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## **KENTUCKY AML**

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## **DRAINAGE-SURFACE (AMLSUR)**

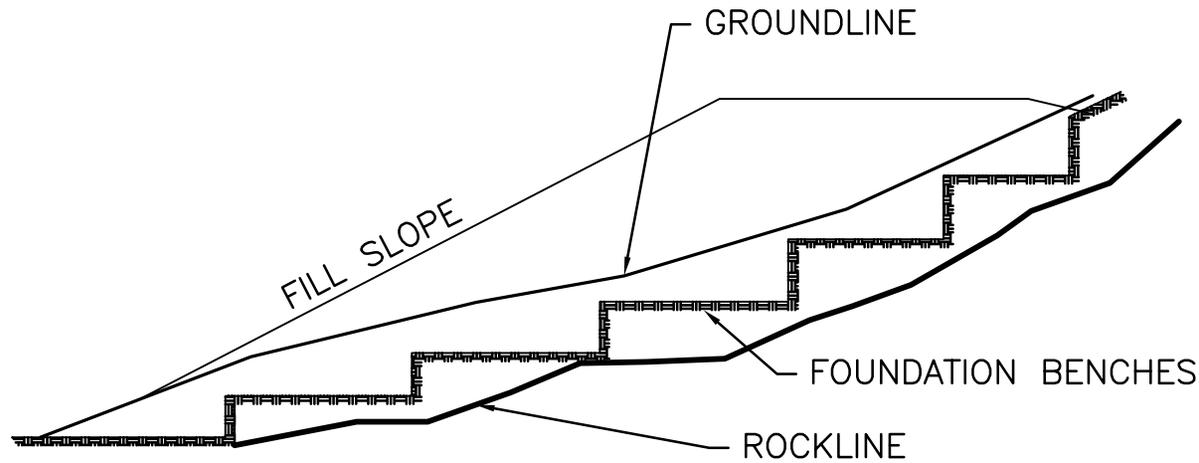
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***DRAINAGE-SURFACE (AMLSUR) CONTINUED:***

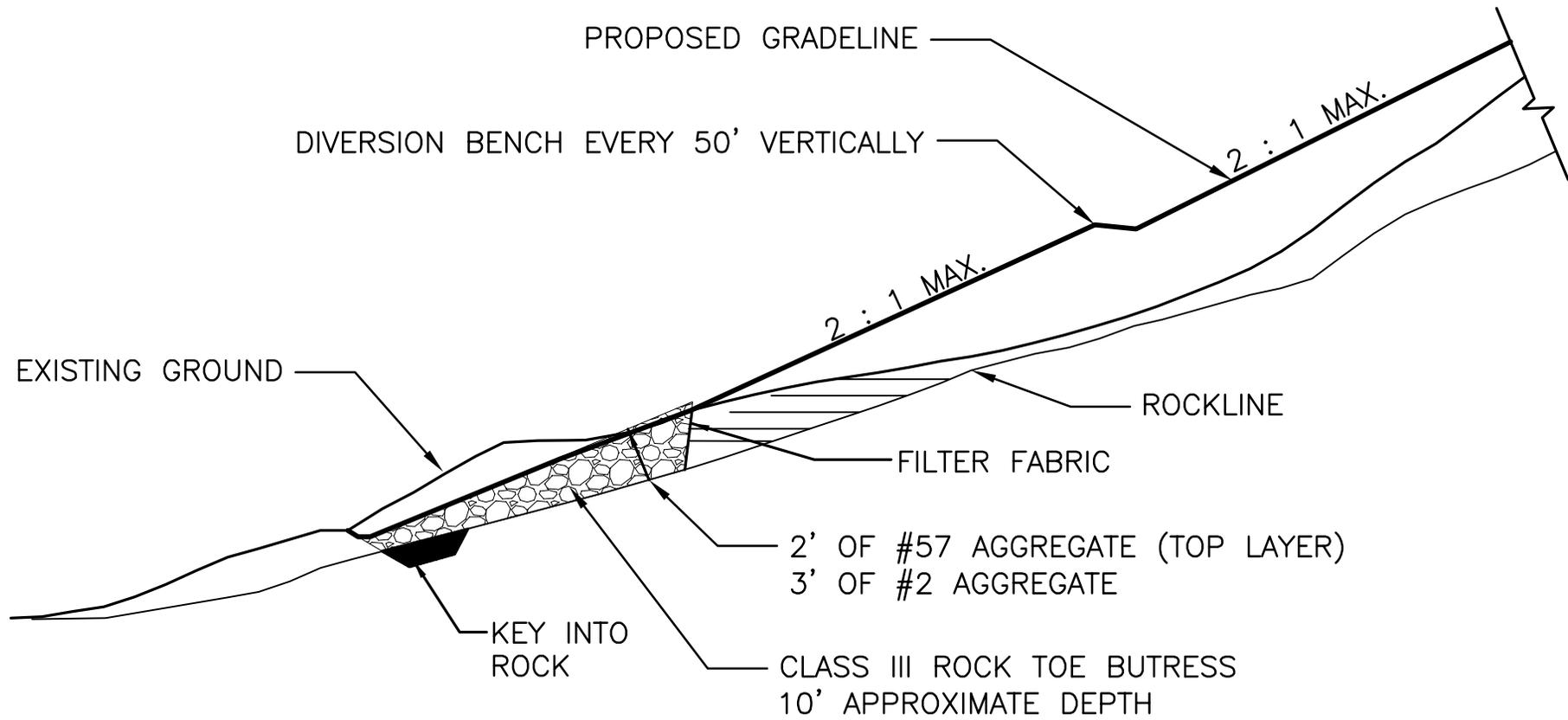
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## **WATER TREATMENT (AMLWT)**

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<b><i>AMLWT 3</i></b>	<i>MANHOLE AND SIPHON SYSTEM</i>
<b><i>AMLWT 4</i></b>	<i>GATE VALVE AND HOUSING</i>
<b><i>AMLWT 5</i></b>	<i>SEQUENTIAL AERATION DITCH</i>
<b><i>AMLWT 6</i></b>	<i>FLUME (TIMBER)</i>



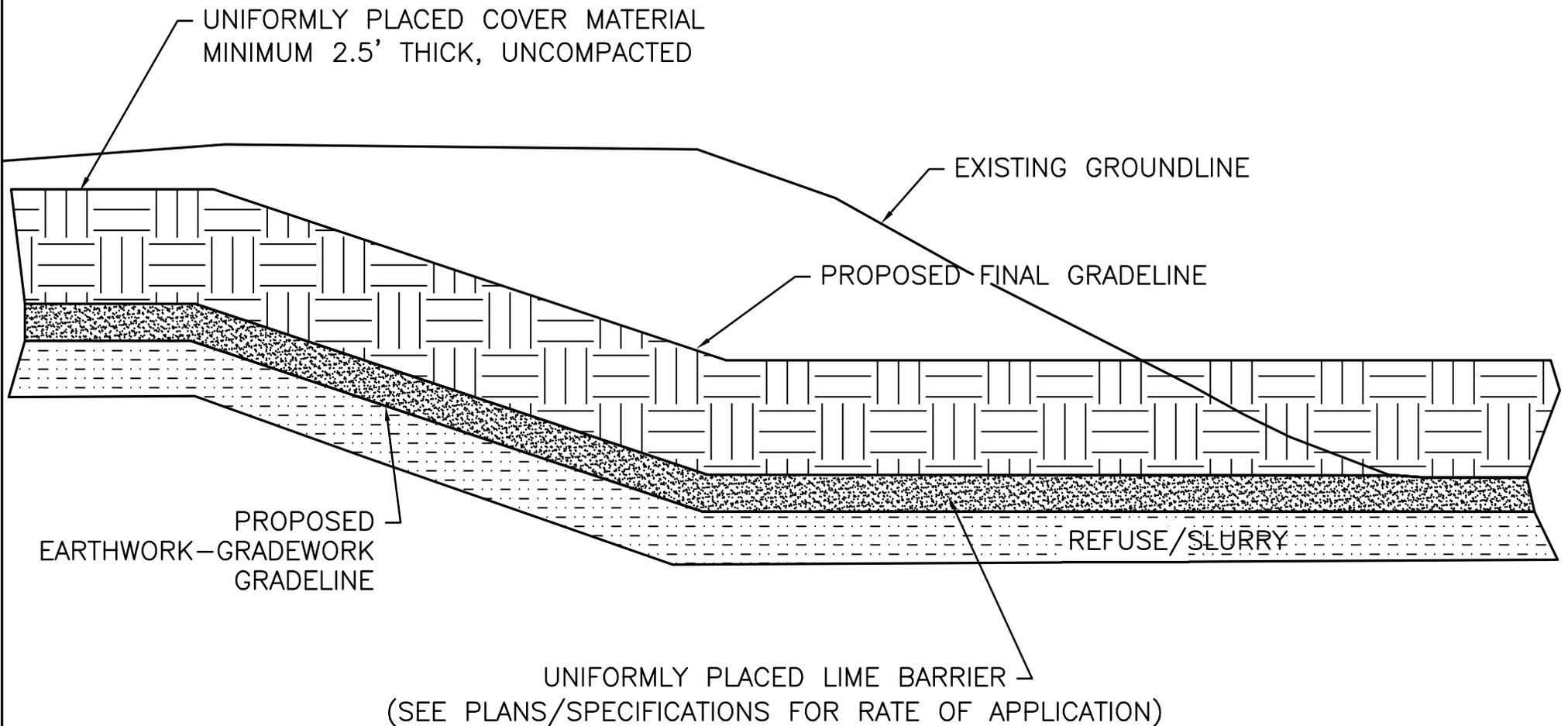
1. THIS TREATMENT FOR EMBANKMENT FOUNDATION BENCHES AS INDICATED ON THIS SHEET SHALL BE ACCEPTED AS GUIDES, HOWEVER, ALL THE CONDITIONS THAT WILL BE ENCOUNTERED CANNOT BE SHOWN, THEREFORE, THE DESIGN ENGINEER AND/OR CONTRACTOR MUST GIVE CONSIDERABLE THOUGHT TO THE LOCATION AND DIMENSIONS OF THESE BENCHES.
2. DEFINITE DESIGN INFORMATION CANNOT BE ESTABLISHED AS TO SIZE OF THESE BENCHES, DUE TO IRREGULARITIES AND THE DIFFERENT RATES OF INCLINE OF THE EXISTING CROSS SECTION. HOWEVER, IT IS GENERALLY BELIEVED THAT A 6' TO 12' RISE AND A 20' TO 35' HORIZONTAL RUN ARE FAIRLY TYPICAL WITH A 15' HORIZONTAL RUN BEING THE MINIMUM.
3. WHEN THE INCLINE OF THE CROSS SECTIONS IS 15% OR GREATER THESE EMBANKMENT FOUNDATION BENCHES SHALL BE CONSTRUCTED IN THE ORIGINAL SLOPE AS THE EMBANKMENT IS CONSTRUCTED IN COMPACTED LAYERS OR LIFTS.
4. WHEN EMBANKMENT FOUNDATION BENCHES ARE SHOWN ON THE CROSS SECTION, THE VOLUME SHALL BE INCIDENTAL.
5. NO QUANTITIES WILL BE ALLOWED FOR THE REFILLING OF THESE BENCHES, SINCE SUPPOSEDLY; THE MATERIAL THAT WAS EXCAVATED WILL BE PROCESSED AND PLACED BACK IN THESE BENCHES.



SLOPE RECONSTRUCTION (AMLMIS 2)

NOTE: COVER MATERIAL SHALL BE PLACED AT 2.5' MIN. DEPTH ONCE EARTHWORK-GRADEWORK AND LIME BARRIER HAS BEEN PLACED. SEE CONSTRUCTION NOTES AND TECHNICAL SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND REQUIREMENTS.

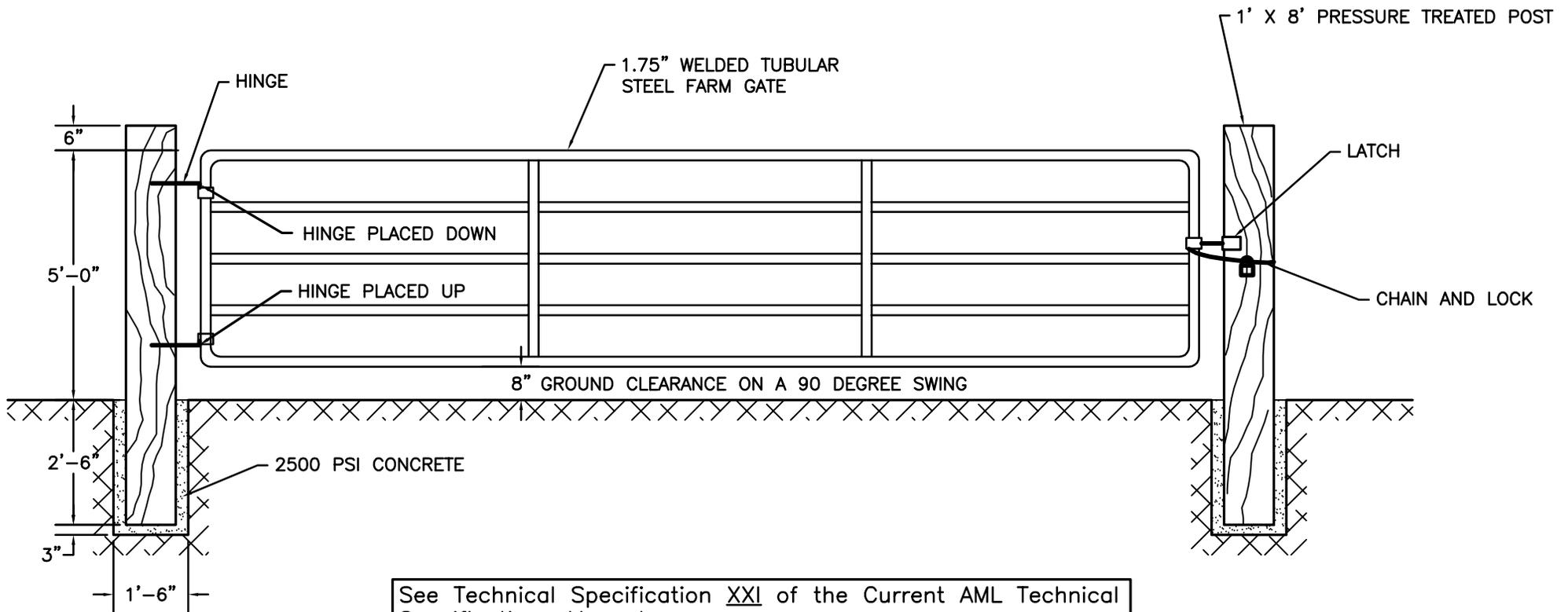
ALL MATERIALS EXCAVATED (EARTHWORK-GRADEWORK) SHALL BE USED TO STABILIZE SLURRY PONDS. UNDER NO CIRCUMSTANCES WILL SLURRY OR REFUSE MATERIALS BE PUSHED INTO WETLAND AREAS.



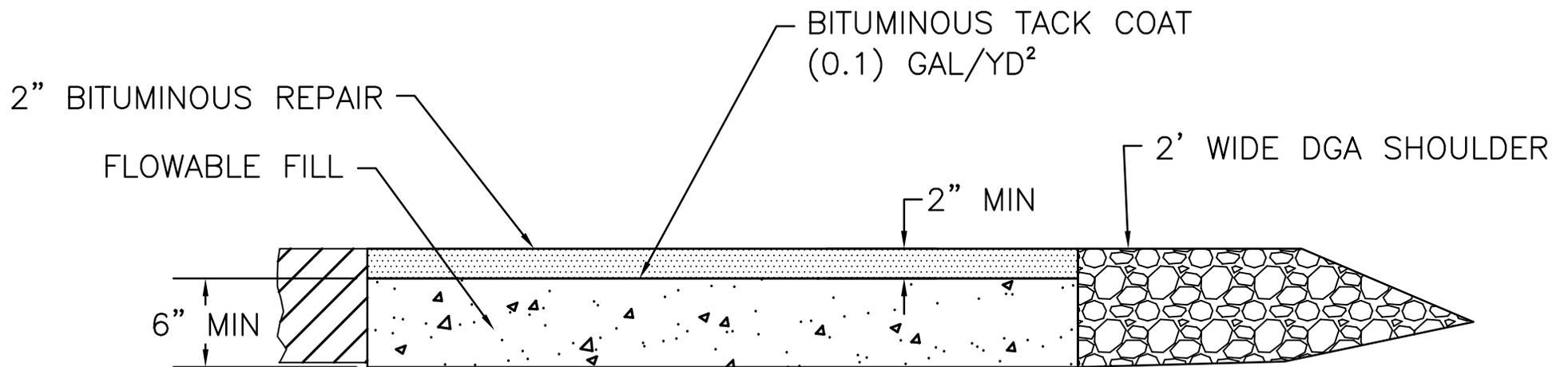
### COVER MATERIAL PLACEMENT (AMLMIS 3)

NOTES:  
USE HINGES, LATCH, CHAIN, AND LOCK AS RECOMMENDED BY THE GATE MANUFACTURER AND APPROVED BY THE ENGINEER.

A MINIMAL AMOUNT OF FENCE SHALL BE REQUIRED ON EITHER SIDE OF THE GATE AS DIRECTED BY THE ENGINEER. FENCE AND ALL HARDWARE SHALL BE CONSIDERED INCIDENTAL TO THE CONSTRUCTION OF THE GATE.

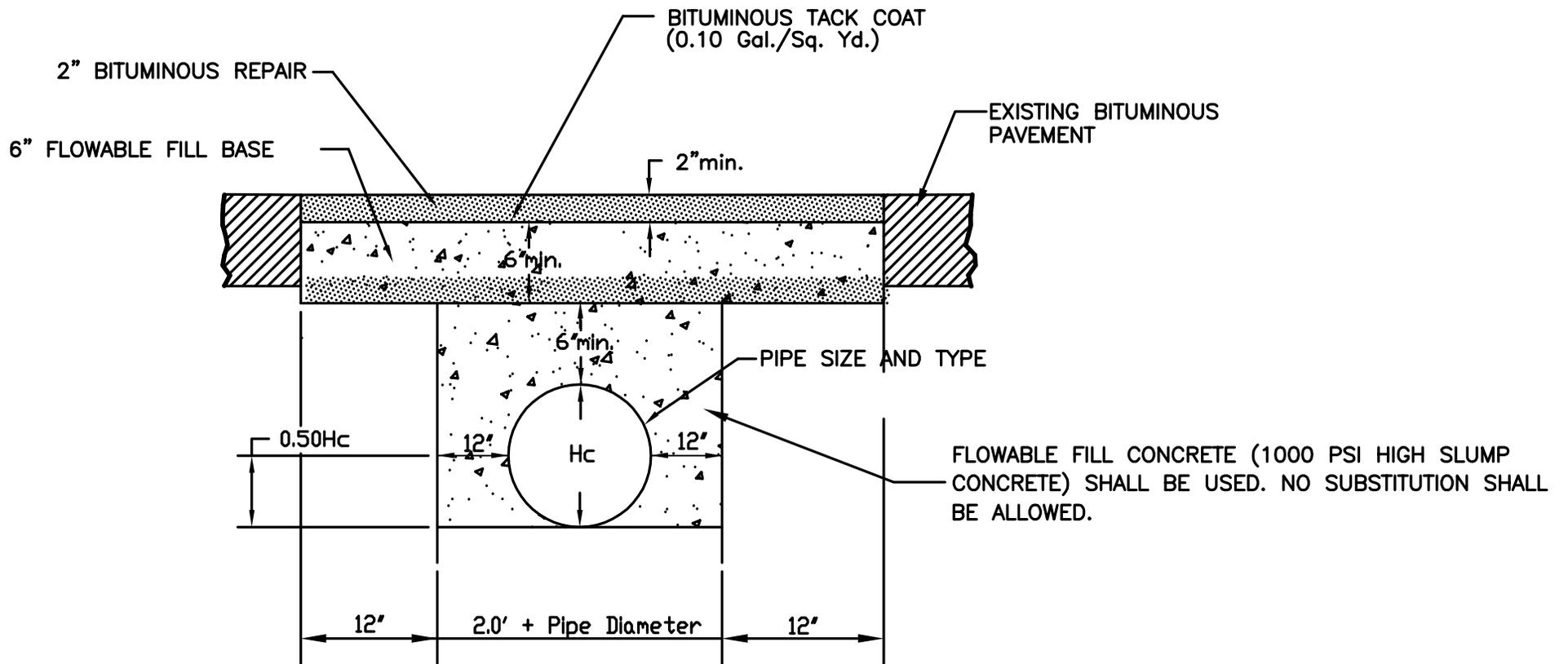


ACCESS GATE - 16' STEEL TUBE (AML MIS 4)



FLOWABLE FILL CONCRETE (1000 PSI HIGH SLUMP CONCRETE) SHALL BE USED ON ALL PAVED ROADS WHERE REINFORCED CONCRETE PIPE (RCP) IS USED.

See AML Technical Specifications, Current Edition:  
 Section XVI– Bituminous Repair  
 Section XXV– Flowable Fill

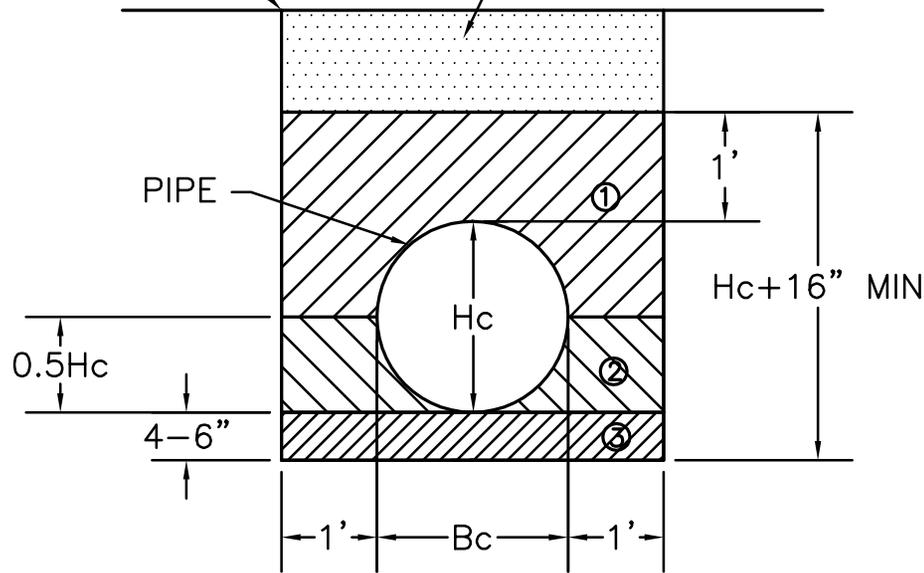


REINFORCED CONCRETE PIPE (RCP) SHALL BE USED. NO SUBSTITUTION ALLOWED

See AML Technical Specifications, Current Edition:

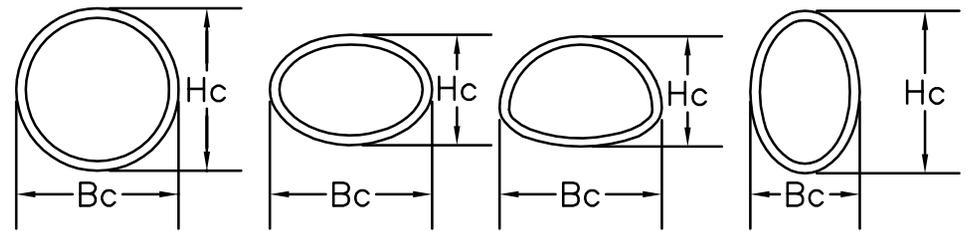
Section XVI— Bituminous Repair  
 Section XXV— Flowable Fill

SUBGRADE ROADWAY STONE OR COMPACTED SELECT SOILS AS DIRECTED BY ENGINEER.



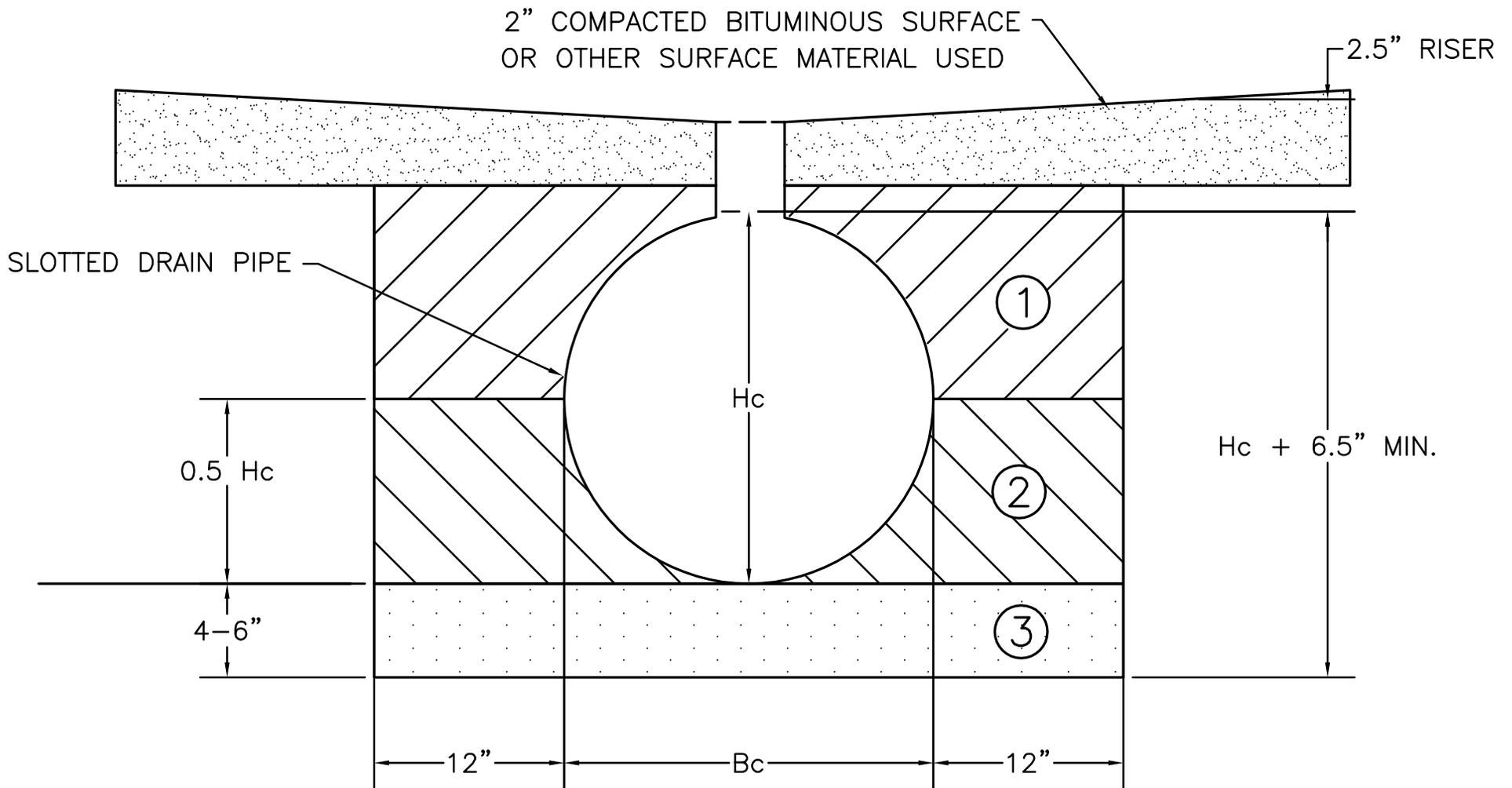
QUANTITY

DGA = 0.44 TONS / LF (18" PIPE)
DGA = 0.54 TONS / LF (24" PIPE)
DGA = 0.65 TONS / LF (30" PIPE)
DGA = 0.77 TONS / LF (36" PIPE)
DGA = 1.03 TONS / LF (48" PIPE)



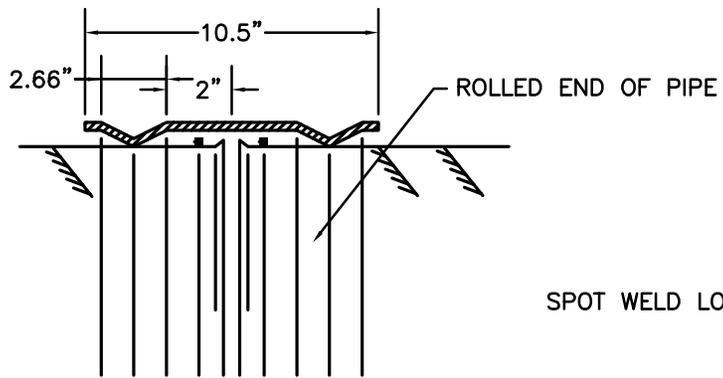
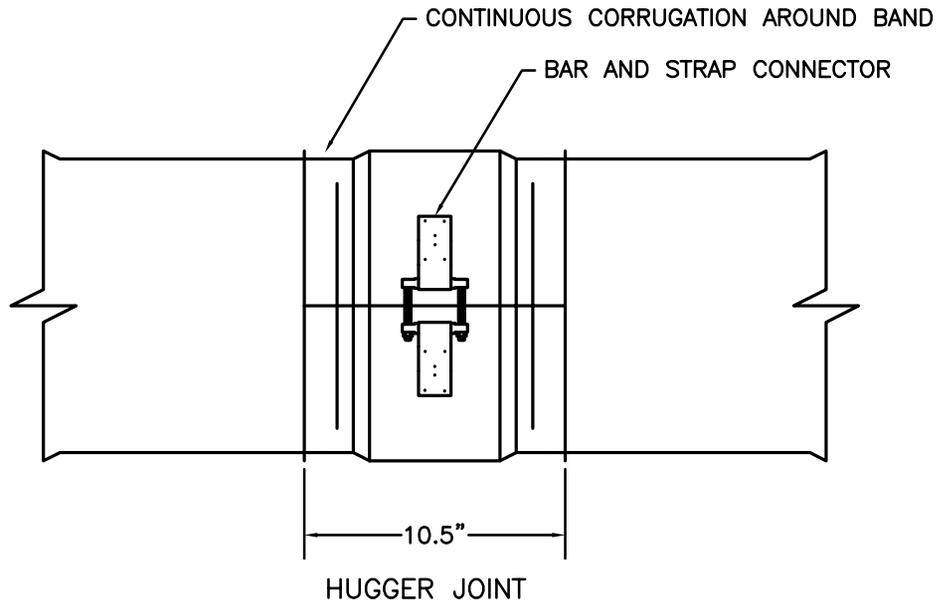
1. 85% COMPACTED DGA IN LAYERS 6" OR LESS TO WIDTH AND ELEVATION AS SHOWN W/ MECHANICAL TAMPERS OR COMPACTORS.
2. 95% COMPACTED DGA IN LAYERS 6" OR LESS W/ MECHANICAL TAMPERS OR COMPACTORS.
3. UNCOMPACTED DGA TO WIDTH AND ELEVATION SHOWN.
4. FLOWABLE FILL CONCRETE (1000 PSI HIGH SLUMP CONCRETE) SHALL BE USED ON ALL PAVED ROADS WHERE REINFORCED CONCRETE PIPE IS USED. HDPE PIPE MUST BE ANCHORED WITH GUY WIRE ANCHORS AND STRAPS OR EQUIVALENT PRIOR TO PLACING FLOWABLE FILL.

PIPE BEDDING (AMLMIS 6)



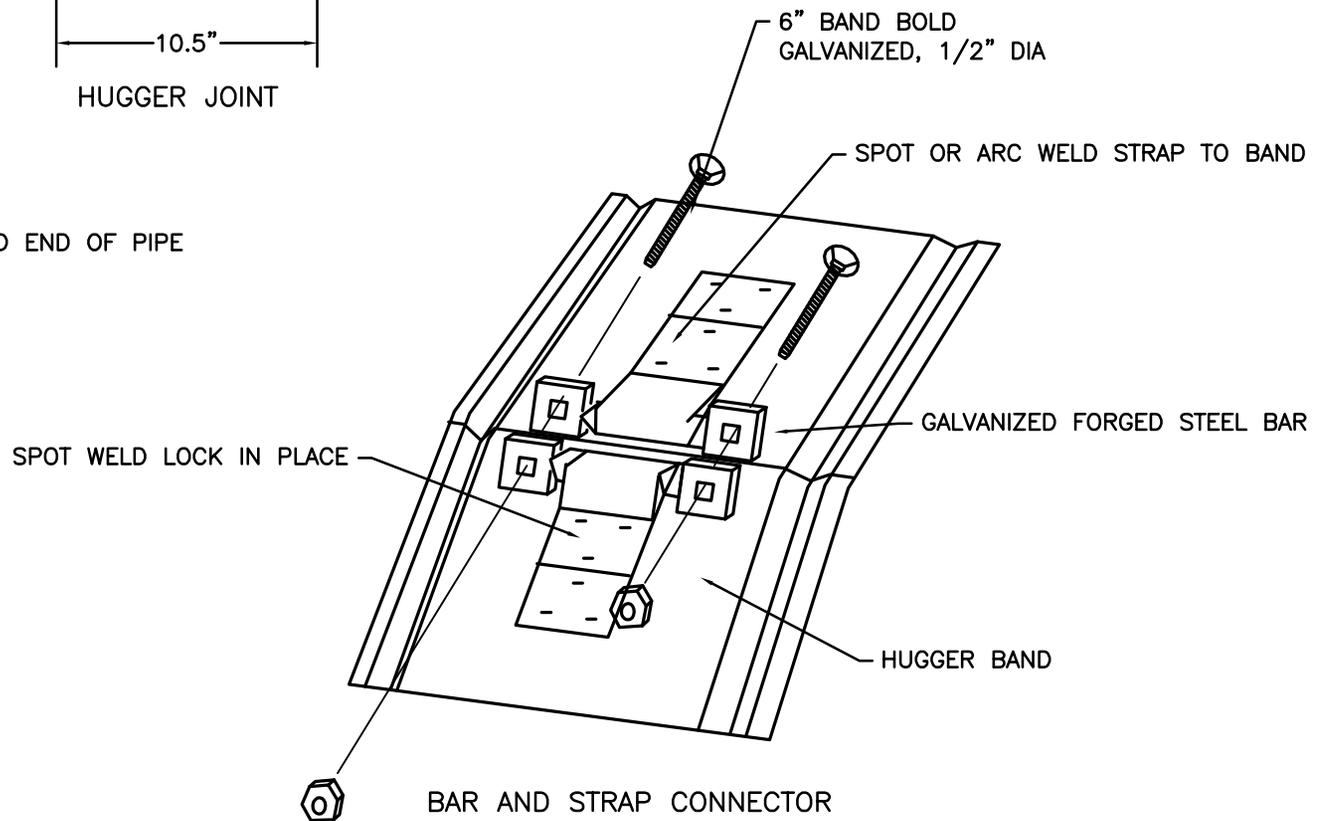
1. 85% COMPACTED DGA IN LAYERS 6" OR LESS TO WIDTH AND ELEVATION AS SHOWN W/ MECHANICAL TAMPERS OR COMPACTORS.
2. 95% COMPACTED DGA IN LAYERS 6" OR LESS W/ MECHANICAL TAMPERS OR COMPACTORS.
3. UNCOMPACTED DGA TO WIDTH AND ELEVATION SHOWN.
4. FLOWABLE FILL CONCRETE (1000 PSI HIGH SLUMP CONCRETE) SHALL BE USED ON ALL PAVED ROADS WHERE REINFORCED CONCRETE PIPE IS USED. HDPE PIPE MUST BE ANCHORED WITH GUY WIRE ANCHORS AND STRAPS OR EQUIVALENT PRIOR TO PLACING FLOWABLE FILL.

### SLOTTED PIPE BEDDING (AMLMIS 7)

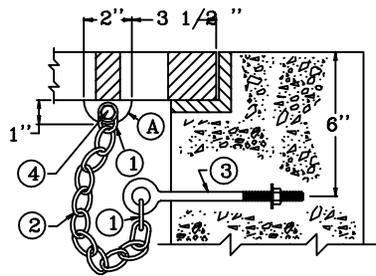


JOINT CROSS SECTION

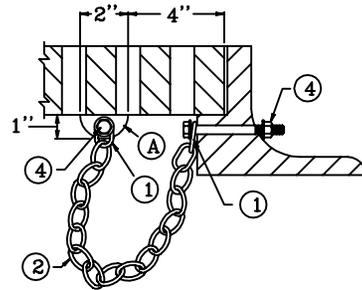
O-RING GASKETS MAY BE PROVIDED FOR SPECIAL APPLICATIONS



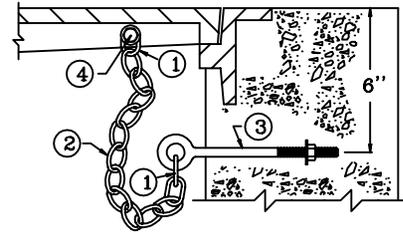
CMP JOINTS (AMLMIS 8)



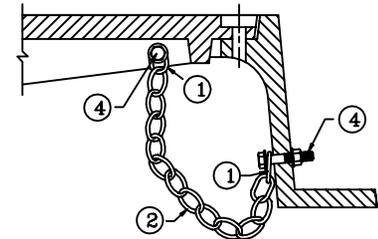
GRATE CONNECTED TO WALL



GRATE CONNECTED TO FRAME



LID CONNECTED TO WALL

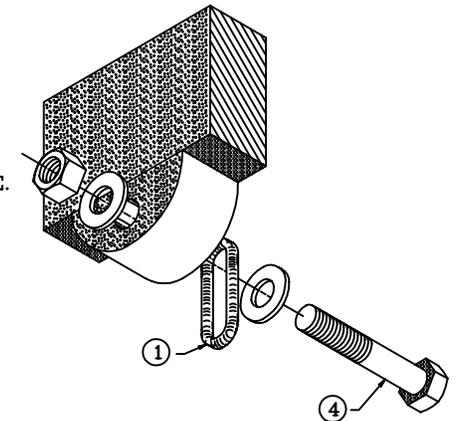


LID CONNECTED TO FRAME

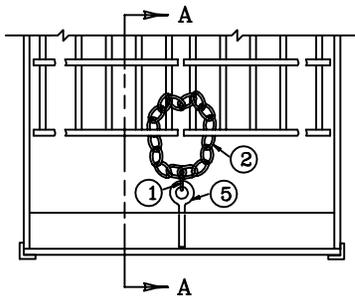
TYPICAL ILLUSTRATIONS FOR CASTINGS

NOTES

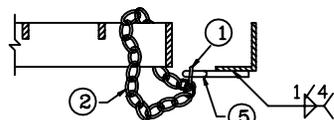
- ① CHAIN SHACKLE, OR COLD SHUT OF AN APPROVED TYPE.
- ② 3/16" PROOF COIL CHAIN OF SUFFICIENT LENGTH TO ALLOW REMOVAL AND DISPLACEMENT OF GRATE OR LID.
- ③ 3/8" x 6" EYE BOLT, NUT, AND WASHER.
- ④ 3/8" HEX HEAD CAP SCREW (GRADE 2), NUT AND WASHERS. LENGTH DETERMINED BY THICKNESS OF FRAME OR GRATE. 7/16" DIA. HOLE FOR CAP SCREW. BATTER THREADS ON CAP SCREW TO PREVENT REMOVAL OF NUT.
- ⑤ 3/8" EYE BOLT (LENGTH DETERMINED BY THE FRAME DIMENSION).
6. ALL EYE BOLTS SHALL HAVE A CONTINUOUS OR SOLID EYE.
7. ALL HARDWARE SHALL BE GALVANIZED AND OF COMMERCIAL QUALITY AND SHALL BE APPROVED BY THE ENGINEER.
8. THE COST OF THE COMPLETE SECURITY DEVICE, INSTALLED, SHALL BE INCIDENTAL TO THE COST OF THE STRUCTURE.
9. THE DESIGNS SHOWN ARE ACCEPTABLE; HOWEVER ARE SUBJECT TO CHANGE IF APPROVED IN WRITING BY THE ENGINEER.



① LUG ON CENTER CROSS MEMBER AND BOLT ASSEMBLY ( AXONOMETRIC VIEW )

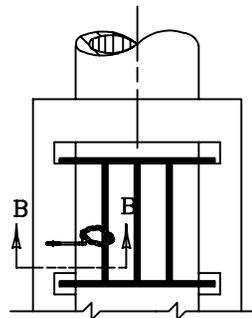


PLAN VIEW



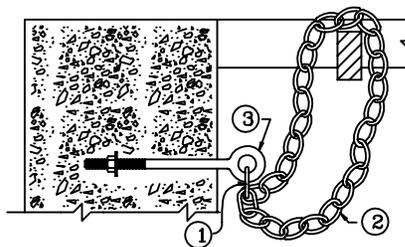
SECTION A-A

GRATE CONNECTED TO FRAME

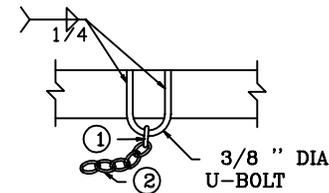


PLAN VIEW

GRATE CONNECTED TO WALL



SECTION B-B

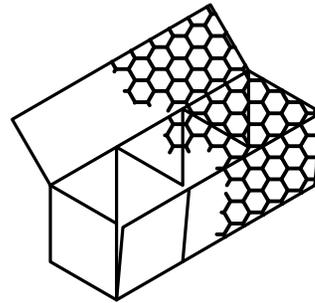


ALTERNATE FOR STRUCTURAL STEEL MEMBERS

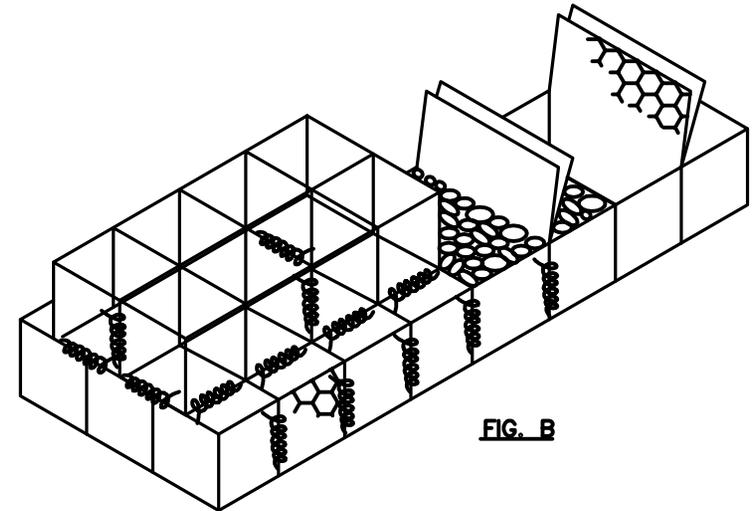
TYPICAL ILLUSTRATIONS FOR STRUCTURAL STEEL UNITS

**ASSEMBLY**

1. LIFT THE SIDES, ENDS, AND DIAPHRAGMS INTO VERTICAL POSITION. (FIG. A.)
2. WIRE THE CORNERS OF THE PANELS AND DIAPHRAGMS TO THE FRONT AND BACK PANELS USING THE GAGE WIRE PROJECTING FROM THE CORNER OF EACH PANEL.
3. LACE ALL VERTICAL EDGES OF END PANELS AND DIAPHRAGMS USING MANUFACTURER'S APPROVED LACING WIRE. LACING SHALL BEGIN BY SECURING THE WIRE AT THE BASKET CORNER BY LOOPING AND TWISTING, THEN PROCEEDING ALONG EDGES BY LOOPING THE WIRE AT APPROXIMATELY 5" INTERVALS ALTERNATING BETWEEN SINGLE AND DOUBLE LOOPS, FINALLY SECURING THE WIRE BY LOOPING AND TWISTING AT THE OPPOSITE CORNER (FIG. C).
4. ALL VERTICAL EDGES SHALL BE SECURED BY LACING WIRE TO ANOTHER VERTICAL EDGE WHEN TOUCHING ANOTHER BASKET.



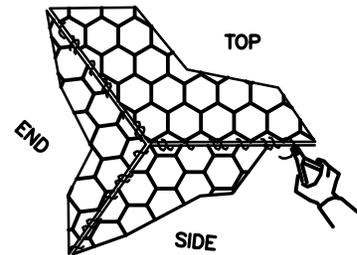
**FIG. A**



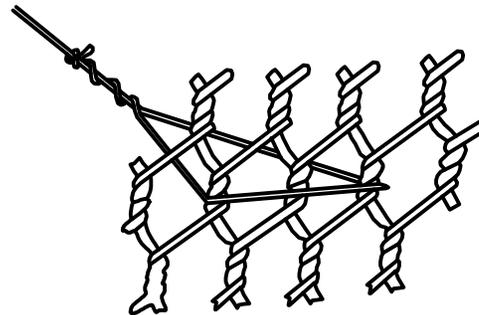
**FIG. B**

**INSTALLATION**

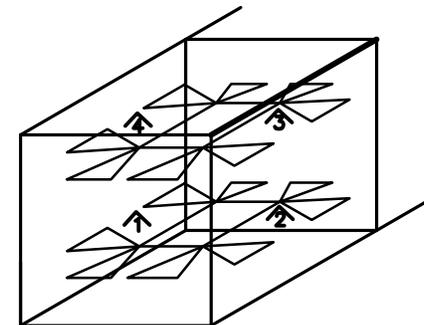
1. THE FOUNDATION SURFACE ON WHICH THE GABIONS ARE TO BE PLACED SHALL BE RELATIVELY SMOOTH AND EVEN.
2. GABIONS SHALL BE PLACED, WHERE POSSIBLE, FRONT TO FRONT AND BACK TO BACK TO EXPEDITE STONE FILLING AND LID LACING OPERATIONS (FIG. B).
3. ADJACENT GABIONS SHALL BE LACED ALONG THE PERIMETER OF ALL CONTACT SURFACES INCLUDING ANY UNDERLYING ROWS OF GABIONS (FIG. B).
4. GABIONS SHALL BE FILLED IN APPROXIMATELY 1' LIFTS. CONNECTING WIRES SHALL BE PLACED IN OUTSIDE CELLS AT ALL EXPOSED FACES AND FIRMLY WIRED (FIGS D AND E).
5. FILLED GABIONS SHALL BE STRETCHED TIGHT DURING THE LACING OPERATION TO LIMIT SHIFTING OF THE GABION STONE AFTER INSTALLATION.
6. ALTERNATIVE GABION UNIT FASTENERS MAY BE USED TO SECURE THE HORIZONTAL EDGES.
7. ADJACENT ROWS OF GABION UNITS SHALL BE PLACED SUCH THAT THE SEAMS ARE OFFSET.



**FIG. C**



**FIG. D**

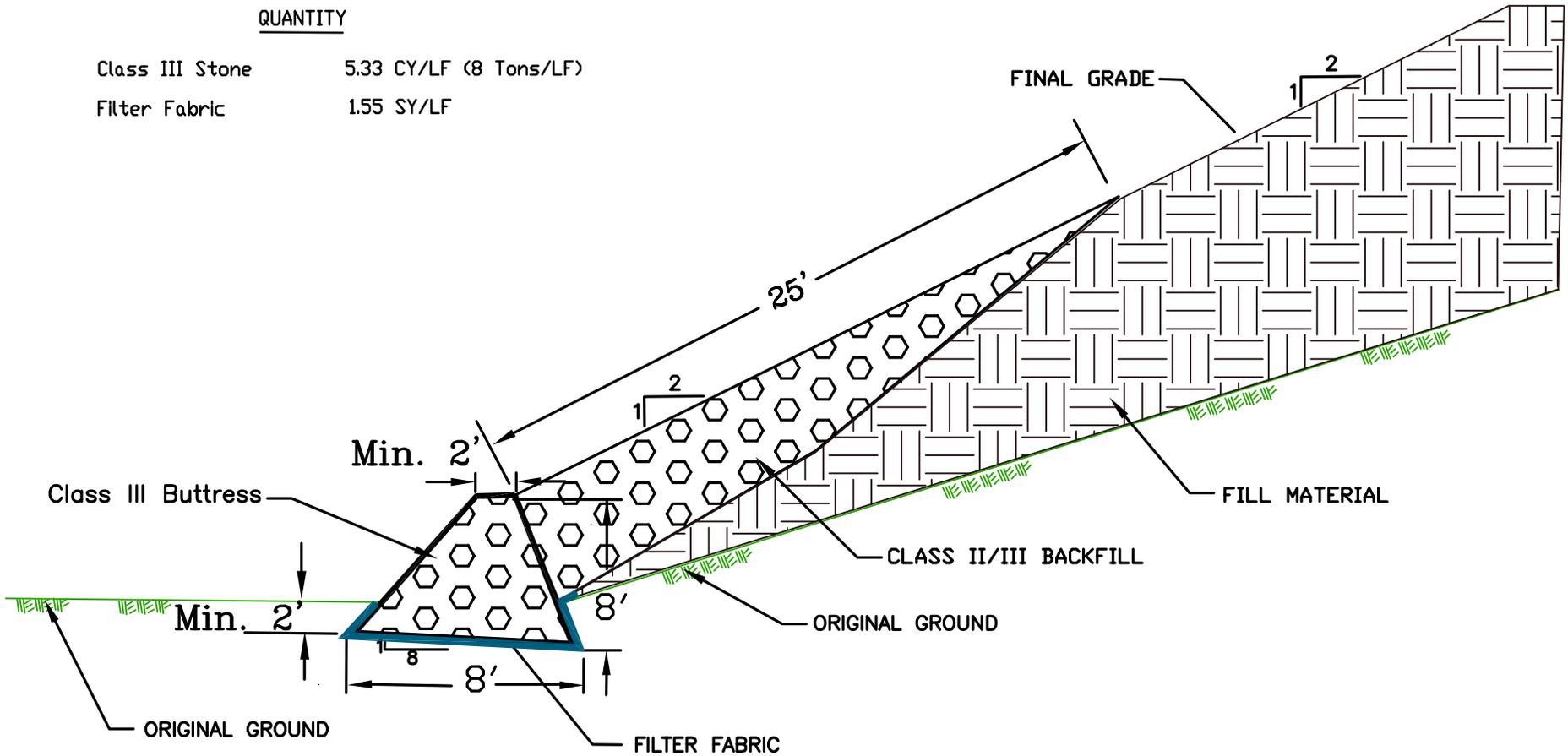


**FIG. E**

SEE AML TECHNICAL SPECIFICATION, CURRENT EDITION  
SECTION X

QUANTITY

Class III Stone	5.33 CY/LF (8 Tons/LF)
Filter Fabric	1.55 SY/LF



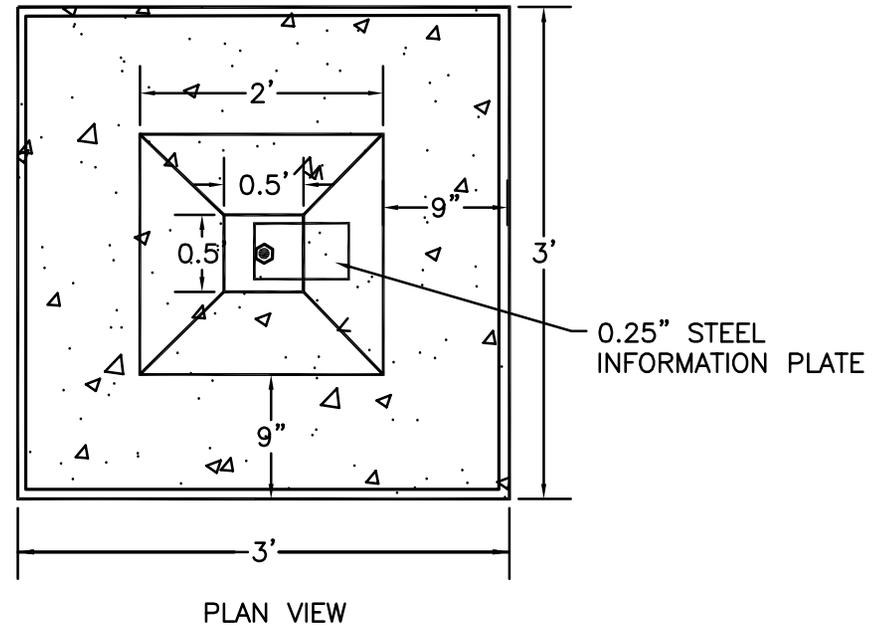
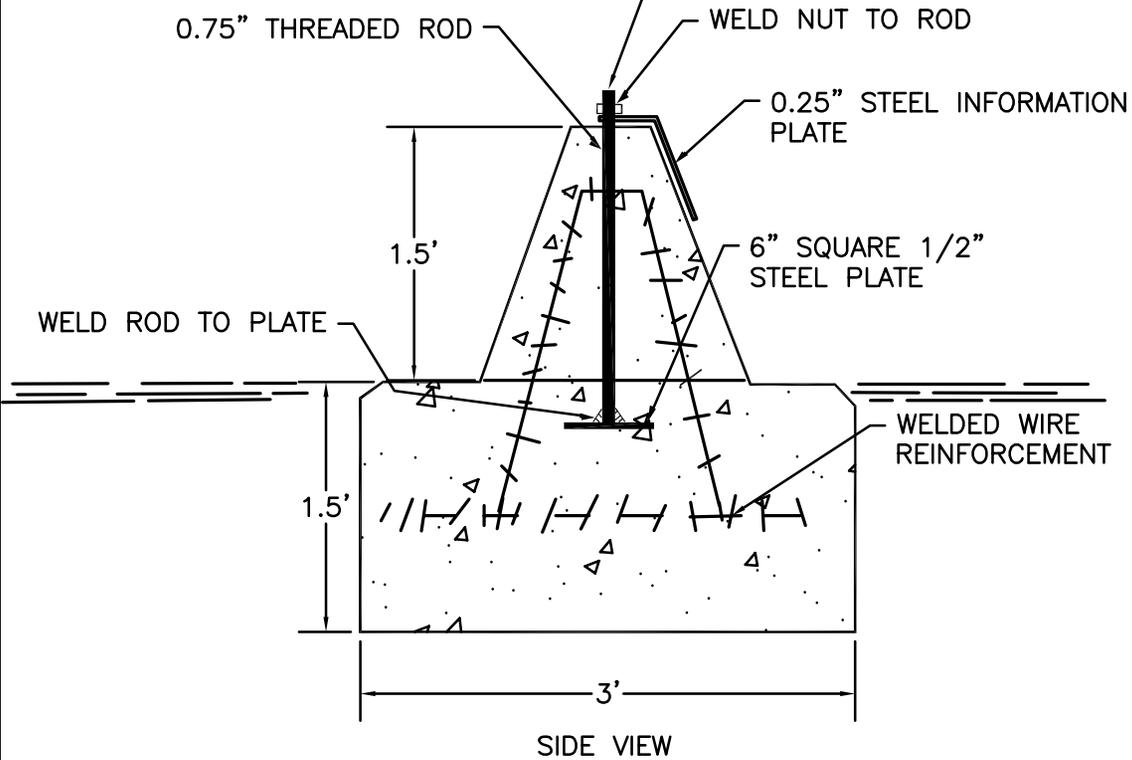
*Note: Excavate For Buttress At Min. 8:1 Back-Slope*

ROCK TOE BUTTRESS- CLASS II/III BACKFILL (AMLMIS 11)

NOTE: INFORMATION TO BE DISPLAYED ON STEEL PLATE SHALL BE PROVIDED TO THE CONTRACTOR BY THE ENGINEER.

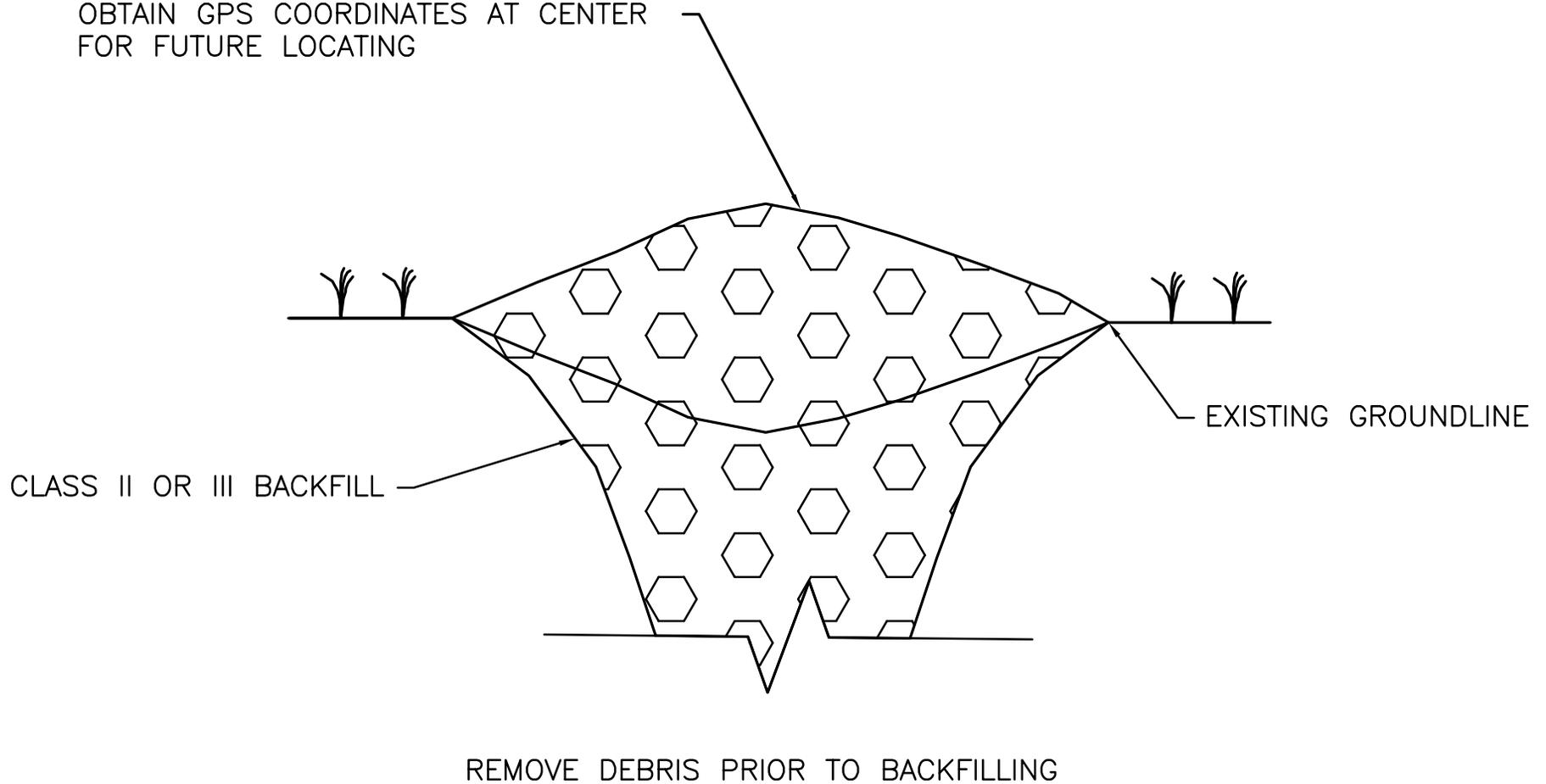


OBTAIN GPS COORDINATES AT NUT LOCATION (LATITUDE AND LONGITUDE ONLY)

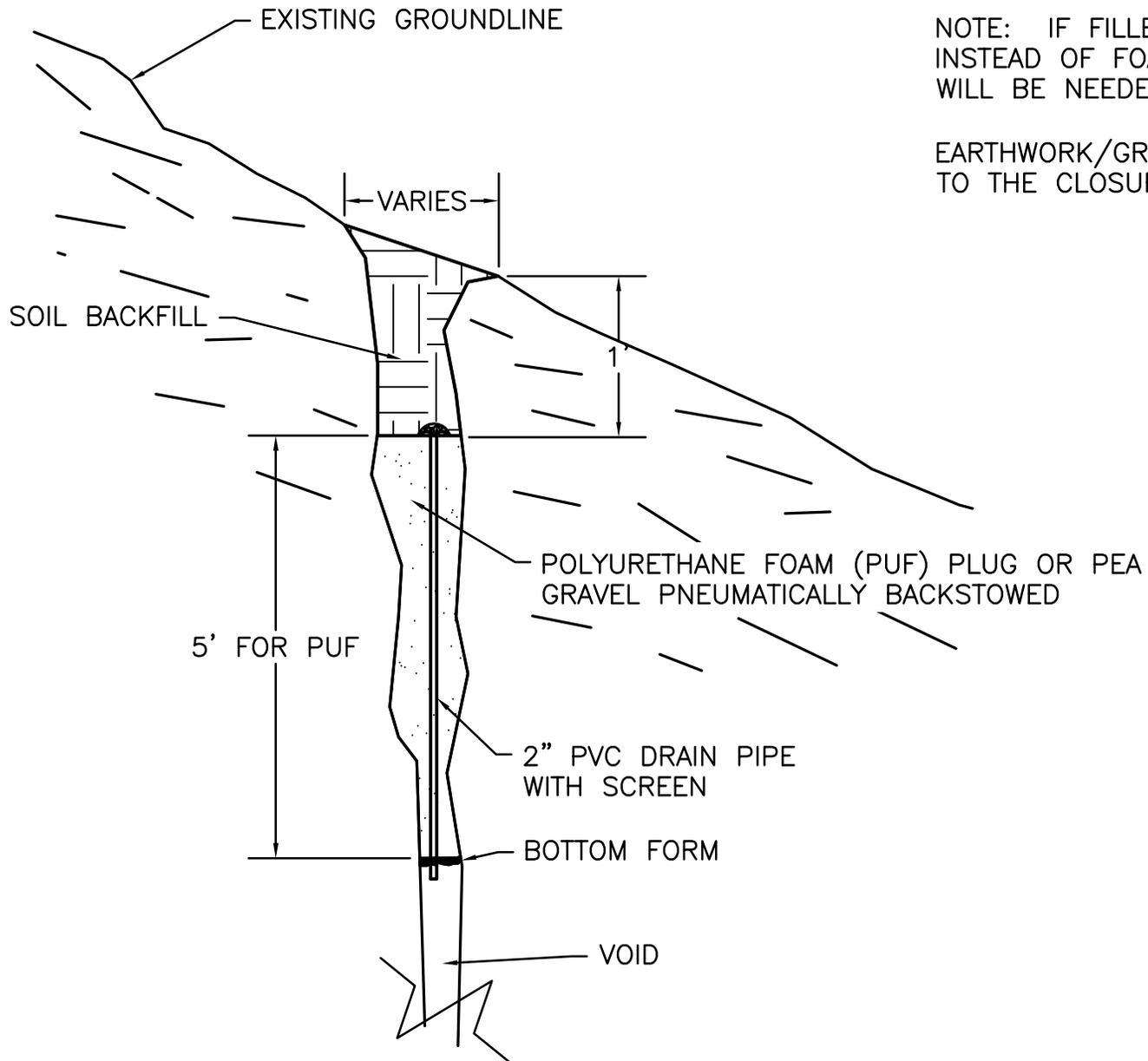


### CONCRETE MINE SHAFT MONUMENT (AMLPC 1)

OBTAIN GPS COORDINATES AT CENTER  
FOR FUTURE LOCATING



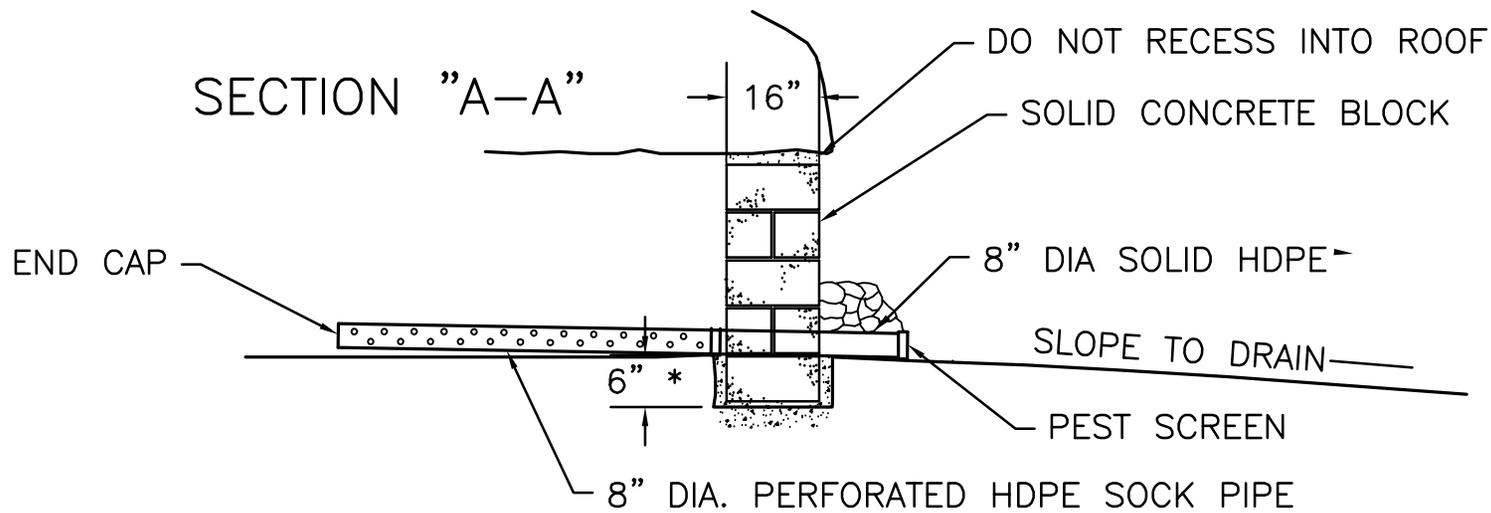
## SUBSIDENCE AND MINE BACKFILL (AMLPC 2)



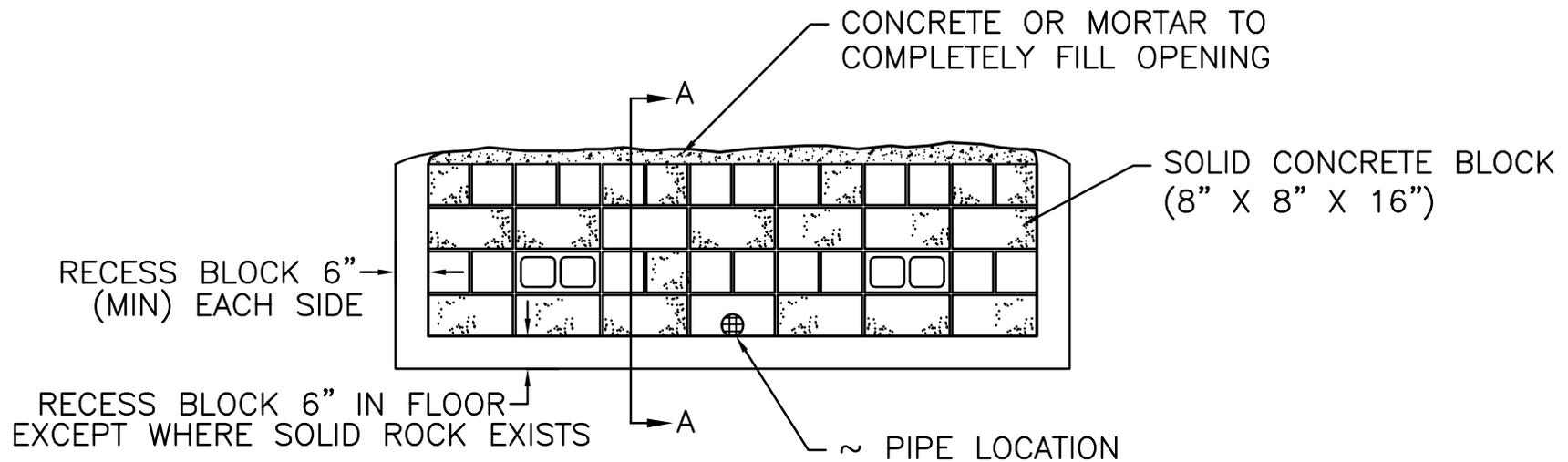
NOTE: IF FILLED WITH PEA GRAVEL  
INSTEAD OF FOAM, NO BOTTOM FORM  
WILL BE NEEDED.

EARTHWORK/GRADEWORK IS INCIDENTAL  
TO THE CLOSURE.

