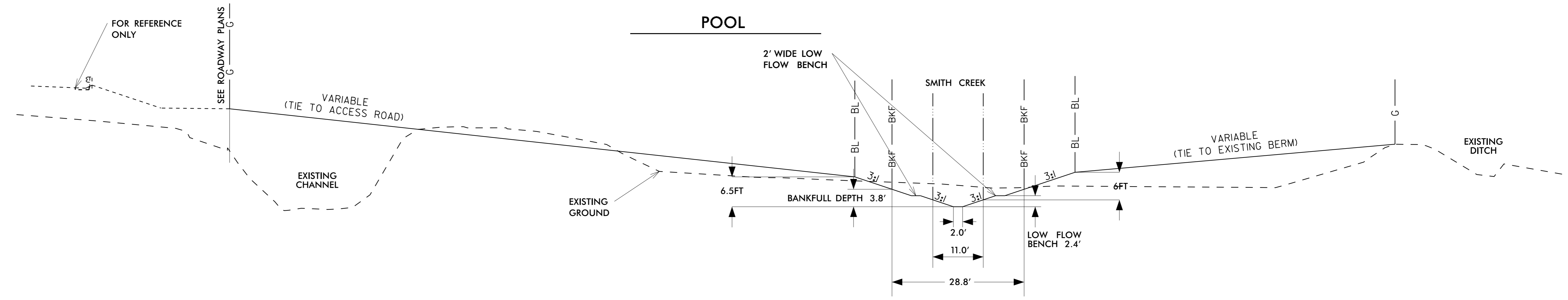
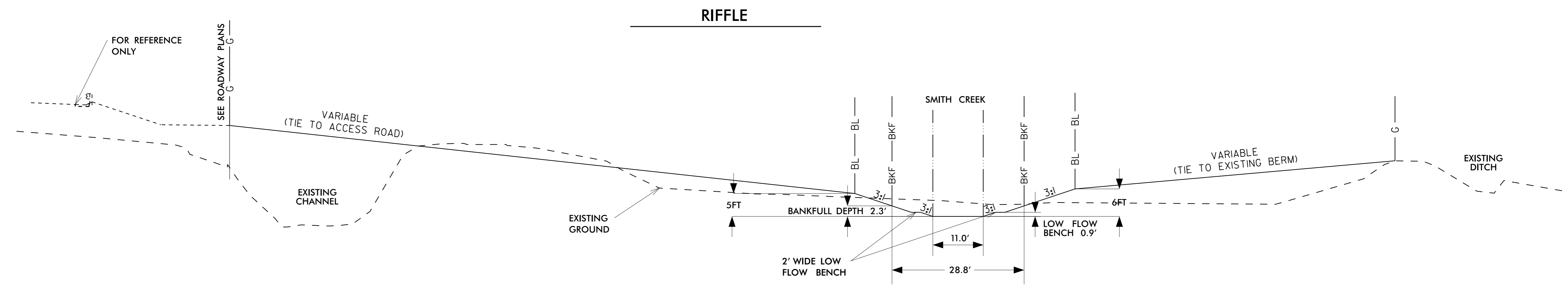
LEGEND	
-----	CHANNEL TOE
—BKF—	BANKFULL
—BL—	GRADE BREAK POINT
—FP—	BACK OF FLOODPLAIN BENCH
—G—	GRADING LIMITS
—B—	TOP OF BERM

<b>Kimley Horn</b> 421 FAYETTEVILLE STREET, SUITE 600 RALEIGH, NC 27601	PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM - 2A-3
RIGHT-OF-WAY REV. CONST. REV.	HYDRAULICS ENGINEER	

DocuSigned by:  
*Jennifer Murphy*  
3/31/2020



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



### STREAM TYPICAL SECTION NO. 3

DRAWING NOT TO SCALE

-SMITH CREEK- STA 17+38.00 TO 19+55.00

-Y4WB- STA 54+50.00 TO 56+55.00 RT

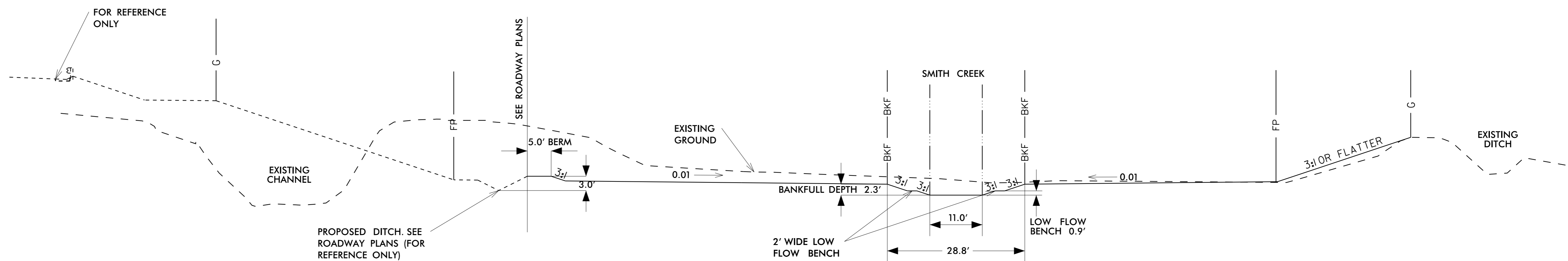
SEE STREAM-7 THRU STREAM-9 FOR RIFFLE AND POOL LOCATIONS



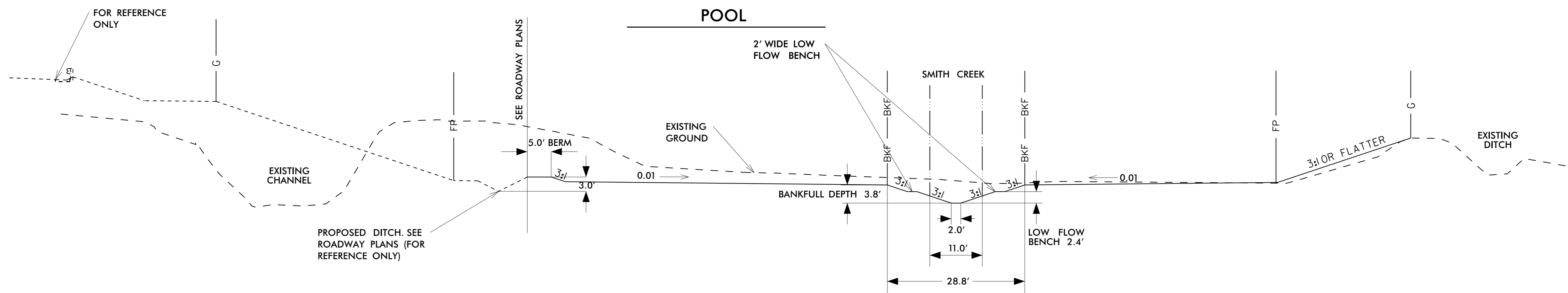
**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

LEGEND	
	CHANNEL TOE
	BANKFULL
	GRADE BREAK POINT
	BACK OF FLOODPLAIN BENCH
	GRADING LIMITS
	TOP OF BERM

**RIFFLE**



**POOL**



**STREAM TYPICAL SECTION NO. 4**

DRAWING NOT TO SCALE

-SMITH CREEK- STA 19+55.00 TO 23+40.00

-Y4WB- STA 56+55.00 TO 60+18.00 RT

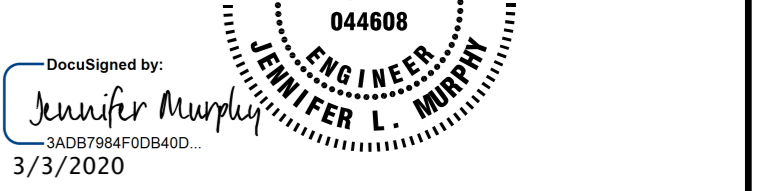
SEE STREAM-7 THRU STREAM-9 FOR RIFFLE AND POOL LOCATIONS

REVISIONS

5/14/99

**Kimley Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601

PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM - 2A-5
HYDRAULICS ENGINEER	

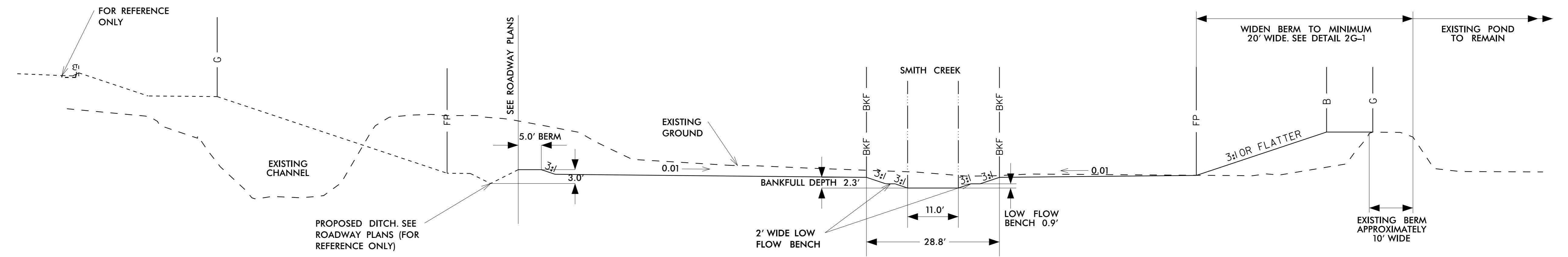


DocuSigned by:  
 Jennifer L. Murphy  
 3426794702040D  
 3/3/2020

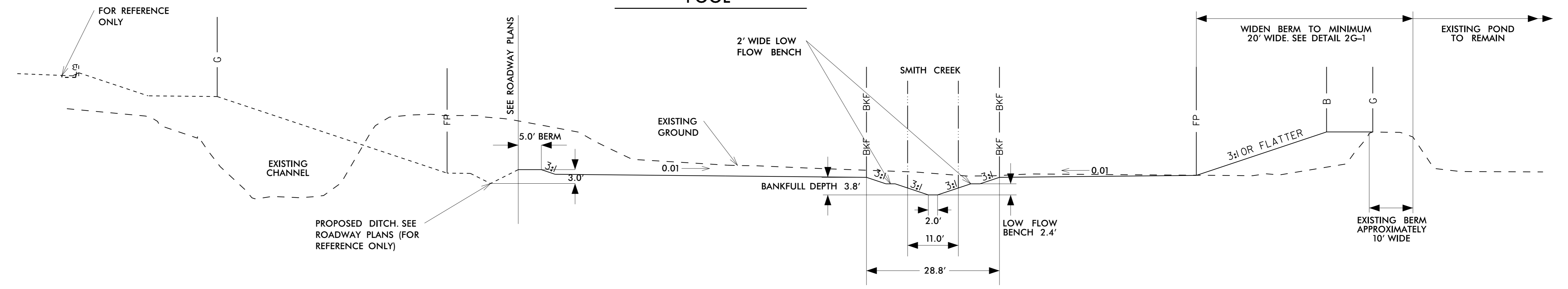
**DOCUMENT NOT CONSIDERED FINAL  
 UNLESS ALL SIGNATURES COMPLETED**

LEGEND	
--- ---	CHANNEL TOE
—BKF—	BANKFULL
—BL—	GRADE BREAK POINT
—FP—	BACK OF FLOODPLAIN BENCH
—G—	GRADING LIMITS
—B—	TOP OF BERM

**RIFFLE**



**POOL**



**STREAM TYPICAL SECTION NO. 5**

DRAWING NOT TO SCALE

-SMITH CREEK- STA 23+44.00 TO 31+32.00

-Y4WB- STA 60+18.00 TO 67+52.00 RT

SEE STREAM-7 THRU STREAM-9 FOR RIFFLE AND POOL LOCATIONS

REVISIONS

LEGEND	
	CHANNEL TOE
	BANKFULL
	GRADE BREAK POINT
	BACK OF FLOODPLAIN BENCH
	GRADING LIMITS
	TOP OF BERM

**Kimley»Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601

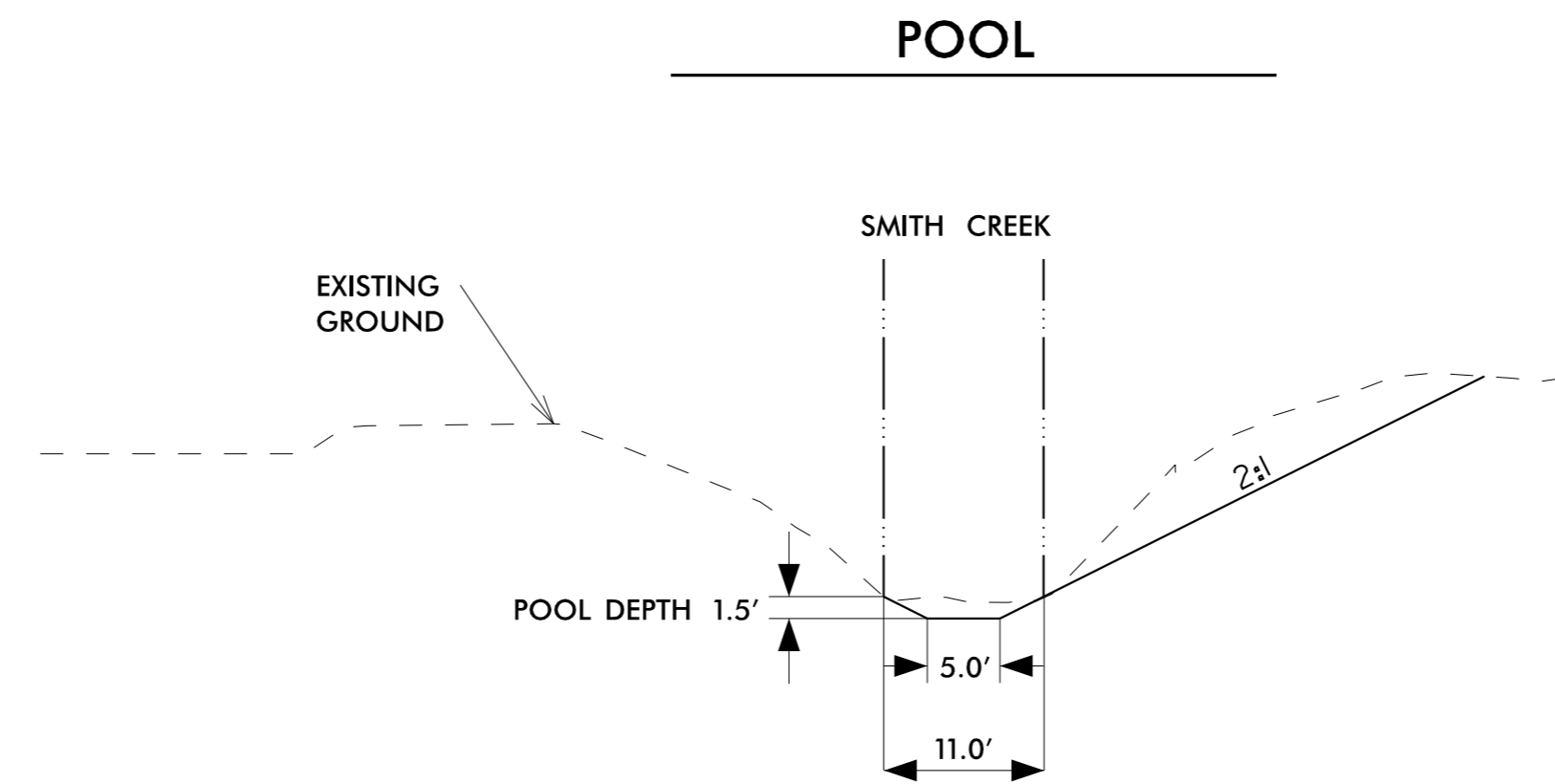
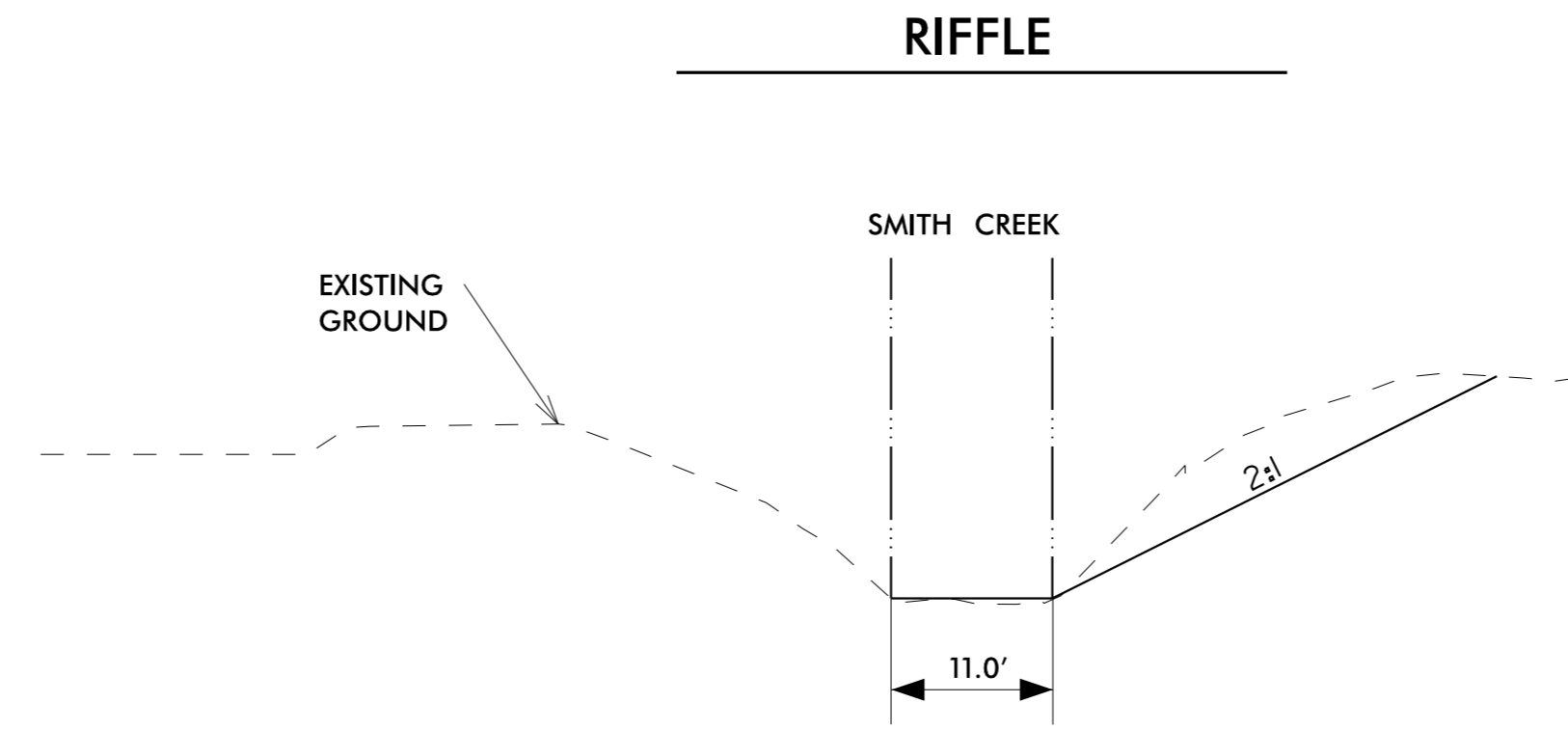
RIGHT-OF-WAY REV.  
 CONST. REV.

PROJECT REFERENCE NO. SHEET NO.  
 U-2579BA STREAM - 2A-6

HYDRAULICS  
 ENGINEER



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



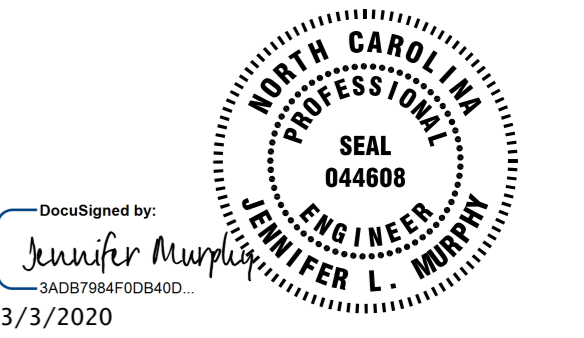
**STREAM TYPICAL SECTION NO. 6**

DRAWING NOT TO SCALE

-SMITH CREEK- STA 31+32.00 TO 32+76.65

-Y4WB- STA 67+52.00 TO 68+07.00 RT

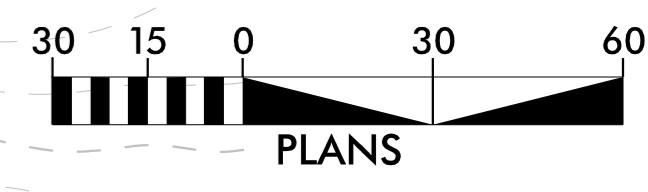
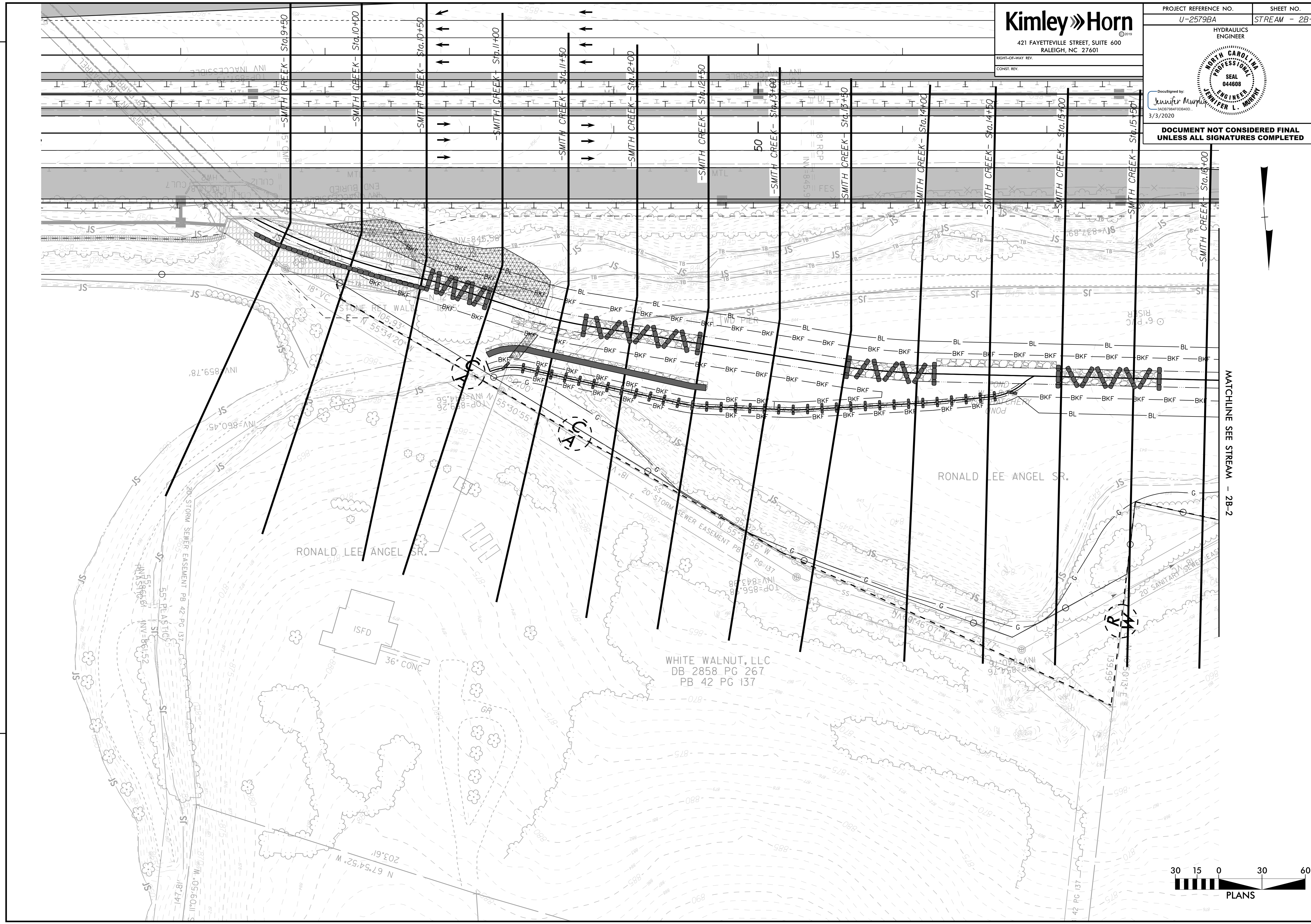
SEE STREAM-7 THRU STREAM-9 FOR RIFFLE AND POOL LOCATIONS



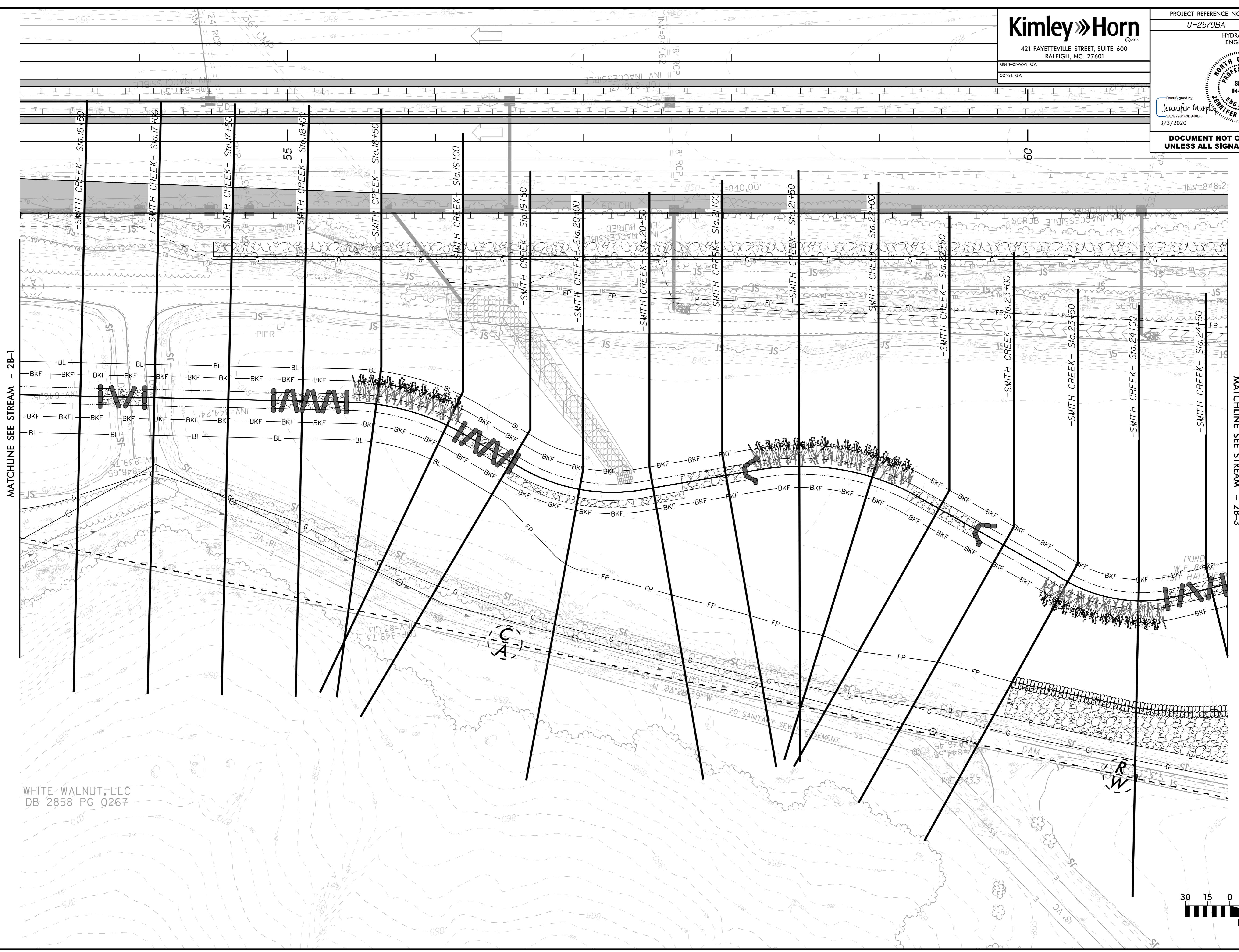
DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

