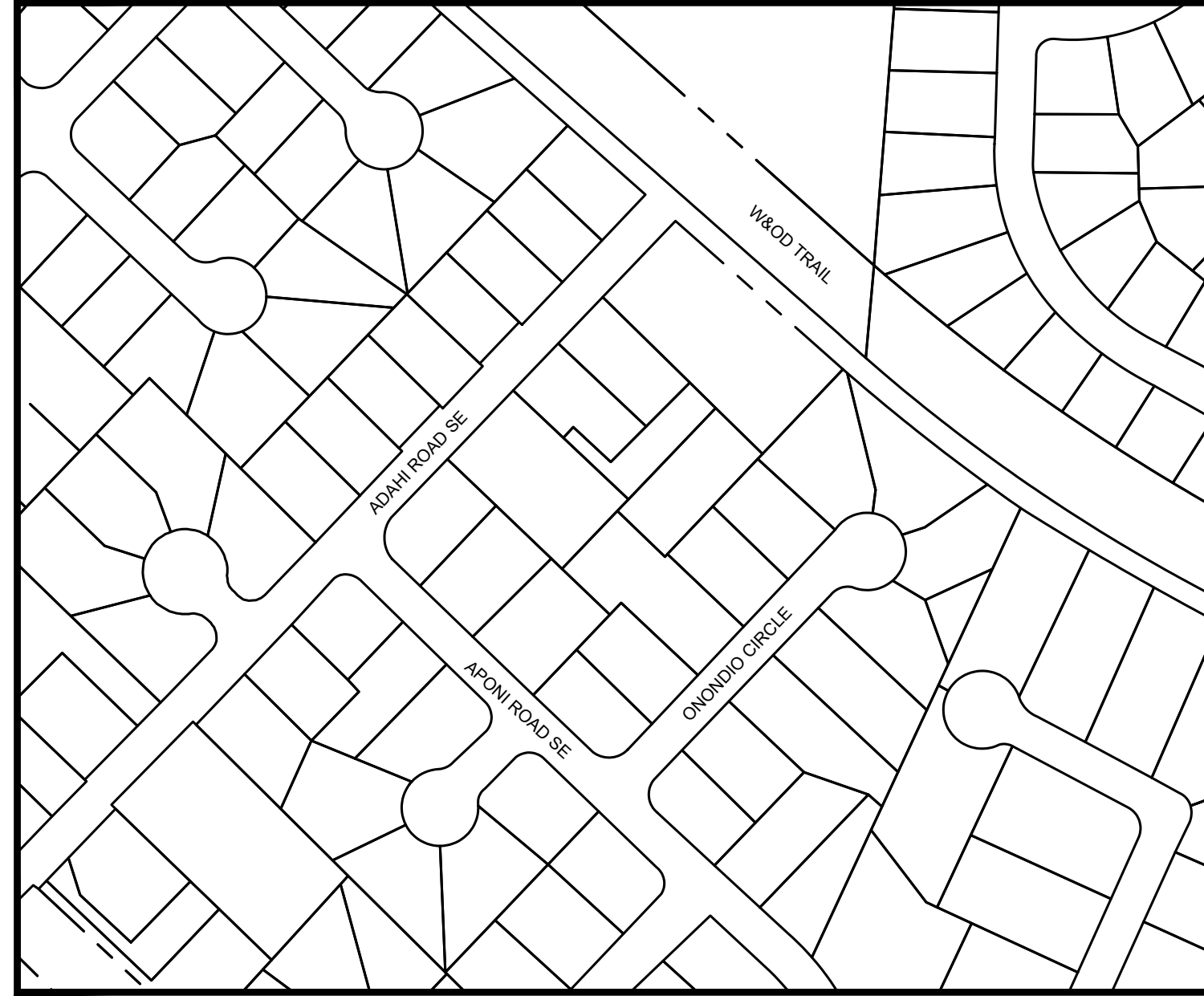


PROJECT NARRATIVE

THE BEAR BRANCH AT ONONDIO CIRCLE PROJECT PROPOSES THE RESTORATION OF APPROXIMATELY 620 LINEAR FEET OF STREAM THAT FLOWS SOUTHWEST BETWEEN THE WO&D TRAIL AND APONI ROAD SE IN VIENNA, VA. THE 0.1-SQ MI WATERSHED OF THE STREAM IS HIGHLY URBANIZED, LEADING TO A FLASHY HYDROLOGIC REGIME, WHICH HAS ERODED THE BANKS TO AS HIGH AS 8 FEET THROUGHOUT MUCH OF THE REACH. THE NEARBY PROPERTY OWNERS REQUESTED THE TOWN LOOK AT RESTORING THE STREAM DUE TO SAFETY AND FLOODING CONCERNS. THE DESIGN CONSISTS OF REESTABLISHING A RIFFLE POOL SEQUENCE USING CROSS VANE STRUCTURES AND RIPARIAN PLANTINGS TO STABILIZE THE SEVERELY ERODED AREA.

ONONDIO CIRCLE STREAM RESTORATION CONCEPT

OWNER X
APPLICANT X
ENGINEER
WSP EARTH AND ENVIRONMENT
13530 DULLES TECHNOLOGY DRIVE, SUITE 300
HERNDON, VA 20171



VICINITY MAP
SCALE: 1" = 200'

Sheet List Table	
Sheet Number	Sheet Title
001	COVER SHEET
002	EXISTING CONDITIONS
003	CONCEPT PLAN
004	TYPICAL SECTIONS & DIMENSIONS TABLE
005	PLUNGE POOL DETAIL
006	CONSTRUCTED RIFFLE DETAIL
007	ROCK CROSS VANE DETAIL
008	ROCK REVETMENT DETAIL



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CONCEPT DESIGN
**ONONDIO CIR. STREAM RESTORATION
COVER SHEET**
VIENNA, VIRGINIA

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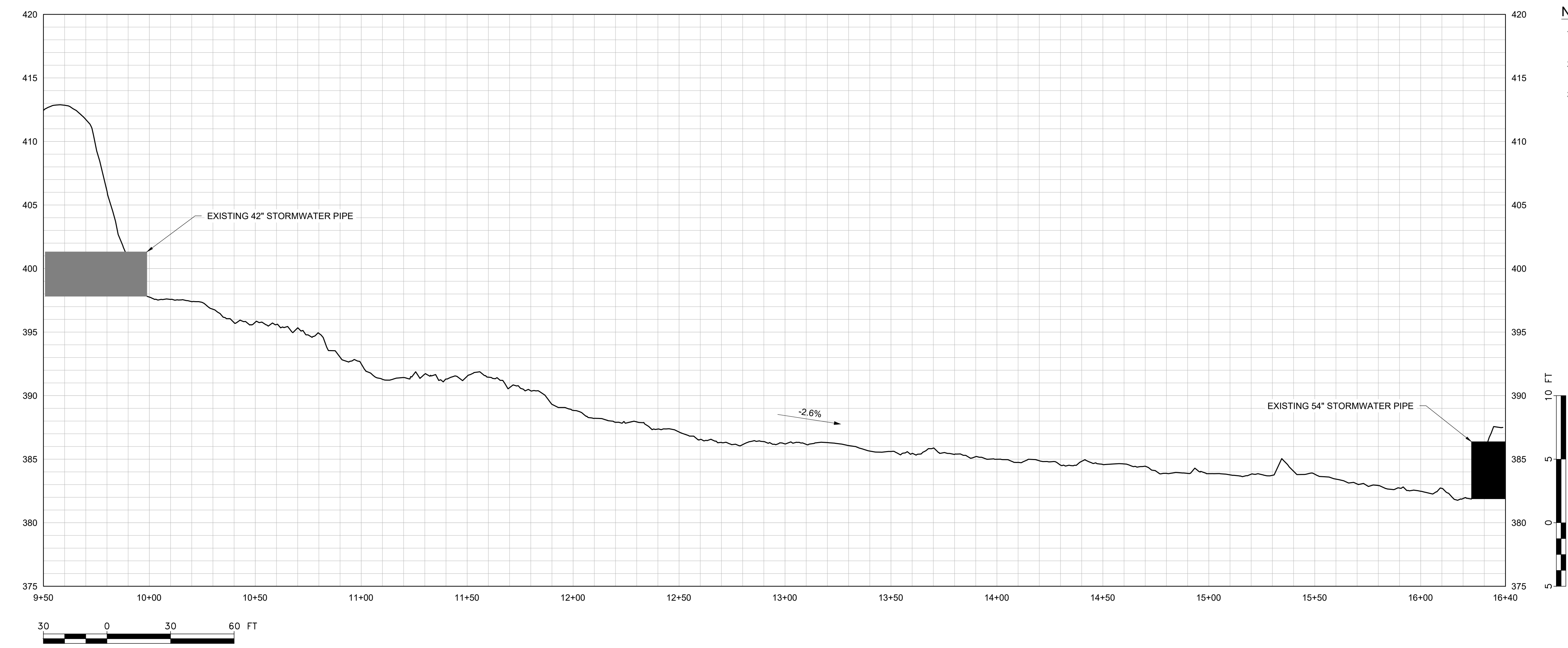
SHEET **001** OF **###**
PLAN NO: TBD PROJECT NO: -

PLOTTED BY: HUMPTON, JOHN SHEET SET: ONONDIO CIRCLE CONCEPT LAYOUT: 001 COVER SHEET September 15, 2025 09:48:45am F:\D7526\PROJECT\VIENNA, VA_VSMP_M54\BEAR BRANCH STREAM RESTORATION AT ONONDIO CIRCLE\05 CAD\CIV\COVER SHEET.DWG

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CONCEPT DESIGN
ONONDIO CIR. STREAM RESTORATION
EXISTING CONDITIONS
 VIENNA, VIRGINIA

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NOTE:

1. TOPOGRAPHIC INFORMATION DERIVED FROM USGS 1M LIDAR INFORMATION DATED 2022 FOR CONCEPT ONLY. ANY ENGINEERED DESIGN TO USE IN-SITU SURVEY.
2. PIPE, BUILDING, AND PROPERTY LINE INFORMATION ACQUIRED FROM FAIRFAX GIS AND MAPPING SERVICES WEBSITE.
3. PIPE INVERT INFORMATION IF APPROXIMATE.

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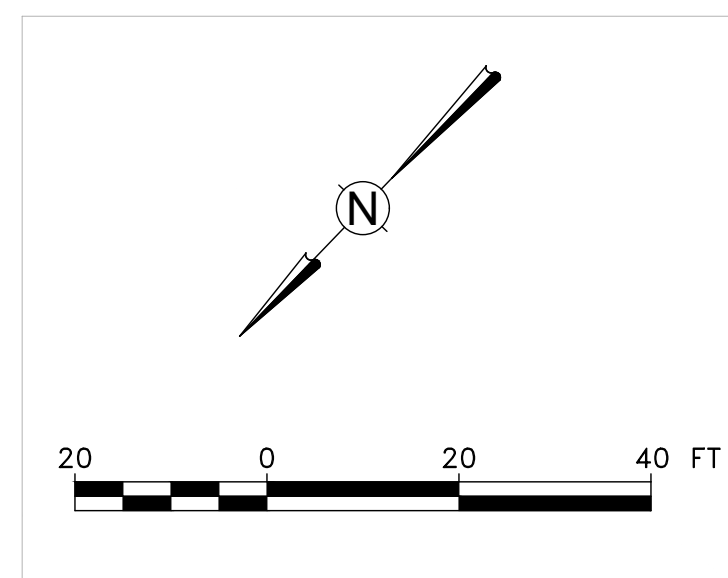


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CONCEPT DESIGN
ONONDIO CIR. STREAM RESTORATION
CONCEPT PLAN

VIENNA, VIRGINIA



PLAN VIEW LEGEND

- 326- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- ROCK CROSS VANE
- CONSTRUCTED RIFFLE
- ROCK TOE REVETMENT

NOTE:

1. LAYOUT IS FOR CONCEPTIONAL PURPOSES ONLY AND SUBJECT TO CHANGE BASED ON SURVEYED CONDITIONS, CLIENT/PUBLIC FEEDBACK, AND/OR ENGINEER'S JUDGEMENT.