MOUNTAIN BREAK BACKFILL (AMLPC 3)

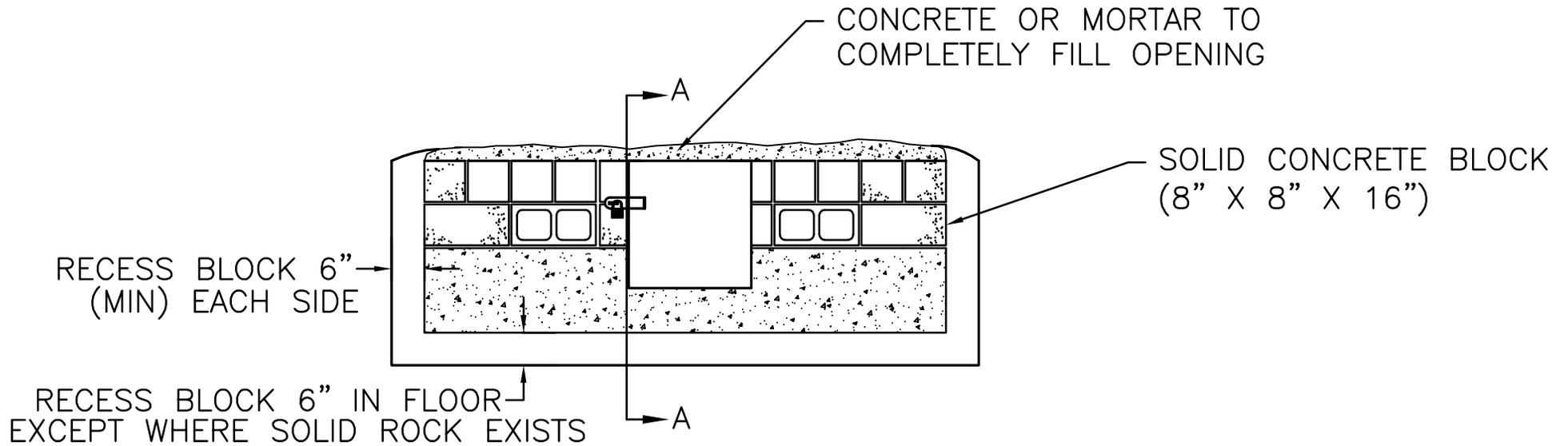
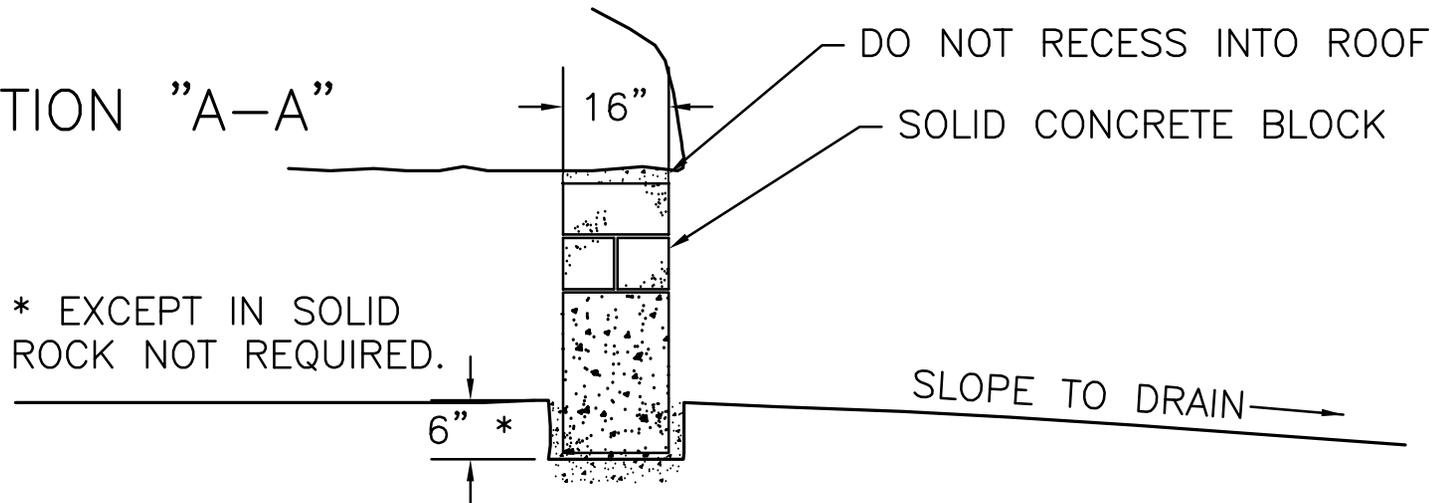


\* EXCEPT IN SOLID ROCK NOT REQUIRED.



CONCRETE BLOCK CLOSURE (AMLPC 4)

SECTION "A-A"



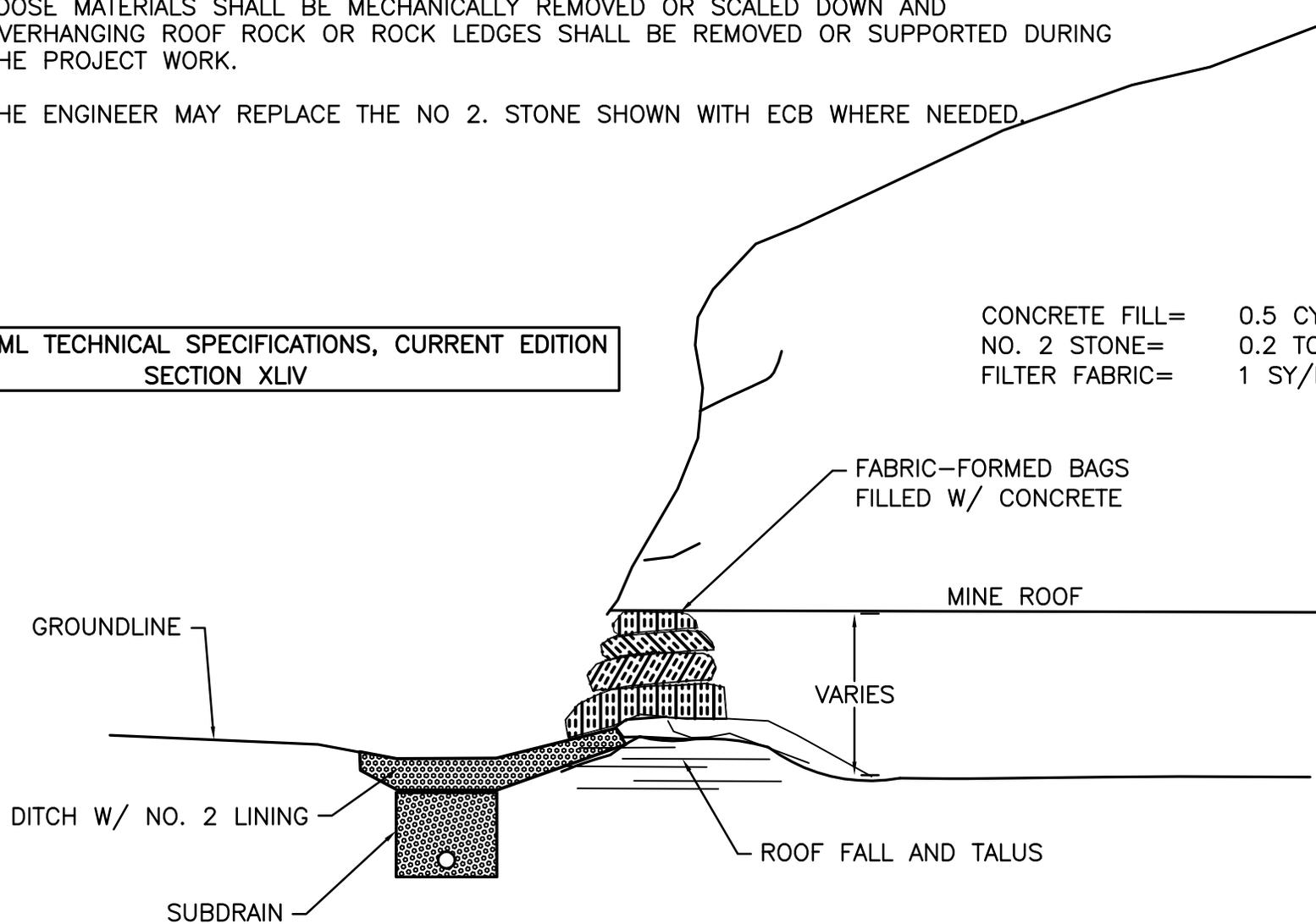
CONCRETE BLOCK CLOSURE WITH HUMAN ACCESS (AMLPC 5)

NOTES:

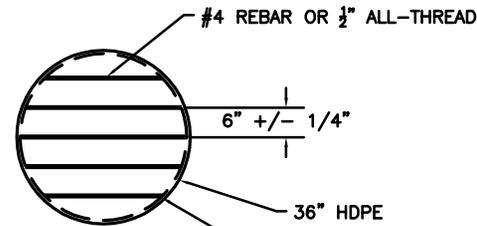
1. BOTTOM OF SUBDRAIN SHALL BE INSTALLED BELOW THE FLOOR OF THE COAL SEAM. A ROCK TOE BUTTRESS SHALL BE CONSTRUCTED AT OR BELOW THE EXISTING GROUND.
2. BEFORE ENTERING THE HIGHWALL WORK ZONE, THE WALL SHALL BE VISUALLY INSPECTED. LOOSE MATERIALS SHALL BE MECHANICALLY REMOVED OR SCALED DOWN AND OVERHANGING ROOF ROCK OR ROCK LEDGES SHALL BE REMOVED OR SUPPORTED DURING THE PROJECT WORK.
3. THE ENGINEER MAY REPLACE THE NO 2. STONE SHOWN WITH ECB WHERE NEEDED.

SEE AML TECHNICAL SPECIFICATIONS, CURRENT EDITION  
SECTION XLIV

CONCRETE FILL= 0.5 CY/LF  
NO. 2 STONE= 0.2 TONS/LF  
FILTER FABRIC= 1 SY/LF



FABRIC FORMED CONCRETE CLOSURE (AMLPC 6)



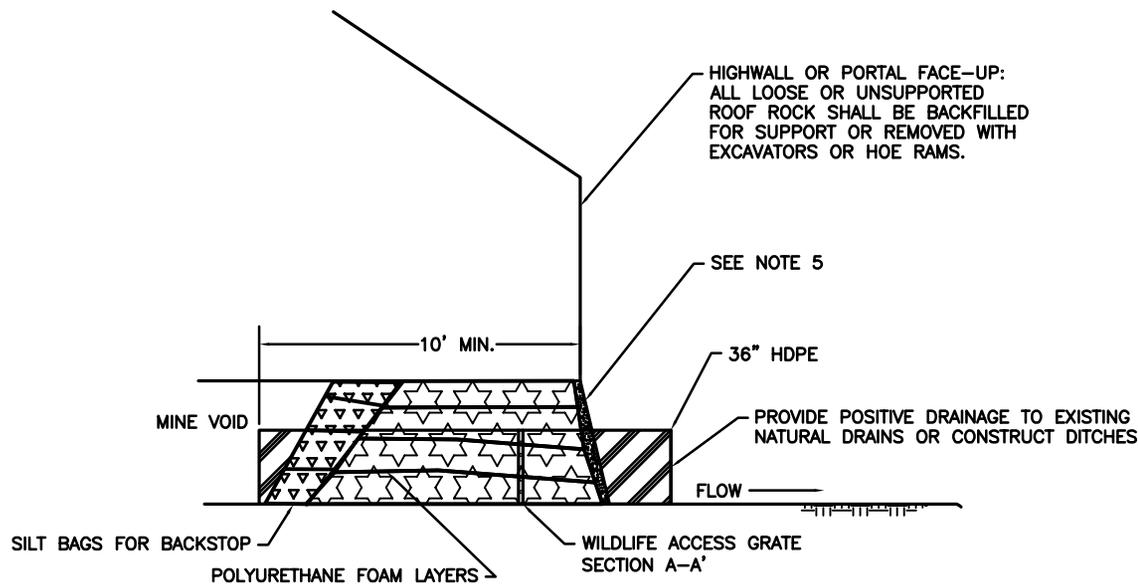
**NOTE:**

SEAM MUST BE AT LEAST 36" OR GREATER IN THICKNESS  
USE 36" PIPE, MINIMUM SIZE

SECTION A - A' (4X)

SECURE REBAR OR ALL-THREAD ON EXTERIOR OF PIPE WITH WELDED WASHERS, LOCK NUTS, OR OTHER APPROVED METHODS. DO NOT SET BARS VERTICALLY.

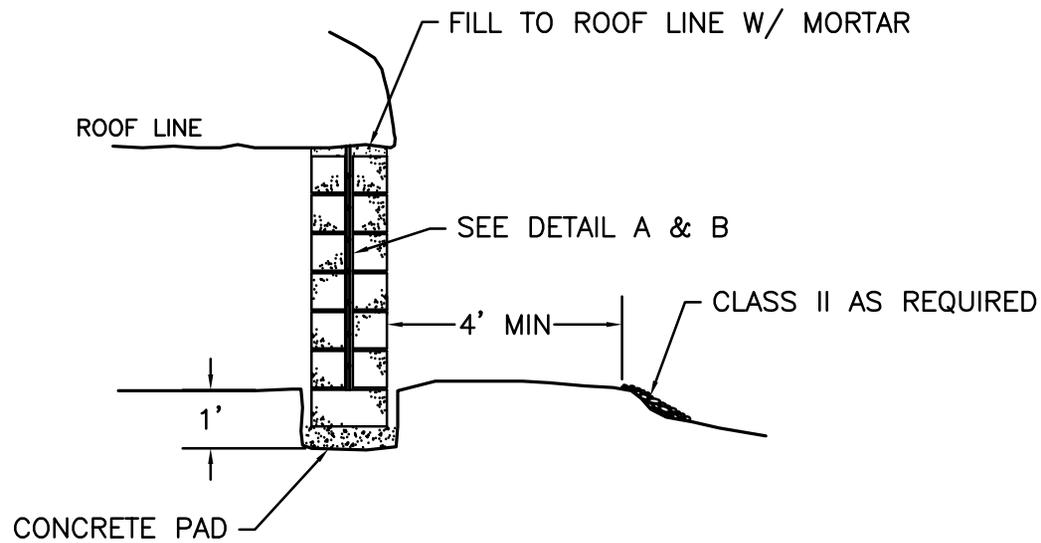
SEE AML TECHNICAL SPECIFICATIONS, CURRENT EDITION  
SECTION XXXI



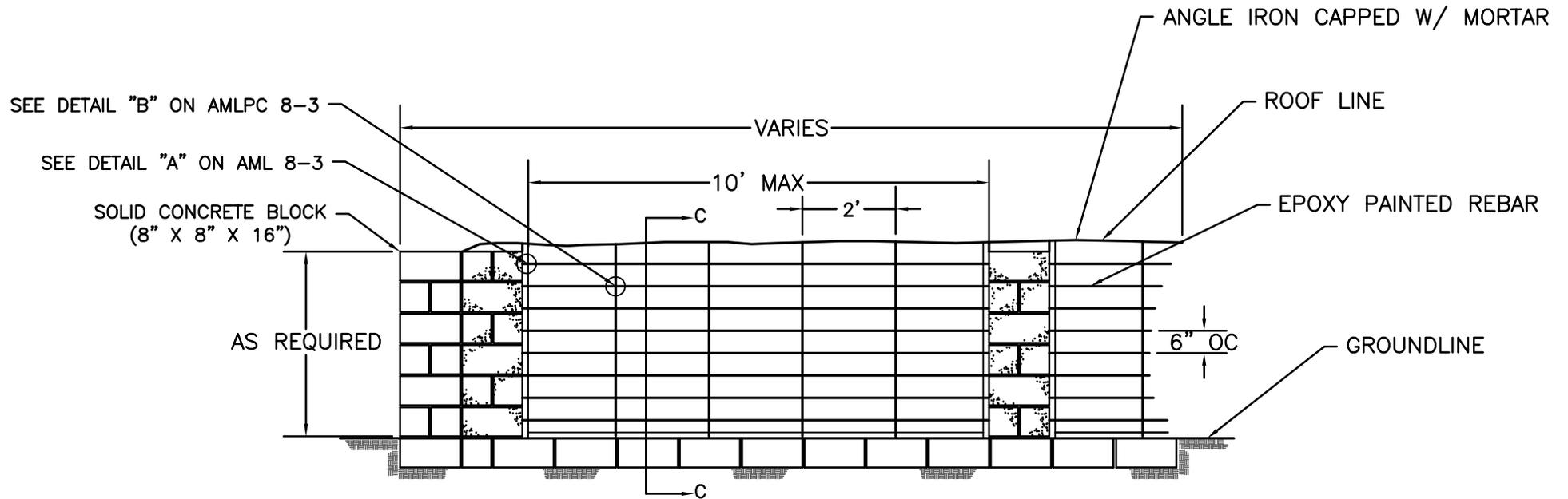
**POLYURETHANE FOAM NOTES:**

1. IN ORDER TO CONFINE THE FOAM INSIDE THE ADIT, SUCCESSIVE LAYERS OF TEMPORARY BARRIERS SHALL BE INSTALLED INSIDE THE ADIT PRIOR TO CONSTRUCTION OF THE EARTH PLUG.
2. REAR FOAM BARRIERS SHALL BE CONSTRUCTED FROM COMMON MATERIALS OR SHALL BE COMPRISED OF BAGGED FOAM PLACED IN LAYERS AND ALLOWED TO PARTIALLY HARDEN. THE VOID IN FRONT OF EACH SUCCESSIVE LAYER SHALL THEN BE FILLED WITH FOAM.
3. THE FOAM SEAL SHALL BE TIGHT ENOUGH TO SECURE THE ADIT, BUT IT DOES NOT HAVE TO BE AIR TIGHT.
4. TEMPORARY FLAMMABLE BARRIER MATERIALS SHALL BE REMOVED FROM THE FRONT BARRIERS AFTER THE ENTIRE FOAM SEAL HAS HARDENED.
5. THE FOAM SEAL SHALL BE PROTECTED FROM DEGRADATION FROM THE EFFECTS OF ULTRA-VIOLET LIGHT AND FIRE BY CONSTRUCTION AN OUTER PLUG OF EARTH NO LESS THAN 2' MINIMUM EARTH MATERIALS/AGGREGATE OR 1' MINIMUM OF CONCRETE GROUT COMBINED WITH COBBLES OR BOULDERS.
6. THE CONTRACTOR MAY, W/ PERMISSION OF THE ENGINEER, SUBSTITUTE CONSTRUCTED BULKHEADS WITH LOCAL OR COMMON MATERIALS.
7. SEE ADIT CLOSURE SPECIFICATIONS FOR DEPTH OF FOAM
8. FOR NON WILDLIFE ACCESSIBLE CLOSURES, REPLACE 36" WILDLIFE CLOSURE WITH 6" HDPE PIPE WITH PEST SCREEN FOR DRAINAGE AND VENTING

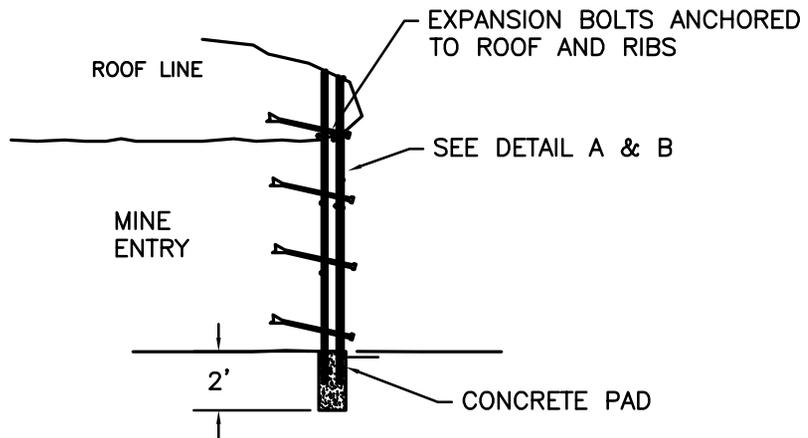
**POLYURETHANE FOAM CLOSURE WITH WILDLIFE ACCESS (AMLPC 7)**



**SECTION "C-C"**

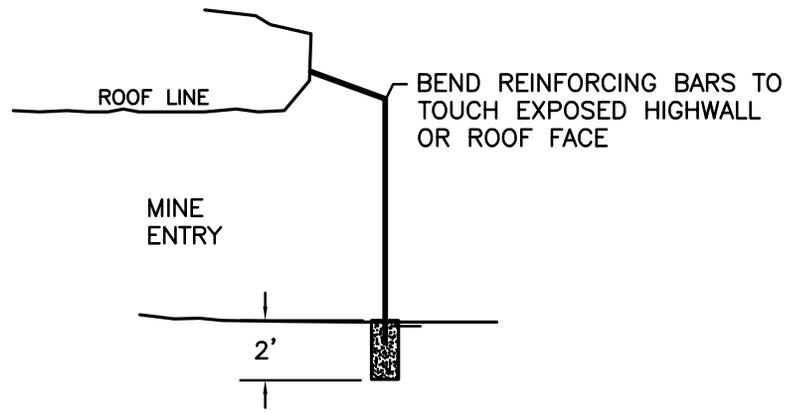


**CLOSURE WITH EXTERIOR BARS IN CONCRETE BLOCK (AMLPC 8-1)**



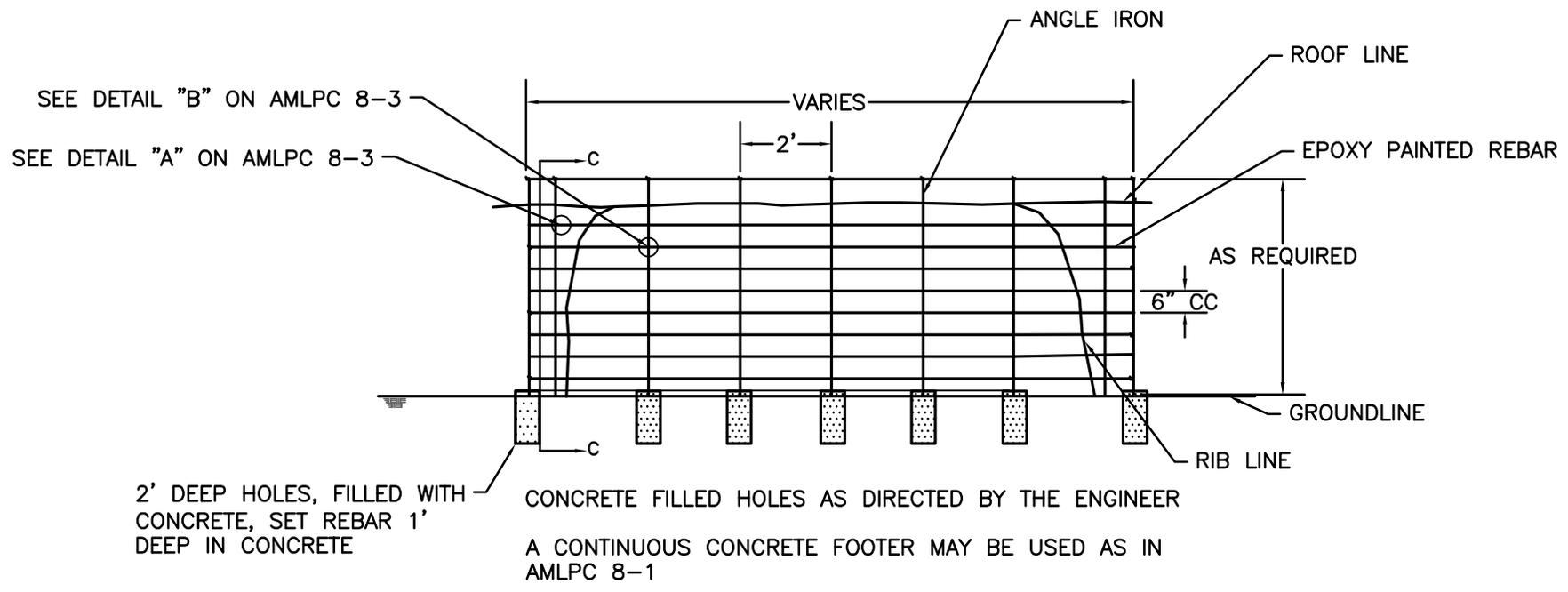
**METHOD 1**

USE FOR STABLE HIGHWALLS



**METHOD 2**

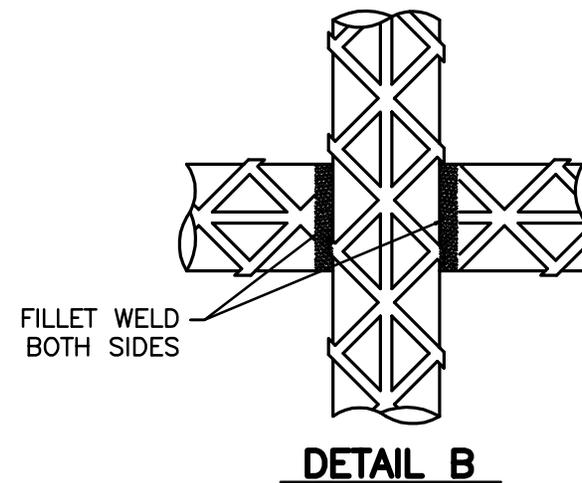
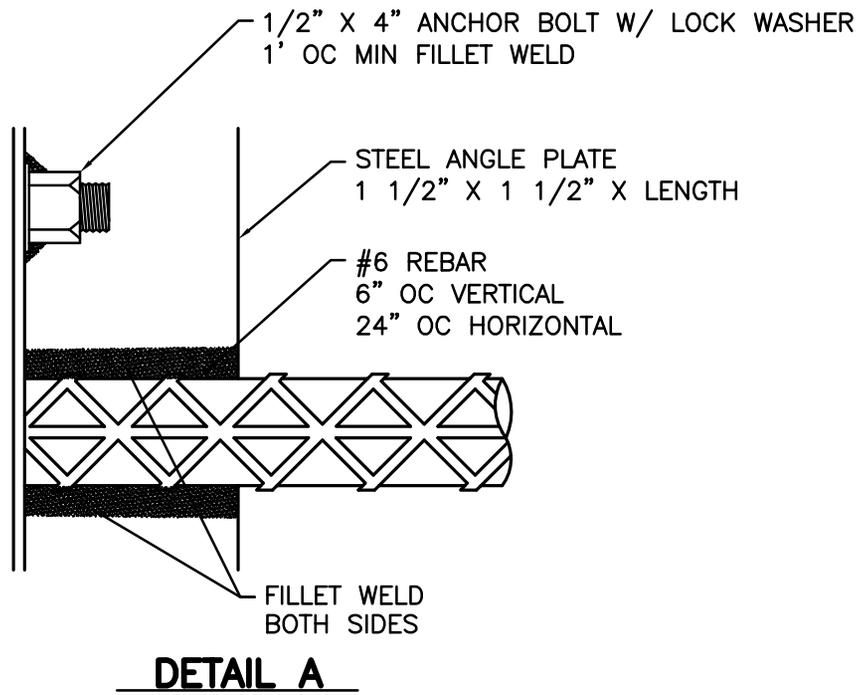
USE FOR UNSTABLE HIGHWALLS



**WILDLIFE CLOSURE WITH EXTERIOR BARS SET IN CONCRETE (AMLPC 8-2)**

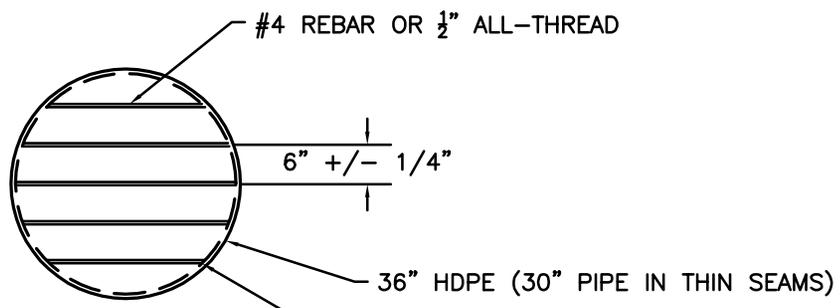
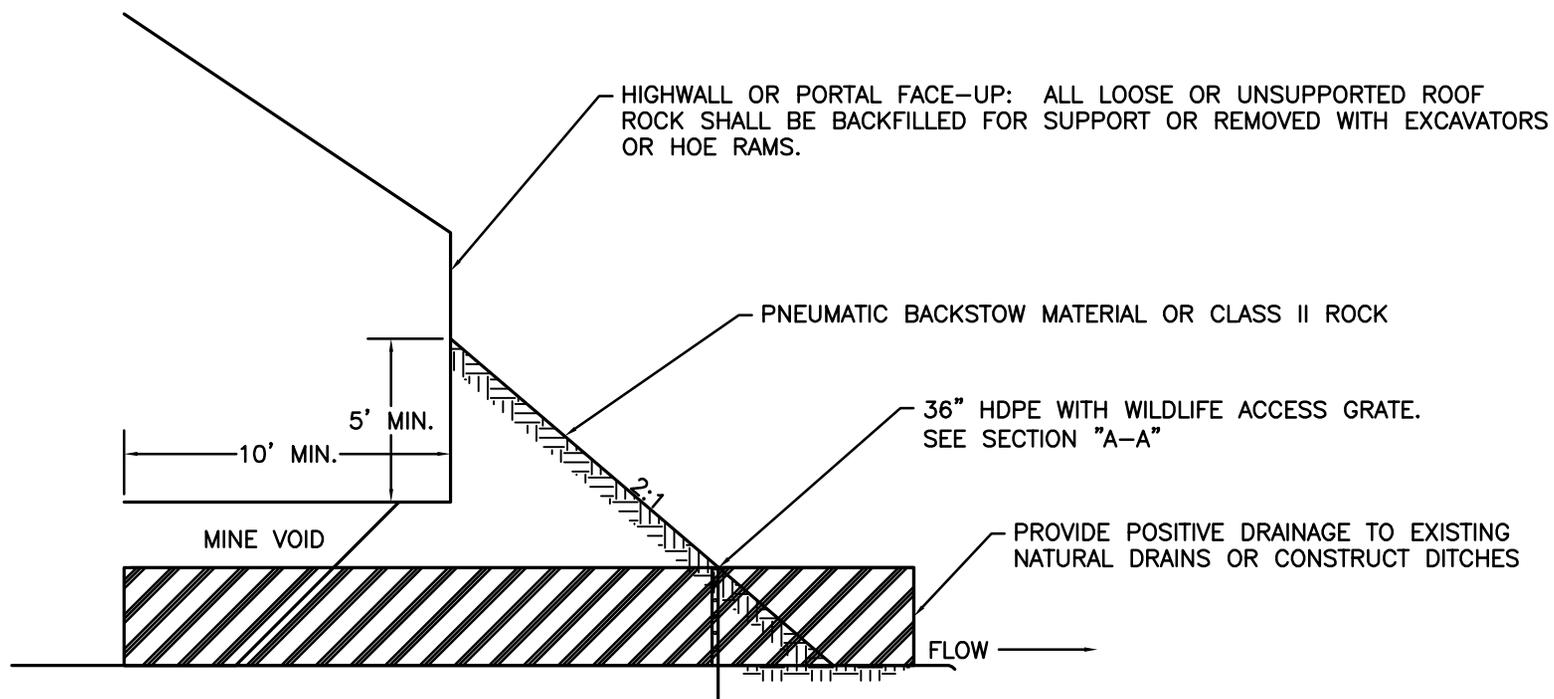
NOTES:

1. ALL EXTERIOR EXPOSED SURFACES OF BLOCK, CONCRETE, REBAR, AND METAL DOORS SHALL BE PAINTED BLACK OR BROWN SO AS TO BLEND WITH SURROUNDINGS. ALL WELDS AND EXPOSED METAL SURFACES SHALL BE PAINTED WITH RUST INHIBITING PAINT.
2. THE EXTERIOR CAGE CLOSURE SHALL BE UTILIZED WHERE SOLID AND STABLE FACE-UPS ARE PRESENT WHICH WILL ENSURE THE LONGEVITY OF THE CLOSURE.
3. THE CAGE SHALL BE ANCHORED INTO SOLID STRATA WITH EXPANSION BOLTS, GUY WIRE ANCHORS OR EQUIVALENT. ALL BOLTS AND NUTS SHALL BE SPOT WELDED TO PREVENT REMOVAL.
4. DANGEROUS ROOF ROCK MAY BE PRESENT AT ALL PORTALS. NO PERSONNEL SHALL BE ALLOWED BENEATH ANY PORTAL WITHOUT PROPER STRUCTURAL ROOF SUPPORT. IN MOST CASES, PROPER SUPPORT CANNOT BE PROVIDED AND NO PERSONNEL SHALL ENTER INTO ANY PORTAL.
5. ALL OPENINGS SHALL BE A MAXIMUM OF 24" X 6".



USE WITH AMLPC 8-2

CLOSURE EXTERIOR BARS DETAILS (AMLPC 8-3)

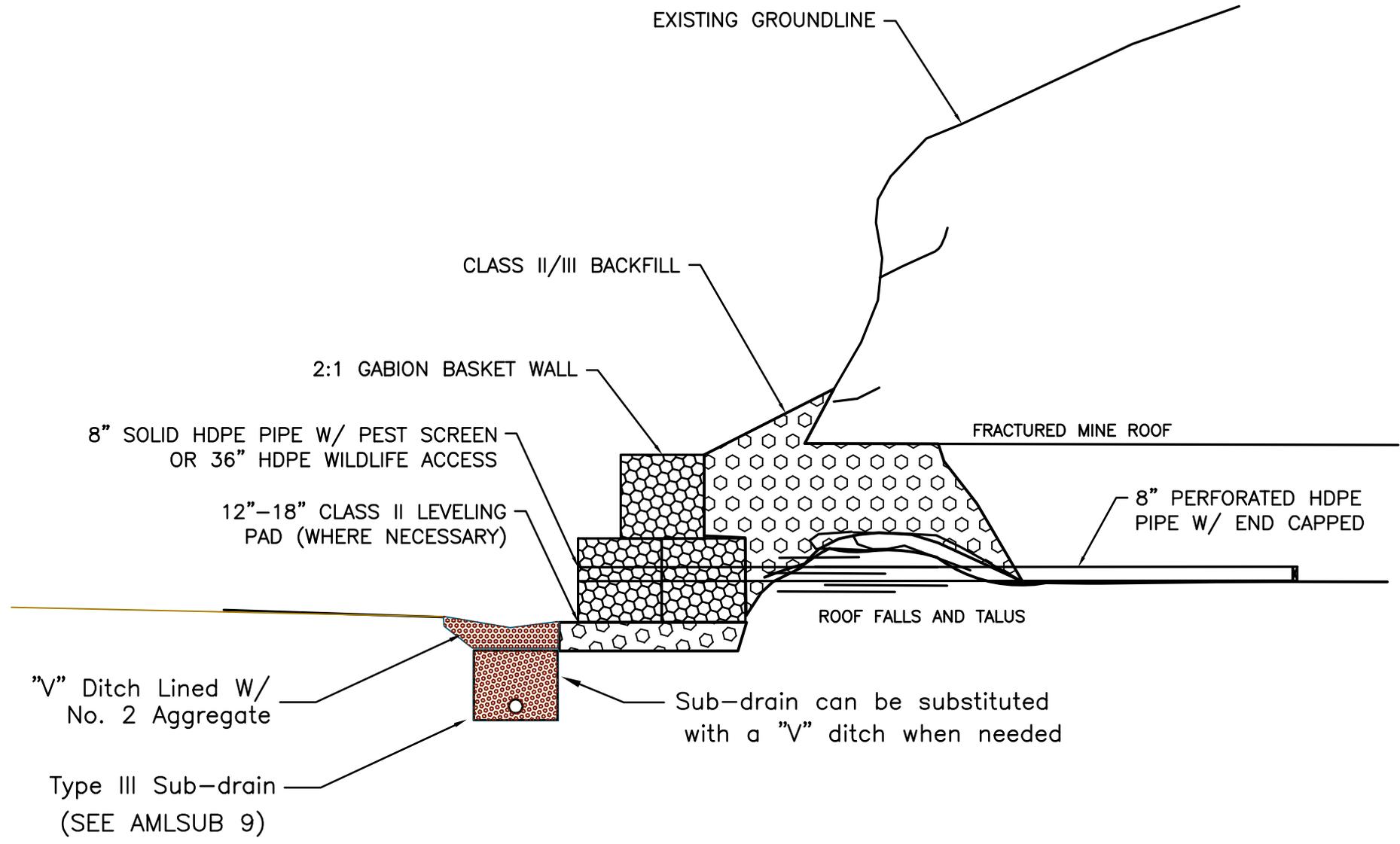


SECTION "A - A"

SECURE REBAR OR ALL-THREAD ON EXTERIOR OF PIPE WITH WELDED WASHERS, LOCK NUTS, OR OTHER APPROVED METHODS. DO NOT SET BARS VERTICALLY.

REBAR SHALL BE SET BACK THE DISTANCE FROM THE END TWICE THE DIAMETER OF THE PIPE. E.G. 36" PIPE WOULD BE SETBACK 6' MIN. FROM THE END.

PORTAL CLOSURE WITH WILDLIFE ACCESS (AMLPC 9)



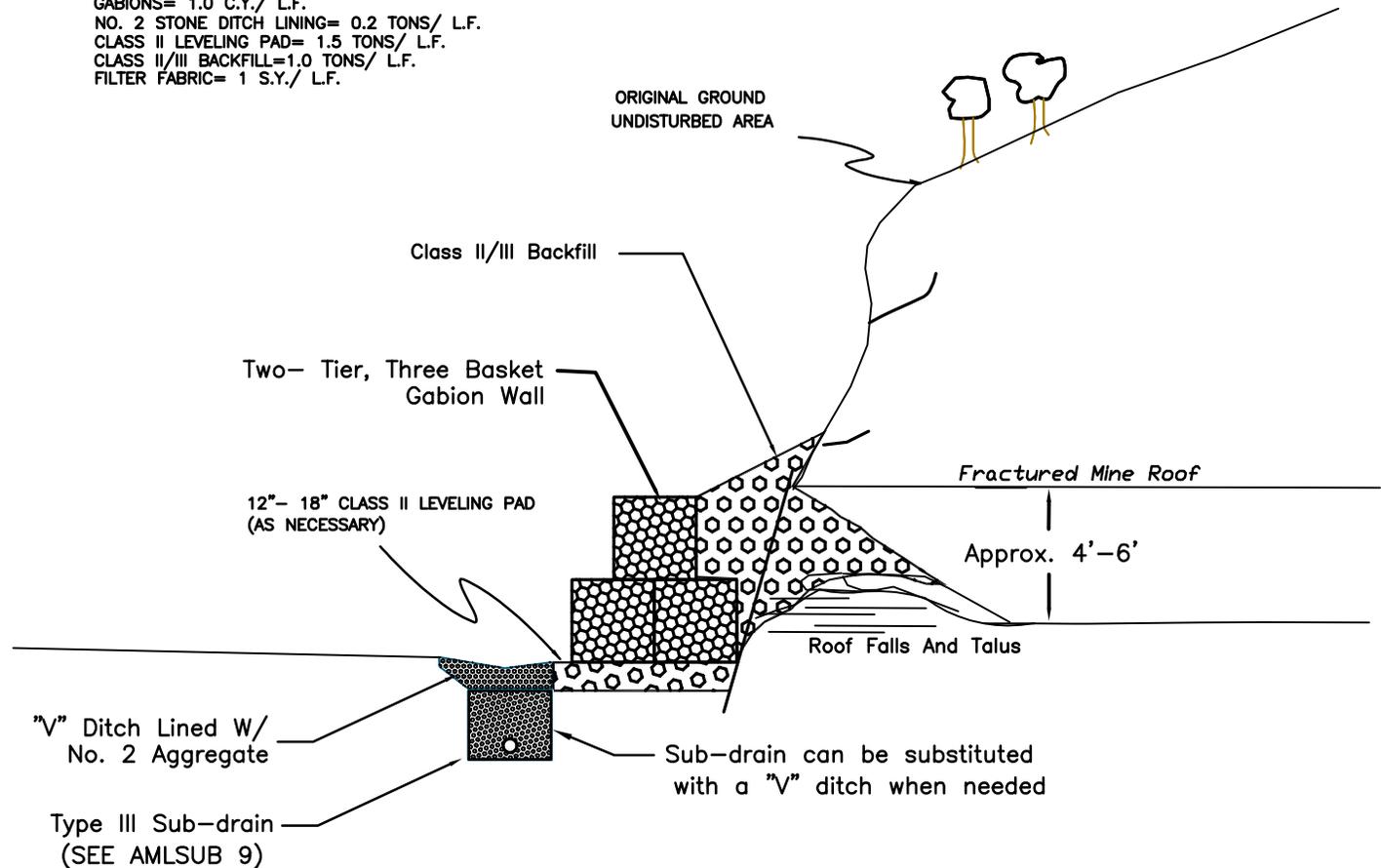
PORTAL CLOSURE WITH 6' (2-1) GABION RETAINING WALL W/ PIPE (AMLPC 10)

NOTES:

1. Bottom Of Sub-drain Shall Be Installed Below Floor Of Seam;  
Half of bottom row of Gabion Wall shall be buried below existing grade;  
Gabion Wall And Levelling Pad Shall Be Constructed At Or Below Seam Floor
2. Before Entering The Highwall Work Zone The Wall Shall Be Visually Inspected;  
Loose Materials Shall Be Mechanically Removed Or Scaled Down And Overhanging  
Roof Rock Or Rock Ledges Shall Be Removed Or Supported During Project Work
3. The ENGINEER May Replace the No. 2 Stone with ECB where needed.

QUANTITIES

GABIONS= 1.0 C.Y./ L.F.  
 NO. 2 STONE DITCH LINING= 0.2 TONS/ L.F.  
 CLASS II LEVELING PAD= 1.5 TONS/ L.F.  
 CLASS II/III BACKFILL=1.0 TONS/ L.F.  
 FILTER FABRIC= 1 S.Y./ L.F.

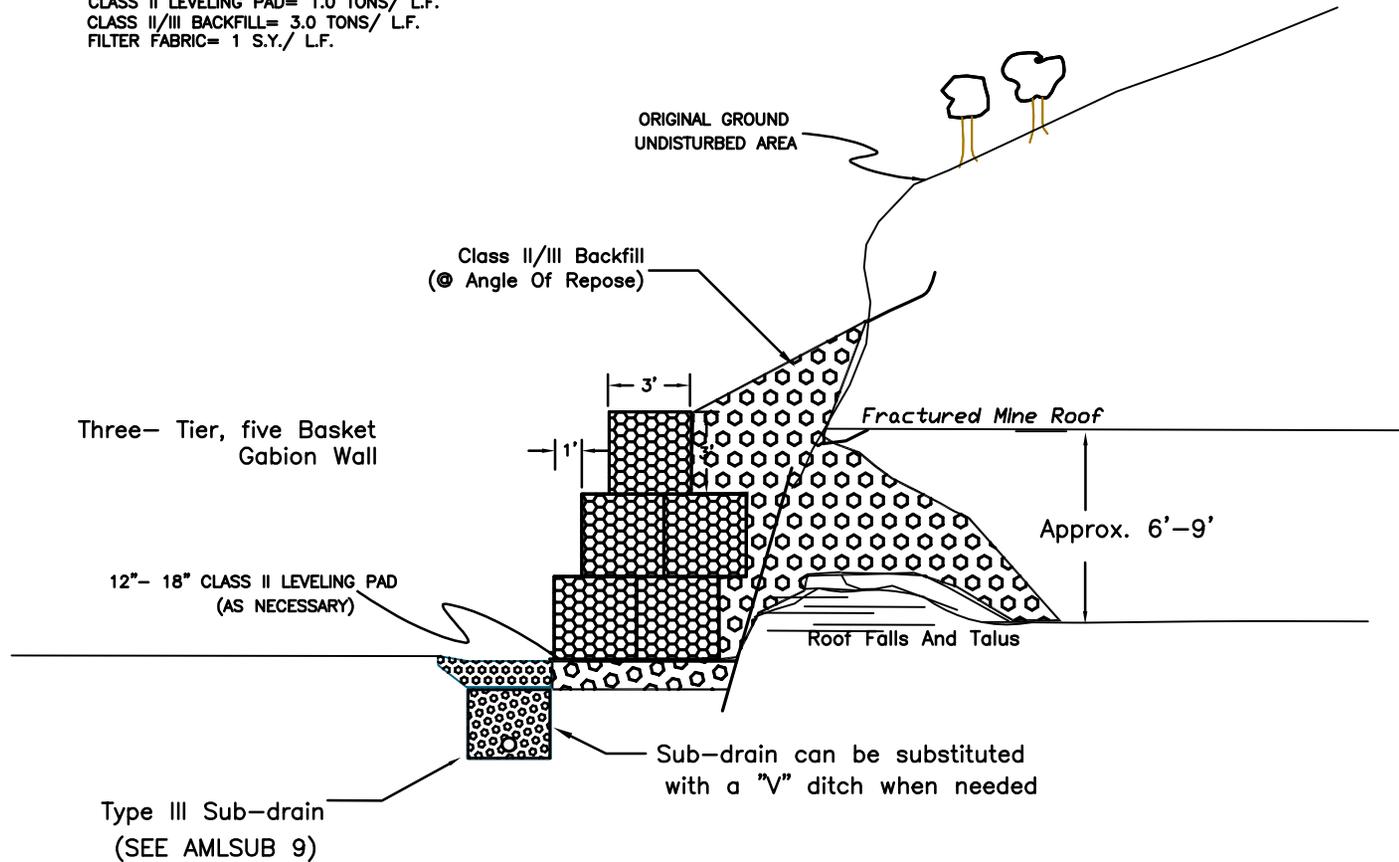


PORTAL CLOSURE WITH 6' (2-1) GABION- NO PIPE (AMLPC 11)

NOTES:

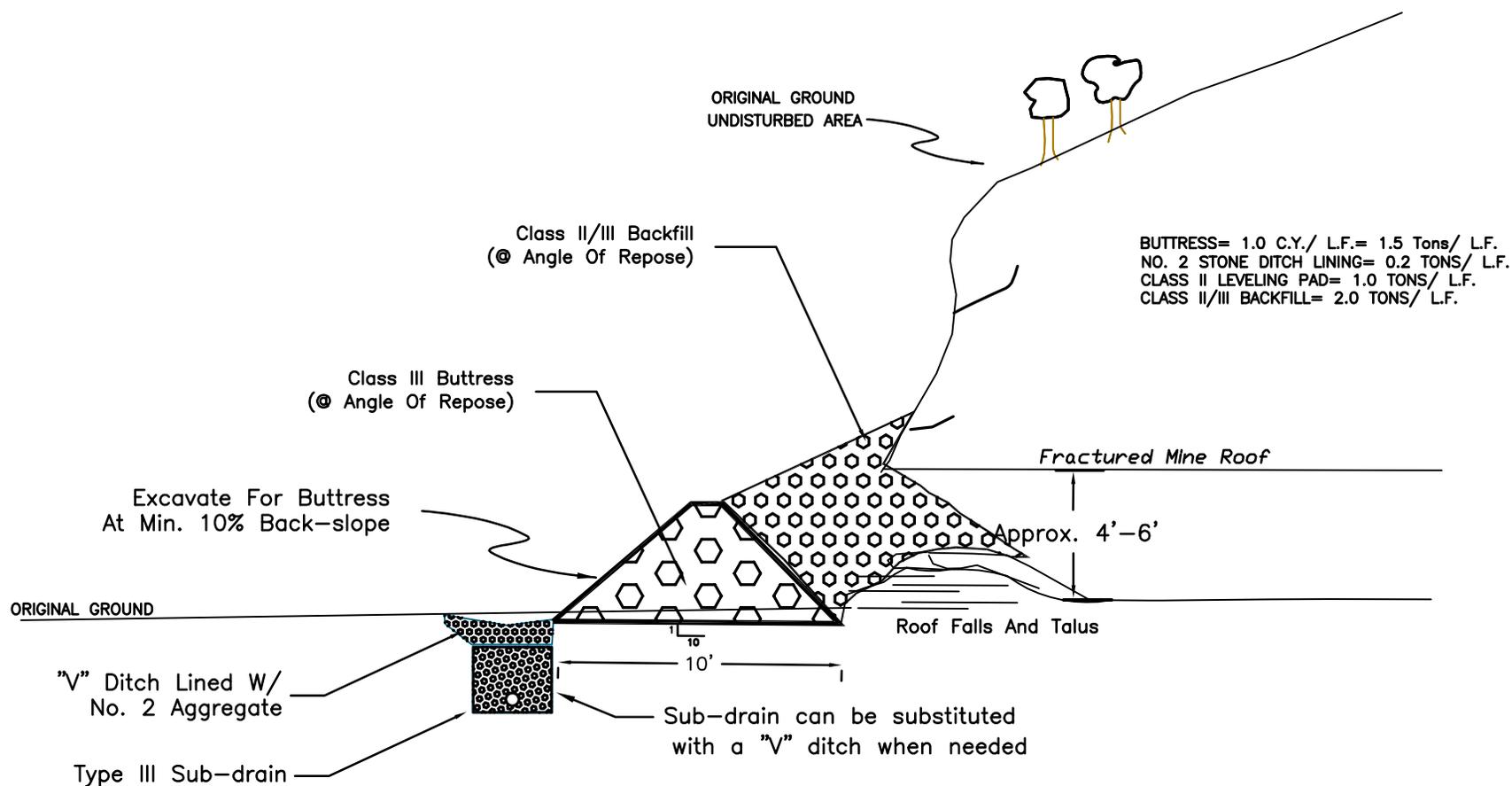
1. Bottom Of Sub-drain Shall Be Installed Below Floor Of Seam;  
Half of bottom row of Gabion Wall shall be buried below existing grade;  
Gabion Wall And Levelling Pad Shall Be Constructed At Or Below Seam Floor
2. Before Entering The Highwall Work Zone The Wall Shall Be Visually Inspected;  
Loose Materials Shall Be Mechanically Removed Or Scaled Down And Overhanging  
Roof Rock Or Rock Ledges Shall Be Removed Or Supported During Project Work
3. The ENGINEER May Replace the No. 2 Stone with ECB where needed.

GABIONS= 1.7 C.Y./ L.F.  
NO. 2 STONE DITCH LINING= 0.2 TONS/ L.F.  
CLASS II LEVELING PAD= 1.0 TONS/ L.F.  
CLASS II/III BACKFILL= 3.0 TONS/ L.F.  
FILTER FABRIC= 1 S.Y./ L.F.

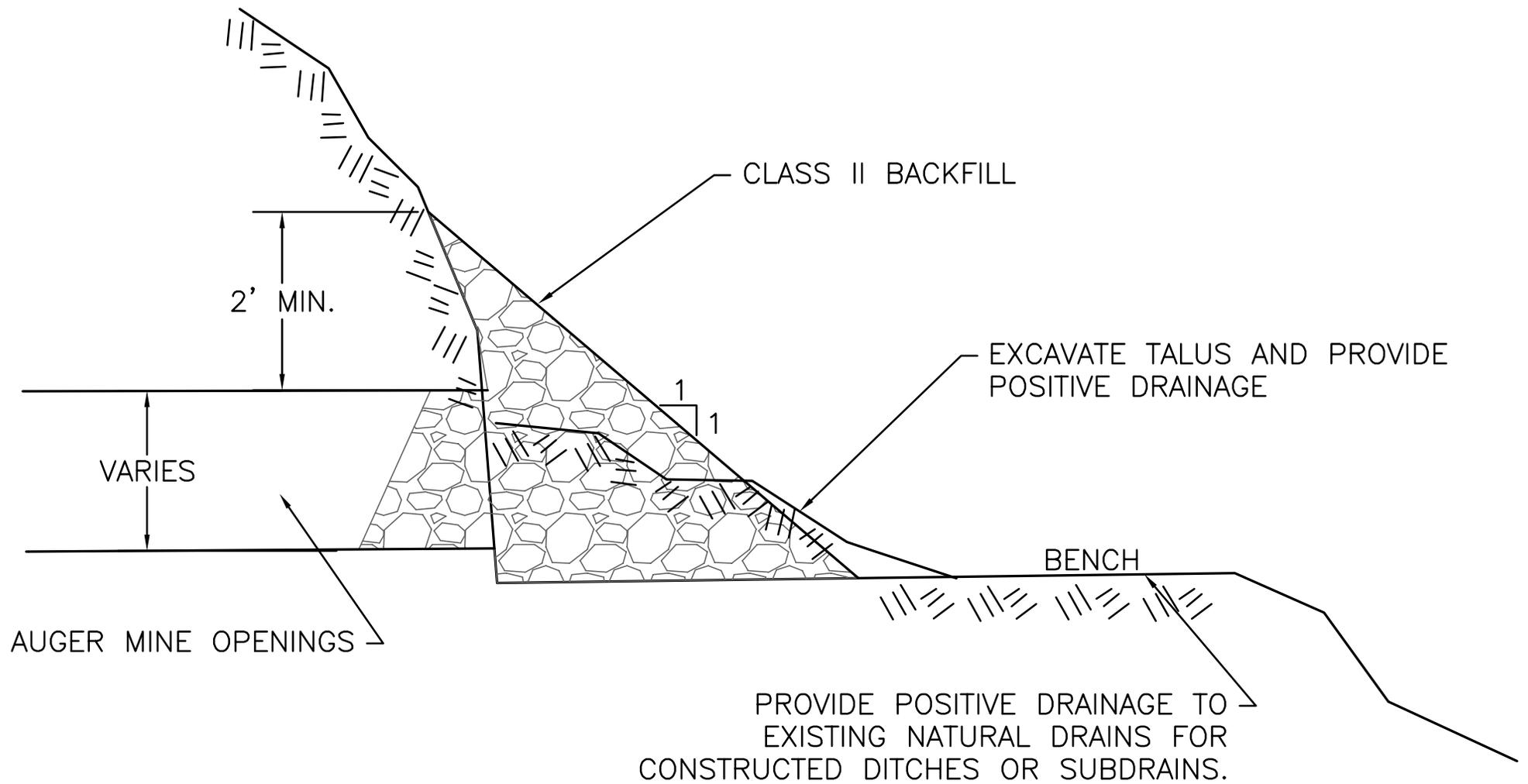


PORTAL CLOSURE WITH 9' (2-2-1) GABION (AMLPC 12)

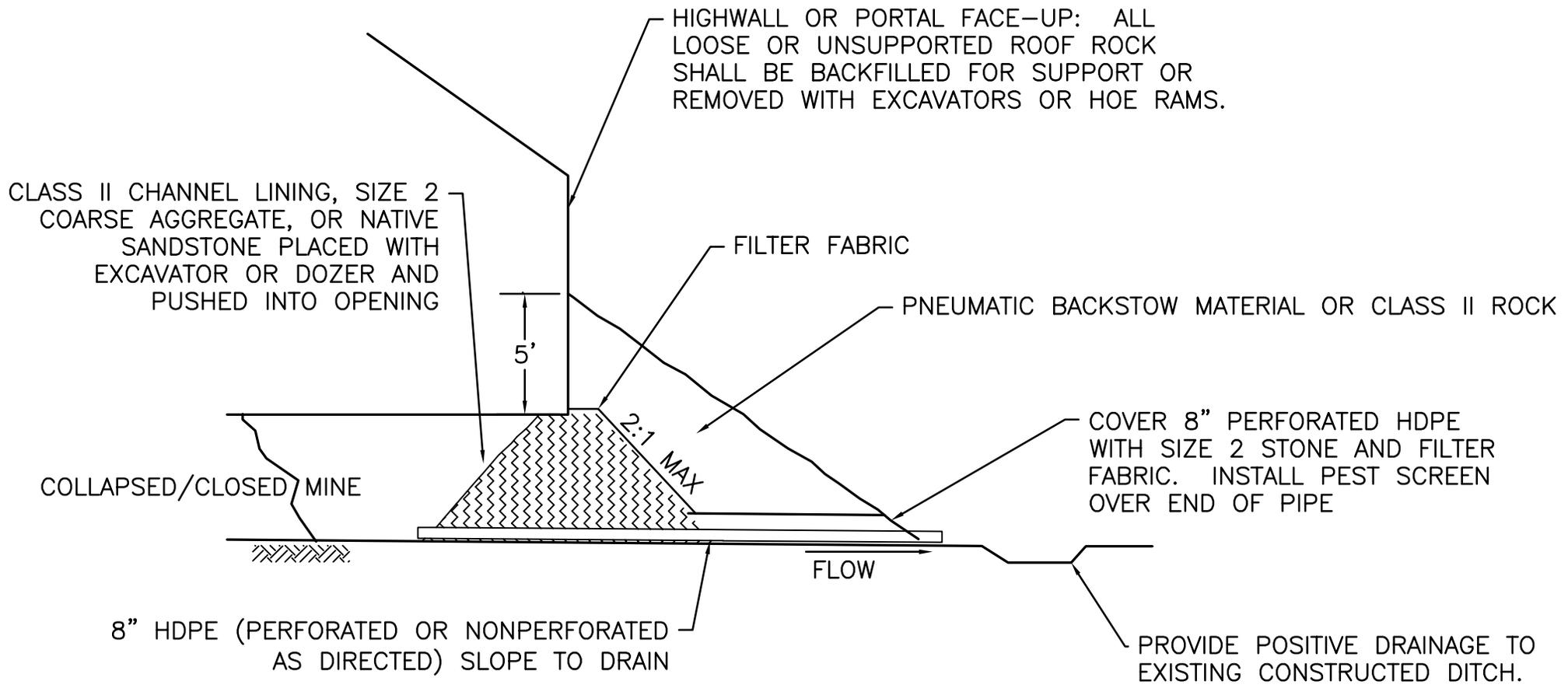
1. Bottom Of Sub-drain Shall Be Installed Below Floor Of Seam;  
Half of bottom row of Gabion Wall shall be buried below existing grade;  
Gabion Wall And Levelling Pad Shall Be Constructed At Or Below Seam Floor
2. Before Entering The Highwall Work Zone The Wall Shall Be Visually Inspected;  
Loose Materials Shall Be Mechanically Removed Or Scaled Down And Overhanging  
Roof Rock Or Rock Ledges Shall Be Removed Or Supported During Project Work
3. The ENGINEER May Replace the No. 2 Stone with ECB where needed.



## PORTAL CLOSURE WITH ROCK BUTTRESS (AMLPC 13)



AUGUR CLOSURE WITH CLASS II BACKFILL (AMLPC 14)



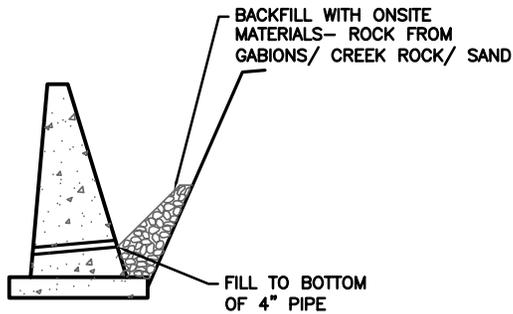
CLOSURE WITH CLASS II OR PNEUMATIC BACKSTOWED MATERIAL (AMLPC 15)

PORTAL CLOSURE DESIGN & SAFETY REQUIREMENTS NOTES:

1. EXCAVATION EFFORTS SHALL BEGIN AT THE TOP MOST OF EACH DESIGNATED PORTAL CLOSURE AND PROCEED INCREMENTALLY DOWNWARD UNTIL ALL OF THE MATERIAL HAS BEEN REMOVED DOWN TO GRADE. AS EXCAVATION WORK PROCEEDS, THE CONTRACTOR SHALL BE WATCHFUL FOR THE PRESENCE OF MINE WATER. ANY MINE WATER DETECTED, SHALL BE IMMEDIATELY REPORTED TO THE ENGINEER AND EXCAVATION WORK HALTED UNTIL APPROVAL HAS BEEN GRANTED BY THE ENGINEER TO PROCEED FURTHER.
2. DANGEROUS ROOF ROCK MAY BE PRESENT AT ALL PORTALS. NO PERSONNEL SHALL BE ALLOWED BENEATH ANY PORTAL WITHOUT PROPER STRUCTURAL ROOF SUPPORT. IN MOST CASES, PROPER SUPPORT CANNOT BE PROVIDED AND NO PERSONNEL SHALL ENTER INTO ANY PORTAL.
3. BLACK DAMP OR OTHER DANGEROUS VENTILATION / GAS CONDITIONS MAY BE PRESENT. THE CONTRACTOR MUST TAKE EVERY PRECAUTION AND UTILIZE QUALIFIED PERSONNEL TO ENSURE THE SAFETY OF HIS WORKERS AND THE PUBLIC.
4. ALL PORTALS BEING USED AS A WATER SOURCE SHALL BE MAINTAINED AS A WATER SOURCE BY GROUTING TO CREATE A RESERVOIR IN THE MINE. AN END CAP WITH APPROPRIATE FITTINGS SHALL BE PLACED OVER THE END OF THE HDPE. PROVISIONS FOR A SUPPLY LINE OUTLET SHALL BE MADE IN THE POURED CONCRETE BASE AT A LOCATION DETERMINED BY THE ENGINEER.
5. ALL COARSE AGGREGATE, CLASS II, OR PNEUMATICALLY BACKSTOWED AGGREGATE SHALL BE INCIDENTAL TO THE PORTAL CLOSURE. GROUT SHALL BE USED TO SURFACE SEAL ALL SURFACES AS REQUIRED BY THE ENGINEER AND SHALL BE INCIDENTAL TO THE PORTAL CLOSURE.
6. ALL EXTERIOR EXPOSED SURFACES OF BLOCK, CONCRETE, REBAR, AND METAL DOORS SHALL BE PAINTED BLACK OR BROWN SO AS TO BLEND WITH SURROUNDINGS. ALL WELDS AND EXPOSED METAL SURFACES SHALL BE PAINTED WITH RUST INHIBITING PAINT.
7. IF ROOF LINE IS UNSTABLE THEN CAP REBAR WITH APPROPRIATE LENGTH OF 2 1/2" x 2" x 3/8" STEEL ANGLE AND FILL TO ROOF LINE WITH MORTAR.
8. THE ACCESS DOOR IS TO BE USED WHERE THE MINE IS A WATER SOURCE OR AS DIRECTED BY THE ENGINEER. DOOR SIZE MAY DEPEND ON SIZE OF MINE OPENING.
9. 8" DIAMETER HDPE PIPE SHALL BE USED UNLESS 12" IS REQUIRED BY THE ENGINEER.
10. A CONCRETE FOOTING SHALL BE CONSTRUCTED WHERE REQUIRED TO PROVIDE A SUITABLE LEVEL BASE FOR THE BLOCK WALL. CONCRETE SHALL BE 3000 PSI.

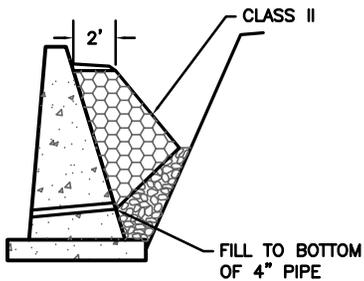
**BACKFILL PROCEDURE**

**STEP 1**



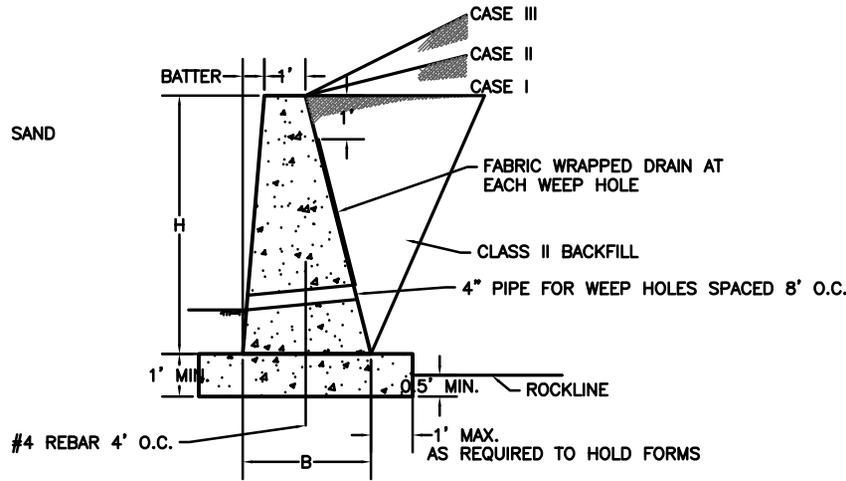
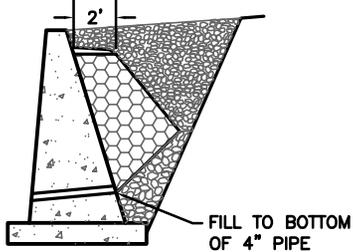
**STEP 2**

PLACE FILTER FABRIC AND CLASS II SUBDRAIN ROCK AS SHOWN



**STEP 3**

FILL REMAINING AREA WITH ONSITE MATERIALS AS DIRECTED BY THE ENGINEER



**CONCRETE GRAVITY WALL FOR STREAM WORK & ROCK BASE**

NTS

THE RETAINING WALL DEPICTED ON THIS DRAWING SHALL BE USED WHEN THE HEIGHT (H DIMENSION) OF THE WALL IS 12'-0" OR LESS PROVIDED THE FILL COMPLIES WITH THE FOLLOWING CONDITIONS:

CASE I: WALL BACKFILL SLOPES DOWN, IS LEVEL, OR SLOPES UP FROM WALL AT 20:1 OR FLATTER SLOPE ALLOWS FOR BACKFILL WHICH WOULD BE LEVEL EXCEPT FOR THE SLOPE REQUIRED TO FACILITATE PROPER DRAINAGE.

CASE II: BACKFILL SLOPES UP STEEPER THAN 20:1, BUT NOT STEEPER THAN 4:1.

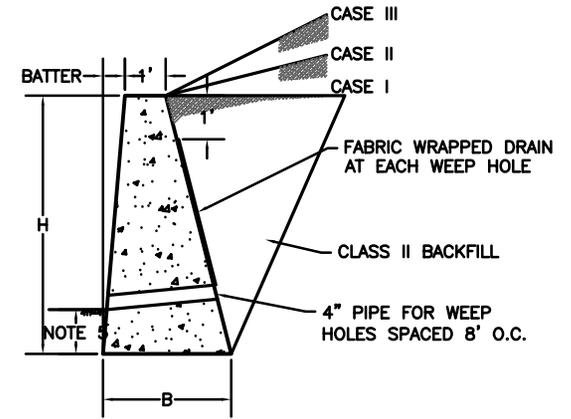
CASE III: BACKFILL SLOPES UP STEEPER THAN 4:1, BUT NOT STEEPER THAN 2:1. WHEN 'H' IS GREATER THAN 8' (6' FRONT FACE) INCREASE THE EMBEDMENT DEPTH TO 1/4 'H.'

SPECIAL DESIGNS SHALL BE REQUIRED WHEN THE FOLLOWING CONDITIONS EXIST:

- A. WALL HEIGHT IS GREATER THAN 12'0"
- B. WALL IS SURCHARGED WITH DEAD LOAD FILL SLOPES STEEPER THAN 2:1
- C. WALL IS SURCHARGED WITH A LIVE LOAD, WITHOUT THE LIMITS OF A 1:1 SLOPE EXTENDING FROM THE BASE OF THE WALL.

AREAS AND VOLUMES HAVE BEEN COMPUTED WITHOUT REDUCTION FOR BEVELED EDGES OR PIPE DRAINS. WHEN A RETAINING WALL VARIES IN HEIGHT, THE PRISMoidal FORMULA SHALL BE USED IN COMPUTING VOLUMES. THE FOOTER IS NOT INCLUDED IN THE TABULATED VOLUMES.

1. BATTER: **CASE I AND CASE II**  
 H = 3'-0" TO LESS THAN 5'-0" (VERTICAL)  
 H = 5'-0" TO LESS THAN 10'-0" (12:1)  
 H = 10'-0" TO LESS THAN 12'-0" (6:1)  
**CASE III**  
 H = 3'-0" TO LESS THAN 5'-0" (12:1)  
 H = 5'-0" TO LESS THAN 12'-0" (6:1)
2. FABRIC WRAPPED DRAINS AND 4" PIPE SOIL WEEP HOLES SHALL BE INCLUDED IN THE UNIT PRICE FOR GRAVITY TYPE RETAINING WALLS.
3. PLACE GEOGRID UNDER THE BASE OF THE WALL AS DIRECTED BY THE ENGINEER.
4. CONCRETE SHALL BE CLASS A CONCRETE WITH FIBER REINFORCEMENT.
5. MINIMUM EMBEDMENT VALUE FOR FIRM EARTH IS 2'-0".



