

Drawing Set #2

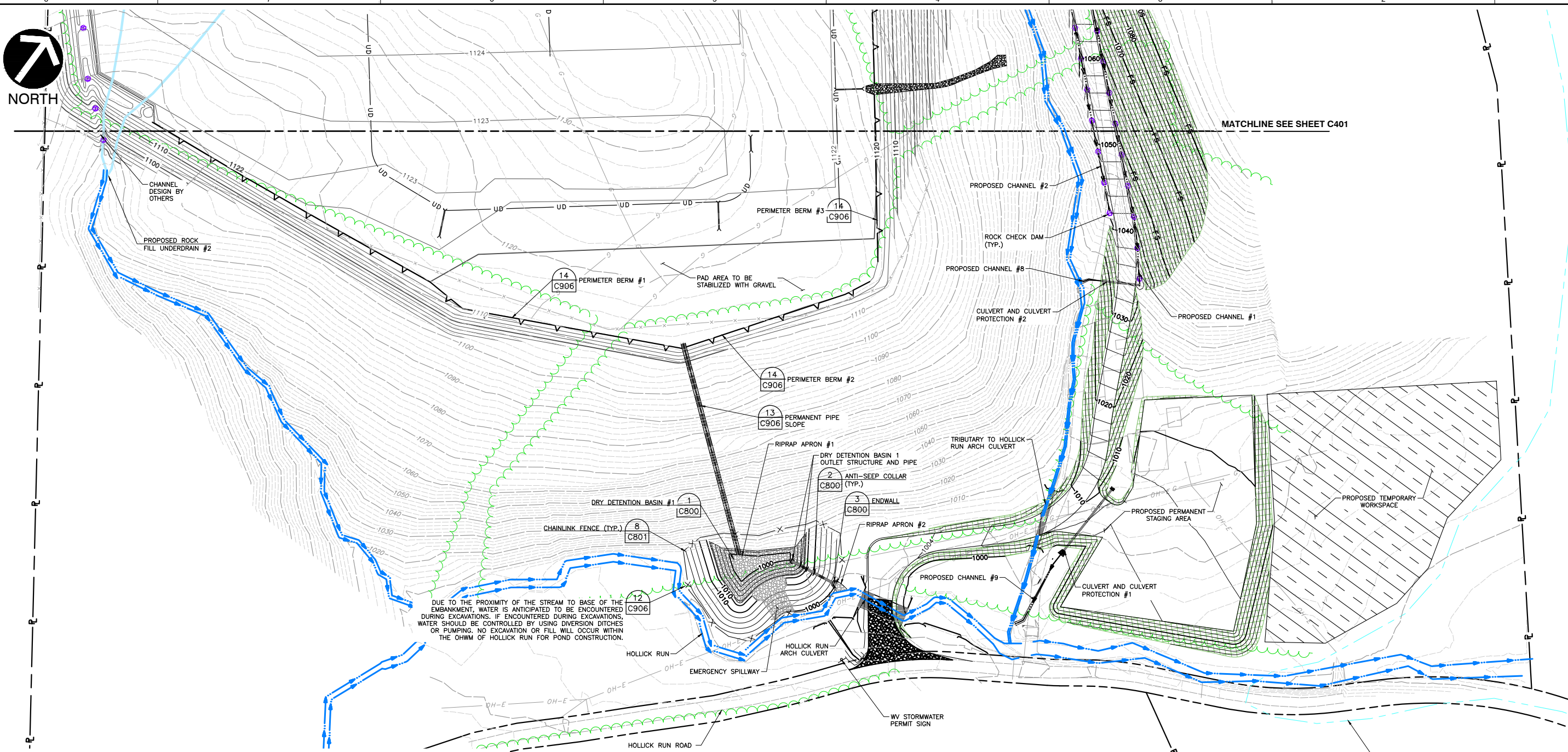
Aboveground Facility Site Specific Plans