REVISIONS

MATCHLINE SEE STREAM - 2B-2





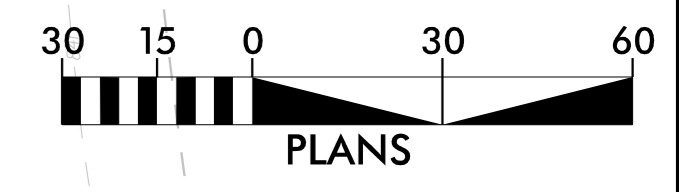


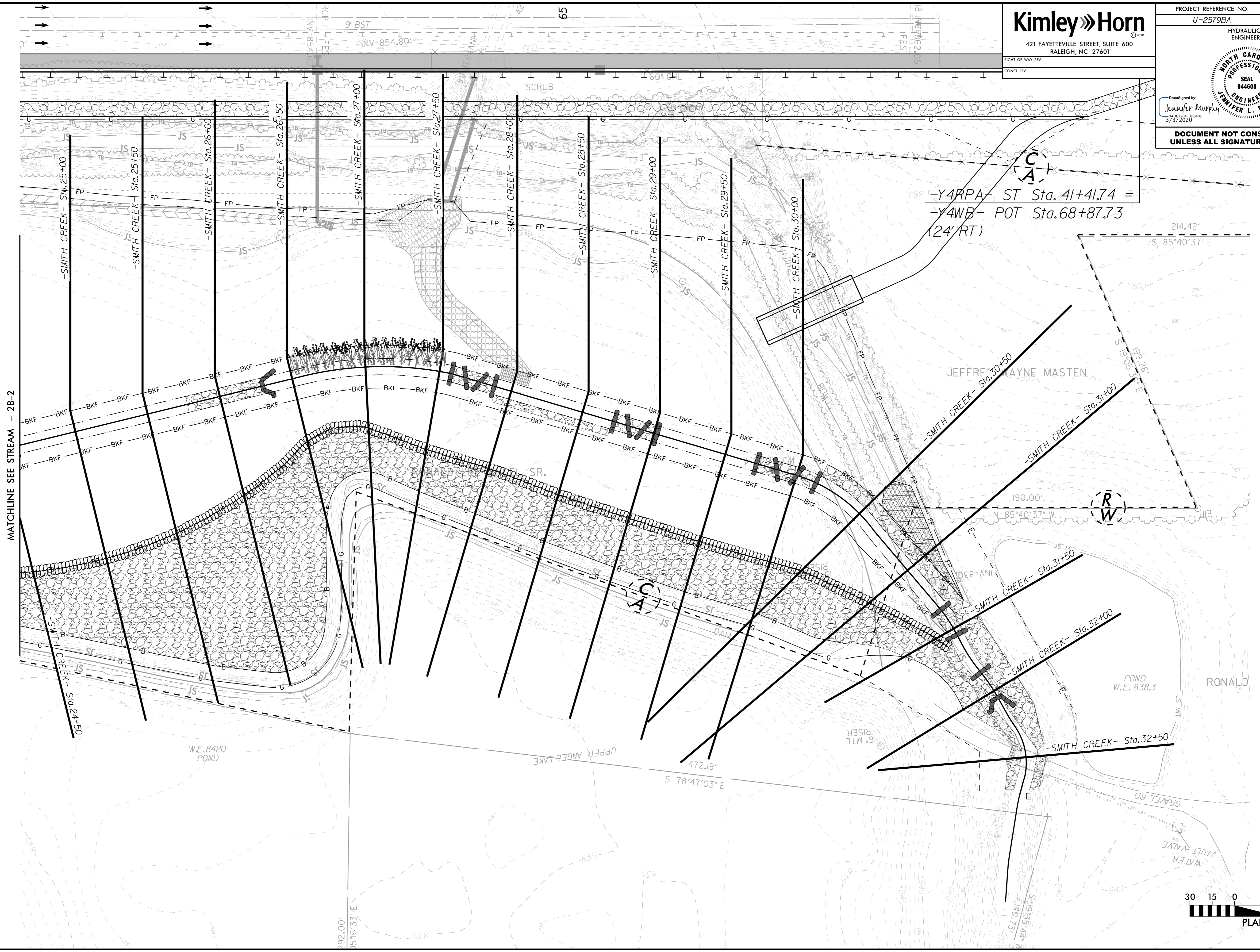
REVISIONS

MATCHLINE SEE STREAM - 2B-1

MATCHLINE SEE STREAM - 2B-3

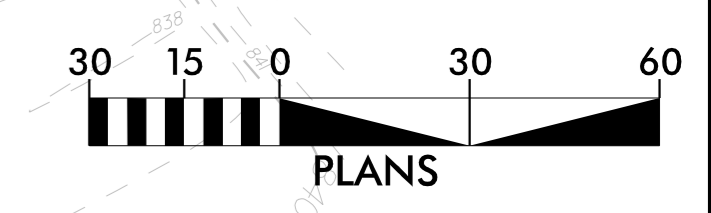
WHITE WALNUT, LLC  
DB 2858 PG 0267





REVISIONS

MATCHLINE SEE STREAM - 2B-2



5/14/19

# CURVE DATA

**Kimley»Horn**

421 FAYETTEVILLE STREET, SUITE 600  
RALEIGH, NC 27601

RIGHT-OF-WAY REV.

CONST. REV.

PROJECT REFERENCE NO.

U-2579BA

SHEET NO.

STREAM - 2B-4

HYDRAULICS  
ENGINEER



DocuSigned by:

Jennifer Murphy

3ADB784F00B45D

3/3/2020

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

-SMITH CREEK-

PI Sta 9+88.43  
Δ = 15° 43' 15.2" (LT)  
D = 12' 37' 08.6"  
L = 124.58'  
T = 62.68'  
R = 454.04'

PI Sta 10+55.50  
Δ = 5° 55' 24.0" (RT)  
D = 57' 17' 44.8"  
L = 10.34'  
T = 5.17'  
R = 100.00'

PI Sta 11+43.66  
Δ = 10° 51' 24.9" (LT)  
D = 18' 49' 14.0"  
L = 57.69'  
T = 28.93'  
R = 304.43'

PI Sta 13+80.47  
Δ = 5° 22' 51.0" (LT)  
D = 9' 42' 29.7"  
L = 55.43'  
T = 27.73'  
R = 590.18'

PI Sta 18+72.22  
Δ = 27° 03' 43.5" (RT)  
D = 35' 25' 17.4"  
L = 76.40'  
T = 38.93'  
R = 161.75'

PI Sta 19+99.00  
Δ = 39° 27' 17.2" (LT)  
D = 46' 19' 54.9"  
L = 85.16'  
T = 44.34'  
R = 123.66'

PI Sta 21+77.26  
Δ = 36° 29' 51.7" (RT)  
D = 34' 50' 49.1"  
L = 104.74'  
T = 54.21'  
R = 164.42'

PI Sta 23+81.54  
Δ = 44° 44' 51.4" (LT)  
D = 55' 36' 10.2"  
L = 80.48'  
T = 42.42'  
R = 103.04'

PI Sta 27+07.70  
Δ = 26° 03' 54.6" (RT)  
D = 25' 15' 15.7"  
L = 103.21'  
T = 52.51'  
R = 226.87'

PI Sta 30+31.57  
Δ = 39° 47' 07.5" (RT)  
D = 56' 25' 47.2"  
L = 70.50'  
T = 36.74'  
R = 101.53'

PI Sta 31+42.73  
Δ = 12° 32' 35.8" (RT)  
D = 57' 17' 44.8"  
L = 21.89'  
T = 10.99'  
R = 100.00'

PI Sta 31+70.89  
Δ = 10° 07' 22.5" (LT)  
D = 57' 17' 44.8"  
L = 17.67'  
T = 8.86'  
R = 100.00'

PI Sta 31+96.31  
Δ = 8° 38' 45.0" (RT)  
D = 57' 17' 44.8"  
L = 15.09'  
T = 7.56'  
R = 100.00'

PI Sta 32+22.04  
Δ = 5° 54' 04.5" (LT)  
D = 57' 17' 44.8"  
L = 10.30'  
T = 5.15'  
R = 100.00'

PI Sta 32+45.99  
Δ = 46° 46' 31.0" (RT)  
D = 131' 48' 38.8"  
L = 35.49'  
T = 18.80'  
R = 43.47'

PI Sta 32+68.99  
Δ = 2° 21' 47.1" (LT)  
D = 18' 42' 37.3"  
L = 12.63'  
T = 6.32'  
R = 306.22'

PI Sta 32+80.02  
Δ = 5° 23' 55.4" (LT)  
D = 57' 17' 44.8"  
L = 9.42'  
T = 4.71'  
R = 100.00'

PI Sta 33+21.77  
Δ = 4° 55' 51.4" (LT)  
D = 57' 17' 44.8"  
L = 8.61'  
T = 4.31'  
R = 100.00'

-SMITH TRIB-

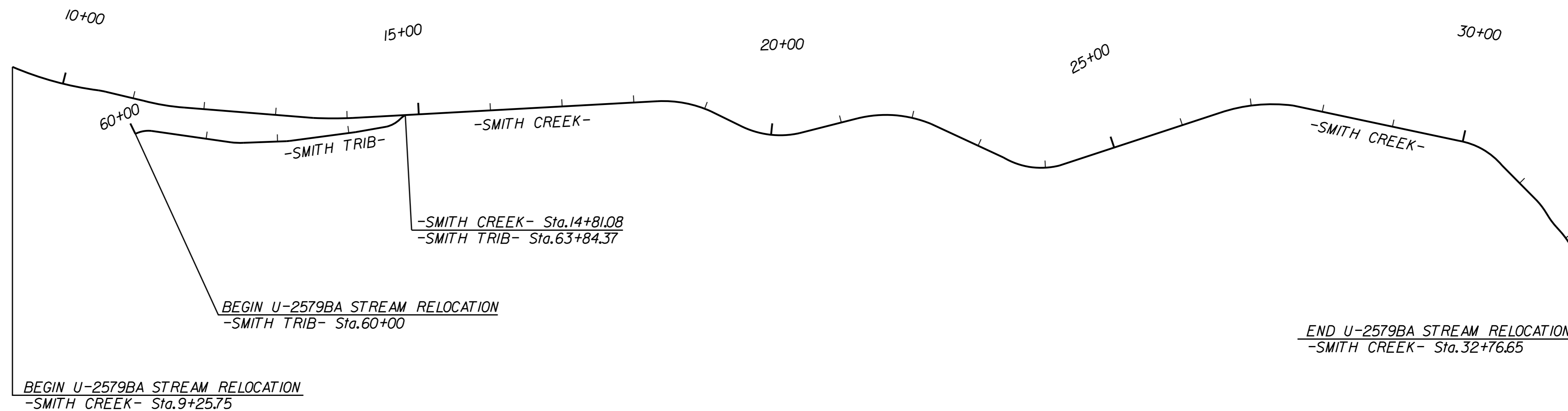
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Δ = 31° 31' 56.8" (RT)  
D = 135' 20' 31.0"  
L = 23.30'  
T = 11.95'  
R = 42.33'

PI Sta 61+43.60  
Δ = 9° 52' 40.1" (LT)  
D = 57' 17' 44.8"  
L = 17.24'  
T = 8.64'  
R = 100.00'

PI Sta 62+14.72  
Δ = 5° 20' 37.0" (LT)  
D = 114' 35' 29.6"  
L = 4.66'  
T = 2.33'  
R = 50.00'

PI Sta 63+64.26  
Δ = 31° 37' 53.4" (LT)  
D = 146' 13' 08.3"  
L = 21.63'  
T = 11.01'  
R = 39.18'

PI Sta 63+79.61  
Δ = 13° 52' 09.4" (RT)  
D = 144' 50' 00.3"  
L = 9.58'  
T = 4.81'  
R = 39.56'



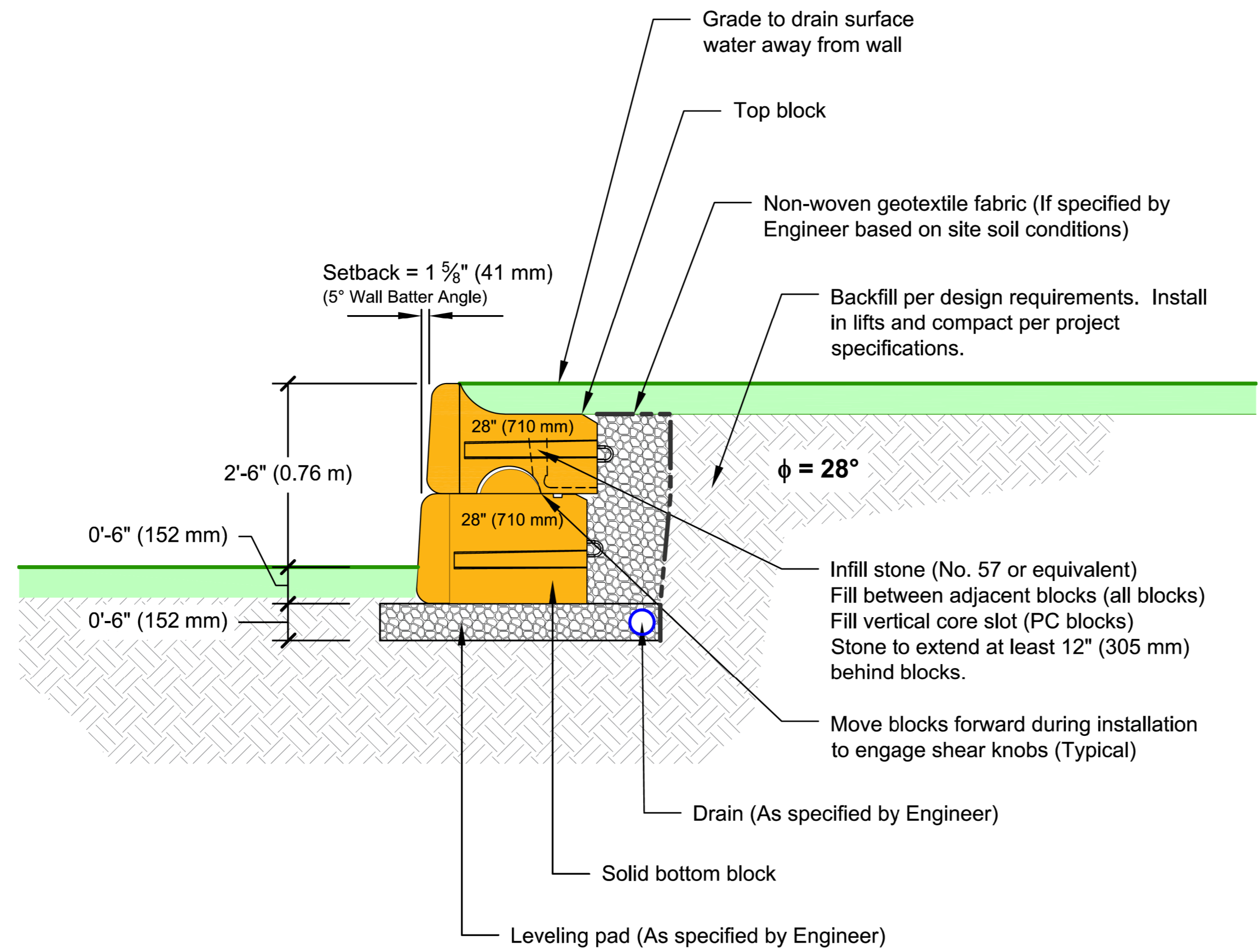
REVISIONS

NOTE: THE DETAILS BELOW REPRESENT A PRECAST CONCRETE GRAVITY WALL WITH NATURAL BOULDER APPEARANCE ALONG FACE (PER PLANS). THIS PRODUCT OR A COMPARABLE PRODUCT CAN BE UTILIZED ON THIS PROJECT. A PRODUCT SUBMITTAL AND DESIGN TO BE APPROVED BY THE ENGINEER WILL BE REQUIRED.

$\phi = 28^\circ$  | SILTY SAND or CLAYEY SAND  
**LOAD CONDITION A** | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

**2 BLOK HIGH SECTION**  
 (2) 28" (710 mm) Blocks

**PRELIMINARY**  
 Professional Engineering Design  
 Required for Construction



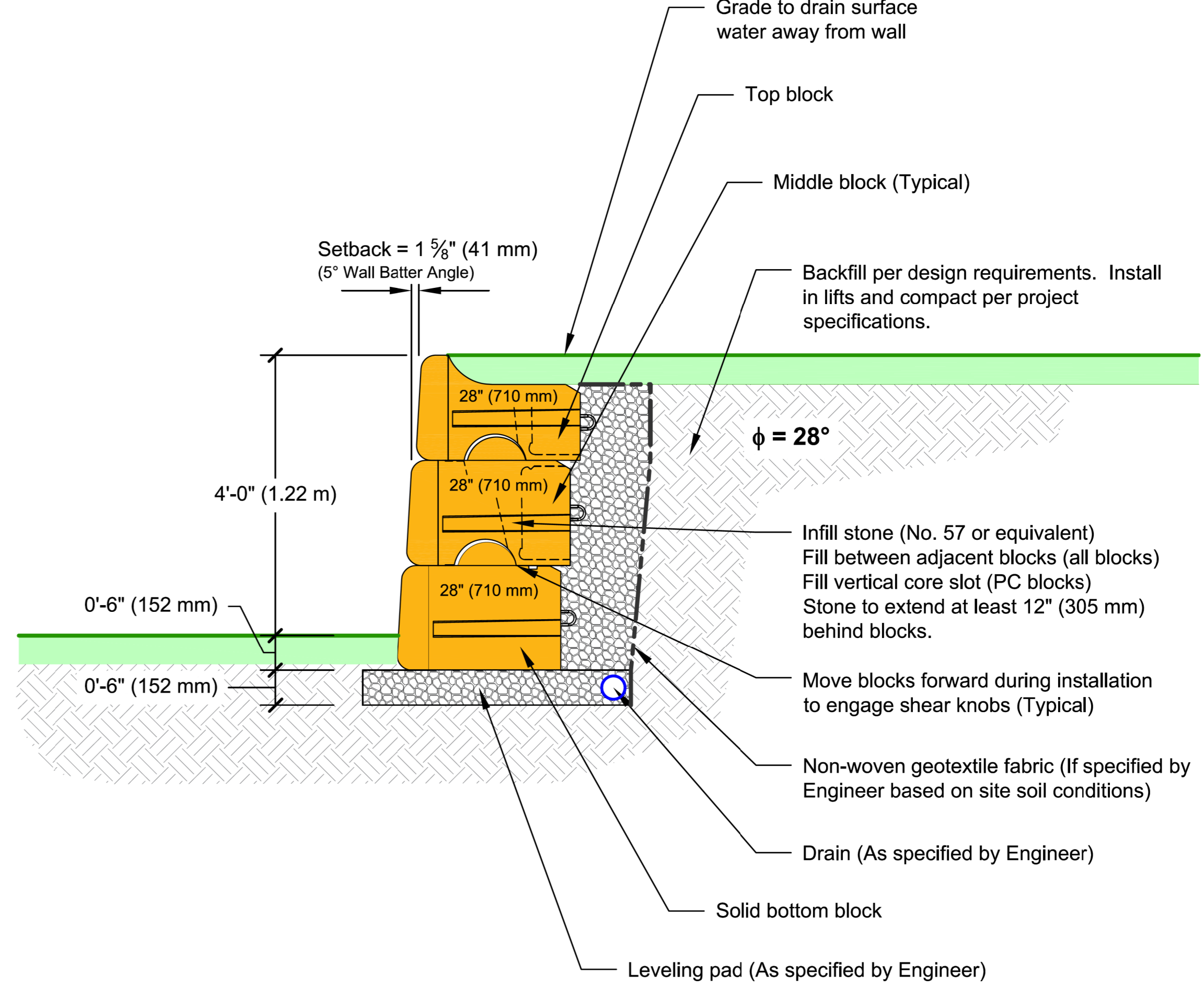
This drawing is for reference only. Determination of the suitability and/or manner of use of any details contained in this document is the sole responsibility of the design engineer of record. Final project designs, including all construction details, shall be prepared by a licensed professional engineer using the actual conditions of the proposed site. Final wall design must address both internal and external drainage and all modes of wall stability.

DRAWN BY: C. Kruger	TITLE: <b>Preliminary Wall Section</b>	<p>05481 US 31 SOUTH, CHARLEVOIX, MI 49720        (866) 222-8400 ext 3010 • engineering@redi-rock.com        www.redi-rock.com</p>
APPROVED BY: J. Johnson	Silty Sand or Clayey Sand, $\phi = 28^\circ$	
DATE: June 10, 2015	No Live Load Surcharge, No Back Slope, No Toe Slope	
SHEET: 1 of 1	FILE: A_28_B_28_36_cad.dwg	

$\phi = 28^\circ$  | SILTY SAND or CLAYEY SAND  
**LOAD CONDITION A** | NO LIVE LOAD SURCHARGE, NO BACK SLOPE, NO TOE SLOPE

**3 BLOCK HIGH SECTION**  
 (3) 28" (710 mm) Blocks

**PRELIMINARY**  
 Professional Engineering Design  
 Required for Construction

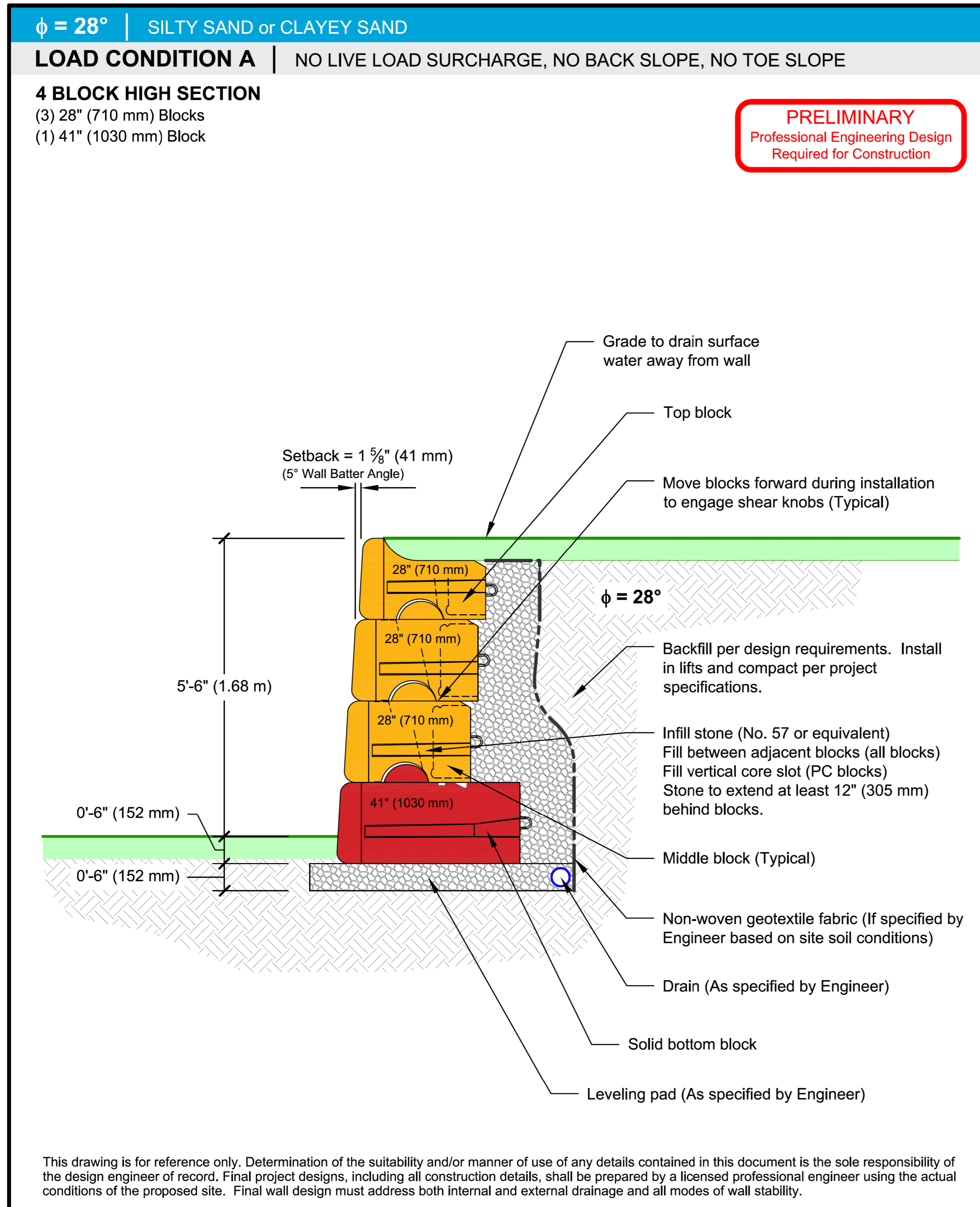


This drawing is for reference only. Determination of the suitability and/or manner of use of any details contained in this document is the sole responsibility of the design engineer of record. Final project designs, including all construction details, shall be prepared by a licensed professional engineer using the actual conditions of the proposed site. Final wall design must address both internal and external drainage and all modes of wall stability.