**CONCRETE GRAVITY WALL FOR SOIL**

NTS

HEIGHT	BASE	SQ FT	CY/LF
<b>CASE I OR II OR III</b>			
3'-0"	1'-6"	3.7500	0.1389
3'-6"	1'-9"	4.8125	0.1782
4'-0"	2'-0"	6.0000	0.2222
4'-6"	2'-3"	7.3125	0.2708
5'-0"	2'-6"	8.7500	0.3241
5'-6"	2'-9"	10.3125	0.3819
6'-0"	3'-0"	12.0000	0.4444
6'-6"	3'-3"	13.8125	0.5116
7'-0"	3'-6"	15.7500	0.5833
7'-6"	3'-9"	17.8125	0.6597
8'-0"	4'-0"	20.0000	0.7407
8'-6"	4'-3"	22.3125	0.8264
9'-0"	4'-6"	24.7500	0.9167
9'-6"	4'-9"	27.3125	1.0116
<b>CASE I</b>			
10'-0"	5'-0"	30.0000	1.1111
10'-6"	5'-3"	32.8125	1.2153
11'-0"	5'-6"	35.7500	1.3241
11'-6"	5'-9"	38.8125	1.4375
12'-0"	6'-0"	42.0000	1.5556
<b>CASE II OR III</b>			
10'-0"	6'-0"	35.0000	1.2963
10'-6"	6'-3"	38.0625	1.4097
11'-0"	6'-6"	41.2500	1.5278
11'-6"	6'-9"	44.5625	1.6505
12'-0"	7'-0"	48.0000	1.7778

**CONCRETE GRAVITY WALL (AMLRW 1)**

WALL DIMENSIONS AND REINFORCEMENT REQUIREMENTS ARE PROVIDED WHERE THE USE OF A BASIC WALL IS NEEDED. FOR WALL DESIGNS THAT MAY BE PROJECT SPECIFIC, SEE THE DESIGN PLANS.

WALL HT	"B"	"C"	"T"	"W"
5'-7'	2.00	3.00	1.00	6.00
8'-10'	2.00	3.00	1.25	6.25
11'-13'	2.75	4.00	1.25	8.00
14'-16'	3.50	5.00	1.50	10.00
17'-20'	4.00	6.25	2.25	12.50

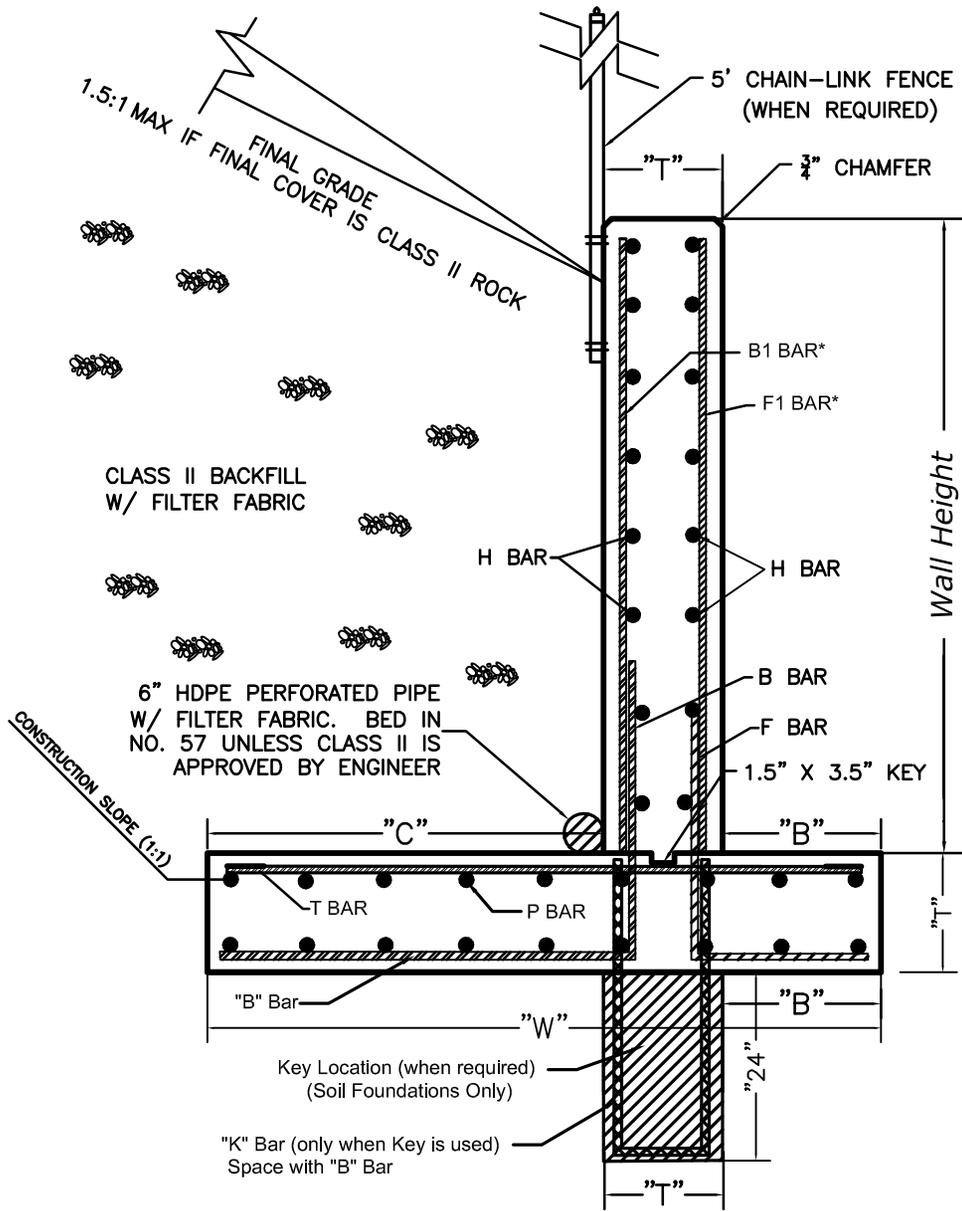
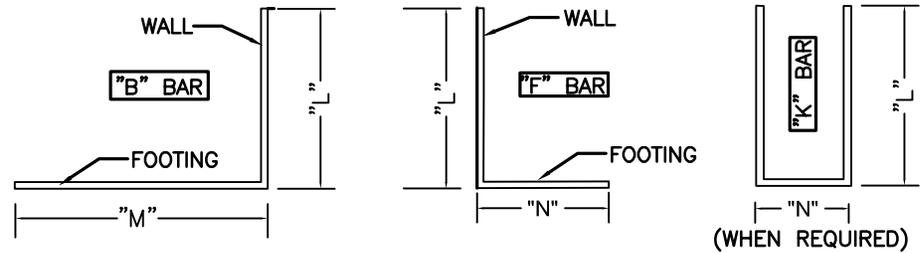
ALL REINFORCEMENT IS TO BE SPACED AT 12 INCH CENTERS

WALL HT	B BAR	F BAR	H BAR	P BAR	T BAR	K BAR
5'-7'	#5	#5	#4	#5	#5	#4
8'-10'	#6	#5	#5	#5	#6	#4
11'-13'	#7	#5	#5	#5	#7	#4
14'-16'	#8	#5	#6	#5	#8	#4
17'-20'	#9	#5	#6	#5	#9	#4

\* B1 BAR IS TO BE ONE BAR SIZE SMALLER THAN "B" BAR  
 \* F1 BAR IS TO BE ONE BAR SIZE SMALLER THAN "F" BAR

NUMBER OF H BARS TO USE IS EQUAL TO WALL HEIGHT X 2  
 NUMBER OF P BARS TO USE IS EQUAL TO "W" (FOOTING WIDTH) X 2

WALL HT	B BAR	F BAR	K BAR
5'-7'	L= 3.00', M= 2.75'	L= 2.75', N= 1.75'	L= 2.50', N= 0.50'
8'-10'	L= 3.33', M= 3.00'	L= 2.75', N= 1.75'	L= 2.50', N= 0.50'
11'-13'	L= 4.00', M= 3.75'	L= 3.50', N= 2.50'	L= 2.50', N= 0.75'
14'-16'	L= 5.00', M= 4.75'	L= 3.75', N= 3.25'	L= 2.50', N= 1.00'
17'-20'	L= 7.25', M= 6.00'	L= 4.25', N= 3.75'	L= 2.50', N= 1.50'



KEY AND FOOTING SHALL BE SAME CONCRETE POUR

SEE AMLRW 2-2 FOR ADDITIONAL DETAILS AND CONSTRUCTION NOTES

# REINFORCED CONCRETE WALL (HEIGHTS FROM 5' TO 20') (AMLRW 2-1)

**CONSTRUCTION NOTES:**

ALL FOUNDATION EXCAVATION AREA SHALL BE APPROVED BY THE ENGINEER, PRIOR TO THE PLACEMENT OF FORMWORK AND REBAR PLACEMENT. IN THE OPINION OF THE ENGINEER, ANY AREA NOT SUITABLE FOR FOOTING PLACEMENT (I.E. SOFT, SATURATED, ETC.) SHALL BE OVER EXCAVATED AND BACKFILLED WITH MECHANICALLY COMPACTED DENSE GRADE AGGREGATE AS DESCRIBED IN THE TECHNICAL SPECIFICATIONS AND DIRECTED BY THE ENGINEER.

ALL REINFORCING BARS ARE 2" FROM EDGE UNLESS OTHERWISE NOTED.

SAFETY FENCE MAY BE BOLTED TO THE WALL OR SET IN PLACE WITH CONCRETE BEHIND THE WALL. DO NOT PLACE FENCE IN THE WALL.

CONSTRUCTION JOINTS SHALL BE PLACED A MINIMUM OF 10' & A MAXIMUM OF 20'. SEE DETAIL, THIS SHEET

ALL STEEL REINFORCEMENT SHALL BE 60 KSI.

ALL CONCRETE SHALL BE 4000 PSI.

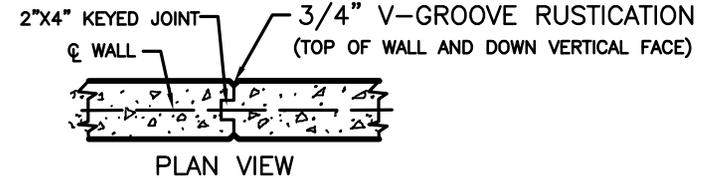
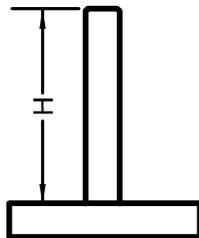
AT THE CONTRACTOR'S REQUEST, THE LENGTHS OF THE LONGITUDINAL REINFORCEMENT MAY BE CHANGED WITH PRIOR APPROVAL OF THE ENGINEER. LONGER OR SHORTER LONGITUDINAL BARS MAY BE USED TO ACCOMMODATE CONSTRUCTION OR FOR ECONOMY. ALL WORK AND/OR MATERIALS REQUIRED FOR CHANGES IN THE LENGTHS OF LONGITUDINAL REINFORCEMENT SHALL BE AT NO COST TO AML.

CONCRETE VOLUMES		
WALL HEIGHT	VOLUME (PER FOOT OF WALL LENGTH)	Key Volume (PER FOOT OF WALL LENGTH)
5'-7'	$V = 0.23 + (.04 \times H)$	0.062 Cu. Yds.
8'-10'	$V = 0.28 + (.05 \times H)$	0.093 Cu. Yds.
11'-13'	$V = 0.37 + (.05 \times H)$	0.093 Cu. Yds.
14'-16'	$V = 0.56 + (.06 \times H)$	0.111 Cu. Yds.
17'-20'	$V = 1.04 + (.08 \times H)$	0.148 Cu. Yds.

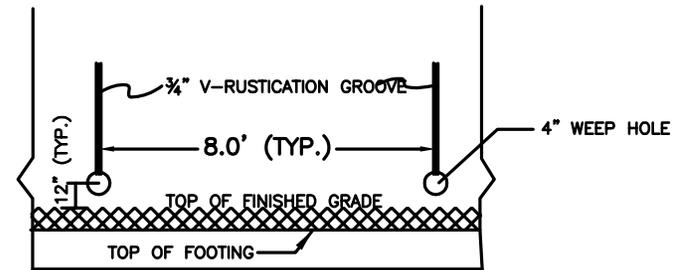
V= Cu. Yds. PER FOOT OF WALL LENGTH  
H= ACTUAL WALL HEIGHT USED FOR DESIGN

Example: 12' Wall Height, 100' Long, with Key

$V = 0.37 + (.05 \times 12) + 0.093 = 0.970$   
Total V =  $0.970 \times 100' = 97.0$  Cu. Yds.



CONSTRUCTION JOINT DETAIL



WEEP HOLE DETAIL

REINFORCEMENT QUANTITIES			
WALL HEIGHT	FOOTING*	WALL**	ADD FOR "K" BAR
5'-7'	29.50	2.68	3.68
8'-10'	35.00	3.80	3.68
11'-13'	54.63	4.26	3.85
14'-16'	80.22	5.72	4.02
17'-20'	118.38	6.34	4.36

\* PER FOOT OF WALL LENGTH

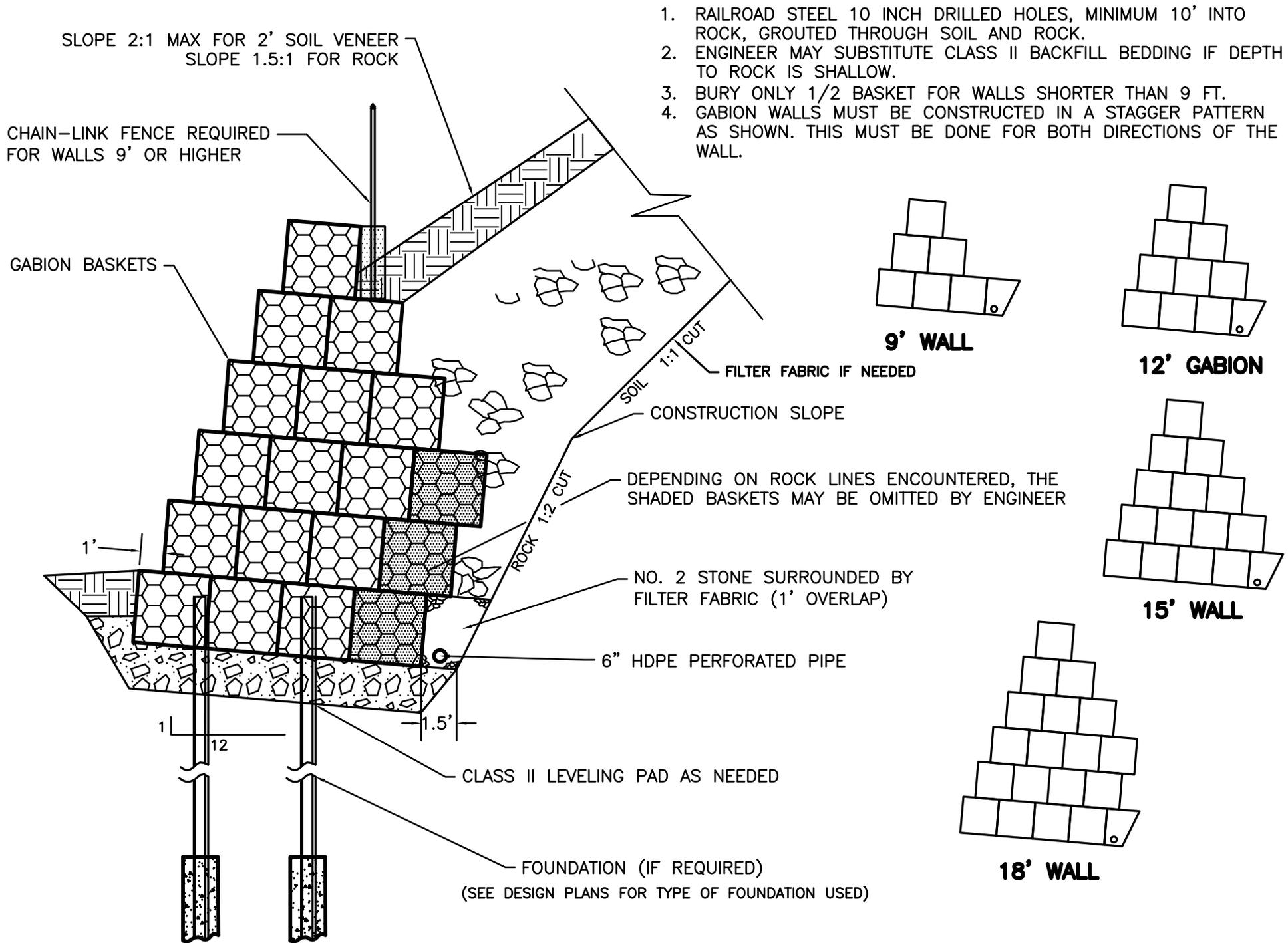
\*\* PER FOOT OF WALL HEIGHT AND PER FOOT OF WALL LENGTH

Example: 12' Wall Height, 100' Long, with Key

$[(4.26 \times 12) + 54.63 + 3.85] \times 100 = 10,960$  LBS. REINFORCEMENT

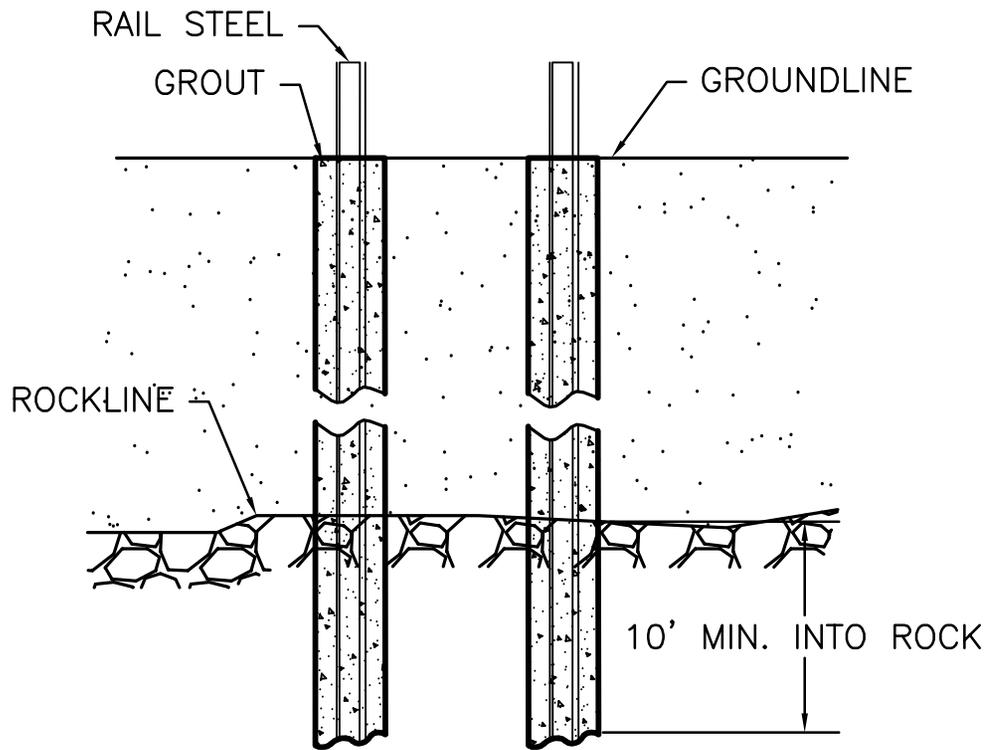
WALL HEIGHT ——— "K" BAR BECAUSE USING KEY

**(USE THIS DRAWING WITH AMLRW 2-1)**



1. RAILROAD STEEL 10 INCH DRILLED HOLES, MINIMUM 10' INTO ROCK, GROUTED THROUGH SOIL AND ROCK.
2. ENGINEER MAY SUBSTITUTE CLASS II BACKFILL BEDDING IF DEPTH TO ROCK IS SHALLOW.
3. BURY ONLY 1/2 BASKET FOR WALLS SHORTER THAN 9 FT.
4. GABION WALLS MUST BE CONSTRUCTED IN A STAGGER PATTERN AS SHOWN. THIS MUST BE DONE FOR BOTH DIRECTIONS OF THE WALL.

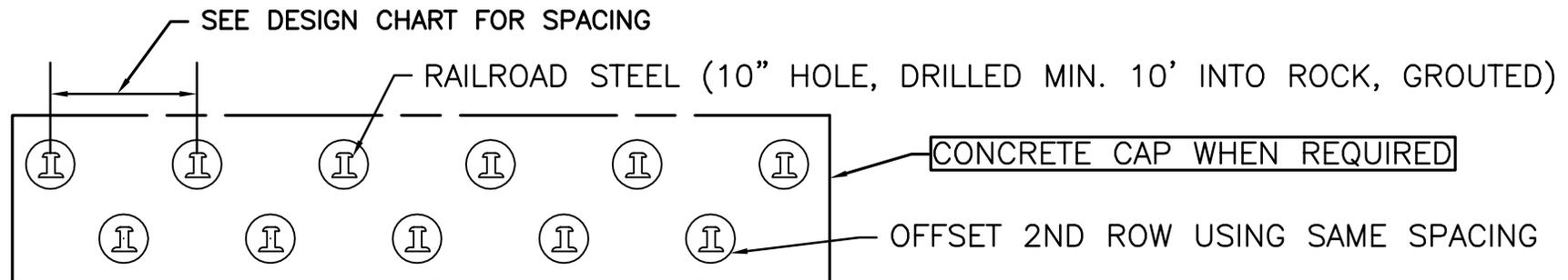
GABION RETAINING WALL (AMLRW 3-1)



DESIGN CHART FOR 130 TO 133 LBS/YD RAIL	
DEPTH OF ROCK	CTR-CTR SPACING OF RAILS AND NO. OF ROWS
5'-9'	USE 48" SPACING- 1 ROW
10'-14'	USE 36" SPACING- 1 ROW
15'-19'	USE 24"- 1 ROW <u>OR</u> USE 48"- 2 ROWS
20'-24'	USE 24"- 2 ROWS <u>OR</u> USE 36"- 3 ROWS
25'+	USE 24" SPACING- 3 ROWS

NOTE:

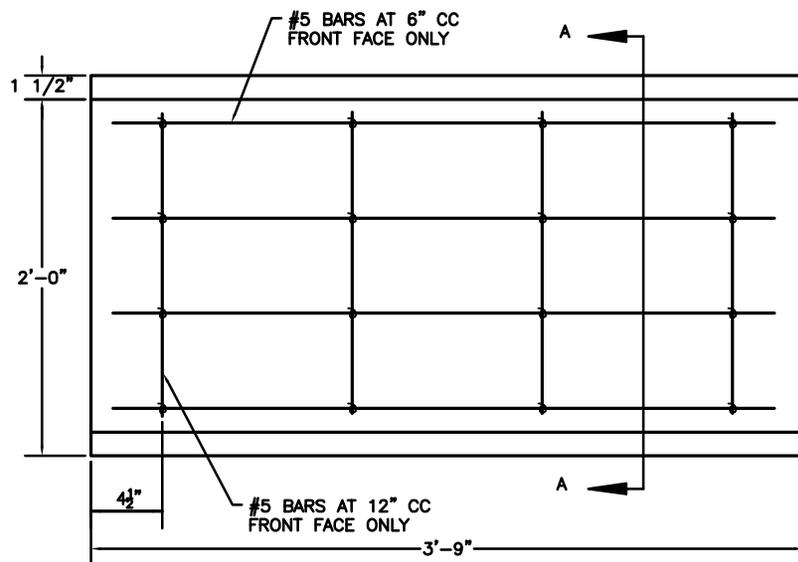
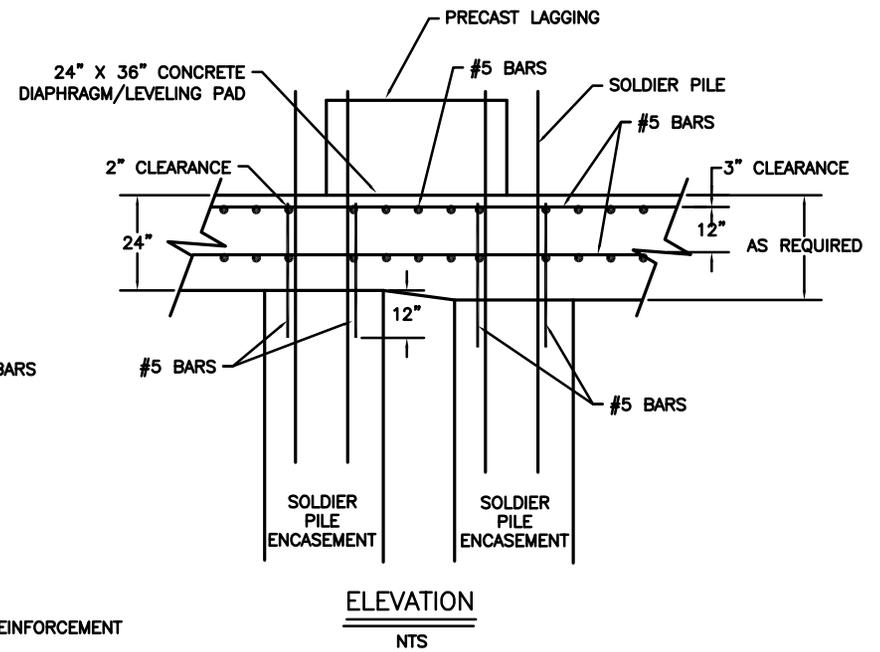
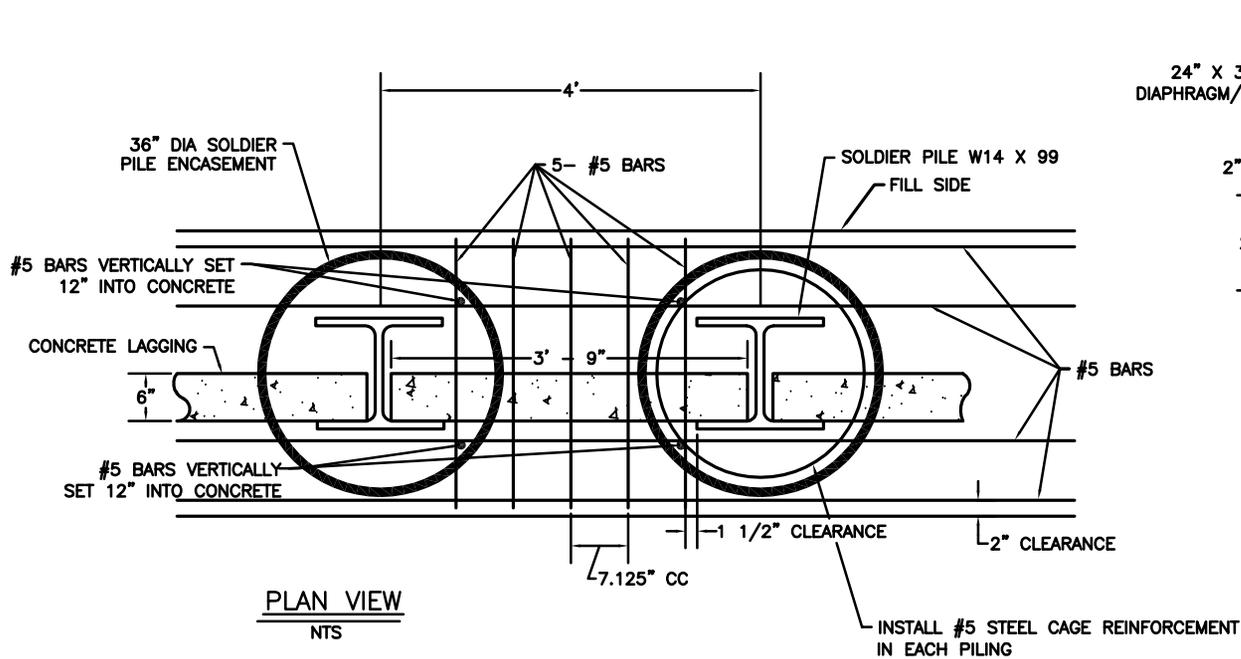
IF SOIL DEPTH EXCEEDS 5 FEET, THEN A 2' THICK CONCRETE CAP SHALL BE USED TO TIE THE RAIL STEEL TOGETHER.



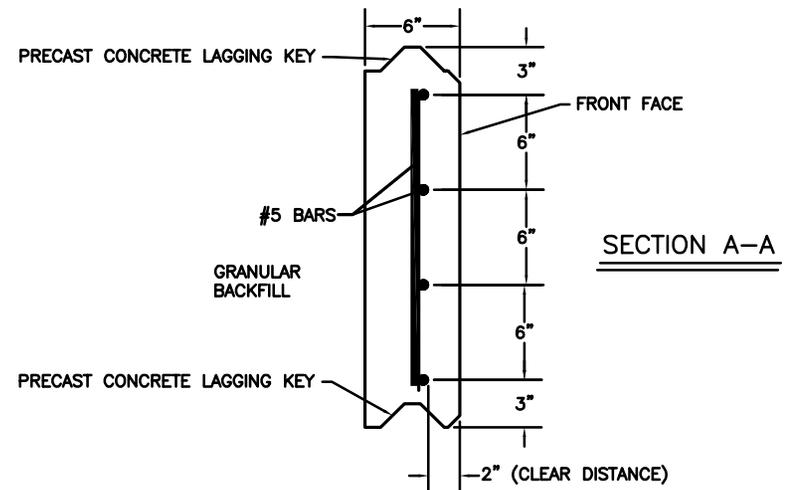
NOTES:

1. IF DEPTHS TO ROCK EXCEED 20' THE ENGINEER MAY REQUIRE ADDITIONAL EXCAVATION.
2. RAILS SHALL BE ORIENTED WITH FLANGES PERPENDICULAR TO POSSIBLE SLIDE MOVEMENT.
3. RAILS SHALL BE ENCASED WITH GROUT FOR THE ENTIRE DEPTH OF THE HOLE.
4. RAILS SHALL BE USED RAILROAD RAILS WITH A MINIMUM WEIGHT OF 130 LBS/YD
5. RAILS SHALL BE STRAIGHT AND STRUCTURALLY SOUND. NO SPLICING SHALL BE ALLOWED.

RAIL STEEL FOUNDATION (AMLRW 3-2)



PRECAST CONCRETE LAGGING



See AML Technical Specifications, Current Edition:  
 Section XXVII - Pile & Lagging Retaining Wall  
 Section XXXIII - Concrete

(USE WITH AMLRW 4-2)

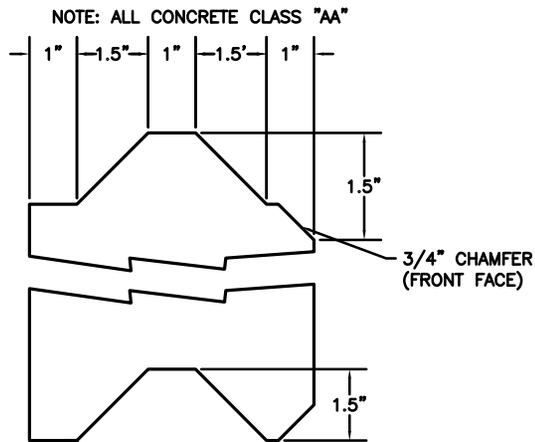
PILE AND LAGGING WALL (AMLRW 4-1)

**NOTE:**

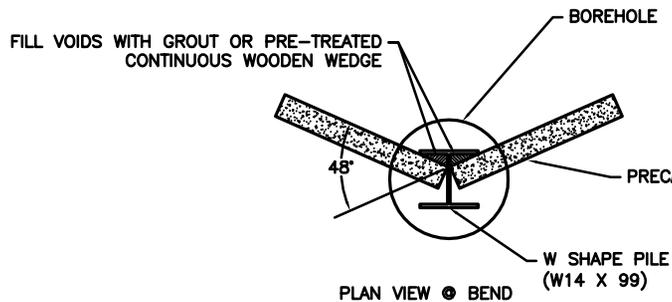
THE CONTRACTOR SHALL NOTIFY THE ENGINEER PRIOR TO FORMING AND/OR POURING ANY PANELS SUCH THAT THE ENGINEER MAY HAVE A REPRESENTATIVE ON SITE PRIOR TO AND DURING THE POURING PROCESS.

ALL STEEL REINFORCEMENT SHALL BE ACCURATELY PLACED IN THE FORMS VERTICALLY AND HORIZONTALLY OF THE THE POSITIONS SHOWN. THE REINFORCEMENT CAGE (REBARS) SHALL BE HELD FIRMLY IN PLACE BY THE USE OF CHAIRS AND WIRE TIES DURING THE VIBRATION, AGITATION, AND CURING CYCLES OF THE CONCRETE TO PREVENT MOVEMENT. WIRE TIES SHALL BE USED IN THE FABRICATION OF THE REINFORCEMENT CAGE (REBARS). ALL STEEL REINFORCEMENT SHALL BE 60 KIP AND SHALL CONFORM TO ASTM A-615. WELDING SHALL NOT BE PERMITTED.

See AML Technical Specifications, Current Edition:  
 Section XXVII – Pile & Lagging Retaining Wall  
 Section XXXIII – Class "AA" Concrete



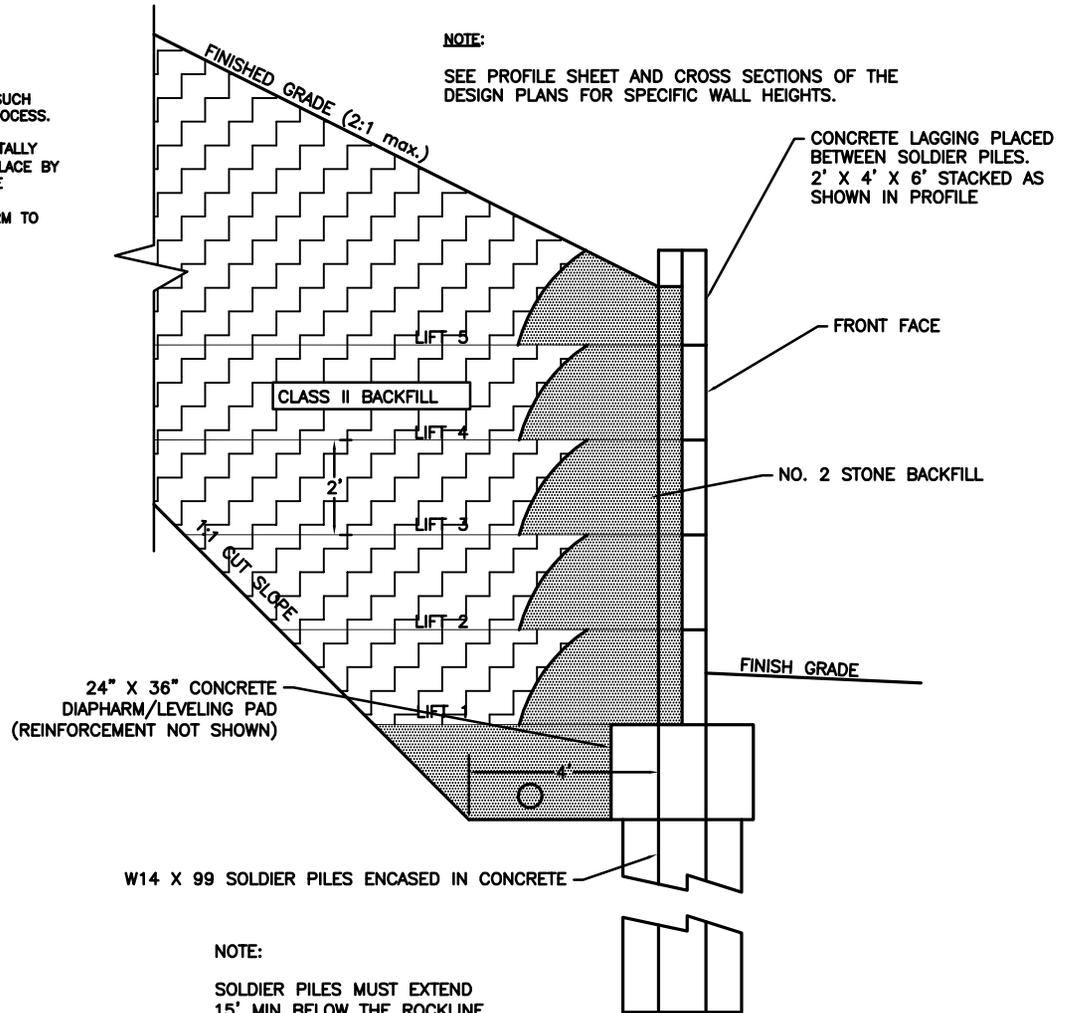
PRECAST CONCRETE LAGGING KEY



FLANGE PRESSURE DISTRIBUTION DETAIL  
 NTS

**NOTE:**

SEE PROFILE SHEET AND CROSS SECTIONS OF THE DESIGN PLANS FOR SPECIFIC WALL HEIGHTS.



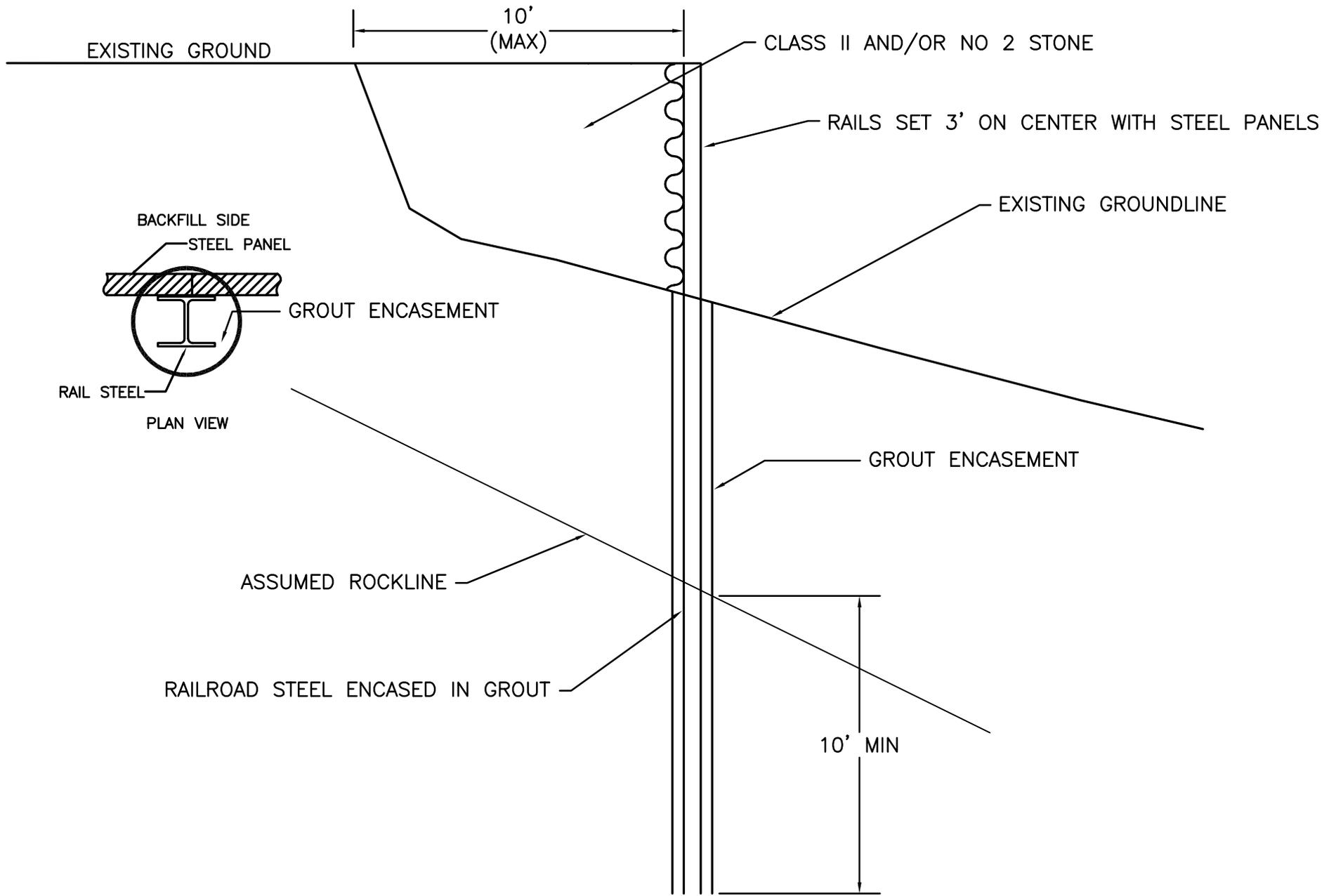
**NOTE:**

SOLDIER PILES MUST EXTEND 15' MIN BELOW THE ROCKLINE

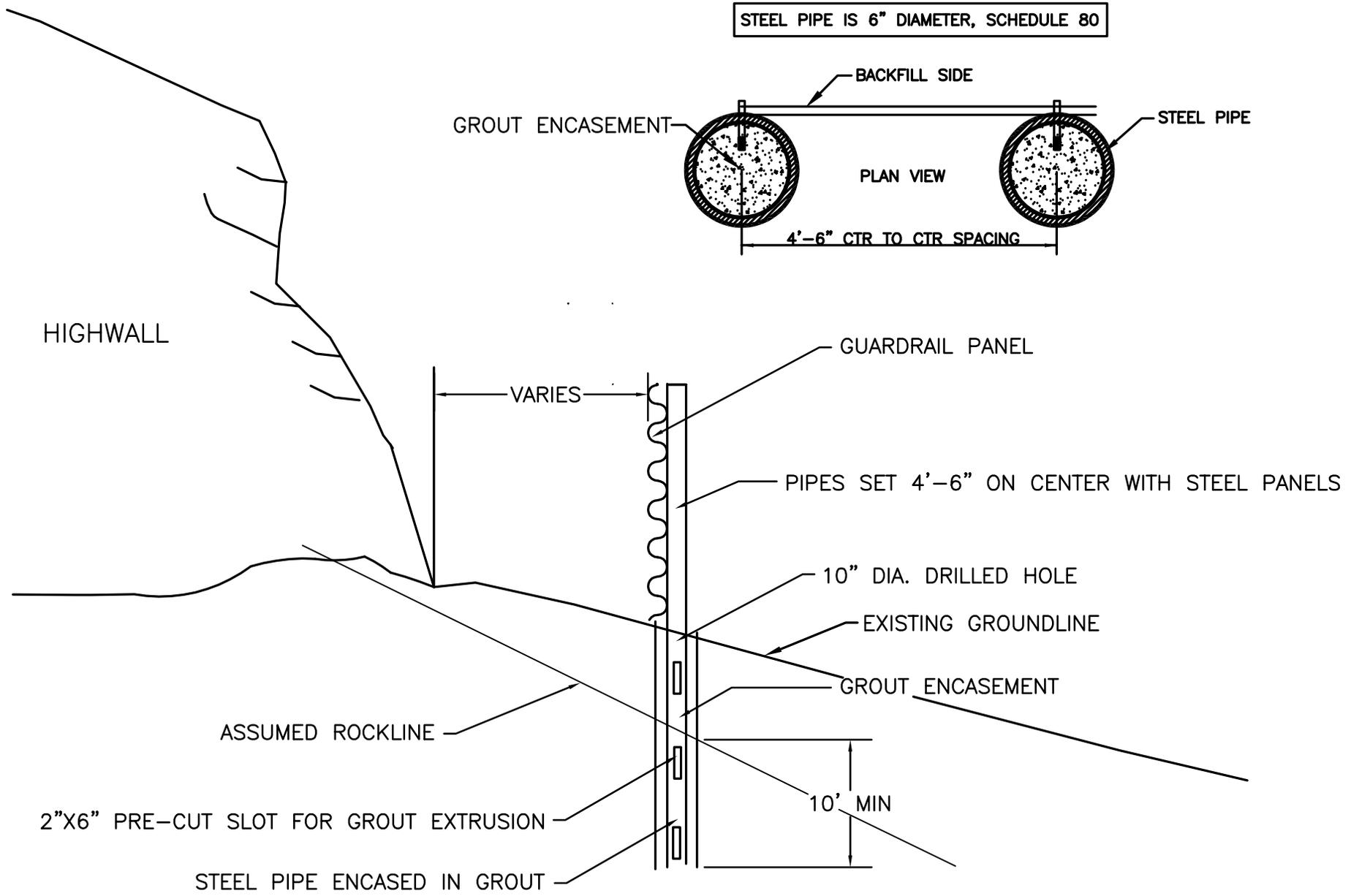
SECTION – PILE AND LAGGING WALL  
 NTS

(USE WITH AMLRW 4-1)

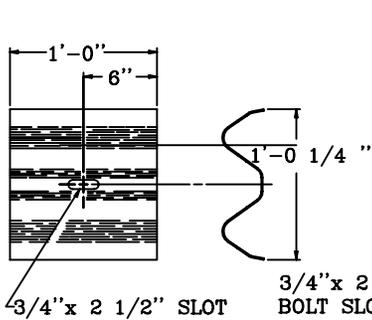
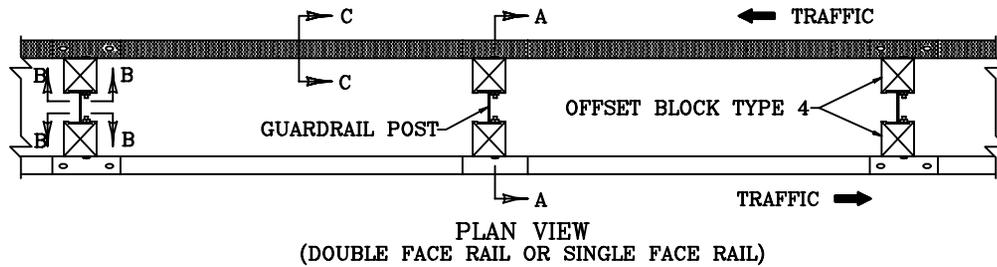
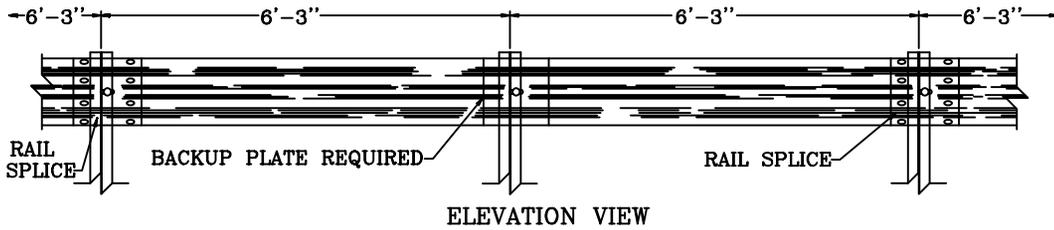
**PILE AND LAGGING WALL- ADDITIONAL DETAILS (AMLRW 4-2)**



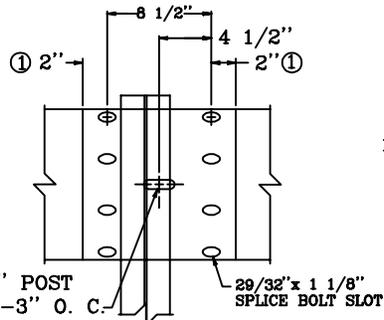
GUARDRAIL PANEL WALL- RAIL STEEL (AMLRW 5)



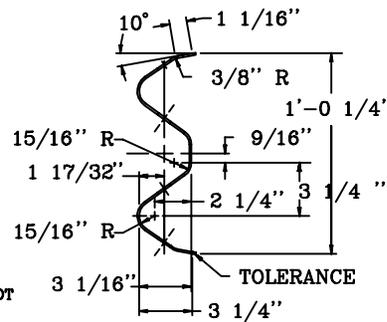
GUARDRAIL PANEL WALL- STEEL PIPE SUPPORT (AMLRW 6)



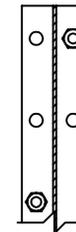
BACK-UP PLATE



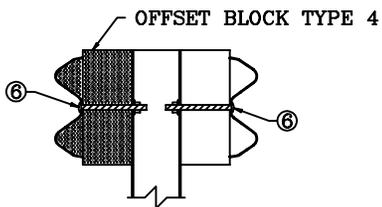
RAIL SPLICE ②



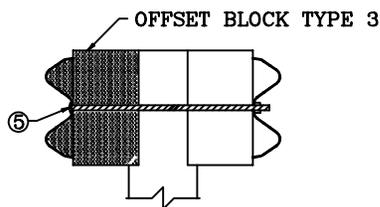
SECTION C-C  
(RAIL CORRUGATED  
SHEET STEEL BEAM)



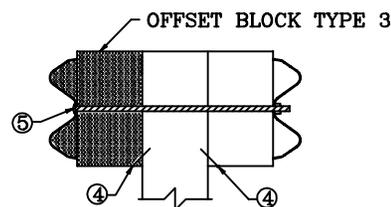
SECTION B-B



SECTION A-A  
DOUBLE FACE RAIL WITH  
STEEL POST ( W6x9 )  
( TIMBER OFFSET BLOCK )



SECTION A-A  
DOUBLE FACE RAIL WITH  
ROUND TIMBER POST



SECTION A-A  
DOUBLE FACE RAIL WITH  
TIMBER POST

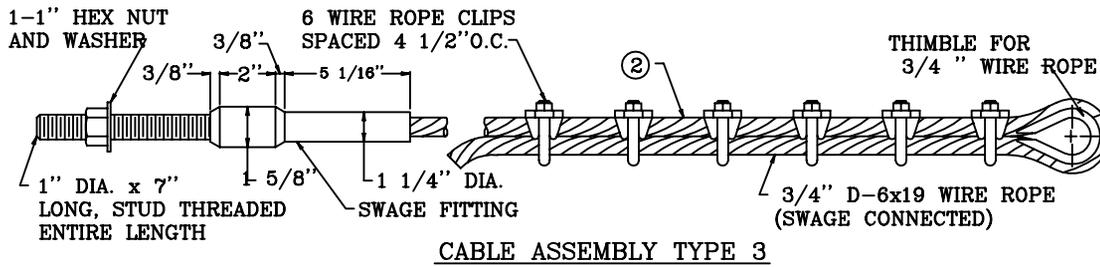
(USE WITH AMLRW 7-3,7-4,7-5)

**NOTES**

THE CONTRACT UNIT PRICE BID SHALL BE:  
 GUARDRAIL-STEEL W BEAM-SINGLE FACE - LIN. FT.  
 OR  
 GUARDRAIL-STEEL W BEAM-DOUBLE FACE - LIN. FT.  
 DIMENSIONAL TOLERANCES NOT SHOWN OR IMPLIED ARE  
 INTENDED TO BE THOSE CONSISTENT WITH THE PROPER  
 FUNCTIONING OF THE PART, INCLUDING ITS APPEARANCE  
 AND ACCEPTED MANUFACTURING PRACTICES.  
 THE RAIL ELEMENT SHALL COMPLY WITH AASHTO M-180  
 -CLASS A, TYPE II.  
 ALL LAPS SHALL BE PLACED IN THE DIRECTION OF TRAFFIC  
 FLOW.

- ① TOLERANCE + 1 1/4", - 1/4"
  - ② 8 - 5/8" x 1 1/4" LONG BUTTON HEAD BOLTS AND HEX HEAD RECESS NUTS REQUIRED FOR EACH RAIL SPLICE.
  - ③ LENGTH EQUALS POST AND BLOCK WIDTH PLUS: 2" FOR BOLT OR 2 1/4" FOR THREADED ROD.
  - ④ GALVANIZED STEEL 10d COMMON COATED NAIL (DRIVE NAIL AT THE TOP OR BOTTOM CENTER OF BLOCK AND POST AFTER BOLT IS INSTALLED).
  - ⑤ 5/8" x ③ STEEL THREADED ROD AND TWO (2) HEX HEAD NUTS OR 5/8" x ③ BUTTON OR HEX HEAD BOLT AND HEX HEAD NUT.
  - ⑥ 5/8" x 8" BUTTON HEAD BOLT, HEX HEAD RECESS NUT AND ONE 5/8" ROUND WASHER (TYP.). BOLT SHALL HAVE A MINIMUM THREAD LENGTH OF 2".
- REQUIRED FOR DOUBLE RAIL

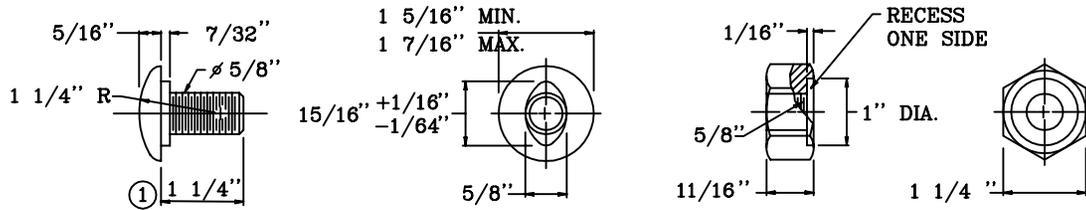
**STEEL BEAM GUARDRAIL (AMLRW 7-1)**



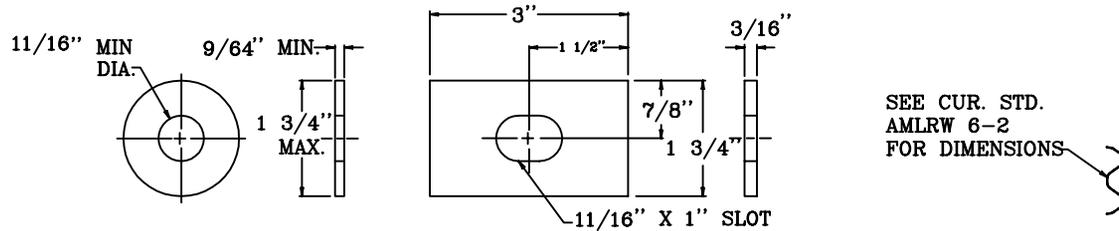
**CABLE ASSEMBLY TYPE 3**

**NOTES**

- ① RAIL BOLT SIMILAR EXCEPT LENGTH.
- ② CABLE ASSEMBLY TYPE 3 - GUARDRAIL END TREATMENT TYPE 2A
- ③ THE THRIE BEAM TO "W" BEAM CONNECTOR SHALL COMPLY WITH AASHTO M-180 CLASS A, TYPE 2 EXCEPT WHERE IN CONFLICT WITH THIS DETAIL.

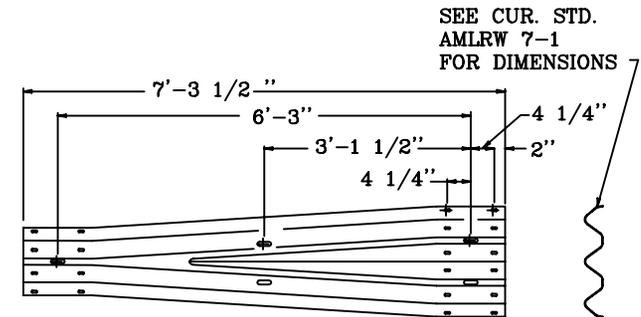


**5/8" BUTTON HEAD BOLT AND RECESSED NUT**

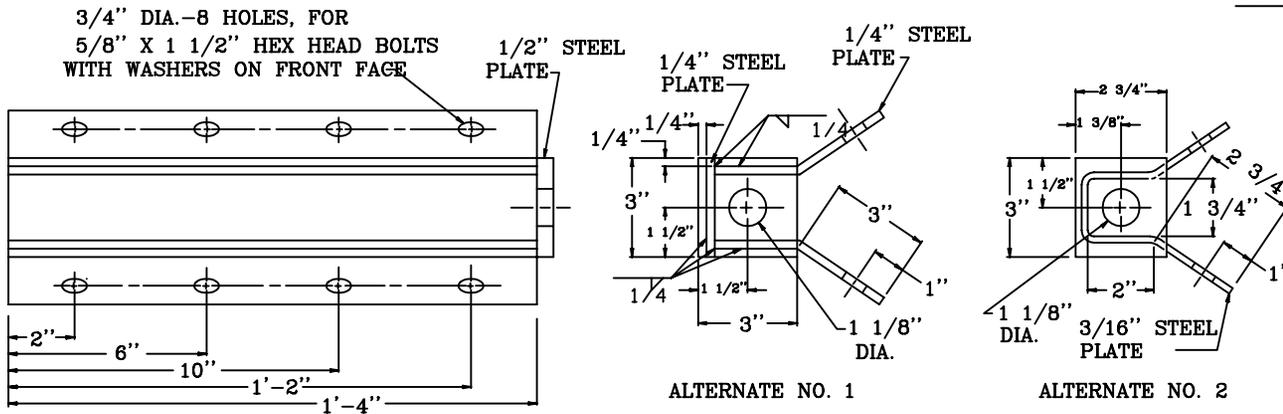


**ROUND WASHER AND RECTANGULAR PLATE WASHER**

SEE CUR. STD. AMLRW 6-2 FOR DIMENSIONS



**THRIE BEAM TO "W" BEAM CONNECTOR ③**



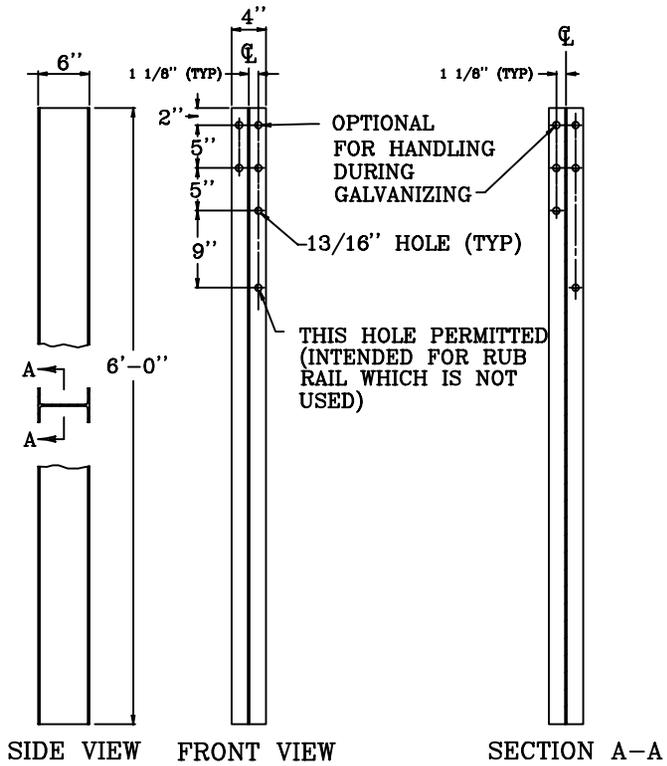
**ALTERNATE NO. 1**

**ALTERNATE NO. 2**

**RAIL ANCHOR ASSEMBLY**

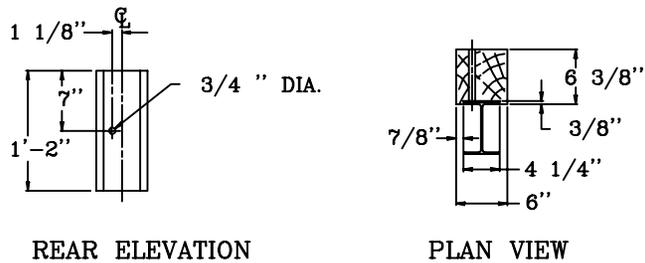
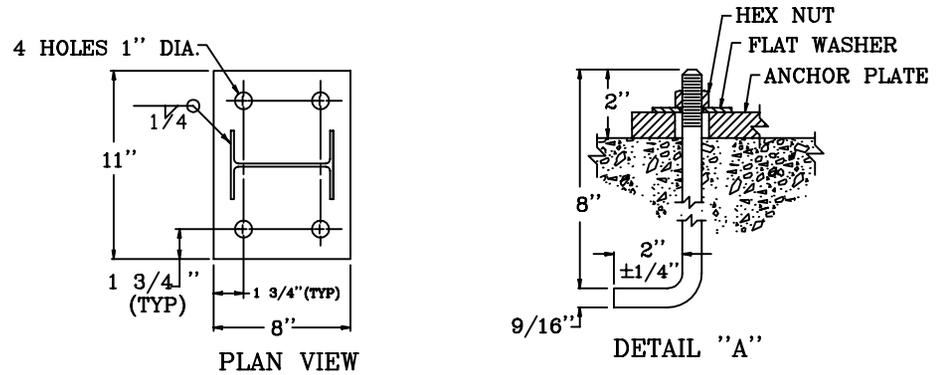
(USE WITH AMLRW 7-1, 7-3, 7-4)

**GUARDRAIL COMPONENTS (AMLRW 7-2)**

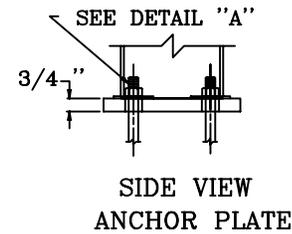


~ W6 X 9.0 STEEL POST ① ~

~ NOTES ~  
 ① W6 X 8.5 IS AN ACCEPTABLE ALTERNATE.

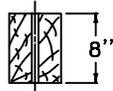


OFFSET BLOCK TYPE 4  
 (TIMBER)  
 (FOR USE WITH STEEL POST ONLY)

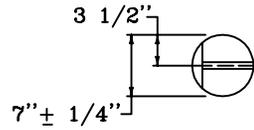


(USE WITH AMLRW 7-1,7-2)

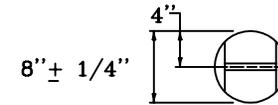
GUARDRAIL POST- STEEL (AMLRW 7-3)



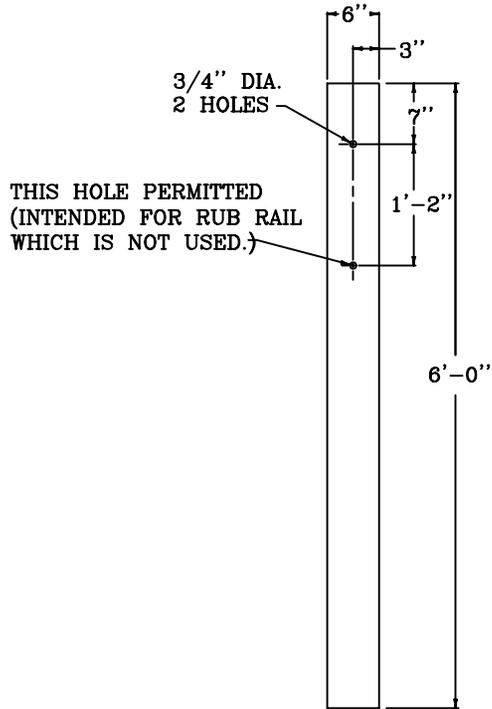
PLAN VIEW



PLAN VIEW

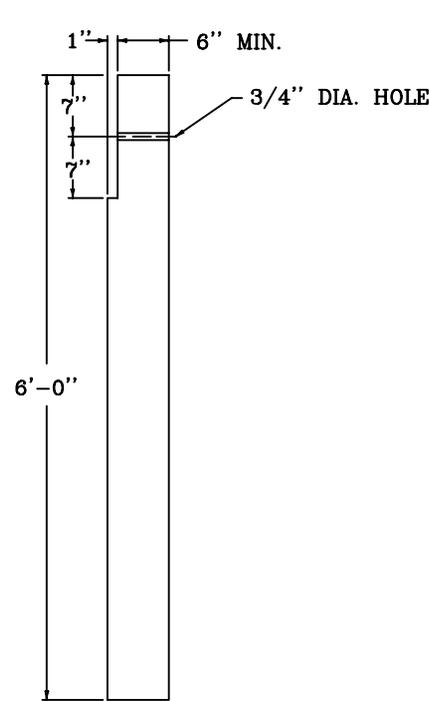


PLAN VIEW

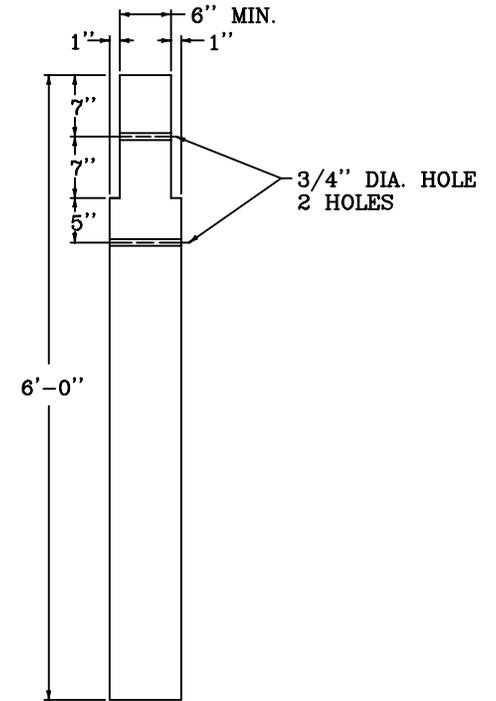


THIS HOLE PERMITTED  
(INTENDED FOR RUB RAIL  
WHICH IS NOT USED.)