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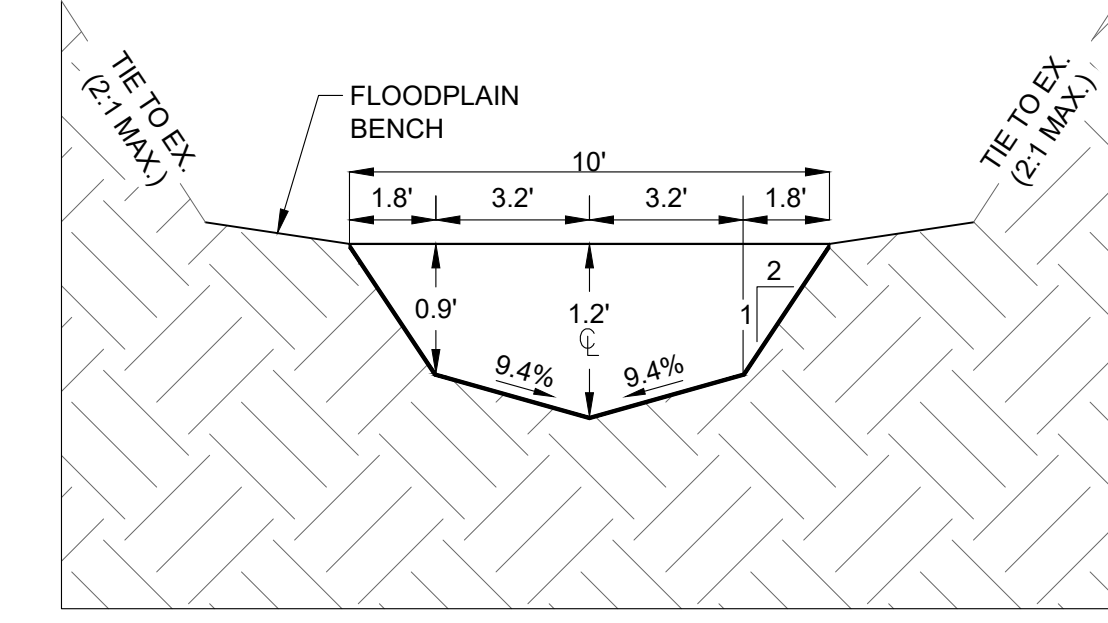
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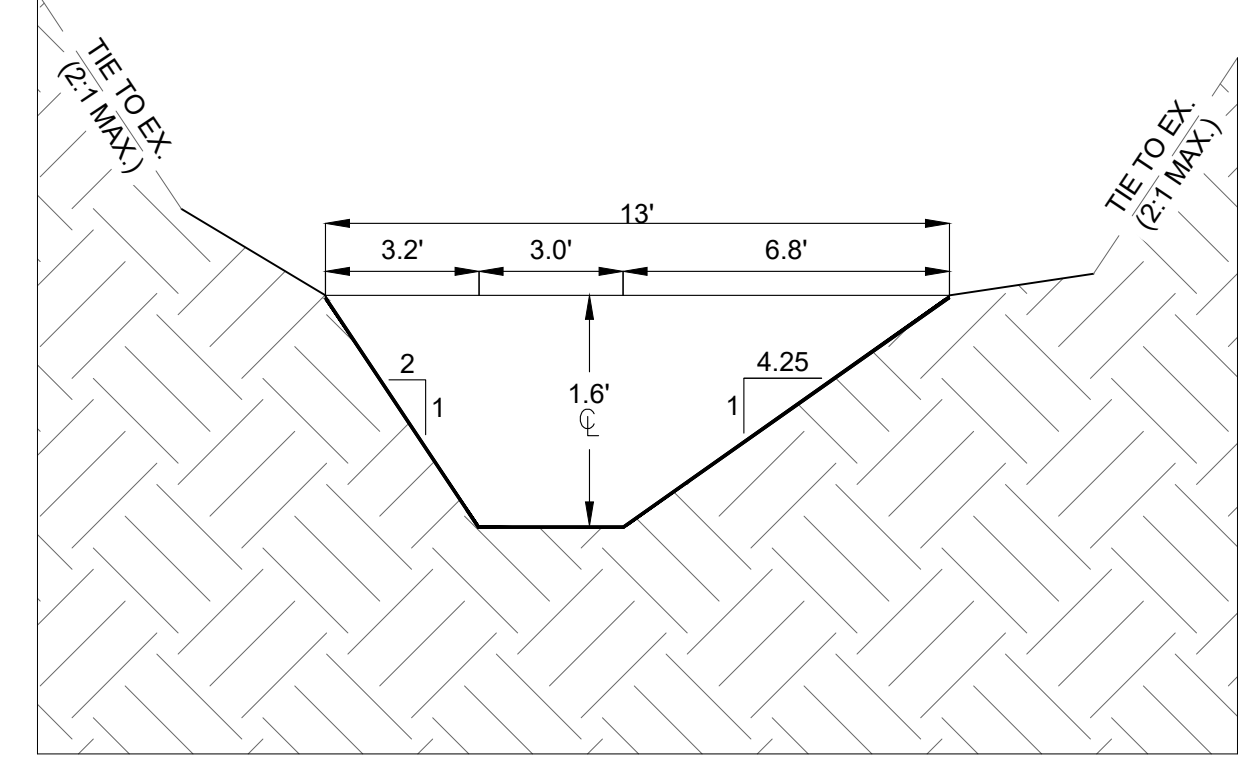
CONCEPT DESIGN
ONONDIO CIR. STREAM RESTORATION
TYPICAL SECTIONS & DIMENSIONS TABLE
 VIENNA, VIRGINIA

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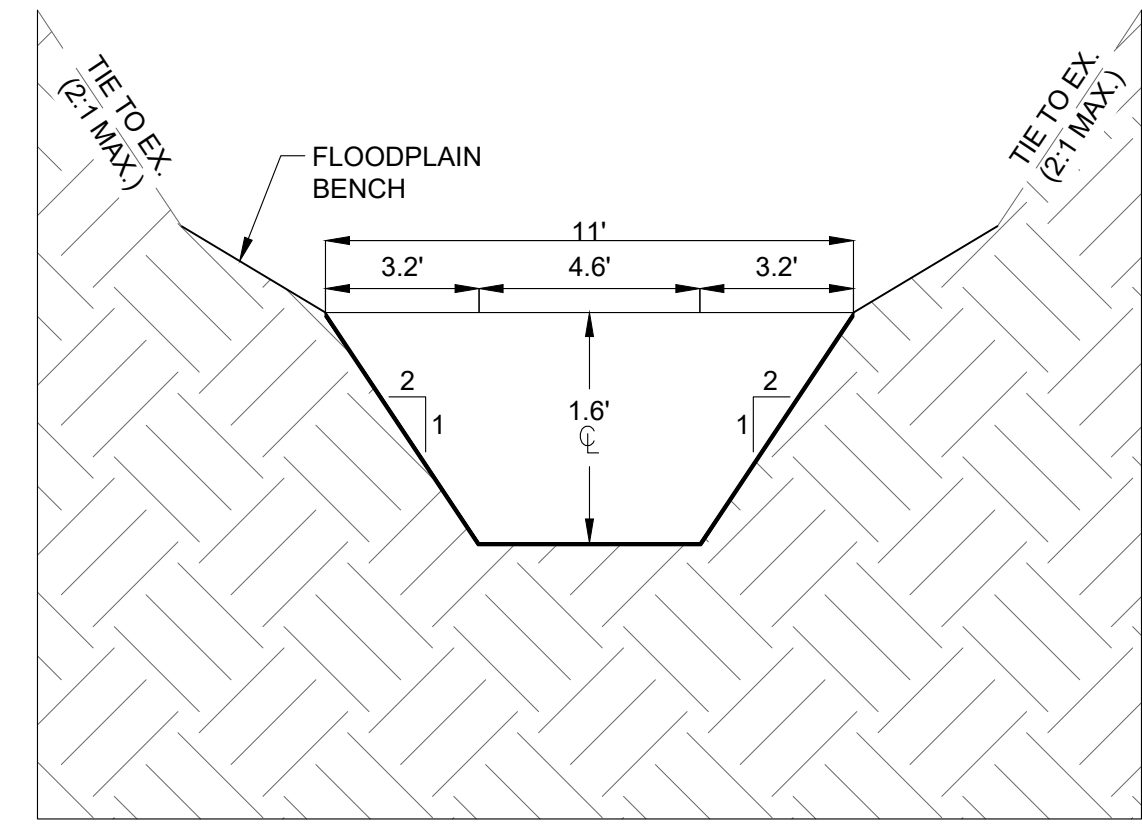
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TYPICAL CONSTRUCTED RIFFLE SECTION



TYPICAL CURVE POOL SECTION



TYPICAL STRAIGHT POOL SECTION

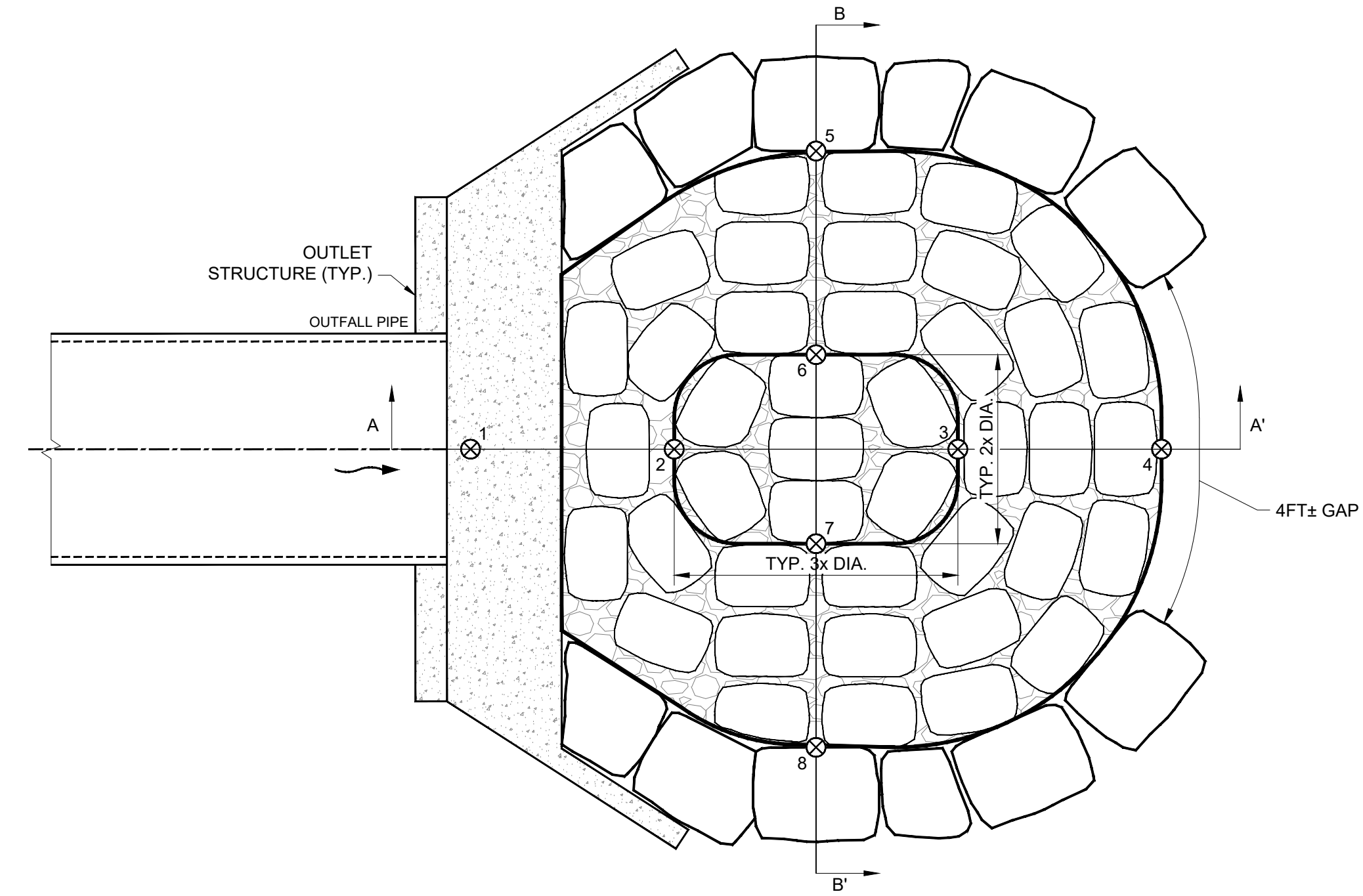
NOTE:
 THESE ARE TYPICAL SECTIONS; THERE IS VARIABILITY OF THE CHANNEL THROUGHOUT THE PROFILE LENGTH RESULTING FROM TRANSITIONS AND THE TOP OF BANK WHICH IS A CONTINUALLY SLOPING SURFACE.