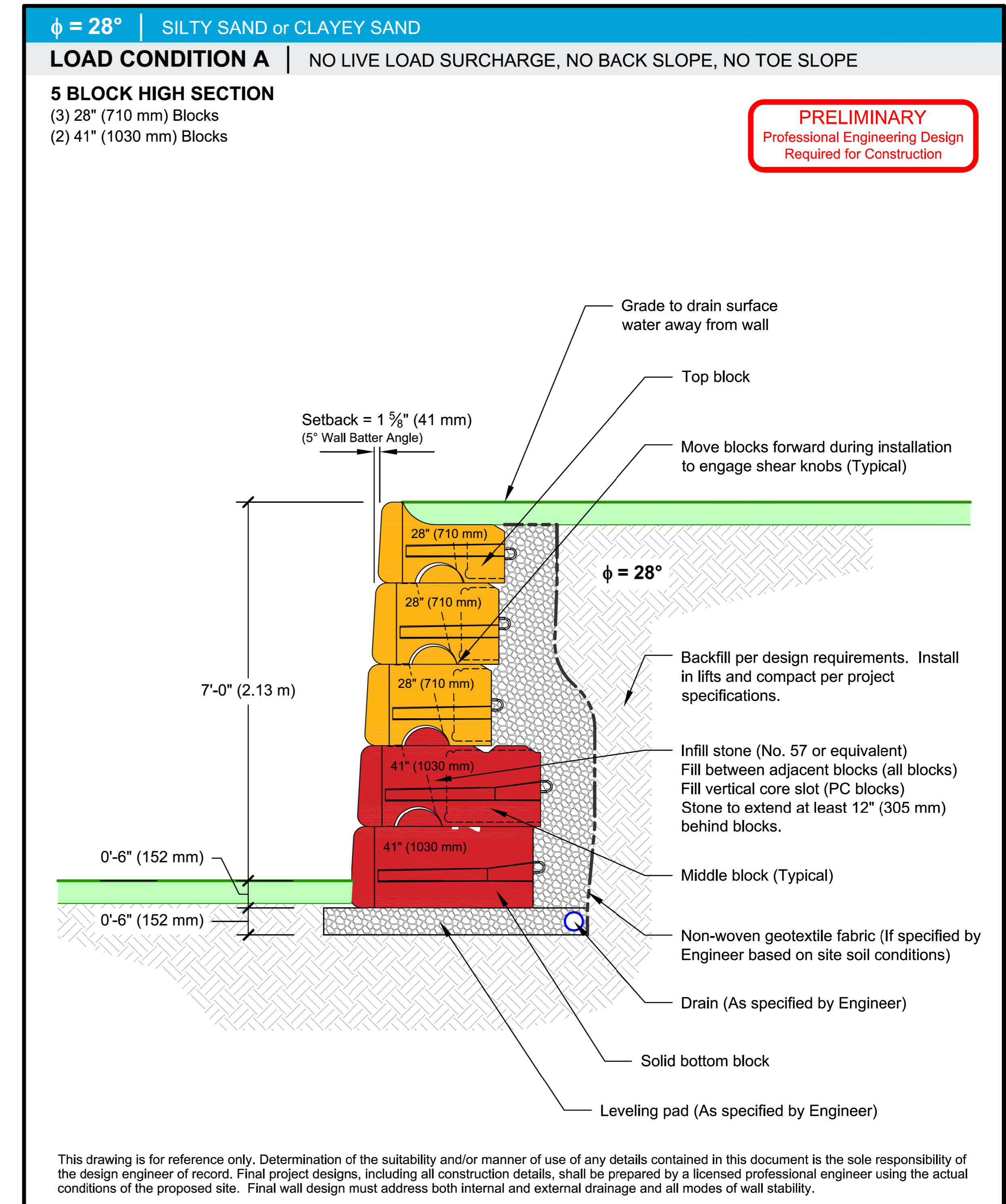
DRAWN BY: C. Kruger	TITLE: <b>Preliminary Wall Section</b>	<p>05481 US 31 SOUTH, CHARLEVOIX, MI 49720        (866) 222-8400 ext 3010 • engineering@redi-rock.com        www.redi-rock.com</p>
APPROVED BY: J. Johnson	Silty Sand or Clayey Sand, $\phi = 28^\circ$	
DATE: June 10, 2015	No Live Load Surcharge, No Back Slope, No Toe Slope	
SHEET: 1 of 1	FILE: A_30_B_28_54_cad.dwg	

5/14/2015 10:59:59 AM

NOTE: THE DETAILS BELOW REPRESENT A PRECAST CONCRETE GRAVITY WALL WITH NATURAL BOULDER APPEARANCE ALONG FACE (PER PLANS). THIS PRODUCT OR A COMPARABLE PRODUCT CAN BE UTILIZED ON THIS PROJECT. A PRODUCT SUBMITTAL AND DESIGN TO BE APPROVED BY THE ENGINEER WILL BE REQUIRED.



DRAWN BY: C. Kruger	TITLE: <b>Preliminary Wall Section</b> Silty Sand or Clayey Sand, φ = 28° No Live Load Surcharge, No Back Slope, No Toe Slope	 05481 US 31 SOUTH, CHARLEVOIX, MI 49720 (866) 222-8400 ext 3010 • engineering@redi-rock.com www.redi-rock.com
APPROVED BY: J. Johnson		
DATE: June 10, 2015		
SHEET: 1 of 1	FILE: A_28_B_41_72_cad.dwg	



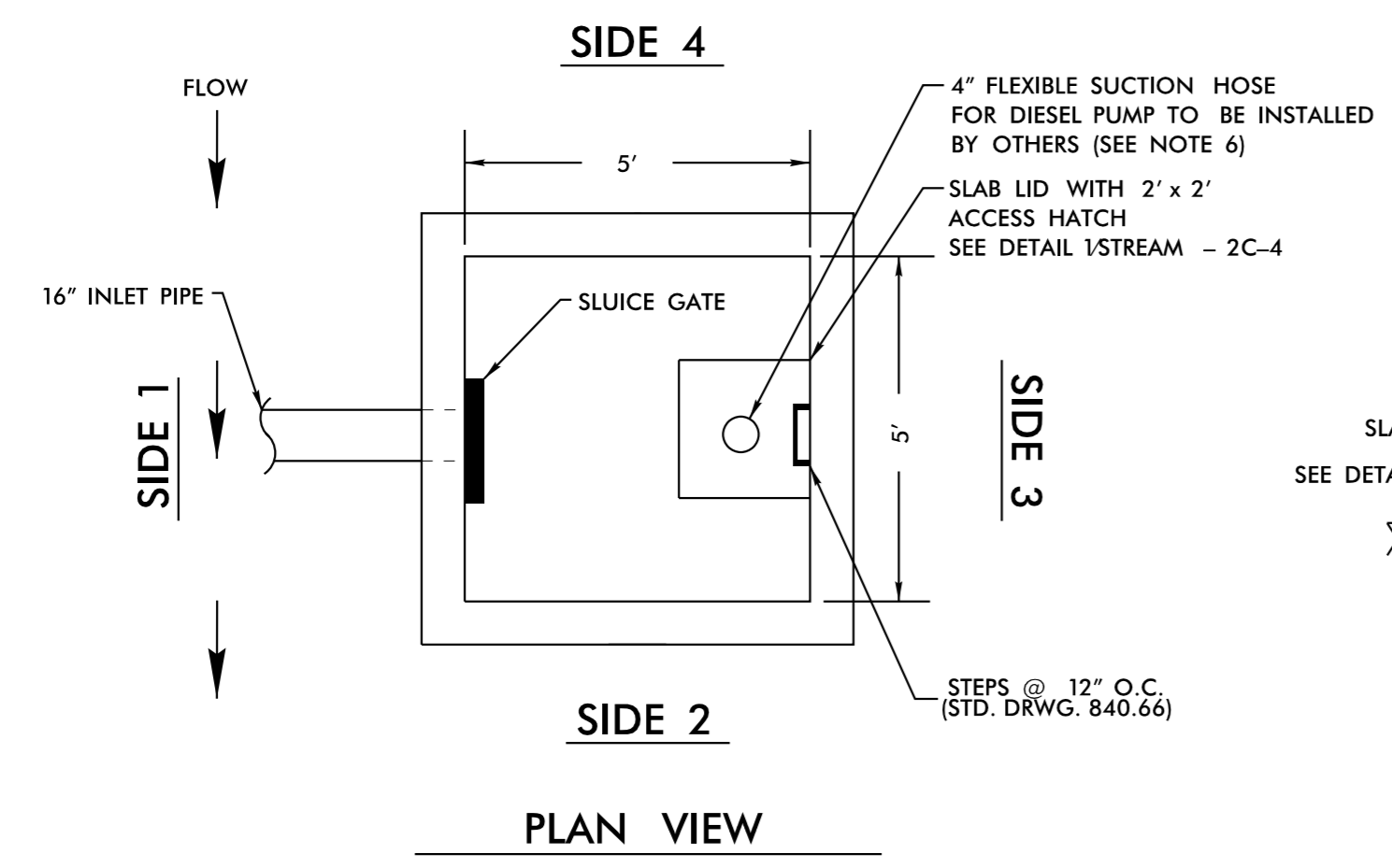
DRAWN BY: C. Kruger	TITLE: <b>Preliminary Wall Section</b> Silty Sand or Clayey Sand, φ = 28° No Live Load Surcharge, No Back Slope, No Toe Slope	 05481 US 31 SOUTH, CHARLEVOIX, MI 49720 (866) 222-8400 ext 3010 • engineering@redi-rock.com www.redi-rock.com
APPROVED BY: J. Johnson		
DATE: June 10, 2015		
SHEET: 1 of 1	FILE: A_28_B_41_90_cad.dwg	

5/14/2015 10:59:59 AM

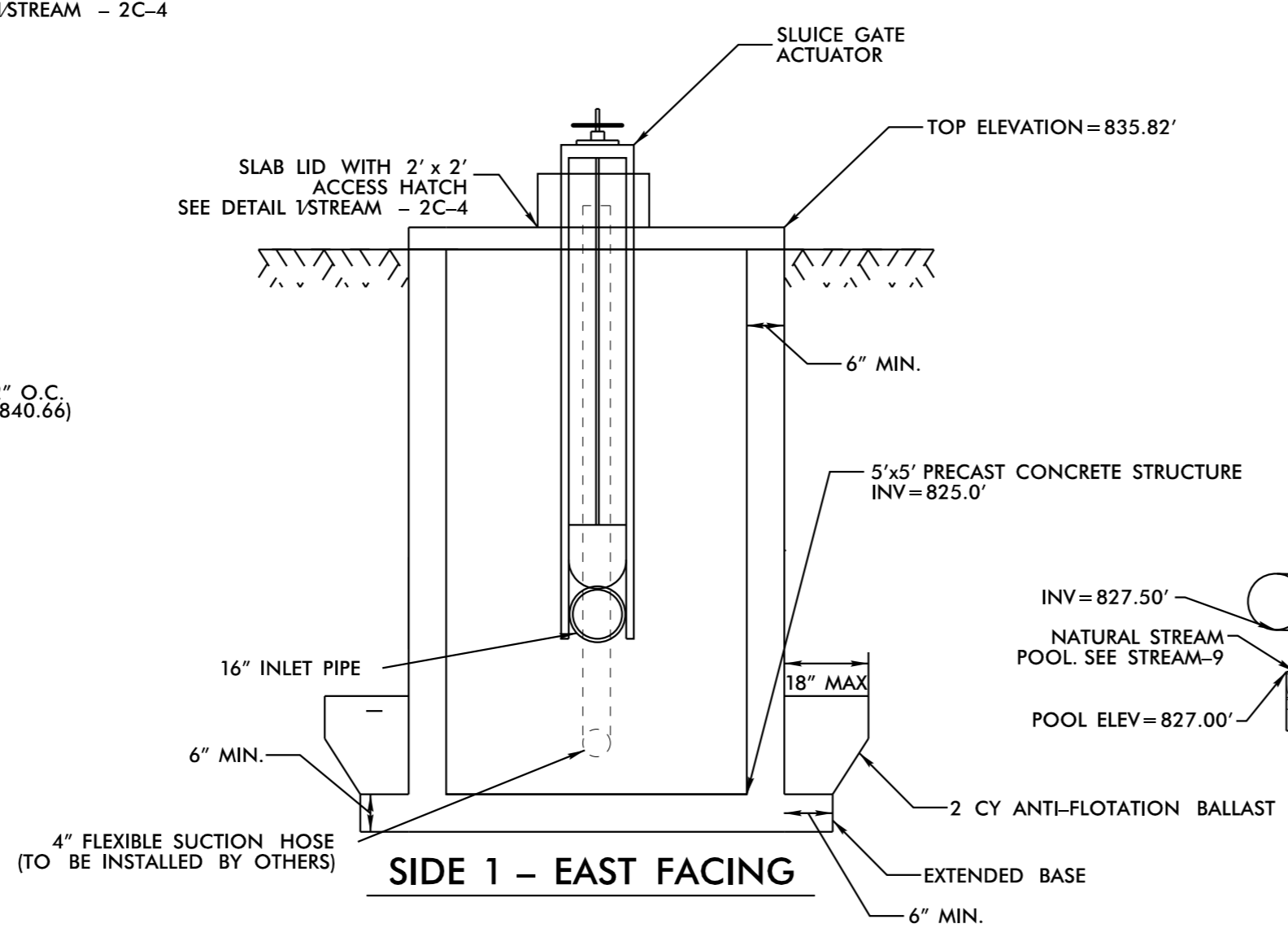
5/14/20

# DETAIL STREAM INTAKE VAULT (SEE SPECIAL PROVISIONS)

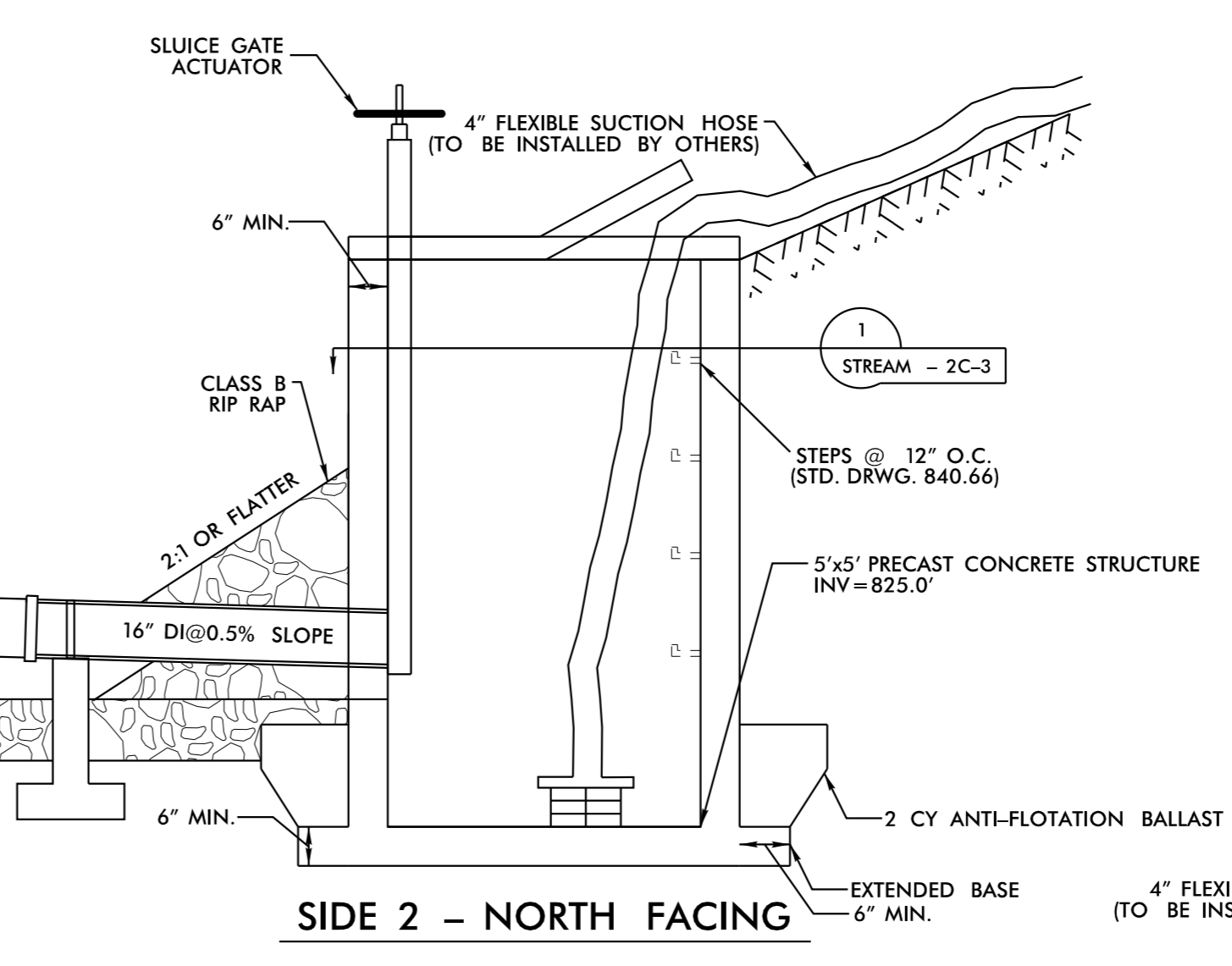
\*NOT TO SCALE\*



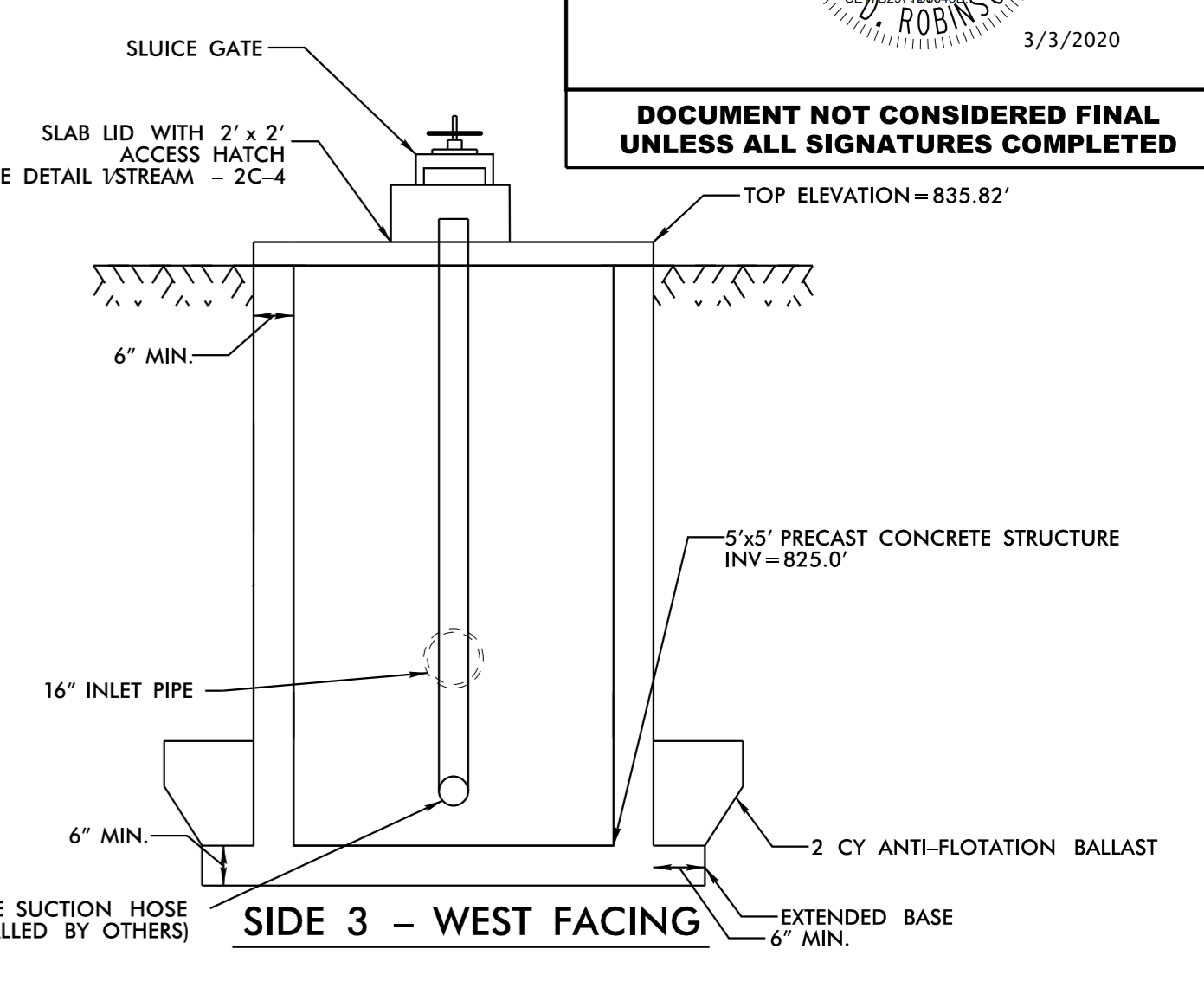
1	ACCESS HATCH
STREAM - 2C-3	SCALE: N.T.S.



2	CONCRETE VAULT STRUCTURE
STREAM - 2C-3	SCALE: N.T.S.

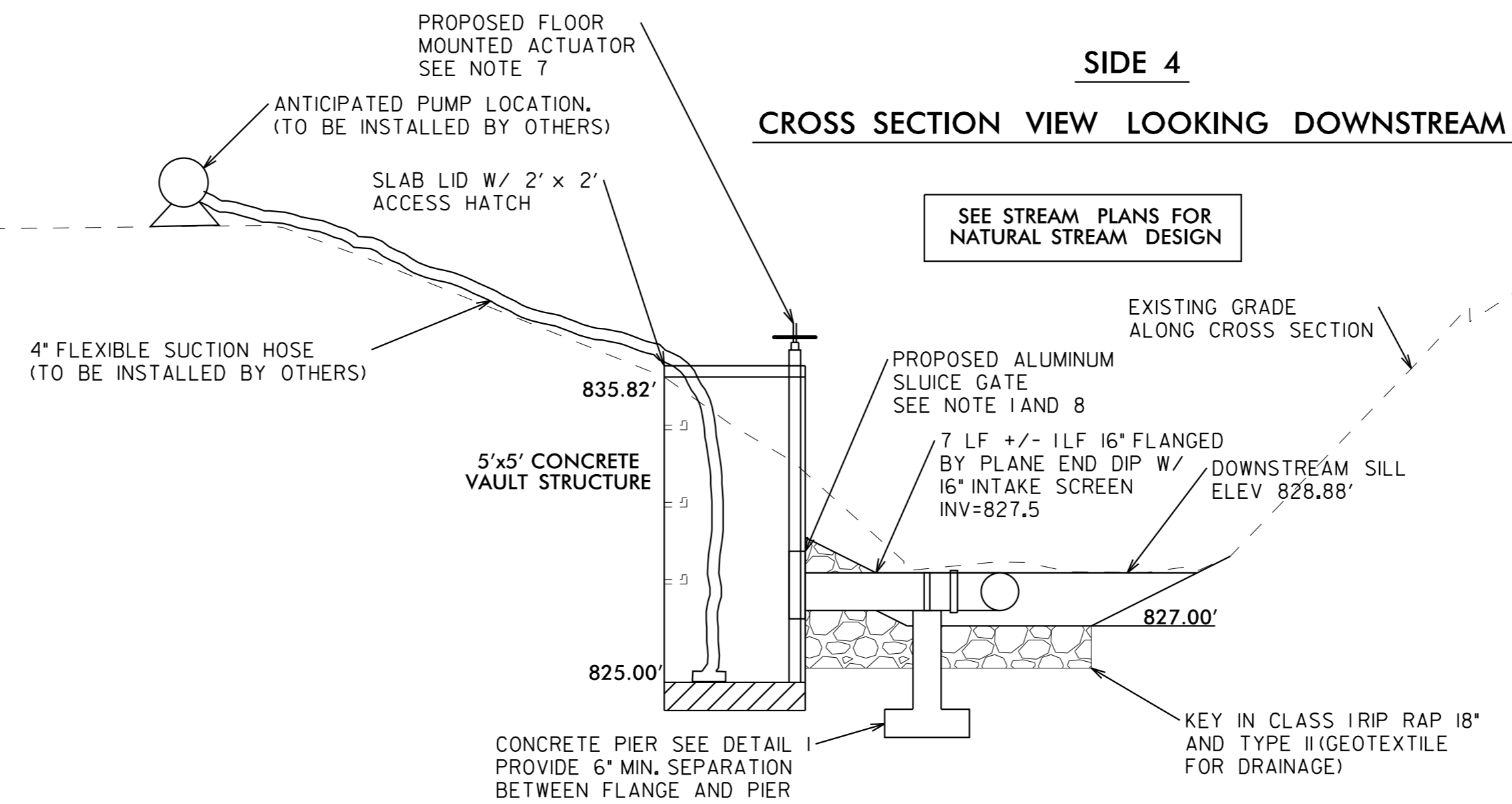


3	CONCRETE VAULT STRUCTURE
STREAM - 2C-3	SCALE: N.T.S.



4	CONCRETE VAULT STRUCTURE
STREAM - 2C-3	SCALE: N.T.S.

- NOTES:
1. SLUICE GATE IS FOR INTAKE VAULT AND SHOULD REMAIN CLOSED DURING NORMAL OPERATION.
  2. SLUICE GATE SHALL PROVIDE WATERTIGHT SEAL. PROVIDE ADEQUATE CLEARANCE FOR INTAKE VAULT OPERATION.
  3. SELECT BOX STANDARD AS REQUIRED TO ACCOMMODATE SLUICE GATE AND SLAB LID WITH ACCESS HATCH.
  4. ENSURE ACCESS HATCH OPENS FREELY AND WITHOUT INTERFERENCE WITH SLUICE GATE.
  5. ADJUST FOOTER DIMENSIONS AS NEEDED FOR ANTI-FLOTATION. ANTI-FLOTATION BALLAST IS REQUIRED AND SHALL BE CONCRETE. WET WELL STRUCTURE MAY BE SUBSTITUTED, SHOP DRAWINGS MUST BE SUBMITTED FOR APPROVAL BY ENGINEER.
  6. BYPASS PUMP, SUCTION HOSE, AND DISCHARGE HOSE NOT IN CONTRACT. SEE SPECIAL PROVISIONS.
  7. SLUICE GATE SHALL BE WALL MOUNTED AND SEAL A 16" WALL PENETRATION UNDER A MINIMUM OF 10' OF HEAD. SLUICE GATE SHALL BE SERIES A-121 AS MANUFACTURED BY RODNEY HUNT COMPANY OR APPROVED EQUAL.
  8. SLUICE GATE SHALL HAVE STAINLESS STEEL ACME THREADED RISING STEMS WITH AN UNGEARED, FLOOR MOUNTED HANDWHEEL ACTUATOR WITH A STEM COVER AND INDICATOR. ALL METALLIC HARDWARE BELOW THE RIM OF THE STRUCTURE SHALL BE STAINLESS STEEL OR ALUMINUM. SUPPLY STEM GUIDES AND BRACKETS AS NECESSARY TO PREVENT BUCKLING OF STEM.



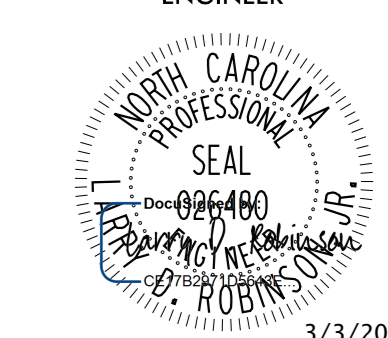
5	ACCESS HATCH
STREAM - 2C-3	SCALE: N.T.S.