Combined Marts CS and Kincheloe M&R Station Plans



NORTH

MATCHLINE SEE SHEET C401



LEGEND

	EXISTING INDEX CONTOUR		EXISTING RIGHT-OF-WAY
	EXISTING CONTOUR (INTER)		EXISTING TAX PARCEL LINE
	EXISTING TREE LINE		DELINEATED STREAM
	EXISTING FENCE		PROPOSED INDEX CONTOUR
	EXISTING ROADS (PAVED)		PROPOSED CONTOUR (INTER)
	EXISTING ROADS (UNPAVED)		EDGE OF PAVEMENT
	EXISTING TREE		PROPOSED ROCK CHECK DAM
	EXISTING GUARDRAIL		PROPOSED STORM SEWER/PIPE SLOPE
	EXISTING UTILITY POLE		PERIMETER BERM
	EXISTING GAS LINE		PROPOSED RIPRAP APRON
	EXISTING STREET SIGN		PROPOSED INDEX CONTOUR (BY OTHERS)
	EXISTING OVERHEAD UTILITY		PROPOSED INTERMEDIATE CONTOUR (BY OTHERS)
	WDEP STORMWATER PERMIT SIGN		PROPOSED EMERGENCY SPILLWAY
	PROPOSED TEMPORARY/PERMANENT CHANNEL		PROPOSED ROCK FILL UNDERDRAIN
			PROPOSED UNDERDRAIN

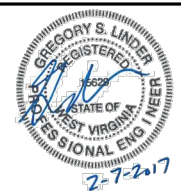
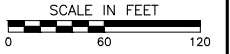
DUE TO THE PROXIMITY OF THE STREAM TO BASE OF THE EMBANKMENT, WATER IS ANTICIPATED TO BE ENCOUNTERED DURING EXCAVATIONS. IF ENCOUNTERED DURING EXCAVATIONS, WATER SHOULD BE CONTROLLED BY USING DIVERSION DITCHES OR PUMPING. NO EXCAVATION OR FILL WILL OCCUR WITHIN THE OHWM OF HOLLICK RUN FOR POND CONSTRUCTION.

STORMWATER GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE INSTALLATION, INSPECTION, TESTING AND FINAL ACCEPTANCE OF ALL NEW STORMWATER MANAGEMENT FACILITIES CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH ALL APPLICABLE REGULATING AGENCIES CONCERNING INSTALLATION, INSPECTION AND APPROVAL OF THE STORM DRAINAGE SYSTEM CONSTRUCTION.
2. ALL STORMWATER MANAGEMENT FACILITIES, INCLUDING COLLECTION AND CONVEYANCE STRUCTURES SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE STATE CODES AND REGULATIONS.

REFERENCE

1. TOPOGRAPHIC INFORMATION BASED ON MAPPING PROVIDED BY DOMINION TRANSMISSION, INC.



REVISION RECORD

NO.	DATE	DESCRIPTION

C&E
Civil & Environmental Consultants, Inc.
 600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
 Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
 www.ceinc.com

ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINA

POST CONSTRUCTION STORMWATER MANAGEMENT PLAN

DATE: FEBRUARY 2017
 DWG SCALE: 1"=60'
 PROJECT NO: 160-781
 APPROVED BY: G.S.L.