Design Section	
RIFFLE-POOL	
Width, W	10 ft
Mean Depth, d_{bkr}	0.8 ft
Max Depth, d_{max}	1.2 ft (1.5 d_{bkr})
Cross Section Area (CSA)	8.3 ft ²
W/ d_{bkr}	12.5
Pool Width (straight), PW_s	11 ft (1.1W)
Pool Width (curve), PW_c	13 ft (1.1W)
Pool-to-Pool Spacing, P_{sp}	40-70 ft (4-7W)
Pool Depth, $d_{maxpool}$	1.6 ft (2 d_{bkr})
Riffle Length, R_L	10-30 ft (1-3W)
Radius of Curvature, R_c	30 ft (3W)
Slope of Reach, S_{ave}	3.1%
Slope of Riffle, R_s	5.3% (1.7 S_{ave})

- Existing Length = 621 ft
- Total Proposed Length = 521 ft
- Delta = 16 ft
- Total Riffle Length = 258 ft
- Total Pool Length = 233 ft
- Plunge Pool Length = 30 ft

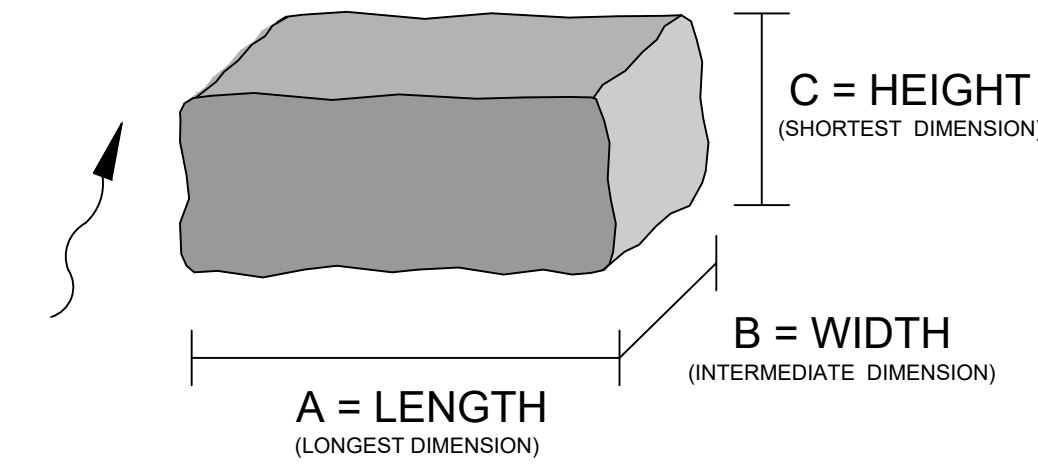
PLUNGE POOL
NOTES

1. FOR PLUNGE POOL BELOW CULVERT, THERE ARE TO BE NO MAJOR GAPS AND SPLASH ROCKS SHALL TOUCH. INTERSTITIAL SPACE OR SMALLER GAPS SHALL BE FILLED WITH VDOT #57 STONE.
2. CONSTRUCT A 3 FOOT WIDE BENCH AROUND THE PERIMETER OF THE PLUNGE POOL WITH HEADER BOULDERS.
3. IF AREA UNDER EXISTING CONCRETE APRON HAS BEEN UNDERMINED, CONTRACTOR SHALL PLACE SPLASH ROCKS AND #57 STONE TO FILL AREA BEFORE SPLASH ROCKS ARE PLACED SLOPING TOWARDS CENTER OF POOL.
4. DETAIL REPRESENTS GENERAL SCHEMATICS OF THE PLUNGE POOL AND STRUCTURE STONES. DETAILS DO NOT REPRESENT ACTUAL AMOUNTS OF STRUCTURE STONE REQUIRED TO BUILD STRUCTURES.



PLUNGE POOL
PLAN

NOT TO SCALE

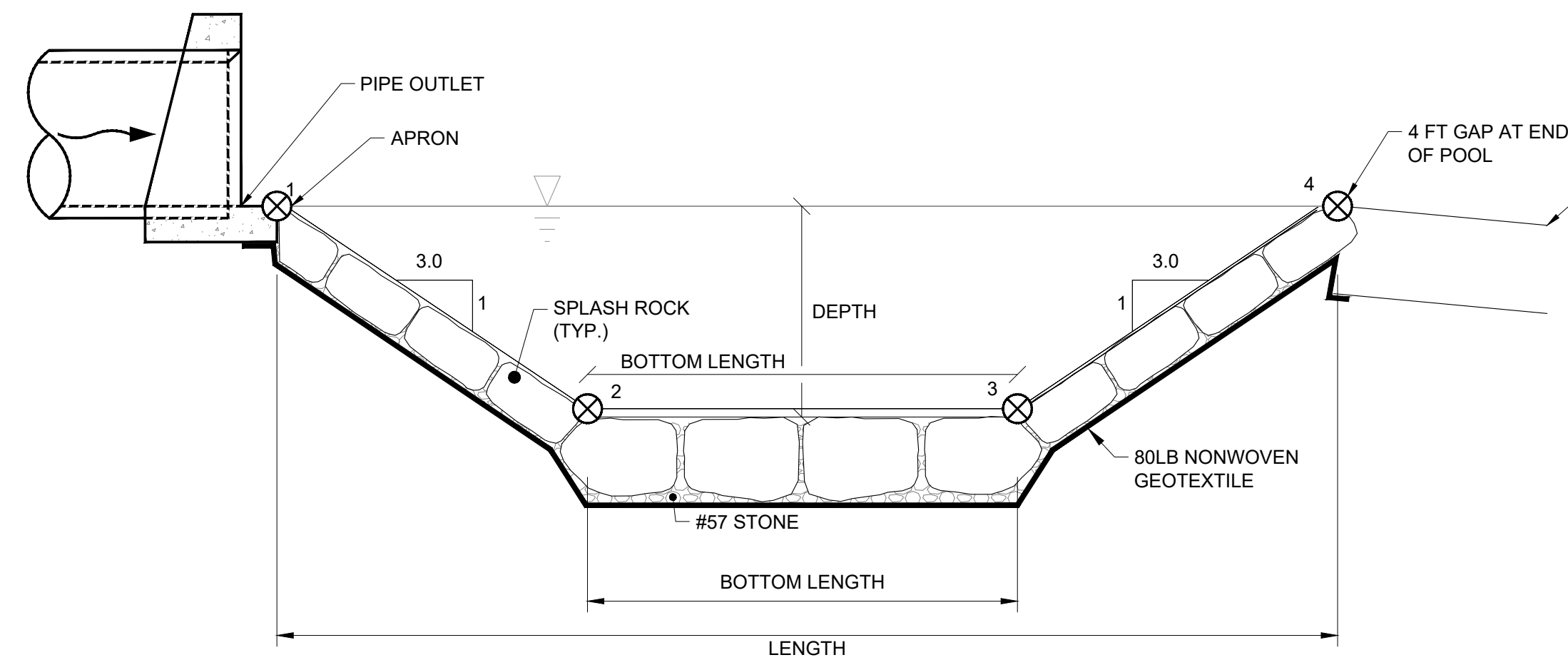


PLUNGE POOL DIMENSIONS

STRUCTURE SIZE TABLE		A	B	C
STRUCTURES	HEADER BOULDER	4'	3'	2'
	SPLASH ROCKS	2'	2'	1'

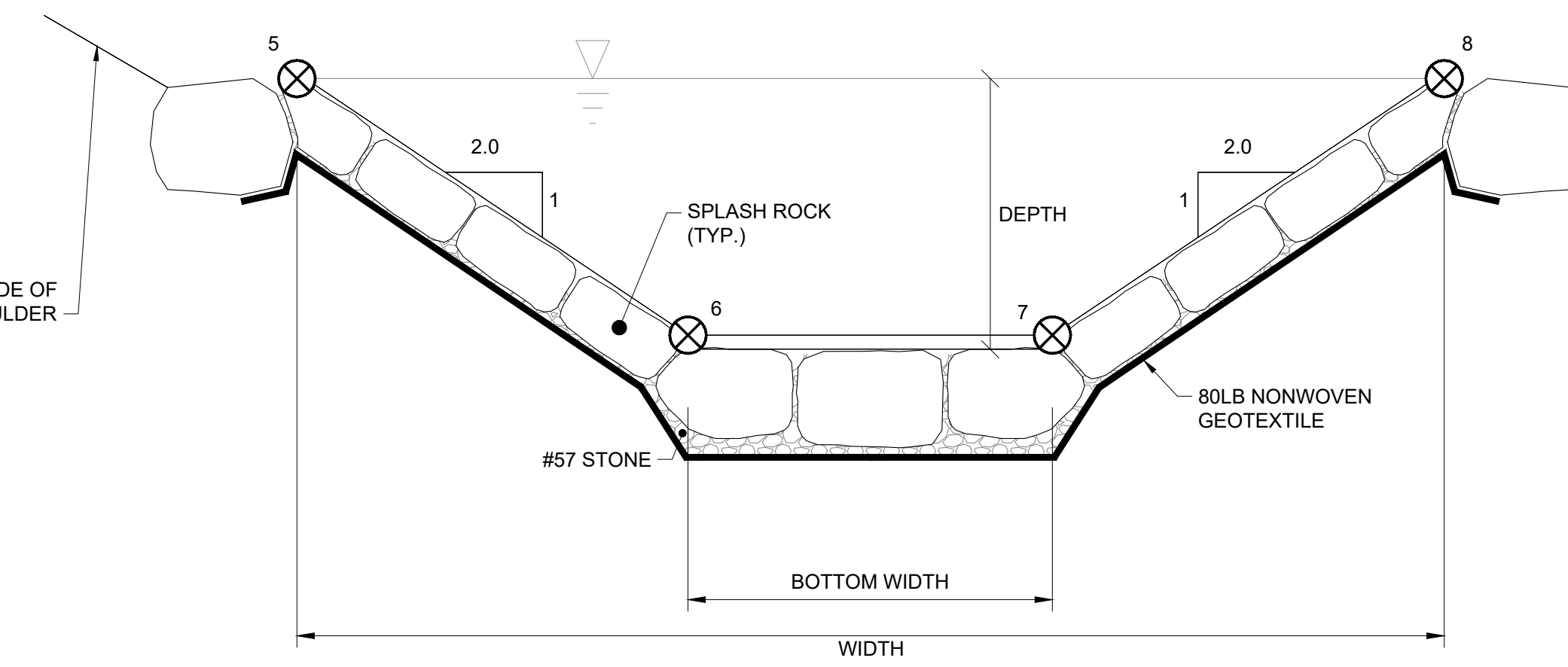
NOTES:
ASSUMED ROCK DENSITY 165 LB/FT³

NOTE:
BACKFILL SHALL BE PLACED IN 8" LOOSE LIFTS AND COMPACTED USING TRACKED EQUIPMENT OR AN EXCAVATOR BUCKET SUCH THAT THE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM. MINIMUM STRUCTURE DIMENSIONS SHALL BE +/- 0.5'.