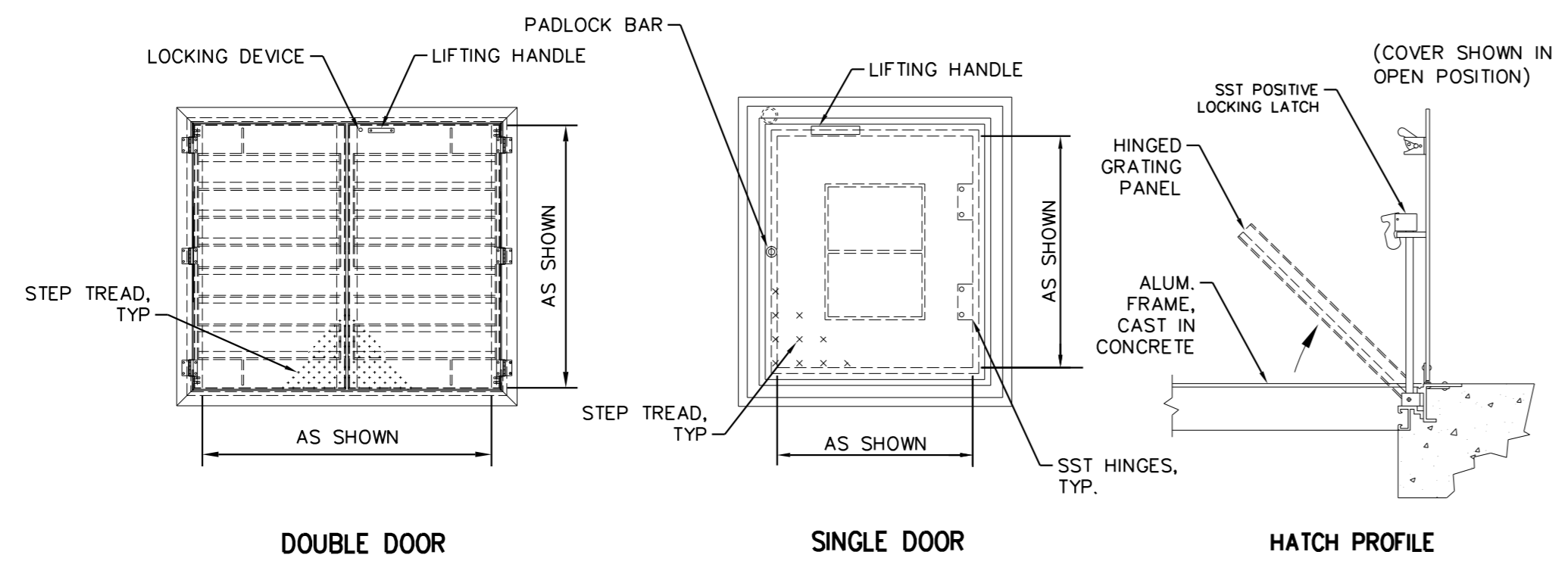
PROJECT REFERENCE NO. <b>U-2579BA</b>	SHEET NO. <b>STREAM - 2C-3</b>
R/W SHEET NO.	
HYDRAULIC DESIGN ENGINEER	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

421 FAYETTEVILLE STREET, SUITE 600  
RALEIGH, NC 27601

5/14/19

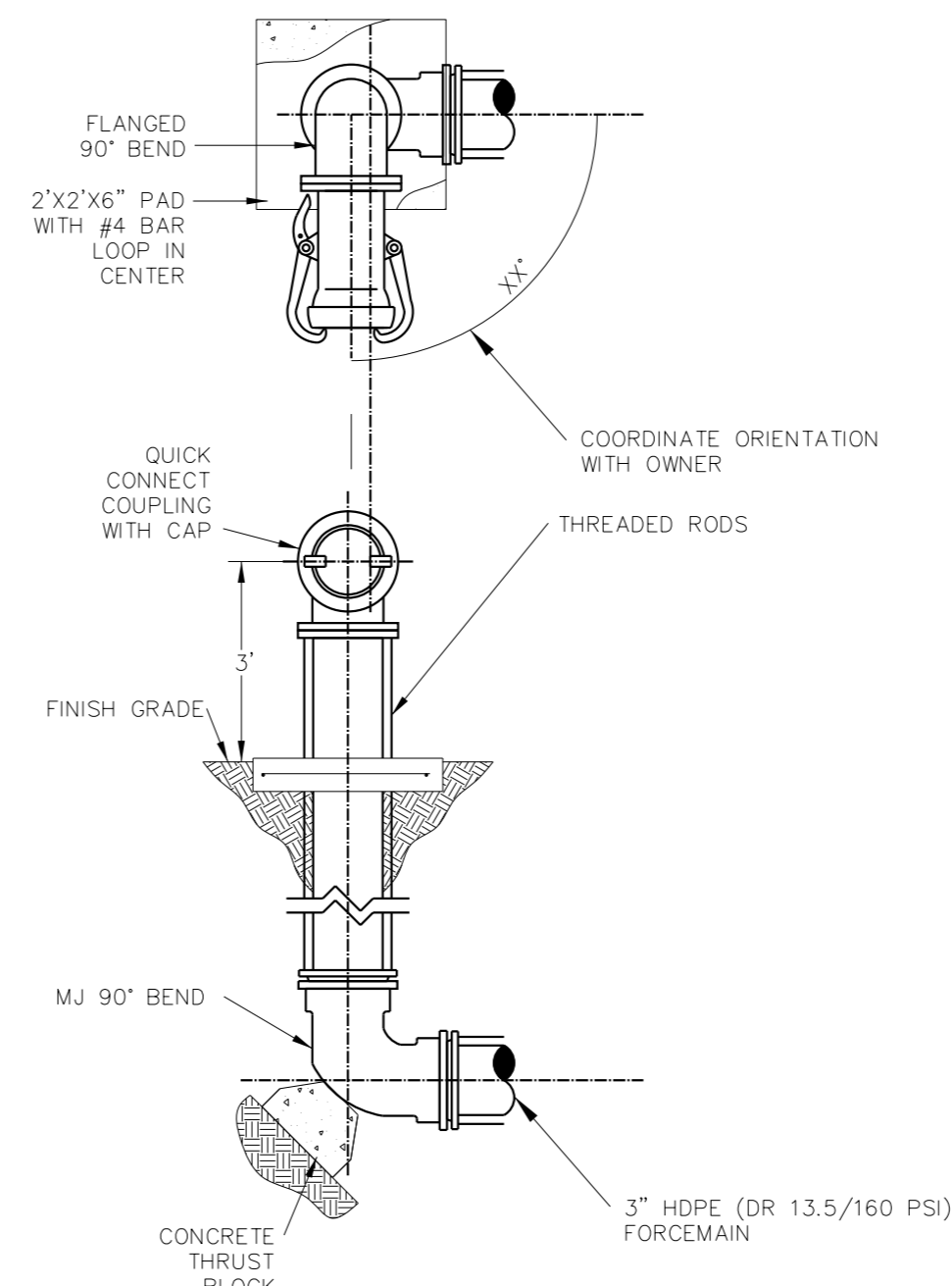
# DETAIL STREAM INTAKE VAULT (SEE SPECIAL PROVISIONS)

<b>PROJECT REFERENCE NO.</b> U-2579BA	<b>SHEET NO.</b> STREAM - 2C-4
<b>R/W SHEET NO.</b> HYDRAULIC DESIGN ENGINEER	
	
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



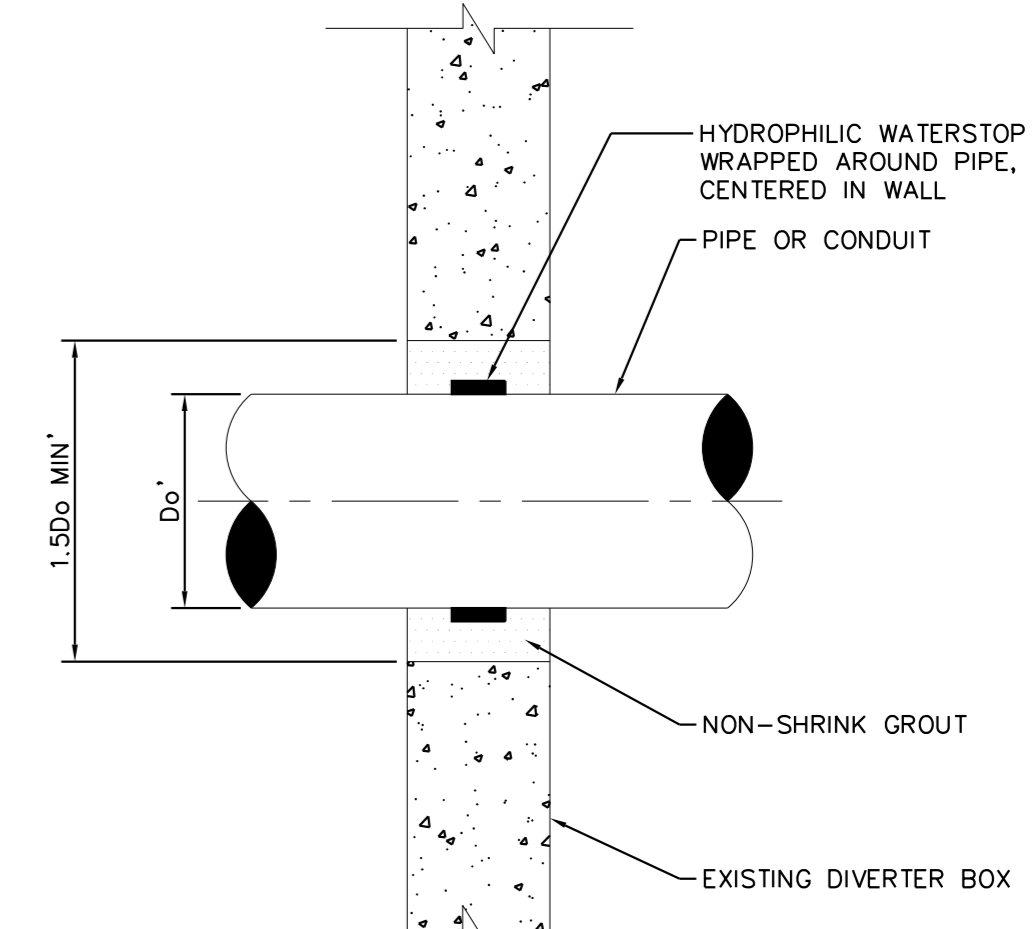
- NOTES:**
1. ALL HATCH COMPONENTS SHALL BE SST OR ALUMINUM.
  2. HATCHES SHALL BE WATERPROOF AND RATED FOR 300PSF.
  3. EXPOSED HARDWARE SHALL BE TAMPER-PROOF.
  4. FALL PROTECTION SHALL BE IN ACCORDANCE WITH OSHA REQUIREMENTS.
  5. CONTRACTOR SHALL CONFIRM THAT DIMENSIONS ARE ADEQUATE FOR INSTALLATION, REMOVAL, AND MAINTENANCE OF EQUIPMENT WITH EQUIPMENT MANUFACTURERS.

1	<b>ACCESS HATCH</b>
STREAM - 2C-4	SCALE: N.T.S.



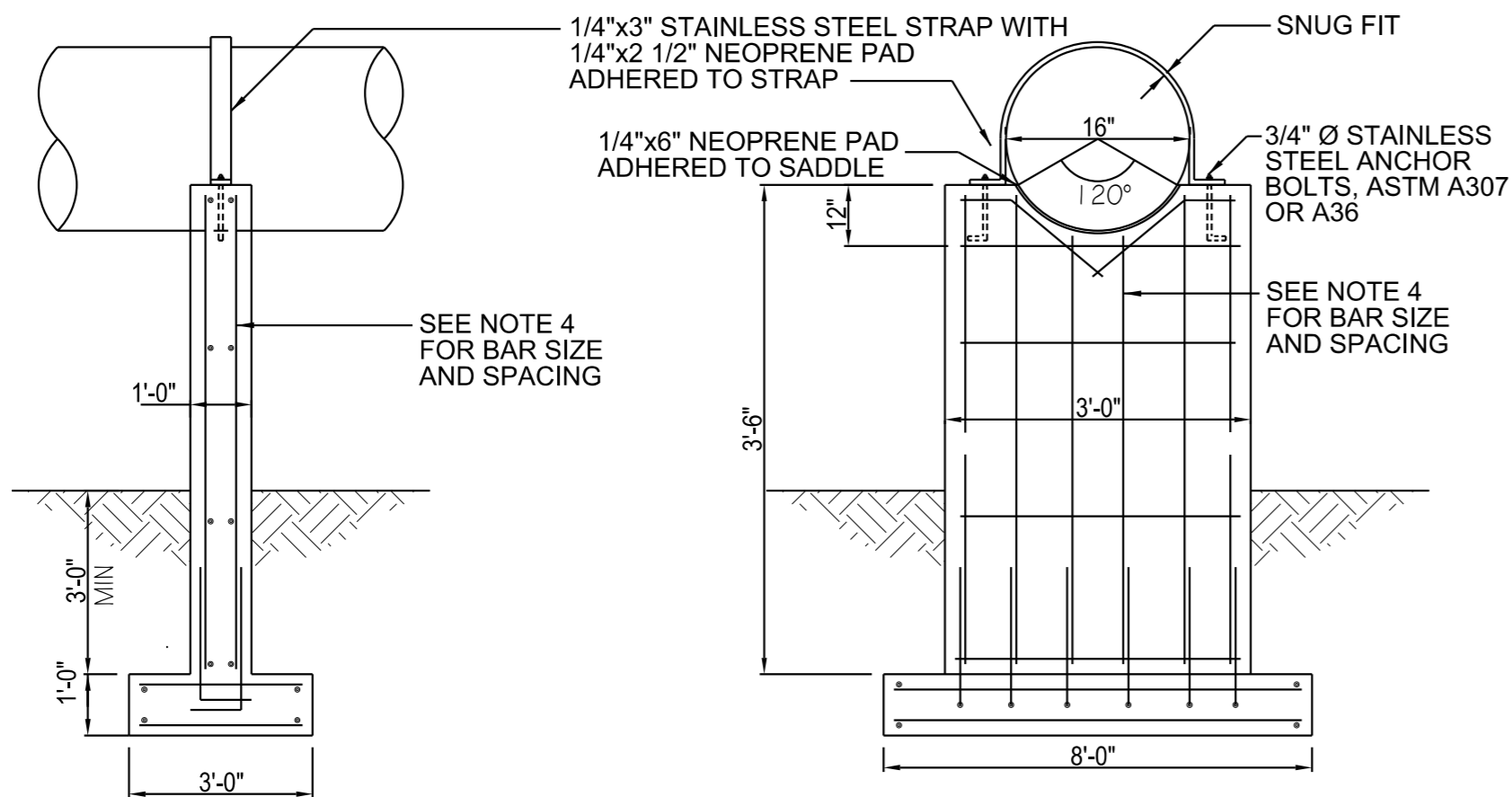
- NOTE:**
- 1.) SHOWN FOR INFORMATION ONLY, TO BE INSTALLED BY OTHERS.
  - 2.) ALL PIPE AND FITTINGS SHALL BE THE SAME DIAMETER AS FORCE MAIN UNLESS NOTED.
  - 3.) QUICK CONNECT FITTING SHALL BE BAUER/BALL AND SOCKET TYPE FOR 6" AND LARGER. CAMLOCK STYLE SHALL BE USED FOR 4" AND SMALLER. CONTRACTOR SHALL CONFIRM QUICK CONNECTION TYPE AND ORIENTATION WITH OWNER.

2	<b>EMERGENCY BYPASS PUMPING DISCHARGE CONNECTION</b>
STREAM - 2C-4	SCALE: N.T.S.



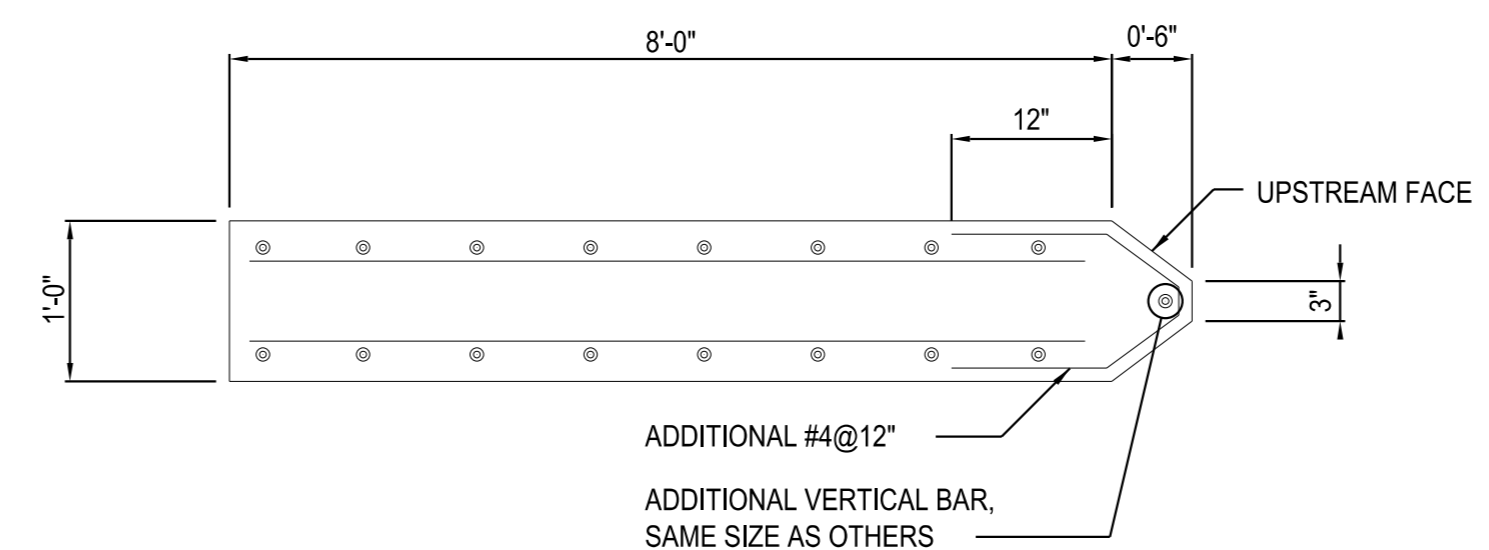
- NOTE:**
- 1.) SHOWN FOR INFORMATION ONLY, TO BE INSTALLED BY OTHERS.

3	<b>PERMANENT PIPE PENETRATION</b>
STREAM - 2C-4	SCALE: N.T.S.

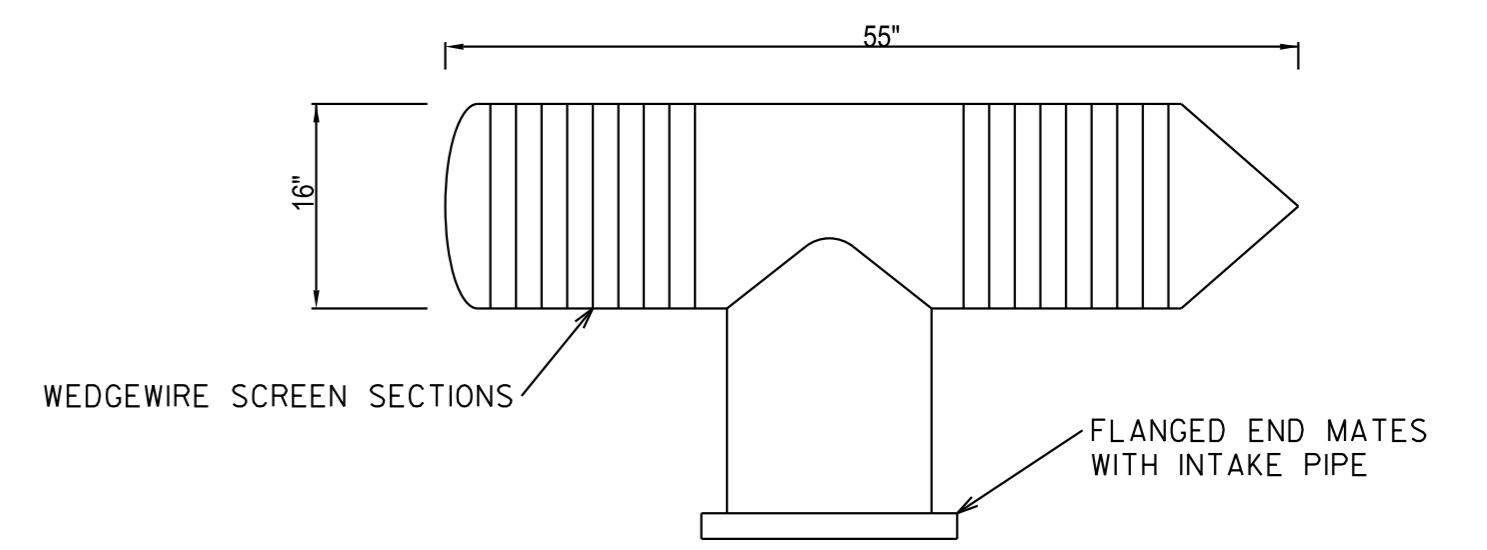


4	<b>CONCRETE PIER DETAIL</b>
STREAM - 2C-4	SCALE: N.T.S.

- NOTES:**
1. SHALLOW FOUNDATION DESIGN SHOWN ON THIS DETAIL IS BASED ON THE FOLLOWING PARAMETERS:  
ALLOWABLE SOIL BEARING CAPACITY = 2000 PSF  
CONCRETE COMPRESSIVE STRENGTH = 4000 PSI  
GRADE 60 REINFORCING STEEL  
MAXIMUM STREAM VELOCITY = 10 FT/SEC  
MAXIMUM SUPPORT HEIGHT (H) = 12'-0"  
IF FIELD CONDITIONS REQUIRE ANY DEVIATION FROM THESE PARAMETERS, THE FOUNDATION DESIGN SHALL BE REVIEWED BY THE ENGINEER.
  2. IF SUBGRADE AT LOCATION OF SUPPORTS IS DEEMED UNABLE TO WITHSTAND 2000 PSF BEARING PRESSURE, NOTIFY ENGINEER.
  3. IF BEDROCK IS ENCOUNTERED WHICH WILL PREVENT 3-FEET MINIMUM COVER OVER FOOTING, DOWELS SHALL BE DRILLED INTO BEDROCK PRIOR TO PLACING FOUNDATION. NOTIFY ENGINEER.
  4. TWELVE-INCH AND FOURTEEN-INCH THICK PIERS AND FOOTINGS SHALL BE REINFORCED WITH #5 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE. EIGHTEEN-INCH WIDE PIERS AND FOOTINGS SHALL BE REINFORCED WITH #7 BARS AT 12 INCHES OC IN EACH DIRECTION ON EACH FACE.
  5. SHOP DRAWINGS ARE REQUIRED FOR THE STREAM INTAKE VAULT DESIGN AND COMPONENTS



5	<b>CONCRETE PIER DETAIL PLAN</b>
STREAM - 2C-4	SCALE: N.T.S.