T.G.L.
 ARG
 CV01

DRAWING NO.: **C400**

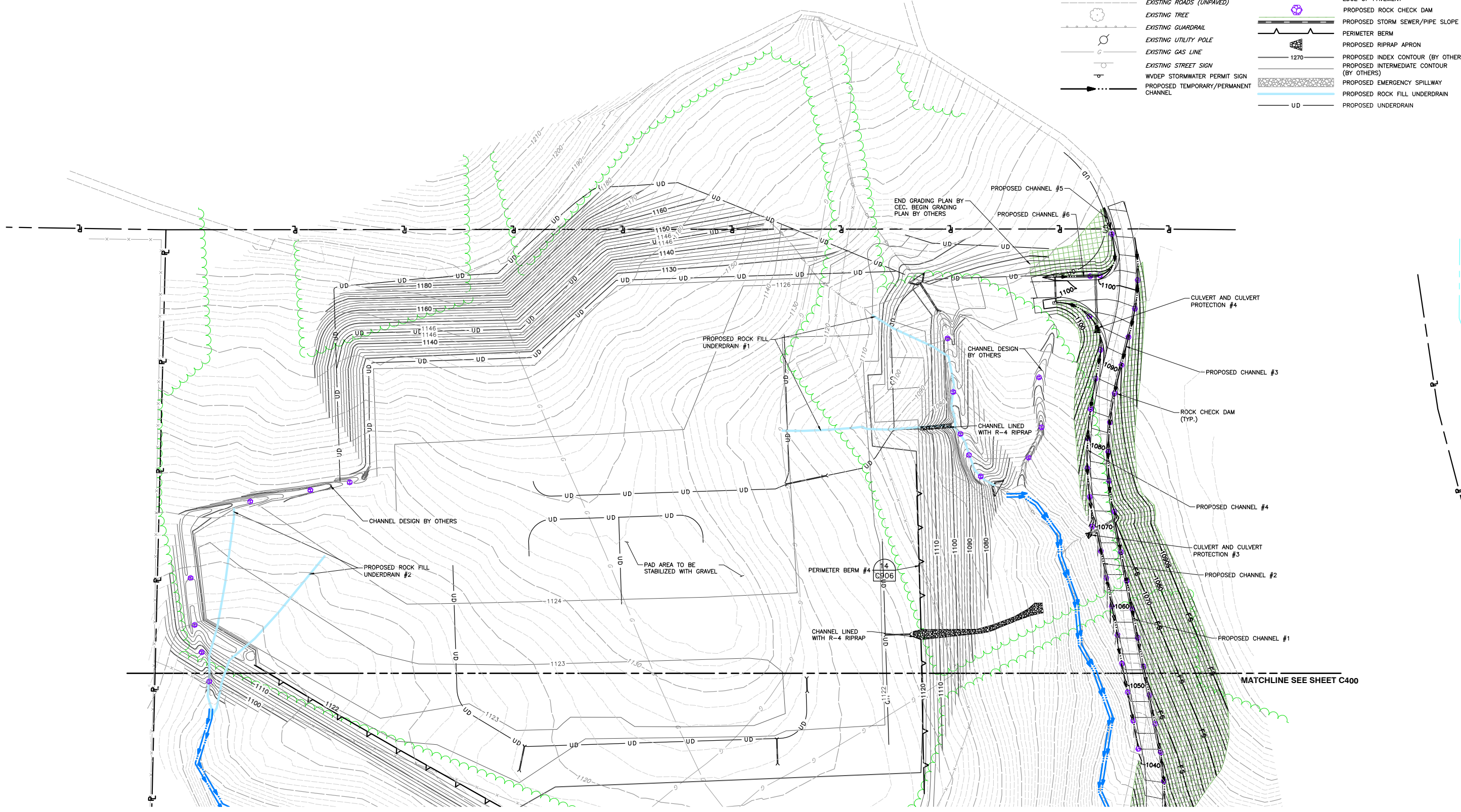
P:\2016\160-781-C400\DWG\C400-01\160781-C401-C400.mxd (1/24/2017 1:44 PM) - LP: 2/24/2017 1:44 PM



NORTH

LEGEND

	EXISTING INDEX CONTOUR		EXISTING RIGHT-OF-WAY
	EXISTING CONTOUR (INTER)		EXISTING TAX PARCEL LINE
	EXISTING TREE LINE		DELINEATED STREAM
	EXISTING FENCE		PROPOSED INDEX CONTOUR
	EXISTING ROADS (PAVED)		PROPOSED CONTOUR (INTER)
	EXISTING ROADS (UNPAVED)		EDGE OF PAVEMENT
	EXISTING TREE		PROPOSED ROCK CHECK DAM
	EXISTING GUARDRAIL		PROPOSED STORM SEWER/PIPE SLOPE
	EXISTING UTILITY POLE		PERIMETER BERM
	EXISTING GAS LINE		PROPOSED RIPRAP APRON
	EXISTING STREET SIGN		PROPOSED INDEX CONTOUR (BY OTHERS)
	WDEP STORMWATER PERMIT SIGN		PROPOSED INTERMEDIATE CONTOUR (BY OTHERS)
	PROPOSED TEMPORARY/PERMANENT CHANNEL		PROPOSED EMERGENCY SPILLWAY
			PROPOSED ROCK FILL UNDERDRAIN
			PROPOSED UNDERDRAIN