PLUNGE POOL
PROFILE A - A'

NOT TO SCALE



PLUNGE POOL
CROSS SECTION B - B'

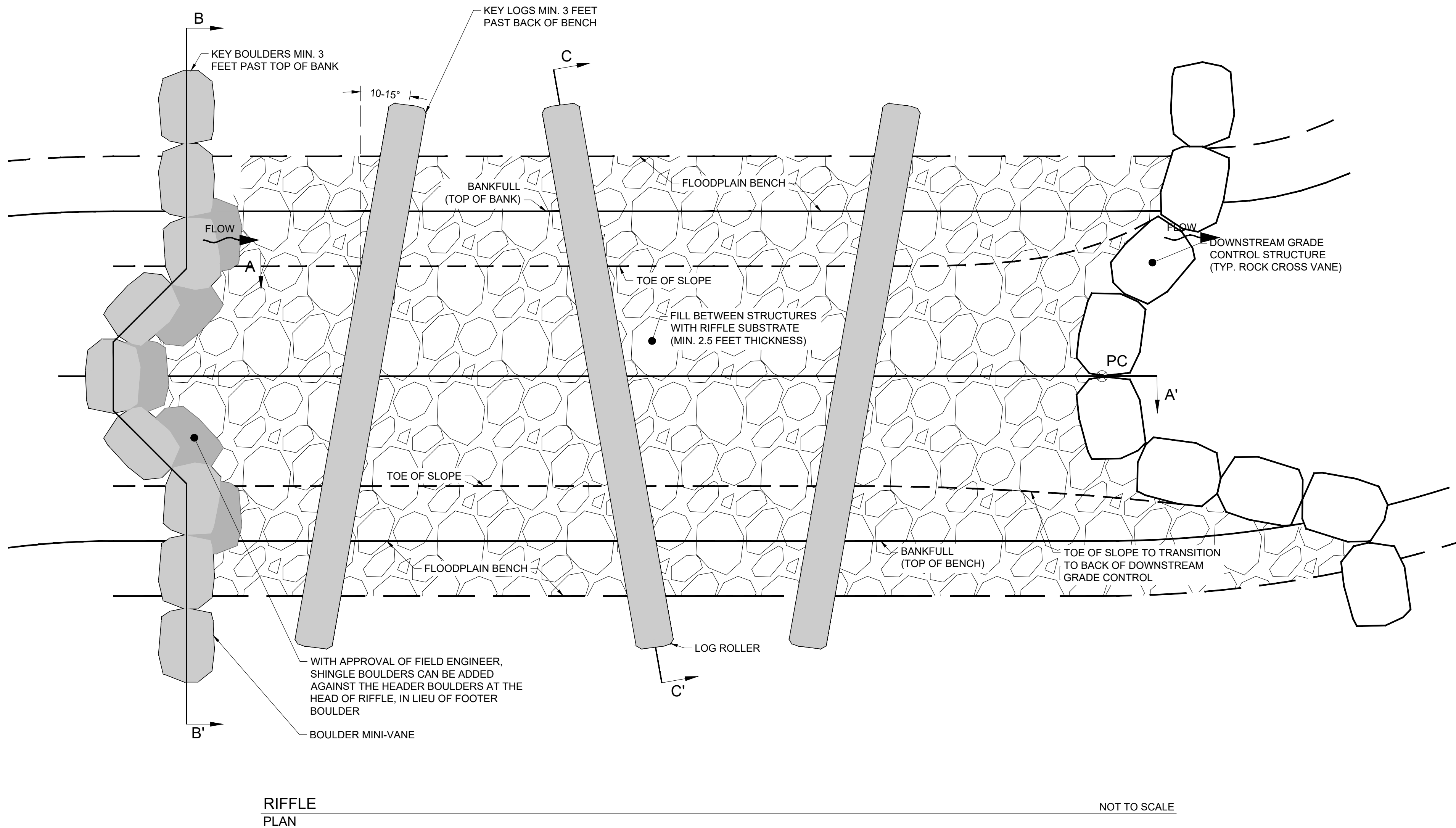
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CONCEPT DESIGN
ONONDIO CIR. STREAM RESTORATION
PLUNGE POOL DETAIL

VIENNA, VIRGINIA

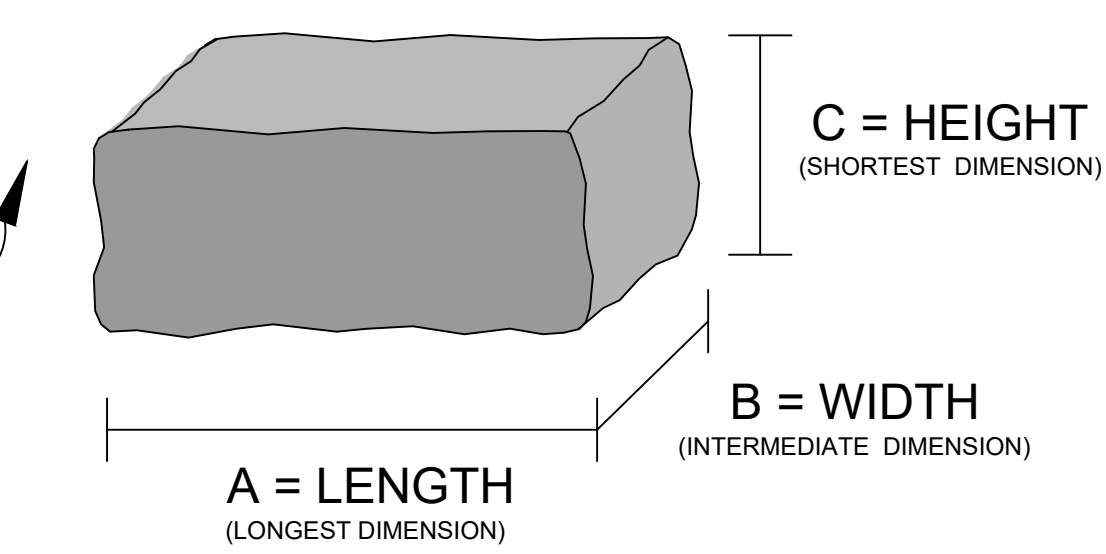
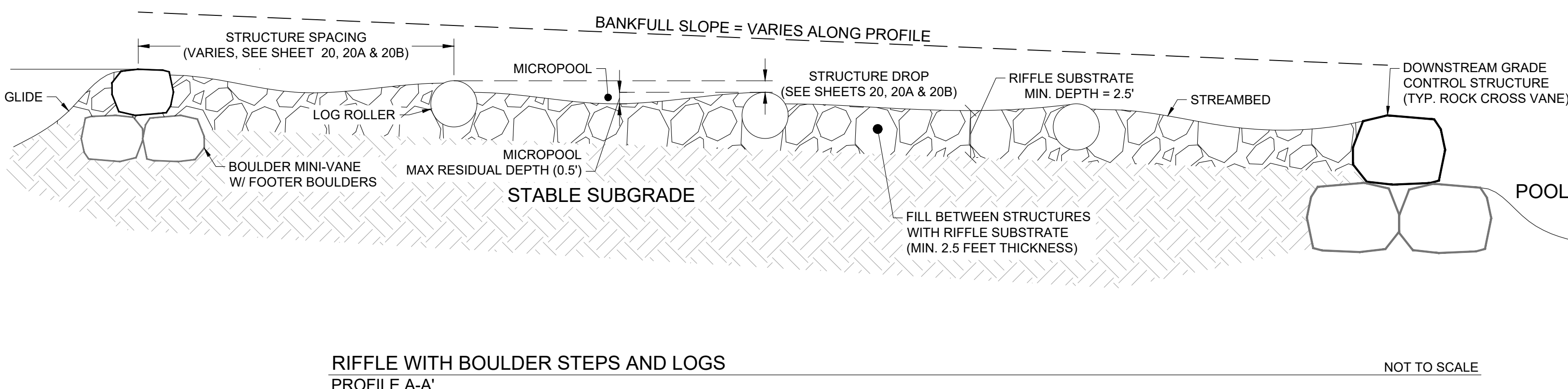
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RIFFLE WITH BOULDER MINI-VANES AND LOG ROLLERS
 NOTES

1. RIFFLE WITH BOULDER MINI-VANES AND LOG ROLLERS IS A STREAM AND RIVER RESTORATION DESIGN FEATURE THAT INCORPORATES COARSE SUBSTRATE MATERIAL, BOULDERS AND LARGE WOOD (LOGS) IN THE CHANNEL BOTTOM THAT WILL NOT BE MOBILIZED UNDER DEFINED FLOW CONDITIONS. REPLACING (OR ADDING TO) THE NATIVE CHANNEL BED MATERIAL WITH LARGER DIAMETER ROCK AND LARGE WOOD CREATES A RIFFLE THAT FUNCTIONS AS RIGID GRADE CONTROL AND A HABITAT FEATURE. LARGER ROCK MATERIAL AND WOOD ENHANCES FLOW DIVERSITY AND TURBULENCE UNDER BASE FLOW CONDITIONS, PROMOTES AQUATIC HABITAT, NUTRIENT PROCESSING, AND RE-AERATION OF STREAM FLOW BENEFITING WATER QUALITY. THE D100 PARTICLES OF THE RIFFLE ARE DESIGNED TO RESIST THE SHEAR STRESS ASSOCIATED WITH THE 100-YR DESIGN STORM WHILE ALLOWING SMALLER SUBSTRATE PARTICLES TO BE MOBILIZED AND REPLACED BY UPSTREAM SEDIMENT SUPPLY.
2. RIFFLE SUBSTRATE SHALL BE QUARRIED STONE UNLESS NATIVE MATERIAL OF SIMILAR SIZE IS AVAILABLE ONSITE AND MEETS THE RIFFLE SUBSTRATE SIZE REQUIREMENTS. THE TOWN'S ON-SITE ENGINEER/INSPECTOR MUST APPROVE THE USE OF ALL ONSITE NATIVE MATERIAL.
3. THE GRAVEL AND COBBLE SUBSTRATE USED FOR THIS DESIGN FEATURE SHALL BE PREFERENTIALLY HARVESTED FROM THE EXISTING CHANNEL AND CUT AREAS ONSITE. ALL HARVESTED GRAVEL AND COBBLE SHALL MEET DESIGN SPECIFICATIONS. SORTING AND SIEVING OF THE HARVESTED RIFFLE SUBSTRATE IS INCIDENTAL TO THE CONSTRUCTION OF THIS STRUCTURE.
4. LOGS SHALL HAVE MINIMUM DIAMETER OF 2'. LOGS SHALL HAVE A MINIMUM LENGTH OF 24 FEET. ALL LOGS SHALL BE RELATIVELY STRAIGHT WITH LIMBS AND BRANCHES TRIMMED FLUSH. ALL LOGS SHALL SLOPE UPSTREAM IN THE DOWNSTREAM DIRECTION.
5. FOR INSTALLATION, THE CONTRACTOR SHALL EXCAVATE THE LENGTH OF THE RIFFLE, INSTALL STRUCTURES, INSTALL COIR FIBER MATTING, KEY MATTING INTO THE RIFFLE TRENCH AND ALONG STRUCTURES, AND BACKFILL WITH THE RIFFLE SUBSTRATE TO THE ELEVATIONS SHOWN ON THE PROPOSED PROFILE.
6. FLOODPLAIN BENCHES ARE TO BE CONSTRUCTED FROM RIFFLE SUBSTRATE. INTERSTITIAL SPACES BETWEEN RIFFLE SUBSTRATE MATERIAL ALONG FLOODPLAIN BENCH SHALL BE FILLED. TOPSOIL SHALL BE INTERMITTENTLY MIXED INTO TO GAPS TO HELP PROMOTE VEGETATIVE GROWTH. FLOODPLAIN BENCH IS TO BE TOP DRESSED WITH EXISTING BED MATERIAL.
7. RIFFLE SUBSTRATE SHALL EXTEND A MINIMUM OF 3 FEET UPSTREAM OF THE POINT OF TANGENCY (PT) INTO THE GLIDE.
8. POINT OF CURVATURE (PC) AND POINT OF TANGENCY (PT) STATIONS AND ELEVATIONS ARE INCLUDED ON THE GEOMETRY PLAN AND THE PROPOSED PLAN AND PROFILE SHEETS. ELEVATIONS OF BOULDER MINI-VANES AND LOGS SHALL NOT VARY FROM THE PLAN WITHOUT DIRECTION FROM THE TOWN'S ON-SITE ENGINEER/INSPECTOR.
9. RIFFLE SUBSTRATE SHALL BE USED AS BACKFILL AROUND/BETWEEN ALL STRUCTURES AND BE USED TO CONSTRUCT THE FLOODPLAIN BENCH.
10. RIFFLE SUBSTRATE SHALL BE AT LEAST 2.5 FEET DEEP. RIFFLE SUBSTRATE SHALL BE PLACED AT A UNIFORM THICKNESS.
11. RIFFLE SUBSTRATE SHALL BE PLACED SUCH THAT, IN CROSS-SECTION, ITS LOWEST ELEVATION OCCURS IN THE CENTER OF THE CHANNEL AS PER THE DETAIL.
12. RIFFLE SUBSTRATE SHALL BE COMPACTED USING TRACKED EQUIPMENT OR AN EXCAVATOR BUCKET SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM. WITH APPROVAL FROM AND AT THE DIRECTION OF THE TOWN'S ON-SITE ENGINEER AND SEDIMENT CONTROL INSPECTOR, RIFFLE MATERIAL MAY BE WASHED IN USING AN EXCAVATOR BUCKET PROVIDED ADEQUATE EROSION AND SEDIMENT CONTROLS ARE IN PLACE AND FUNCTIONING PROPERLY AT ALL TIMES.
13. THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
14. RE-DRESSING OF CHANNEL AND FLOODPLAIN BENCH WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION. MIGRATION OF FINES, ESPECIALLY AFTER RAINFALL EVENTS, IS TO BE EXPECTED AND MAY REQUIRE RE-SHAPING OF THE CHANNEL AND RE-DISTRIBUTION OF RIFFLE SUBSTRATE MATERIAL TO MEET PROPOSED GRADES.
15. EXISTING STREAM BED MATERIAL (COBBLE-GRAVEL-SAND) MAY BE USED TO TOP DRESS AND FILL THE MATRIX OF THE RIFFLE SUBSTRATE AT THE DIRECTION OF THE TOWN'S ON-SITE ENGINEER/INSPECTOR.