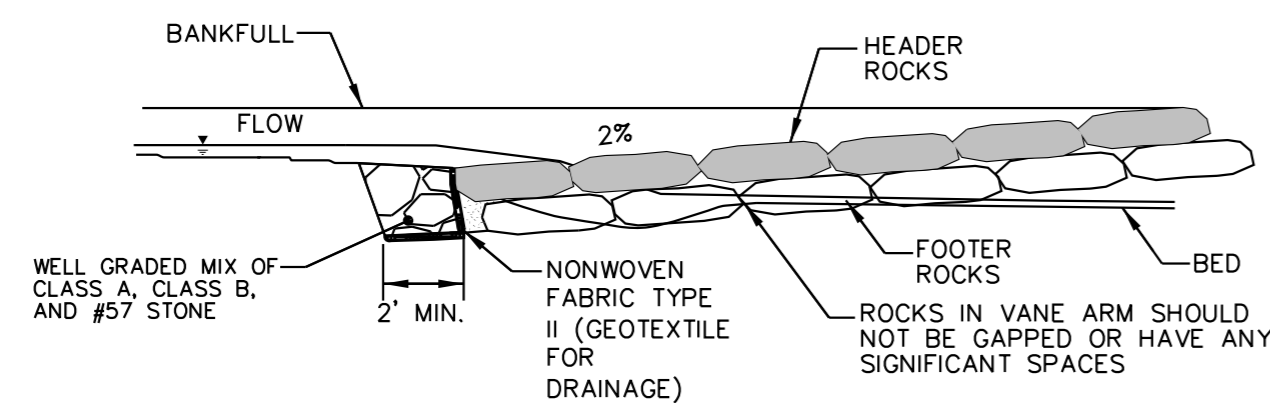
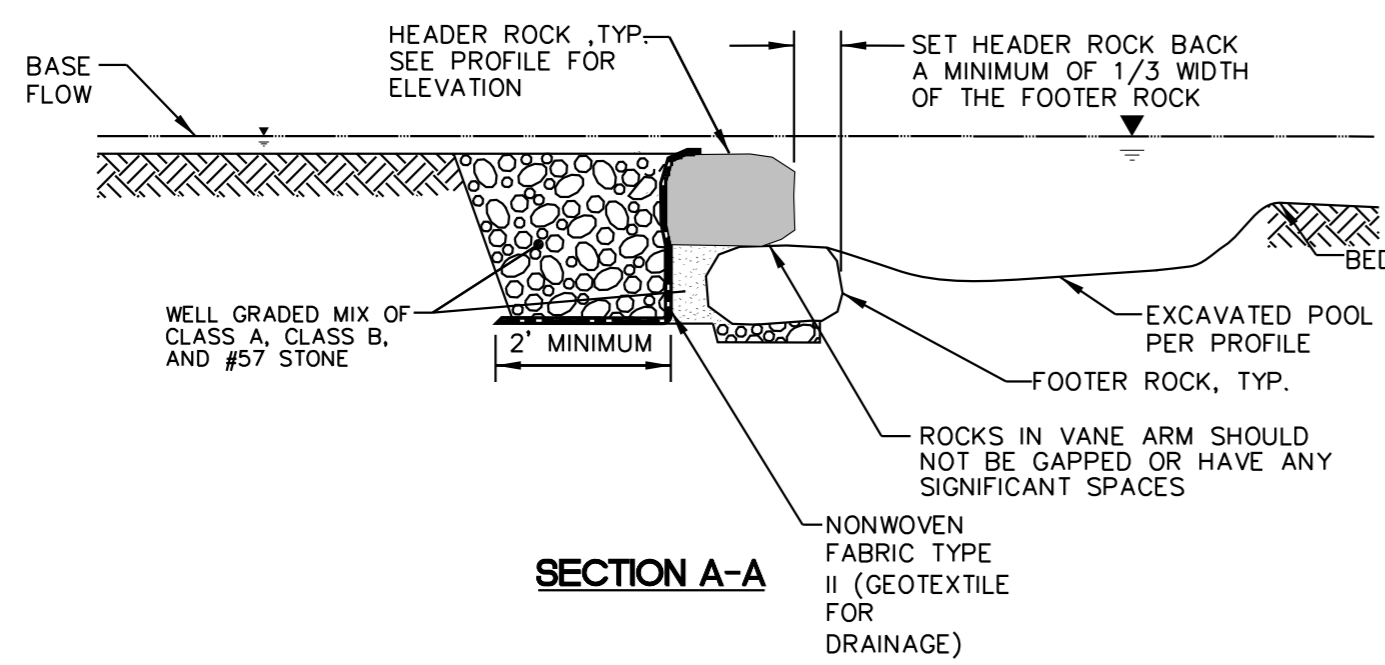


- NOTES:**
1. INTAKE SCREEN SHALL BE T-16 CONCORD SCREEN OR EQUAL AS APPROVED BY ENGINEER

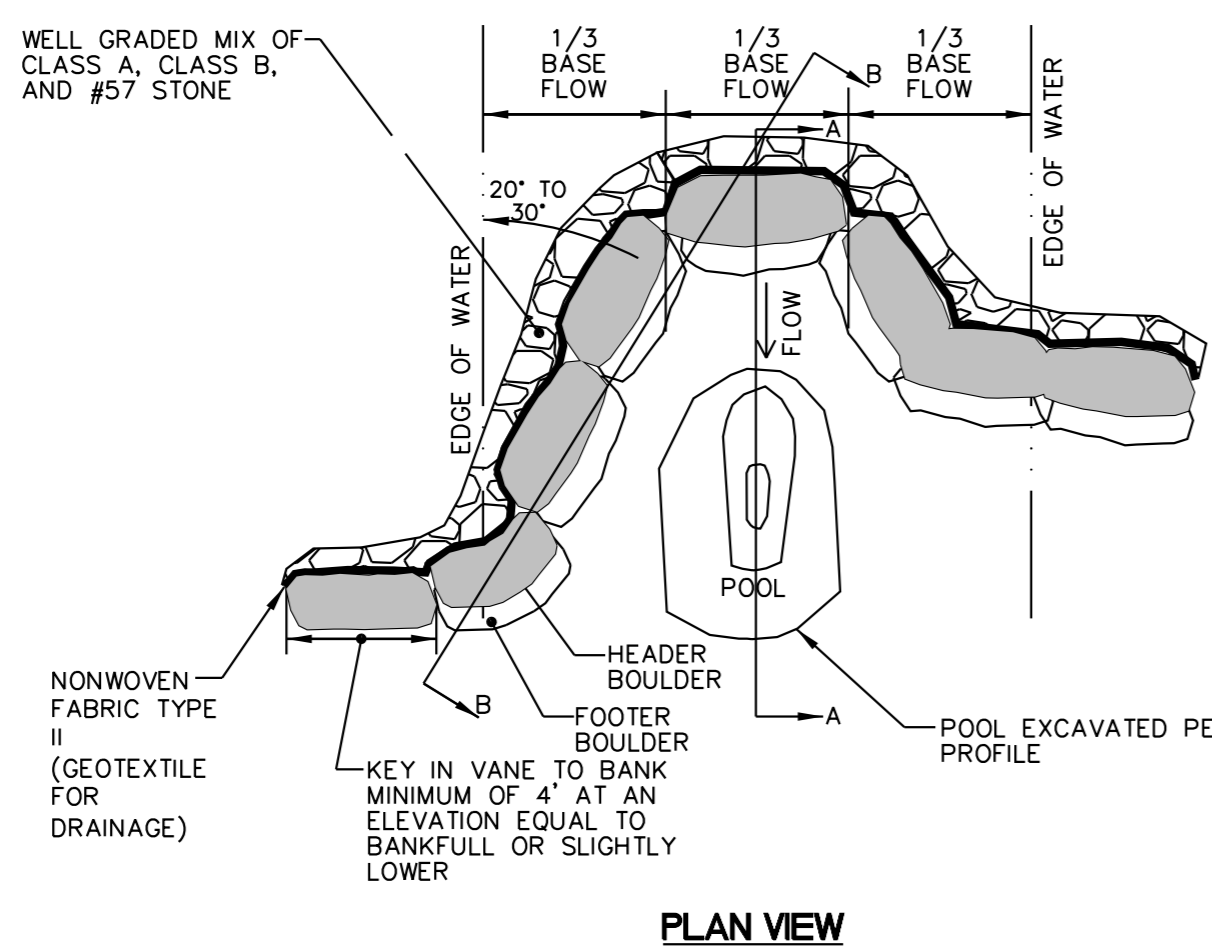
6	<b>INTAKE SCREEN DETAIL</b>
STREAM - 2C-4	SCALE: N.T.S.



DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

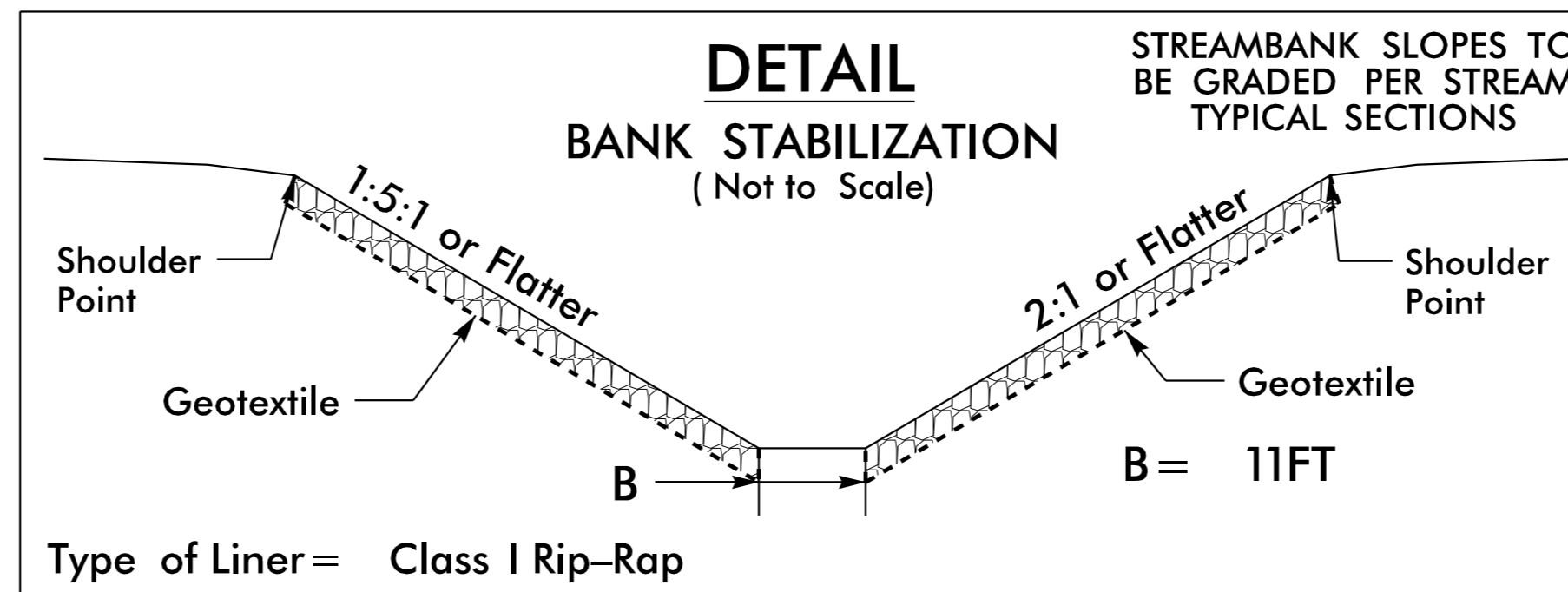


- NOTES:
1. DEEPEST PART OF POOL TO BE IN LINE WITH WHERE VANE ARM TIES INTO THE BANK.
  2. POOL DEPTH SHOULD BE ACCORDING PROFILE AND TYPICAL SECTIONS.
  3. BOULDERS SHALL HAVE A MEAN DIAMETER OF 30"

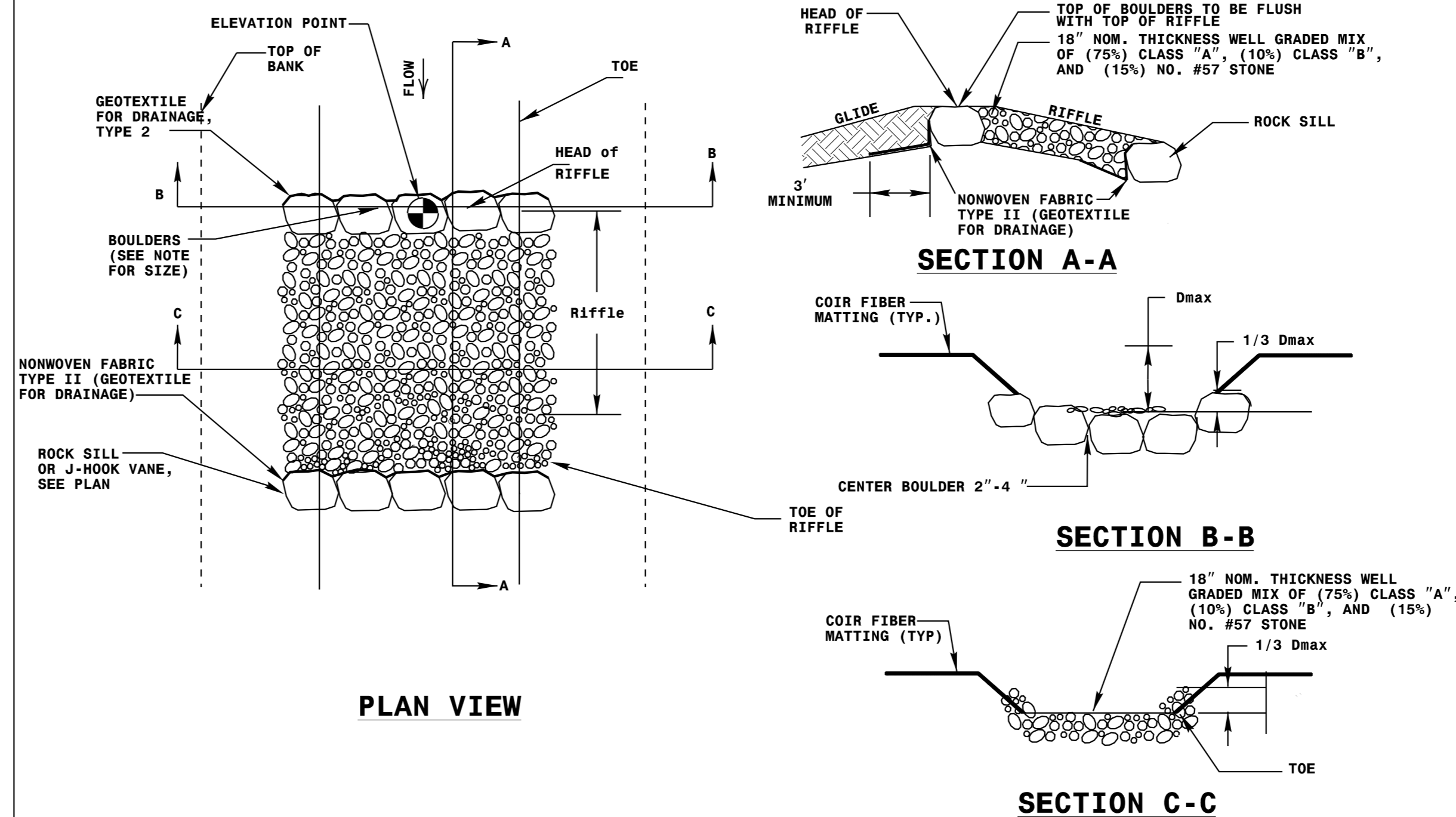


**J-HOOK VANE DETAIL**

NOT TO SCALE

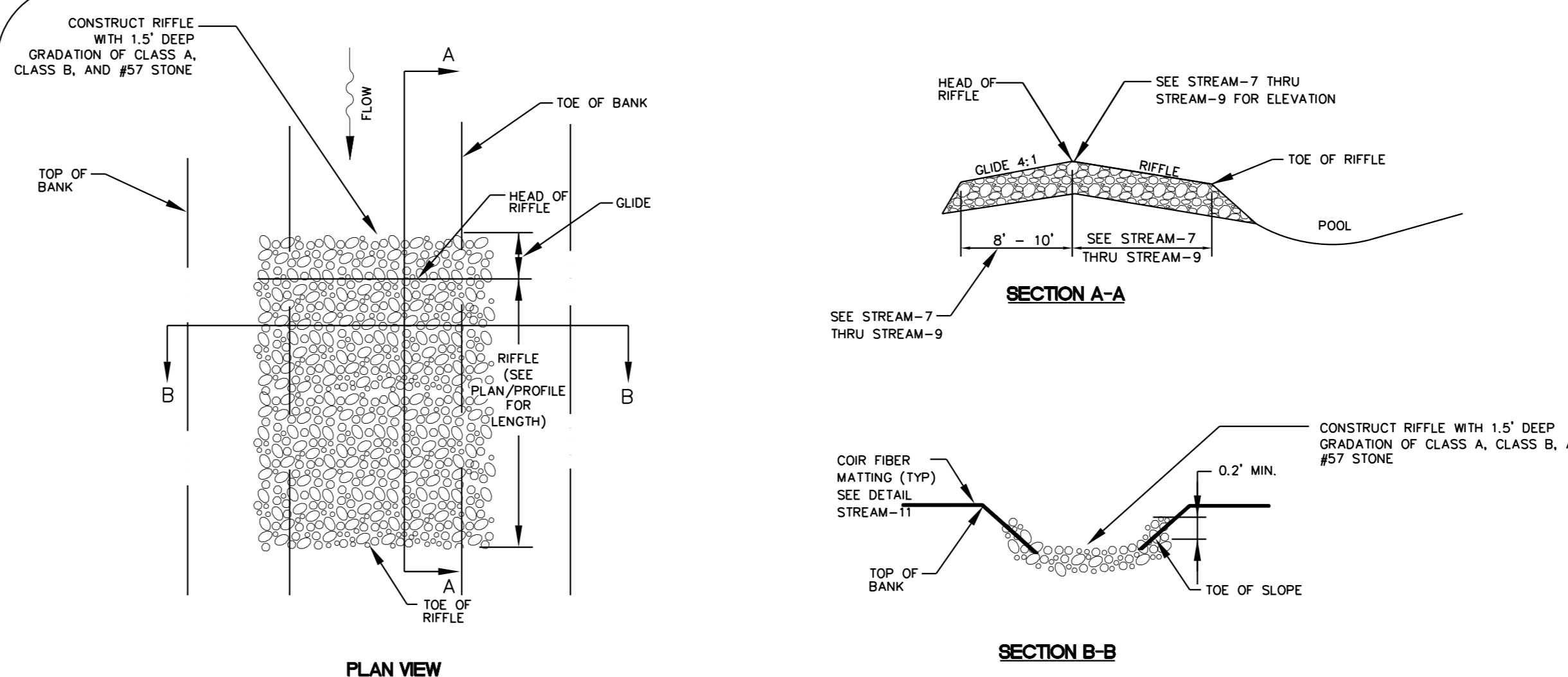


Type of Liner = Class I Rip-Rap  
FROM 30+15 STA. TO 32+73 STA. -SMITH CREEK- (LT)  
FROM 31+60 STA. TO 32+73 STA. -SMITH CREEK- (RT)



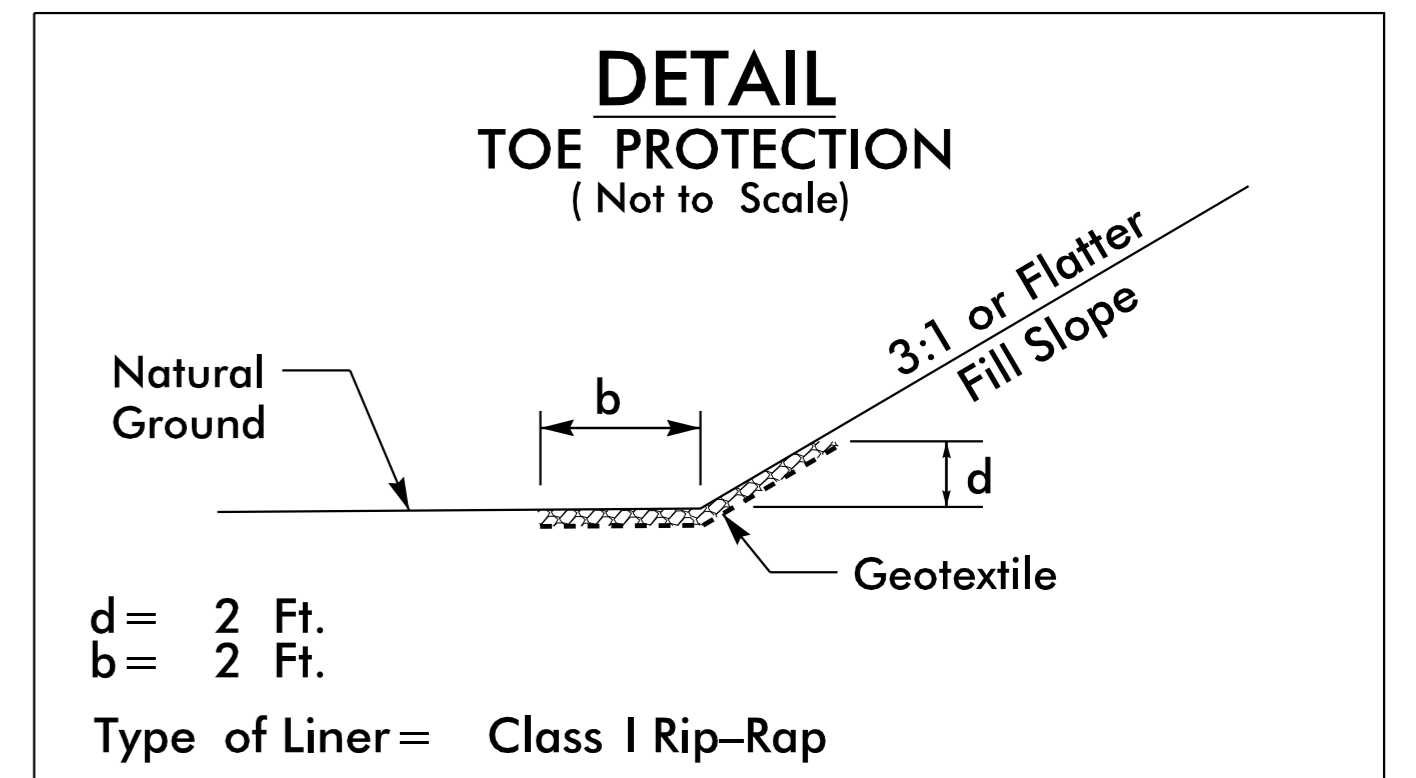
REACH	
Wbkf (ft)	28.8
Dmax (ft)	2.3

- NOTE:
1. BOULDERS SHOULD BE NATIVE STONES OR SHOT ROCK, ANGULAR AND OBLONG, WITH A MEAN DIAMETER OF 30"