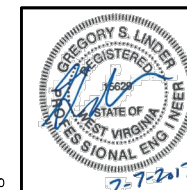
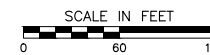


STORMWATER GENERAL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE INSTALLATION, INSPECTION, TESTING AND FINAL ACCEPTANCE OF ALL NEW STORMWATER MANAGEMENT FACILITIES CONSTRUCTION. CONTRACTOR SHALL COORDINATE WITH ALL APPLICABLE REGULATING AGENCIES CONCERNING INSTALLATION, INSPECTION AND APPROVAL OF THE STORM DRAINAGE SYSTEM CONSTRUCTION.
2. ALL STORMWATER MANAGEMENT FACILITIES, INCLUDING COLLECTION AND CONVEYANCE STRUCTURES SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE STATE CODES AND REGULATIONS.

REFERENCE

1. TOPOGRAPHIC INFORMATION BASED ON MAPPING PROVIDED BY DOMINION TRANSMISSION, INC.



NO.	DATE	DESCRIPTION

C&E
Civil & Environmental Consultants, Inc.
 600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
 Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
 www.ceinc.com

ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINA

POST CONSTRUCTION
STORMWATER MANAGEMENT PLAN

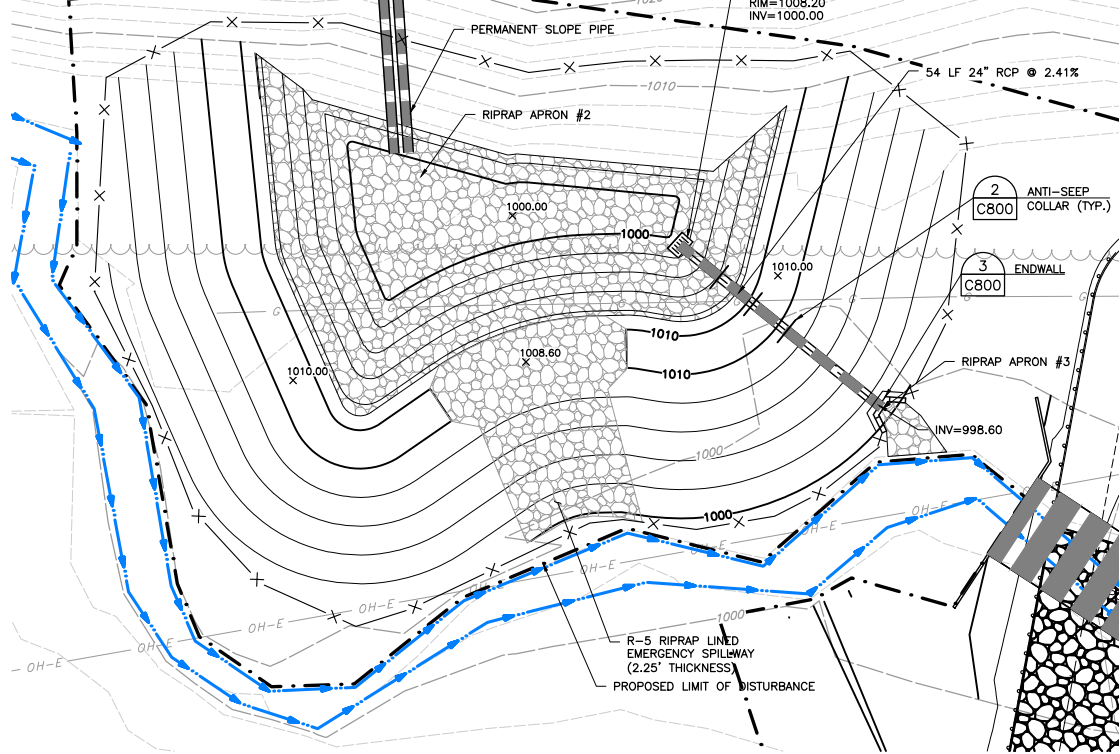
DATE: FEBRUARY 2017
 DWG SCALE: T=60'
 PROJECT NO: 160-781 CV01
 APPROVED BY: G.S.L.