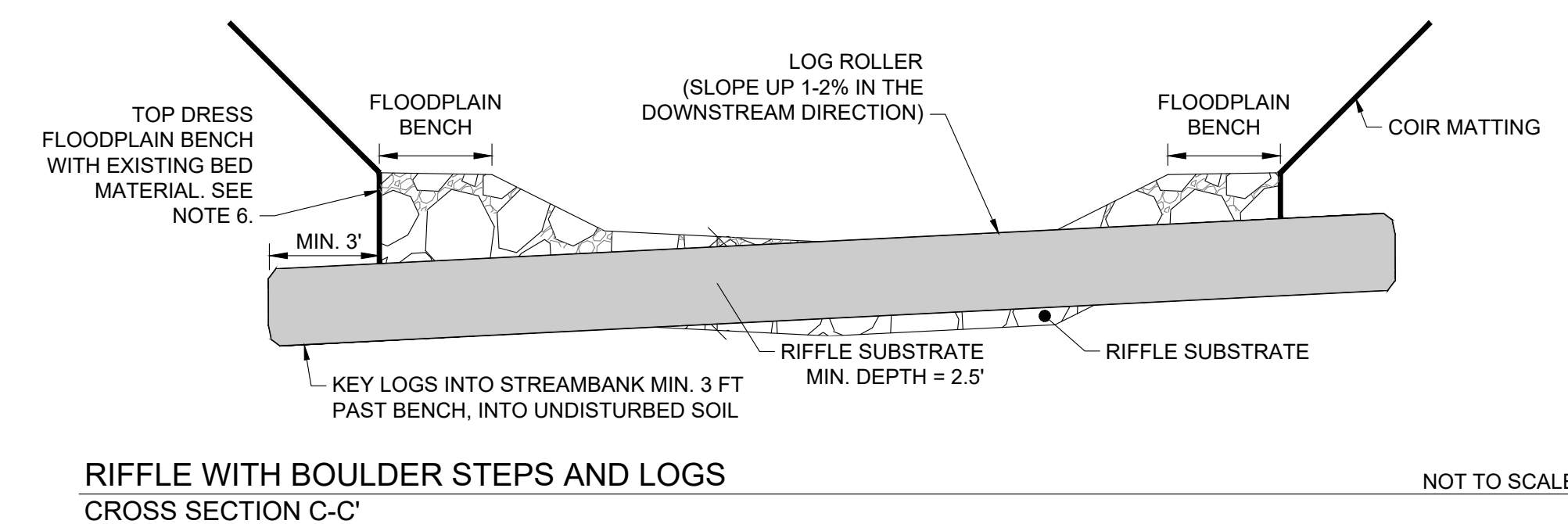
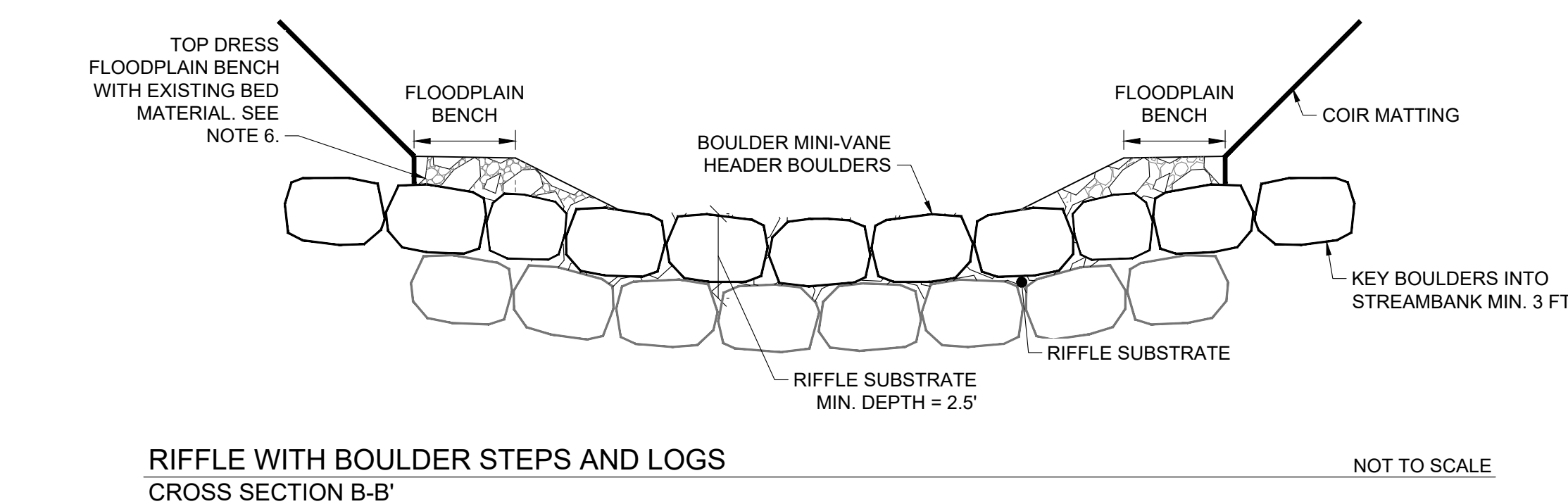
NOTE:
 BACKFILL SHALL BE PLACED IN 8" LOOSE LIFTS AND COMPACTED USING TRACKED EQUIPMENT OR AN EXCAVATOR BUCKET SUCH THAT FUTURE SETTLEMENT IS KEPT TO A MINIMUM. MINIMUM STRUCTURE DIMENSIONS SHALL BE +/- 0.5'. BEFORE PLACEMENT OF BACKFILL, CHANNEL SHALL BE EXCAVATED TO A STABLE SUBGRADE (APPROVED BY THE TOWN'S ON-SITE ENGINEER/INSPECTOR). FOOTER BOULDERS MUST HAVE ATLEAST ONE CONTACT POINT WITH HEADER BOULDERS, AND MAY BE MORE ROUNDED THAN HEADER.

RIFFLE MATERIAL DIMENSIONS

STRUCTURE SIZE TABLE		A	B	C
ROCK	OFFSET BOULDER STEP	4'	3'	2'
	FOOTER BOULDER	4'	3'	2'
LOGS	MIN DIAMETER = 2' MIN LENGTH = 24'			

CHANNEL BED MATERIAL SPECS

RIFFLE SUBSTRATE	VDOT CLASS II RIPRAP SELECT BOULDERS ¹ VDOT CLASS I RIPRAP GABION STONE SUPPLEMENTAL EXISTING BED MATERIAL ²
	¹ ROUNDED RIVER COBBLE LIKE STONE 14-20". ² EXISTING STREAM BED MATERIAL (COBBLE-GRAVEL-SAND) SHALL BE USED TO TOP DRESS THE RIFFLE TO FILL SURFACE VOIDS.



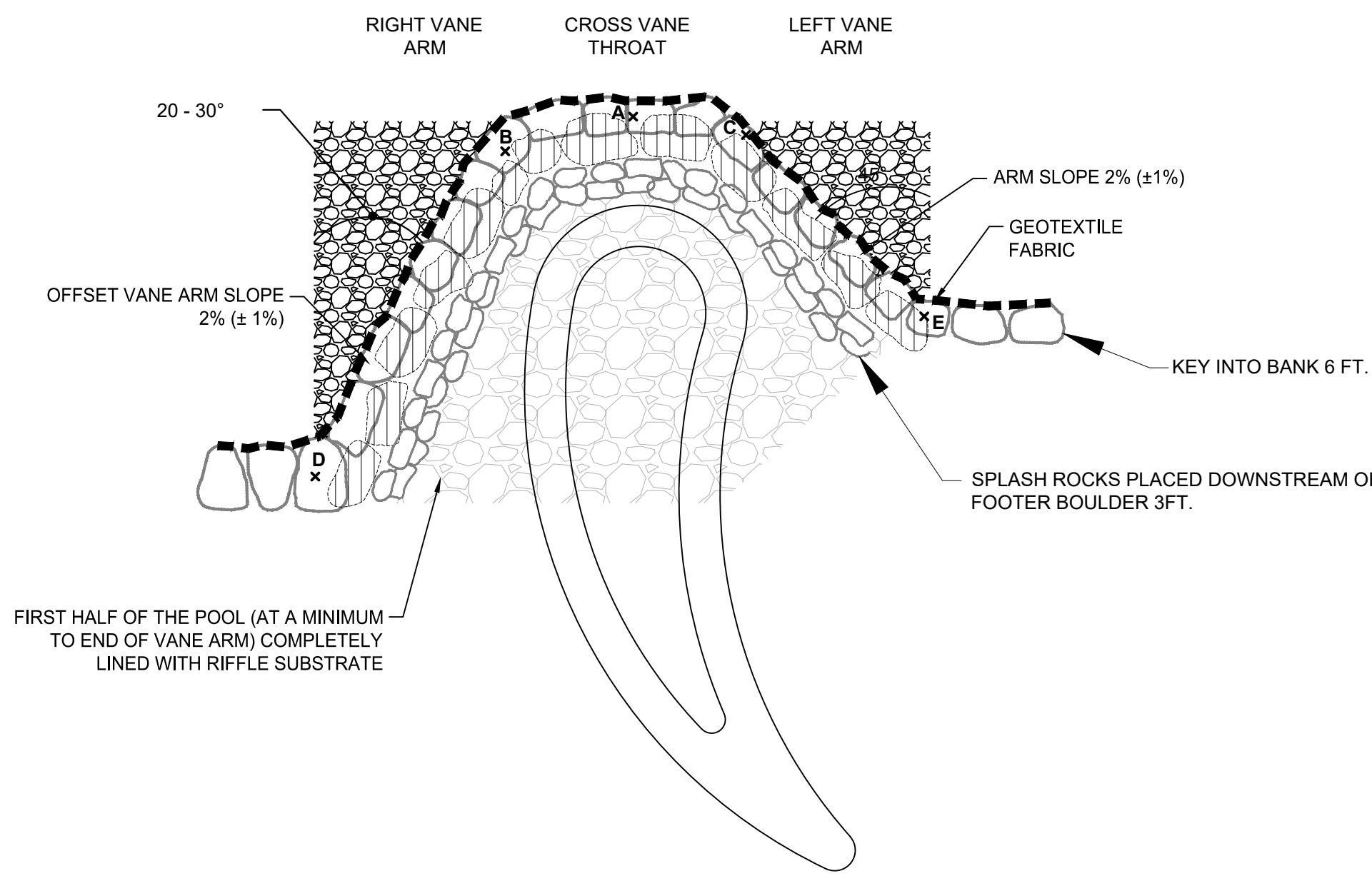
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ROCK CROSS VANE