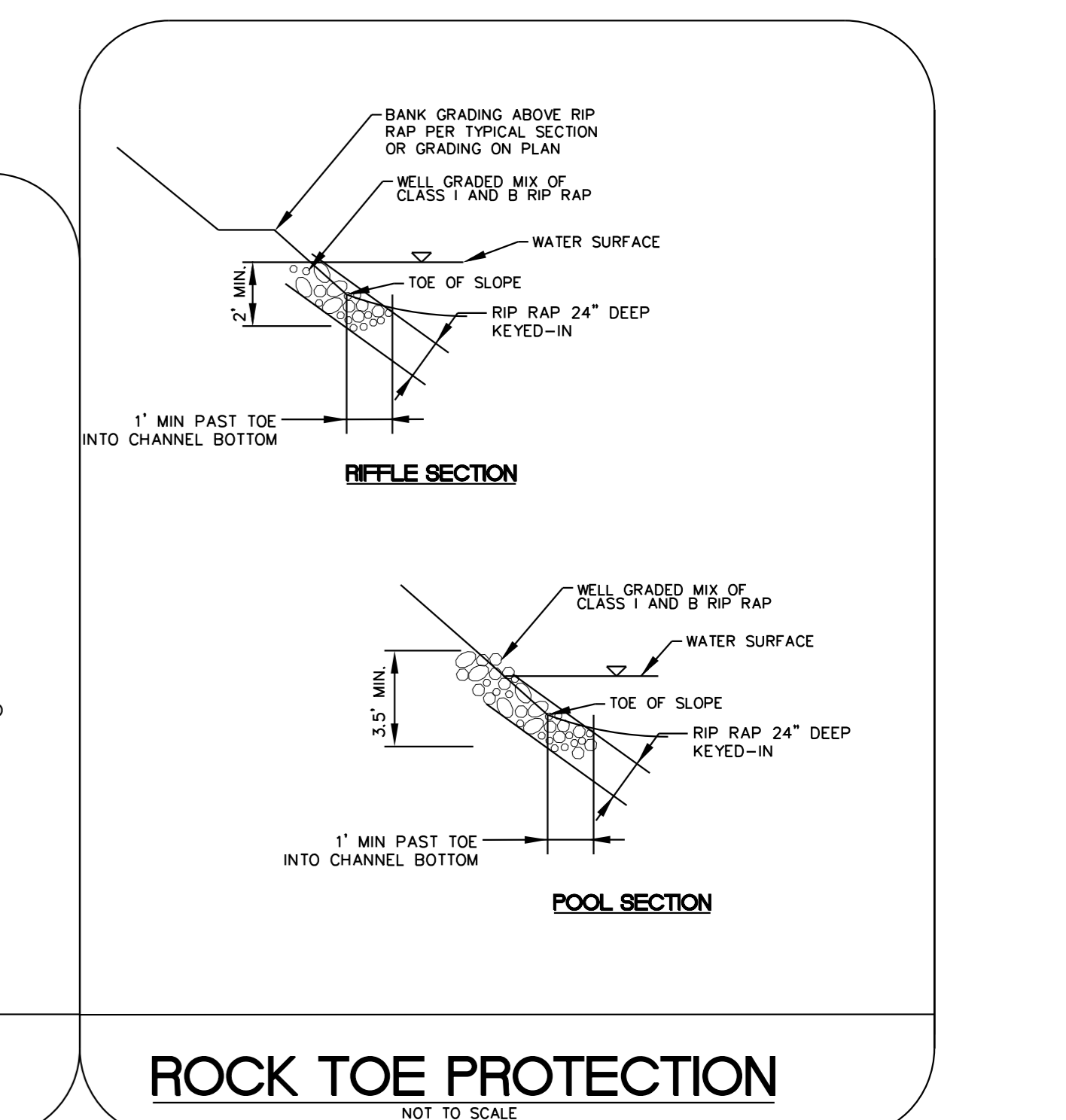


**CONSTRUCTED RIFFLE**

NOT TO SCALE



FROM 23+50 STA. TO 31+60 STA.  
-SMITH CREEK-



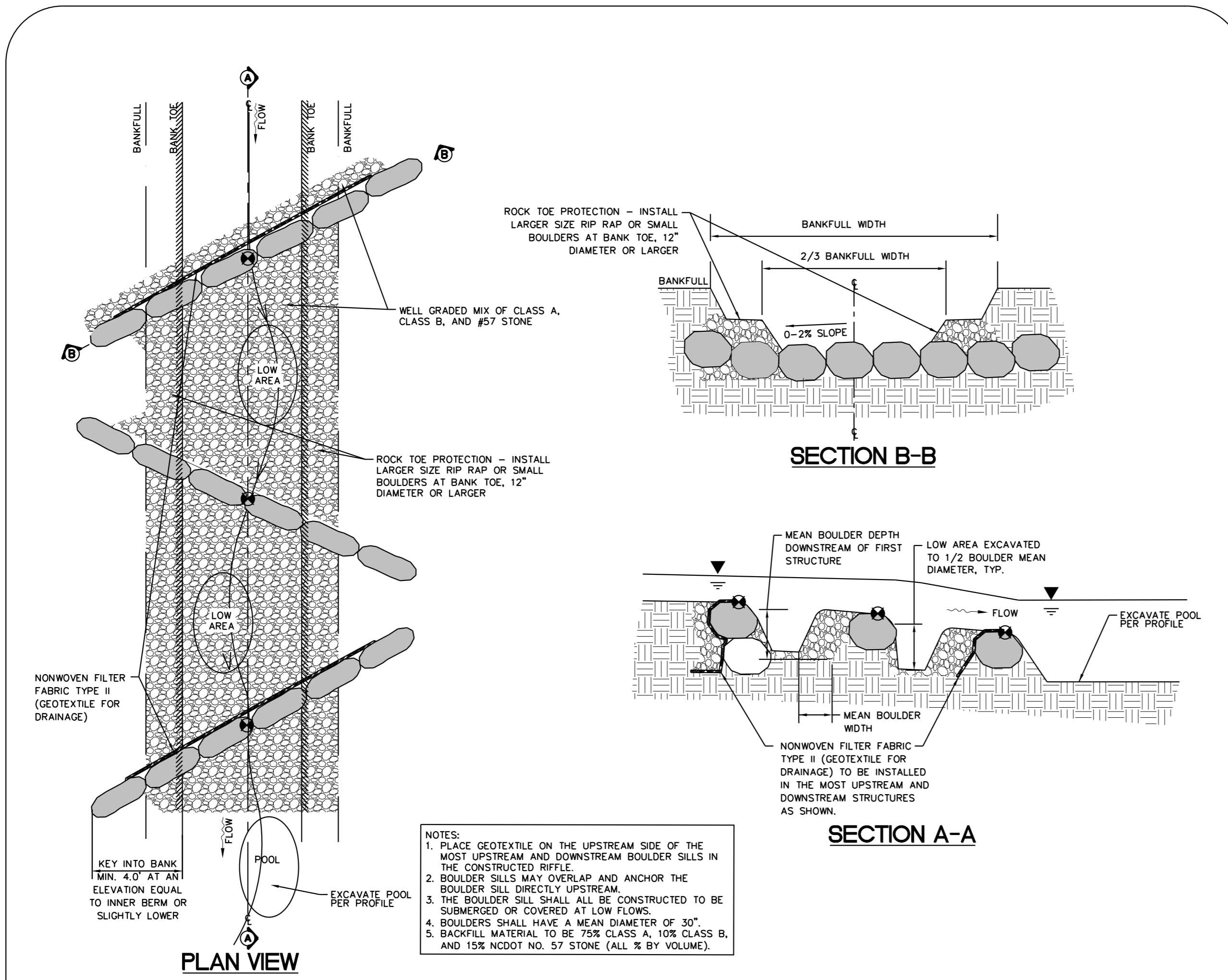
**ROCK TOE PROTECTION**

NOT TO SCALE



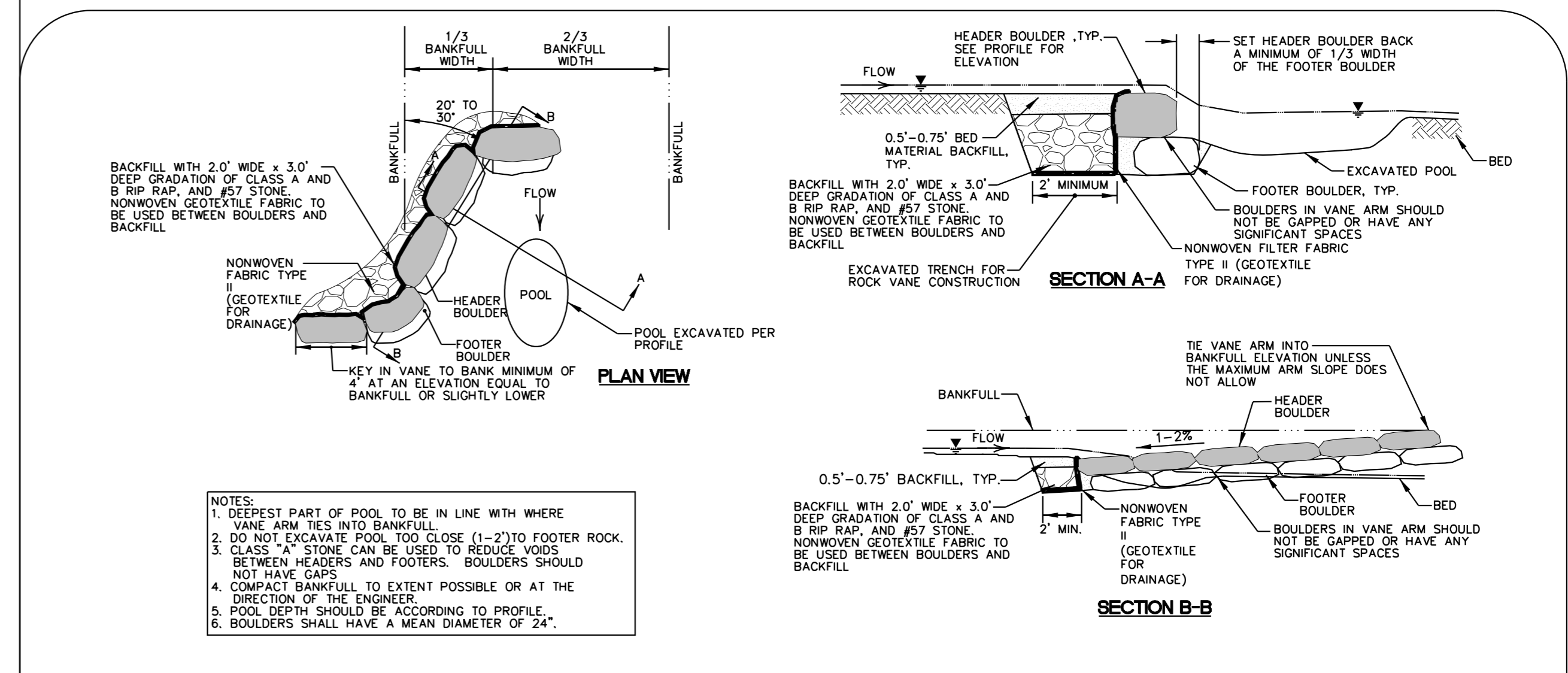


DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED



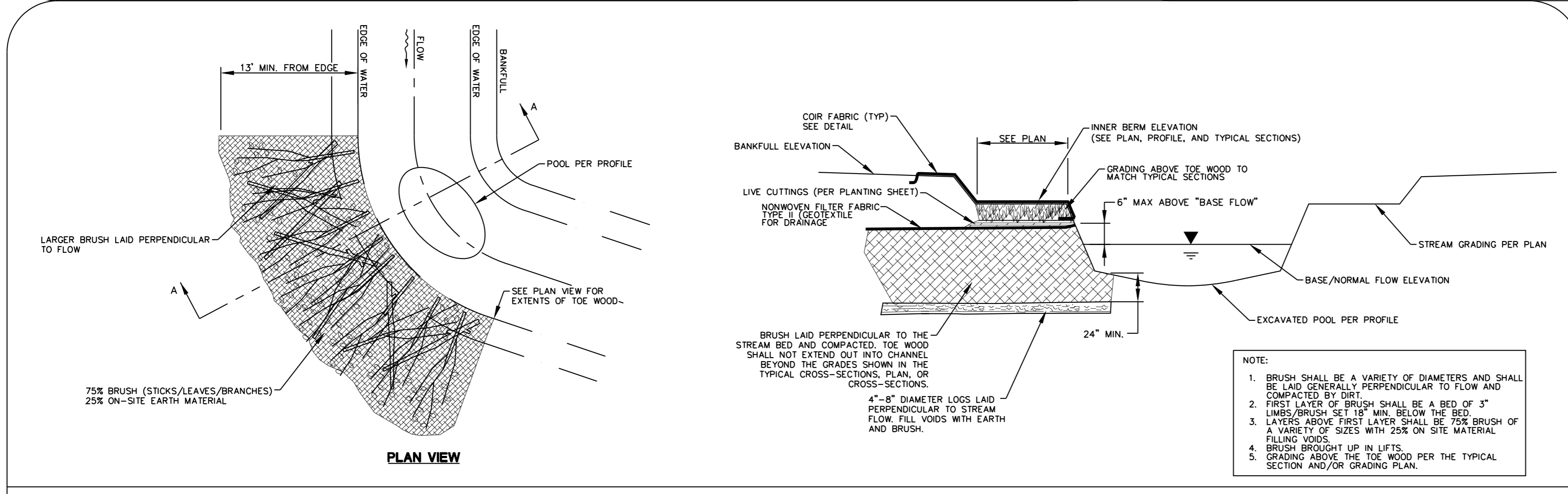
## BOULDER ROCK AND ROLL RIFFLE

NOT TO SCALE



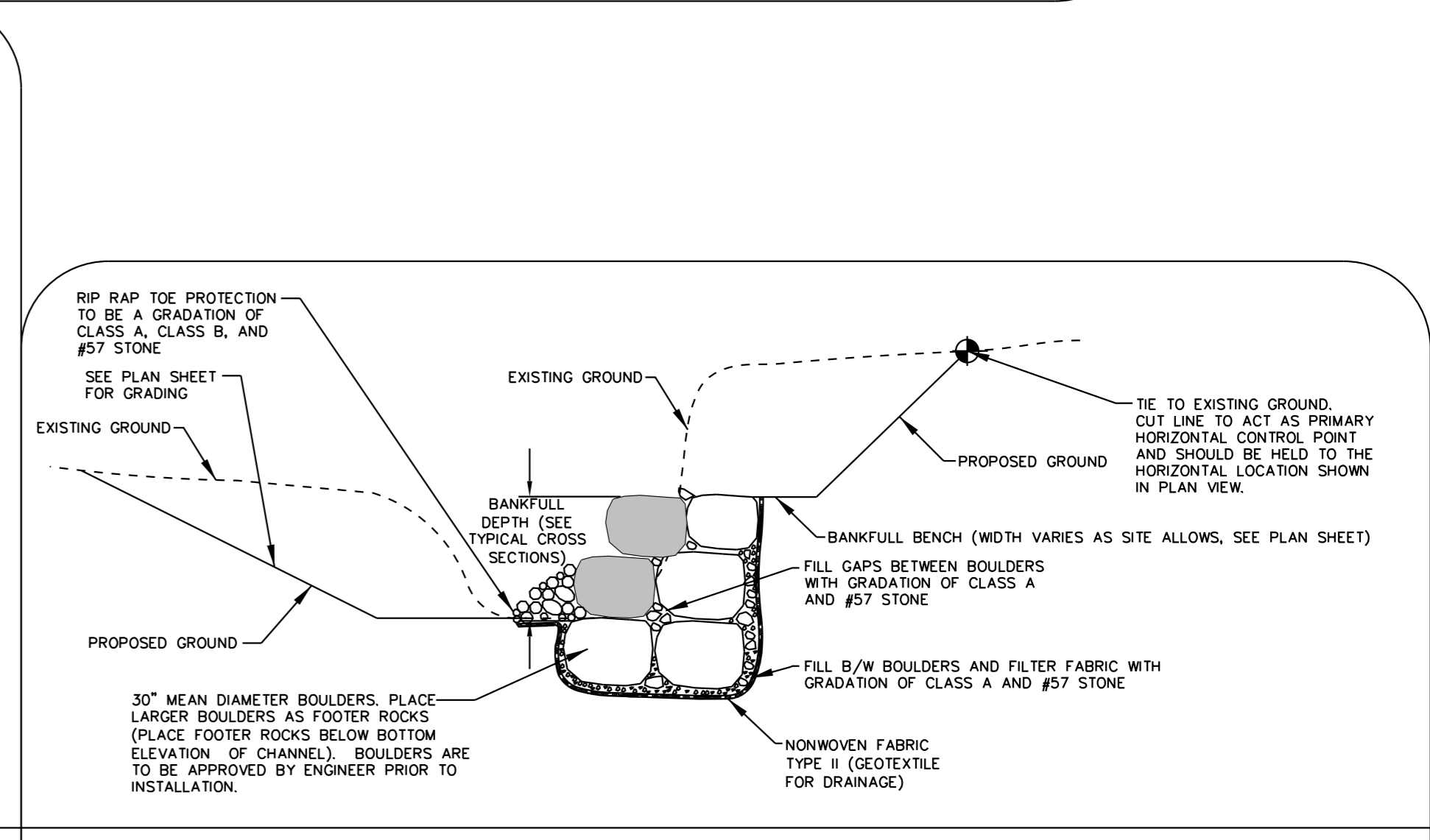
## ROCK VANE DETAIL

NOT TO SCALE



## TOE WOOD PROTECTION

NOT TO SCALE




## BOULDER TOE PROTECTION

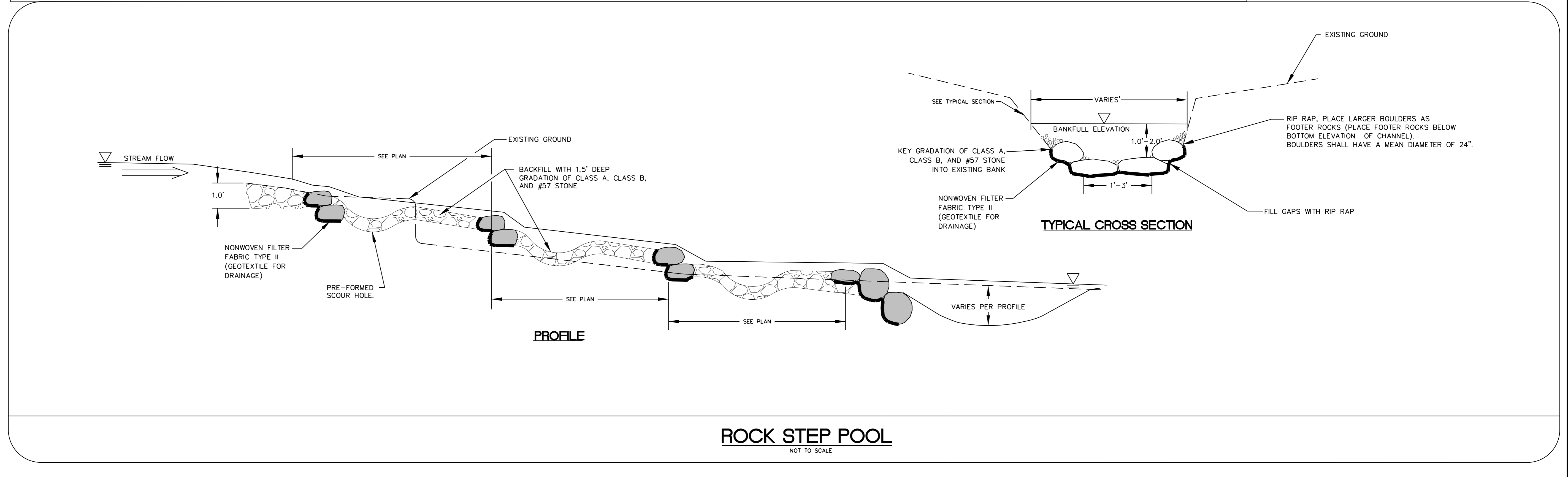
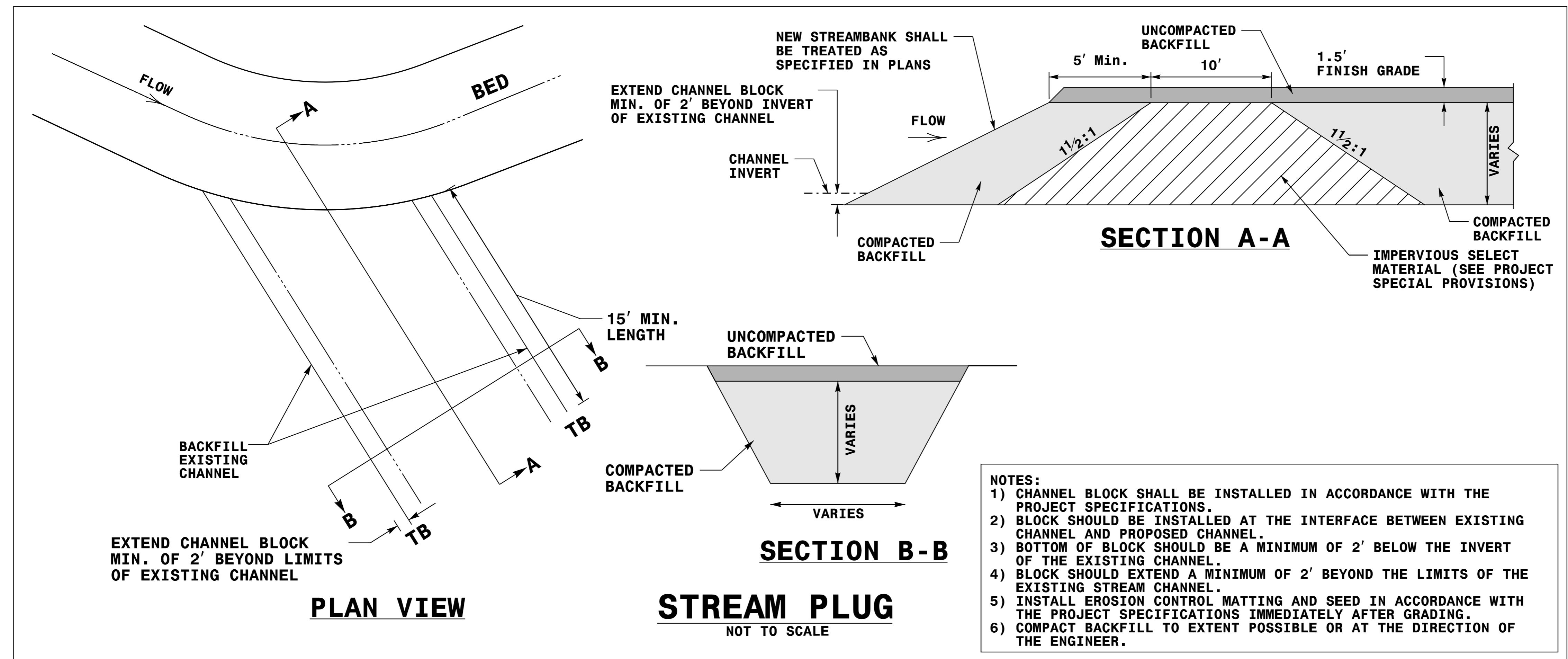
NOT TO SCALE

5/14/99

**Kimley Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601


RIGHT-OF-WAY REV.  
 CONST. REV.

PROJECT REFERENCE NO. <b>U-2579BA</b>	SHEET NO. <b>STREAM - 2D-3</b>
RW SHEET NO.	
HYDRAULIC DESIGN ENGINEER	
	
Documented by: Jennifer Murphy 3/3/2020	
<b>DOCUMENT NOT CONSIDERED FINAL          UNLESS ALL SIGNATURES COMPLETED</b>	



3/3/2020 U-2579ba-stream.dtl.dgn

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-2579BA	STREAM - 2D-4
R/W SHEET NO.	
	
421 FAYETTEVILLE STREET, SUITE 600 RALEIGH, NC 27601	
RIGHT-OF-WAY REV.	
CONST. REV.	

## SUMMARY OF QUANTITIES FOR STREAM RELOCATION

ITEM NUMBER	SECTION	ITEM DESCRIPTION	UNIT	QUANTITY
0223000000-E	275	ROCK PLATING	SY	3750
1077000000-E	SP	#57 STONE	TONS	390
3628000000-E	876	CLASS I RIP RAP	TONS	450
3635000000-E	876	CLASS II RIP RAP	TONS	110
3642000000-E	876	CLASS A RIP RAP	TONS	1800
3649000000-E	876	CLASS B RIP RAP	TONS	220
3651000000-E	SP	BOULDERS	TONS	1000
3656000000-E	876	GEOTEXTILE FOR DRAINAGE	SY	2680
6037000000-E	SP	COIR FIBER MAT	SY	19400
6084000000-E	1660	SEEDING AND MULCHING	ACRE	9
6126000000-E	SP	STREAMBANK REFORESTATION	ACRE	9
6133000000-N	SP	GENERIC EROSION CONTROL ITEM - SURVEYING FOR MITIGATION	LS	1
6133000000-N	SP	GENERIC EROSION CONTROL ITEM - PUMP AROUND OPERATION	LS	1
6133000000-N	SP	GENERIC EROSION CONTROL ITEM - STREAM INTAKE VAULT	LS	1
6135000000-E	SP	GENERIC EROSION CONTROL ITEM - COMPOST BLANKET	ACRE	5
6138000000-E	SP	GENERIC EROSION CONTROL ITEM - IMPERVIOUS SELECT MATERIAL	CY	700
6138000000-E	SP	GENERIC EROSION CONTROL ITEM - UNCLASSIFIED FOR STREAM RELOCATION	CY	34000
6138000000-E	SP	GENERIC EROSION CONTROL ITEM - UNDERCUT FOR STREAM RELOCATION	CY	13000
6138000000-E	SP	GENERIC EROSION CONTROL ITEM - BORROW FOR STREAM RELOCATION	CY	25000
6138000000-E	SP	GENERIC EROSION CONTROL ITEM - DAM EMBANKMENT EARTH FILL	CY	4850
6138000000-E	SP	GENERIC EROSION CONTROL ITEM - BLANKET DRAIN	CY	1350
6141000000-E	SP	GENERIC EROSION CONTROL ITEM - TYPE 2 GEOTEXTILE	SY	1050
6147000000-E	SP	GENERIC EROSION CONTROL ITEM - TOE WOOD PROTECTION	LF	400
6900000000-E	SP	TOPSOIL	CY	3600

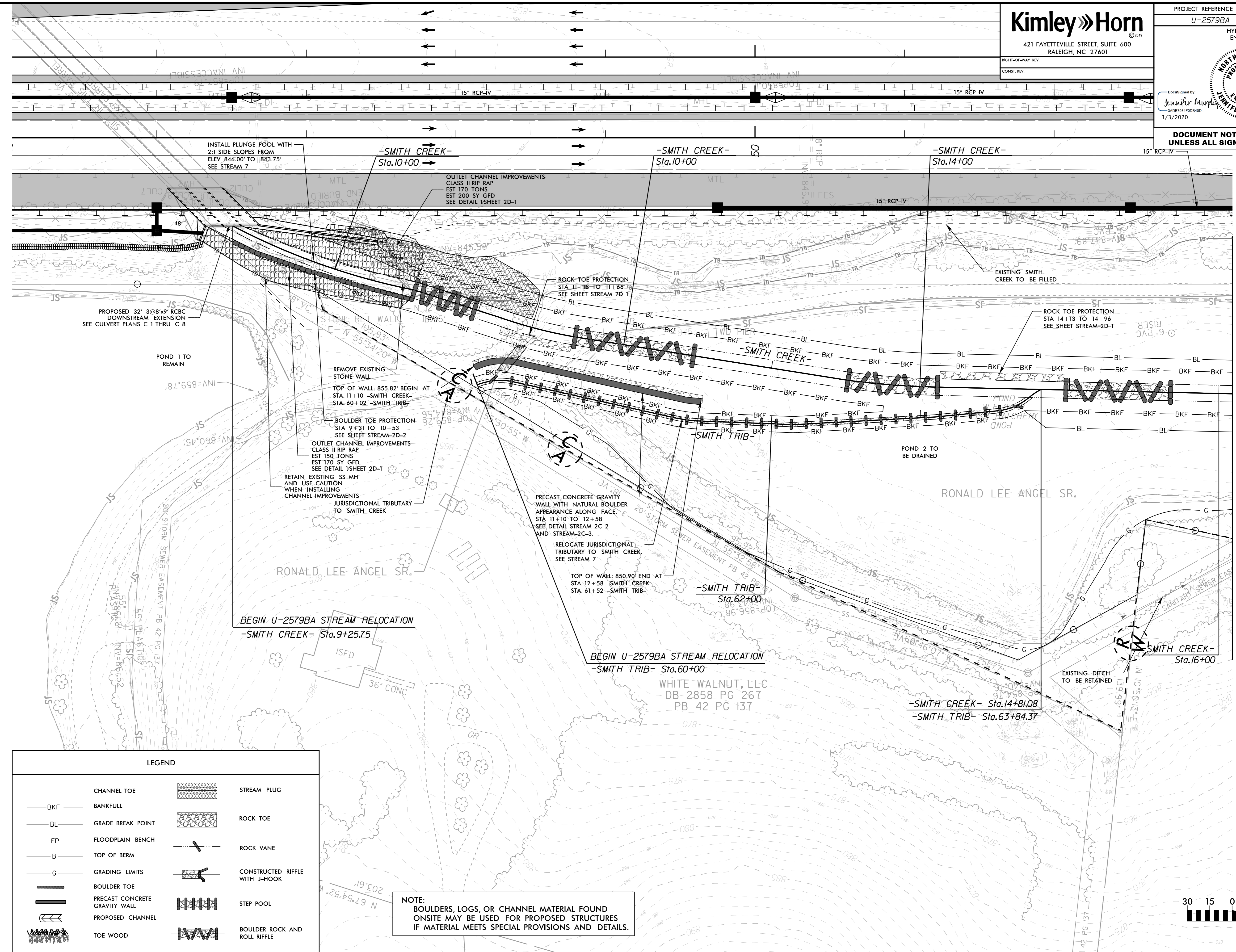
## SUMMARY OF EARTHWORK FOR STREAM RELOCATION

STREAM UNCLASSIFIED EXCAV. (CY)	STREAM UNDERCUT EXCAV. (CY)	STREAM UNSUITABLE MATERIAL (CY)	STREAM EMBANKMENT (CY)	STREAM BORROW (CY)
33748	13000	10124	35459	24835
SAY				
34000	13000			25000

SEE SHEET 3B-1 FOR ROADWAY EARTHWORK SUMMARY

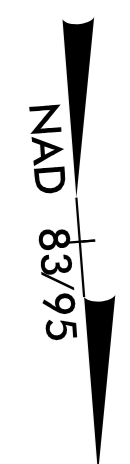
MITIGATION UNDERCUT EXCAVATION ESTIMATES ARE BASED ON LIMITED GEOTECHNICAL INVESTIGATION WITHIN THE POND BEDS. PROBE RODS WERE UTILIZED TO APPROXIMATE SOFT MATERIAL DEPTHS WITHIN VARIOUS LOCATIONS IN THE DRAINED POND BEDS. DEPTHS VARIED FROM 6" TO 48" WITH DEEPER AREAS CLOSER TO THE THALWEG OF THE PONDS. CONSIDERING THE REQUIRED EXCAVATION WITHIN PONDS, AN AVERAGE UNDERCUT DEPTH OF 12" WAS ESTIMATED. THIS NUMBER MAY BE MORE OR LESS AT THE TIME OF CONSTRUCTION BASED ON CURRENT POND CONDITIONS.

UNSUITABLE MATERIAL WAS CALCULATED ASSUMING APPROXIMATELY 30% OF UNCLASSIFIED EXCAVATION IS UNSUITABLE FOR EMBANKMENT.



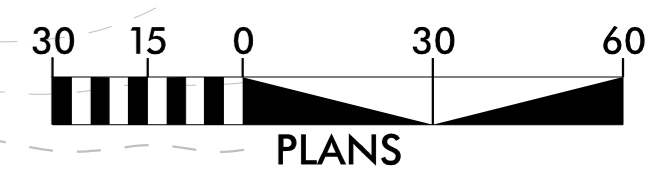
REVISIONS

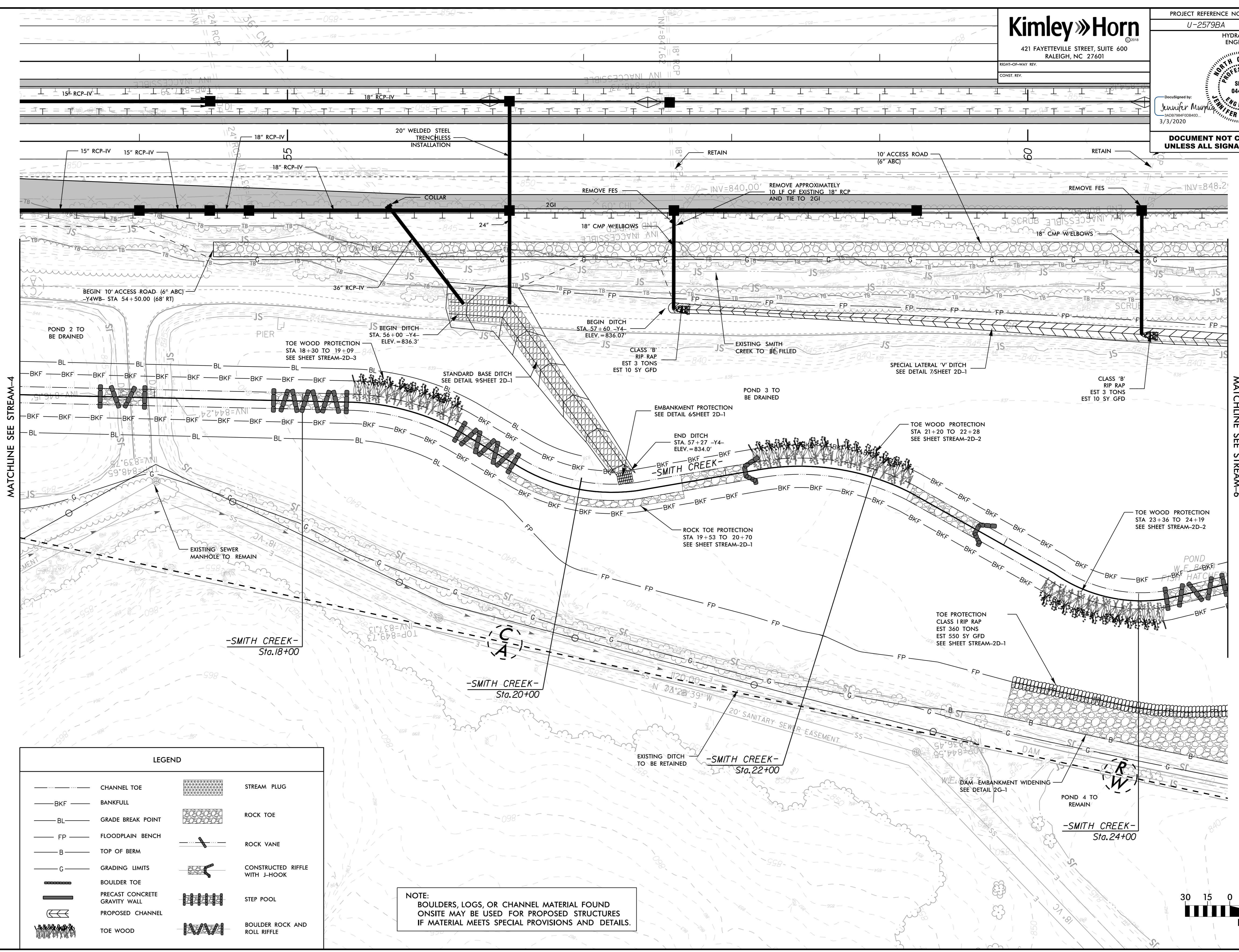
MATCHLINE SEE STREAM-5



LEGEND	
	CHANNEL TOE
	BANKFULL
	GRADE BREAK POINT
	FLOODPLAIN BENCH
	TOP OF BERM
	GRADING LIMITS
	BOULDER TOE
	PRECAST CONCRETE GRAVITY WALL
	PROPOSED CHANNEL
	TOE WOOD
	STREAM PLUG
	ROCK TOE
	ROCK VANE
	CONSTRUCTED RIFFLE WITH J-HOOK
	STEP POOL
	BOULDER ROCK AND ROLL RIFFLE

**NOTE:**  
BOULDERS, LOGS, OR CHANNEL MATERIAL FOUND  
ON-SITE MAY BE USED FOR PROPOSED STRUCTURES  
IF MATERIAL MEETS SPECIAL PROVISIONS AND DETAILS.