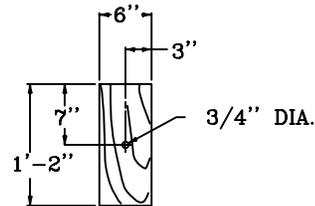
FRONT ELEVATION  
6"x8" TIMBER POST



7" ROUND TIMBER POST  
(SINGLE FACE RAIL)



8" ROUND TIMBER POST  
(DOUBLE FACE RAIL)



FRONT ELEVATION  
OFFSET BLOCK TYPE 3  
(6" X 8" TIMBER)  
(FOR USE WITH RECTANGULAR  
AND ROUND POSTS)

USE WITH DRAWINGS [AMLRW 7-1,7-2](#)

GUARDRAIL POST- TIMBER ([AMLRW 7-4](#))

QUANTITY (36" PILING REBAR)  
4' X 2' CONCRETE CAP

STEEL = 34.6 LBS/LF  
CONCRETE = 0.30 CY/LF

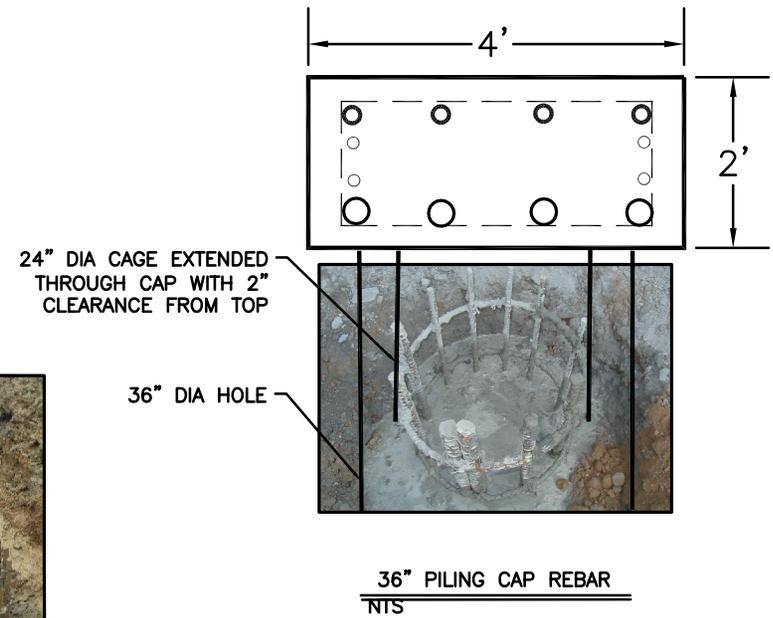
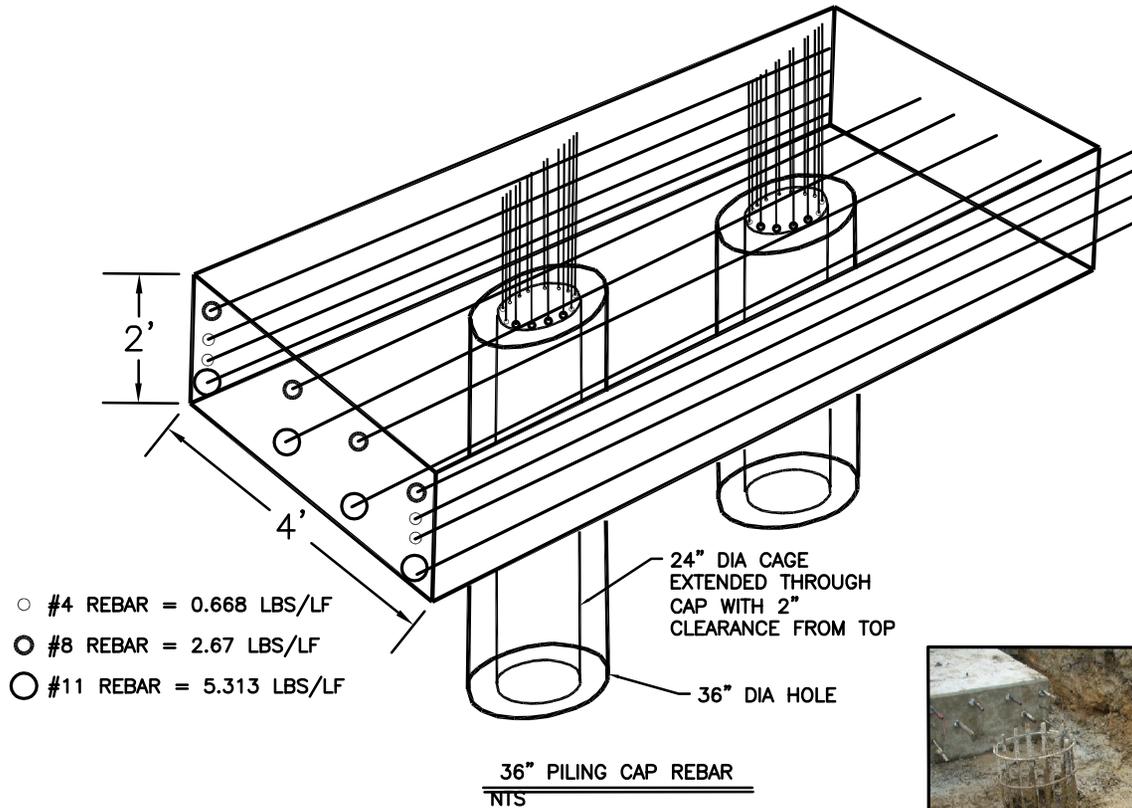
QUANTITY (30" PILING CAP)  
3.5' X 2' CONCRETE CAP

STEEL = 34.6 LBS/LF  
CONCRETE = 0.26 CY/LF

QUANTITY (24" PILING CAP)  
3' X 2' CONCRETE CAP

STEEL = 34.6 LBS/LF  
CONCRETE = 0.22 CY/LF

- #4 REBAR = 0.668 LBS/LF
- #8 REBAR = 2.67 LBS/LF
- #11 REBAR = 5.313 LBS/LF

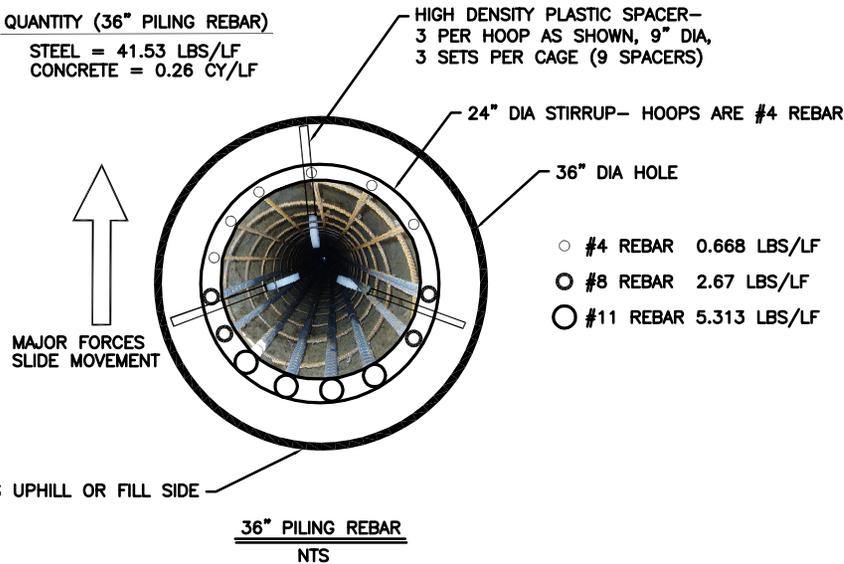


(USE WITH AMLRW 8-2)

## REINFORCED CONCRETE PILES AND CAP (AMLRW 8-1)

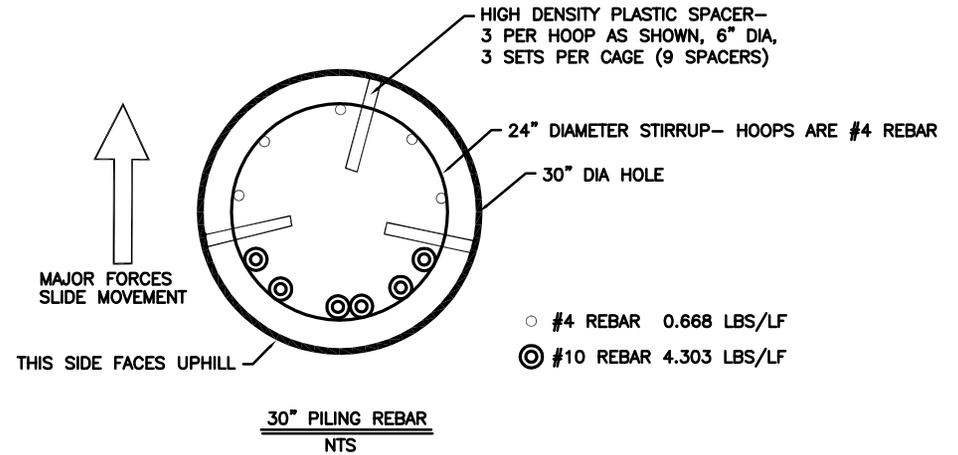
QUANTITY (36" PILING REBAR)

STEEL = 41.53 LBS/LF  
CONCRETE = 0.26 CY/LF



QUANTITY (30" PILING REBAR)

STEEL = 34.75 LBS/LF  
CONCRETE = 0.182 CY/LF

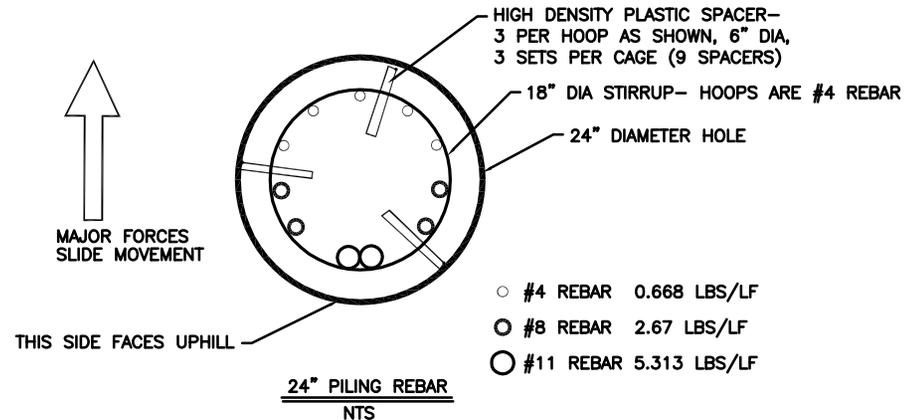


NOTE:

1. SPACERS SHALL BE UTILIZED TO ENSURE REBAR CAGE STAYS CENTERED IN THE CASING.
2. SPACING OF CIRCULAR REBAR STIRRUPS SHALL BE 12" IN THE UPPER AND LOWER THIRDS OF THE PILE AND SHALL BE 6" IN THE MIDDLE THIRD.
3. VERTICAL REBAR GROUPS SHALL BE EQUALLY SPACED AS SHOWN WITH THE #11'S CENTERED ON THE BACK FACE.

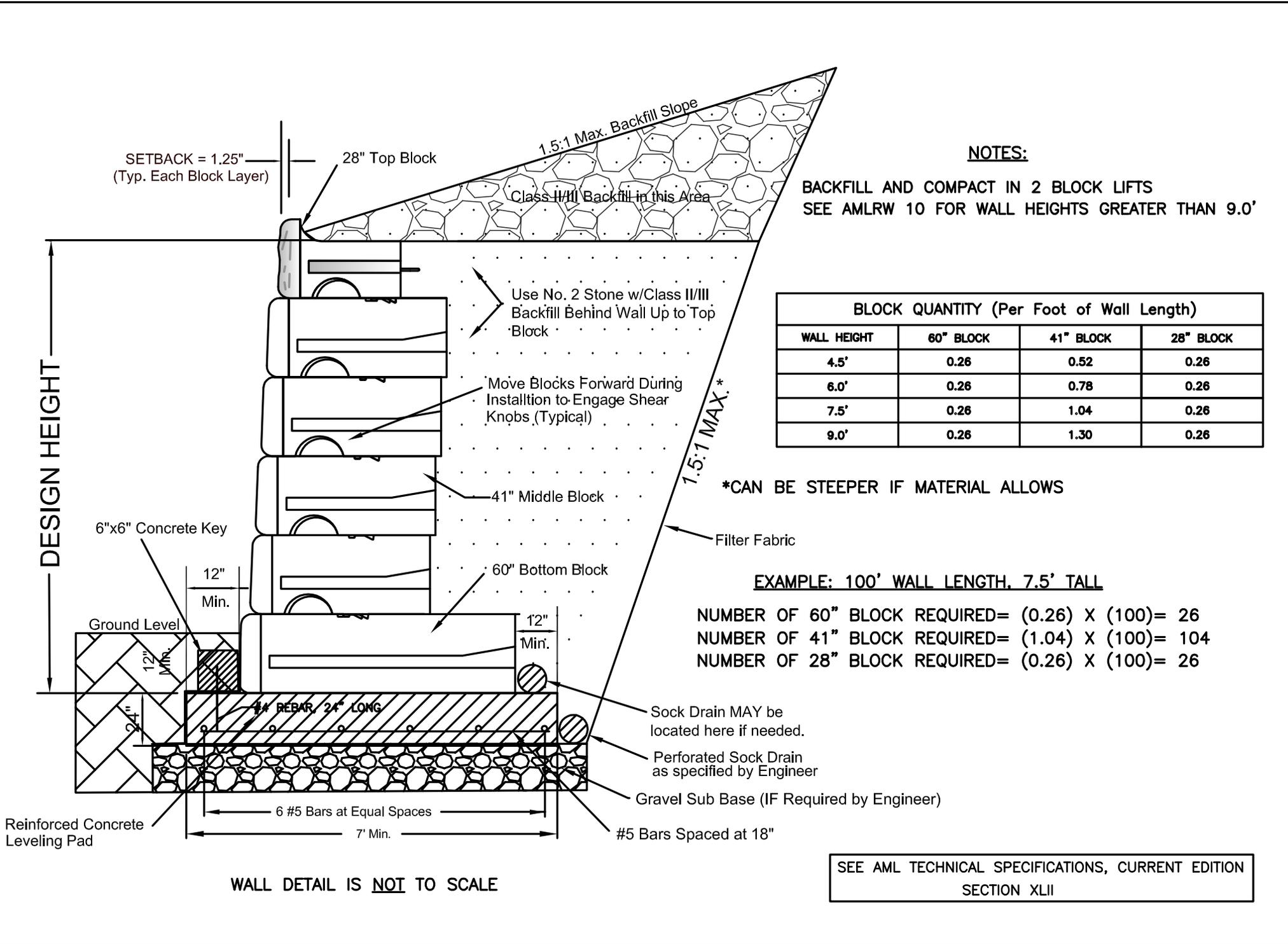
QUANTITY (24" PILING REBAR)

STEEL = 28.85 LBS/LF  
CONCRETE = 0.116 CY/LF



(USE WITH AMLRW 8-1)

REINFORCED CONCRETE PILES AND CAP- REINFORCEMENT DETAILS (AMLRW 8-2)



**NOTES:**

BACKFILL AND COMPACT IN 2 BLOCK LIFTS  
SEE AMLRW 10 FOR WALL HEIGHTS GREATER THAN 9.0'

BLOCK QUANTITY (Per Foot of Wall Length)			
WALL HEIGHT	60" BLOCK	41" BLOCK	28" BLOCK
4.5'	0.26	0.52	0.26
6.0'	0.26	0.78	0.26
7.5'	0.26	1.04	0.26
9.0'	0.26	1.30	0.26

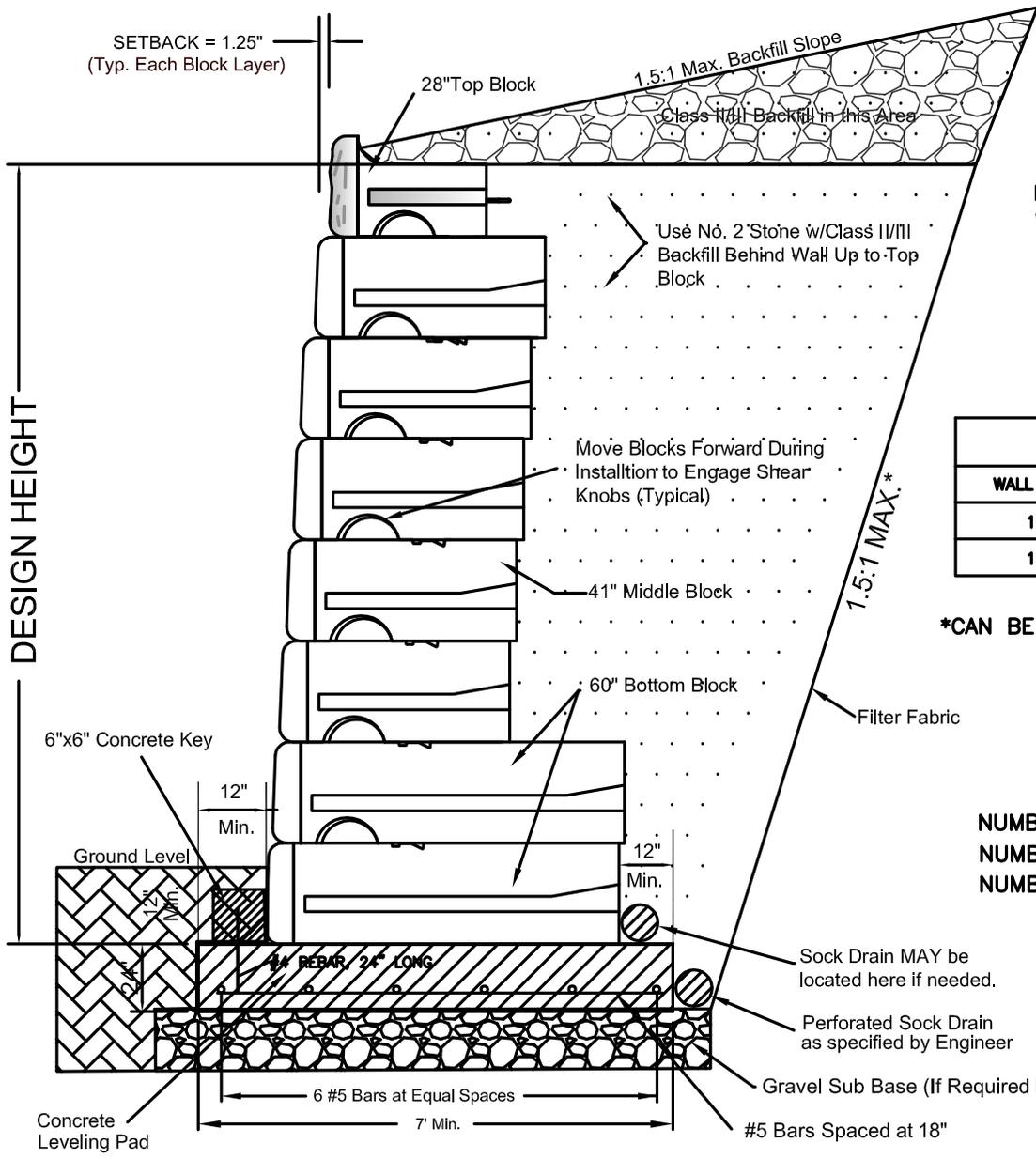
\*CAN BE STEEPER IF MATERIAL ALLOWS

**EXAMPLE: 100' WALL LENGTH, 7.5' TALL**

NUMBER OF 60" BLOCK REQUIRED= (0.26) X (100)= 26  
 NUMBER OF 41" BLOCK REQUIRED= (1.04) X (100)= 104  
 NUMBER OF 28" BLOCK REQUIRED= (0.26) X (100)= 26

SEE AML TECHNICAL SPECIFICATIONS, CURRENT EDITION  
SECTION XLII

**NON-REINFORCED BLOCK WALL (WALL HEIGHTS UP TO 9.0') (AMLRW 9)**



**NOTES:**

BACKFILL AND COMPACT IN 2 BLOCK LIFTS  
 WALL HEIGHTS ABOVE 12' SHALL REQUIRE SPECIAL DESIGN

BLOCK QUANTITY (Per Foot of Wall Length)			
WALL HEIGHT	60" BLOCK	41" BLOCK	28" BLOCK
10.5'	0.26	1.30	0.26
12.0'	0.52	1.56	0.26

\*CAN BE STEEPER IF MATERIAL ALLOWS

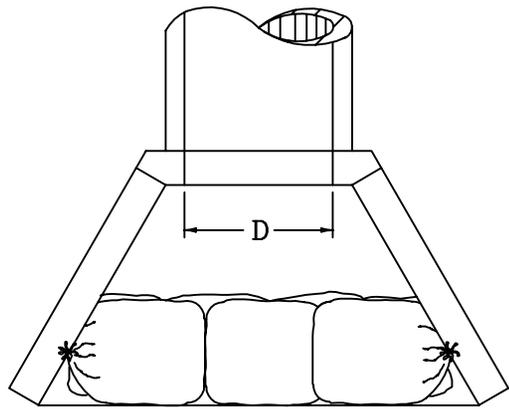
**EXAMPLE: 100' WALL LENGTH, 12' TALL**

NUMBER OF 60" BLOCK REQUIRED = (0.52) X (100) = 52  
 NUMBER OF 41" BLOCK REQUIRED = (1.56) X (100) = 156  
 NUMBER OF 28" BLOCK REQUIRED = (0.26) X (100) = 26

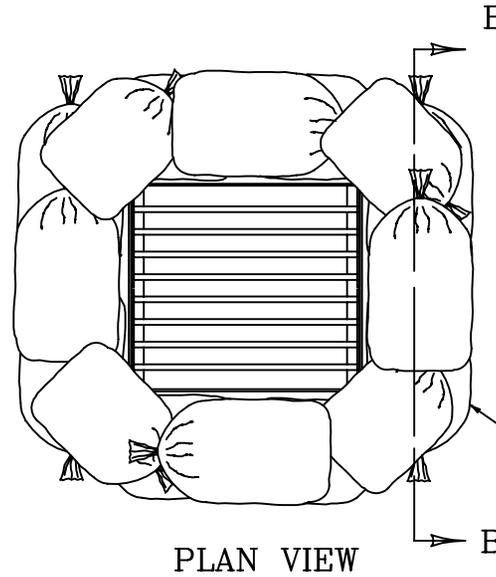
SEE AML TECHNICAL SPECIFICATIONS, CURRENT EDITION  
 SECTION XLII

WALL DETAIL IS NOT TO SCALE

**NON-REINFORCED BLOCK WALL (WALL HEIGHTS 10.5' TO 12.0') (AMLRW 10)**

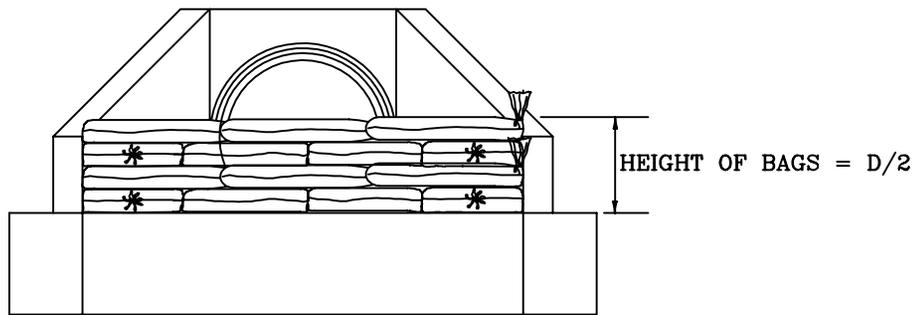


PLAN VIEW

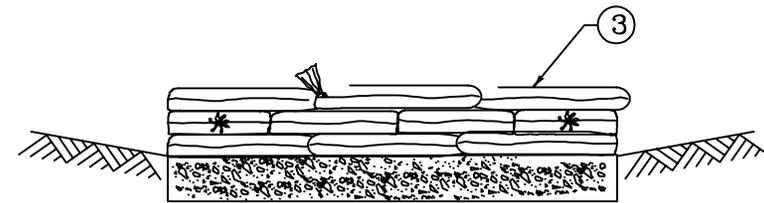


PLAN VIEW

SURROUND INLET WITH TWO COURSES OF BAGS (MINIMUM).



FRONT ELEVATION

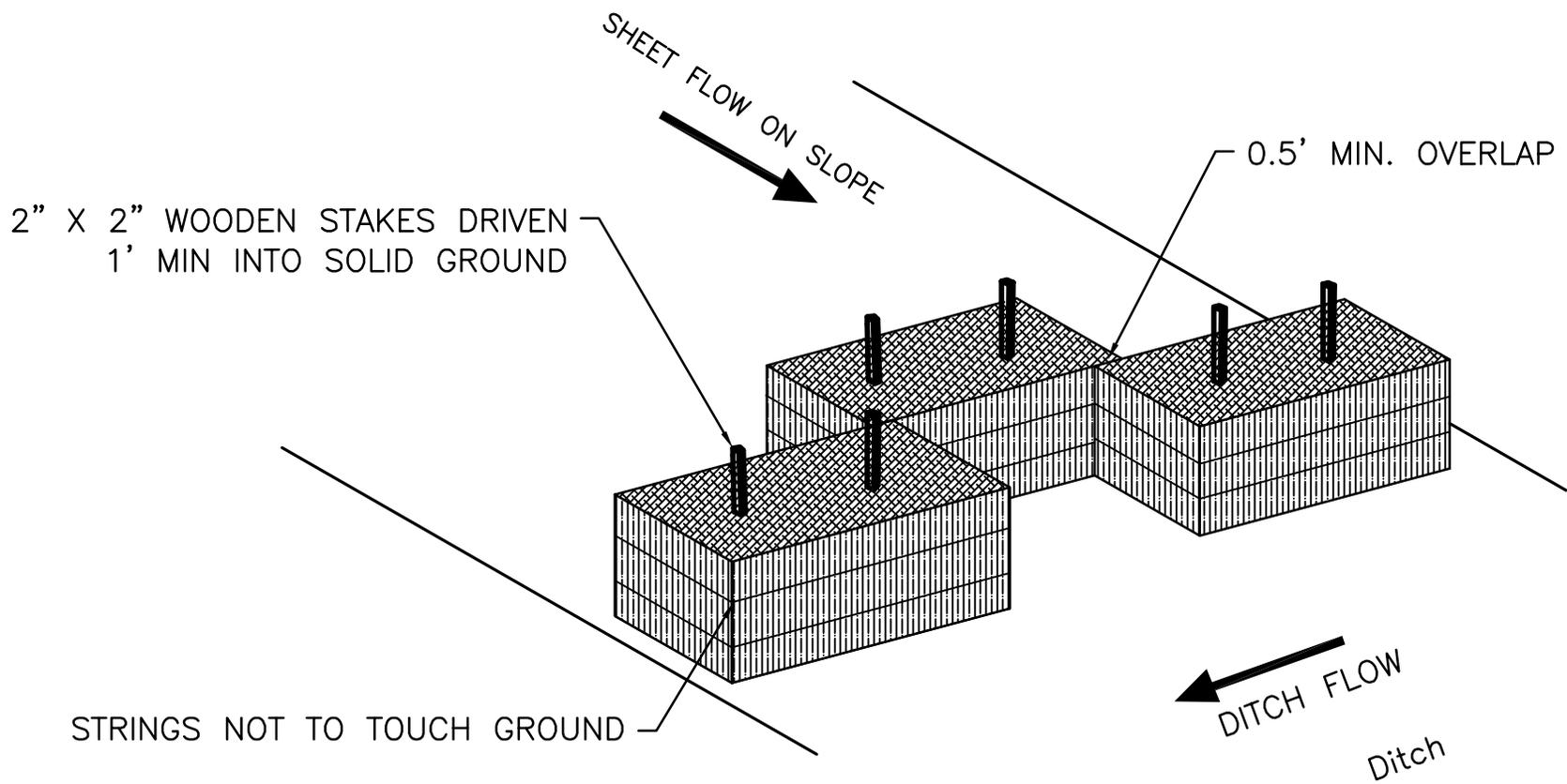


SECTION B~B

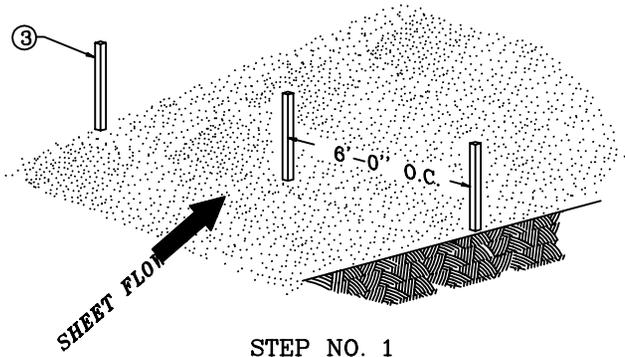
~NOTES~

- 1 INLET PROTECTION IS SUITABLE FOR USE IN BOTH PAVED AND UNPAVED AREAS.
- 2 THE HEIGHT REQUIREMENT IS WAIVED IN CASES WHERE IT WILL CREATE AN UNACCEPTABLE PONDING SITUATION ON THE PAVEMENT OR ON AN ADJACENT PROPERTY.
- 3 INTERWEAVE BAG ENDS TO FILL GAPS BETWEEN BAGS.
4. CONSTRUCT 18" X 30" BAGS OF NON-WOVEN TYPE II GEOTEXTILE FABRIC. DOUBLE STITCH BAG SEAMS WITH 1 LB. POLYESTER THREAD. ATTACH ONE (1) TIE STRING TO EACH BAG. BAG OPENING SHALL BE ON 18" SIDE.
5. FILL BAGS WITH NO. 57 STONE BETWEEN 1/2 TO 2/3 FULL (50 LB TO 60 LB).
6. DO NOT USE IN BLUE LINE STREAMS

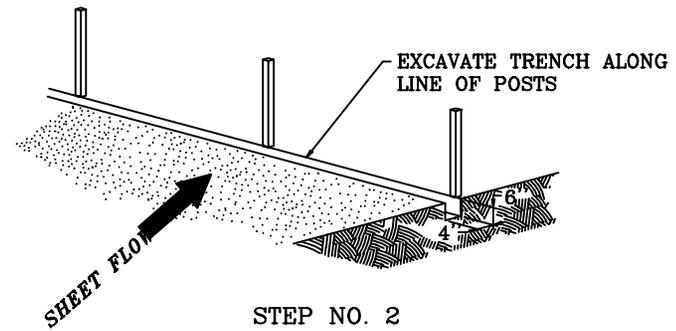
SILT CHECKS- BAGS (AMLSC 1)



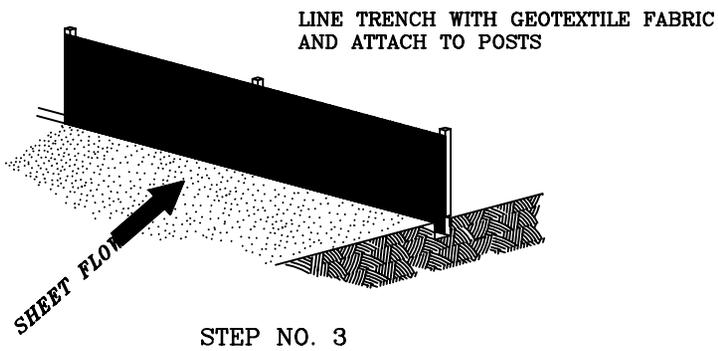
SILT CHECKS - BALE (AMLSC 2)



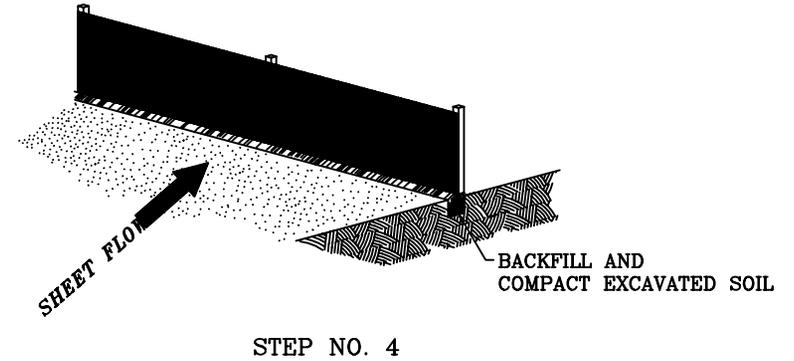
STEP NO. 1



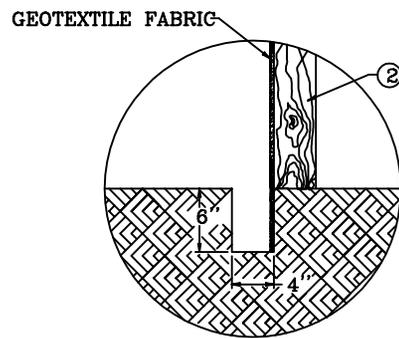
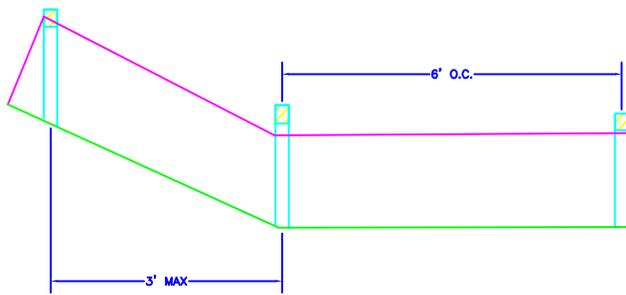
STEP NO. 2



STEP NO. 3



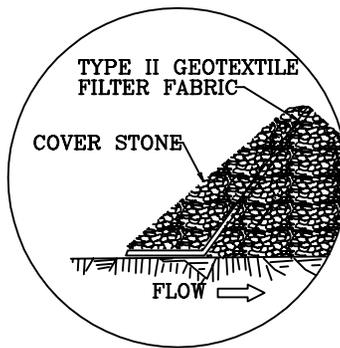
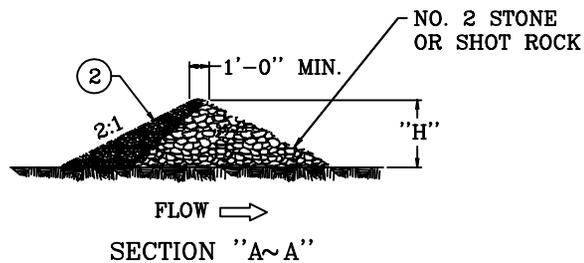
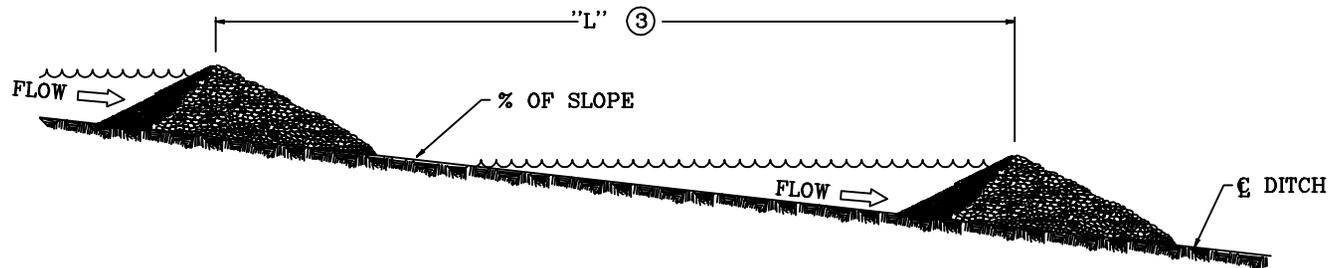
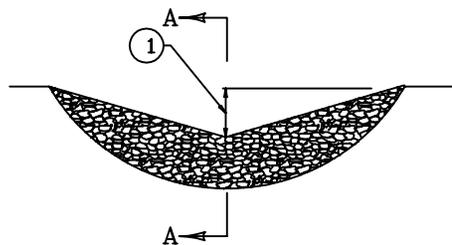
STEP NO. 4



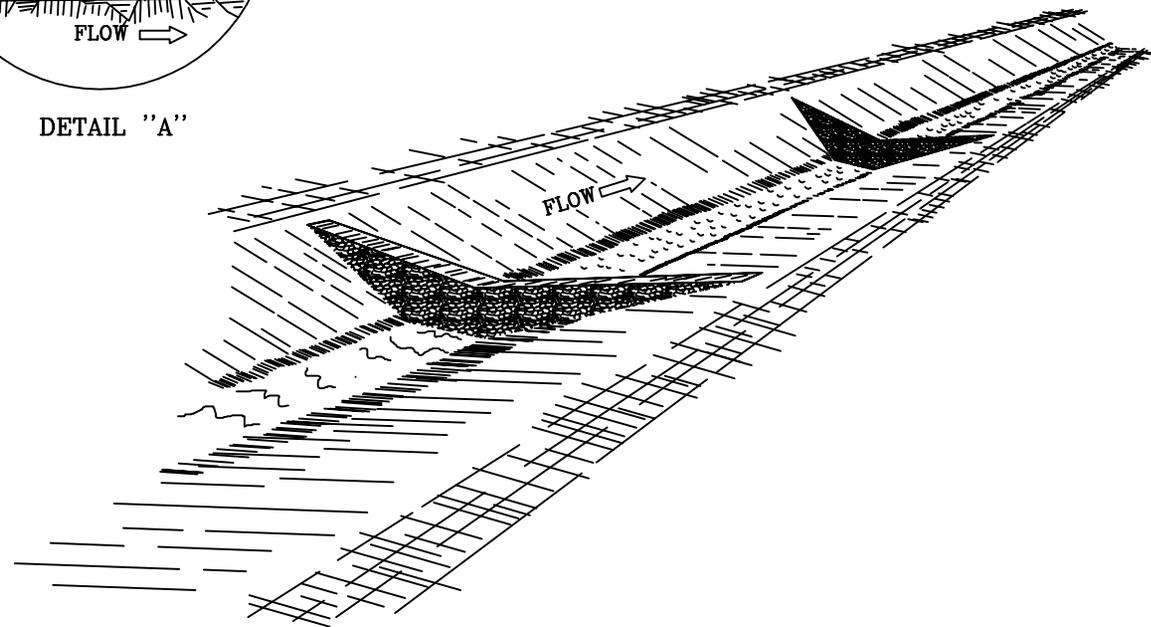
SECTIONAL DETAIL

- NOTES**
1. SEE STANDARD SPECIFICATIONS FOR POST SIZE, GEOTEXTILE FABRIC, WIRE STAPLES AND ALL OTHER PERTINENT INFORMATION.
  - ② POSTS MAY BE WOODEN OR METAL T-SECTION.
  - ③ POSTS SHALL BE SET 1'-4" DEEP.

**SILT CHECK- FENCE (AMLSC 3)**



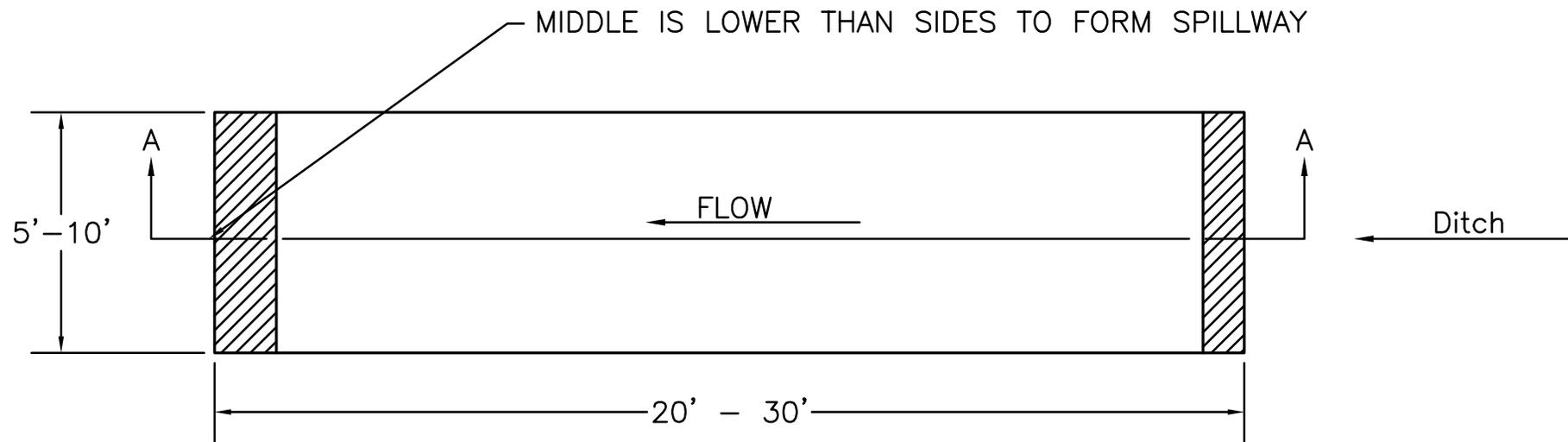
DETAIL "A"



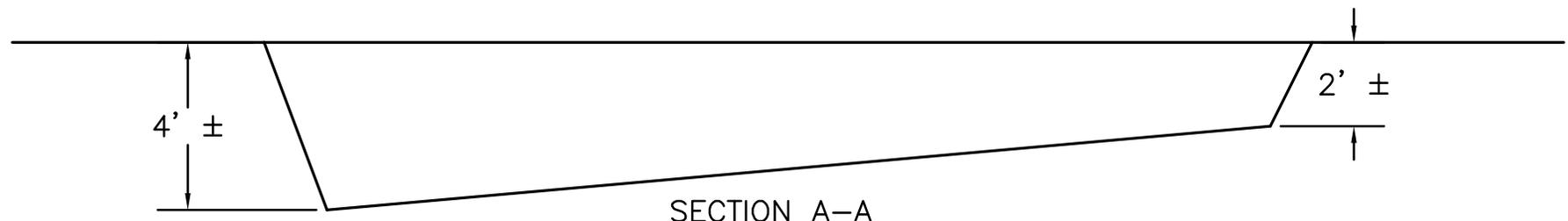
NOTES

1. MIDDLE OF SILT CHECK SHALL BE A MINIMUM OF 1'-0" LOWER THAN SIDES SO FLOW WILL NOT BYPASS CHECK OR ERODE BANKS.
2. UPSTREAM FACE OF ROCK SHALL BE A FOUR INCH MIN. LAYER OF CRUSHED AGGREGATE HAVING 100% PASSING A 3" SIEVE AND NO MORE THAN 5% PASSING A NO. 8 SIEVE (SEE SECTION "A-A"). LINE UPSTREAM FACE WITH FILTER FABRIC UP TO BOTTOM OF THE V AND COVER FABRIC WITH STONE TO HOLD IN PLACE (SEE DETAIL "A").
3. "L" = "H"/SLOPE OF DITCH.
4. SPACE SILT CHECKS AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
5. DO NOT PLACE CHECKS IN BLUE LINE STREAMS.

SILT CHECKS - ROCK (AMLSC 4)

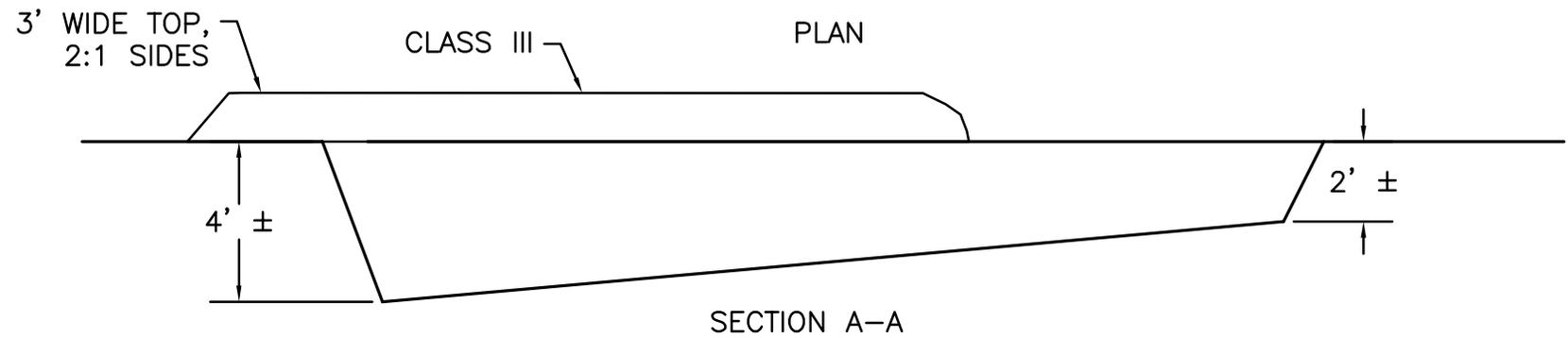
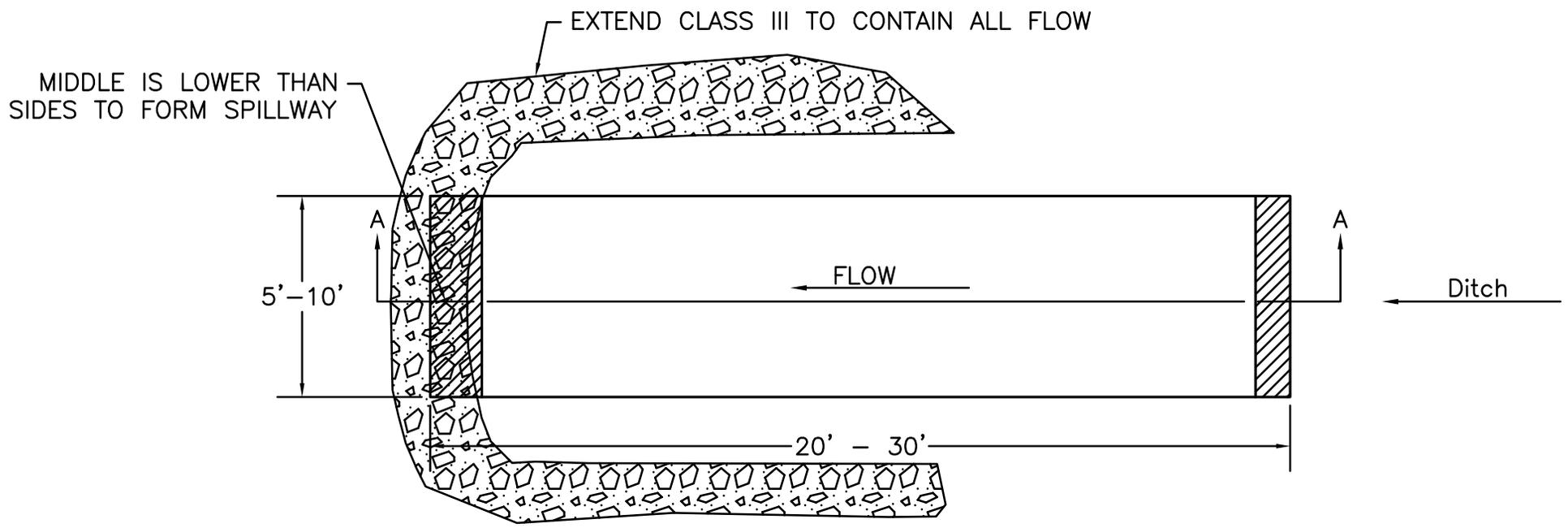


PLAN



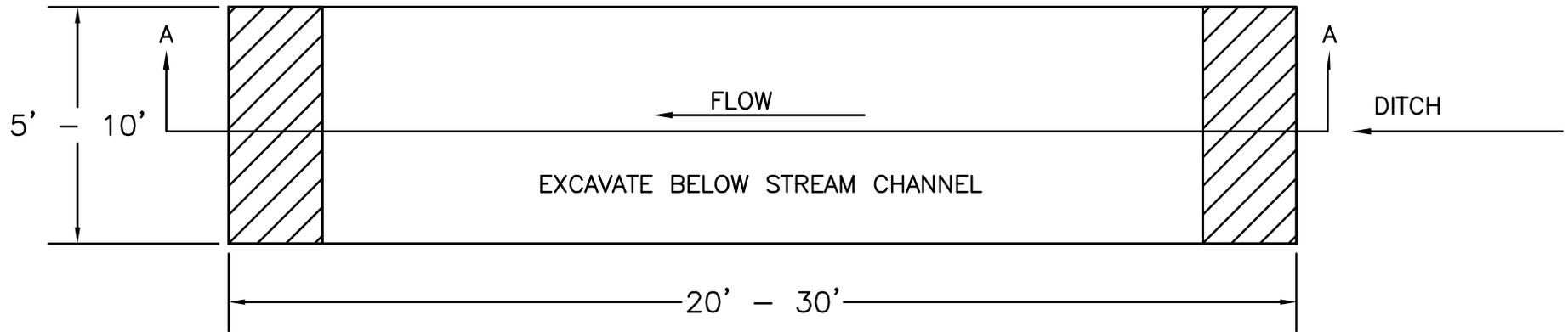
THE SIZE, SHAPE, AND LOCATION OF TRAPS MAY BE ADJUSTED FROM THAT SHOWN IN THE DRAWINGS, AS DIRECTED BY THE ENGINEER. SILT TRAPS SHALL BE CLEANED WHEN THEY ARE APPROXIMATELY 50% FILLED WITH SEDIMENT. SILT TRAPS MAY REMAIN IN PLACE UPON COMPLETION OF THE PROJECT ONLY WHEN APPROVED BY THE ENGINEER.

SILT TRAP - TYPE A (AMLSC 5)

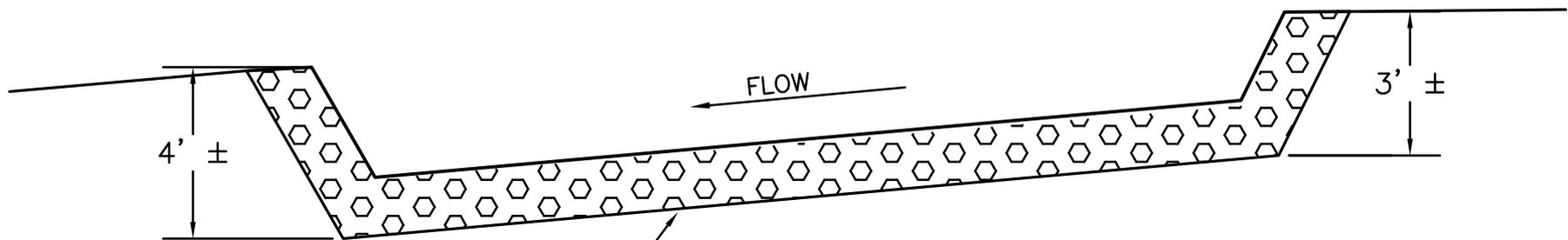


THE SIZE, SHAPE, AND LOCATION OF TRAPS MAY BE ADJUSTED FROM THAT SHOWN IN THE DRAWINGS, AS DIRECTED BY THE ENGINEER. SILT TRAPS SHALL BE CLEANED WHEN THEY ARE APPROXIMATELY 50% FILLED WITH SEDIMENT. SILT TRAPS MAY REMAIN IN PLACE UPON COMPLETION OF THE PROJECT ONLY WHEN APPROVED BY THE ENGINEER.

SILT TRAP - TYPE B (AMLSC 6)



PLAN

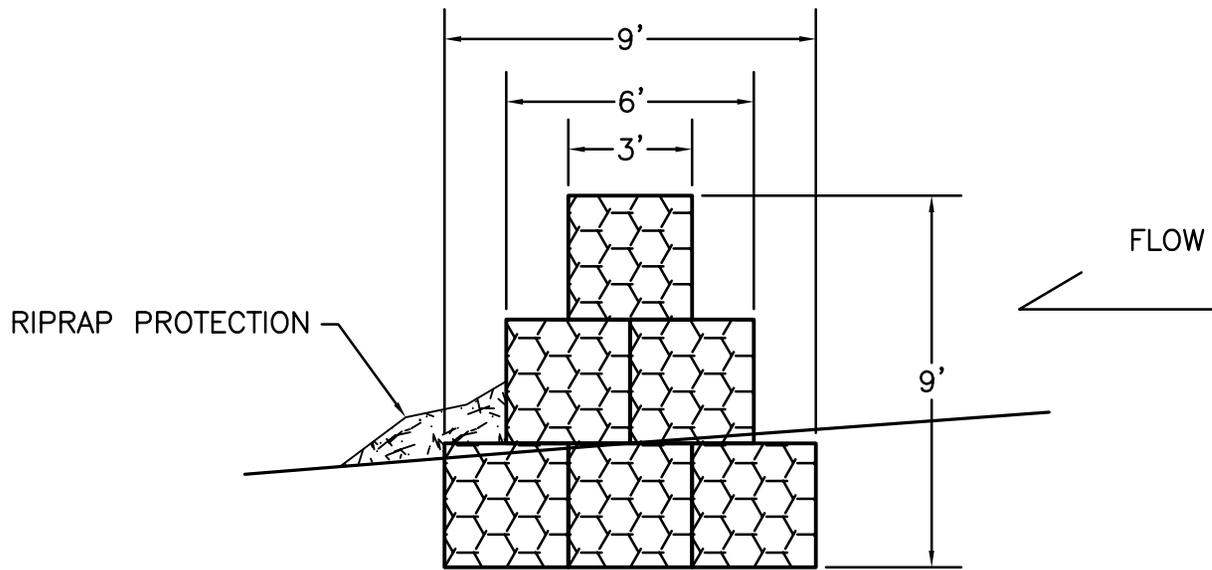


2' DEEP CLASS III LINING AFTER CONSTRUCTION IS COMPLETED

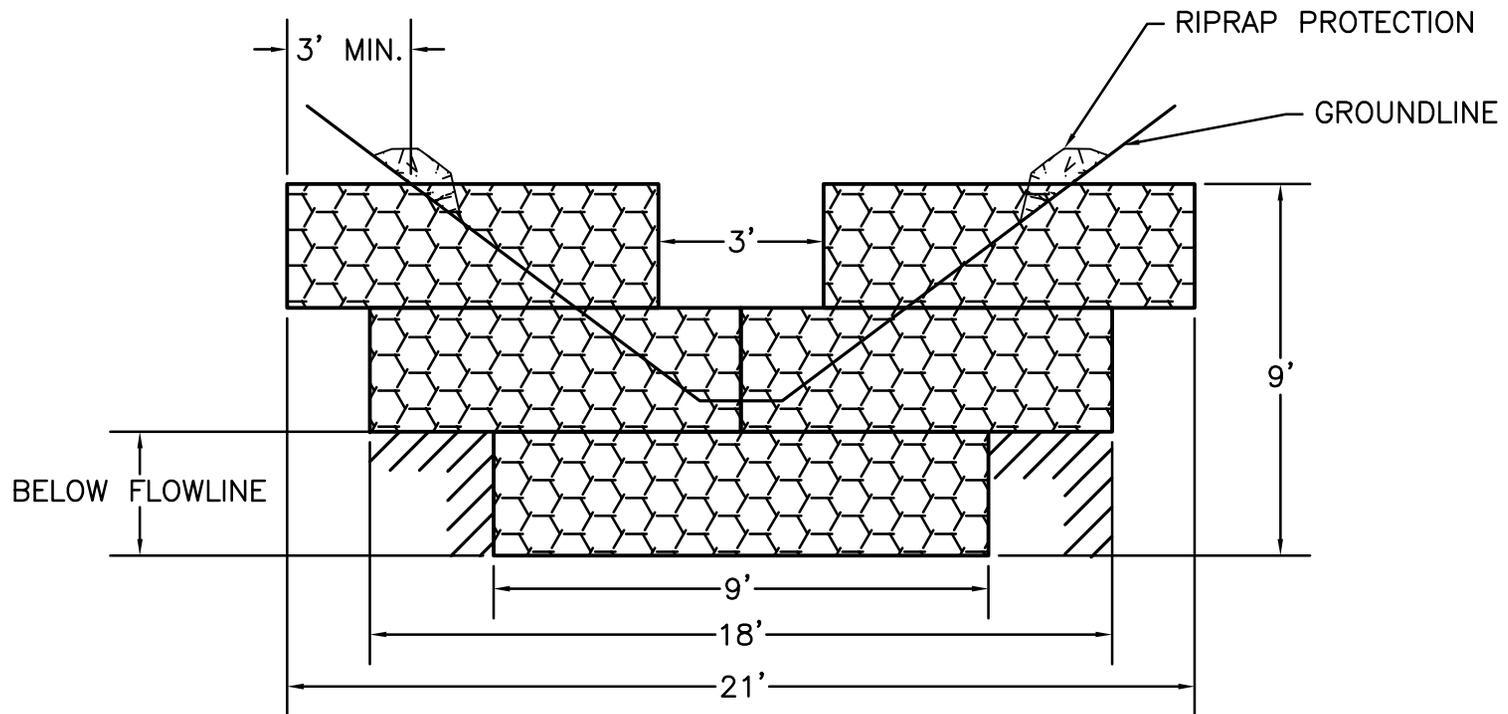
SECTION A-A

THE SIZE, SHAPE, AND LOCATION OF TRAPS MAY BE ADJUSTED FROM THAT SHOWN IN THE DRAWINGS, AS DIRECTED BY THE ENGINEER. PLUNGE POOLS SHALL BE CLEANED WHEN THEY ARE APPROXIMATELY 50% FILLED WITH SEDIMENT. PLUNGE POOLS SHALL BE LINED WITH CLASS III UPON COMPLETION OF THE PROJECT.

ENERGY DISSIPATER (AMLSC 7)

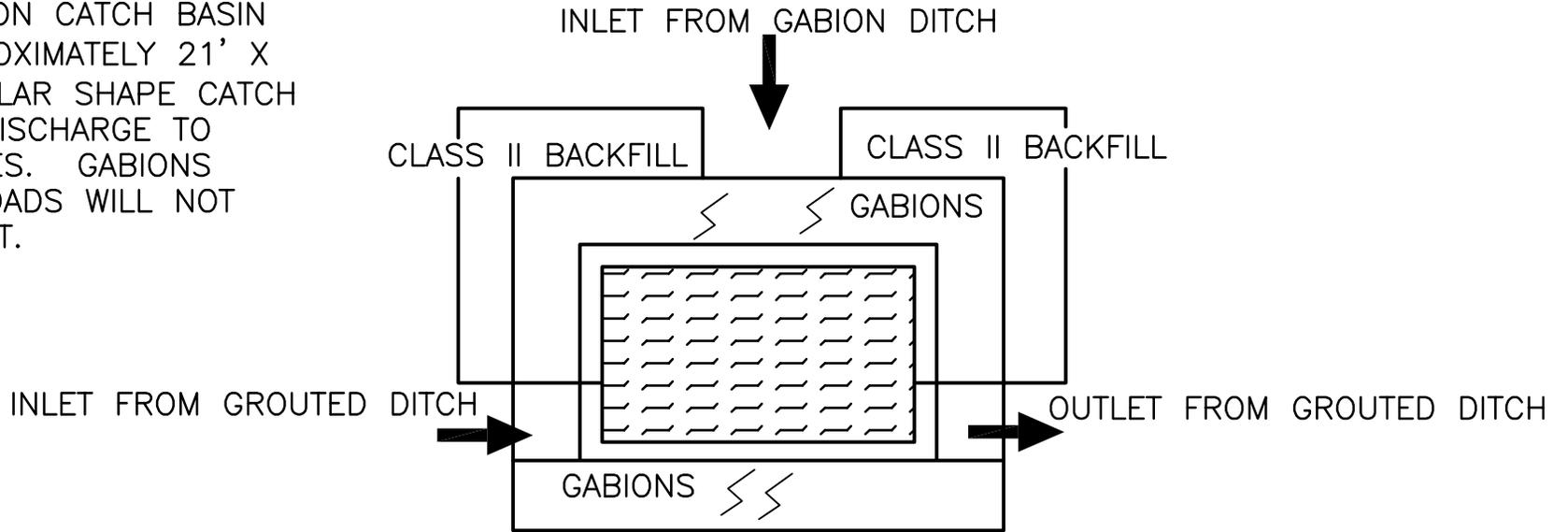


DIMENSIONS SHOWN ARE TYPICAL BUT MAY VARY FROM SITE TO SITE.



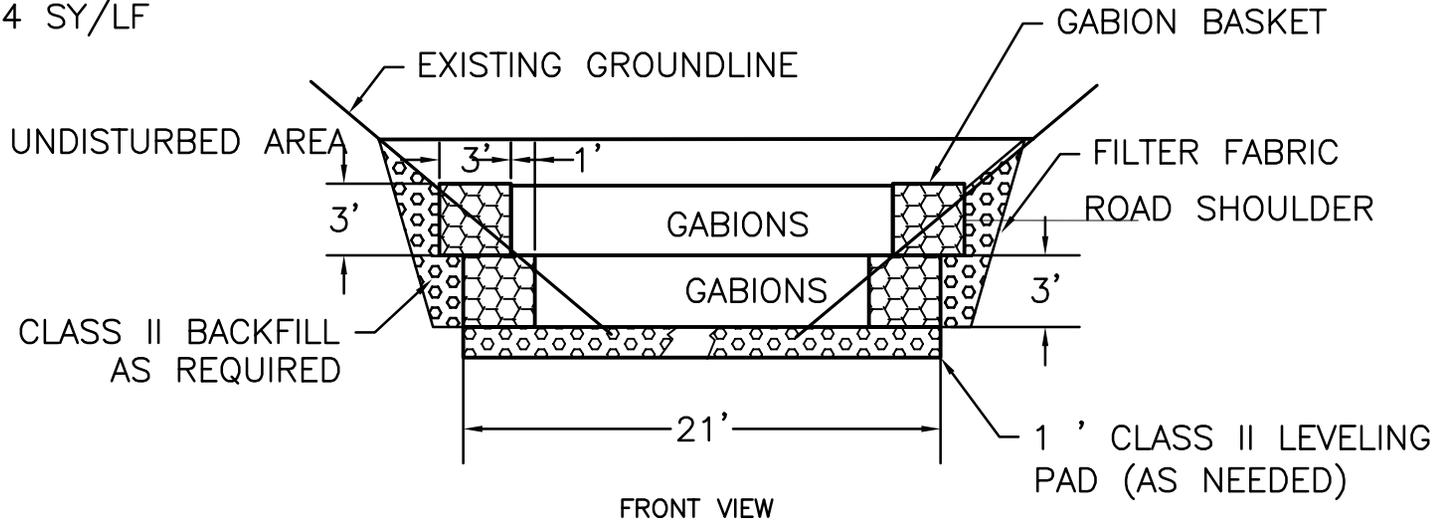
**GABION SILT CHECK (AMLSC 8)**

NOTE: SEDIMENT SHALL BE REMOVED AT CONCLUSION OF PROJECT. GABION CATCH BASIN SHALL BE APPROXIMATELY 21' X 21'. RECTANGULAR SHAPE CATCH BASINS SHALL DISCHARGE TO GROUTED DITCHES. GABIONS PARALLEL TO ROADS WILL NOT REQUIRE BALLAST.



PLAN VIEW

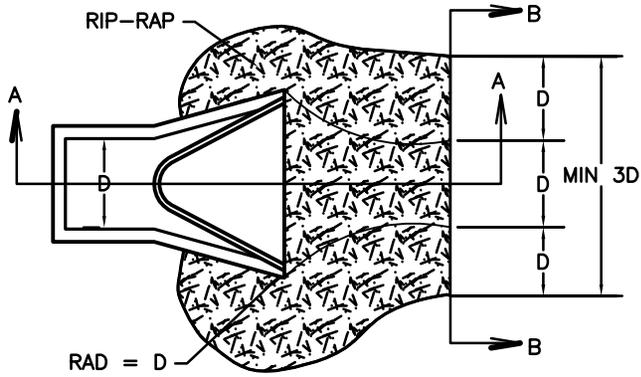
GABION= 0.67 CY/LF  
 CLASS II BACKFILL= 0.67 TON/LF  
 FILTER FABRIC= 2.34 SY/LF



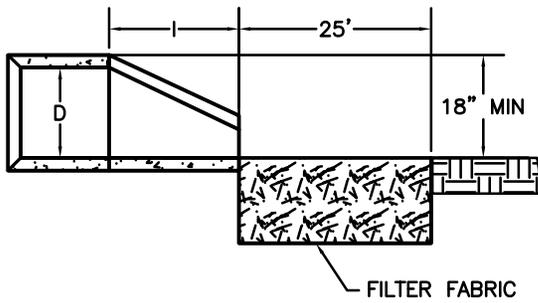
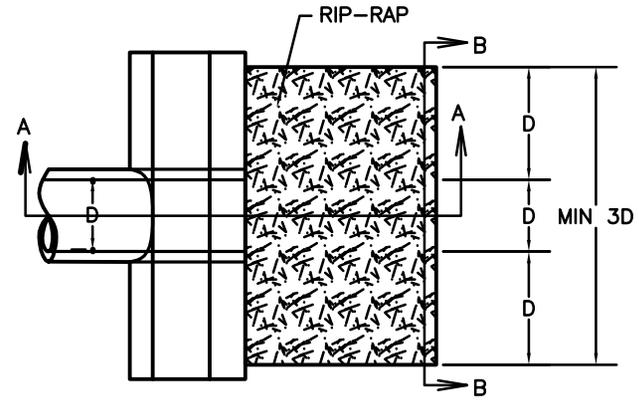
FRONT VIEW

GABION CATCH BASIN (AMLSC 9)

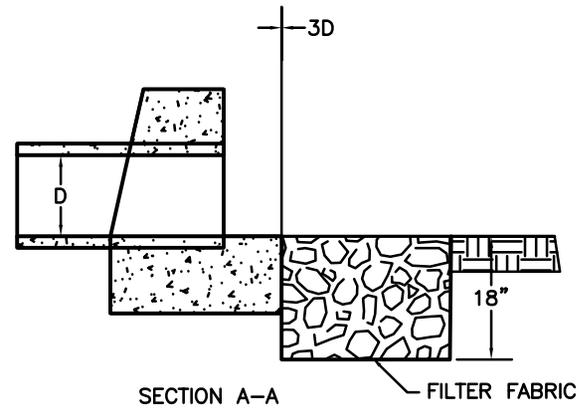
FLARED END SECTION PLAN



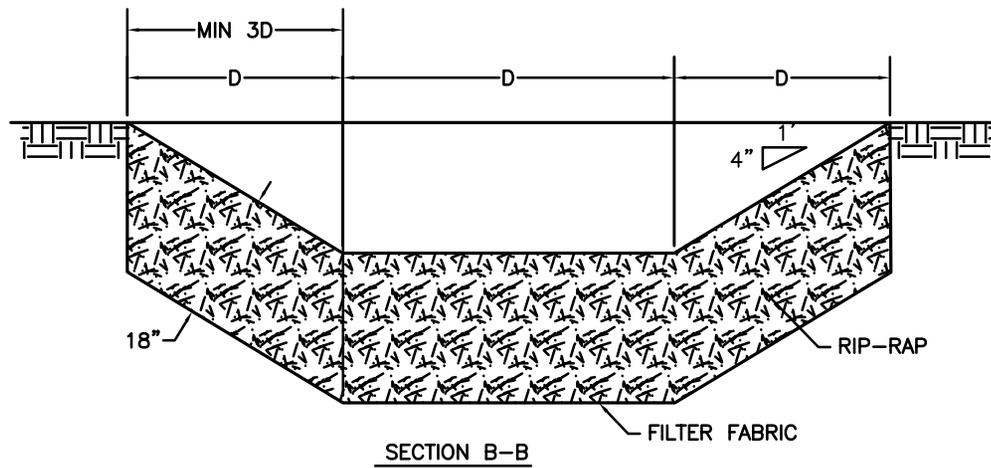
HEADWALL PLAN



SECTION A-A



SECTION A-A



SECTION B-B

**DISCHARGE AREA EROSION CONTROL (AMLSC 10)**

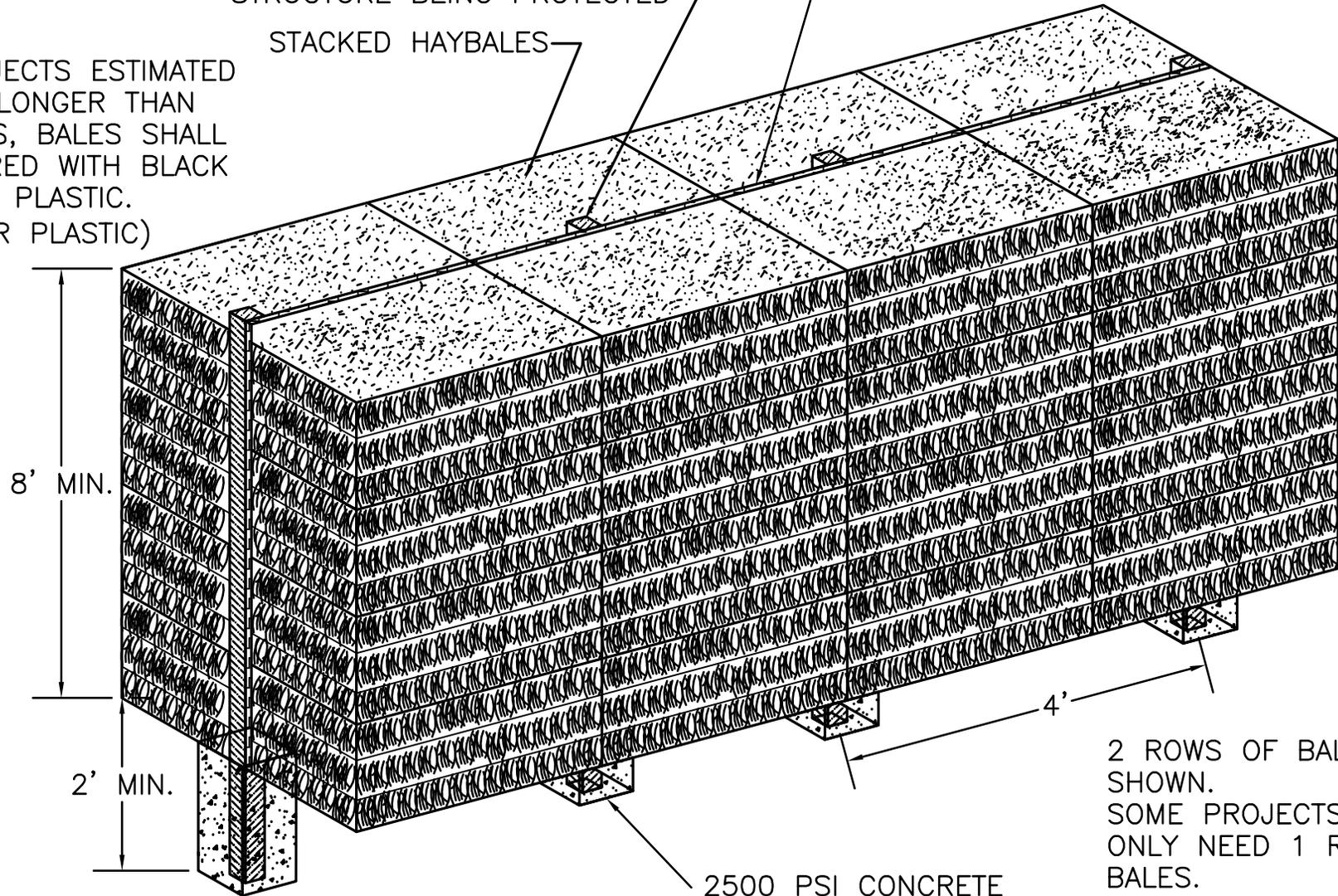
DEBRIS AND OTHER MATERIALS SHALL NOT BE PERMITTED TO BUILD UP ON THE STRUCTURE. ALL MATERIALS SHALL BE IMMEDIATELY REMOVED AND TRANSPORTED TO A LOCATION AS DIRECTED BY THE ENGINEER. ALL SUCH WORK SHALL BE INCIDENTAL.