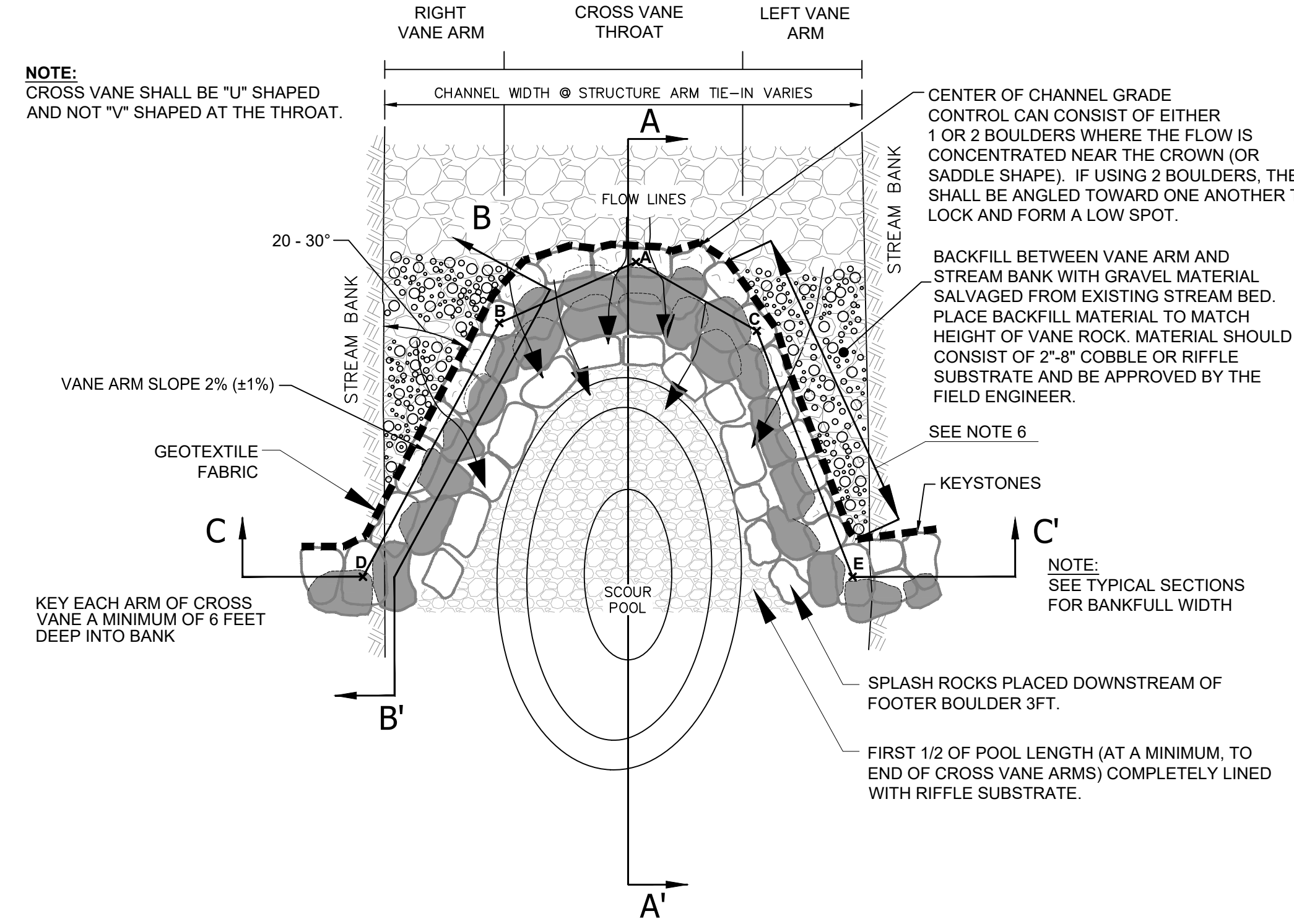
NOTES

- ALL STONES ARE TO BE STRUCTURE STONE. STRUCTURE STONE IS DEFINED AS BLOCK LIKE, CUBICAL, OR STRAIGHT EDGED BOULDERS.
- GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER, PLUGGING WITH GABION STONE OR COBBLE/BOULDER SIZE MATERIAL AS APPROPRIATE, AS APPROVED BY THE TOWN OF VIENNA'S ON-SITE ENGINEER/INSPECTOR, AND LINING WITH FILTER FABRIC.
- DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE TOWN OF VIENNA'S ON-SITE ENGINEER/INSPECTOR OR QUALIFIED REPRESENTATIVE.
- CONTRACTOR WILL BE REQUIRED TO FIT BOULDERS TIGHTLY.
- FOOTER BOULDERS AND VANE BOULDERS SHALL BE NATIVE STONE OR SHOT ROCK, CUBICAL OR RECTANGULAR IN NATURE.
- THERE SHALL BE NO DROP GREATER THAN 1.0 FOOT. VERTICAL TOLERANCE SHALL BE 0.1' FOR CROSS VANE STRUCTURES.
- FILTER FABRIC SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF STRUCTURE.
- 1/2 THE POOL LENGTH OR POOL LENGTH TO THE END OF THE CROSS VANE ARMS (WHICHEVER IS GREATER) SHALL BE LINED WITH RIFFLE SUBSTRATE. SPLASH ROCKS SHALL EXTEND A MINIMUM LENGTH OF 3 FEET DOWNSTREAM OF THE FOOTER BOULDERS AND BE PLACED TO PROVIDE A ROUGH SURFACE SUCH THAT ROCK EDGES PROTRUDE 0.3 TO 0.5 FT ABOVE THE BED SURFACE.
- IF BEDROCK IS PRESENT DIRECTLY BELOW SURFACE BOULDER, FOOTING MAY NOT BE NECESSARY. HOWEVER, BASED ON THE DEPTH TO BEDROCK, ADDITIONAL FOOTER BOULDERS MAY BE REQUIRED IN ORDER TO SEAT FOOTERS ON BEDROCK. CHIP BEDROCK 0.5' FOR PLACEMENT AND SEAT FOOTER BOULDERS IN BEDROCK AT THE DIRECTION OF THE FIELD ENGINEER. IF BEDROCK IS NOT ENCOUNTERED, ADDITIONAL FOOTER BOULDERS WILL BE REQUIRED. IN THIS CASE ADDITIONAL TIER(S) OF FOOTER BOULDERS SHALL EXTEND BELOW THE MAX SCOUR DEPTH (CHANNEL INVERT).
- AS THE TAIL OF RIFFLE APPROACHES THE PROPOSED CROSS VANES, THE CONTRACTOR SHALL CONSTRUCT THE RIFFLE SUCH THAT IT GRADUALLY REDUCES AND FANS OUT/TAPERS INTO THE BACKSIDE OF THE VANE ARM AND DOES NOT IMPEDE OR BLOCK THE FLOW OF WATER THROUGH THE THROAT OF THE CROSS VANE.
- KEYS SHALL BE CONSTRUCTED PERPENDICULAR TO STREAMBANKS AND EXTEND A MINIMUM OF SIX (6) FEET PAST THE BACK OF THE FLOODPLAIN BENCH.

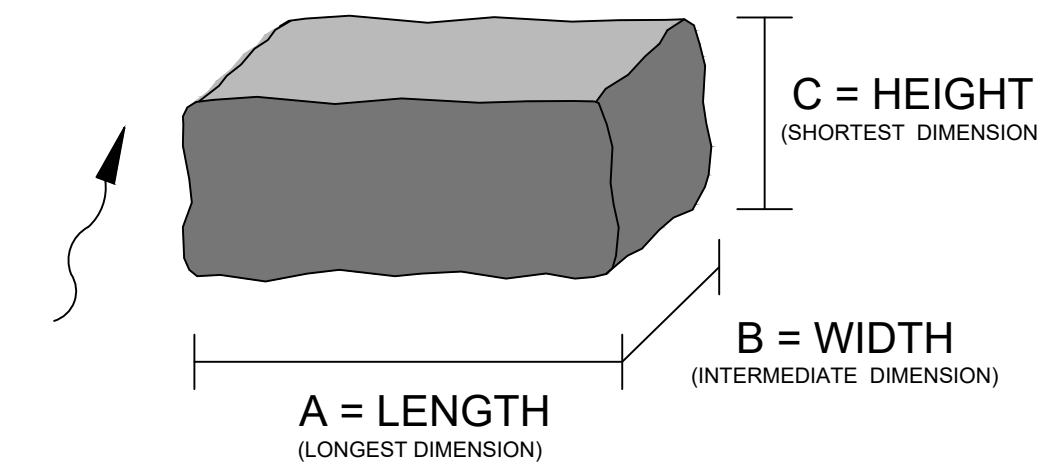


OFFSET CROSS VANE

CROSS VANE PLAN



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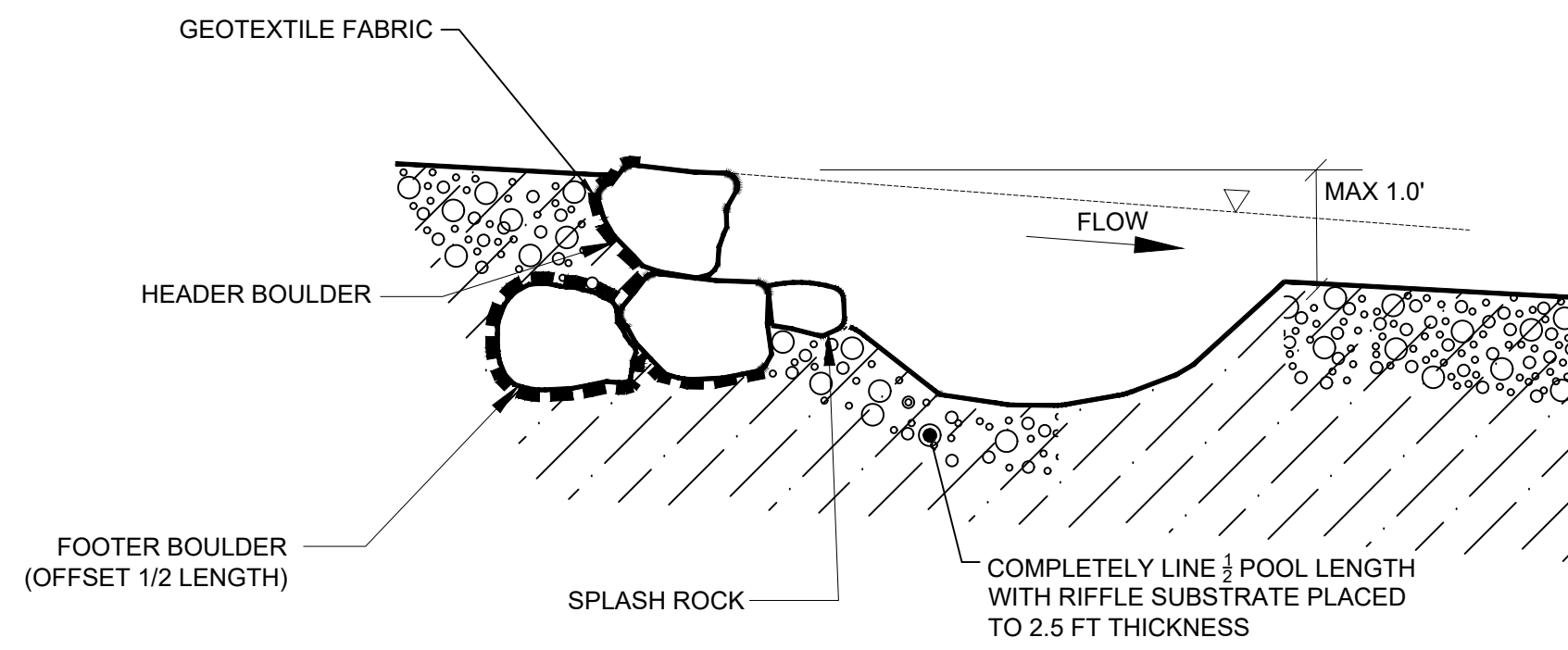