REVISIONS

MATCHLINE SEE STREAM-4

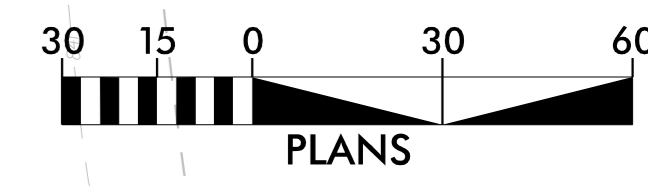
MATCHLINE SEE STREAM-6

NAD 83/95

**LEGEND**

	CHANNEL TOE		STREAM PLUG
	BANKFULL		ROCK TOE
	GRADE BREAK POINT		ROCK VANE
	FLOODPLAIN BENCH		CONSTRUCTED RIFFLE WITH J-HOOK
	TOP OF BERM		STEP POOL
	GRADING LIMITS		BOULDER ROCK AND ROLL RIFFLE
	BOULDER TOE		
	PRECAST CONCRETE GRAVITY WALL		
	PROPOSED CHANNEL		
	TOE WOOD		

**NOTE:**  
 BOULDERS, LOGS, OR CHANNEL MATERIAL FOUND  
 ONSITE MAY BE USED FOR PROPOSED STRUCTURES  
 IF MATERIAL MEETS SPECIAL PROVISIONS AND DETAILS.



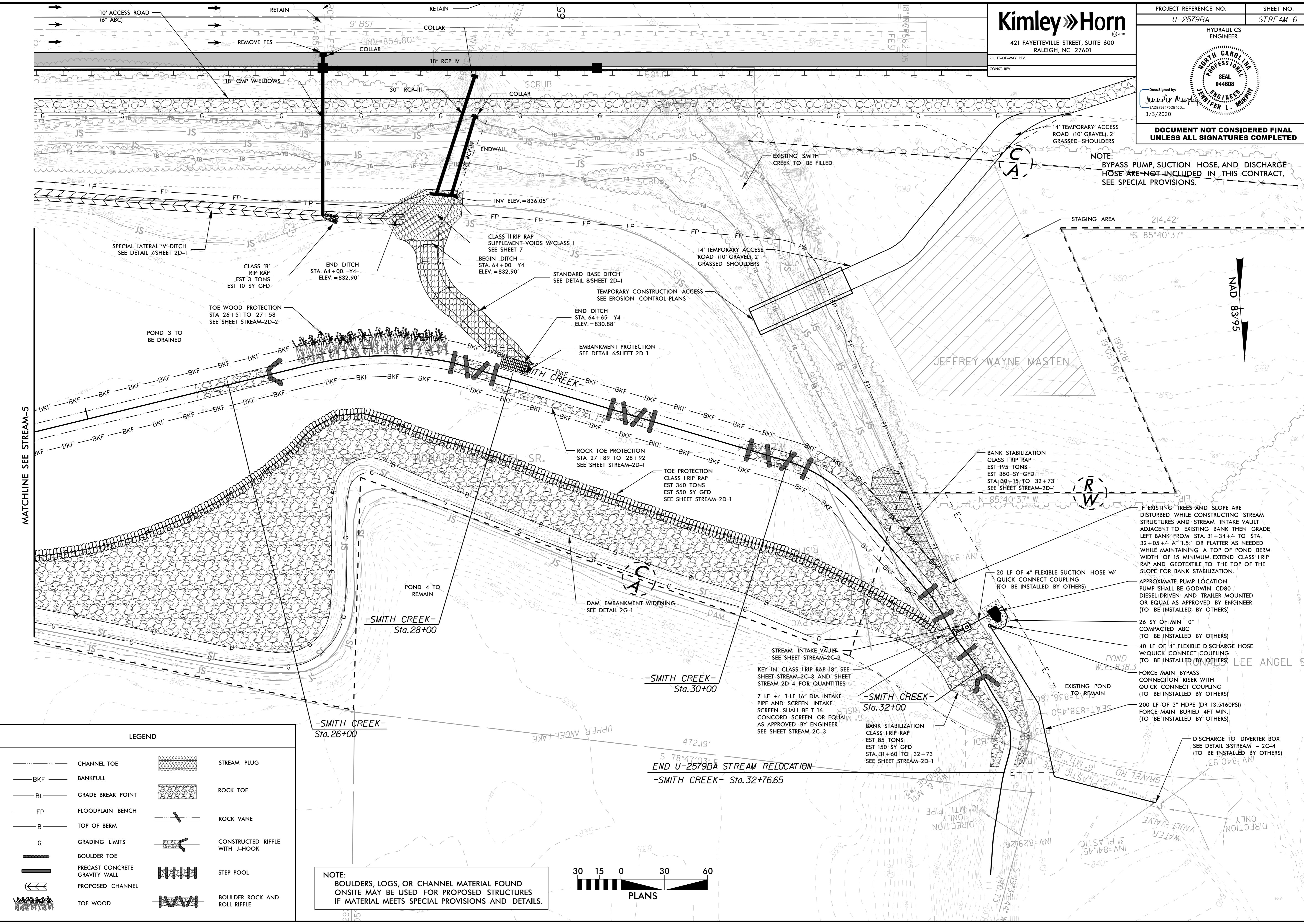
**Kimley Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601

PROJECT REFERENCE NO. U-2579BA SHEET NO. STREAM-6  
 HYDRAULICS ENGINEER

DocuSigned by:  
 Jennifer Murrell  
 3AD87984F0D840D  
 3/3/2020

**SEAL**  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 JENNIFER L. MURRELL  
 044608

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



**NOTE:**  
 BYPASS PUMP, SUCTION HOSE, AND DISCHARGE HOSE ARE NOT INCLUDED IN THIS CONTRACT, SEE SPECIAL PROVISIONS.

STAGING AREA  
 214.42'  
 S 85°40'37" E

NAD  
 83.95

IF EXISTING TREES AND SLOPE ARE DISTURBED WHILE CONSTRUCTING STREAM STRUCTURES AND STREAM INTAKE VAULT ADJACENT TO EXISTING BANK THEN GRADE LEFT BANK FROM STA. 31+34+/- TO STA. 32+05+/- AT 1.5:1 OR FLATTER AS NEEDED WHILE MAINTAINING A TOP OF POND BERM WIDTH OF 15 MINIMUM. EXTEND CLASS I RIP RAP AND GEOTEXTILE TO THE TOP OF THE SLOPE FOR BANK STABILIZATION.

APPROXIMATE PUMP LOCATION. PUMP SHALL BE GODWIN CD80 DIESEL DRIVEN AND TRAILER MOUNTED OR EQUAL AS APPROVED BY ENGINEER (TO BE INSTALLED BY OTHERS)

26 SY OF MIN 10" COMPACTED ABC (TO BE INSTALLED BY OTHERS)

40 LF OF 4" FLEXIBLE DISCHARGE HOSE W/ QUICK CONNECT COUPLING (TO BE INSTALLED BY OTHERS)

FORCE MAIN BYPASS CONNECTION RISER WITH QUICK CONNECT COUPLING (TO BE INSTALLED BY OTHERS)

200 LF OF 3" HDPE (DR 13.5160PSI) FORCE MAIN BURIED 4FT MIN. (TO BE INSTALLED BY OTHERS)

DISCHARGE TO DIVERTER BOX SEE DETAIL 3/STREAM-2C-4 (TO BE INSTALLED BY OTHERS)

**LEGEND**

	CHANNEL TOE		STREAM PLUG
	BANKFULL		ROCK TOE
	GRADE BREAK POINT		ROCK VANE
	FLOODPLAIN BENCH		CONSTRUCTED RIFFLE WITH J-HOOK
	TOP OF BERM		STEP POOL
	GRADING LIMITS		BOULDER ROCK AND ROLL RIFFLE
	BOULDER TOE		
	PRECAST CONCRETE GRAVITY WALL		
	PROPOSED CHANNEL		
	TOE WOOD		

**NOTE:**  
 BOULDERS, LOGS, OR CHANNEL MATERIAL FOUND ONSITE MAY BE USED FOR PROPOSED STRUCTURES IF MATERIAL MEETS SPECIAL PROVISIONS AND DETAILS.



REVISIONS

MATCHLINE SEE STREAM-5

JEFFREY WAYNE MASTEN

LEE ANGEL SP

UPPER ANGEL LAKE

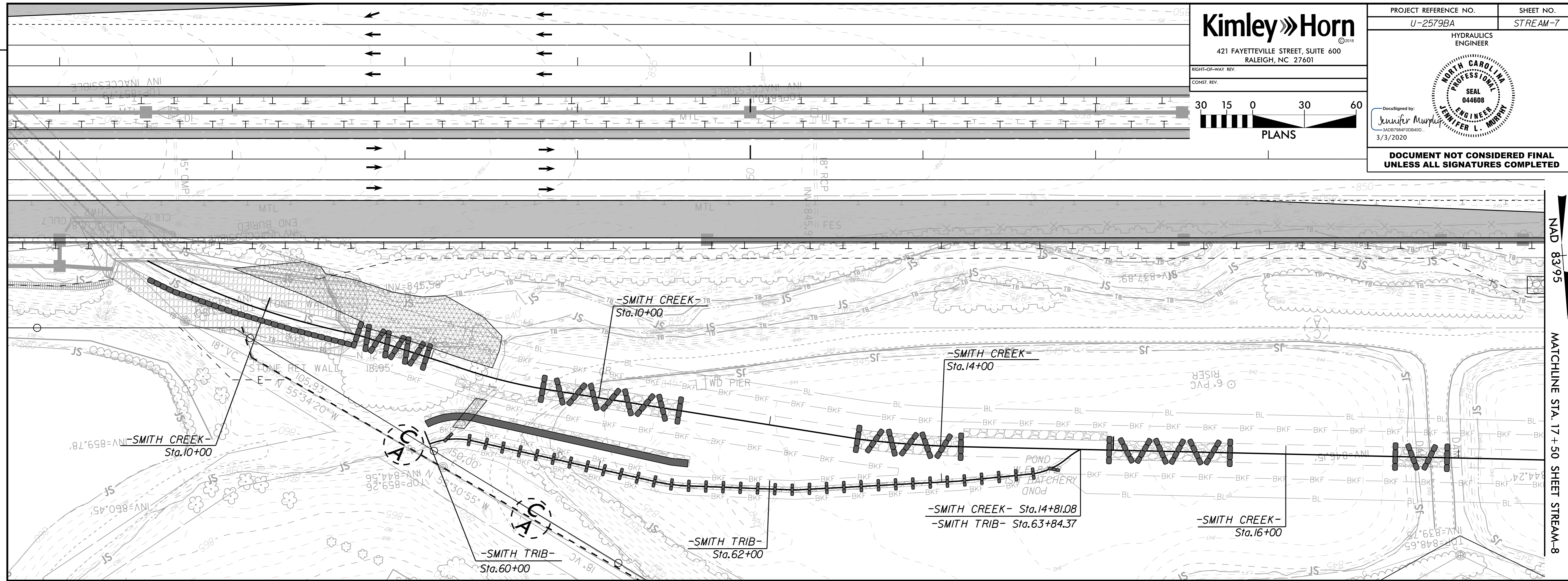
END U-2579BA STREAM RELOCATION  
 -SMITH CREEK- Sta.32+76.65

**Kimley Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601

RIGHT-OF-WAY REV.  
 CONST. REV.

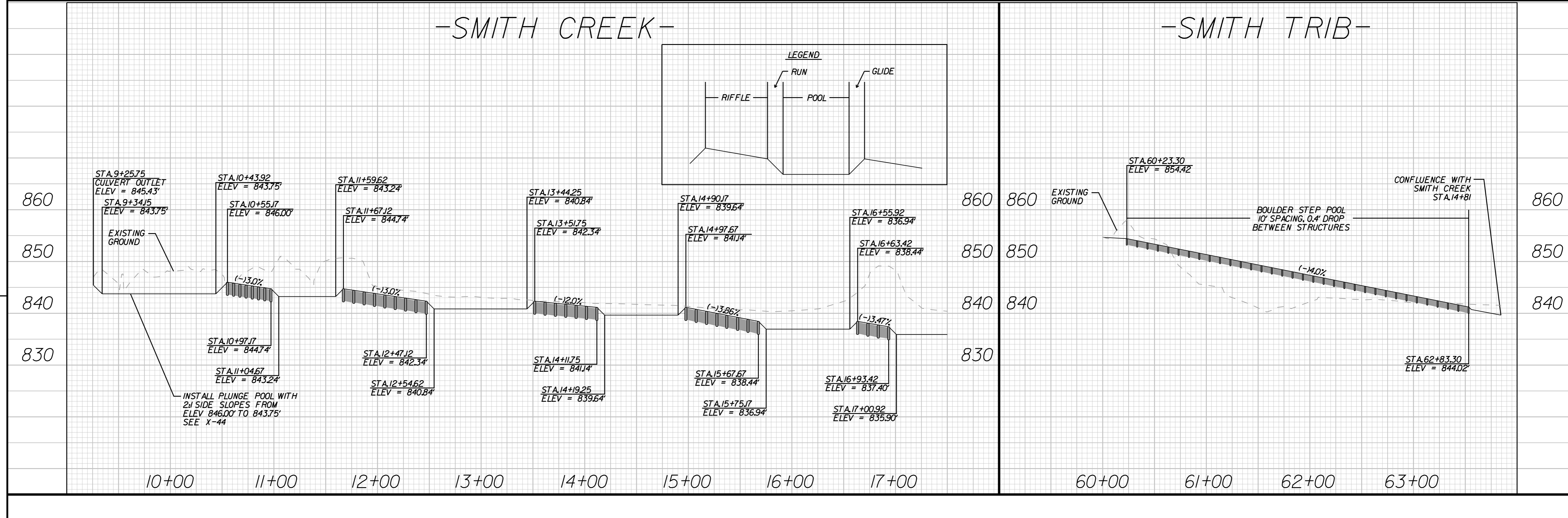
30 15 0 30 60  
 PLANS

PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM-7
HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REVISIONS


NAD 83/95  
MATCHLINE STA. 17 + 50 SHEET STREAM-8

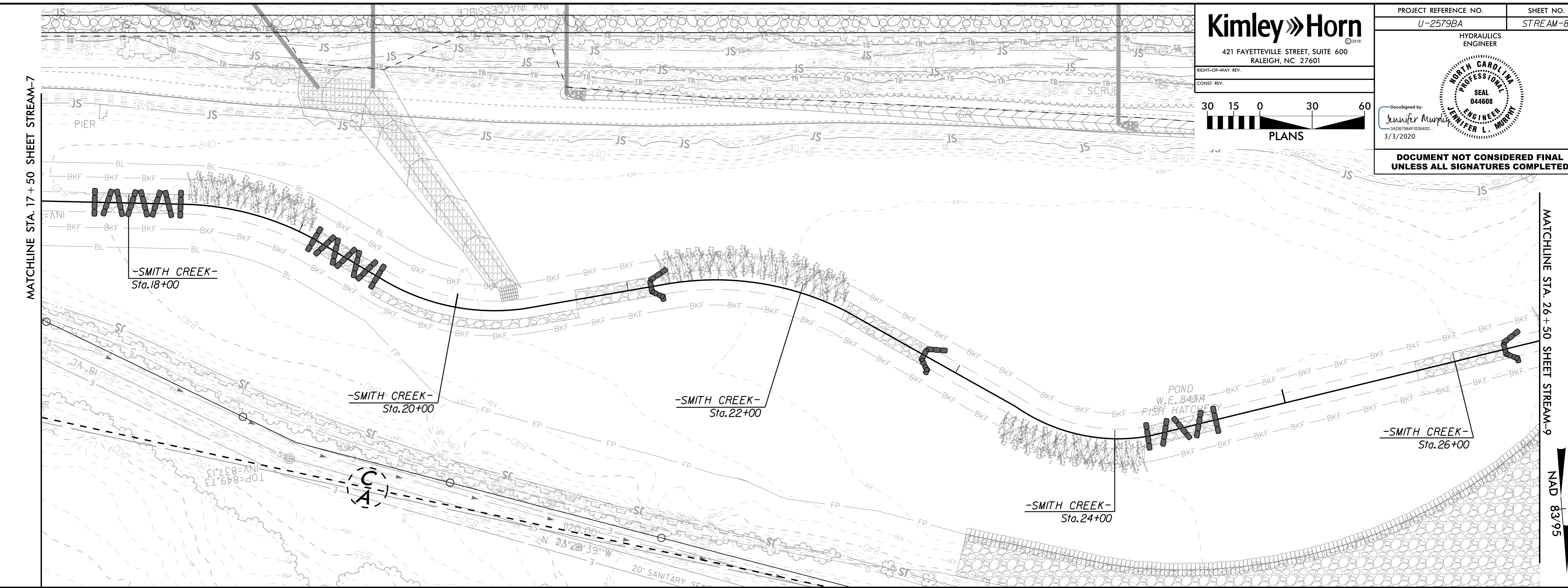


**Kimley»Horn**  
 421 FAYETTEVILLE STREET, SUITE 600  
 RALEIGH, NC 27601

RIGHT-OF-WAY REV.  
 CONST. REV.

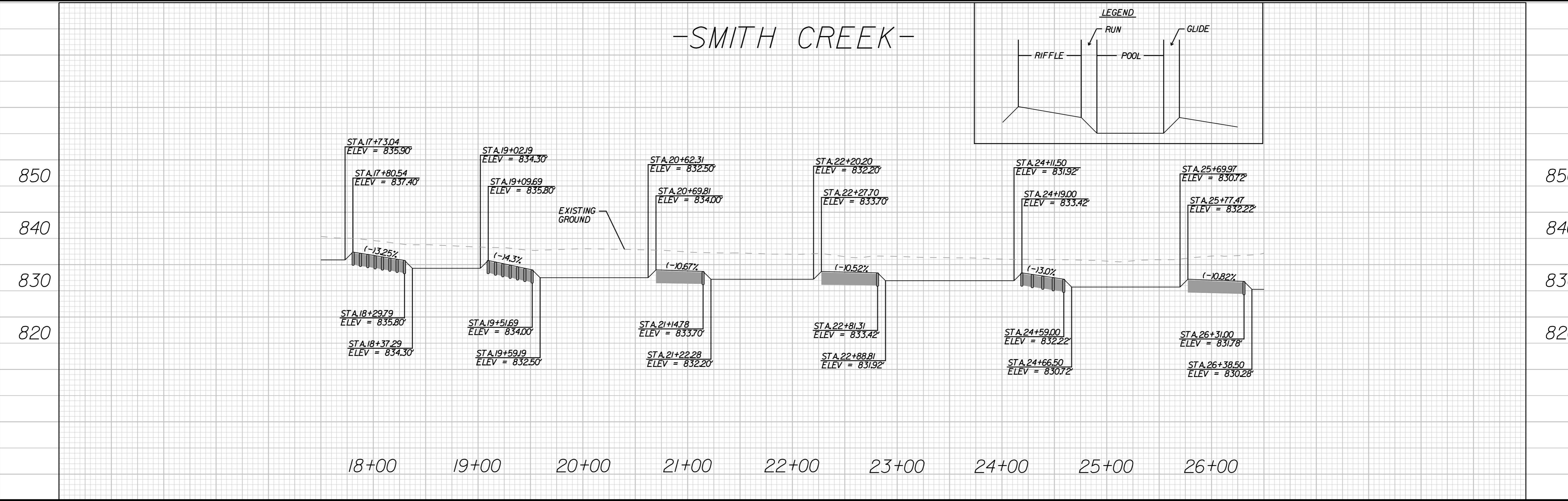
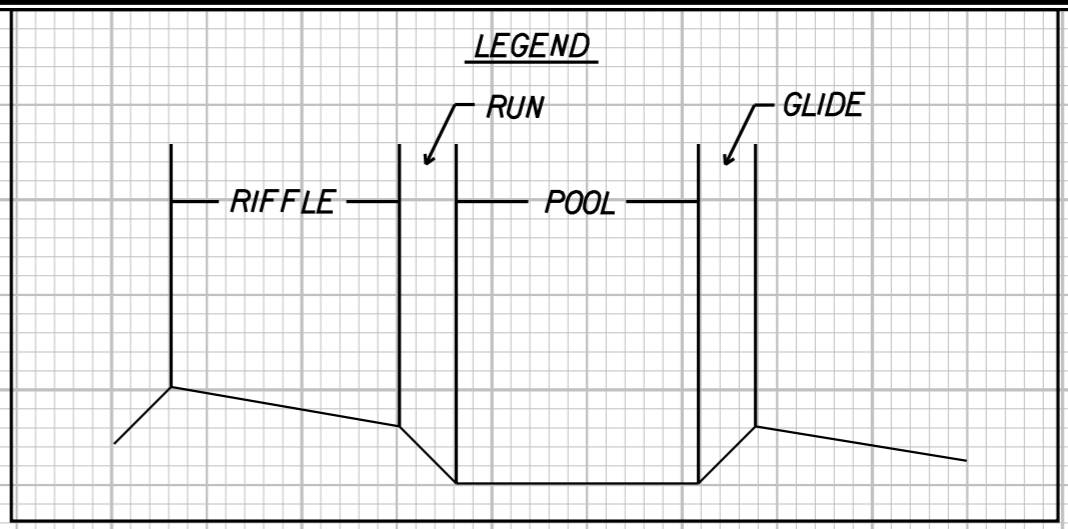
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PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM-8
HYDRAULICS ENGINEER	
	
Documented by: Jennifer Murrin 3/3/2020	
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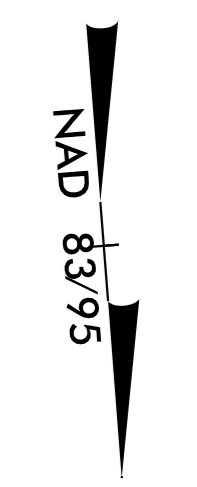
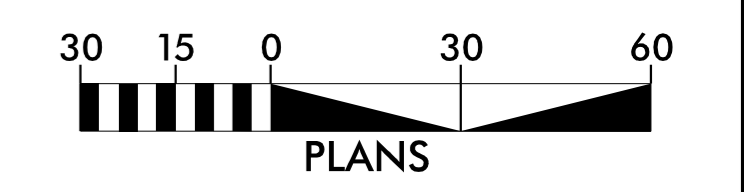