4" X 4" X 10' WOODEN STAKES  
DRIVEN 2' MIN. INTO SOLID GROUND  
AND SET IN CONCRETE ON SIDE OF  
STRUCTURE BEING PROTECTED

4' X 8' SECTIONS OF  $\frac{3}{4}$ " PLYWOOD  
ON OUTSLOPE SIDE AWAY FROM  
STRUCTURE TO BE PROTECTED

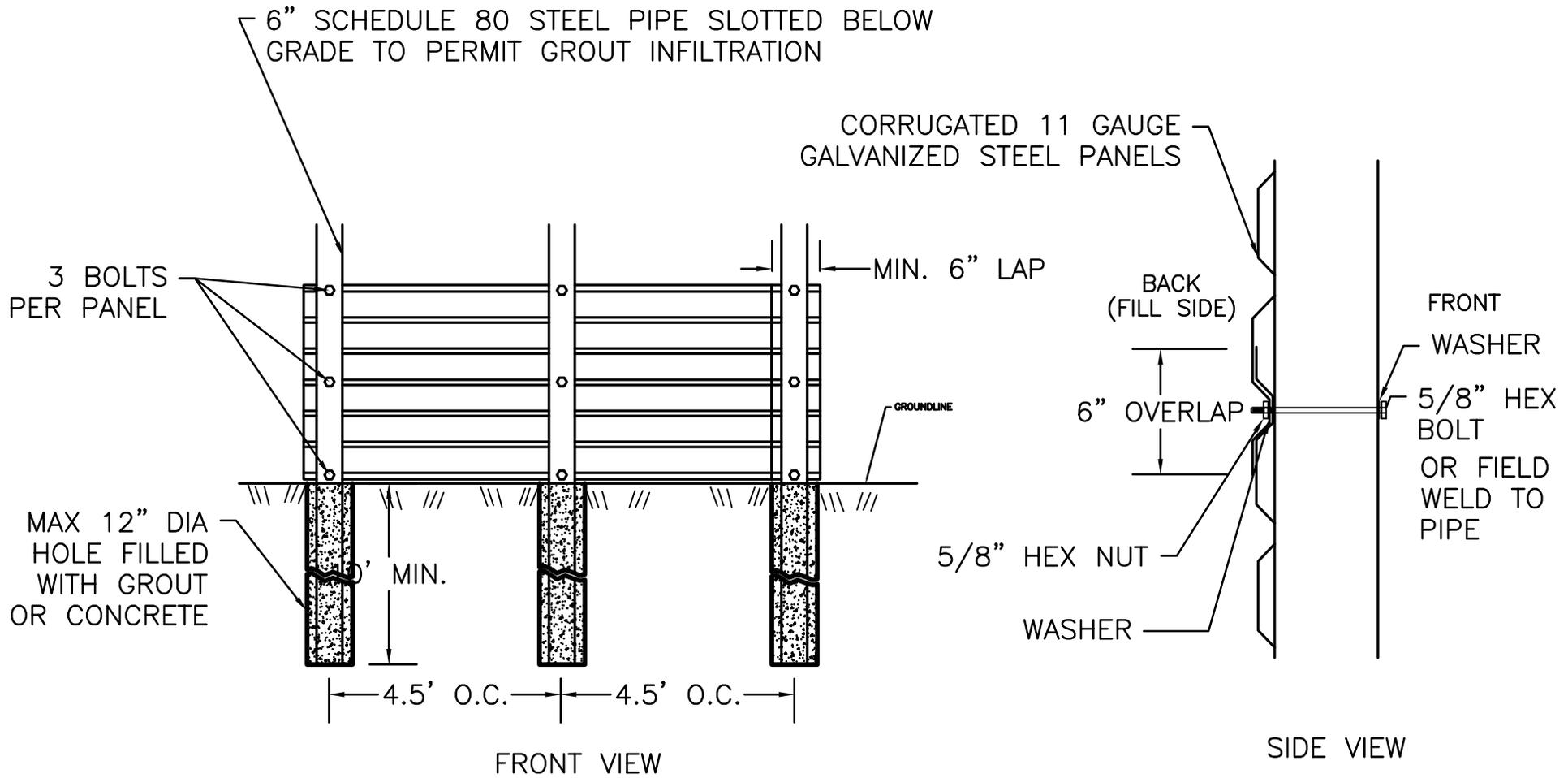
STACKED HAYBALES

FOR PROJECTS ESTIMATED  
TO LAST LONGER THAN  
2 MONTHS, BALES SHALL  
BE COVERED WITH BLACK  
OR WHITE PLASTIC.  
(NO CLEAR PLASTIC)



2 ROWS OF BALES ARE  
SHOWN.  
SOME PROJECTS MAY  
ONLY NEED 1 ROW OF  
BALES.

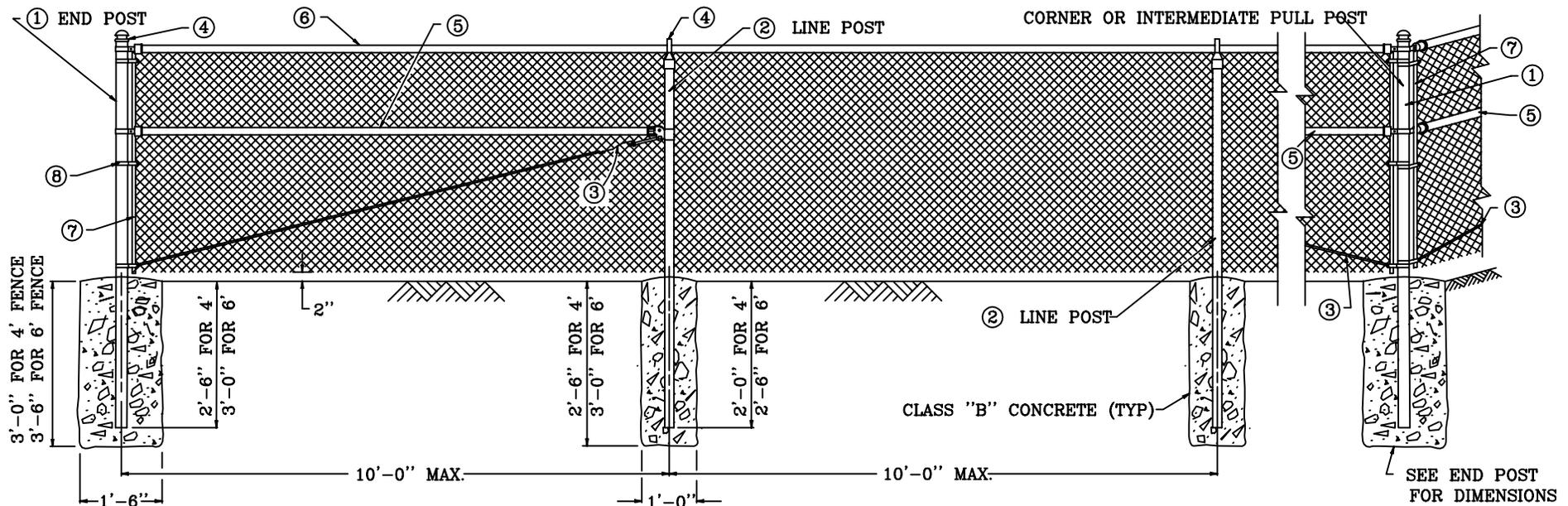
DEBRIS BARRIER WALL - TEMPORARY (AMLSF 1)



FINISHED STEEL PANEL SIZE - 3.75' X 10'

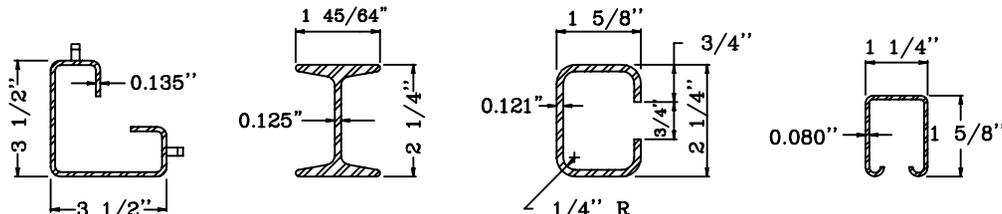
SEE AML TECHNICAL STANDARDS, CURRENT EDITION  
SECTION XXXII

STEEL PANEL WALL W/ PIPE SUPPORT (AMLSF 2)



~ NOTES ~

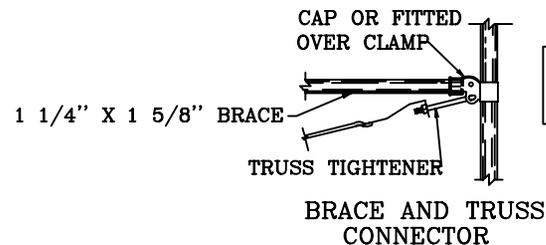
- ALL POSTS SHALL BE SET IN CONCRETE TO THE DIMENSIONS INDICATED ON THIS DRAWING.
- 4' HIGH FENCE SHALL HAVE 4' FABRIC HEIGHT. 6' HIGH FENCE SHALL HAVE 6' FABRIC HEIGHT.
- ALL FENCE FITTINGS SHALL COMPLY WITH ASTM F 626.
- POST CAPS AND SOCKET TYPE BRACE END CONNECTIONS SHALL BE GALVANIZED PRESSED STEEL, CAST IRON OR OTHER TYPE AS APPROVED BY THE ENGINEER. THEY SHALL BE DESIGNED IN A MANNER TO EXCLUDE MOISTURE FROM INSIDE POSTS AND RAILS.
- NPS = NOMINAL PIPE SIZE - ASTM F1083 AND F1043 (HEAVY INDUSTRIAL FENCE) SHALL GOVERN.
- INDISCRIMINATE MIXING OF POSTS WILL NOT BE PERMITTED.
- ⑥ TENSION WIRE COMPLYING WITH ASTM A 824 SHALL BE SUBSTITUTED FOR THE TOP RAIL WHEN THE FENCE IS TO BE INSTALLED IN THE PATH OF AN ERRANT VEHICLE.



ROLL FORMED TERMINAL POST & CORNER POST      HOT ROLLED LINE POST H - COLUMN      LINE POST HEAVY "C" ROLL FORMED      HOT ROLLED TOP & BRACE RAIL

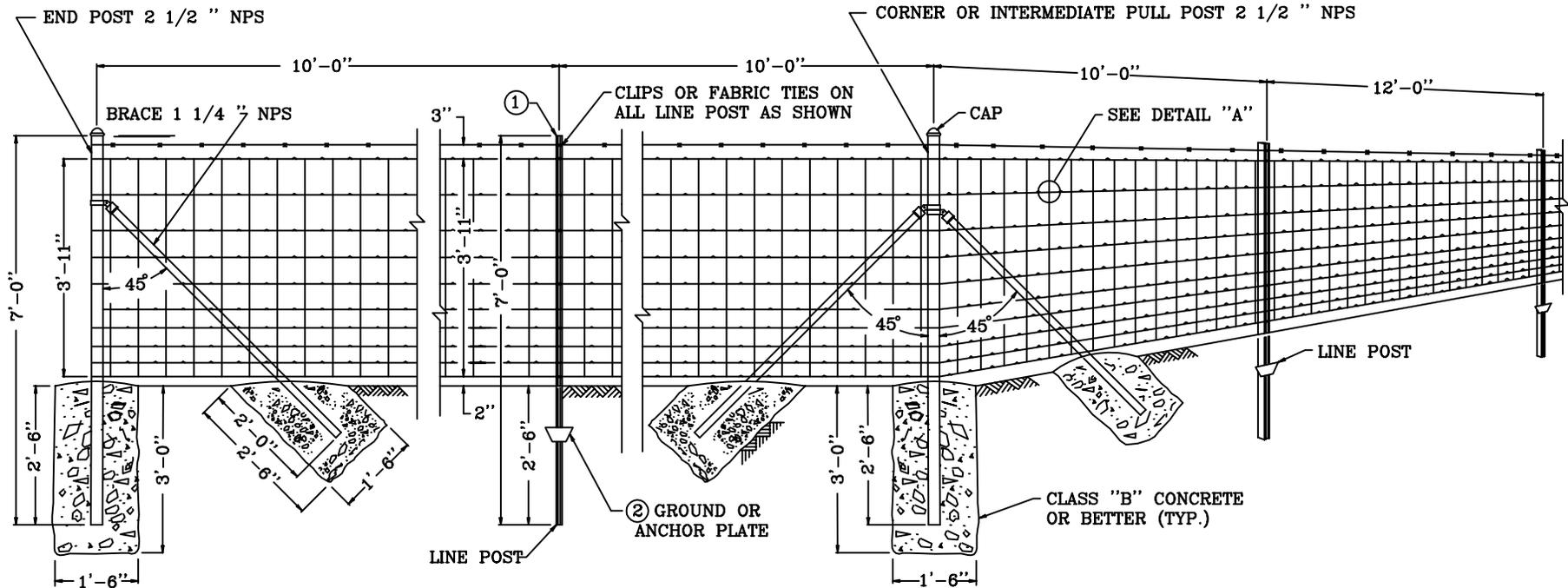
LEGEND / (ALTERNATES)

	TUBULAR	ROLL FORMED
①	2 1/2" NPS END POST	3 1/2" X 3 1/2" END POST
②	2" NPS LINE POST	2 1/4" H-COL. LINE POST - OR - 2 1/4" C-COL. LINE POST
③	3/8" DIA. TRUSS ROD AND TIGHTNER	3/8" DIA. TRUSS ROD AND TIGHTNER
④	APPROVED CAPS	NOT REQUIRED
⑤	1 1/4" NPS BRACE	1 1/4" X 1 5/8" TOP RAIL & BRACE
⑦	FLAT TENSION BAR	NOT REQUIRED
⑧	BRACE BAND AND TENSION BAND	NOT REQUIRED



See AML Technical Specifications, Current Edition:  
Section XVIII - Fence

CHAIN LINK FENCE (AMLSF 3)



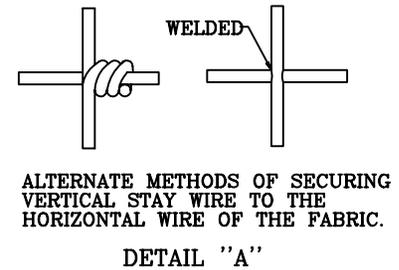
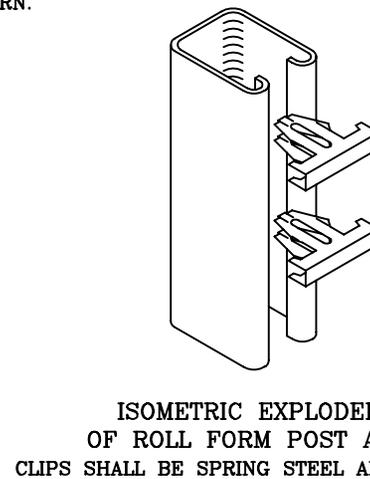
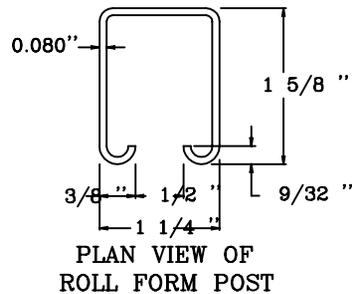
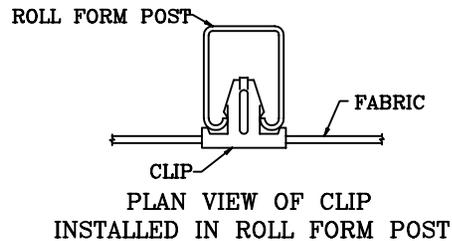
**MATERIALS:**

WOVEN-WIRE FABRIC SHALL BE EITHER ALUMINUM-COATED STEEL NO. 1047-8-9 OR ZINC-COATED STEEL NO. 1047-6-9.

ALL FENCE FITTINGS SHALL COMPLY WITH ASTM F 626.

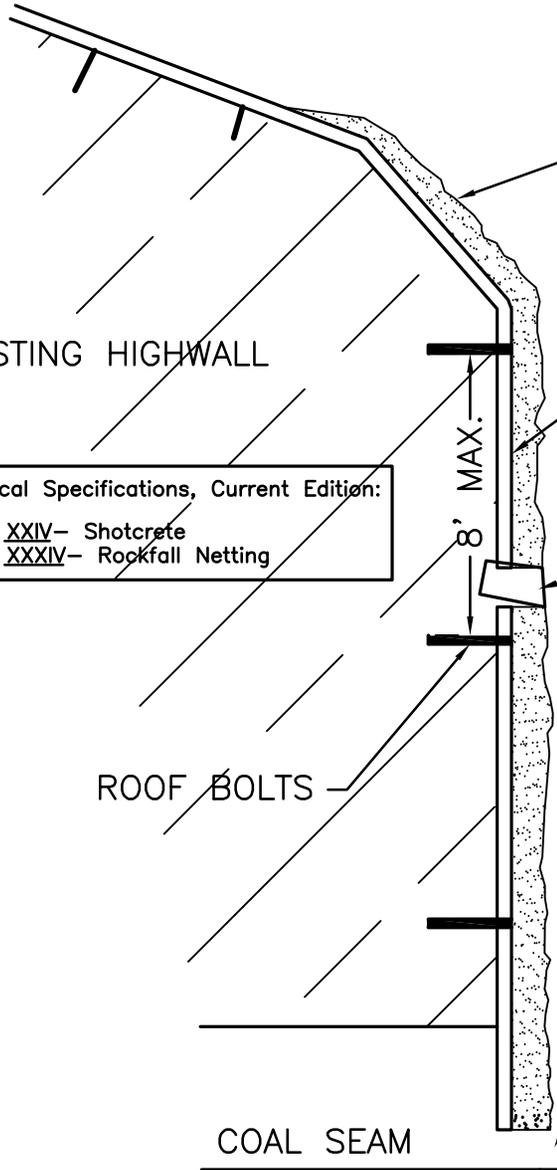
NPS = NOMINAL PIPE SIZE - ASTM F1083 AND F1043 (HEAVY INDUSTRIAL FENCE) SHALL GOVERN.

- ① STUDDED "T" POST AT 1.33 LBS. PER FOOT  
- OR -  
ROLL FORM POST AT 1.40 LBS. PER FOOT (SEE DETAIL)
- ② NOT REQUIRED FOR ROLL FORM POST.



See AML Technical Specifications, Current Edition:  
Section XVIII - Fence

**WOVEN - WIRE FENCE (AMLSF 4)**



APPLY MINIMUM OF 4" SHOTCRETE

ROCKFALL NETTING (SECURELY FASTEN WITH ROOF BOLTS ON 8'x8' MAX. SPACING GRID)

FOR ROOF BOLT SPECIFICATIONS, SEE CURRENT EDITION OF TECHNICAL SPECIFICATIONS

See AML Technical Specifications, Current Edition:  
 Section XXIV- Shotcrete  
 Section XXXIV- Rockfall Netting

2" DIA WEEPHOLES 10' C/C HORIZ/VERT

ROOFBOLTS ARE TO BE PRE-DRILLED TO A 24" MIN. DEPTH AND GROUTED

ROOF BOLTS

2" DIA WEEP HOLES 10' ON CENTER UNLESS PLANS CALL FOR SPECIFIC PORTAL CLOSURE

SEPARATE BID ITEMS

ROCKFALL NETTING  
 SHOTCRETE

COAL SEAM

ADD SMALL CONCRETE DITCH IF WATER PRESENT

EXISTING HIGHWALL SHALL BE THOROUGHLY CLEANED BY PRESSURE WASHING AS DIRECTED BY THE ENGINEER. REMOVE ALL LOOSE ROCK.

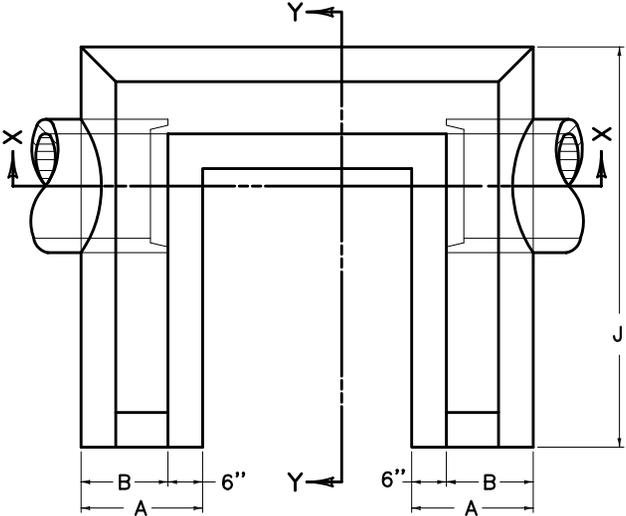
HIGHWALL RESTORATION (AMLSF 5)

### DIMENSIONS AND QUANTITIES

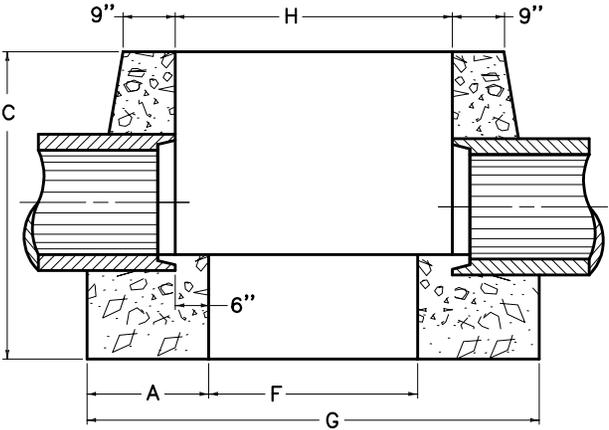
PIPE DIAMETER	HEADWALL DIMENSIONS									CU. YD. CONC. FOR 1 HEADWALL
	A	B	C	D	E	F	G	H	J	
12"	1'-8"	1'-2"	4'-0"	1'-6"	2'-6"	2'-6"	5'-10"	3'-6"	4'-8"	2.07
15"	1'-8"	1'-2"	4'-3"	1'-6"	2'-9"	2'-9"	6'-2"	3'-9"	5'-2"	2.42
18"	1'-9"	1'-3"	4'-6"	1'-6"	3'-0"	3'-0"	6'-6"	4'-0"	5'-9"	2.86
24"	1'-10"	1'-4"	5'-0"	1'-6"	3'-6"	3'-6"	7'-2"	4'-6"	6'-10"	3.75
30"	1'-11"	1'-5"	5'-6"	1'-6"	4'-0"	3'-9"	7'-7"	4'-9"	7'-11"	4.78
36"	2'-0"	1'-6"	6'-6"	2'-0"	4'-6"	4'-0"	8'-0"	5'-0"	9'-0"	6.72

**NOTES**

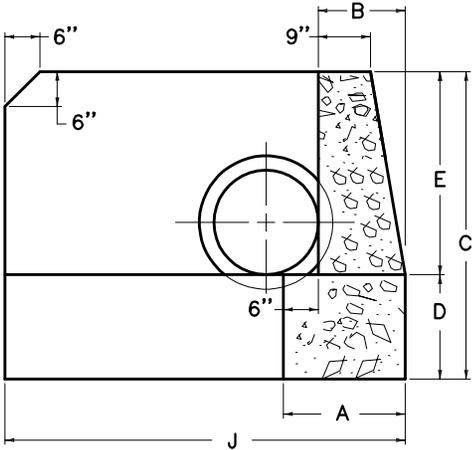
1. VOLUME DISPLACED BY BARREL OF PIPE HAS BEEN COMPUTED USING INSIDE DIAMETER OF PIPE.



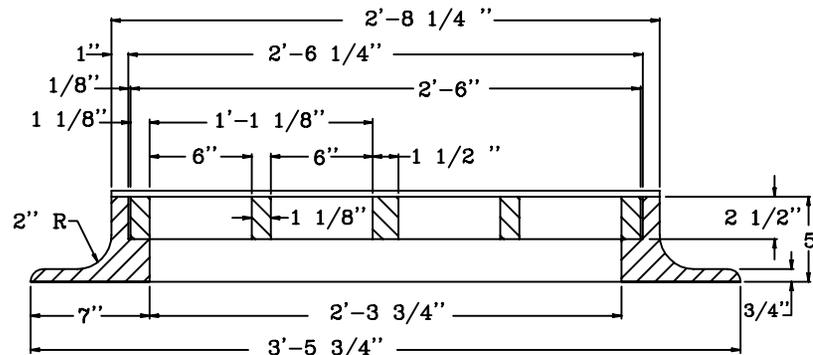
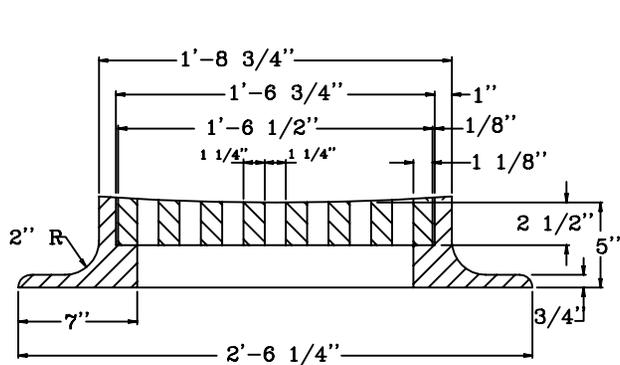
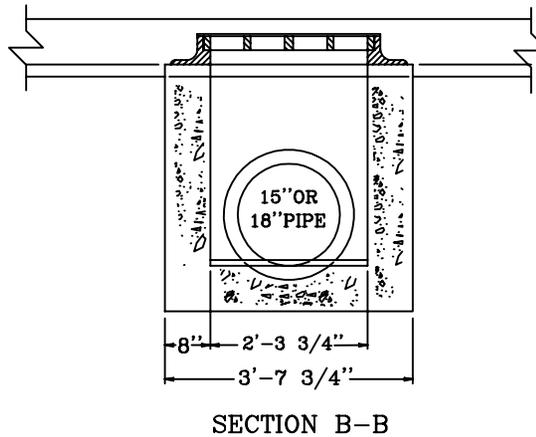
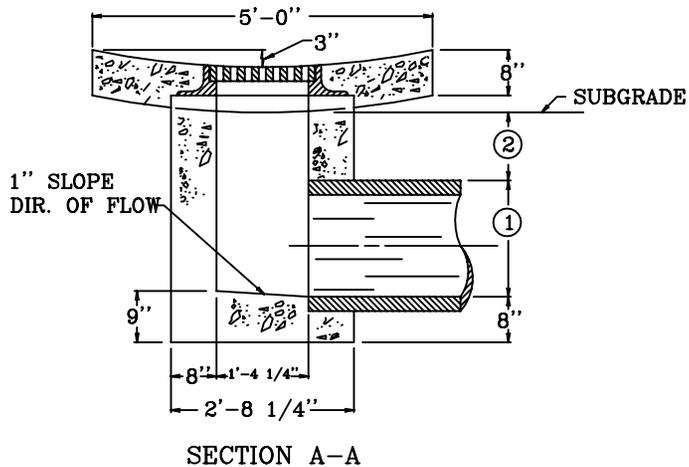
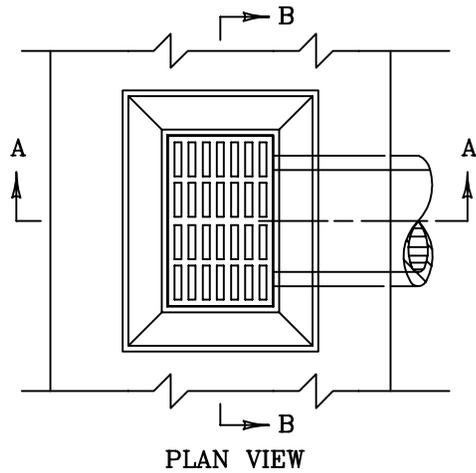
PLAN VIEW



SECTION X-X



SECTION Y-Y



NOTES

PRIMARY USE: VALLEY GUTTER LOCATION  
 CONSTRUCT VALLEY GUTTER IN ACCORDANCE  
 WITH CURRENT STD. DWG. RPM-100.

- ① 1'-5 1/4" FOR 15" PIPE
- 1'-8 1/2" FOR 18" PIPE
- ② 1'-0" MINIMUM COVER BELOW SUBGRADE.

APPROX. CONCRETE QUANTITIES

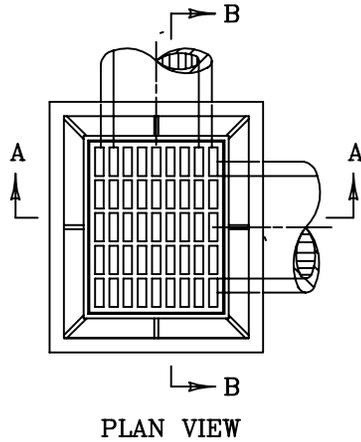
PIPE SIZE	MIN. HEIGHT	CU. YDS. CONC.
15"	3'-4"	0.90
18"	3'-8"	0.97

APPROXIMATE WEIGHTS	
FRAME	365 LBS.
GRATE	185 LBS.

NO DEDUCTIONS HAVE BEEN MADE FOR PIPE.

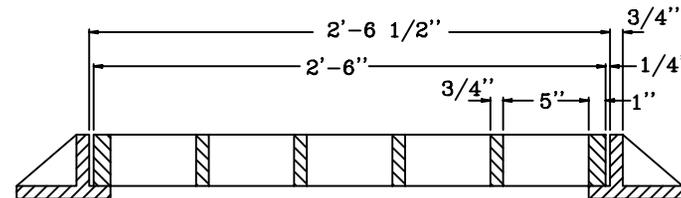
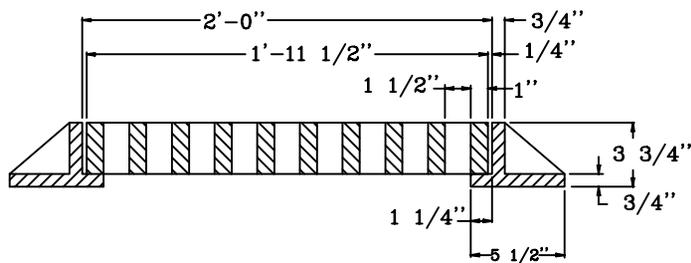
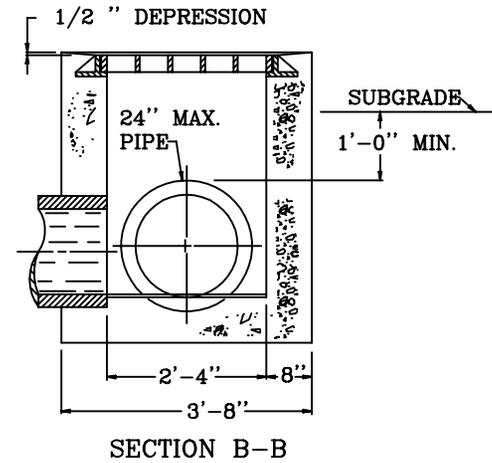
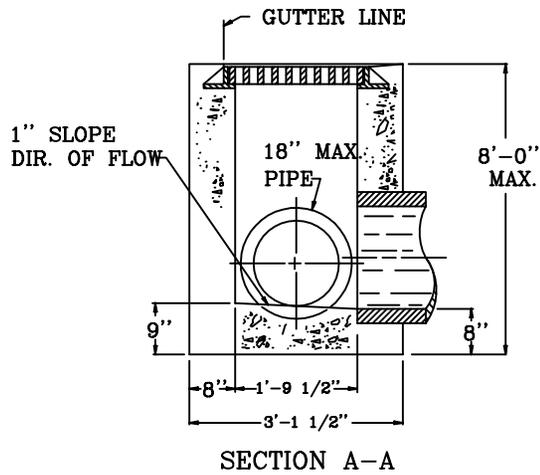
DROP BOX W/RECTANGULAR GRATE-VALLEY GUTTER (AMLSUB 1-2)



APPROX. CONCRETE QUANTITIES

PIPE SIZE	MIN. HEIGHT	CU. YDS. CONC.
15"	2'-11"	0.89
18"	3'-3"	0.97
24"	4'-9"	1.38
APPROXIMATE WEIGHTS		
FRAME		195 LBS.
GRATE		265 LBS.

NO DEDUCTIONS HAVE BEEN MADE FOR PIPE.

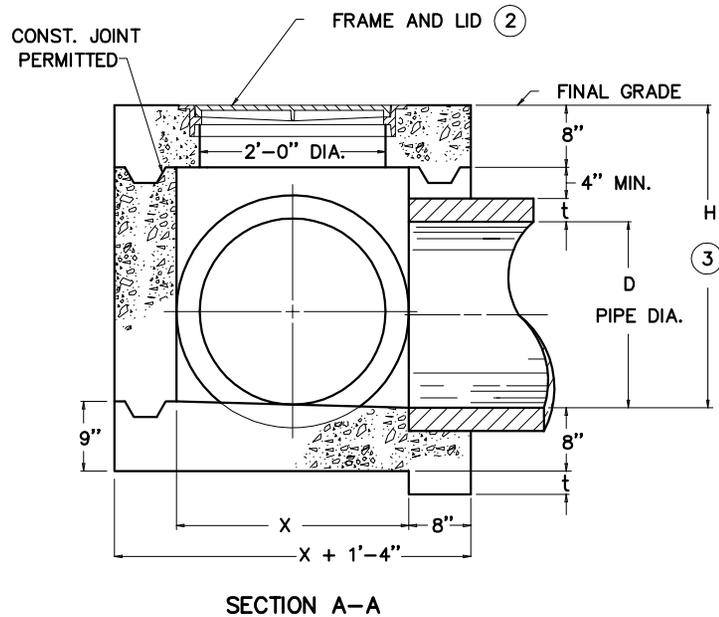
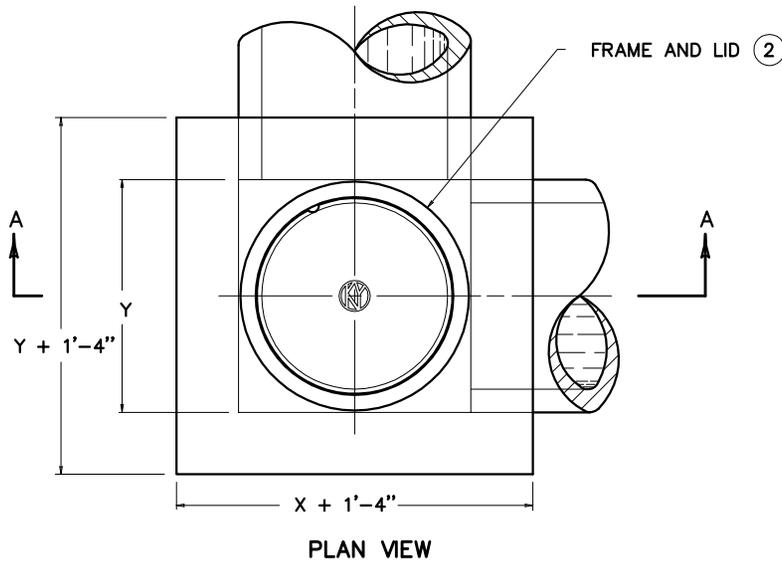


SECTIONAL VIEW OF FRAME AND GRATE

DROP BOX WITH RECTANGULAR GRATE (AMLSUB 1-3)

~ NOTES ~

1. THE CONTRACT UNIT PRICE EACH SHALL INCLUDE PAYMENT IN FULL FOR EXCAVATION, LABOR, FRAME AND LID, CONCRETE, AND ALL OTHER INCIDENTALS NECESSARY TO COMPLETE THE WORK.
2. BOX AS DETAILED CAN BE USED IN NON-VEHICULAR TRAFFIC AREAS. HOWEVER, IF BOX IS TO BE USED IN VEHICULAR TRAFFIC AREAS, MAKE SURE BOX PROVIDER IS AWARE OF THIS. BOX AND LID MAY HAVE TO BE MODIFIED FROM THIS DETAIL TO ACCOMMODATE VEHICULAR TRAFFIC LOADS.
3. THE MAXIMUM DEPTH OF BOX FROM FINAL GRADE TO FLOW LINE OF PIPE SHALL BE 8'-0". ANY BOXES DEEPER THAN 8'-0" SHALL BE SPECIFICALLY DESIGNED.
4. BASED ON H AS EQUAL TO  $D + t + 1'-0"$ .
5.  $Q$  = CUBIC YARDS OF CONCRETE PER FOOT INCREASE OR DECREASE WHEN H VARIES FROM  $D + t + 1'-0"$ .
6. NO DEDUCTIONS HAVE BEEN MADE FOR PIPE, SEE REFERENCE CHART FOR QUANTITIES TO DEDUCT.
7. THE DIMENSIONS AND QUANTITIES HAVE BEEN CALCULATED FOR ROUND CONCRETE PIPE. WHEN NON-CIRCULAR PIPE IS USED THE BOX SIZE SHALL BE DETERMINED BY CONTROLLING DIMENSIONS OF THE PIPE.
8. FOR THIS APPLICATION THE "X" DIMENSION IS ASSUMED TO BE EQUAL TO OR GREATER THAN THE "Y" DIMENSION.
9. THE BOX SIZE NUMBER TO BE SHOWN ON THE PLANS SHALL BE DETERMINED BY THE LARGEST PIPE IN THE "X" AND "Y" DIMENSION.



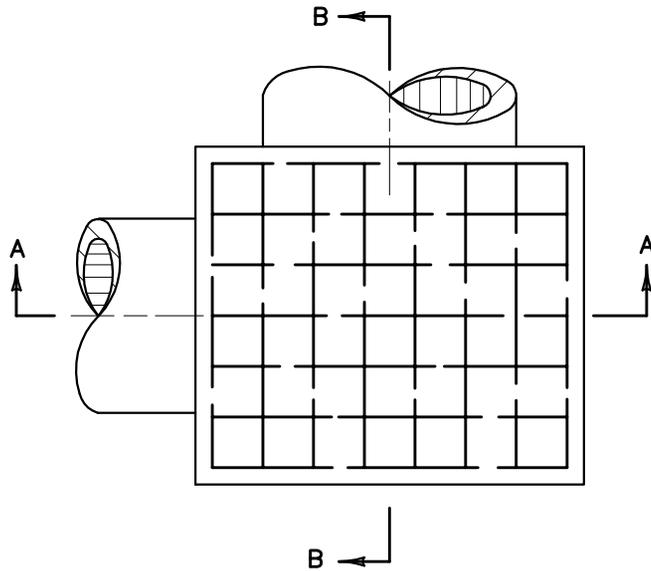
REFERENCE CHART			
DIA. OF PIPE	JUNCTION BOX		CONCRETE TO DEDUCT FOR EACH PIPE CUBIC YARDS
	PIPE ON "X" SIDE OF BOX	PIPE ON "Y" SIDE OF BOX	
0			---
12"	2'-0"	2'-0"	0.1
15"-18"			
21"-24"	2'-6"	2'-6"	

DIMENSIONS & ESTIMATE OF QUANTITIES

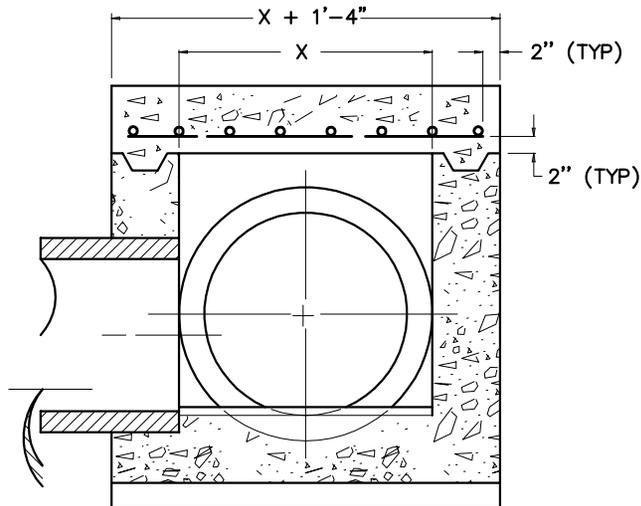
NO.	INLET SIZE		PIPE ④		CONCRETE	
	X	Y	MAX. DIA.	H	CUBIC YARDS ⑤	Q
1			12"	2'-2"	0.91	0.3
2	2'-0"		15"	2'-5"	0.98	
3		2'-0"	18"	2'-9"	1.05	
4			21"	3'-0"	1.27	
5		2'-6"			1.43	
6	2'-6"		2'-0"		1.36	
7		2'-6"	24"	3'-3"	1.52	

NOTES

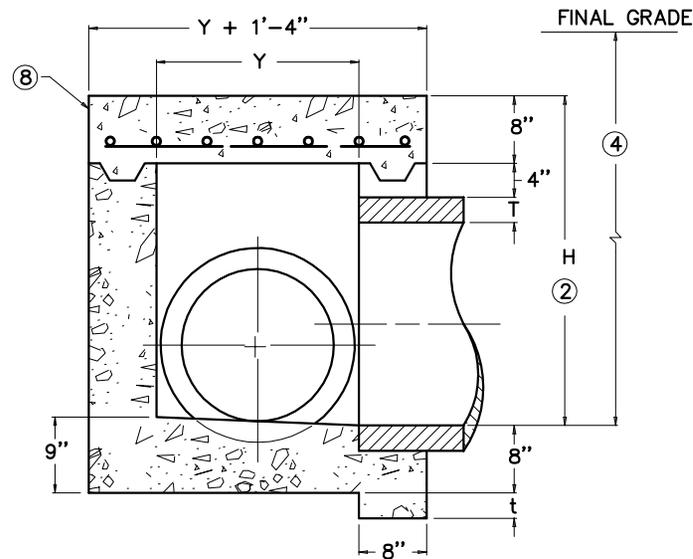
1. THE CONTRACT UNIT PRICE EACH SHALL INCLUDE PAYMENT IN FULL FOR ALL MATERIALS, EXCAVATION, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE WORK.
- ②  $H = D + T + 1'-0"$  FOR THE LARGEST PIPE INVOLVED.
3. STEEL REINFORCEMENT SHALL BE NO. 4 BARS PLACED 6" O.C.
- ④ THE MAXIMUM DEPTH OF BOX FROM FINAL GRADE TO FLOW LINE OF PIPE SHALL BE 8'-0". ANY BOXES DEEPER THAN 8'-0" SHALL BE SPECIFICALLY DESIGNED.
5. SEE CURRENT STD. AMLSUB 2-3 FOR DIMENSIONS AND QUANTITIES.
6. FOR THIS APPLICATION THE "X" DIMENSION IS ASSUMED TO BE EQUAL TO OR GREATER THAN THE "Y" DIMENSION.
7. THE BOX SIZE NUMBER TO BE SHOWN ON THE PLANS SHALL BE DETERMINED BY THE LARGEST PIPE IN THE "X" OR "Y" DIMENSION.
- ⑧ TO ELIMINATE FORM REMOVAL, THE TOP SHALL BE PRECAST.



PLAN VIEW



SECTION A-A



SECTION B-B

USE WITH  
CURRENT STD. DWG. AMLSUB 2-3

JUNCTION BOX- CONCRETE TOP (AMLSUB 2-2)

**DIMENSIONS AND ESTIMATE OF QUANTITIES**

NO.	INLET SIZE		PIPE MAX. DIA.	① H	CONCRETE CUBIC YARDS	② Q	REINF. STEEL LBS.
	X	Y					
1			12"	2'-2"	0.99		
2	2'-0"	2'-0"	15"	2'-5"	1.06		28
3			18"	2'-9"	1.13		
4			21"	3'-0"	1.35		32
5	2'-6"	2'-6"			1.51	0.3	37
6		2'-0"	24"	3'-3"	1.44		32
7		2'-6"			1.60		37
8		2'-0"			1.68		
9	3'-0"	2'-6"	27"	3'-6"	1.86		42
10		3'-0"			2.04	0.4	48
11		2'-0"			1.93	0.3	41
12		2'-6"	30"	3'-10"	2.13		47
13		3'-0"			2.34	0.4	54
14	3'-6"	3'-6"			2.54		60
15		2'-0"			2.02	0.3	41
16		2'-6"	33"	4'-1"	2.24		47
17		3'-0"			2.45		54
18		3'-6"			2.66		60
19		2'-0"			2.30	0.4	45
20		2'-6"			2.53		52
21	4'-0"	3'-0"	36"	4'-4"	2.76		59
22		3'-6"			2.99		66
23		4'-0"			3.22	0.5	73
24		2'-0"			2.70		50
25		2'-6"			2.95	0.4	57
26	4'-6"	3'-0"	42"	4'-11"	3.21		65
27		3'-6"			3.47		73
28		4'-0"			3.73	0.5	80
29		4'-6"			3.98		88
30		2'-0"			3.12	0.4	54
31		2'-6"			3.41		62
32		3'-0"			3.69		71
33	5'-0"	3'-6"	48"	5'-5"	3.97	0.5	79
34		4'-0"			4.26		88
35		4'-6"			4.54		96
36		5'-0"			4.83	0.6	104
37		2'-0"			3.58	0.4	58
38		2'-6"			3.89		67
39		3'-0"			4.20	0.5	76
40	5'-6"	3'-6"	54"	6'-0"	4.51		86
41		4'-0"			4.82		95
42		4'-6"			5.13		104
43		5'-0"			5.44	0.6	113
44		5'-6"			5.75		122
45		2'-0"			4.06		63
46	6'-0"	2'-6"	60"	6'-6"	4.39	0.5	72
47		3'-0"			4.73		82
48		3'-6"			5.07		92

NO.	INLET SIZE		PIPE MAX. DIA.	① H	CONCRETE CUBIC YARDS	② Q	REINF. STEEL LBS.
	X	Y					
49		4'-0"			5.40		102
50		4'-6"			5.74		111
51	6'-0"	5'-0"	60"	6'-6"	6.08	0.6	121
52		5'-6"			6.42		131
53		6'-0"			6.75	0.7	140
54		2'-0"			4.81	0.5	71
55		2'-6"			5.19		83
56		3'-0"			5.57		94
57		3'-6"			5.94	0.6	105
58	7'-0"	4'-0"	66"	7'-1"	6.32		116
59		4'-6"			6.70		127
60		5'-0"			7.07		138
61		5'-6"			7.45	0.7	149
62		6'-0"			7.83		160
63		7'-0"			8.58	0.8	182
64		2'-0"			5.37	0.5	76
65		2'-6"			5.77		88
66		3'-0"			6.17	0.6	99
67		3'-6"			6.57		111
68		4'-0"			6.98		123
69	7'-6"	4'-6"	72"	7'-7"	7.38		134
70		5'-0"			7.78	0.7	146
71		5'-6"			8.19		158
72		6'-0"			8.59		169
73		7'-0"			9.39		193
74		7'-6"			9.80	0.8	204

**NOTES**

- ① BASED ON H AS EQUAL TO D+T+1'-0".
- ② Q = CUBIC YARDS OF CONCRETE PER FOOT INCREASE OR DECREASE WHEN H VARIES FROM D+t+1'-0".
3. NO DEDUCTIONS HAVE BEEN MADE FOR PIPE, SEE REFERENCE CHART FOR QUANTITIES TO DEDUCT.
4. THE DIMENSIONS AND QUANTITIES HAVE BEEN CALCULATED FOR ROUND CONCRETE PIPE. WHEN NON-CIRCULAR PIPE IS USED THE BOX SIZE SHALL BE DETERMINED BY CONTROLLING DIMENSIONS OF THE PIPE.

**REFERENCE CHART**

DIA. OF PIPE	JUNCTION BOX		CONCRETE TO DEDUCT FOR EACH PIPE CUBIC YARDS
	PIPE ON "X" SIDE OF BOX	PIPE ON "Y" SIDE OF BOX	
0			---
12"	2'-0"	2'-0"	
15"-18"			0.1
21"-24"	2'-6"	2'-6"	
27"	3'-0"	3'-0"	
30"-33"	3'-6"	3'-6"	0.2
36"	4'-0"	4'-0"	0.3
42"	4'-6"	4'-6"	0.4
48"	5'-0"	5'-0"	0.5
54"	5'-6"	5'-6"	0.6
60"	6'-0"	6'-0"	0.7
66"	7'-0"	7'-0"	0.8
72"	7'-6"	7'-6"	1.0

USE WITH  
CURRENT STD. DWG. AMLSUB 2-1

USE WITH  
CURRENT STD. DWG. AMLSUB 2-2

**JUNCTION BOX DIMENSIONS (AMLSUB 2-3)**

**INTERMEDIATE ANCHOR FOR PIPE (CLASS "A" CONCRETE)**

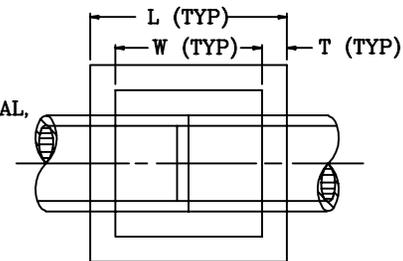
		DIAMETER OF PIPE IN INCHES																
		% GRADE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"
VOLUME IN CU. YDS. OF CLASS "A" CONC. FOR ONE ANCHOR	0	0.68	0.86	1.07	1.31	1.59	1.90	2.25	3.06	5.91	7.41	9.30	11.28	14.99	18.34	22.15	25.64	
	10	0.72	0.91	1.13	1.38	1.68	2.01	2.38	3.24	6.23	7.83	9.70	11.79	15.77	19.27	23.24	26.88	
	20	0.75	0.96	1.19	1.44	1.78	2.14	2.52	3.43	6.59	8.28	10.07	12.24	16.48	20.11	24.22	27.98	
	30	0.79	1.01	1.26	1.53	1.88	2.27	2.67	3.65	6.97	8.78	10.40	12.64	17.12	20.87	25.10	28.95	
	40	0.84	1.07	1.33	1.62	1.99	2.41	2.83	3.88	7.39	9.31	10.69	12.99	17.70	21.53	25.88	29.79	
	50	0.88	1.13	1.41	1.72	2.11	2.56	3.01	4.12	7.83	9.87	10.95	13.30	18.22	22.13	26.55	30.51	
	60	0.93	1.19	1.49	1.82	2.24	2.71	3.19	4.38	8.29	10.47	11.12	13.57	18.69	22.66	27.15	31.15	
	70	0.98	1.25	1.57	1.94	2.37	2.87	3.38	4.65	8.77	11.10	11.40	13.81	19.12	23.14	27.69	31.70	
	80	1.03	1.32	1.66	2.08	2.50	3.07	3.58	4.93	9.28	11.58	11.74	14.02	19.51	23.57	28.16	32.17	
	90	1.08	1.39	1.75	2.19	2.64	3.25	3.79	5.22	9.79	11.75	12.41	14.21	19.79	23.87	28.46	32.42	
100	1.13	1.46	1.84	2.31	2.78	3.43	4.00	5.52	10.32	11.91	13.10	14.38	20.20	24.31	28.95	32.92		
DIMENSIONS	L	3'-4"	3'-7 1/2"	3'-11"	4'-2 1/2"	4'-6"	4'-9 1/2"	5'-1"	5'-8"	6'-11"	7'-6"	8'-1"	8'-8"	9'-7"	10'-2"	10'-9"	11'-4"	
	W	2'-4"	2'-7 1/2"	2'-11"	3'-2 1/2"	3'-6"	3'-9 1/2"	4'-1"	4'-8"	5'-7"	6'-2"	6'-9"	7'-4"	8'-1"	8'-8"	9'-3"	9'-10"	
	H	1'-8"	1'-11 1/4"	2'-2 1/2"	2'-5 3/4"	2'-9"	3'-0 1/4"	3'-3 1/2"	3'-10"	4'-6 1/2"	5'-1"	5'-7 1/2"	6'-2"	6'-9 1/2"	7'-4"	7'-10 1/2"	8'-5"	
	D	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-6"	1'-6"	1'-6"	1'-8"	1'-8"	1'-8"	2'-0"	2'-0"	
	T	6"	6"	6"	6"	6"	6"	6"	6"	6"	8"	8"	8"	8"	9"	9"	9"	

**END ANCHOR FOR PIPE OUTLET (CLASS "A" CONCRETE)**

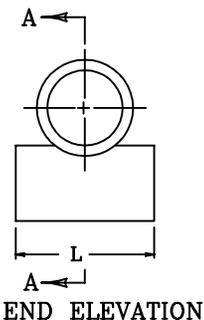
DIMENSIONS	L	2'-4"	2'-8"	2'-9"	3'-3"	3'-6"	3'-10"	4'-1"	4'-0"	5'-3"	5'-10"	6'-5"	7'-0"	7'-7"	8'-2"	8'-9"	9'-4"
	H ON EARTH	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
	H ON ROCK	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"	1'-0"
VOLUME CU. YD.	ON EARTH	0.13	0.15	0.16	0.18	0.19	0.21	0.23	0.26	0.39	0.43	0.48	0.52	0.56	0.61	0.65	0.69
	ON ROCK	0.09	0.10	0.10	0.12	0.13	0.14	0.15	0.17	0.19	0.22	0.24	0.26	0.28	0.31	0.33	0.35

**NOTES**

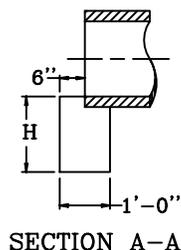
CIRCULAR PIPE INCLUDES SLIGHTLY ELLIPTICAL CONCRETE PIPE WITH CIRCULAR REINFORCEMENT.  
 VOLUME DISPLACED BY BARREL OF PIPE HAS BEEN COMPUTED USING INSIDE DIMENSION OF PIPE.  
 THE UNIT PRICE BID PER CU. YD. FOR CLASS "A" CONCRETE SHALL INCLUDE ALL FORMS, MATERIAL,  
 LABOR, ETC. INCIDENTAL TO CONSTRUCTION.  
 FOR GRADE BREAKS IN PIPE, USE AVERAGE GRADE TO CALCULATE VOLUMES.



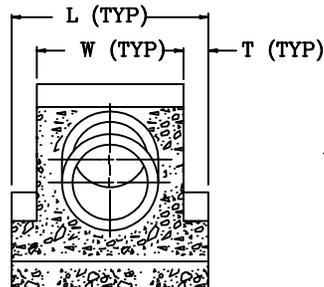
PLAN VIEW



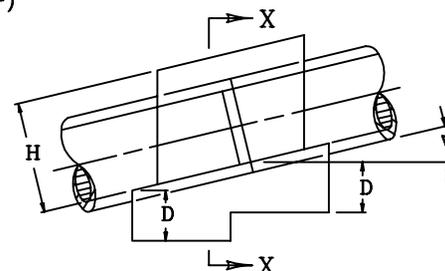
END ELEVATION



SECTION A-A



SECTION X-X

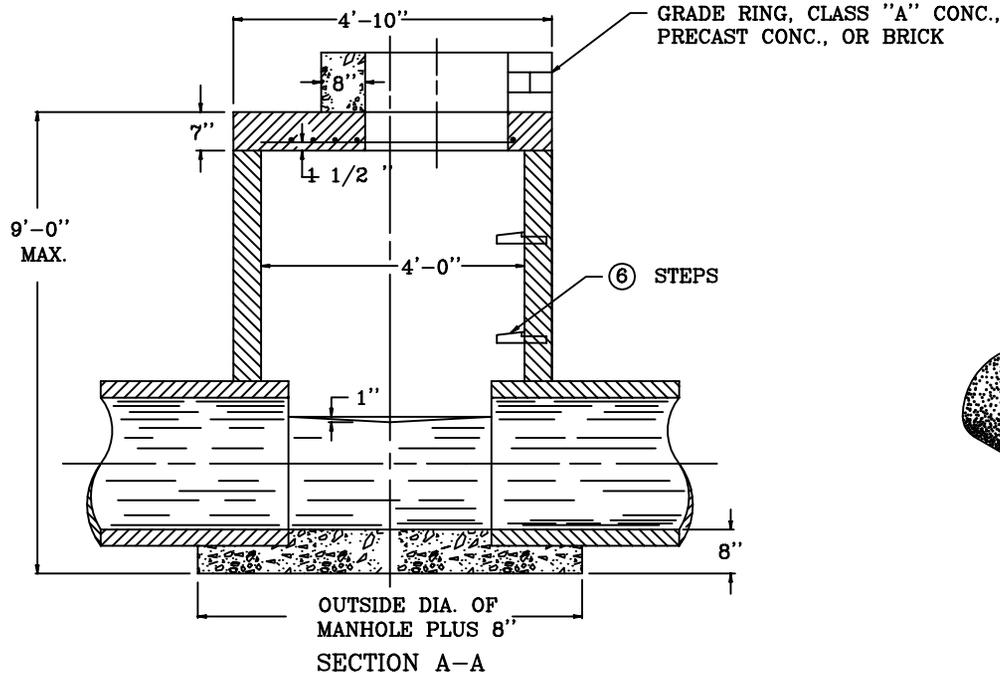
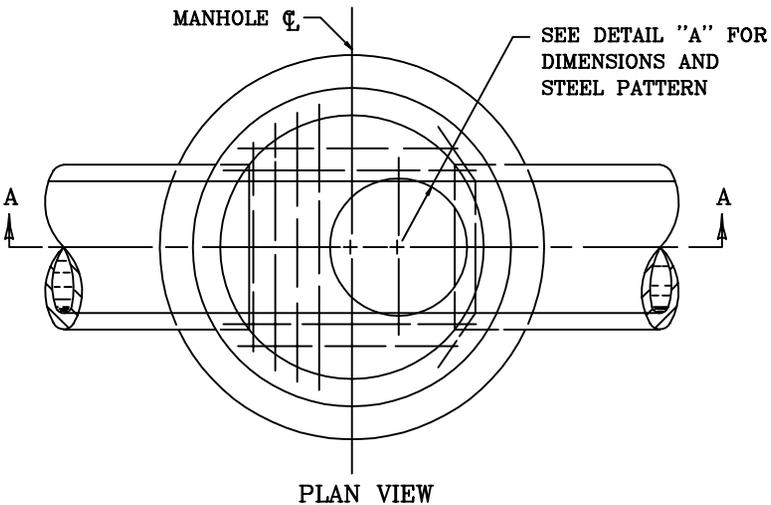


ELEVATION VIEW

END ANCHOR FOR PIPE OUTLET

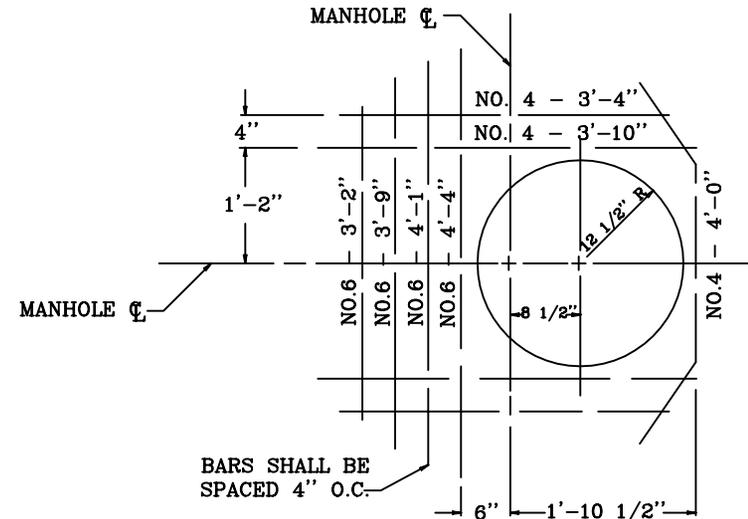
INTERMEDIATE ANCHOR

**INTERMEDIATE AND END CULVERT ANCHOR (AMLSUB 3)**

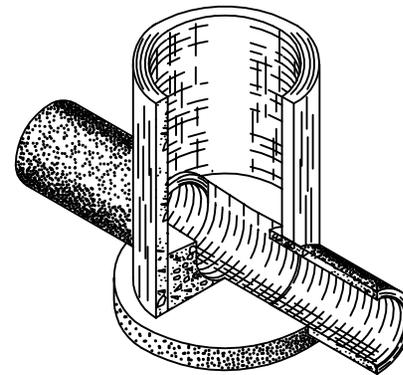


### NOTES

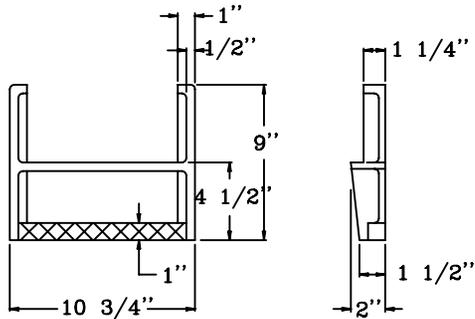
1. THE RISER SECTION MAY BE PRECAST CONCRETE PIPE OR CAST-IN-PLACE CONCRETE. A CONCENTRIC CAST-IN-PLACE CONE OR PRECAST CONCRETE CONE MAY BE PERMITTED, PROVIDED HEIGHT LIMITATIONS WOULD PERMIT.
2. THE MAXIMUM SIZE OF INTERCEPTED PIPE SHALL BE 27".
3. COVER OVER HIGHEST PIPE, EXCLUSIVE OF PAVEMENT, SHALL BE 2'-0".
4. CAST-IN-PLACE CONCRETE MANHOLES SHALL HAVE 8" THICK WALLS.
5. SEE PROPOSAL NOTES OR STANDARD SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- ⑥ SEE CURRENT STD. DWG. AMLSUB 4-2 FOR STEP TYPE, SPACING AND DETAIL.



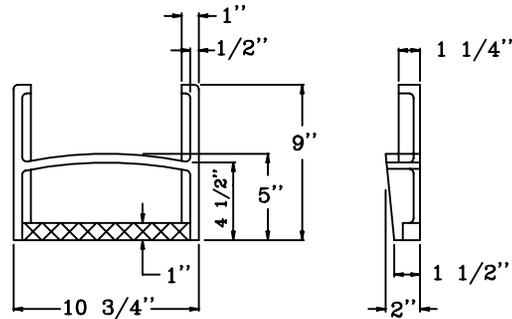
DETAIL "A"  
DIMENSIONS AND  
STEEL PATTERN



## MANHOLE TYPE A (AMLSUB 4-1)



STEP TYPE NO. 1



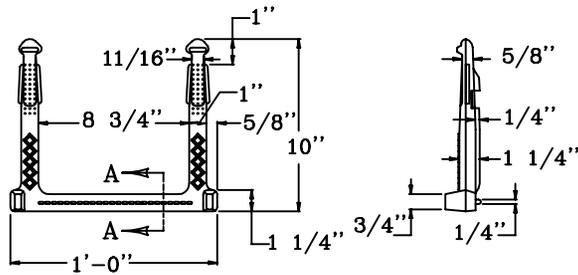
STEP TYPE NO. 2

NOTES

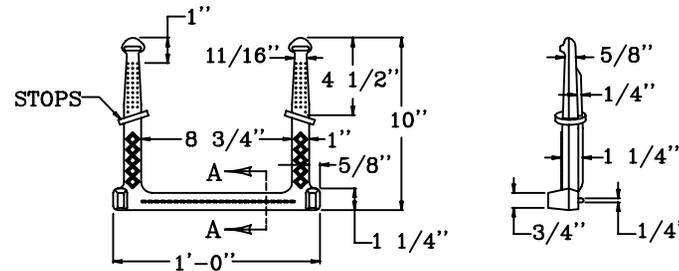
1. STEPS SHALL BE ASPHALT COATED CAST IRON OR POLYPROPYLENE PLASTIC COATED STEEL ROD OR OF A TYPE AND SIZE APPROVED BY THE ENGINEER.
2. STEPS SHALL BE SPACED APPROXIMATELY 12" TO 16" O.C. VERTICALLY SO AS TO FORM A CONTINUOUS LADDER.
3. STEPS SHALL BE REQUIRED IN MANHOLES WHEN THE STRUCTURE IS 4 FEET AND GREATER IN DEPTH. ( MEASURE FROM FLOW LINE OF LOWEST PIPE TO TOP OF STRUCTURE ).
4. THE TREADS OF ALL STEPS SHALL HAVE ANTI-SKID PROPERTIES FOR HAND AND FOOT GRIPS.

MANHOLE:

USE TYPE 1 OR TYPE 3 STEPS FOR MANHOLE PIPE CHAMBER AND STEP TYPE 2 OR TYPE 4 FOR MANHOLE TOWER.