DRAWING NO.: **C401**

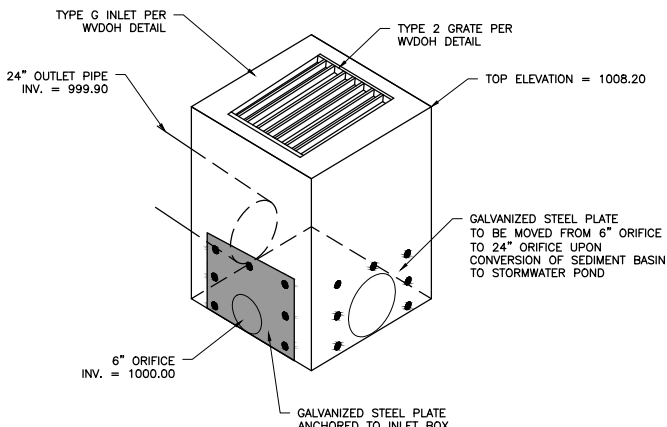
P:\2016\160-781-C401\DWG\C401\160781-CV01-C400.mxd(1) L5(2/24/2017 - 1:44 PM) - LP: 2/24/2017 1:44 PM



NORTH

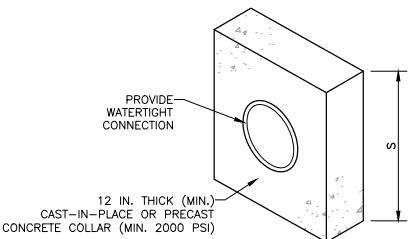


PLAN VIEW



TYPE G INLET/RISER DETAIL

NOT TO SCALE



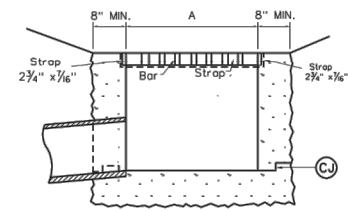
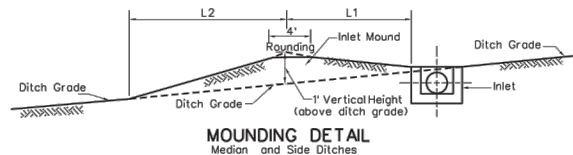
BASIN OR TRAP NO.	PIPE SIZE (IN)	S (IN)	NO. OF COLLARS	RISER TO FIRST COLLAR (FT)	COLLAR SPACING (FT)
1	24	72	3	9	9

NOTES:

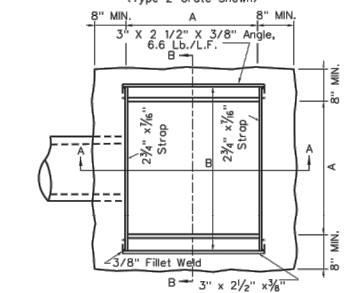
- ALL COLLARS SHALL BE INSTALLED SO AS TO BE WATER TIGHT.
- COLLAR SIZE AND SPACING SHALL BE AS INDICATED WITHIN TABLE.