NOTE:
 BACKFILL SHALL BE PLACED IN 8" LOOSE LIFTS AND COMPACTED USING TRACKED EQUIPMENT OR AN EXCAVATOR BUCKET SUCH THAT THE FUTURE SETTLEMENT IS KEPT TO A MINIMUM. BEFORE PLACEMENT OF BACKFILL, CHANNEL SHALL BE EXCAVATED TO A STABLE SUBGRADE (APPROVED BY THE TOWN OF VIENNA'S ON-SITE ENGINEER). FOOTER BOULDERS MUST HAVE AT LEAST ONE CONTACT POINT WITH HEADER BOULDERS, AND MAY BE MORE ROUNDED THAN HEADER. FOR VANE ARMS, MULTIPLE FOOTERS MAY BE REQUIRED FOR HEADER STONE DEPENDING UPON HEADER BOULDER SIZE AND DEPTH TO STABLE SUBGRADE. MINIMUM STRUCTURE DIMENSIONS SHALL BE +/- 0.5'.

CROSS VANE MATERIAL DIMENSIONS

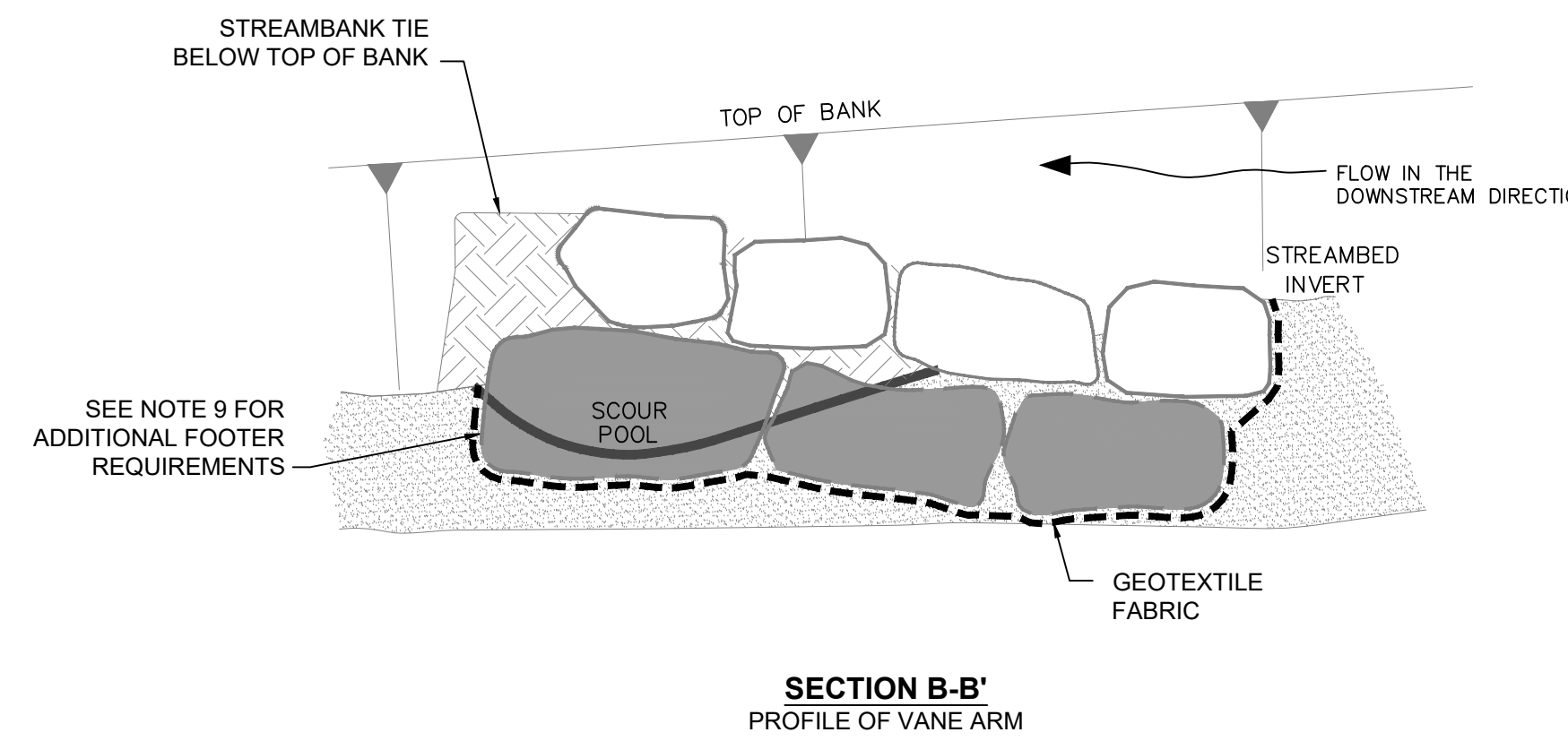
STRUCTURE SIZE TABLE		A	B	C
CROSS VANE STRUCTURES	HEADER BOULDER/ VANE ARMS	4'	3'	2'
	FOOTER BOULDER	4'	3'	2'
	SPLASH ROCKS/ FLOOR ROCKS	3'	2'	2'

NOTES:
 ASSUMED ROCK DENSITY 165 LB/FT³
 STRUCTURE STONE IS TO BE OF IGNEOUS OR METAMORPHIC ORIGIN, UNLESS APPROVED BY THE TOWN OF VIENNA'S FIELD ENGINEER OR QUALIFIED REPRESENTATIVE.
 FOOTER STONES SHALL HAVE A MINIMUM OF ONE (1) CONTACT POINT WITH HEADER STONES. FOOTER STONES MAY BE MORE ROUNDED THAN HEADER STONES. FOR VANE ARMS, MULTIPLE FOOTERS MAY BE REQUIRED FOR HEADER STONES DEPENDING UPON HEADER STONE SIZE.

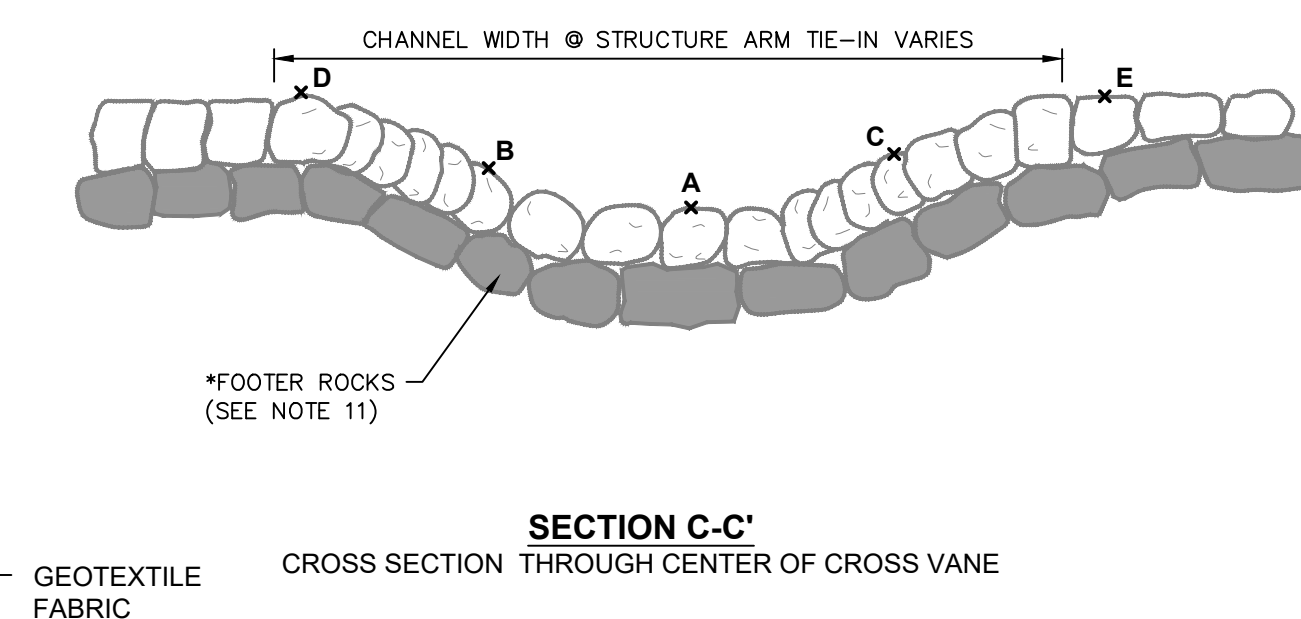


CROSS VANE PROFILE A - A'

NOT TO SCALE



CROSS VANE CROSS SECTIONS B - B' AND C - C'



NOT TO SCALE

CONCEPT DESIGN
 ONONDIO CIR. STREAM RESTORATION
 ROCK CROSS VANE DETAIL
 VIENNA, VIRGINIA

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CONCEPT DESIGN
ONONDIO CIR. STREAM RESTORATION
ROCK REVETMENT DETAIL

VIENNA, VIRGINIA

NO.	DD	MON	YYYY	ISSUE / REVISION DESCRIPTION	DRW	DES	CHK	APPR

ROCK TOE REVETMENT

NOTES

- ALL STRUCTURE ROCK TOE SHALL BE VDOT CLASS III RIPRAP (LARGE ANGULAR ODD SHAPED) OR APPROVED BY THE CITY ON-SITE ENGINEER/INSPECTOR BEFORE INSTALLATION.
- ROCK TOE REVETMENT SHALL BE PLACED SUCH THAT MATERIALS LOCK TOGETHER.
- SELECT BACKFILL AND SOIL BACKFILL MATERIAL SHALL BE COMPACTED SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- ASSUMED ROCK DENSITY = 165 LB/FT³.
- IF BEDROCK IS ENCOUNTERED, SEAT REVETMENT IN BEDROCK AT DIRECTION OF THE CITY ON-SITE ENGINEER/INSPECTOR.
- ROCK TOE REVETMENT TO BEGIN AT CROSS VANE ARM AND END AT POINT OF TANGENCY (PT) / HEAD OF RIFFLE OR BACK OF VANE ARM, IF PRESENT.
- CONTRACTOR TO DIG 1" PILOT HOLES FOR PLACEMENT OF LIVE STAKES IN ROCK TOE REVETMENT.
- CONTRACTOR TO INSTALL ROCK TOE REVETMENT TO A DEPTH 2-3' BELOW MAXIMUM POOL DEPTH INVERT THE ENTIRE LENGTH OF THE ROCK TOE REVETMENT.
- IN STRAIGHT POOLS, ROCK TOE REVETMENT IS TO BE INSTALLED ALONG BOTH THE RIGHT AND LEFT BANKS. ROCK TOE INSTALLATION ALONG THE RIGHT BANK IS TO BE MIRROR IMAGE OF THE CROSS SECTION DETAIL SHOWN BELOW.