STEP TYPE NO. 3



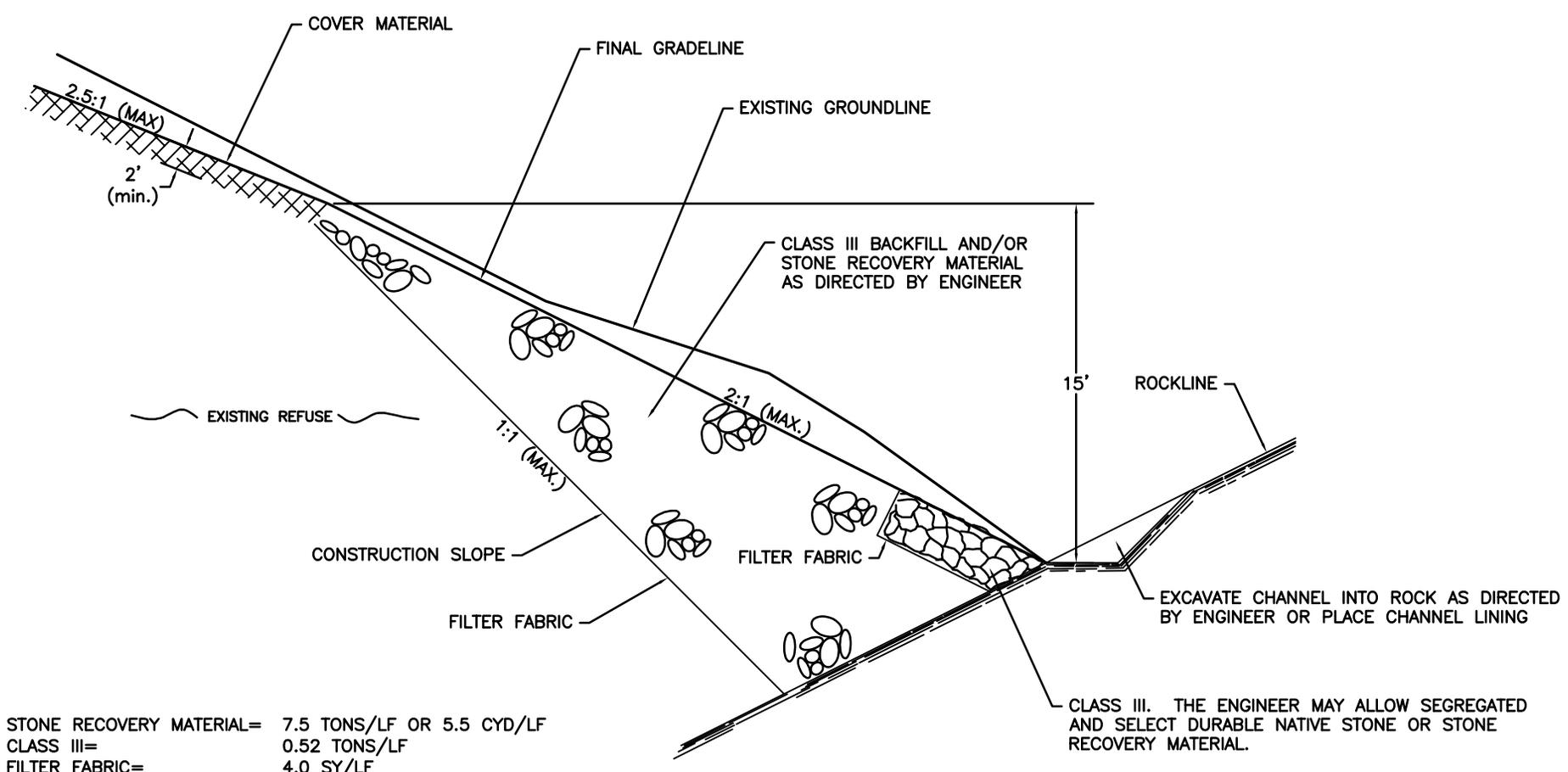
STEP TYPE NO. 4



NO. 3 STEEL ROD

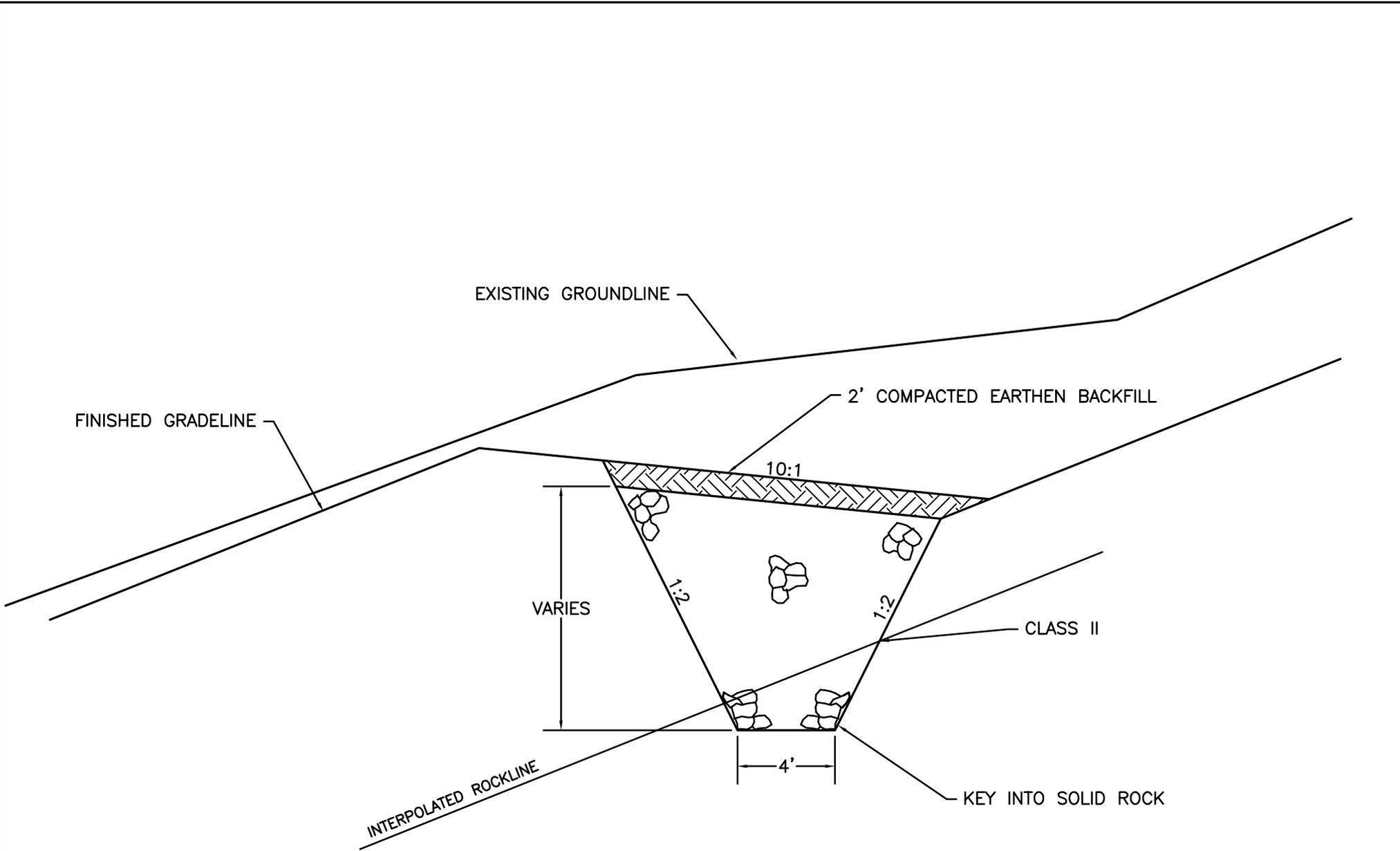
SECTION A-A

MANHOLE TYPE A- STEP DETAILS (AMLSUB 4-2)

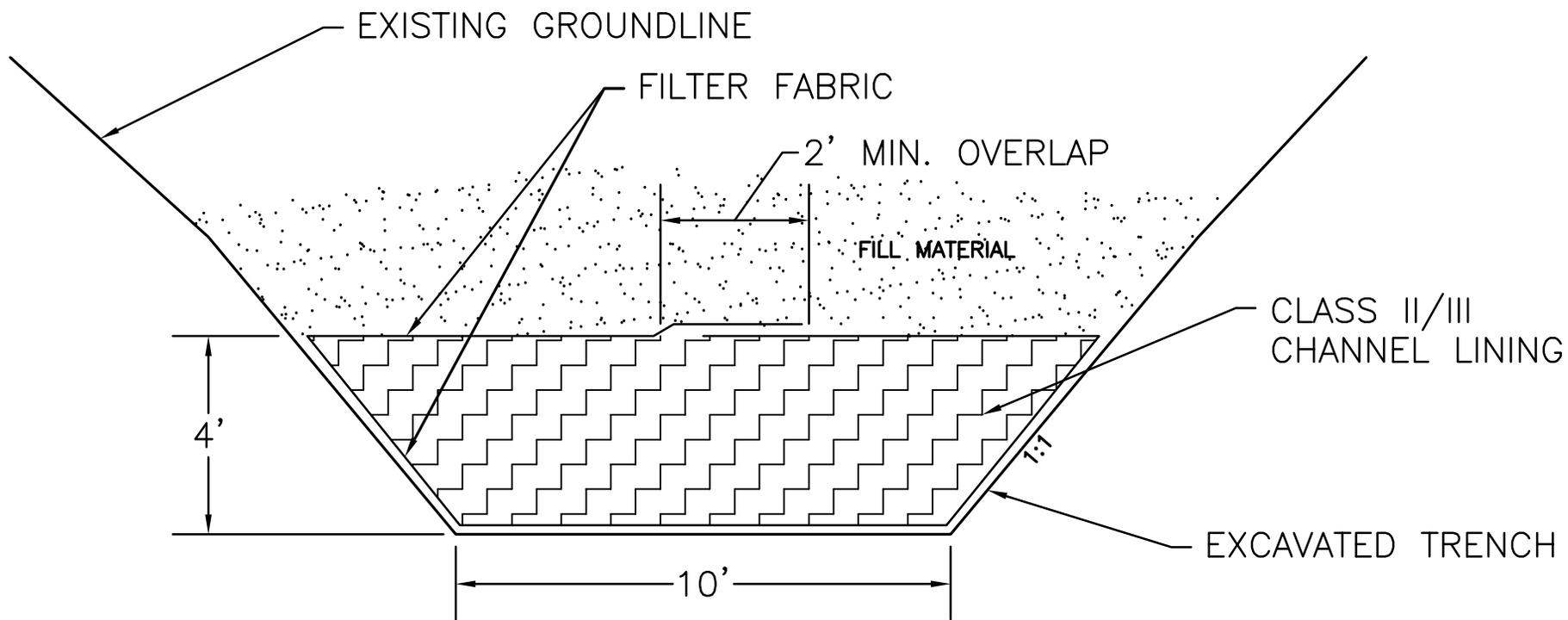


STONE RECOVERY MATERIAL= 7.5 TONS/LF OR 5.5 CYD/LF  
 CLASS III= 0.52 TONS/LF  
 FILTER FABRIC= 4.0 SY/LF

ROCK TOE BUTTRESS & DRAIN- TYPE 1 (AMLSUB 5-1)



ROCK TOE BUTTRESS & DRAIN- TYPE 2 (AMLSUB 5-2)

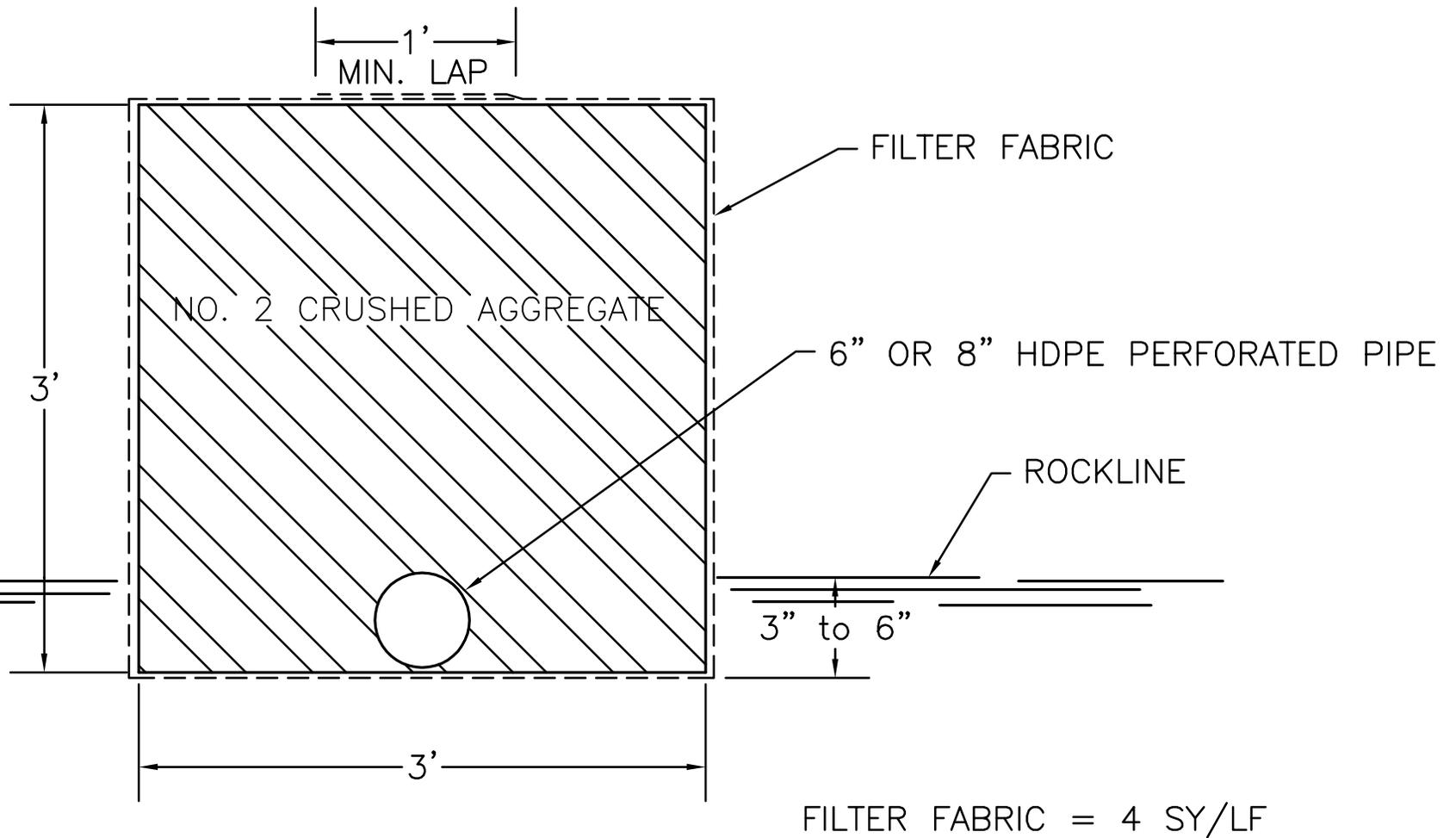


CLASS II/III=	2.7 TONS/LF
FILTER FABRIC=	4.60 SY/LF

ROCK CORE DRAIN (AMLSUB 6)

NOTE:

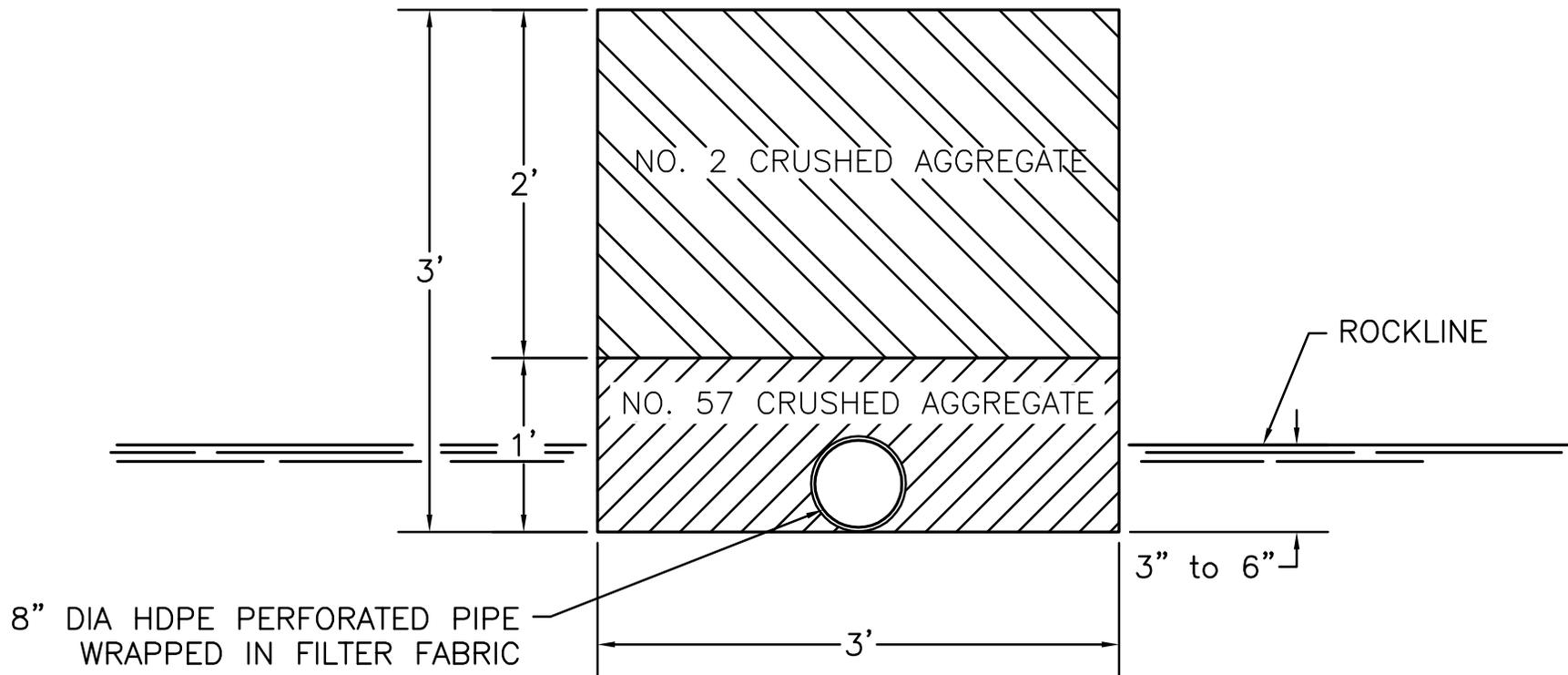
1. EXCAVATION SHALL BE CONSIDERED INCIDENTAL FOR SUBDRAINS INSTALLED LESS THAN 5 FT DEEP. FOR SUBDRAINS DEEPER THAN 5 FT., EXCAVATION SHALL BE INCLUDED FOR PAYMENT AS EARTHWORK ON A CUBIC YARD BASIS.
2. FOR SUBDRAINS DEEPER THAN 5' USE SOCK PIPE.



SUBDRAIN- TYPE 1 (AMLSUB 7)

NOTES:

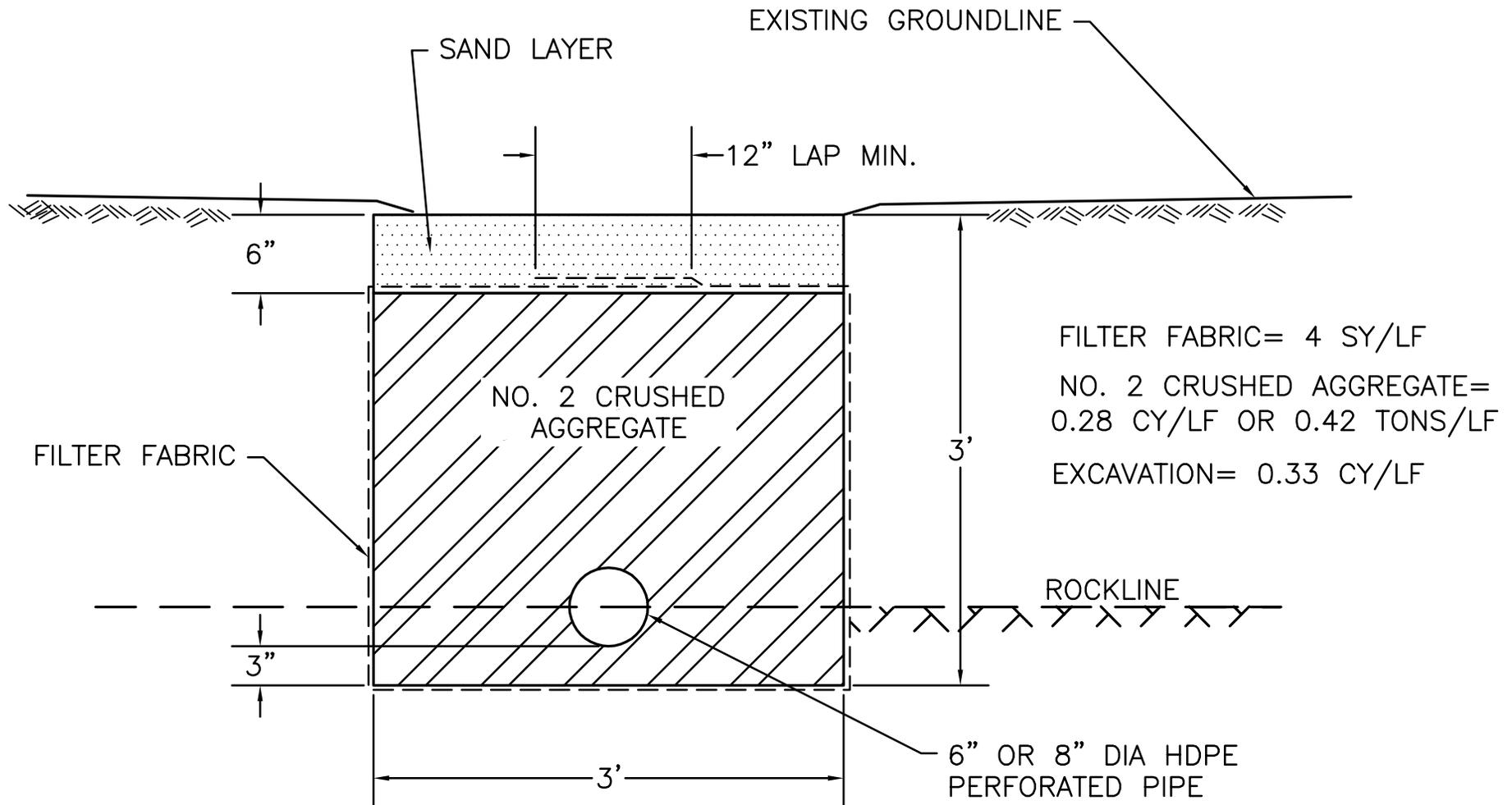
1. THIS SUBDRAIN SHALL BE USED FOR SUBDRAINS BETWEEN 5 AND 15 FT DEEP
2. EXCAVATION SHALL BE CONSIDERED INCIDENTAL FOR SUBDRAINS INSTALLED LESS THAN 5 FT DEEP. FOR SUBDRAINS DEEPER THAN 5 FT, EXCAVATION SHALL BE INCLUDED FOR PAYMENT AS EARTHWORK ON A CUBIC YARD BASIS.
3. THE ENGINEER MAY ALLOW THE CONTRACTOR TO USE #2 CRUSHED AGGREGATE INSTEAD OF #57 CRUSHED AGGREGATE IF IT CAN BE INSTALLED WITHOUT DAMAGE TO THE PIPE AND FABRIC.
4. FOR SUBDRAINS DEEPER THAN 5' USE SOCK PIPE.



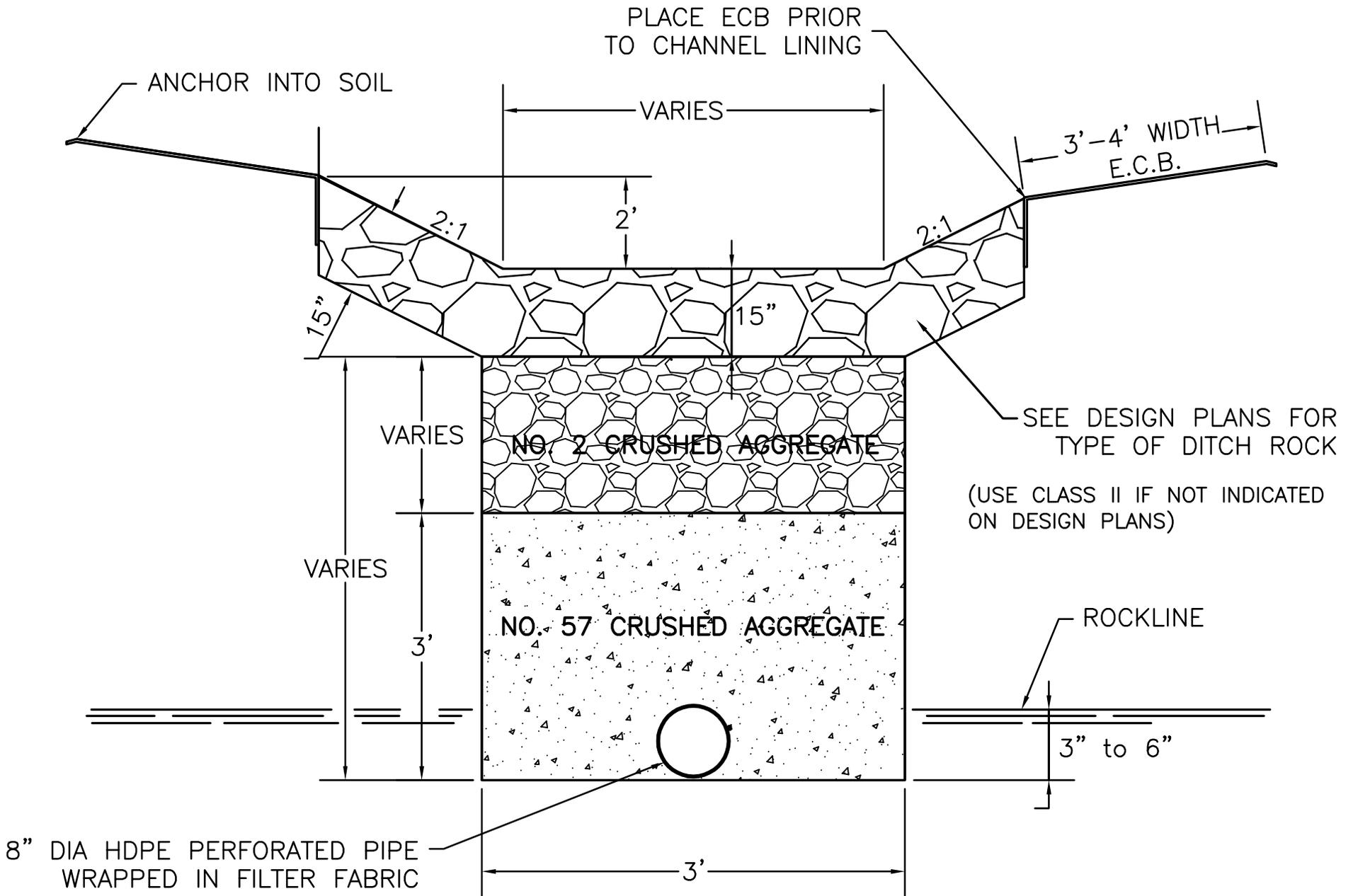
SUBDRAIN- TYPE 2 (AMLSUB 8)

NOTES:

1. EXCAVATION SHALL BE CONSIDERED INCIDENTAL FOR SUBDRAINS INSTALLED LESS THAN 5 FT DEEP. FOR SUBDRAINS DEEPER THAN 5 FT, EXCAVATION SHALL BE INCLUDED FOR PAYMENT AS EARTHWORK ON A CUBIC YARD BASIS.
2. FOR SUBDRAINS DEEPER THAN 5' USE SOCK PIPE.

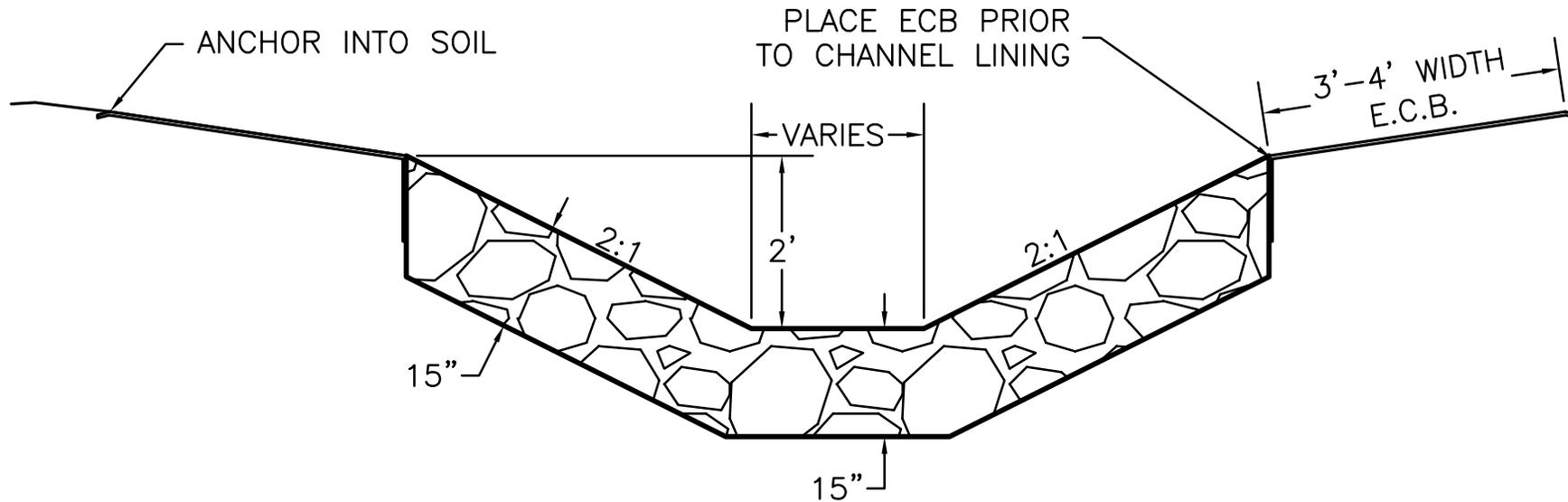


SUBDRAIN- TYPE 3 (AMLSUB 9)



COMBINATION DRAIN-DITCH (AMLSUB 10)

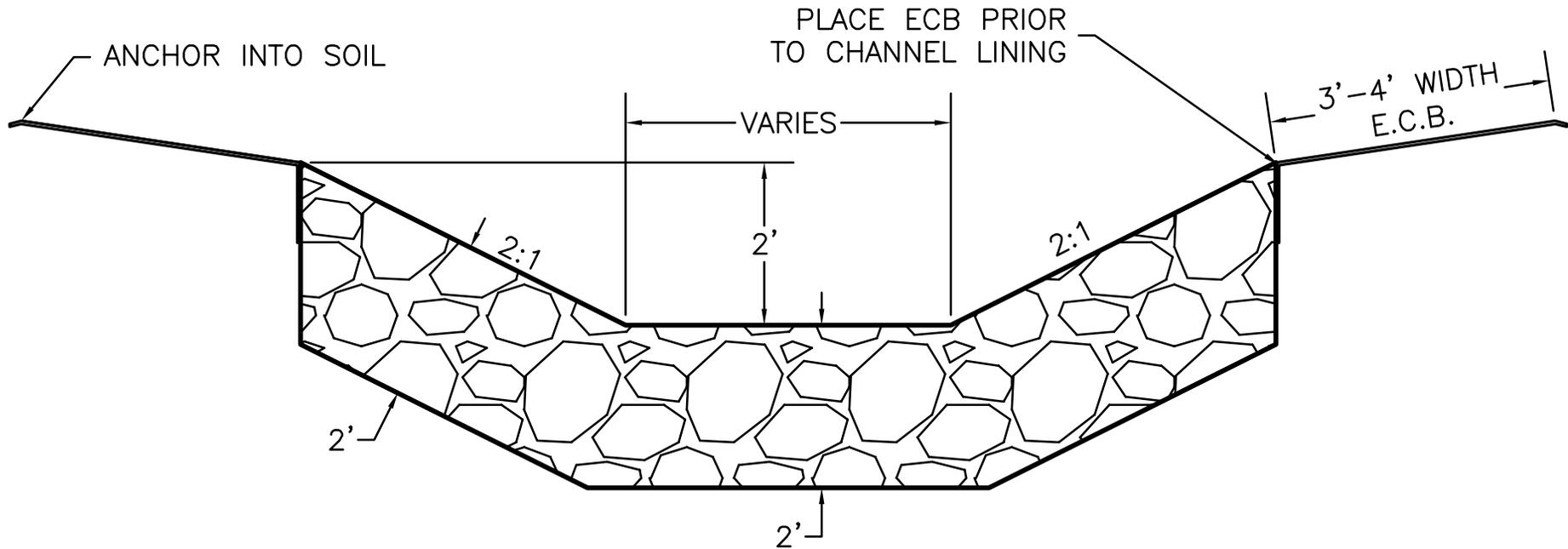
NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%. EXCAVATE DITCH TO DEPTH WHERE WATER RUNS OVER ROCK ON SIDES INTO DITCH.



BOTTOM WIDTH (LF)	CLASS II (TON/LF)	FILTER FABRIC (SQ YD/LF)	ECB (SQ YD/LF)
2	0.76	1.55	1
4	0.90	1.75	1
6	1.03	1.95	1

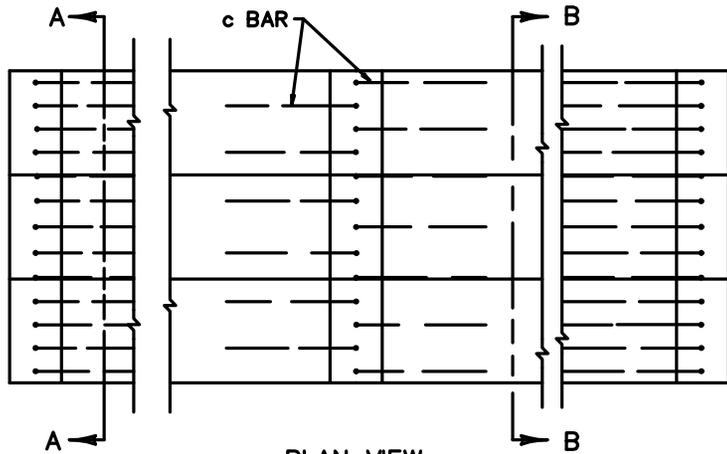
FLAT BOTTOM DITCH- CLASS II (AMLSUR 1)

NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%. EXCAVATE DITCH TO DEPTH WHERE WATER RUNS OVER ROCK ON SIDES INTO DITCH.

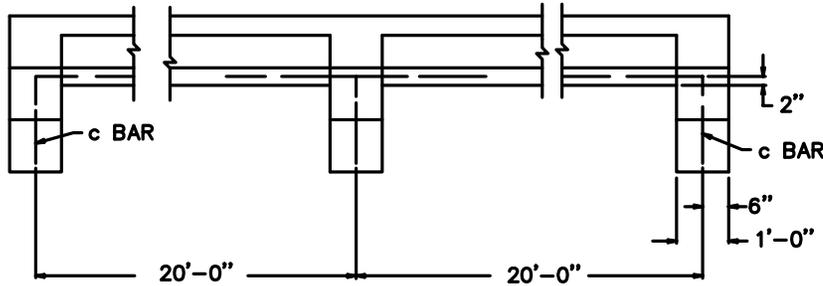


BOTTOM WIDTH (LF)	CLASS II/III (TON/LF)	FILTER FABRIC (SQ YD/LF)	ECB (SQ YD/LF)
4	1.65	2.40	1
6	1.88	2.60	1
8	2.10	2.80	1

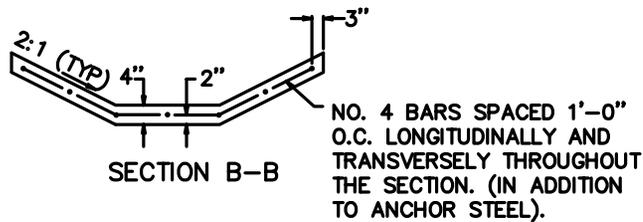
FLAT BOTTOM DITCH- CLASS III (AMLSUR 2)



PLAN VIEW

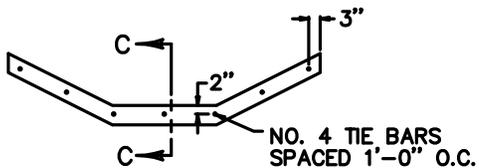


ELEVATION VIEW

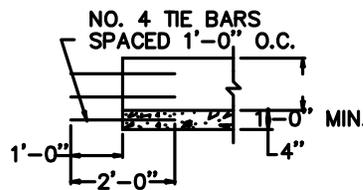


SECTION B-B

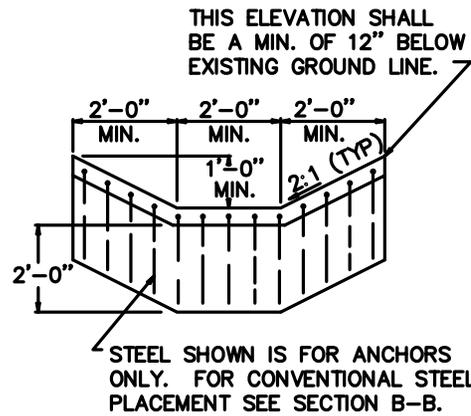
NO. 4 BARS SPACED 1'-0" O.C. LONGITUDINALLY AND TRANSVERSELY THROUGHOUT THE SECTION. (IN ADDITION TO ANCHOR STEEL).



TIE BAR SECTIONAL VIEW



SECTION C-C



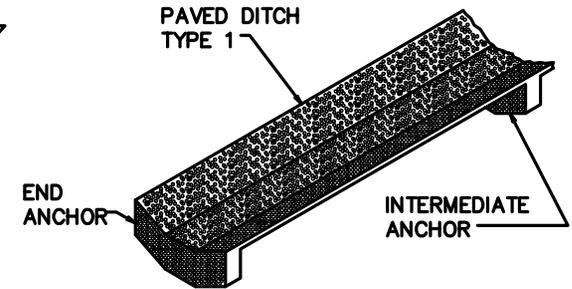
SECTION A-A

THIS ELEVATION SHALL BE A MIN. OF 12" BELOW EXISTING GROUND LINE.

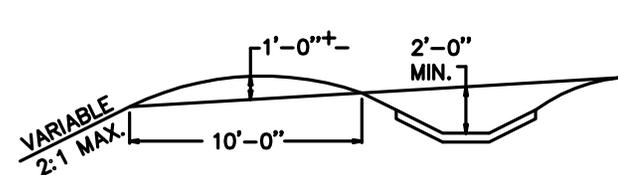
STEEL SHOWN IS FOR ANCHORS ONLY. FOR CONVENTIONAL STEEL PLACEMENT SEE SECTION B-B.

NOTES

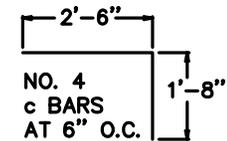
- ROADWAY EXCAVATION SHALL BE PAID FROM THE TOP OF THE PAVED DITCH SLAB TO THE ORIGINAL GROUND. THE EXCAVATION FROM THE TOP OF THE CONCRETE OF THE PAVED DITCH DOWN, WILL BE INCLUDED IN THE PRICE PAID FOR THE PAVED DITCH INCLUDING THE EXCAVATION FOR THE INTERMEDIATE AND END ANCHORS, AND NO DIRECT PAYMENT WILL BE MADE FOR THIS EXCAVATION.
- ESTIMATE 0.080 CU. YDS. CLASS A CONCRETE PER LINEAR FOOT OF PAVED DITCH AND 0.398 CU. YDS. CLASS A CONCRETE PER ANCHOR BASED ON MINIMUM DIMENSIONS SHOWN ON THIS DRAWING.
- THE SECTION SHOWN WITHIN THE MINIMUM DIMENSION IS ESTIMATED AT 0.72 SQ. YD. PER LIN. FT.
- COMPACTION, FINISHING AND CURING SHALL BE THE SAME AS REQUIRED FOR CONCRETE SIDEWALK.
- IF THE CONTRACTOR ELECTS TO USE A CONSTRUCTION JOINT IN THE POURING OF THE PAVED DITCH, IT SHALL BE CONSTRUCTED AS DETAILED.
- ANY LENGTH OF LONGITUDINAL REINFORCING STEEL WILL BE PERMITTED PROVIDED A 1'-0" LAP IS USED IN THE SPLICE. ADEQUATE TIES AT THE SPLICE SHALL BE REQUIRED.
- FIBER REINFORCED CONCRETE MAY BE SUBSTITUTED FOR STEEL AS DIRECTED BY ENGINEER.



ISOMETRIC VIEW



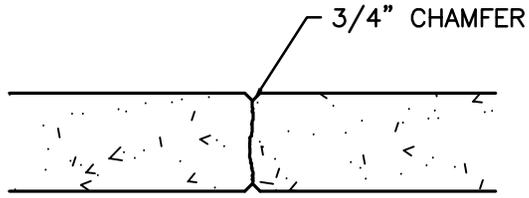
TYPICAL PAVED DITCH (INTERCEPTOR DITCH)



c BAR DETAIL

APPROX. STEEL QUANTITIES FOR MINIMUM SECTION SHOWN	
END ANCHORS (EACH)	36.19 LBS.
INTERMEDIATE ANCHORS (EACH)	36.19 LBS.
CONSTRUCTION JOINTS (EACH)	9.352 LBS.
BARS PER SQ. YD. OF DITCH	12.047 LBS.

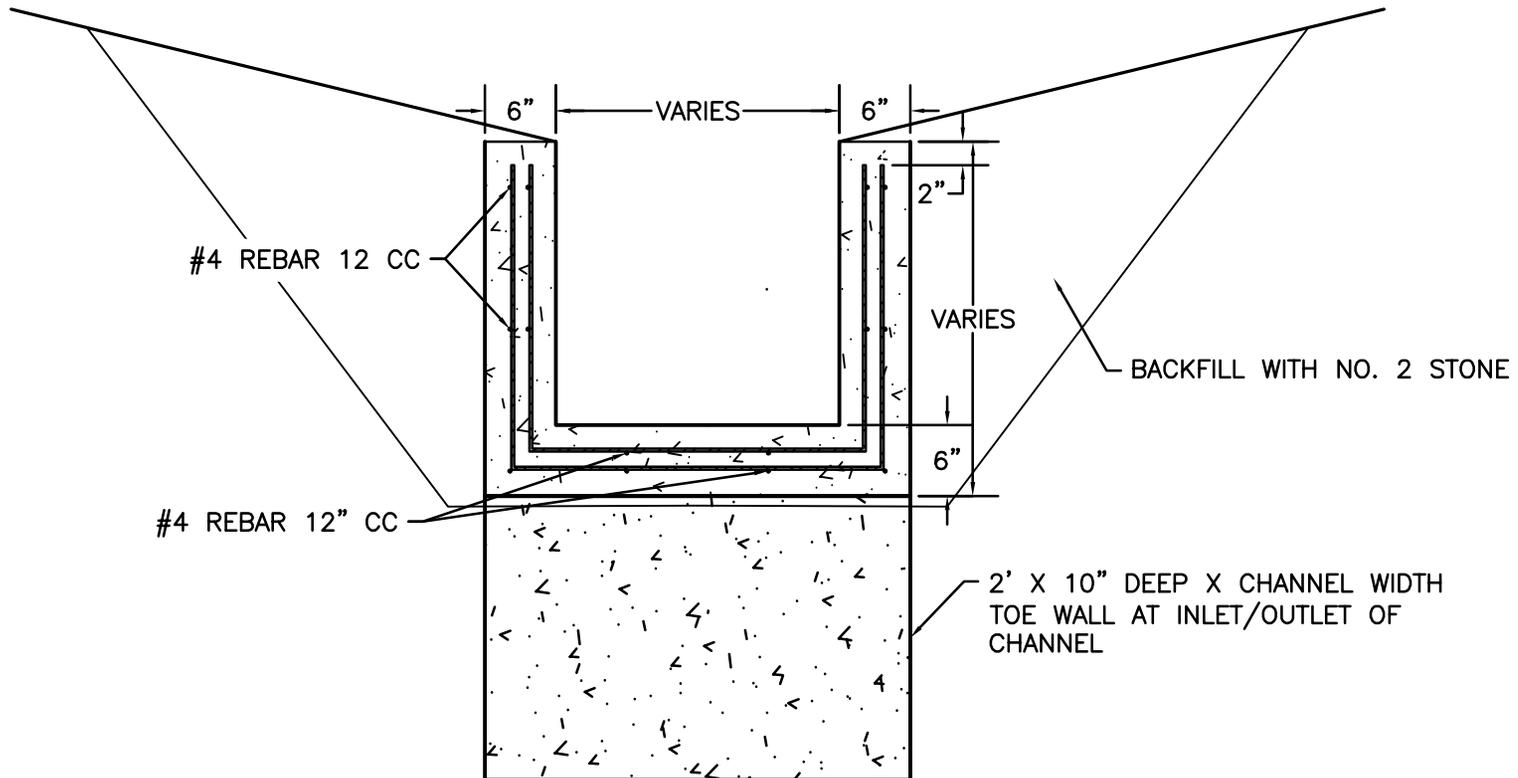
FLAT BOTTOM CONCRETE DITCH- 2 FOOT WIDTH (AMLSUR 3)



CONCRETE JOINT

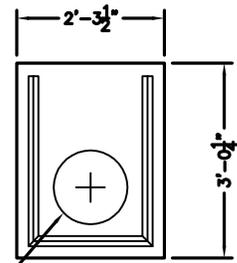
CONSTRUCTION JOINTS SHALL BE PLACED A MINIMUM OF 10' & A MAXIMUM OF 20'. ALL BAR SPLICES SHALL BE A MINIMUM OF 18" AND A MAXIMUM OF 24".

ALL STEEL REINFORCEMENT SHALL BE 60 KSI. ALL CONCRETE SHALL BE 4000 PSI.



ALL REBAR SHALL HAVE 2" MIN CLEARANCE. INSTALL SIDEWALLS COMPLETELY BELOW GROUNDLINE.

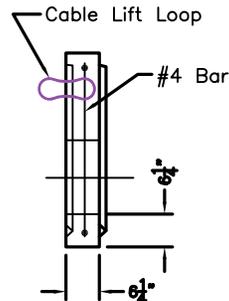
RECTANGULAR CONCRETE DITCH (AMLSUR 4)



Available with Max Hole size of 12"φ

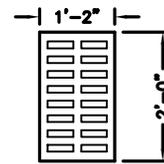
**ELEV VIEW**

**END CAP DETAIL**

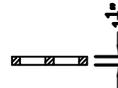


**SIDE VIEW**

**GRATE DETAIL**



**PLAN VIEW**

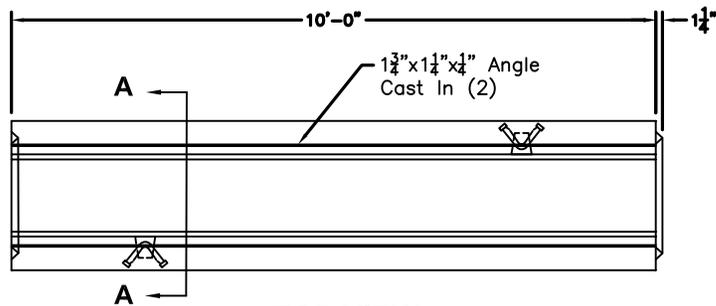


**SIDE VIEW**

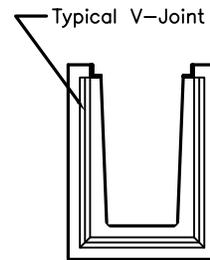
Grate shall be equal to Neenah R-4990-DX

**GENERAL NOTES:**

1. Concrete: 28 Day Compressive Strength  $f'_c = 4,500$  psi
2. Steel Reinforcement: ASTM A-615, Grade 60 KSI
3. Cover to Steel-1" Minimum
4. Trench Drains are Designed to Meet ASTM C858 and ACI 318 with AASHTO HS-20 Loading
5. End Caps & Joints Sealed with 1"φ Butyl Mastic Sealant
6. Weight Per 8'-0" Section is 2,955#
7. Available In Shorter Sections Of 2', 4' And 6'



**TOP VIEW**

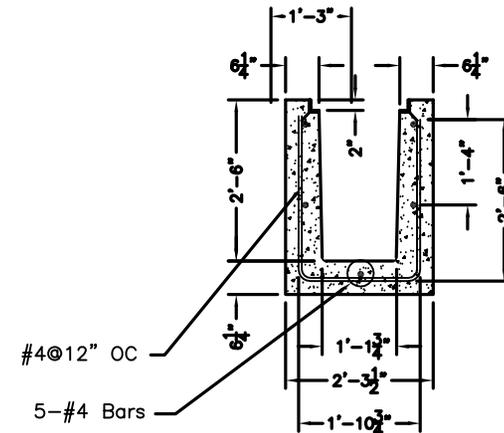


**END VIEW**



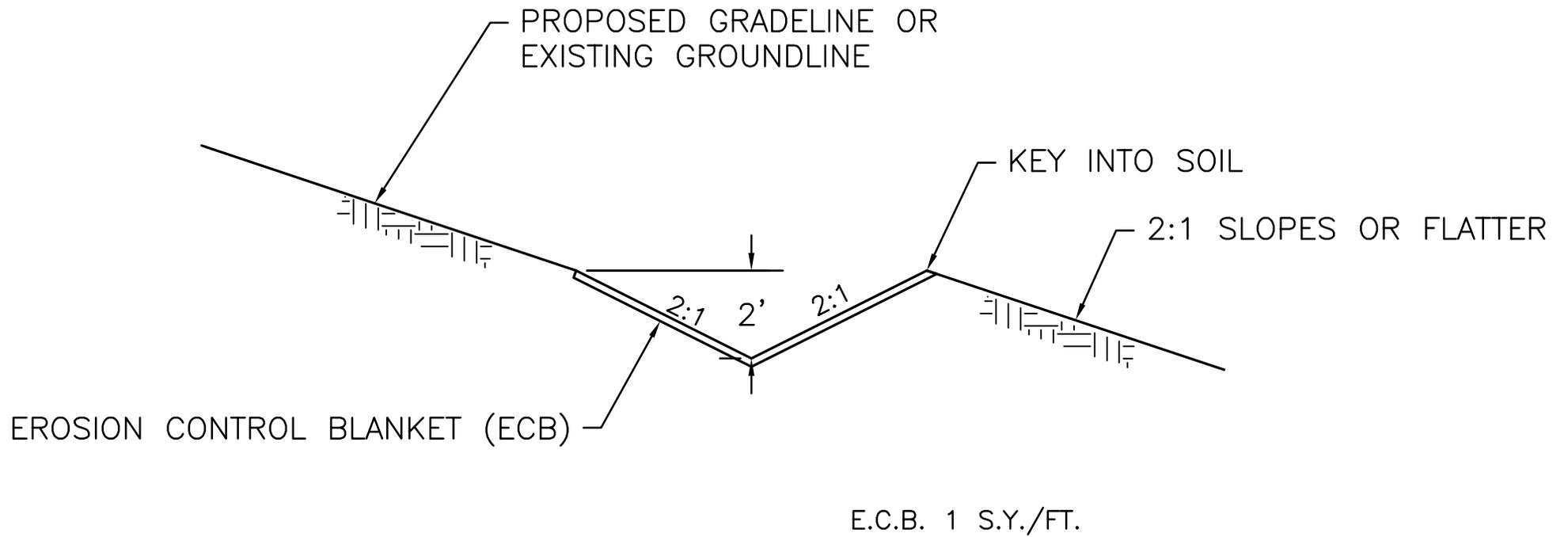
2 Ton UA Anchors(2)

**SIDE VIEW**

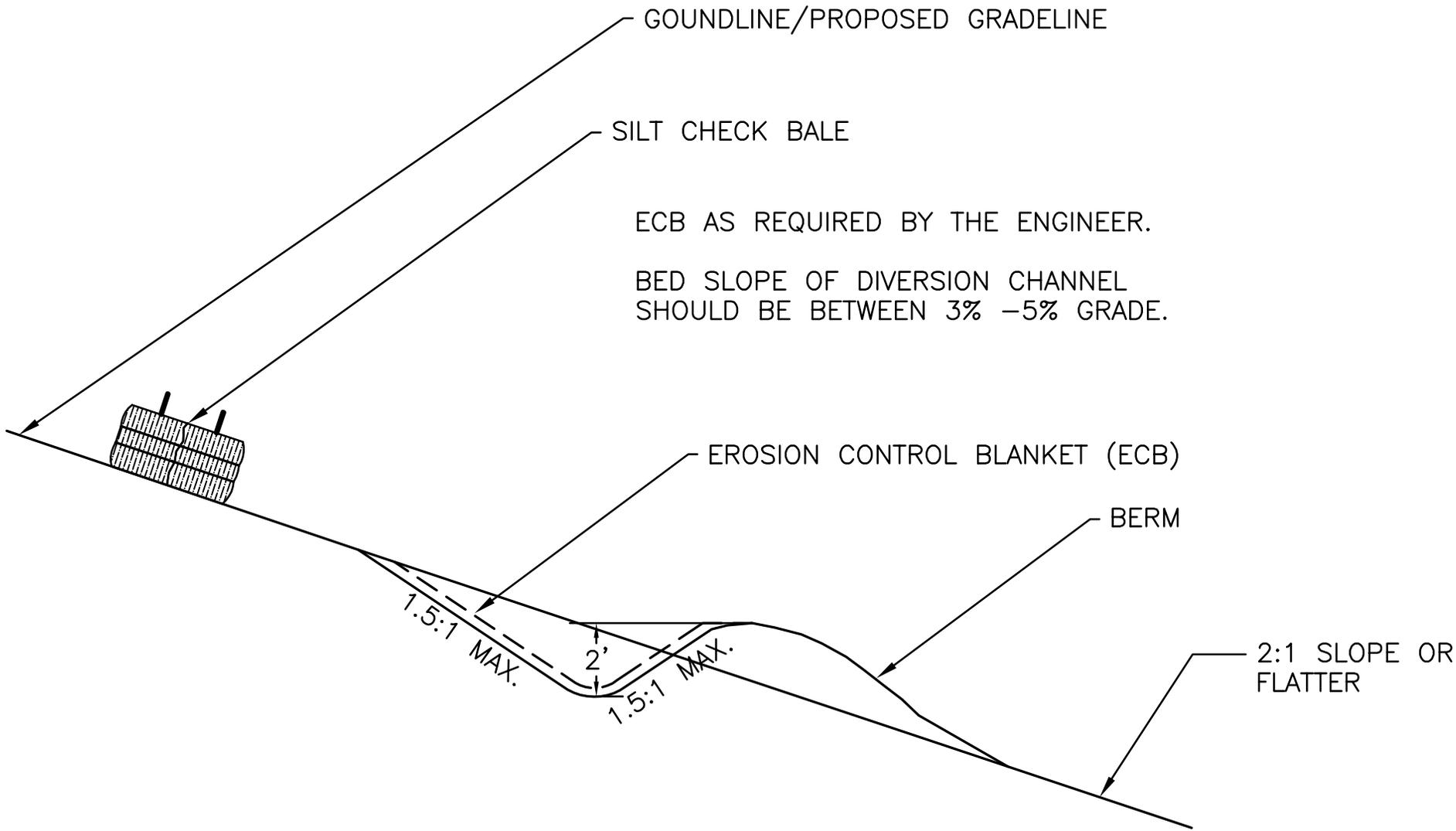


**SECTION A-A**

**GRATED TRENCH DRAIN- 12" (AMLSUR 5)**

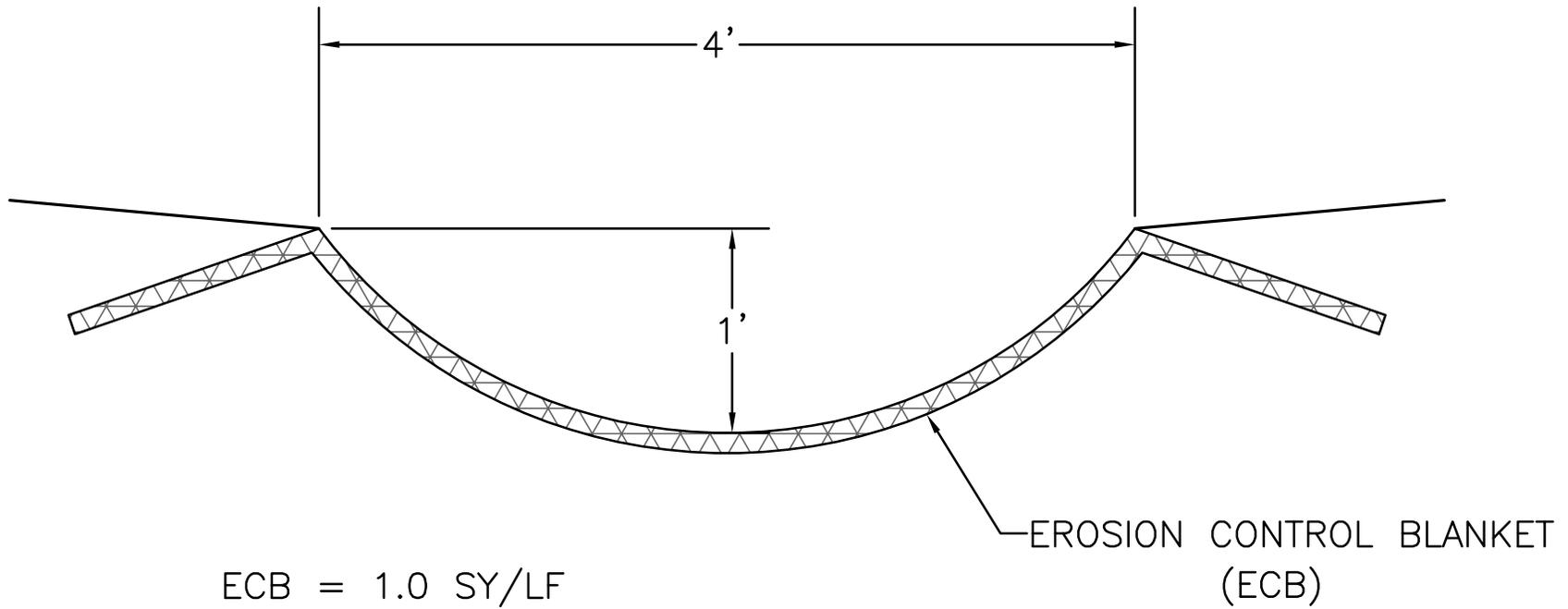


EROSION CONTROL BLANKET "V" DITCH (AMLSUR 6)



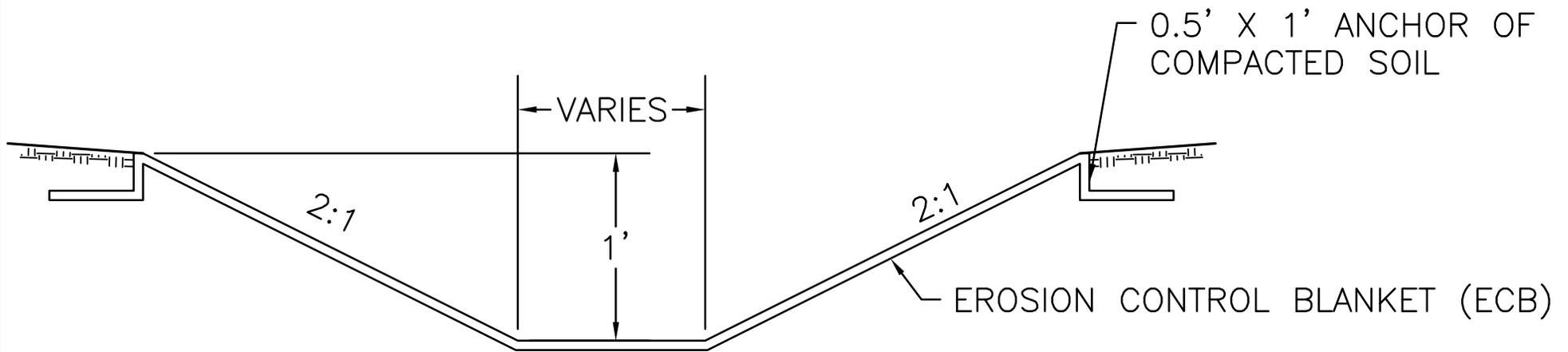
ECB DIVERSION DITCH WITH BERM (AMLSUR 7)

ANCHORS SHALL BE PLACED AT ALL TRAVERSE SEAMS  
AND MAX 100' APART ON SLOPES >7%.



ECB SWALE DITCH- 4 FOOT (AMLSUR 8)

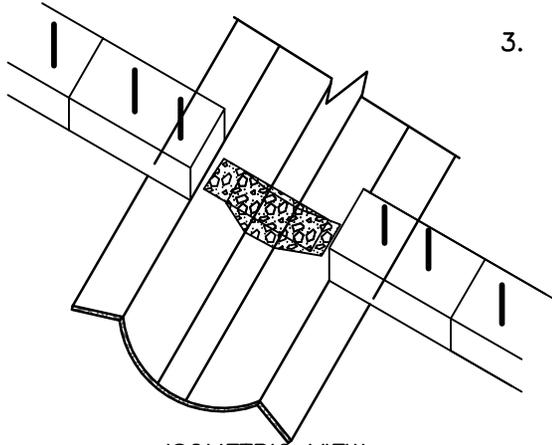
NOTE: SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.



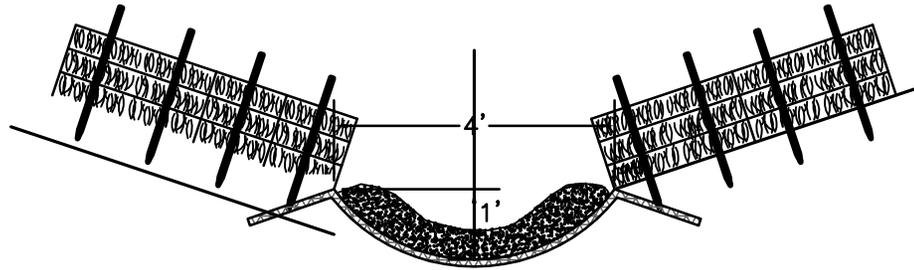
2' FB ECB = 1.30 SY/LF  
4' FB ECB = 1.51 SY/LF

NOTES:

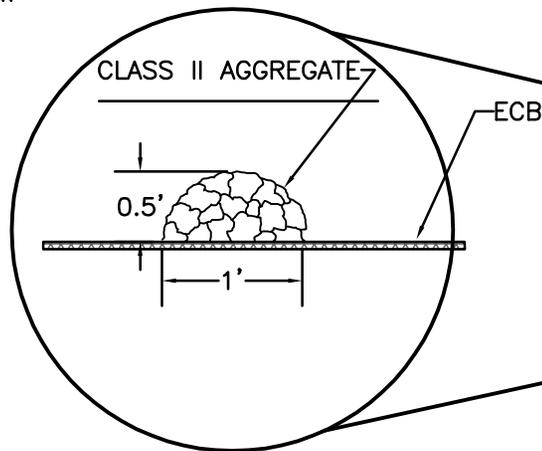
1. SPACING OF ANCHORS SHALL BE AT ALL TRAVERSE SEAMS AND AS STATED ON THE SITE SPECIFIC DRAWINGS.
2. TWO HAYBALES SHALL BE PLACED ON EACH SIDE AT ALL ANCHOR LOCATIONS
3. SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.



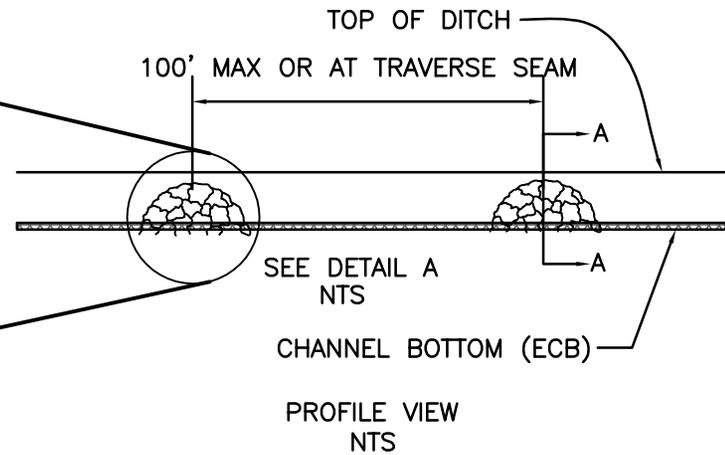
ISOMETRIC VIEW  
NTS



SECTION A-A  
NTS



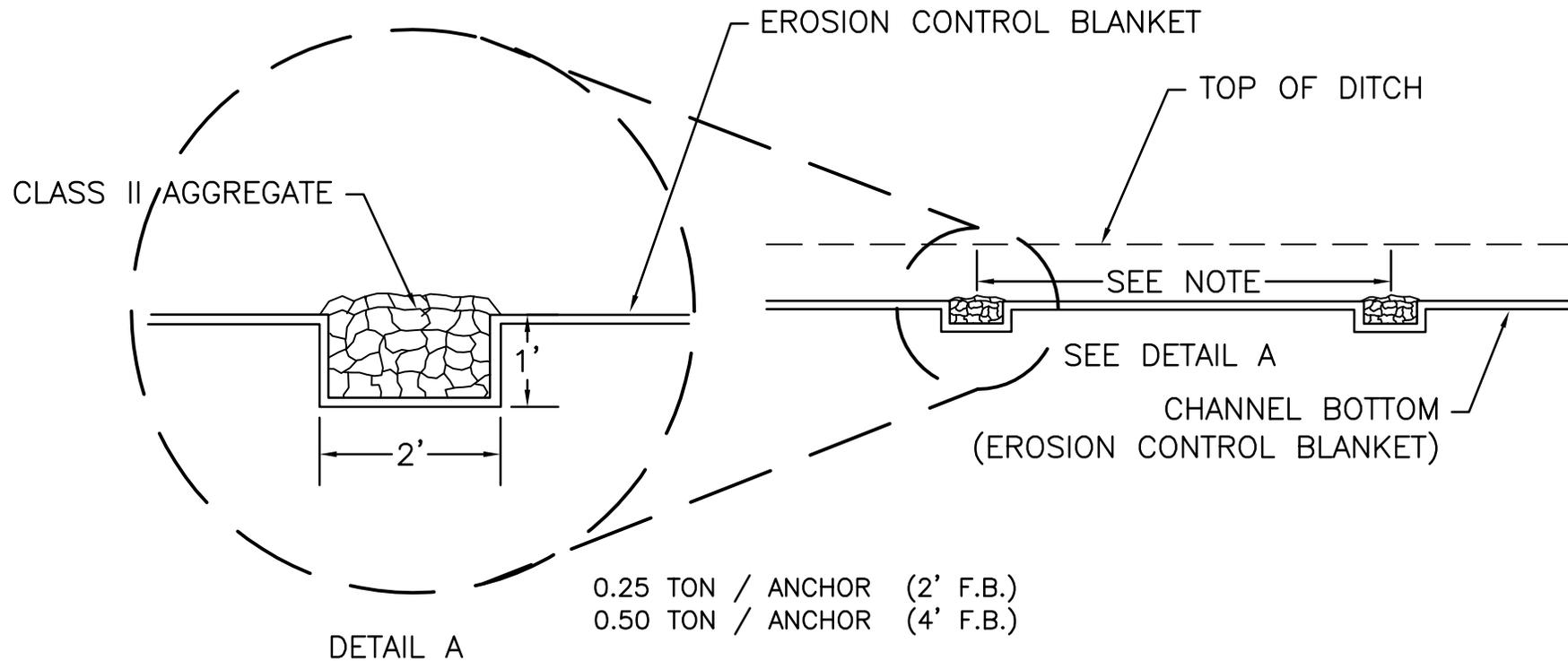
DETAIL A  
NTS



PROFILE VIEW  
NTS

NOTES:

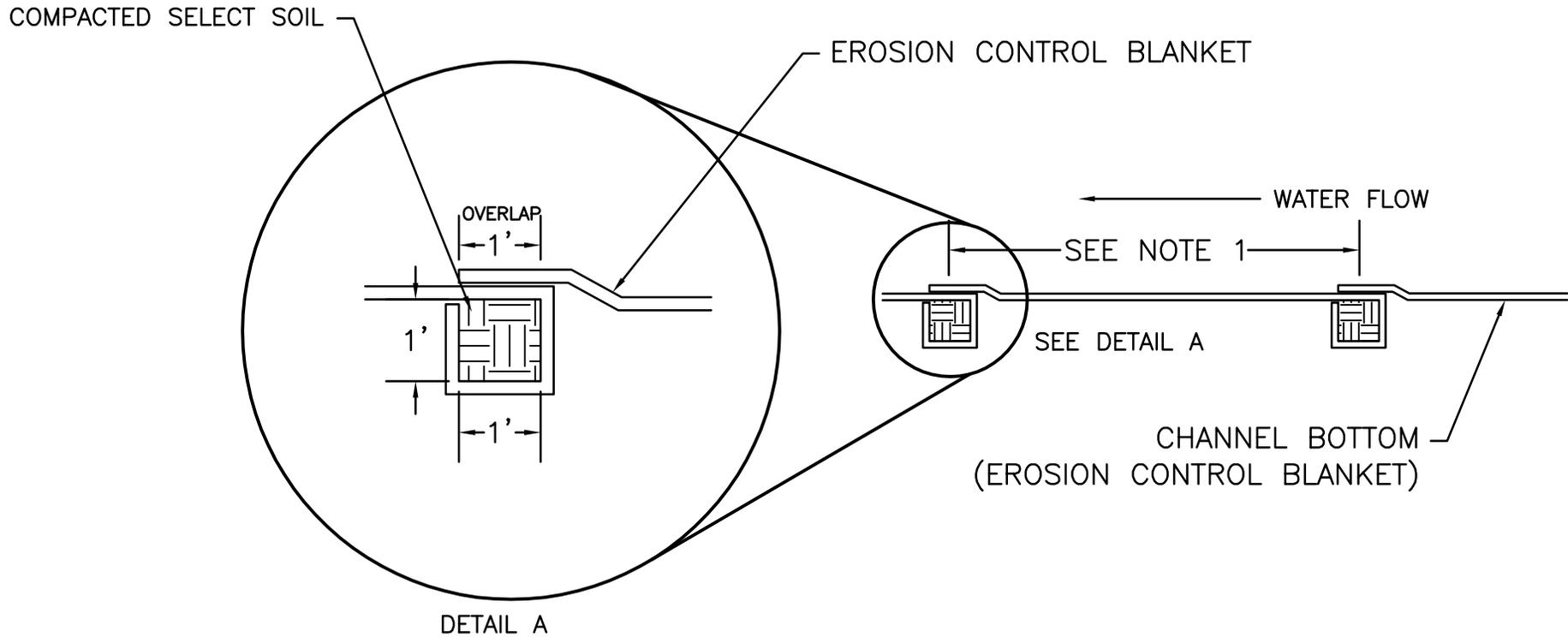
1. SPACING OF ANCHORS SHALL BE AT ALL TRAVERSE SEAMS AND AS STATED ON THE SITE SPECIFIC DRAWINGS.
2. SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.



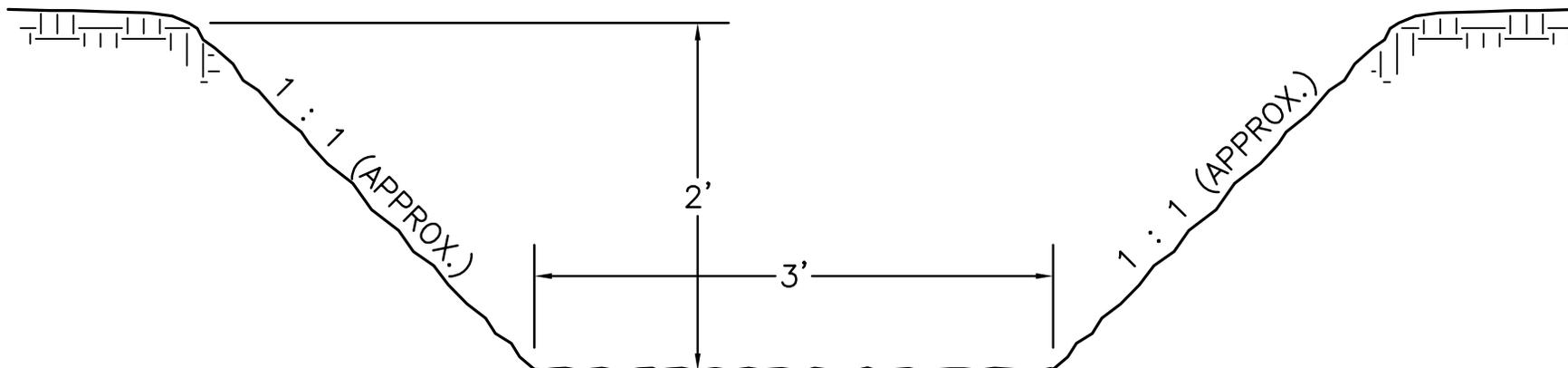
EROSION CONTROL BLANKET ANCHOR- TYPE B (AMLSUR 11)

NOTES:

1. SPACING OF ANCHORS SHALL BE AT ALL TRAVERSE SEAMS AND AS STATED ON THE SITE SPECIFIC DRAWINGS.
2. SOIL AMENDMENTS AND SEED SHALL BE APPLIED BEFORE INSTALLING EROSION CONTROL BLANKETS.