REVISIONS

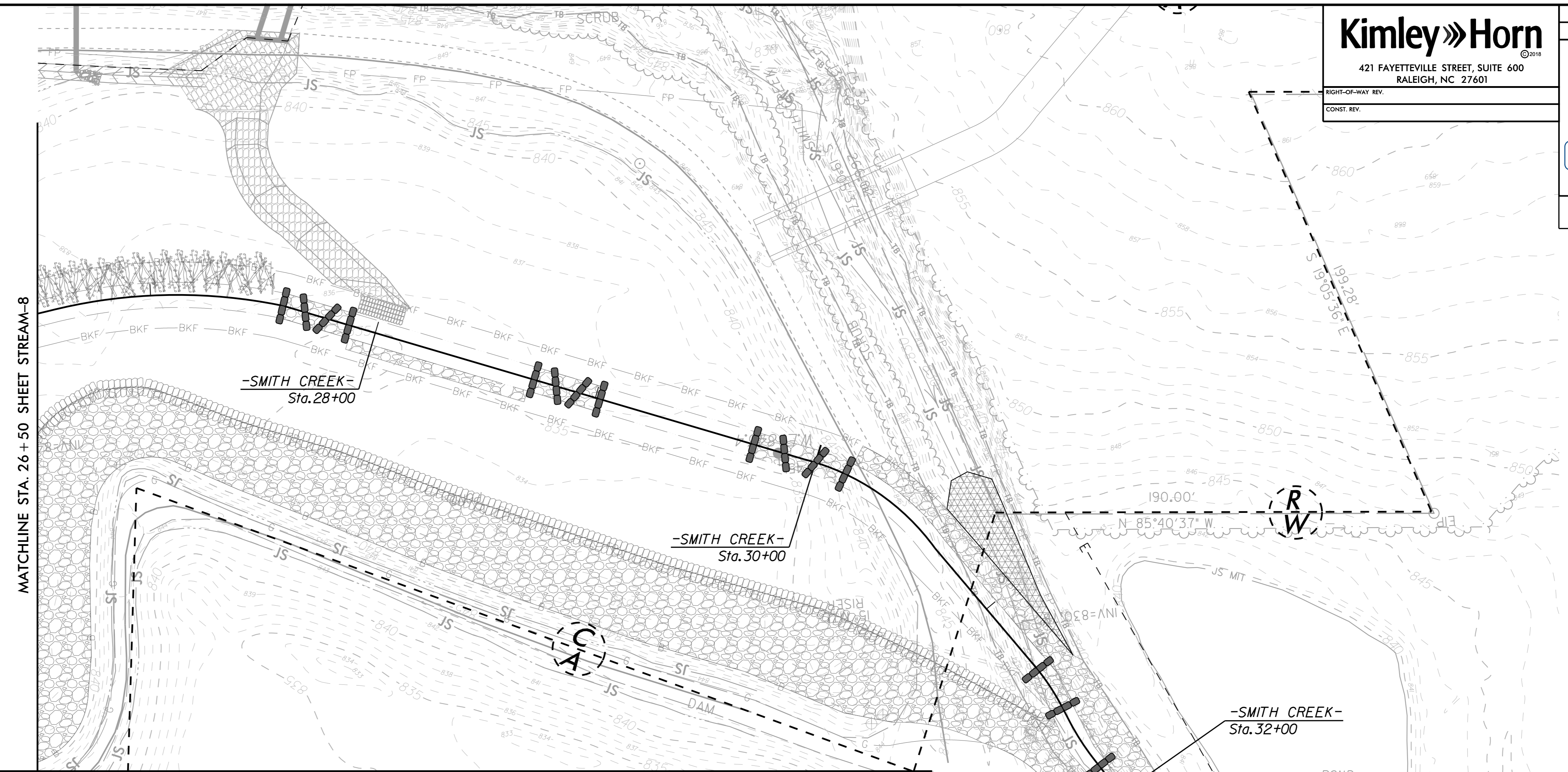
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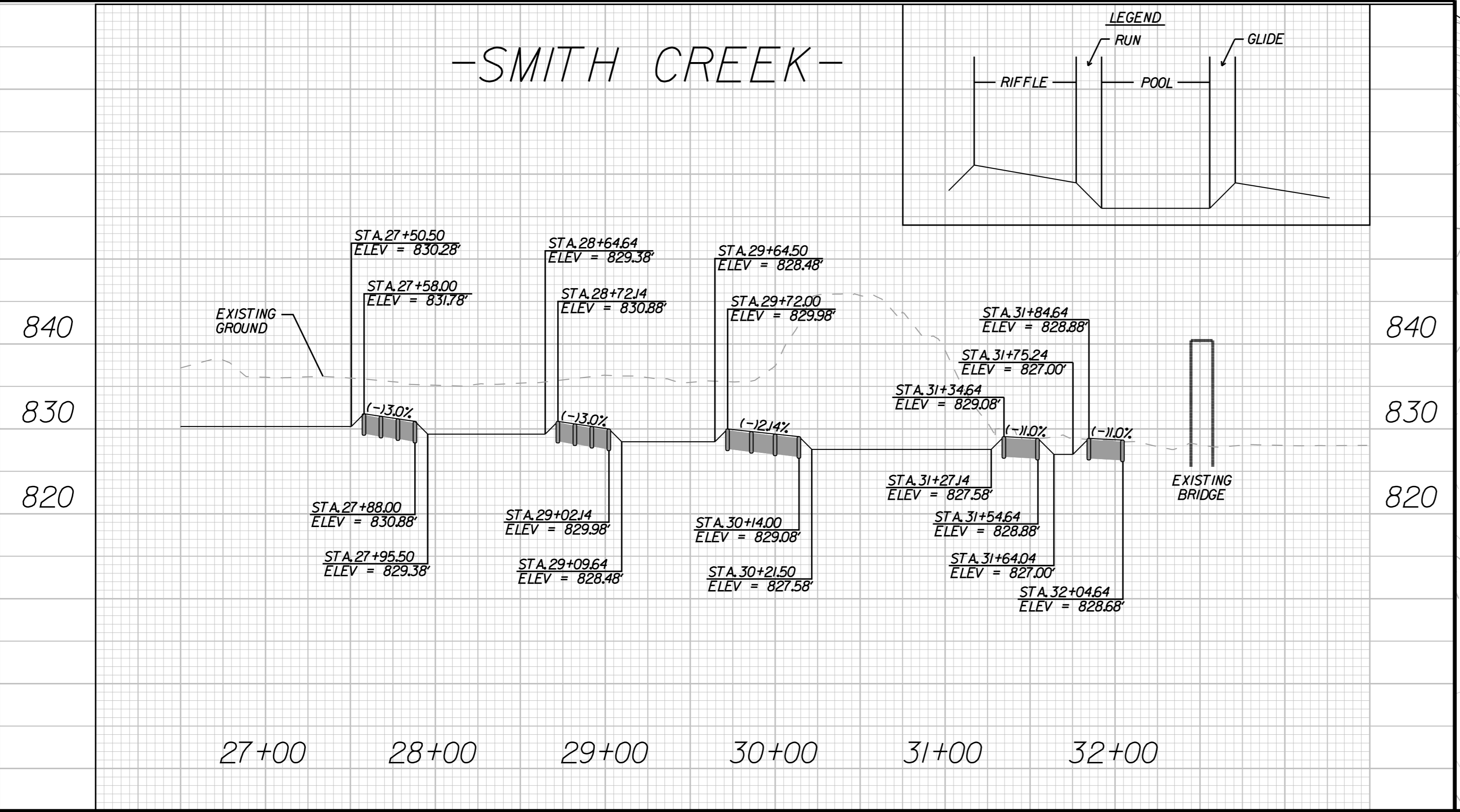
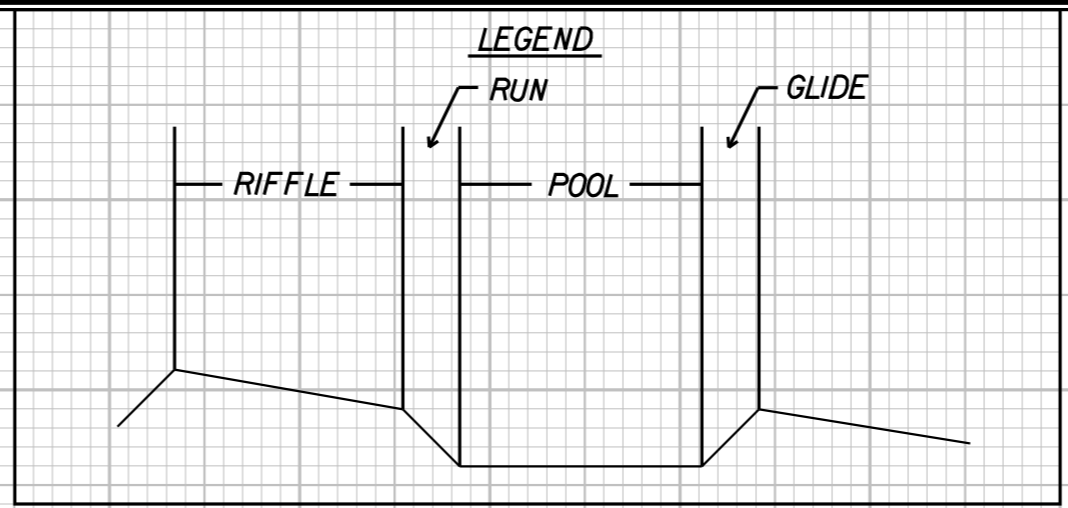




REVISIONS



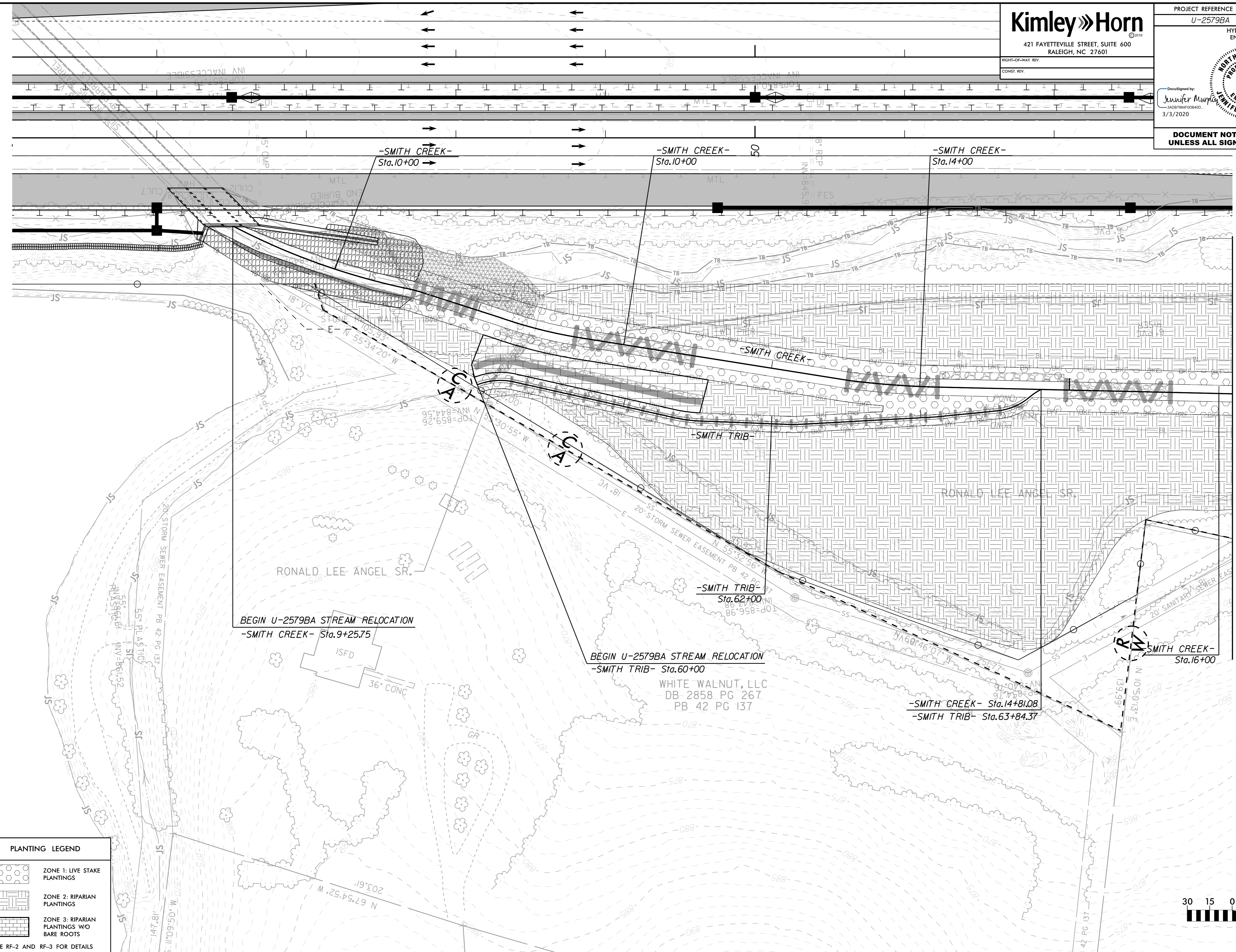
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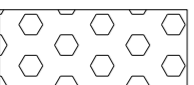

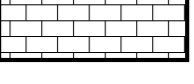
REVISIONS

NAD 83/95

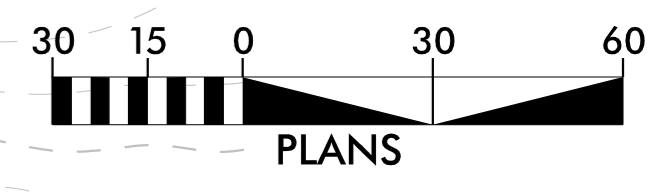
MATCHLINE SEE STREAM-11

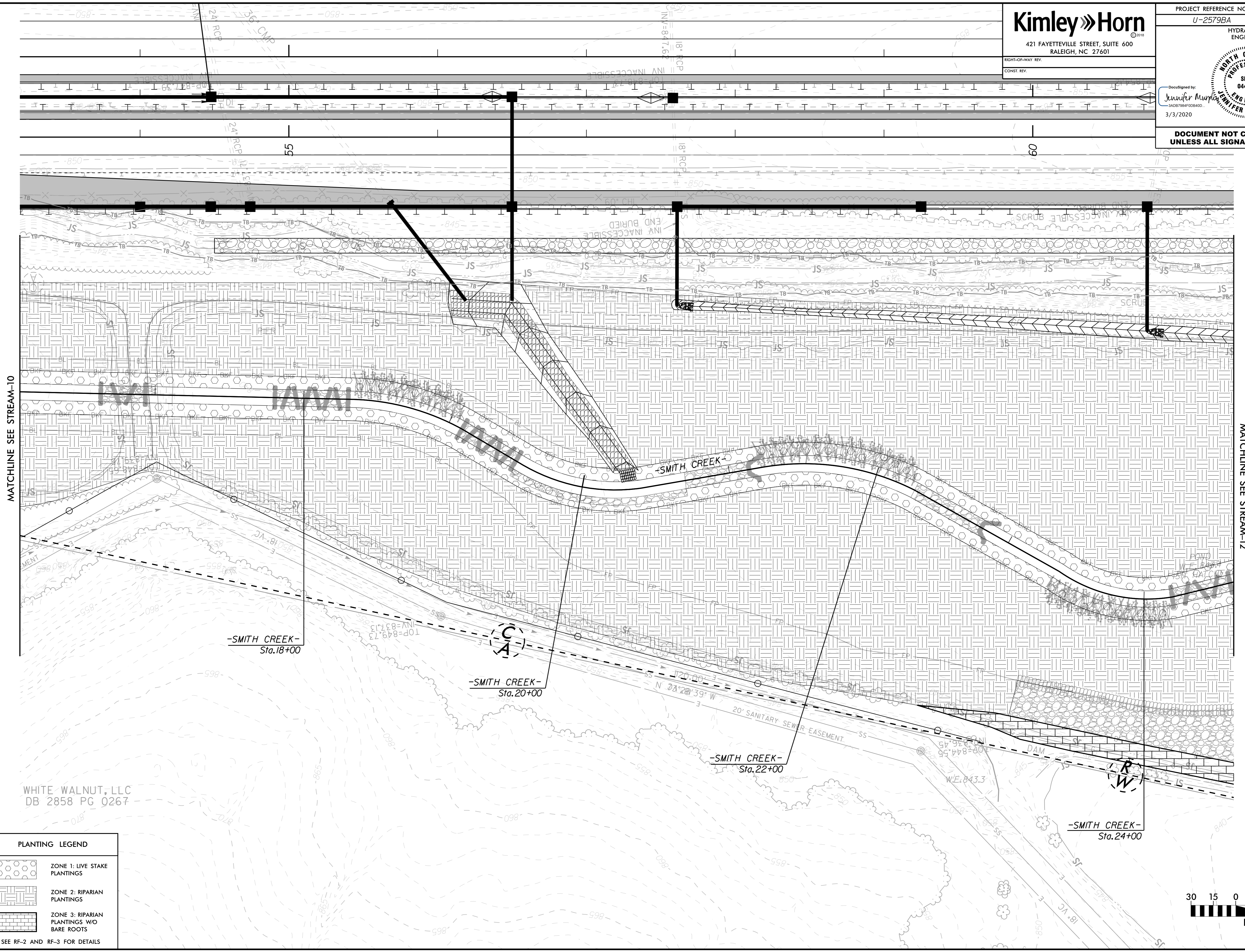


**PLANTING LEGEND**

-  ZONE 1: LIVE STAKE PLANTINGS
-  ZONE 2: RIPARIAN PLANTINGS
-  ZONE 3: RIPARIAN PLANTINGS W/O BARE ROOTS

SEE RF-2 AND RF-3 FOR DETAILS





REVISIONS

MATCHLINE SEE STREAM-10

MATCHLINE SEE STREAM-12

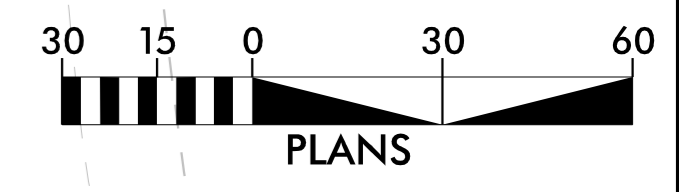
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WHITE WALNUT, LLC  
DB 2858 PG 0267

**PLANTING LEGEND**

	ZONE 1: LIVE STAKE PLANTINGS
	ZONE 2: RIPARIAN PLANTINGS
	ZONE 3: RIPARIAN PLANTINGS W/O BARE ROOTS

SEE RF-2 AND RF-3 FOR DETAILS



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 RALEIGH, NC 27601

PROJECT REFERENCE NO. U-2579BA  
 SHEET NO. STREAM-12

HYDRAULICS ENGINEER

RIGHT-OF-WAY REV.  
 CONST. REV.

DocuSigned by:  
 Jennifer Mumpkin  
 3002984506900  
 3/3/2020

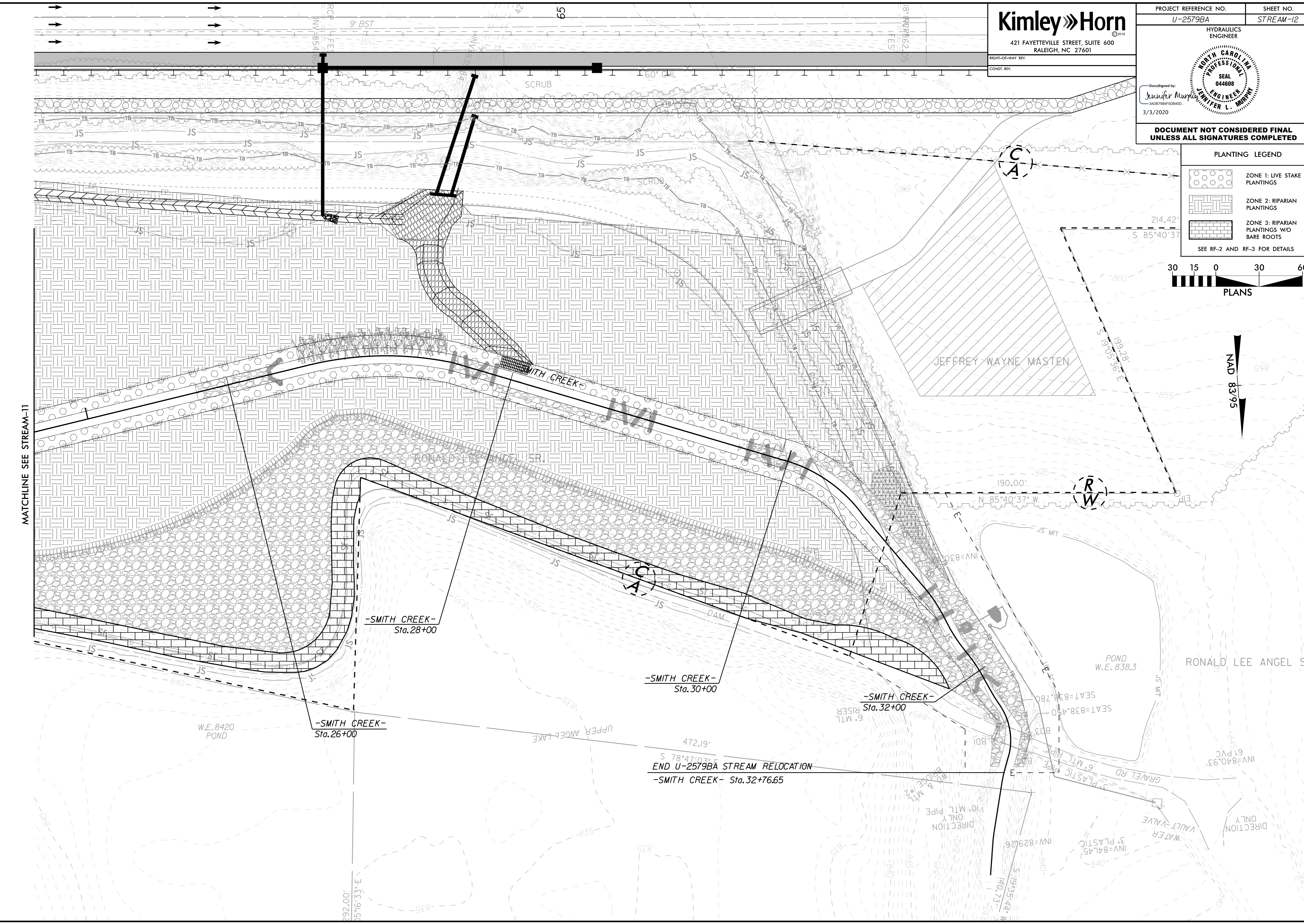
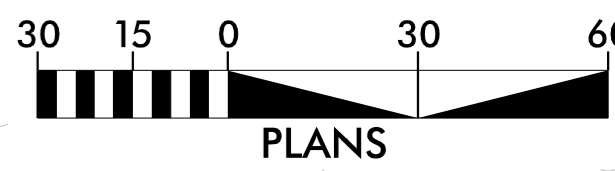
**SEAL**  
 044608  
 JENNIFER L. MUMPKIN

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**PLANTING LEGEND**

	ZONE 1: LIVE STAKE PLANTINGS
	ZONE 2: RIPARIAN PLANTINGS
	ZONE 3: RIPARIAN PLANTINGS W/O BARE ROOTS

SEE RF-2 AND RF-3 FOR DETAILS



REVISIONS

MATCHLINE SEE STREAM-11

-SMITH CREEK- Sta.28+00

-SMITH CREEK- Sta.30+00

-SMITH CREEK- Sta.32+00

-SMITH CREEK- Sta.26+00

END U-2579BA STREAM RELOCATION -SMITH CREEK- Sta.32+76.65

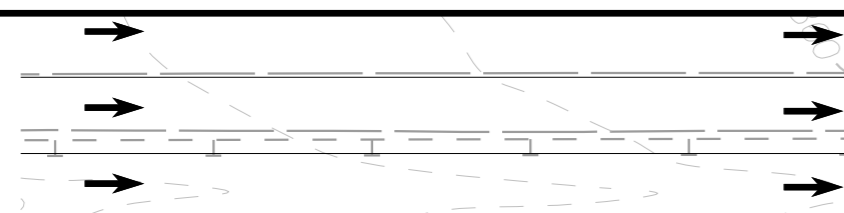
RONALD LEE ANGEL SP

JEFFREY WAYNE MASTEN

(R W)

(C A)

(C A)



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PRECAST CONCRETE GRAVITY WALL

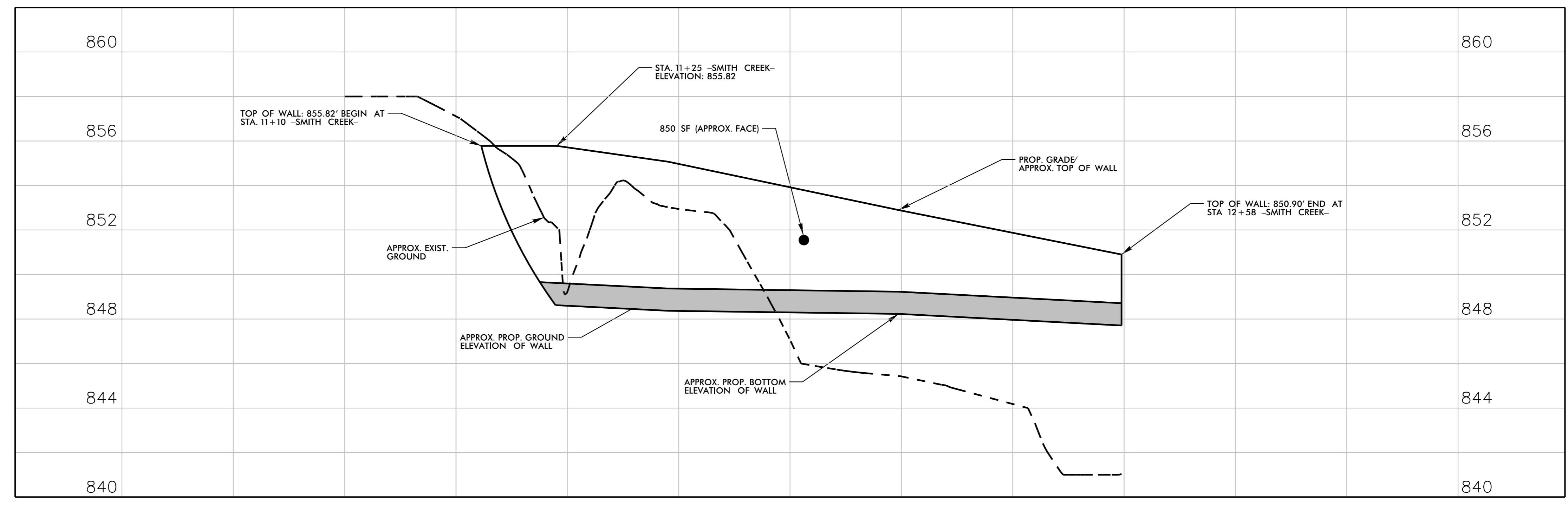
NOTES:

- 1) SEE STREAM-2C-1 AND STREAM-2C-2 FOR DETAILS
- 2) SEE STREAM-4 FOR PLAN SHEET
- 3) SEE X-44/X-45 FOR CROSS SECTIONS
- 4) WALL PROFILES ARE FOR BIDDING PURPOSES ONLY. CONTRACTOR TO SUBMIT SIGNED AND SEALED SHOP DRAWINGS.

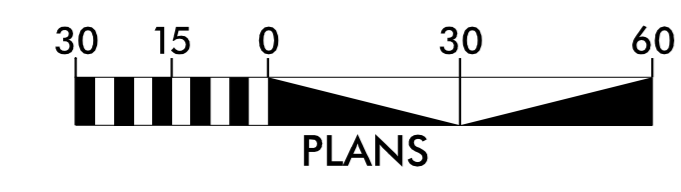
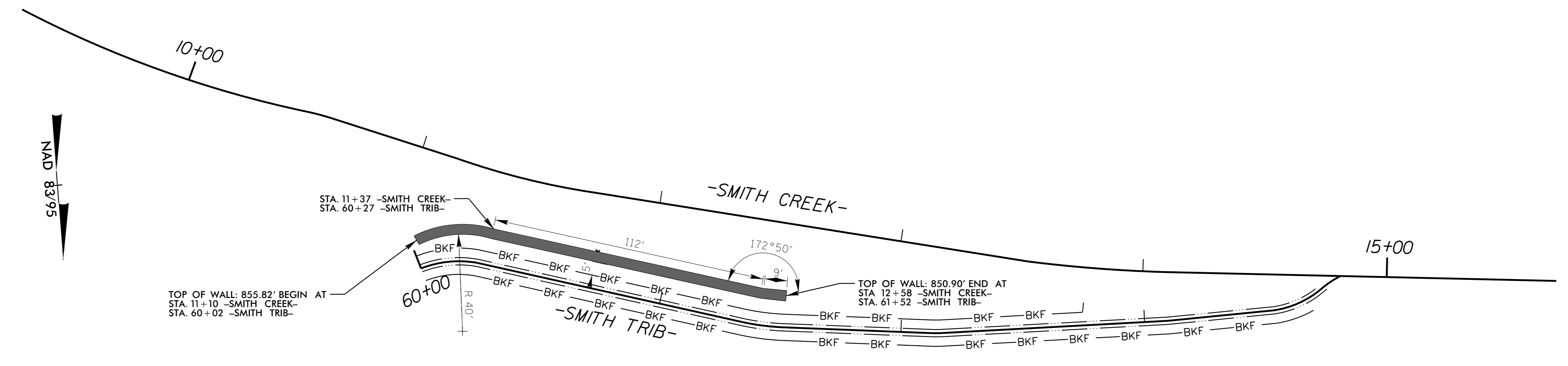
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 RALEIGH, NC 27601

PROJECT REFERENCE NO. U-2579BA	SHEET NO. STREAM - 13
HYDRAULICS ENGINEER	
	
DocuSigned by: Jennifer Murphy 34D87984F0D840D... 3/3/2020	
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PROFILE



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3/3/2020