INSTALLATION GUIDELINES

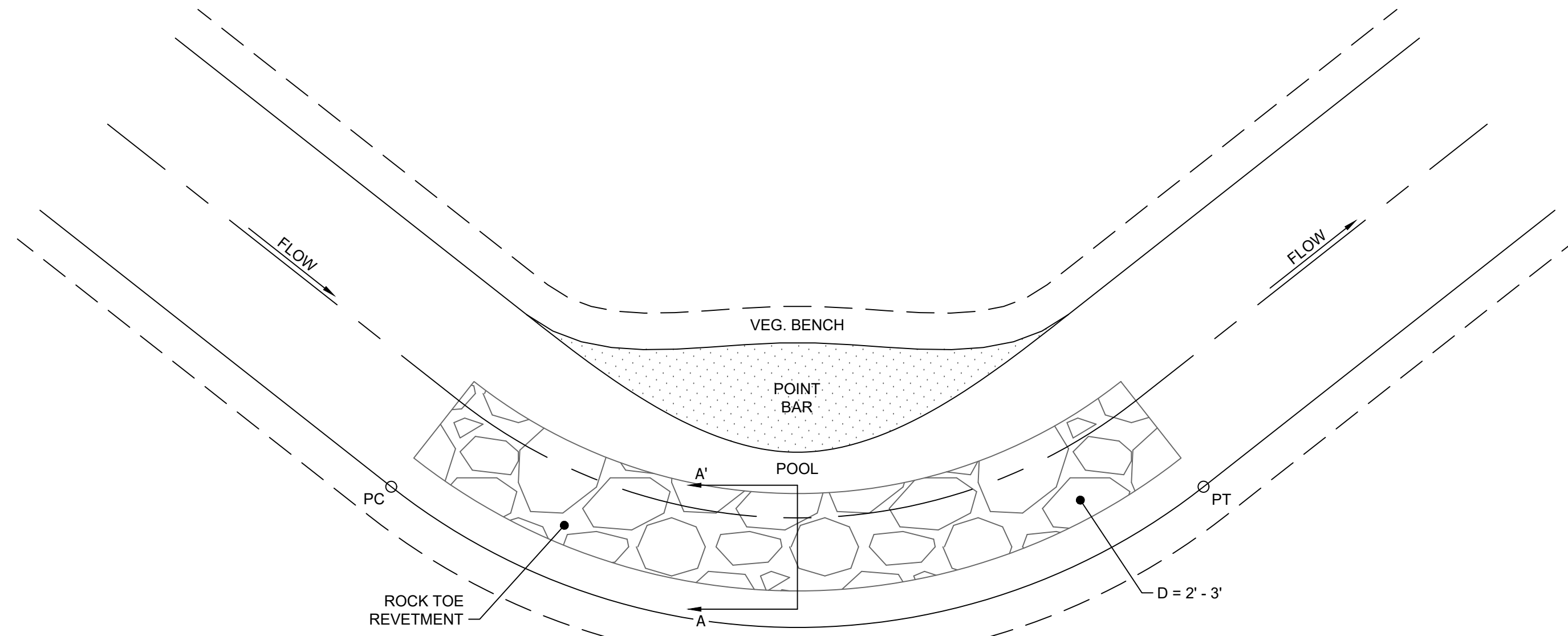
- EXCAVATE A TRENCH ALONG THE TOE OF THE STREAMBANK TO 2-3 FT BELOW THE STREAMBED INVERT.
- PLACE FILTER CLOTH ALONG THE BACKSIDE OF THE TRENCH. PLACE FILTER FABRIC LOOSELY AND EVENLY ON THE PREPARED SLOPE AND SECURED WITH STAKES ON 2 FOOT CENTERS. ADJACENT STRIPS SHOULD OVERLAP 12 INCHES AND BE STAPLED ON 12 INCH CENTERS. THE UPSTREAM OR UPSLOPE FILTER FABRIC SHOULD ALWAYS BE PLACED OVER THE DOWNSTREAM OR DOWNSLOPE FILTER FABRIC. IF THE FILTER FABRIC IS TORN OR DAMAGED, IT SHOULD BE REPAIRED OR REPLACED.
- PLACE STRUCTURE ROCK STARTING IN THE BOTTOM OF THE TRENCH WORKING UP THE BANK. REMAINDER OF THE TRENCH TO BE FILLED WITH ROCK REVETMENT MATERIAL. ROCK MAY HAVE TO BE HAND PLACED IN VOIDS TO ACHIEVE THE DESIRED RESULTS OF LOCKING THE REVETMENT.

ROCK TOE REVETMENT MATERIAL DIMENSIONS

STRUCTURE SIZE TABLE	
ROCK STRUCTURES	VDOT CLASS III RIPRAP
ROCK TOE REVETMENT MATERIAL SPECS	
ROCK TOE REVETMENT	VDOT CLASS II RIPRAP VDOT CLASS I RIPRAP GABION STONE

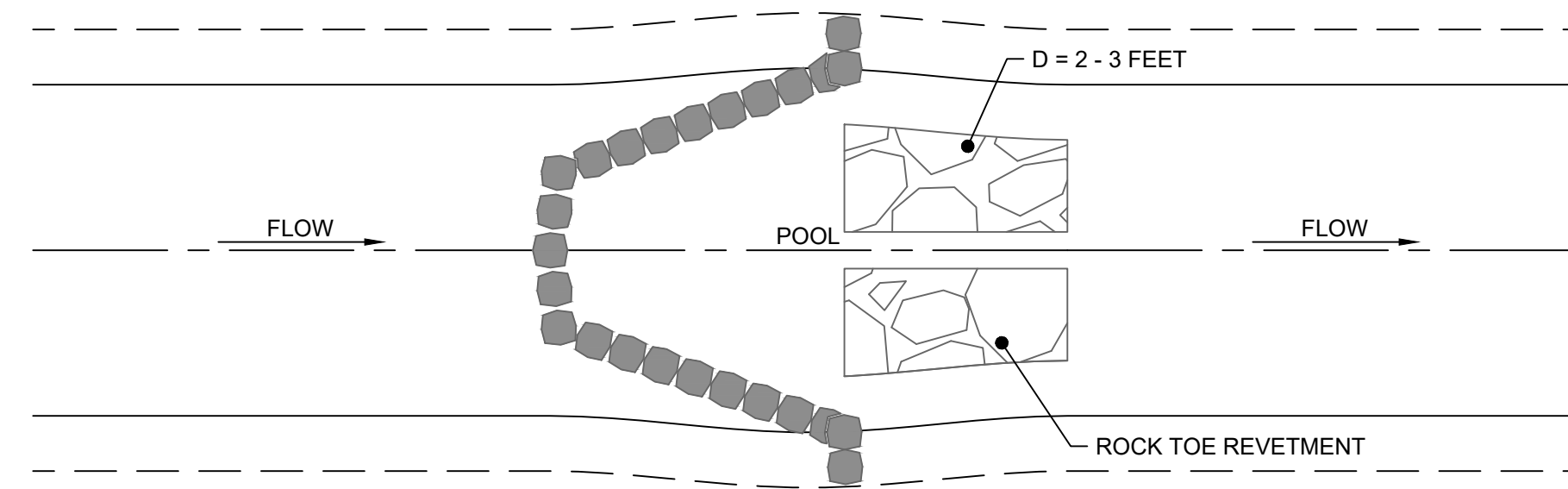
NOTES:

ASSUMED ROCK DENSITY 165 LB/FT³
 BACKFILL SHALL BE PLACED IN 8" LOOSE LIFTS AND COMPACTED USING TRACKED EQUIPMENT OR AN EXCAVATOR BUCKET SUCH THAT THE FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM. STRUCTURE DIMENSIONS SHALL BE +/- 0.5'.



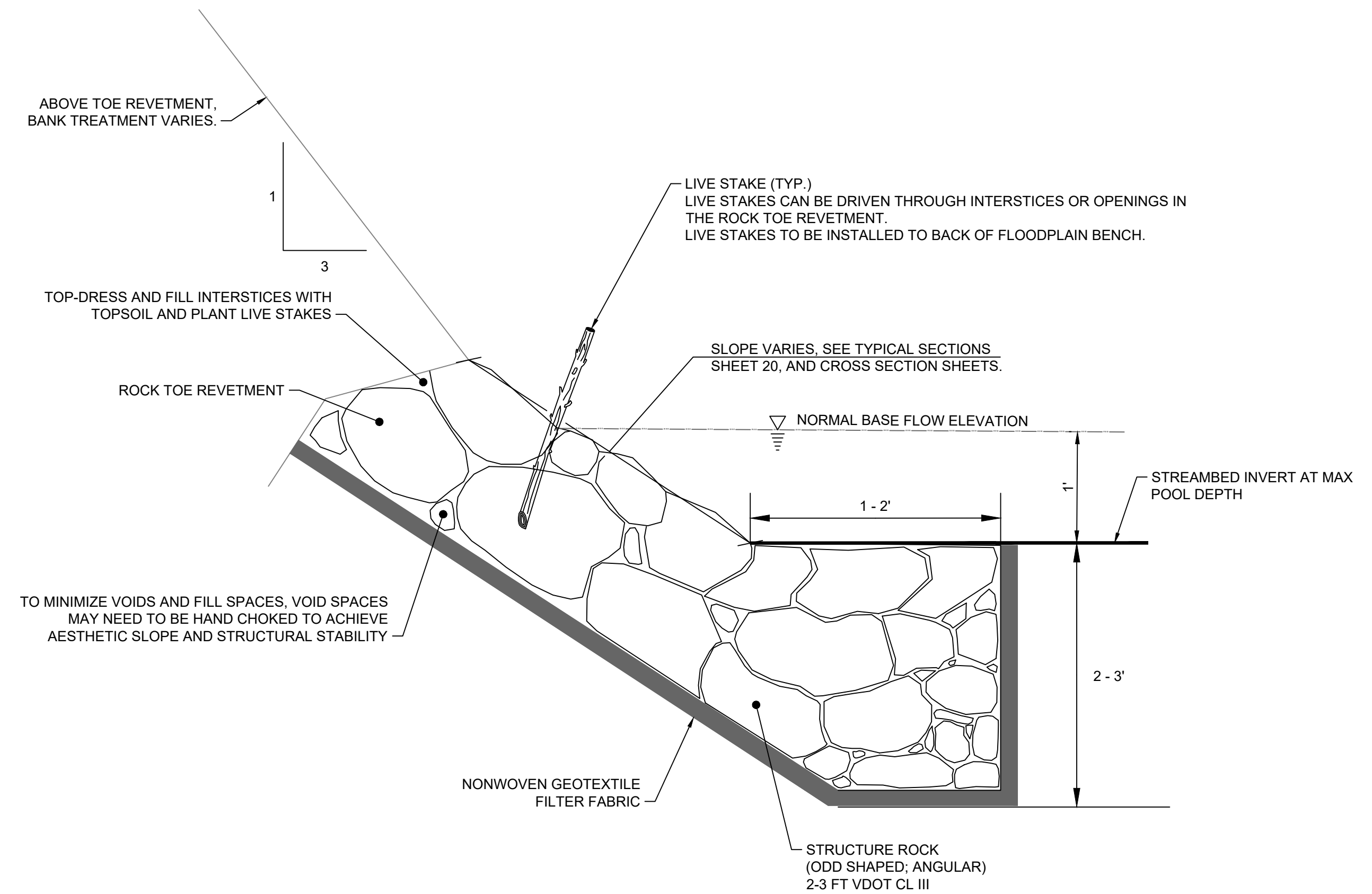
ROCK TOE REVETMENT
 PLAN - POOL IN BEND

NOT TO SCALE



ROCK TOE REVETMENT
 PLAN - STRAIGHT POOL

NOT TO SCALE



ROCK TOE REVETMENT
 CROSS SECTION A - A'

NOT TO SCALE