DETAIL 2 CONCRETE ANTI-SEEP COLLAR NOT TO SCALE

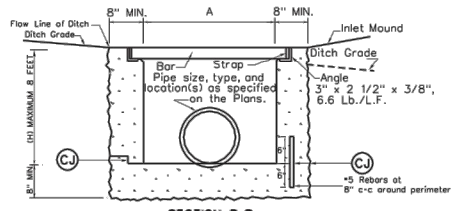
DITCH GRADE (FT)	L1 HORIZONTAL LENGTH (FT.)	L2 HORIZONTAL LENGTH (FT.)
0	3	10
3	5	9
5	7	8
7.5	UP	SPECIAL DESIGN



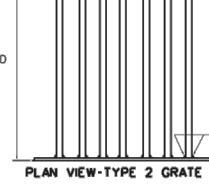
SECTION A-A



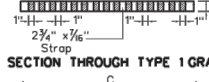
PLAN



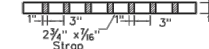
SECTION B-B



PLAN VIEW-TYPE 2 GRATE



SECTION THROUGH TYPE 1 GRATE



SECTION THROUGH TYPE 2 GRATE

Pipe Size	DIMENSIONS				TYPE 2 GRATE FRAME		TYPE 1 GRATE	
	A	B	C	D (HMIN)	F Bars	WT.	F Bars	WT.
18"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-0"	3 3/8"	7	223
21"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-3"	3 3/8"	7	223
24"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-6"	3 3/8"	7	223
27"	3'-0"	3'-6"	2'-11 3/4"	3'-5 3/4"	2'-9"	3 3/8"	8	279
30"	3'-6"	4'-0"	3'-5 3/4"	3'-11 3/4"	3'-0"	3 3/8"	9	357
33"	3'-9"	4'-3"	3'-5 3/4"	4'-2 3/4"	3'-3"	3 7/8"	10	419
36"	4'-0"	4'-6"	3'-11 3/4"	4'-5 3/4"	3'-6"	3 3/8"	11	488
42"	4'-6"	5'-0"	4'-5 3/4"	4'-11 3/4"	4'-0"	3 3/8"	12	587
48"	5'-0"	5'-6"	4'-11 3/4"	5'-5 3/4"	4'-6"	3 3/8"	14	748

Table Note: Grate and frame weights are for information only and will increase if larger straps and bars are used. The following substitutions in dimensions are acceptable for fabricating the grate and frame:
 Strap Thickness: 1/2" Strap Depth: 3" Bar Depth: 3"

NOTES

The final installed top surface of inlet and grate shall be flush with adjacent finished surfaces such as pavement, gutters, curbs, and sidewalks. Top of grate elevation, if shown on the plans, is for information only.

Construction may be cast-in place, precast in one or multiple sections, or any combination of cast-in-place and precast.

Type 2 Grate shall be used at all locations unless otherwise specified on the Plans. Type 1 Urban Grates shall be used only at specially designated locations as shown on the plans.

The Contractor, at his option, may omit use of the frame by forming a ledge in the concrete.

Special care shall be exercised in forming the 2" wide concrete ledge to provide a smooth even surface for supporting the grates if the shallow frame is not used. No projections shall exist on the bearing surfaces of the ledge or the grates, and the grates shall seat on the ledge without rocking.

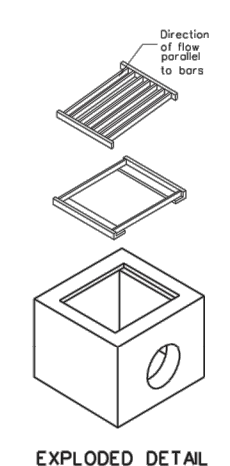
The Mounding Detail as shown is not required when an inlet is placed in a sag.

Optional construction joints labeled 'CJ' may be roughened concrete, keyed or doweled as per the typical details shown herein or as approved by the Engineer. Non shrink grout meeting the requirements of subsection 715.5 of the specifications may be used to a depth of 1/2" for leveling between precast sections. Thicker depths will be allowed as per the manufacturer's recommendations.

This inlet is to be installed in roadside or median ditches only. It is not to be placed adjacent to pavement or in the gutter pan of combination curb and gutter.

The minimum distance from the top of any pipe opening to any construction joint above the opening shall be four (4) inches.

The number and location of pipe openings shall be as shown in the plans. The contractor at no additional cost, shall be responsible for any temporary bracing required to transport precast inlet sections due to multiple openings.