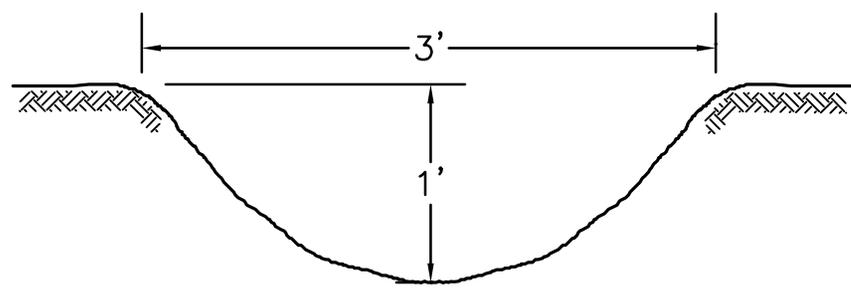


EROSION CONTROL BLANKET ANCHOR- TYPE C (AMLSUR 12)



RECTANGULAR BOTTOM DITCH

USE OF HOE RAM WILL BE REQUIRED ON  
ROCK DITCHES. PAYMENT SHALL BE MADE  
BY THE HOUR.

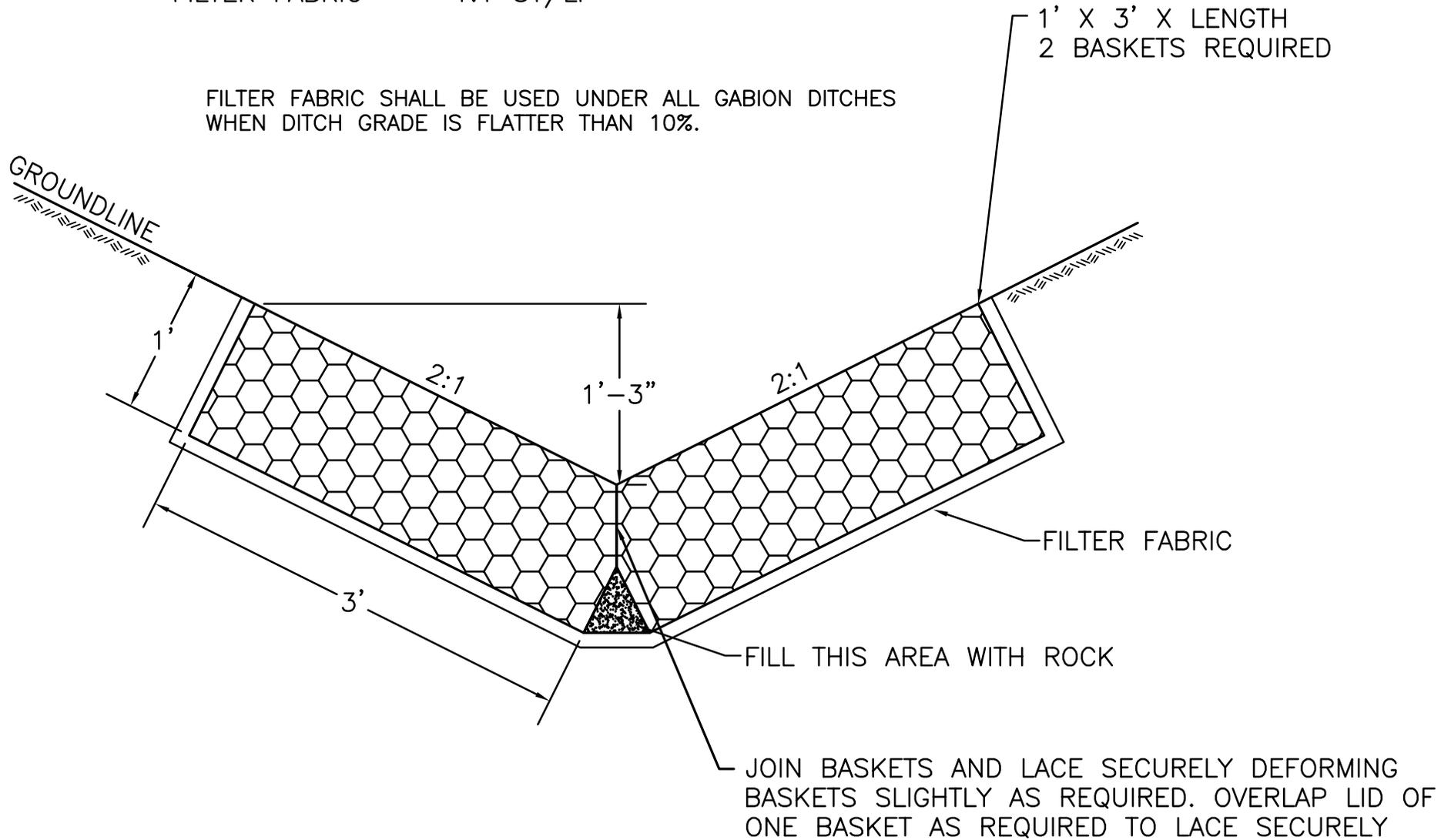


CIRCULAR BOTTOM DITCH

EXCAVATED ROCK DITCHES (AMLSUR 13)

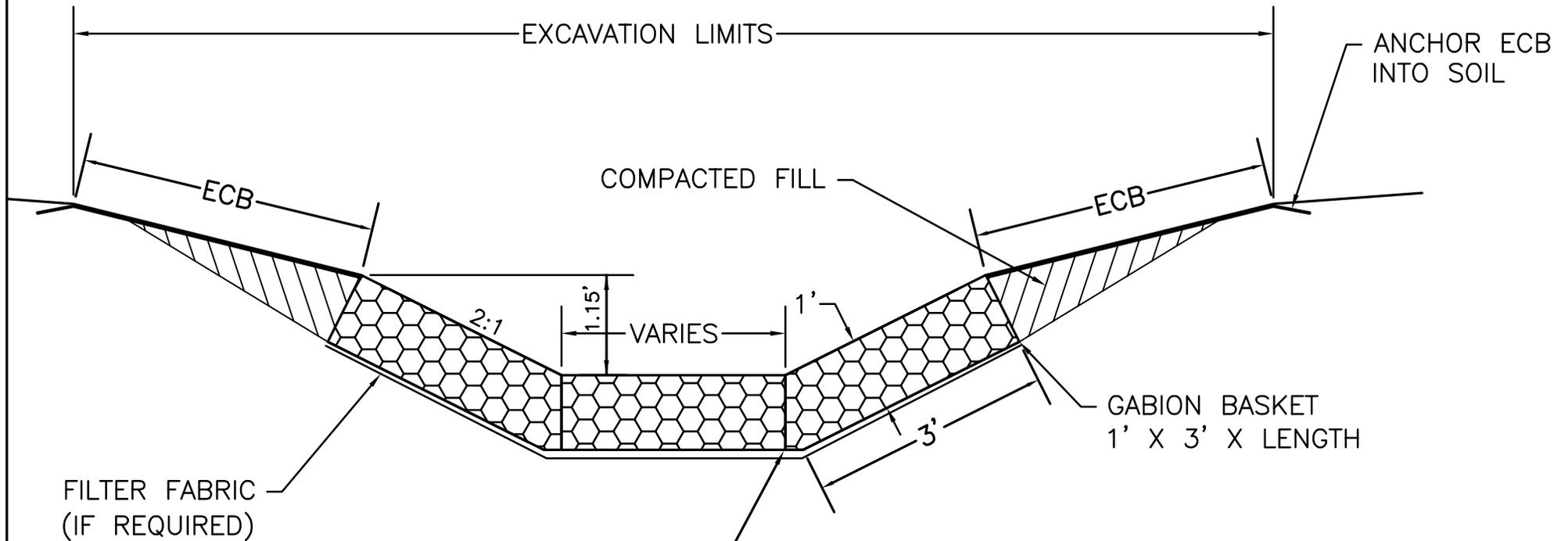
GABION = 0.22 CY/LF  
FILTER FABRIC = 1.1 SY/LF

FILTER FABRIC SHALL BE USED UNDER ALL GABION DITCHES  
WHEN DITCH GRADE IS FLATTER THAN 10%.



GABION "V" DITCH (AMLSUR 14)

NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%.



JOIN BASKETS AND OVERLAP LID OF ONE BASKET, LACE SECURELY, DEFORMING BASKETS SLIGHTLY AS REQUIRED

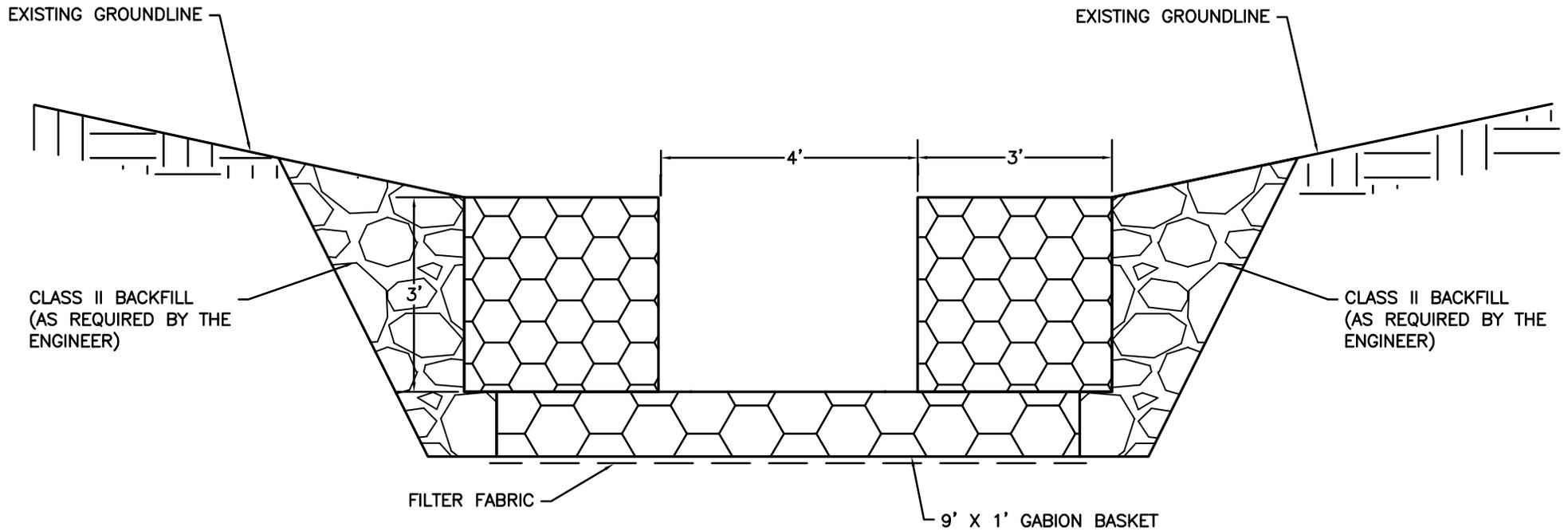
QUANTITIES

	<u>GABIONS</u>	<u>FILTER FABRIC</u>
3' WIDE=	0.35 CY/LF	1.00 SY/LF
6' WIDE=	0.48 CY/LF	1.33 SY/LF
9' WIDE=	0.61 CY/LF	1.67 SY/LF

ECB = 1.00 SY/LF

TRAPEZOIDAL GABION DITCH- (3',6',9' WIDTHS) (AMLSUR 15)

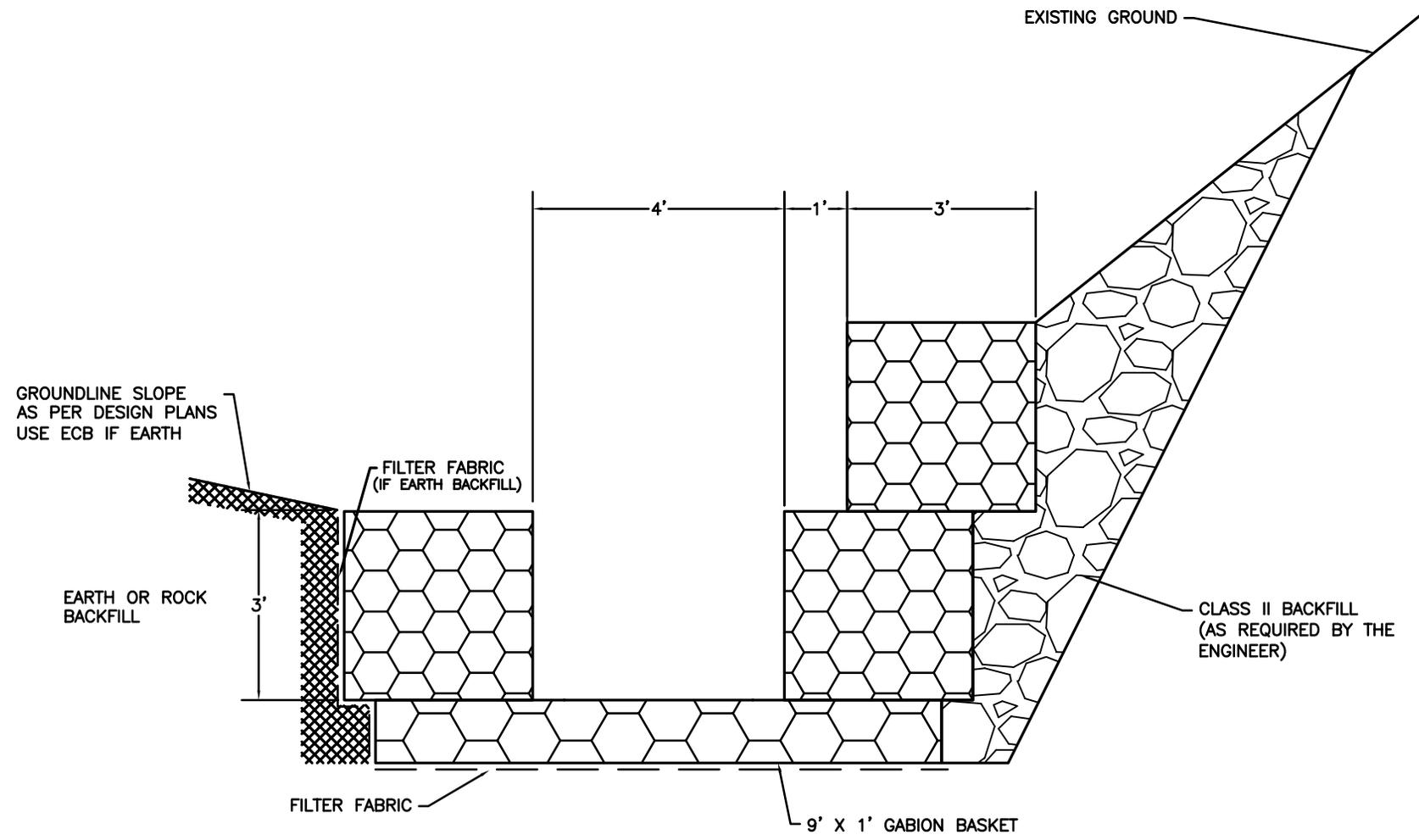
NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%.



QUANTITIES

GABION	1.00 CY/LF
FILTER FABRIC	1.11 SY/LF
CLASS II BACKFILL	0.84 TON/LF
ECB	1.00 SY/LF

RECTANGULAR GABION DITCH- 4' FLAT BOTTOM (AMLSUR 16-1)

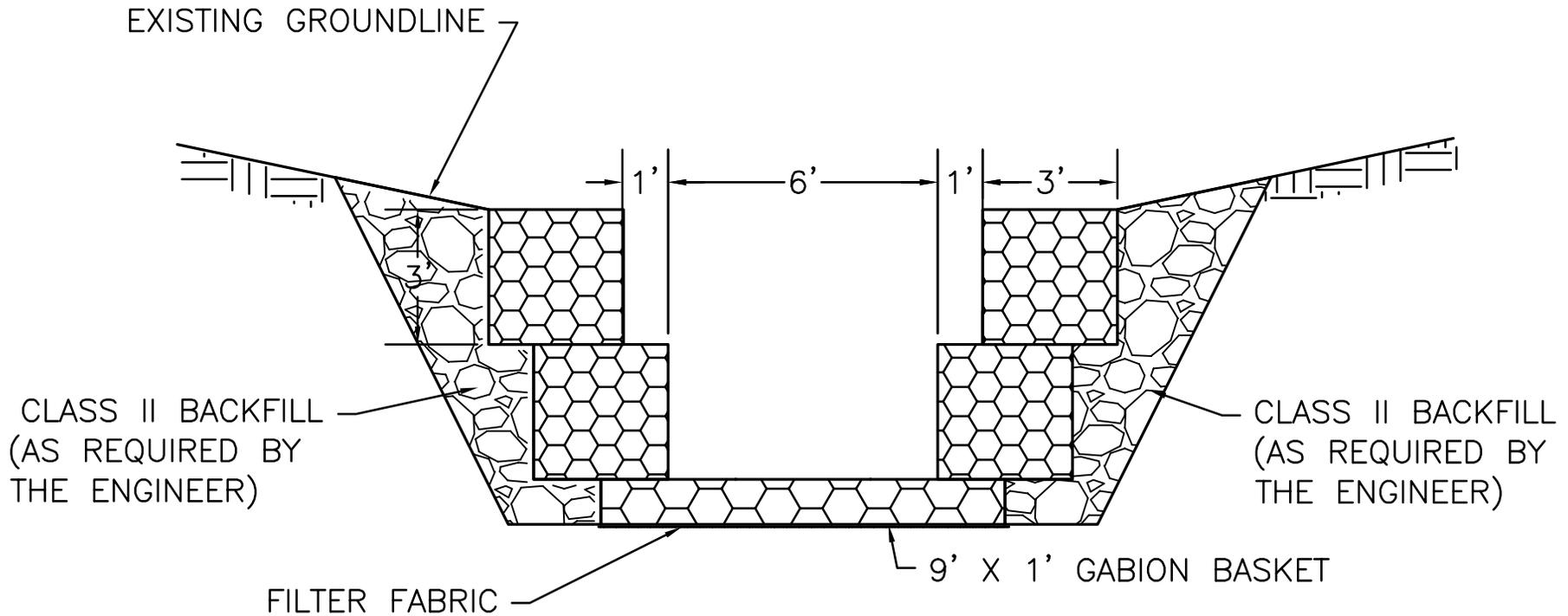


QUANTITIES

GABION	1.33 CY/LF
FILTER FABRIC	1.55 SY/LF
CLASS II BACKFILL	1.11 TON/LF
ECB	1.00 SY/LF

RECTANGULAR GABION DITCH- 4' FLAT BOTTOM (AMLSUR 16-2)

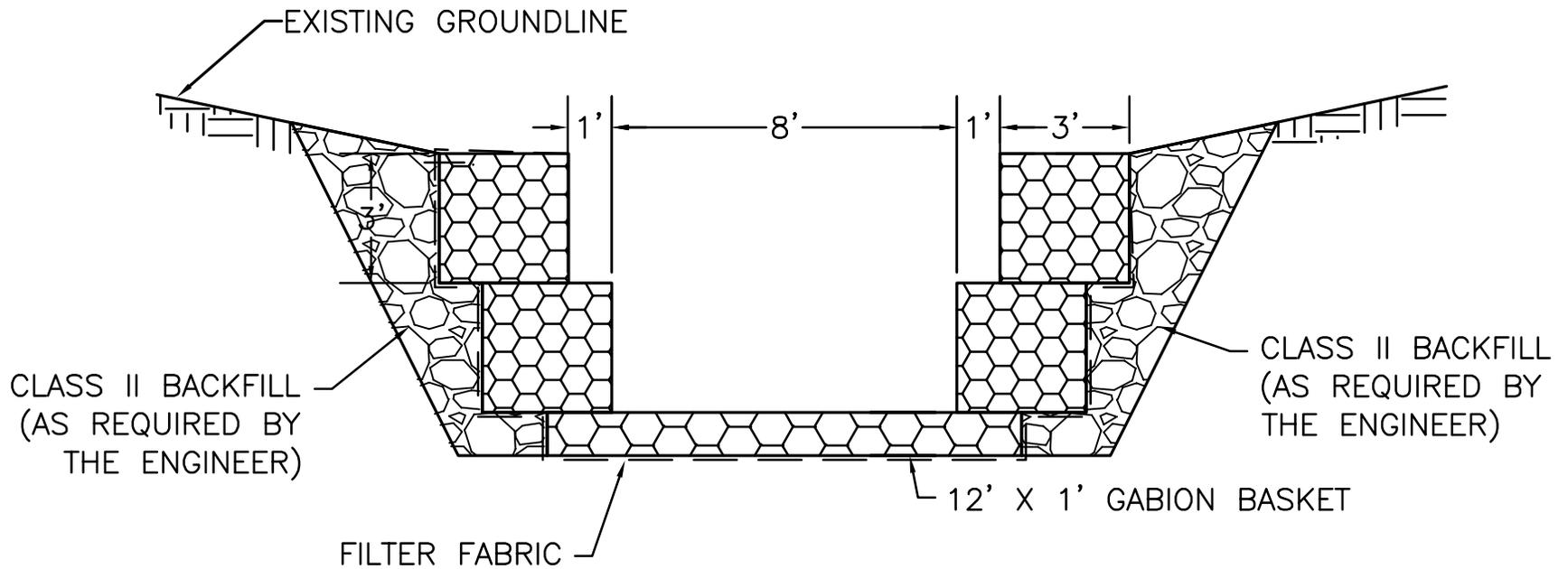
NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%.



GABION	1.70 CY/LF
FILTER FABRIC	2.70 SY/LF
CLASS II BACKFILL	1.80 TON/LF
ECB	1.00 SY/LF

RECTANGULAR GABION DITCH - 6' FLAT BOTTOM (AMLSUR 17)

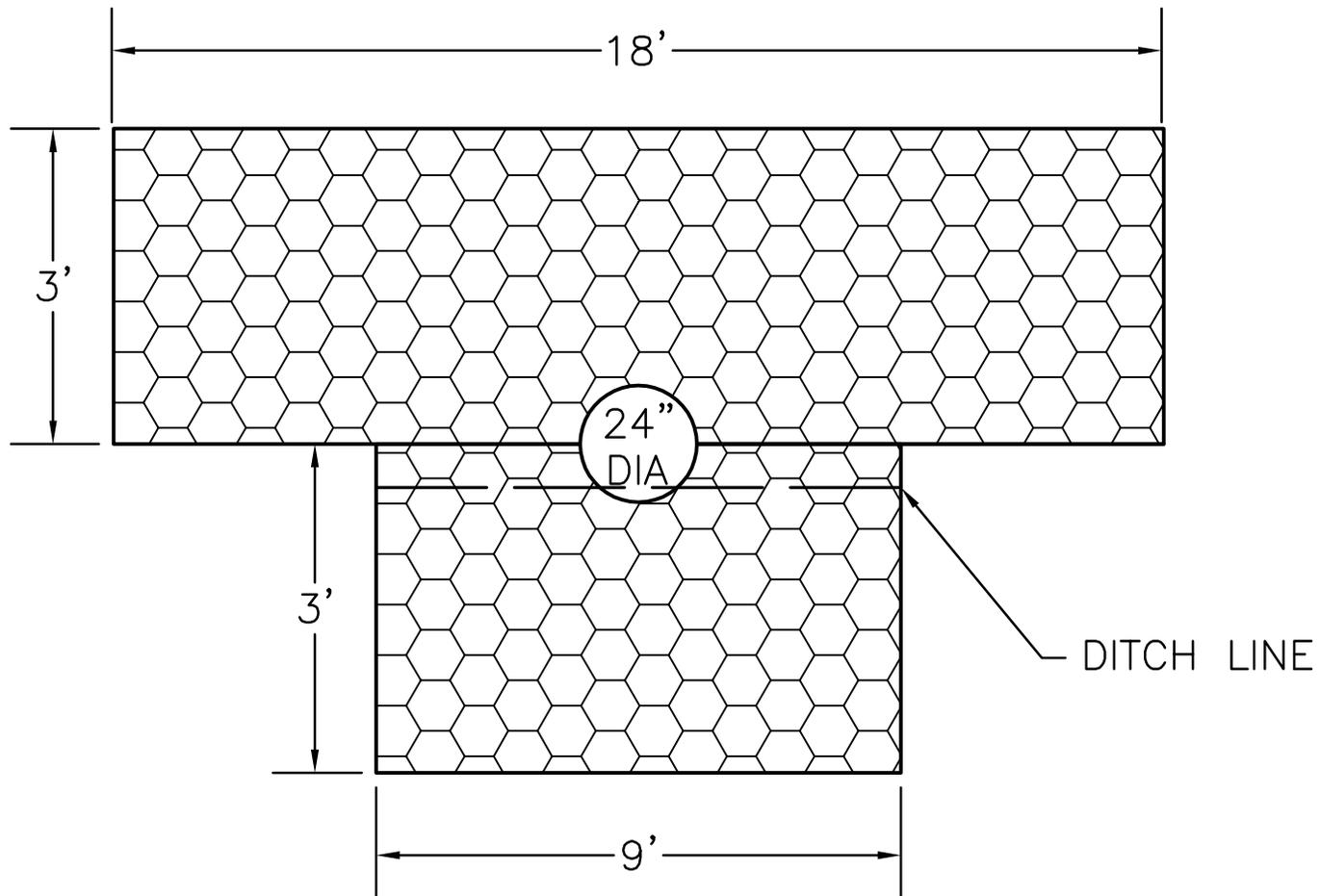
NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%.



GABION	1.80 CY/LF
FILTER FABRIC	3.50 SY/LF
CLASS II BACKFILL	1.80 TON/LF
ECB	1.00 SY/LF

RECTANGULAR GABION DITCH - 8' FLAT BOTTOM (AMLSUR 18)

NOTE: 24" HDPE PIPE IS SET IN BOTTOM OF DITCH. USE FILTER FABRIC AROUND GABIONS.

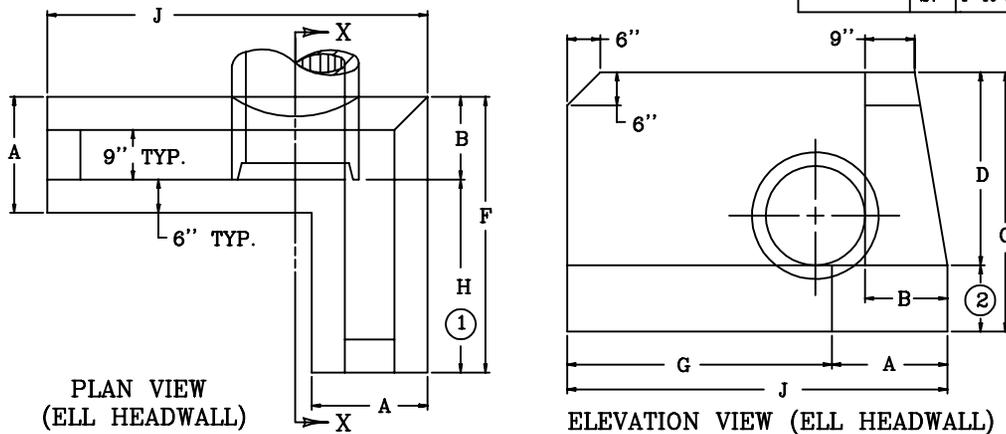
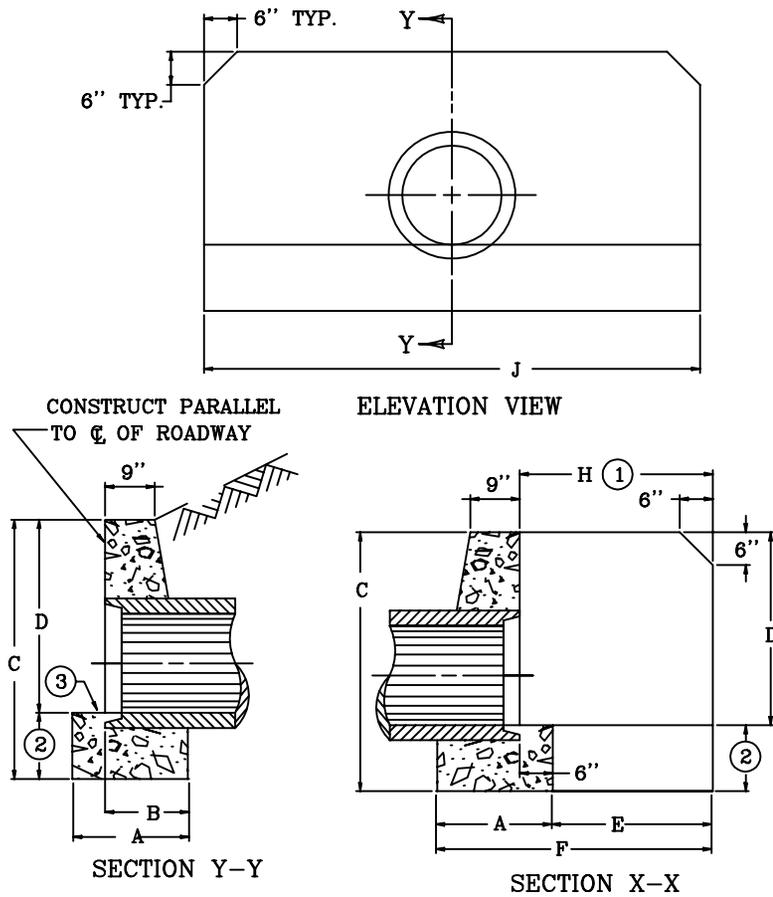


NO. GABIONS = 9 PER HEADWALL

GABION HEADWALL (AMLSUR 19)

## DIMENSIONS AND QUANTITIES

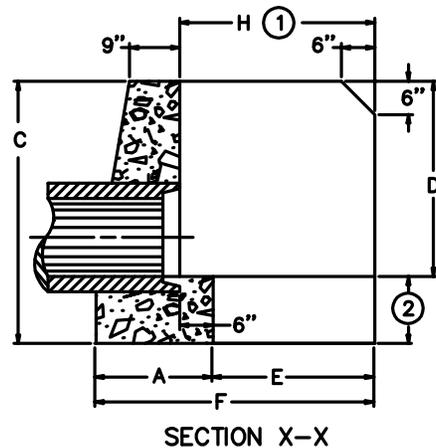
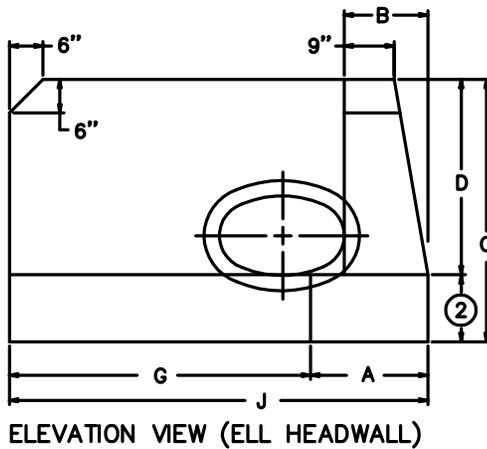
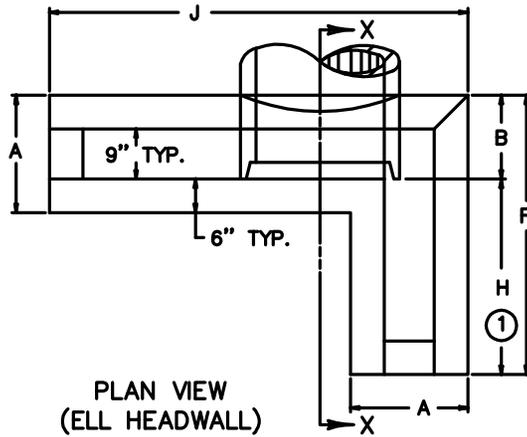
HEADWALL TYPE	PIPE DIAMETER	HEADWALL DIMENSIONS									CUBIC YARDS CONCRETE FOR ONE HEADWALL	
		A	B	C	D	E	F	G	H <sup>①</sup>	J	(EARTH)	(ROCK)
STANDARD	12"	1'-8"	1'-2"	4'-0"	2'-6"	—	—	—	—	6'-0"	1.05	0.87
	15"	1'-8 1/2"	1'-2 1/2"	4'-3"	2'-9"	—	—	—	—	6'-9"	1.25	1.03
	18"	1'-9"	1'-3"	4'-6"	3'-0"	—	—	—	—	7'-6"	1.48	1.23
	21"	1'-9 1/2"	1'-3 1/2"	4'-9"	3'-3"	—	—	—	—	8'-3"	1.73	1.46
	24"	1'-10"	1'-4"	5'-0"	3'-6"	—	—	—	—	9'-0"	1.99	1.69
	27"	1'-10 1/2"	1'-4 1/2"	5'-3"	3'-9"	—	—	—	—	9'-9"	2.27	1.93
RAISED	12"	1'-8"	1'-2"	4'-6"	3'-0"	—	—	—	—	7'-6"	1.45	1.23
	15"	1'-8 1/2"	1'-2 1/2"	4'-9"	3'-3"	—	—	—	—	8'-3"	1.69	1.43
	18"	1'-9"	1'-3"	5'-0"	3'-6"	—	—	—	—	9'-0"	1.96	1.67
	21"	1'-9 1/2"	1'-3 1/2"	5'-3"	3'-9"	—	—	—	—	9'-9"	2.25	1.93
	24"	1'-10"	1'-4"	5'-6"	4'-0"	—	—	—	—	10'-6"	2.54	2.19
	27"	1'-10 1/2"	1'-4 1/2"	5'-9"	4'-3"	—	—	—	—	11'-3"	2.88	2.49
STANDARD ELL	12"	1'-8"	1'-2"	4'-0"	2'-6"	2'-0"	3'-8"	3'-0"	2'-6"	4'-8"	1.19	0.99
	15"	1'-8 1/2"	1'-2 1/2"	4'-3"	2'-9"	2'-3"	3'-11 1/2"	3'-6"	2'-9"	5'-2 1/2"	1.42	1.19
	18"	1'-9"	1'-3"	4'-6"	3'-0"	2'-6"	4'-3"	4'-0"	3'-0"	5'-9"	1.67	1.41
	21"	1'-9 1/2"	1'-3 1/2"	4'-9"	3'-3"	2'-9"	4'-6 1/2"	4'-6"	3'-3"	6'-3 1/2"	1.93	1.63
	24"	1'-10"	1'-4"	5'-0"	3'-6"	3'-0"	4'-10"	5'-0"	3'-6"	6'-10"	2.22	1.89
	27"	1'-10 1/2"	1'-4 1/2"	5'-3"	3'-9"	3'-3"	5'-1 1/2"	5'-6"	3'-9"	7'-4 1/2"	2.52	2.15
RAISED ELL	12"	1'-8"	1'-2"	4'-6"	3'-0"	2'-9"	4'-5"	3'-9"	3'-3"	5'-5"	1.62	1.37
	15"	1'-8 1/2"	1'-2 1/2"	4'-9"	3'-3"	3'-0"	4'-8 1/2"	4'-3"	3'-6"	5'-11 1/2"	1.88	1.59
	18"	1'-9"	1'-3"	5'-0"	3'-6"	3'-3"	5'-0"	4'-9"	3'-9"	6'-6"	2.16	1.85
	21"	1'-9 1/2"	1'-3 1/2"	5'-3"	3'-9"	3'-6"	5'-3 1/2"	5'-3"	4'-0"	7'-0 1/2"	2.47	2.12
	24"	1'-10"	1'-4"	5'-6"	4'-0"	3'-9"	5'-7"	5'-9"	4'-3"	7'-7"	2.79	2.41
	27"	1'-10 1/2"	1'-4 1/2"	5'-9"	4'-3"	4'-0"	5'-10 1/2"	6'-3"	4'-6"	8'-1 1/2"	3.14	2.72



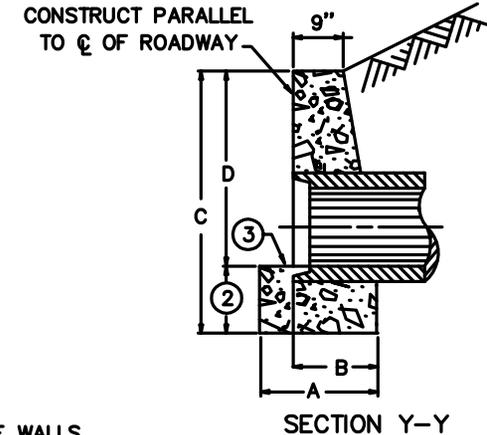
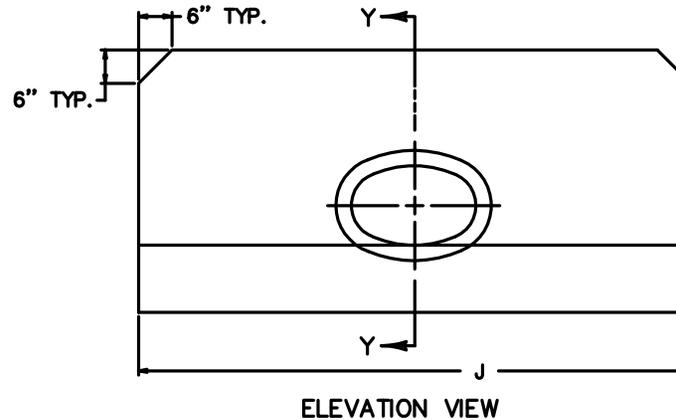
### NOTES

- ① THE DIMENSION AND/OR ANGLE OF INTERSECTION BETWEEN THE WALLS MAY BE VARIED ON CONSTRUCTION.
- ② VOLUME BASED ON VALUES OF 18" ON EARTH, 12" ON ROCK.
- ③ FINISH BY FLOATING
4. CIRCULAR PIPE INCLUDES SLIGHTLY ELLIPTICAL CONCRETE PIPE WITH CIRCULAR REINFORCEMENT.

## DIMENSIONS AND QUANTITIES



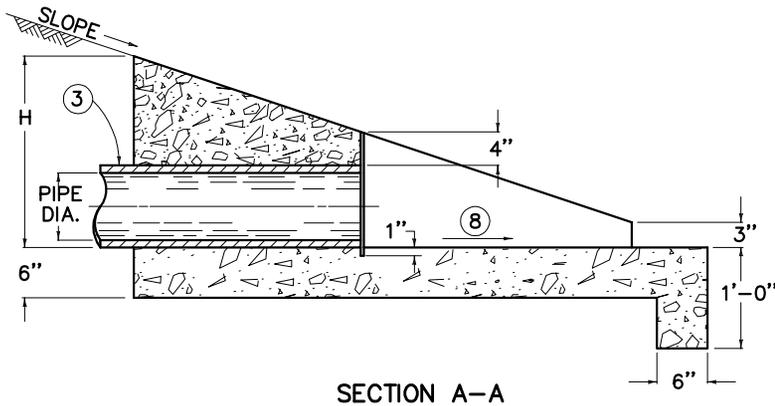
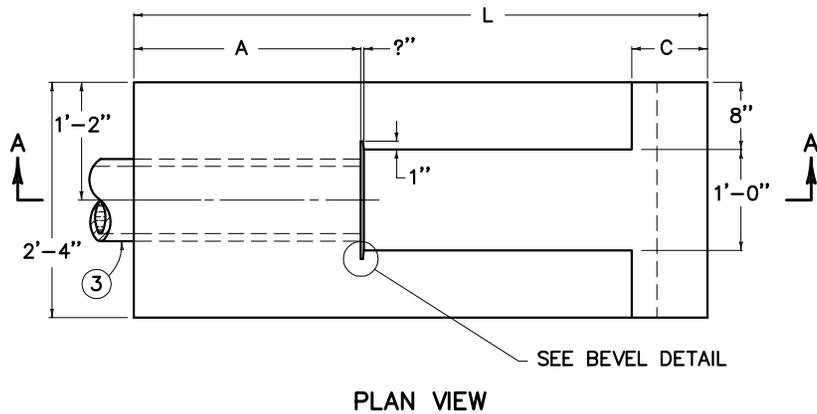
HEADWALL TYPE	ROUND EQUIVALENT	REINFORCED CONCRETE ELLIPTICAL PIPE	CORRUGATED METAL PIPE ARCH	HEADWALL DIMENSIONS								VOLUME CU. YDS FOR 1 HEADWALL (EARTH)	VOLUME CU. YDS FOR 1 HEADWALL (ROCK)		
				A	B	C	D	E	F	G	H ①			J	
SIZE OF PIPE															
STANDARD	15"	—	17" X 13"	1'-9"	1'-3"	4'-0"	2'-6"	—	—	—	—	—	7'-10"	1.43	1.18
	18"	23" X 14"	21" X 15"	1'-9"	1'-3"	4'-5"	2'-11"	—	—	—	—	—	8'-3"	1.64	1.33
	24"	30" X 19"	28" X 20"	1'-9"	1'-3"	4'-10"	3'-4"	—	—	—	—	—	9'-6"	2.10	1.79
	27"	34" X 22"	—	1'-10"	1'-4"	5'-2"	3'-8"	—	—	—	—	—	10'-6"	2.53	2.18
RAISED	15"	—	17" X 13"	1'-9"	1'-3"	4'-6"	3'-0"	—	—	—	—	—	9'-4"	1.89	1.59
	18"	23" X 14"	21" X 15"	1'-9"	1'-3"	4'-11"	3'-5"	—	—	—	—	—	9'-9"	2.11	1.62
	24"	30" X 19"	28" X 20"	1'-9"	1'-3"	5'-4"	3'-10"	—	—	—	—	—	11'-0"	2.68	2.18
	27"	34" X 22"	—	1'-10"	1'-4"	5'-8"	4'-2"	—	—	—	—	—	12'-0"	3.09	2.40
STANDARD ELL	15"	—	17" X 13"	1'-9"	1'-3"	4'-0"	2'-6"	1'-10"	3'-7"	4'-0"	2'-4"	5'-9"	1.41	1.16	
	18"	23" X 14"	21" X 15"	1'-9"	1'-3"	4'-5"	2'-11"	2'-3"	4'-2"	4'-6"	2'-11"	6'-3"	1.86	1.76	
	24"	30" X 19"	28" X 20"	1'-9"	1'-3"	4'-10"	3'-4"	2'-10"	4'-7"	5'-8"	3'-4"	7'-5"	2.48	2.30	
	27"	34" X 22"	—	1'-10"	1'-4"	5'-2"	3'-8"	3'-2"	5'-0"	6'-5"	3'-8"	8'-3"	2.74	2.67	
RAISED ELL	15"	—	17" X 13"	1'-9"	1'-3"	4'-6"	3'-0"	2'-4"	4'-1"	4'-9"	2'-10"	6'-6"	1.81	1.52	
	18"	23" X 14"	21" X 15"	1'-9"	1'-3"	4'-11"	3'-5"	2'-11"	4'-8"	5'-3"	3'-5"	7'-0"	2.33	2.05	
	24"	30" X 19"	28" X 20"	1'-9"	1'-3"	5'-4"	3'-10"	3'-4"	5'-1"	6'-5"	3'-10"	8'-2"	3.02	2.64	
	27"	34" X 22"	—	1'-10"	1'-4"	5'-8"	4'-2"	3'-8"	5'-6"	7'-2"	4'-2"	9'-0"	3.26	2.83	



### NOTES

- ① THE DIMENSION AND/OR ANGLE OF INTERSECTION BETWEEN THE WALLS MAY BE VARIED ON CONSTRUCTION.
- ② VOLUME BASED ON VALUES OF 18" ON EARTH, 12" ON ROCK.
- ③ FINISH BY FLOATING

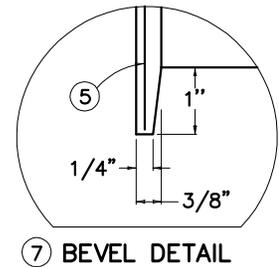
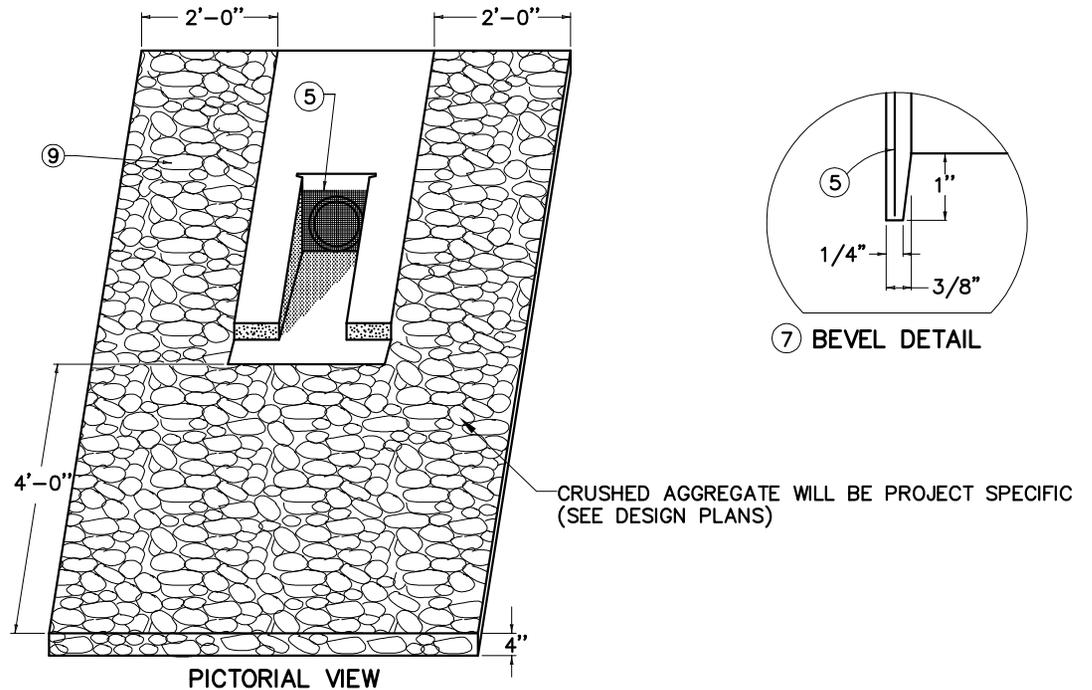
## CONCRETE HEADWALLS (AMLSUR 20-2)



- ~NOTES~
- BID ITEMS AND UNIT TO BID:
    - CRUSHED AGGREGATE SIZE NO. 2 - TON
    - PERF PIPE HWALL TY  $\otimes$   $\triangle$  INCH - EACH
      - $\otimes$  1 = 2:1 SLOPE
      - $\otimes$  2 = 3:1 SLOPE
      - $\otimes$  3 = 4:1 SLOPE
      - $\otimes$  4 = 6:1 SLOPE

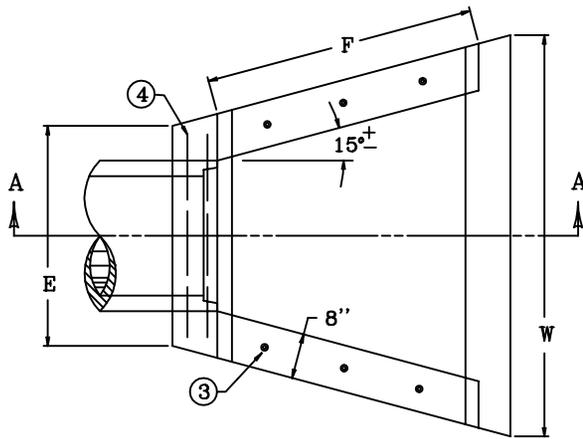
$\triangle$  = PIPE DIA. IN INCHES

BID ITEM EXAMPLE: PERF PIPE HWALL TY 2 - 6 INCH  
 THE CONTRACT UNIT PRICE FOR PERF. PIPE HEADWALLS INCLUDES ALL LABOR, EXCAVATION, FORMS, CLASS "A" CONCRETE AND INCIDENTALS NECESSARY TO COMPLETE ONE INSTALLATION.
  - THIS HEADWALL IS TO BE USED AT THE OUTLET END OF PERFORATED PIPE INSTALLATIONS.
    - APPROXIMATELY 8'-0" TO 12'-0" OF PIPE AT THE OUTLET SHALL BE NON-PERFORATED PIPE MEETING THE REQUIREMENTS OF THE PERFORATED PIPE, EXCEPT FOR PERFORATIONS. IF VITRIFIED CLAY PIPE IS USED, ALL JOINTS WHICH LIE WITHIN THE ABOVE LIMITS AND NOT ENCASED IN CONCRETE (SEE NOTE 4) SHALL BE IN ACCORDANCE WITH THE CURRENT ASTM C-443.
    - ANY PIPE WHICH HAS LESS THAN 1'-0" OF COVER OVER ITS TOP SHALL BE INCASED IN 6" OF CONCRETE ON ALL SIDES.
    - RODENT SCREEN OF 2x2 MESH 16 GAUGE (0.063 IN. DIA.) STEEL HEAVY (MAX.) HOT DIP GALVANIZED WOVEN WIRE CLOTH. THE MESH SHALL EXTEND A MINIMUM OF 1" ABOVE THE O.D. OF THE PIPE.
    - THE SLOT IS TO BE CONSTRUCTED SO THAT THE MESH CAN BE REMOVED FOR CLEANOUT PURPOSES.
    - BEVEL PERMITTED FOR EASY FORM REMOVAL.
    - INSTALL OR CONSTRUCT HEADWALL TO SLOPE 4% TO INSURE POSITIVE OUTLET FLOW.
    - CRUSHED AGGREGATE SIZE NO. 2 PLACED A MIN. DEPTH OF 4". (APPROX. 1 TON PER HEADWALL)

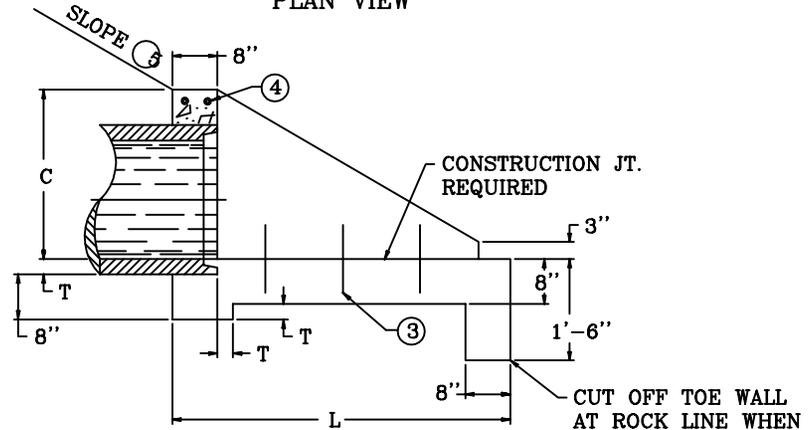


PIPE DIA.	SLOPE	DIMENSIONS				CLASS "A" CONCRETE
		L	H	A	C	CU. YD.
4" AND 6"	2 : 1	3'-4 3/8"	1'-8 7/16"	1'-6"	6"	0.38
	3 : 1	5'-1 5/16"		2'-3"	9"	0.56
	4 : 1	6'-9 3/4"	3'-0"	1'-0"	0.74	
	6 : 1	7'-2 5/8"	1'-2 7/16"	1'-6"	1'-6"	0.62
8"	2 : 1	3'-9 1/2"	1'-10 3/4"	1'-6"	6"	0.43
	3 : 1	5'-8 1/4"		2'-3"	9"	0.63
	4 : 1	7'-7"	3'-0"	1'-0"	0.83	
	6 : 1	8'-4 1/2"	1'-4 3/4"	1'-6"	1'-6"	0.73
10"	2 : 1	4'-2"	2'-1"	1'-6"	6"	0.47
	3 : 1	6'-3"		2'-3"	9"	0.69
	4 : 1	8'-4"	3'-0"	1'-0"	0.91	
	6 : 1	9'-6"	1'-7"	1'-6"	1'-6"	0.83

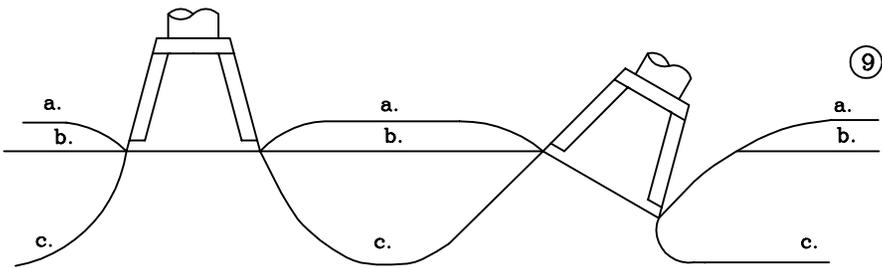
## CONCRETE HEADWALLS (AMLSUR 20-3)



PLAN VIEW



SECTION A-A

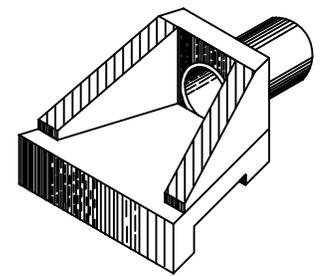


TOE OF SLOPES:  
 a. STEEPER THAN 2:1  
 b. 2:1  
 c. FLATTER THAN 2:1

PIPE DIA. OR EQUIV. DIA.	SHAPE	DIMENSIONS						CLASS A CONC C. Y.	REINF STEEL LBS.
		C	E	F	L	W	T		
12"	○	1'-9"	2'-6"	2'-3"	3'-6"	4'-0"	2"	0.58	7
15"	○	2'-0"	2'-9"	2'-9"	4'-0"	4'-9"	2 1/4"	0.75	
	○	1'-9"	3'-0"	2'-6"	3'-6"	4'-9"		0.68	
18"	○	2'-3"	3'-0"	3'-6"	4'-6"	5'-3"	2 1/2"	0.93	8
	○	2'-0"	3'-6"	3'-0"	4'-0"	5'-6"		0.89	
21"	○	2'-6"	3'-3"	4'-0"	5'-0"	6'-0"	2 3/4"	1.14	9
	○	2'-3"	3'-0"	3'-6"	4'-6"	6'-0"		1.07	
24"	○	2'-9"	3'-6"	4'-6"	5'-6"	6'-6"	3"	1.35	8
	○	2'-6"	4'-0"	4'-0"	5'-0"	6'-9"		3 1/4"	
27"	○	3'-0"	3'-9"	5'-0"	6'-0"	7'-0"	3 1/2"		1.57
	○	2'-9"	4'-6"	4'-3"	5'-3"	7'-3"		1.51	

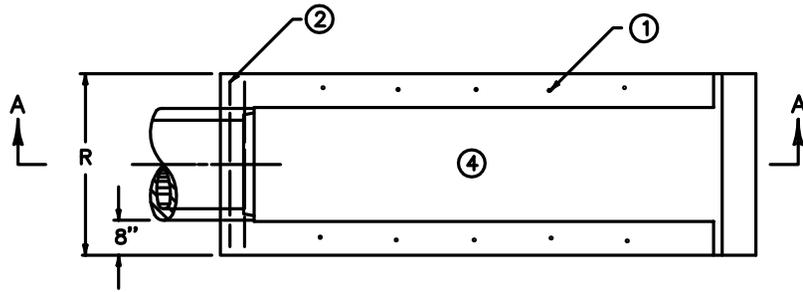
NOTES

1. DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY INSIGNIFICANTLY FOR CORRUGATED METAL PIPE.
2. REINFORCING STEEL : MINIMUM GRADE 40, BARS EVENLY SPACED.
- ③ 6 - NO. 4 x 1'-0" DOWEL BARS.
- ④ 2 - NO. 4 x (E DIMENSION MINUS 4").
- ⑤ SLOPES SHALL BE WARPED TO FIT HEADWALL WHEN PIPE IS SKEWED AND/OR NORMAL SLOPE VARIES FROM 2:1.
6. VOLUME DISPLACED BY PIPE COMPUTED USING INSIDE DIAMETER OF PIPE.
7. WING ANGLES AND/OR DIMENSIONS MAY BE ALTERED DURING CONSTRUCTION TO ACCOMMODATE FLOW OF WATER.
8. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL SHALL REMAIN VERTICAL.
- ⑨ HEADWALLS ARE FOR CIRCULAR, ARCH, AND HORIZONTAL ELLIPTICAL 12"- 27" EQUIVALENT PIPE SIZES.

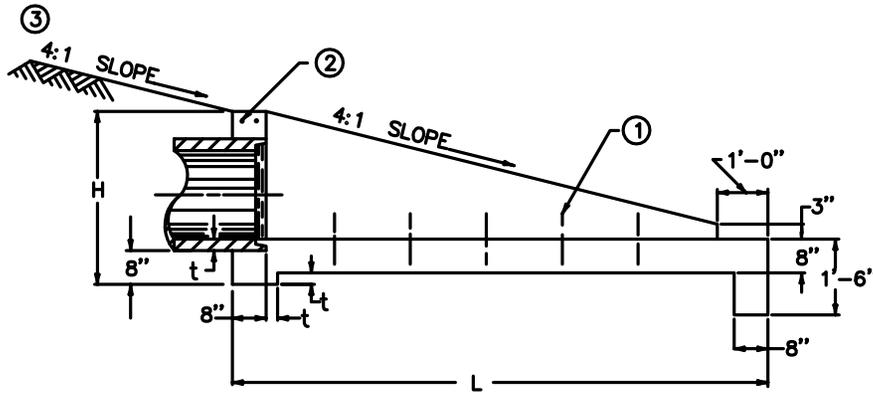


ISOMETRIC VIEW

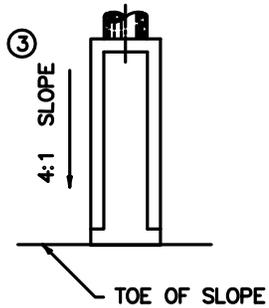
CONCRETE HEADWALLS (AMLSUR 20-4)



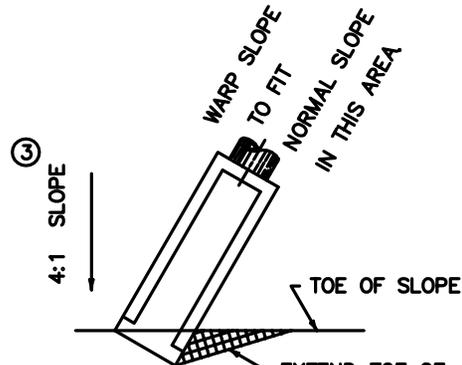
PLAN VIEW



SECTION A-A



CONDITION NO. 1



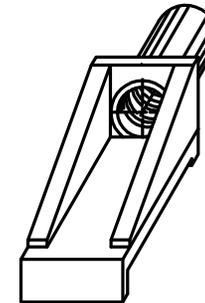
CONDITION NO. 2

PLAN VIEW OF STRUCTURE LOCATIONS

- NOTES -

REINFORCING STEEL : MINIMUM GRADE 40, EVENLY SPACED .

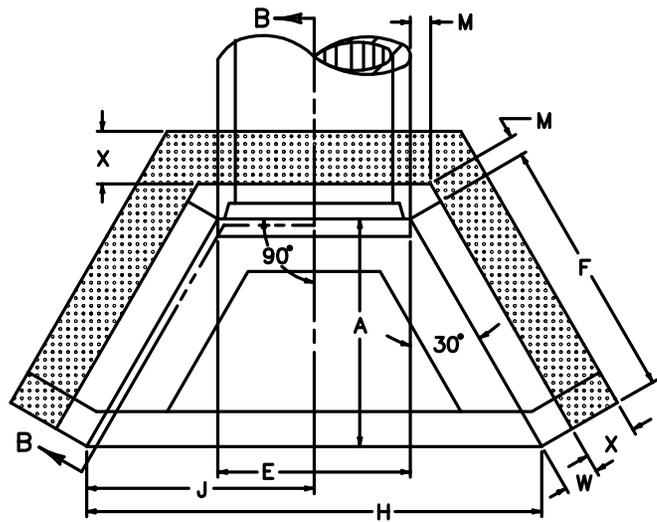
- ① 12 - NO. 4 X 1'-0" DOWEL BARS .
- ② 2 - NO. 4 X ( R DIMENSION MINUS 4" ) .
- ③ SLOPES SHALL BE WARPED TO FIT HEADWALL WHEN PIPE IS SKEWED AND/OR NORMAL SLOPE VARIES FROM 4 : 1 .
- ④ APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE . FRONT FACE OF HEADWALL SHALL REMAIN VERTICAL .
- ⑤ DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY SLIGHTLY FOR METAL PIPE .



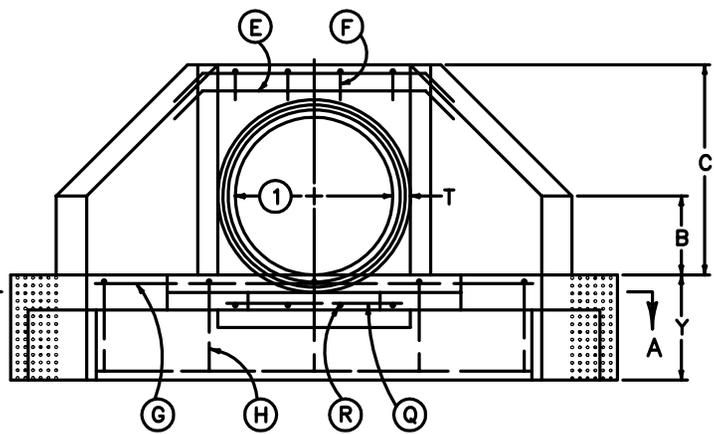
OBLIQUE VIEW

PIPE DIA. OR EQUIV. DIA.	SHAPE	DIMENSIONS ⑤				CLASS A CONC. CU. YD.	REINF. STEEL LBS.
		H	R	L	t		
12"	○	2'-6"	2'-8"	7'-4"	2"	0.93	11
15"	○	2'-10"	3'-0"	8'-5"	2 1/4"	1.20	12
	○	2'-6"	3'-3"	7'-1"		1.02	
18"	○	3'-1"	3'-3"	9'-6"	2 1/2"	1.50	
	○	2'-9"	3'-7"	8'-0"		1.29	
	○	2'-10"	3'-9"	8'-3"		1.38	
21"	○	3'-5"	3'-7"	10'-7"	2 3/4"	1.84	12

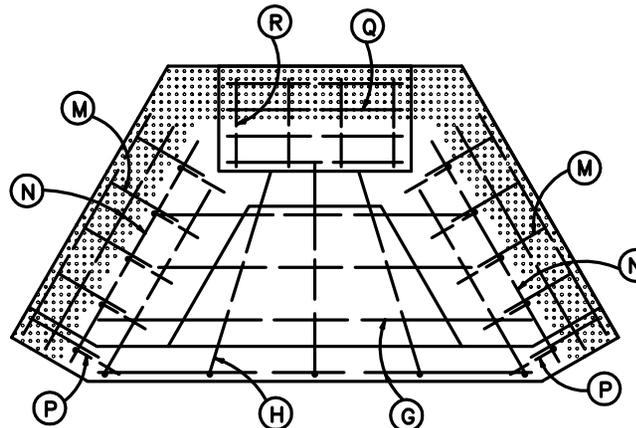
CONCRETE HEADWALLS (AMLSUR 20-5)



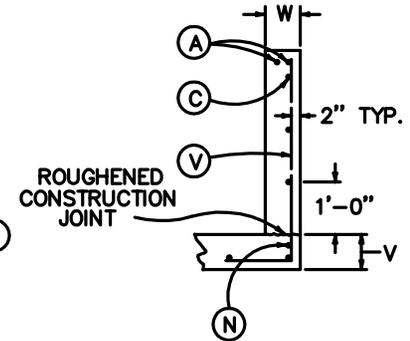
PLAN VIEW



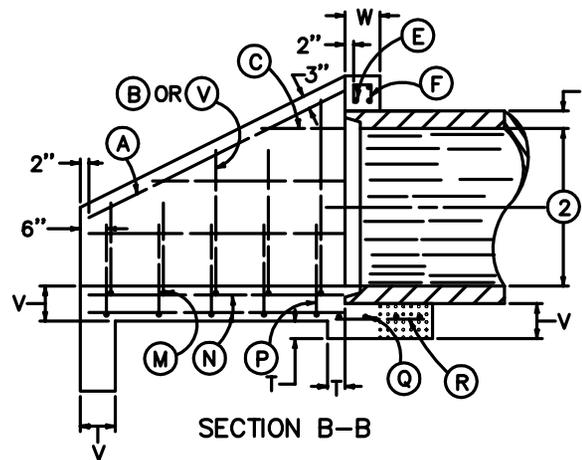
FRONT ELEVATION



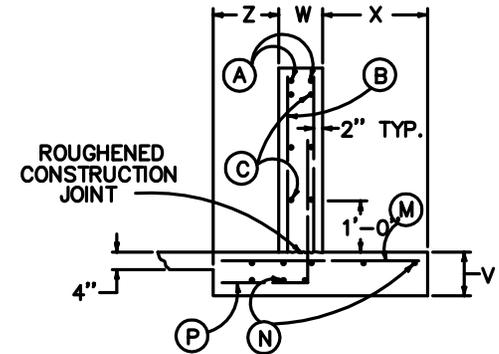
SECTION A-A



WING SECTION  
30" TO 60" CIRCULAR PIPE  
30" TO 72" NON-CIRCULAR PIPE



SECTION B-B



WING SECTION  
66" TO 108" CIRCULAR PIPE

- ① DIAMETER OF CIRCULAR PIPE OR SPAN OF NON-CIRCULAR PIPE
- ② DIAMETER OF CIRCULAR PIPE OR RISE OF NON-CIRCULAR PIPE
3. [Pattern] APPLIES TO 66" DIAMETER AND GREATER. (CIRCULAR PIPE)
4. SEE CURRENT STANDARD DRAWINGS RDH-200 AND 300 SERIES FOR DIMENSIONS, QUANTITIES, AND BILL OF REINFORCEMENT.
5. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR DISTANCE.
6. ENCIRCLED LETTERS, ○, INDICATE STEEL BAR LOCATIONS
7. BARS (B), (C), (G), (P), (M), (V) ARE SPACED 1'-0" O.C. ALL OTHER BARS SHALL BE EVENLY SPACED.
8. BARS (B) AND (V) ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE END OF EACH WING.
9. BARS (C) ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE TOP OF EACH WING.
10. HEADWALLS LOCATED AT EDGE OF SHOULDER SHALL BE PARALLEL TO CENTERLINE OF THE ROAD.
11. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE. FRONT FACE OF HEADWALL AND ENDS OF WINGS SHALL REMAIN VERTICAL.