EXPLODED DETAIL

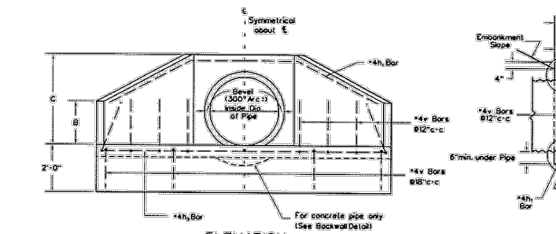
REVISION NO.	DATE	DESCRIPTION

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 STANDARD DETAIL

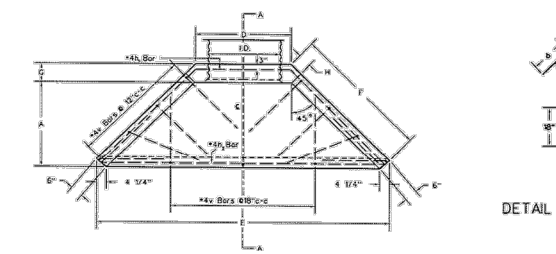
TYPE G INLET
 STANDARD SHEET DR8-G

- DRY DETENTION POND NOTES:**
- PROTECT BASIN BOTTOM FROM COMPACTION PRIOR TO AND DURING INSTALLATION.
 - INSTALL WATER TIGHT GALVANIZED STEEL PLATE WITH ORIFICE ON THE INLET BOX FACE OVER THE HOLE REMAINING FROM THE REMOVAL OF THE SEDIMENT BASIN OUTLET BARREL.
 - BASIN BOTTOM SHOULD BE VEGETATED WITH A DIVERSE NATIVE PLANTING MIX.
 - WOODY VEGETATION SHOULD NOT BE PLANTED ON THE EMBANKMENTS.
 - MEADOW GRASSES OR OTHER DEEPLY ROOTED HERBACEOUS VEGETATION IS RECOMMENDED ON THE INTERIOR SLOPES OF THE EMBANKMENTS.
 - FERTILIZER AND PESTICIDES SHOULD NOT BE USED.
- LONG TERM MAINTENANCE:**
- ALL BASIN STRUCTURES EXPECTED TO RECEIVE AND/OR TRAP DEBRIS AND SEDIMENT SHOULD BE INSPECTED FOR CLOGGING AND EXCESSIVE DEBRIS AND SEDIMENT ACCUMULATION AT LEAST FOUR TIMES PER YEAR, AS WELL AS AFTER EVERY STORM GREATER THAN 1 INCH.
 - SEDIMENT REMOVAL SHOULD BE CONDUCTED WHEN THE BASIN IS COMPLETELY DRY. SEDIMENT SHOULD BE DISPOSED OF PROPERLY AND ONCE SEDIMENT IS REMOVED, DISTURBED AREAS NEED TO BE IMMEDIATELY STABILIZED AND RE-VEGETATED.
 - MOVING AND/OR TRIMMING OF VEGETATION SHOULD BE PERFORMED AS NECESSARY TO SUSTAIN THE SYSTEM, BUT ALL DETRITUS SHOULD BE REMOVED FROM THE BASIN.
 - VEGETATED AREAS SHOULD BE INSPECTED ANNUALLY FOR EROSION.
 - VEGETATED AREAS SHOULD BE INSPECTED ANNUALLY FOR UNWANTED GROWTH OF EXOTIC/INVASIVE SPECIES.
 - VEGETATIVE COVER SHOULD BE MAINTAINED AT A MINIMUM OF 95%. IF VEGETATIVE COVER HAS BEEN REDUCED BY 10%, VEGETATION SHOULD BE RE-ESTABLISHED.