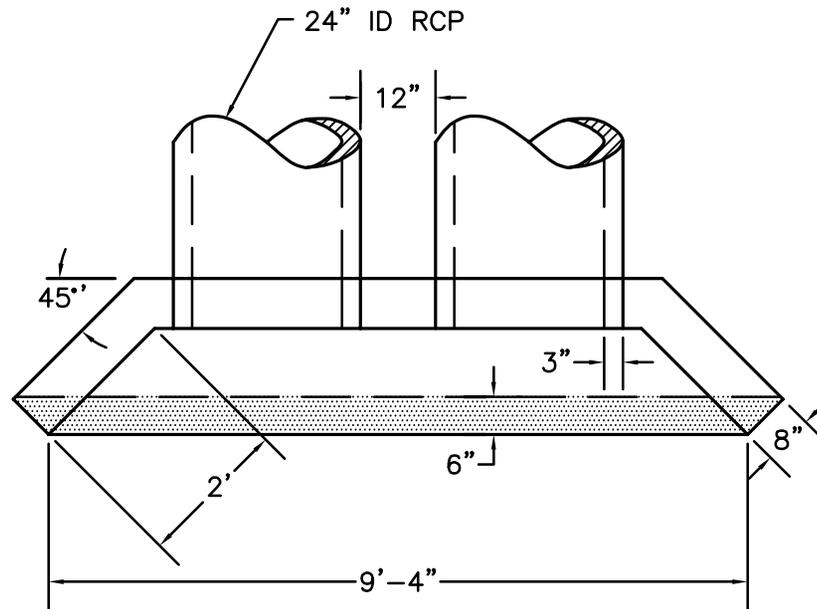
## CONCRETE HEADWALLS (AMLSUR 20-6)

DIMENSION	DIAMETER OF PIPE														DIMENSION
	30''	36''	42''	48''	54''	60''	66''	72''	78''	84''	90''	96''	102''	108''	
A	3'-9''	4'-4''	4'-11''	5'-6''	6'-1''	6'-8''	7'-5''	8'-0''	8'-7''	9'-2''	9'-9''	10'-4''	10'-11''	11'-6''	A
B	1'-3''	1'-6''	1'-9''	2'-0''	2'-3''	2'-6''	2'-9''	3'-0''	3'-3''	3'-6''	3'-9''	4'-0''	4'-3''	4'-6''	B
C	3'-6''	4'-0''	4'-7''	5'-1''	5'-8''	6'-2''	7'-0''	7'-5''	8'-0''	8'-6''	9'-1''	9'-7''	10'-2''	10'-8''	C
E	3'-1''	3'-8''	4'-3''	4'-10''	5'-5''	6'-0''	6'-7''	7'-2''	7'-9''	8'-4''	8'-11''	9'-6''	10'-1''	10'-8''	E
F	4'-4''	5'-0''	5'-8''	6'-4''	7'-0''	7'-8''	8'-7''	9'-3''	9'-11''	10'-7''	11'-3''	11'-11''	12'-7''	13'-3''	F
H	7'-6''	8'-8''	10'-0''	11'-2''	12'-6''	13'-8''	15'-2''	16'-6''	17'-8''	19'-0''	20'-2''	21'-6''	22'-8''	24'-0''	H
J	3'-9''	4'-4''	5'-0''	5'-7''	6'-3''	6'-10''	7'-7''	8'-3''	8'-10''	9'-6''	10'-1''	10'-9''	11'-4''	12'-0''	J
M	0'-5''						0'-6''								M
T	0'-3.5''	0'-4.0''	0'-4.5''	0'-5.0''	0'-5.5''	0'-6.0''	0'-6.5''	0'-7.0''	0'-7.5''	0'-8.0''	0'-8.5''	0'-9.0''	0'-9.5''	0'-10.0''	T
V	0'-8''						1'-0''								V
W	0'-8''						0'-10''								W
X	-----						2'-0''				2'-6''				X
Y	2'-0''						2'-6''				3'-0''				Y
Z	-----						1'-3''				1'-9''				Z
CU.YDS.CONC. 2 HEADWALLS	3.36	4.30	5.35	6.53	7.82	9.22	18.76	20.95	23.25	25.67	31.48	34.31	37.25	40.32	CU.YDS.CONC. 2 HEADWALLS
LBS.STEEL 2 HEADWALLS	281	363	430	496	583	687	1320	1571	1815	2043	2451	2753	3050	3379	LBS.STEEL 2 HEADWALLS

DIMENSIONS AND QUANTITIES ARE BASED ON CONCRETE PIPE AND WILL VARY SLIGHTLY FOR CORRUGATED METAL PIPE.

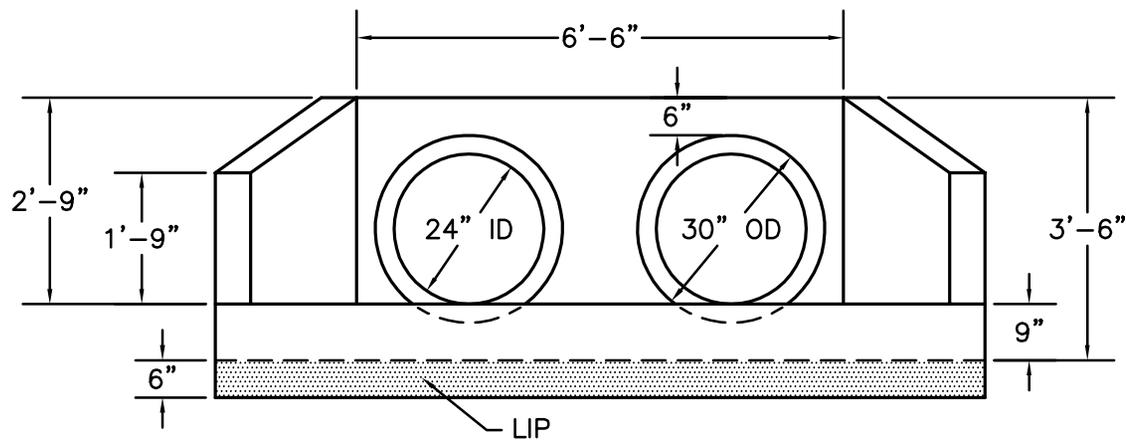
USE WITH AMLSUR 20-6

## CONCRETE HEADWALLS- DIMENSIONS (AMLSUR 20-7)



PLAN VIEW

NOTE: IF SOLID ROCK IS ENCOUNTERED, THE 6" LIP SHALL BE DELETED AS DIRECTED BY THE ENGINEER.

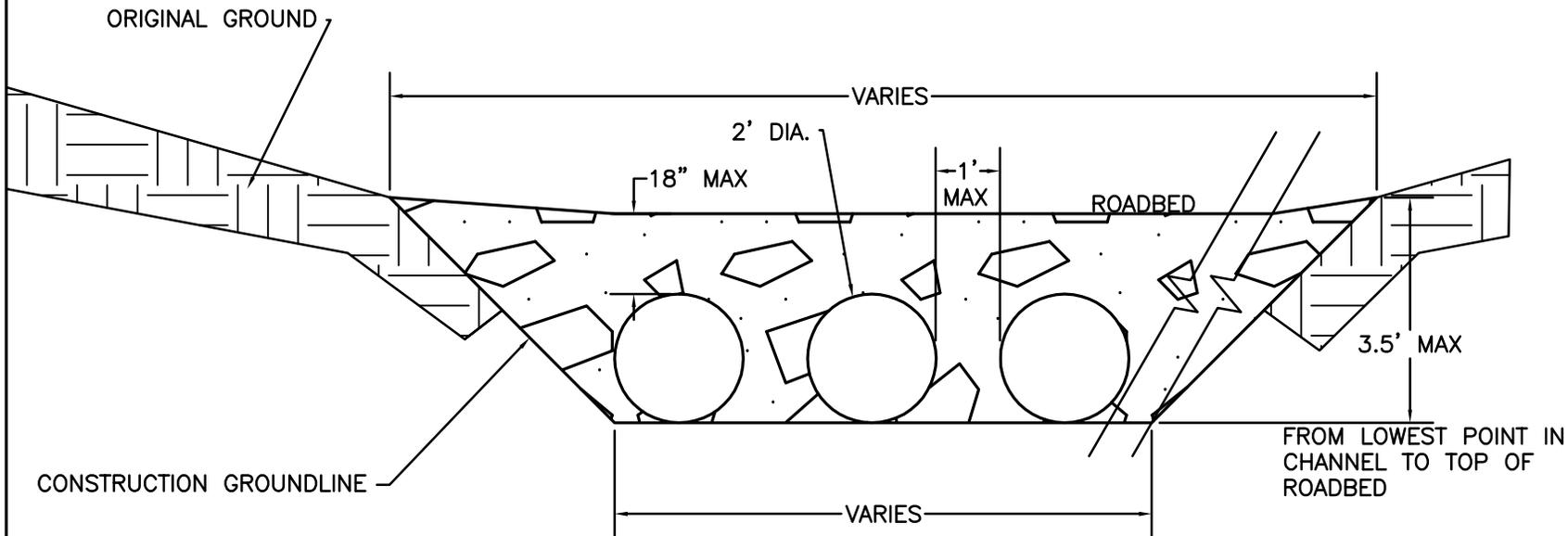


FRONT ELEVATION

DOUBLE PIPE CULVERT CONCRETE HEADWALL (AMLSUR 21)

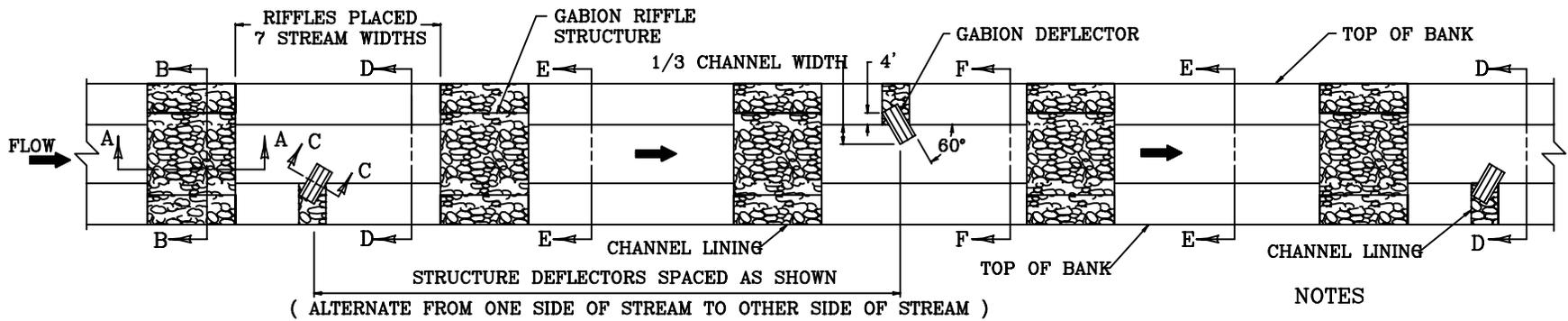
NOTE: TEMPORARY LOW-WATER CROSSING GUIDELINES IN ACCORDANCE WITH KY DIVISION OF WATER.

1. ALL KY DIVISION OF WATER GUIDELINES SHALL BE MET. SEE TECHNICAL SPECIFICATIONS.
2. NO MORE THAN 18" OF FILL OVER PIPES. PIPES AND BACKFILL MUST BE CONTAINED WITHIN STREAM CHANNEL AS SHOWN. NO MORE THAN ONE FOOT (1') SPACING BETWEEN PIPES WITH A MAXIMUM FILL HEIGHT OF 3.5 FT.
3. DURING CONSTRUCTION OF APPROACHES AND ACCESS ROADWAY, UNSTABLE AND UNCONSOLIDATED MATERIALS UNSUITABLE FOR ROADWAYS MAY BE EXCAVATED AND REPLACED WITH RIPRAP, CRUSHED STONE, OR OTHER STABLE ROAD CONSTRUCTION MATERIALS PROVIDED A) THE DISPOSAL OF EXCESS, UNCONSOLIDATED MATERIALS EXCAVATED MUST BE OUTSIDE OF THE FLOODPLAIN (IN WASTE AREA) AND B) THE FINISHED SURFACE OF THE COMPLETED ROAD MAY BE NO MORE THAN THREE INCHES (3") ABOVE THE PRE-CONSTRUCTION SURFACE OF THE FLOODPLAIN AT ANY POINT BEYOND THE TOP OF BANKS.
4. LOW-WATER CROSSING SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION DURATION. ALL PIPES SHALL BE INSPECTED AND CLEANED AS NEEDED TO ENSURE MAXIMUM HYDRAULIC CAPACITY.



PIPE AS APPROVED 2' DIA ONLY; ALL PIPE LEVEL WITH LOW POINT OF ORIGINAL STREAMBED/CHANNEL

## LOW WATER CROSSING (AMLSUR 22)

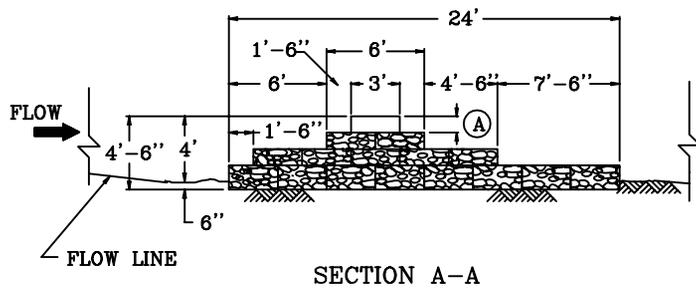


PLAN VIEW

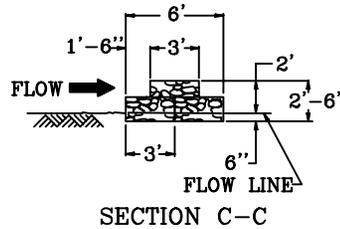
NOTES

- GABION DEFLECTORS AND GABION RIFFLE STRUCTURES SHALL BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE EACH, AND SHALL INCLUDE GABION BASKETS, AGGREGATE, LABOR AND ALL INCIDENTALS NECESSARY FOR ONE COMPLETE INSTALLATION.
- | ITEM CODE | PAY ITEM                  | PAY UNIT |
|-----------|---------------------------|----------|
| 2618      | DEFLECTOR - GABION        | EACH     |
| 2622      | RIFFLE STRUCTURE - GABION | EACH     |
| 2484      | CHANNEL LINING CLASS III  | TON      |
- LOCATION OF STRUCTURES ARE AS NOTED IN THE PLANS. MINOR ADJUSTMENTS ARE PERMITTED UPON APPROVAL BY THE ENGINEER.
  - AGGREGATE USED TO FILL THE GABION BASKETS SHALL MEET THE REQUIREMENTS OF SECTION 805.13.06 OF THE CURRENT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION".
  - GABION BASKETS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 618.03.05 OF THE CURRENT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION".
  - GABION DEFLECTORS AND GABION RIFFLE STRUCTURES SHALL BE REQUIRED ON BLUELINE STREAM CHANNEL CHANGES WHEN THE CHANNEL CHANGE FLOW LINE IS EQUAL TO OR LESS THAN 3%, AND THE CHANNEL CHANGE IS 200 LINEAR FEET OR GREATER.
  - GABIONS BASKETS SHALL COMPLY WITH SECTION 813.14 OF THE CURRENT "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION".
- ⑦ ROCK SHALL BE KEYED ONE (1) TO TWO (2) FEET BELOW THE PROPOSED CHANNEL FLOW LINE AND/OR CHANNEL BANK.
- SEE PLANS FOR CHANNEL MITIGATION LOCATIONS.
  - WHEN PIPES ARE INVOLVED IN CHANNEL CHANGES CUT THE CHANNEL TO CONFORM WITH SECTION E-E, A DISTANCE OF 20 FEET FROM THE INLET AND OUTLET ENDS OF PIPE.

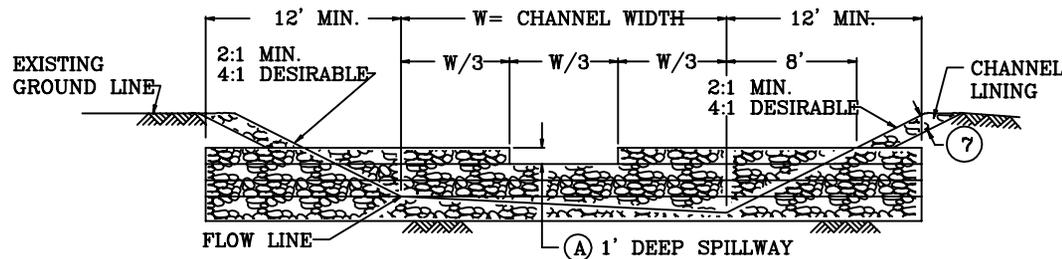
DRAWING NOT TO SCALE



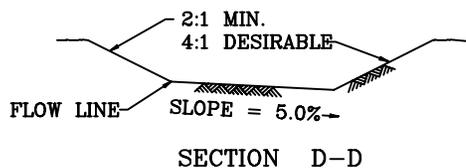
SECTION A-A



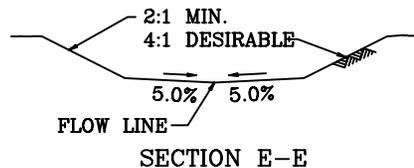
SECTION C-C



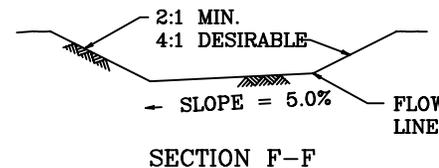
SECTION B-B



SECTION D-D

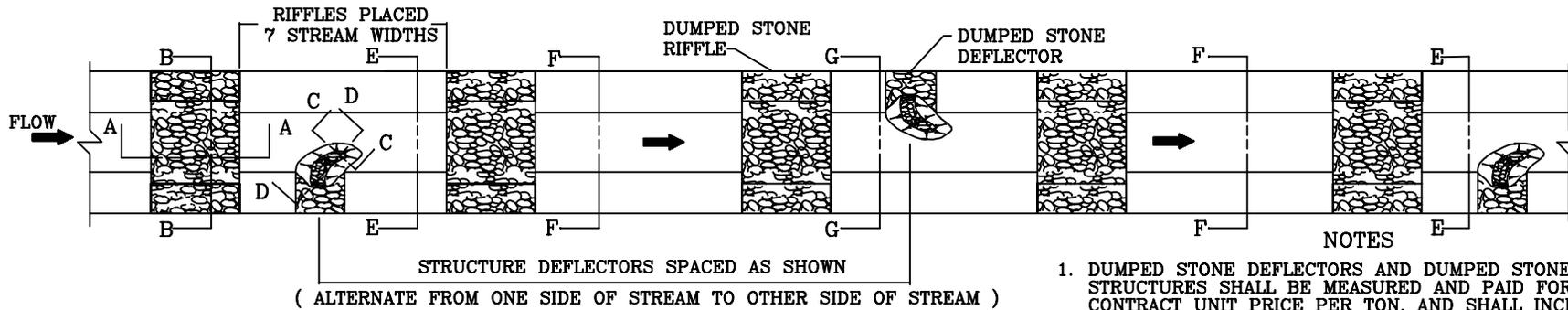


SECTION E-E

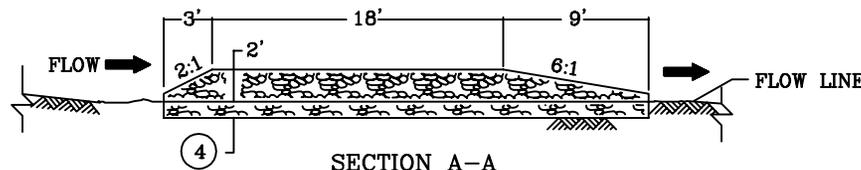


SECTION F-F

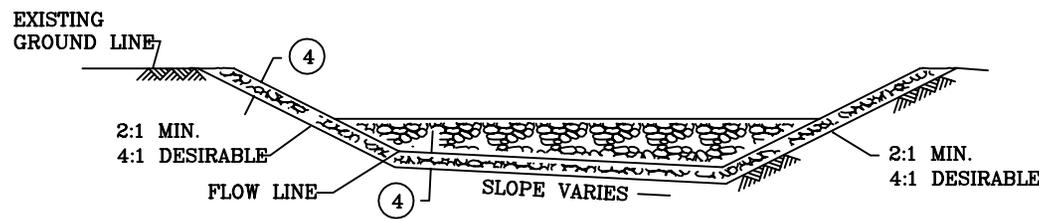
STREAM HABITAT IMPROVEMENT STRUCTURES- GABIONS (AMLSUR 23-1)



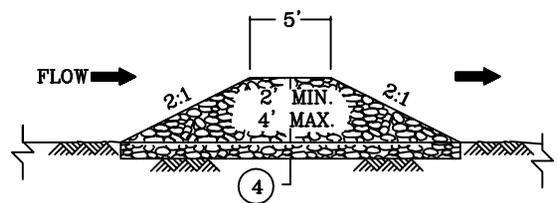
PLAN VIEW



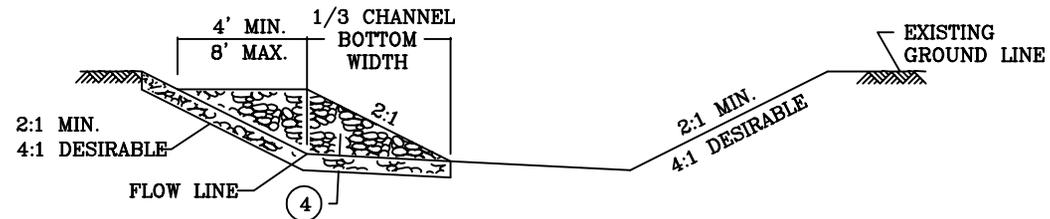
SECTION A-A



SECTION B-B

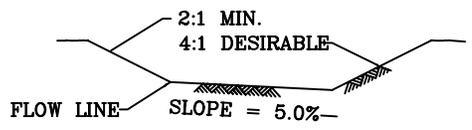


SECTION C-C

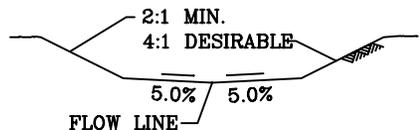


SECTION D-D

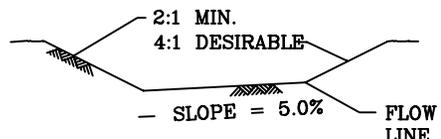
DRAWING NOT TO SCALE



SECTION E-E



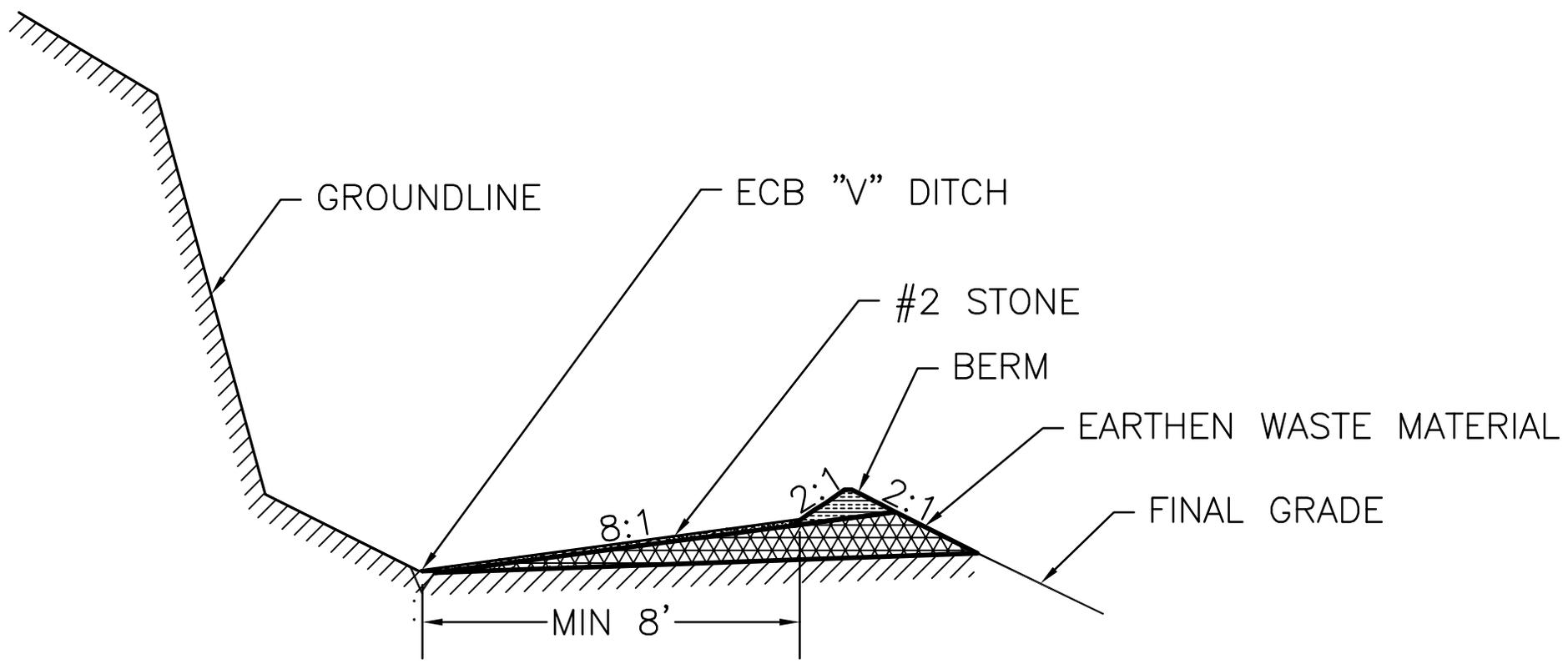
SECTION F-F



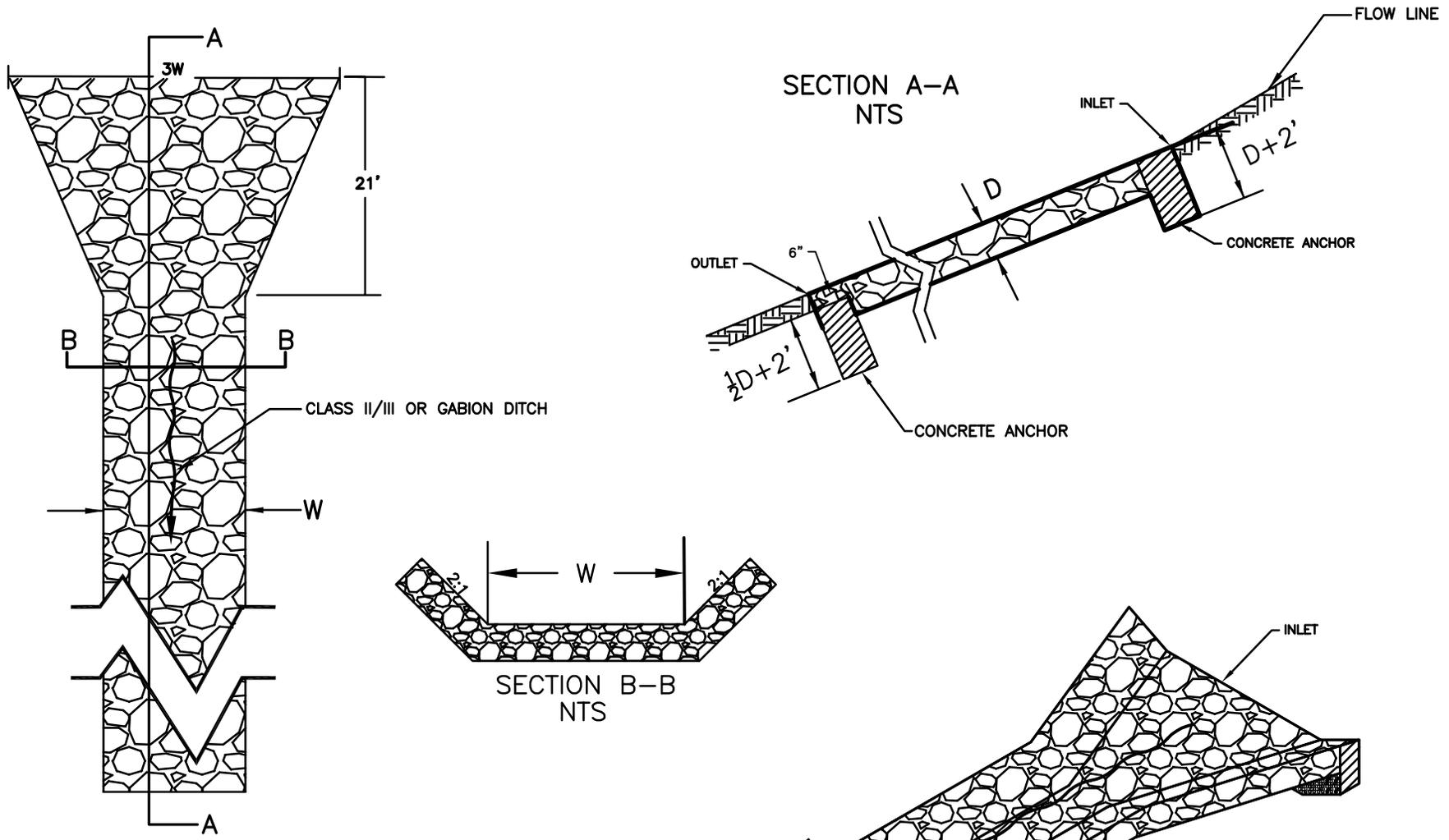
SECTION G-G

- NOTES
- DUMPED STONE DEFLECTORS AND DUMPED STONE RIFFLE STRUCTURES SHALL BE MEASURED AND PAID FOR AT THE CONTRACT UNIT PRICE PER TON, AND SHALL INCLUDE ROCK, LABOR AND ALL INCIDENTALS NECESSARY FOR ONE COMPLETE INSTALLATION.
- | ITEM CODE | PAY ITEM                        | PAY UNIT |
|-----------|---------------------------------|----------|
| 2617      | DEFLECTOR - DUMPED STONE        | TON      |
| 2738      | RIFFLE STRUCTURE - DUMPED STONE | TON      |
- LOCATION OF STRUCTURES ARE AS NOTED IN THE PLANS. MINOR ADJUSTMENTS ARE PERMITTED UPON APPROVAL BY THE ENGINEER.
  - ROCK USED TO CONSTRUCT RIFFLE STRUCTURES AND DUMPED STONE DEFLECTORS SHALL CONSIST OF 80% IN THE RANGE OF FOUR (4) TO EIGHT (8) CUBIC FEET AND 20% SMALLER STONE TO FILL VOIDS.
  - ROCK SHALL BE KEYED ONE (1) TO TWO (2) FEET BELOW THE PROPOSED CHANNEL FLOW LINE AND/OR CHANNEL BANK.
  - DUMPED STONE DEFLECTORS AND DUMPED STONE RIFFLE STRUCTURES SHALL BE REQUIRED ON BLUELINE STREAM CHANNEL CHANGES WHEN THE CHANNEL CHANGE FLOW LINE IS EQUAL TO OR LESS THAN 3%, AND THE CHANNEL CHANGE IS 200 LINEAR FEET OR GREATER.
  - SEE PLANS FOR CHANNEL MITIGATION LOCATIONS.
  - WHEN PIPES ARE INVOLVED IN CHANNEL CHANGES CUT THE CHANNEL TO CONFORM WITH SECTION F-F, A DISTANCE OF 20 FEET FROM THE INLET AND OUTLET ENDS OF PIPE.

STREAM HABITAT IMPROVEMENT STRUCTURES (AMLSUR 23-2)

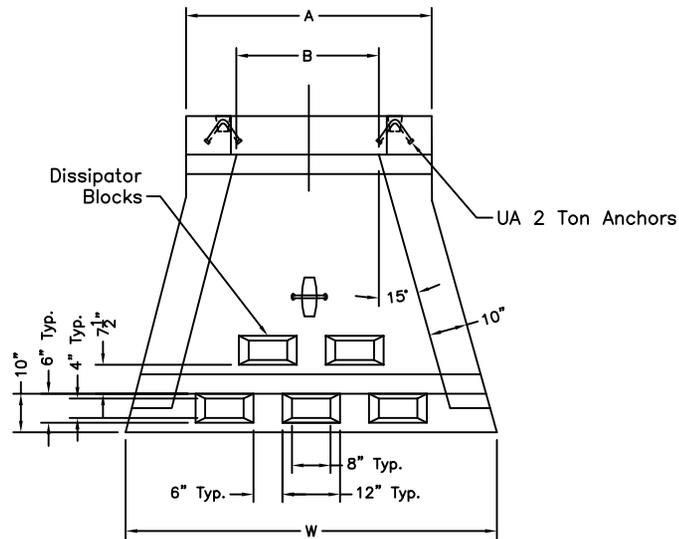


TYPICAL ACCESS ROAD W/SIDE DITCH & BERM (AMLSUR 24)

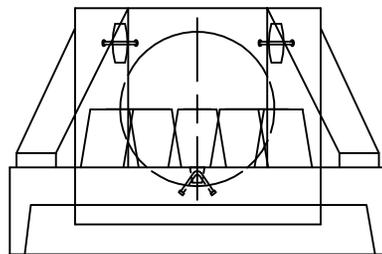


**W = WIDTH OF BOTTOM OF DITCH**  
**D = DEPTH OF CHANNEL LINING**  
**(CLASS II/III OR GABION)**

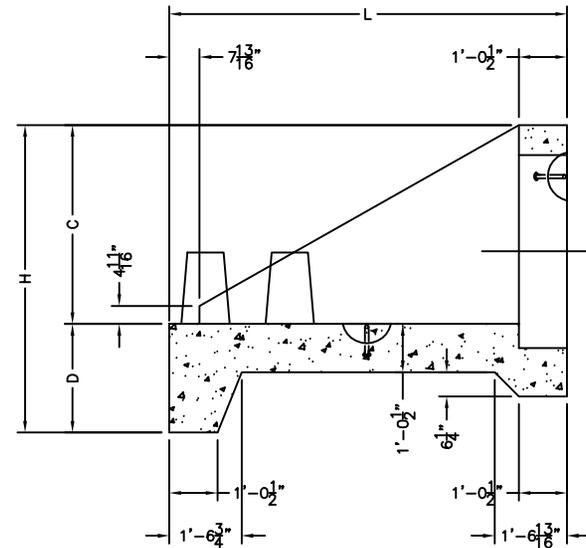
**INLET AND OUTLET DITCH TREATMENT (AMLSUR 25)**



**PLAN VIEW**



**FRONT VIEW**



**SECTION A-A**

**GENERAL NOTES:**

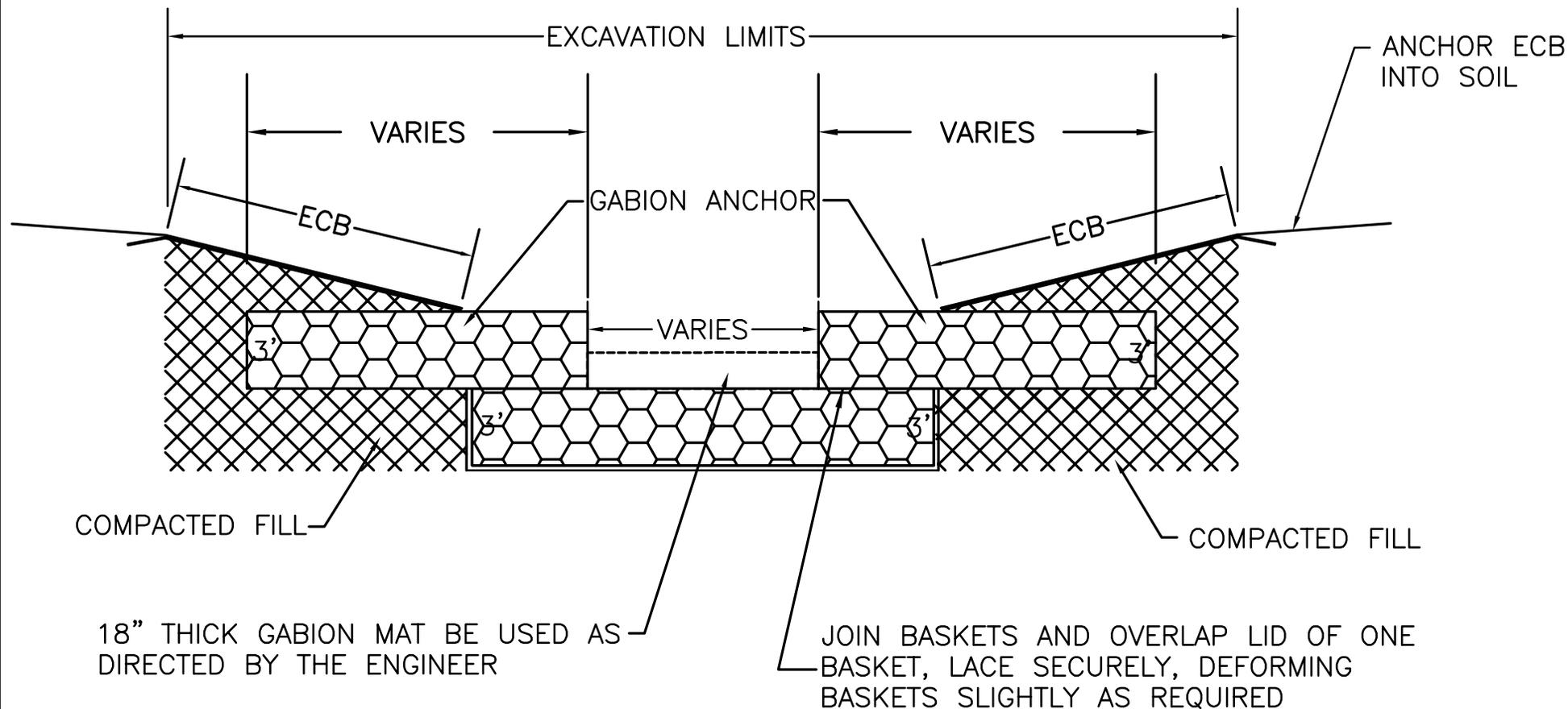
1. Concrete: 28 Day Compressive Strength  $f'_c = 4,500$  psi
2. Steel Reinforcement: ASTM A-615, Grade 60
3. Minimum Reinforcing Cover - 2"
4. 3/4" Chamfer On All Exposed Edges

Pipe Size	Hole Size	W	L	H	A	B	C	D	E	F	G	Weight	**Dissipators
12" RCP	18"Ø								12'	13"	3"		
15" RCP	22"Ø	63"	54"	43"	42"	24"	27"	16"	8.5'	9.75'	3.5"	3605 lbs.	3
18" RCP	26"Ø								5"	6.5"	4"		
24" RCP	32"Ø	78"	66"	51"	51"	29"	33"	18"	5"	6"	4"	5468 lbs.	5

**CULVERT HEADWALL W/DISSIPATORS 12" THRU 24" (AMLSUR 26)**

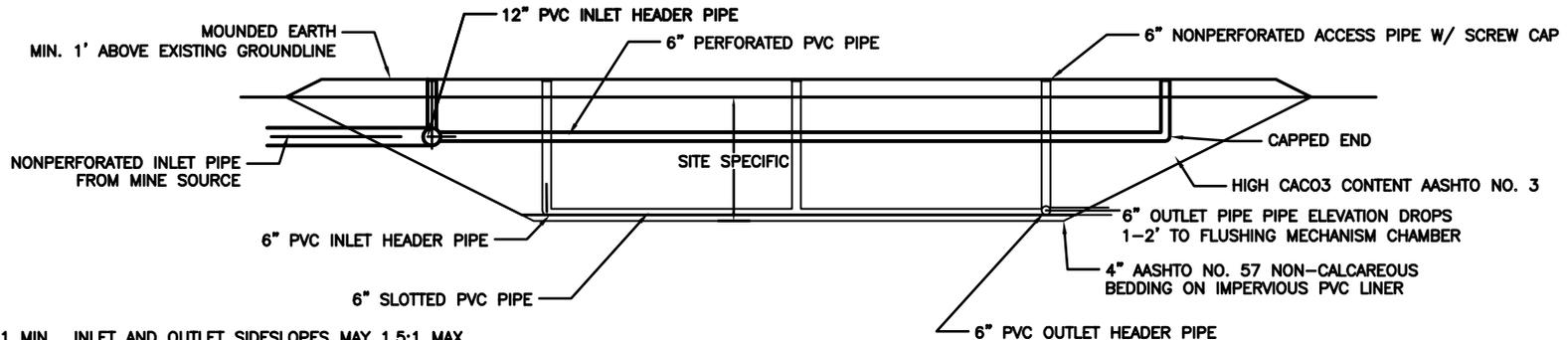
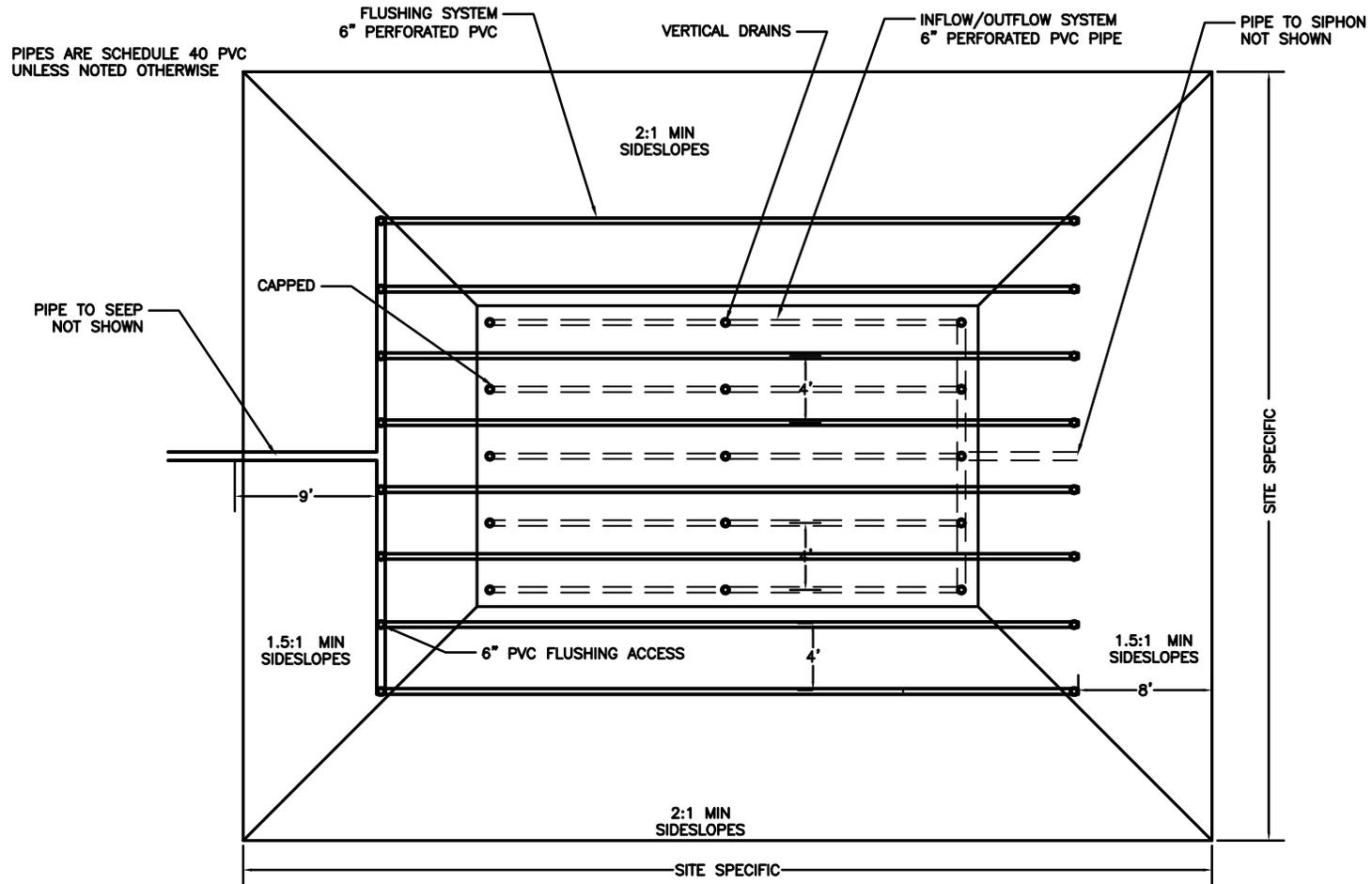


NOTE: FILTER FABRIC SHALL BE PLACED UNDER ALL DITCHES WITH CHANNELS FLATTER THAN 10%.  
 NOTE: FILTER FABRIC SHALL BE PLACED AS DIRECTED BY THE ENGINEER.



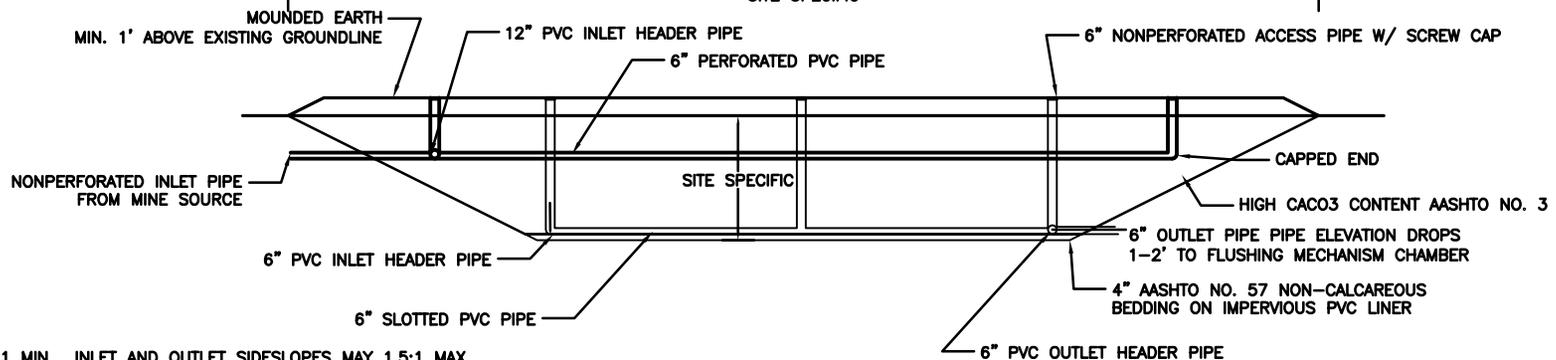
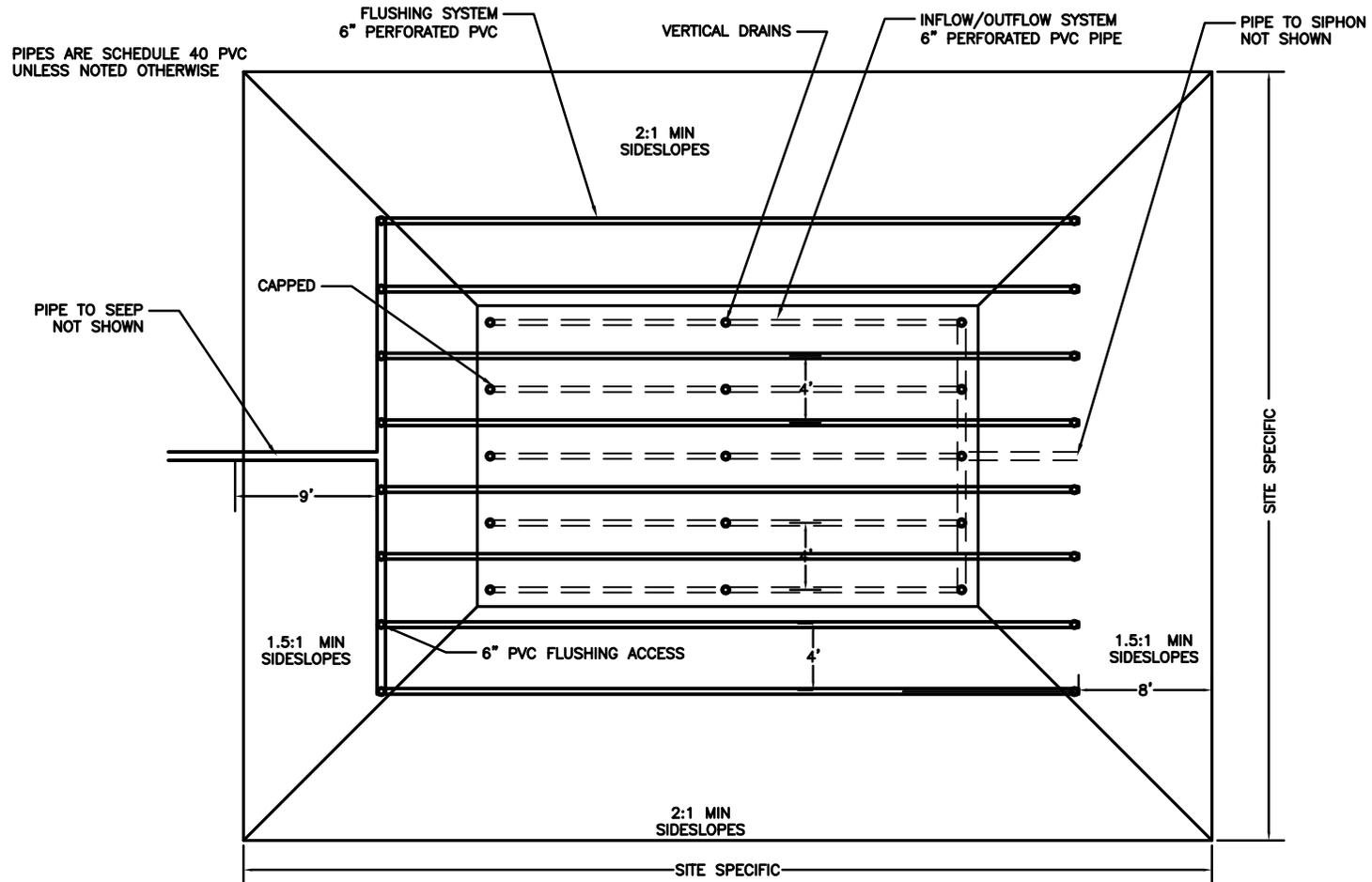
NOTE: GABION ANCHORS MAY BE USED IN OTHER TYPE OF GABION AND VARIOUS DITCHES WHERE NEEDED.

GABION DITCH ANCHORS- (AMLSUR 28)



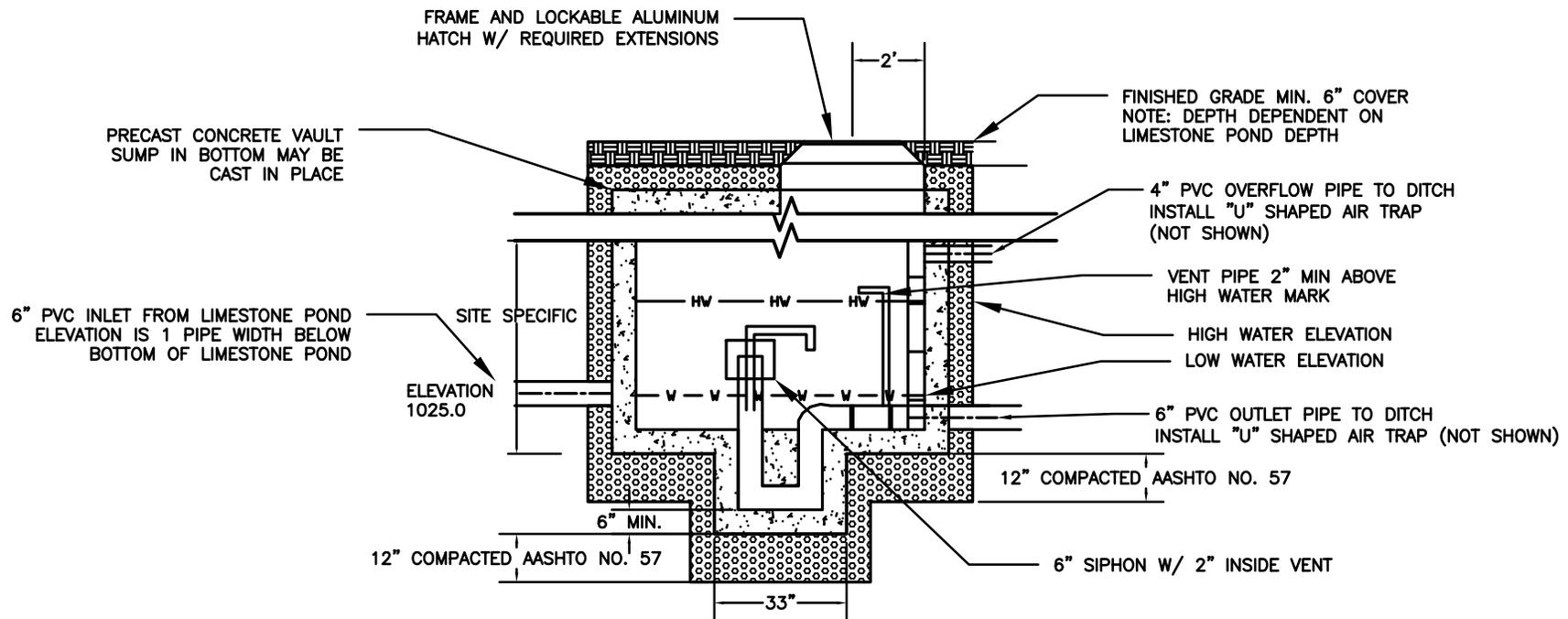
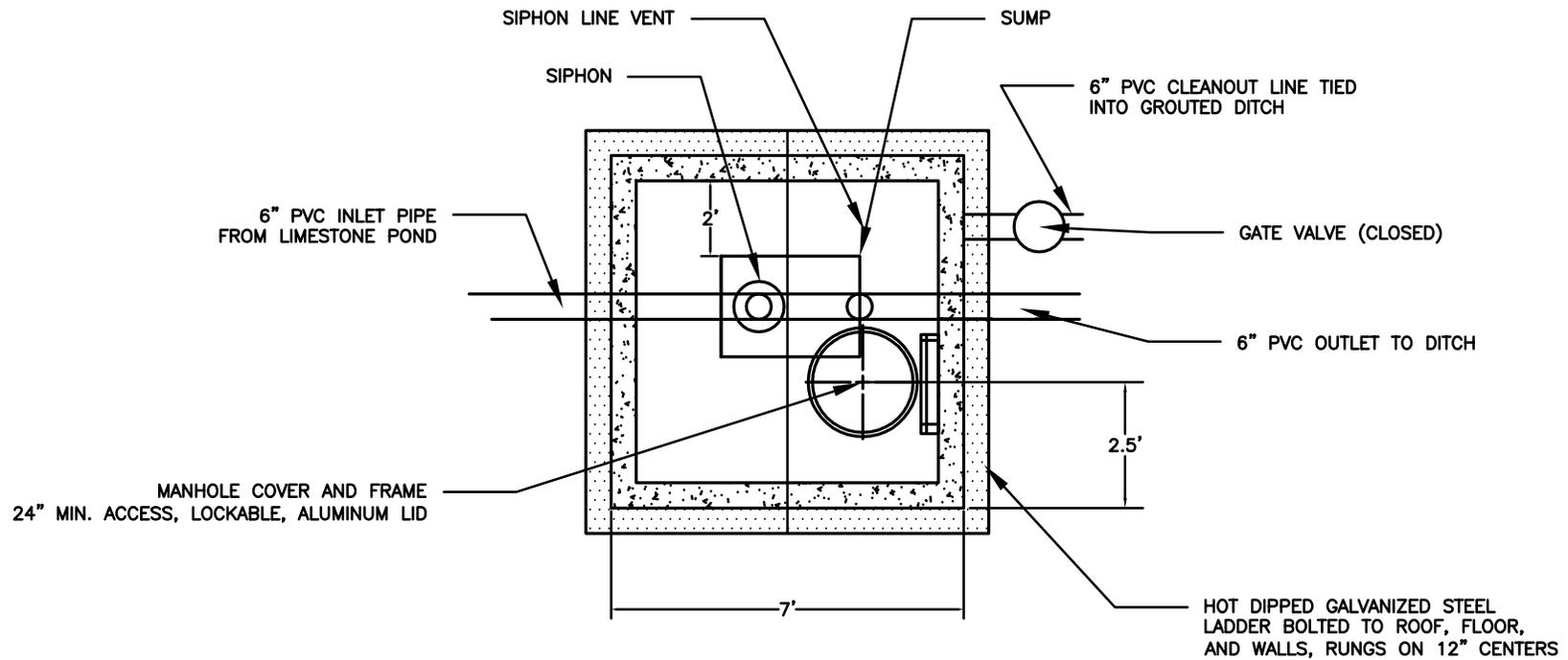
SIDE SLOPES ARE 2:1 MIN. INLET AND OUTLET SIDESLOPES MAY 1.5:1 MAX  
 THE ENTIRE ROCK BASIN IS WRAPPED IN A PVC LINER. SIDE AND BOTTOM SEAMS SHOULD BE SEALED TOGETHER WITH A  
 MANUFACTURER APPROVED METHOD. OVERLAP THE TOP COVER BY 2'. DO NOT SEAL THE TOP. SEAL ALL JOINTS WITH PVC  
 CEMENT OR FOAM. INSTALL 4- 4"x4" POST 2' IN CONCRETE, AT CORNERS TO REFERENCE CAPS LOCATIONS. SLOTTED PVC  
 PIPE MAY BE MADE BY CUTTING SLOTS WITH A CIRCULAR SAW TWO BLADE WIDTH CUTS WIDE EVER 1/2 INCH.

## UPFLOW LIMESTONE POND (AMLWT 1)

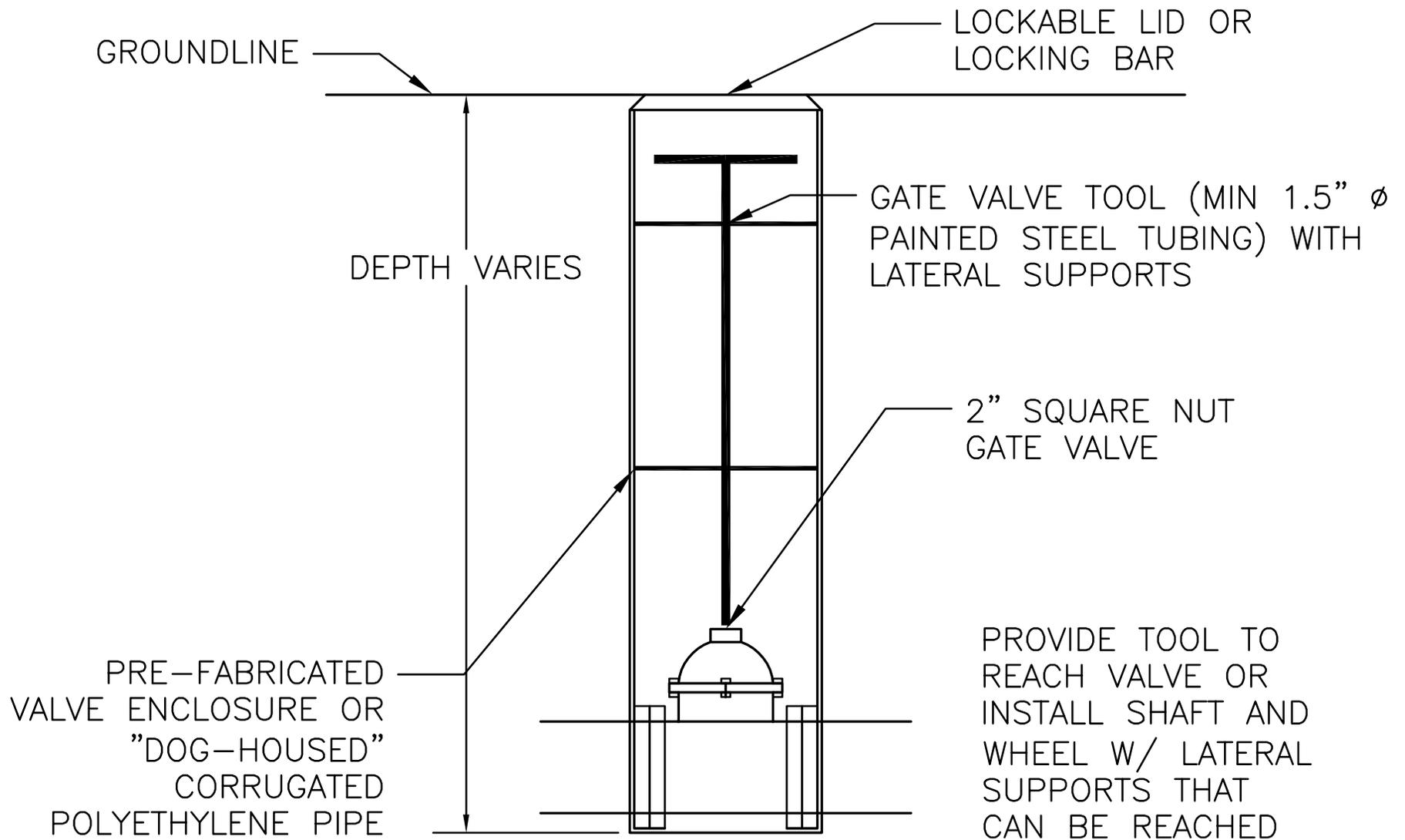


SIDE SLOPES ARE 2:1 MIN. INLET AND OUTLET SIDESLOPES MAY 1.5:1 MAX  
 THE ENTIRE ROCK BASIN IS WRAPPED IN A PVC LINER. SIDE AND BOTTOM SEAMS SHOULD BE SEALED TOGETHER WITH A  
 MANUFACTURER APPROVED METHOD. OVERLAP THE TOP COVER BY 2', DO NOT SEAL THE TOP. SEAL ALL JOINTS WITH PVC  
 CEMENT OR FOAM. INSTALL 4- 4"x4" POST 2' IN CONCRETE, AT CORNERS TO REFERENCE CAPS LOCATIONS. SLOTTED PVC  
 PIPE MAY BE MADE BY CUTTING SLOTS WITH A CIRCULAR SAW TWO BLADE WIDTH CUTS WIDE EVER 1/2 INCH.

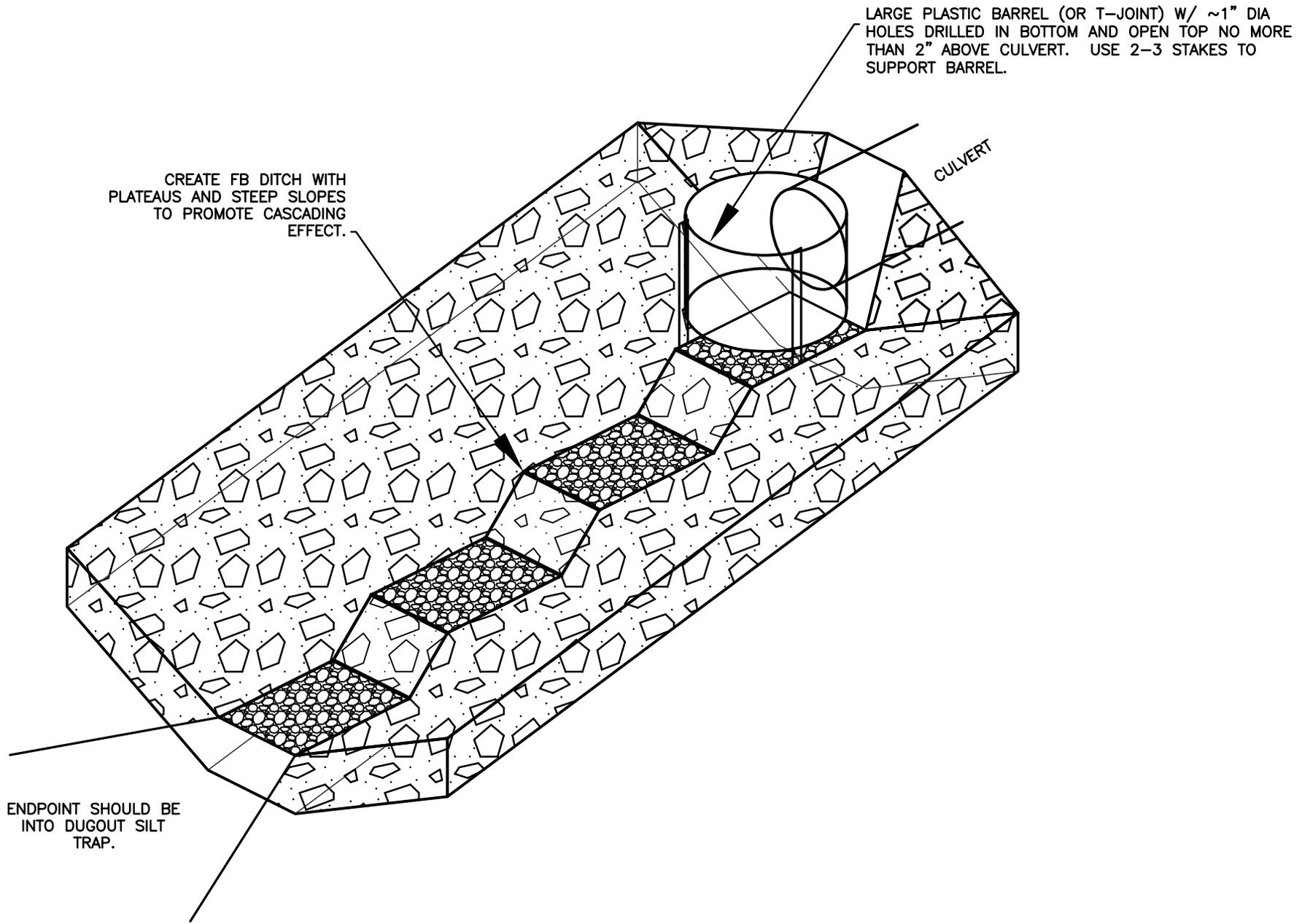
## DOWNFLOW LIMESTONE POND (AMLWT 2)



MANHOLE AND SIPHON SYSTEM (AMLWT 3)



GATE VALVE AND HOUSING (AMLWT 4)



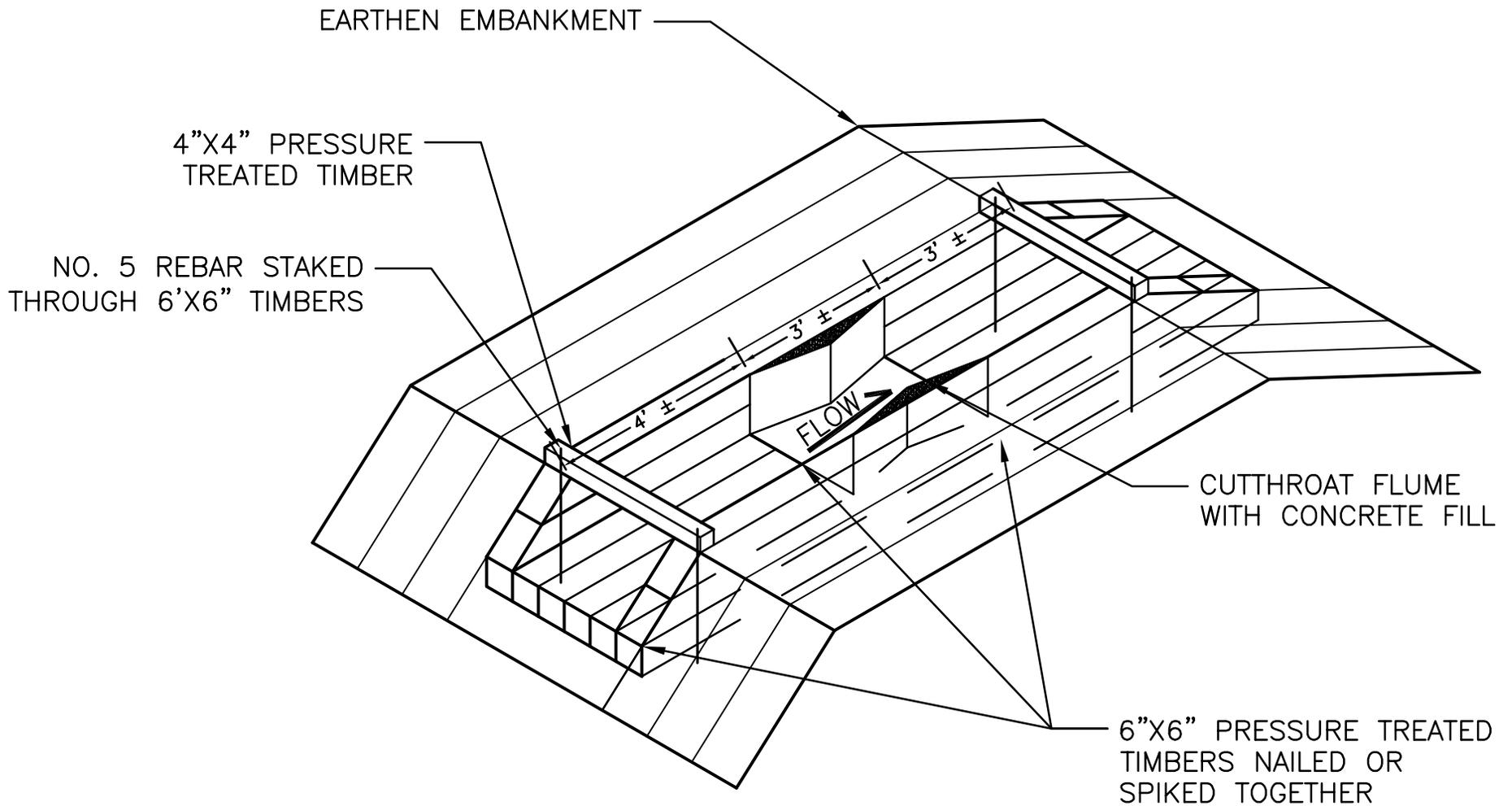
CREATE FB DITCH WITH  
PLATEAUS AND STEEP SLOPES  
TO PROMOTE CASCADING  
EFFECT.

LARGE PLASTIC BARREL (OR T-JOINT) W/ ~1" DIA  
HOLES DRILLED IN BOTTOM AND OPEN TOP NO MORE  
THAN 2" ABOVE CULVERT. USE 2-3 STAKES TO  
SUPPORT BARREL.

CULVERT

ENDPOINT SHOULD BE  
INTO DUGOUT SILT  
TRAP.

### SEQUENTIAL AERATION DITCH (AMLWT 5)



FLUME- TIMBER (AMLWT 6)