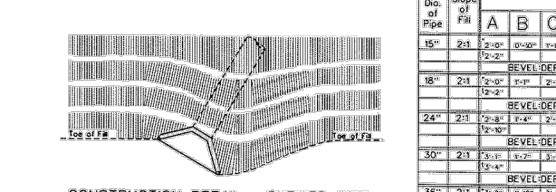
DETAIL 1 DRY DETENTION POND NO. 1 NOT TO SCALE



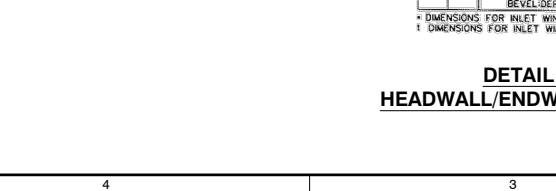
ELEVATION



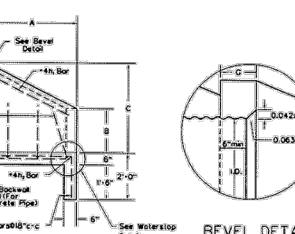
SECTION A-A



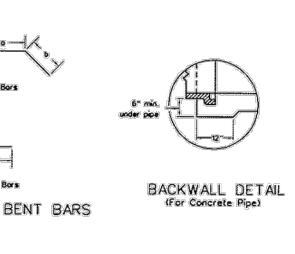
DETAIL OF BENT BARS



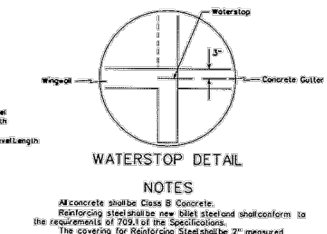
CONSTRUCTION DETAIL - SKEWED PIPE



BEVEL DETAIL



BACKWALL DETAIL (For Concrete Pipe)



WATERSTOP DETAIL

NOTES

All concrete shall be Class B Concrete. Reinforcing steel shall be new steel and shall conform to the requirements of 709.1 of the Specifications. The clearing for reinforcing steel shall be 2" measured from the surface of the concrete to the face of the bar, unless otherwise noted on the Plans. Reinforcement in members where concrete is deposited on the ground shall have 3" of concrete from the face of the bar to the ground contact surface.

All exposed edges shall have a 3/4" x 45° chamfer. Chamfer on vertical edges shall be continued a minimum of one foot below finished ground line.

When wingwalls are placed on the inlet end of corrugated metal or structural pipe, a bevel shall be used at the inlet opening. The end of the pipe shall be set in from the face of the wall as shown on the "Bevel Detail", and the bevel constructed from the end of the pipe to the face of the wall.

When wingwalls are placed on the inlet end of concrete pipe, the "heel" or "groove" of the pipe shall be placed in the wall, and the side of the "heel" or "groove" shall be filled with concrete up to the flow line.

Bevels are not required on outlet wingwalls or on inlet wingwalls for concrete pipe.

Keyed or doweled type construction joints, acceptable to the Engineer, may be used during construction.

If embankment slope above wingwall is flatter than 2:1, provide wings for 2:1 slope and wrap embankment to 2:1 slope at wingwall. The soil quantity for wingwalls constructed in accordance with the details herein, while the soils: grade of Class B Concrete specified on this sheet. Cost of all materials shall be included in the unit price bid for Class B Concrete.

Waterstop meeting the requirements of 708.10 shall be placed as shown when concrete gutter is to abut the wingwall.

Inside Dia. of Pipe	Slope of Fill	DIMENSIONS							REINFORCEMENT		QUANTITIES			
		A	B	C	D	E	F	G	H	No. of Bars	Length	CONC. (CY)	STEEL (LBS.)	
15"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	0.61	0.62	112
18"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	0.87	0.88	118
24"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	1.01	1.02	124
30"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	1.32	1.33	161
36"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	1.79	1.80	208
42"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	2.37	2.38	281
48"	2:1	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	4	2'-0"	3.08	3.09	364

* DIMENSIONS FOR INLET WINGWALLS ON CORRUGATED METAL PIPE (TO ACCOMMODATE THE BEVEL).
 † DIMENSIONS FOR INLET WINGWALLS ON CONCRETE PIPE AND ALL OUTLET WINGWALLS.

DETAIL 3 HEADWALL/ENDWALL DETAIL

NOTES:

ALL MATERIALS, AND REINFORCEMENT FOR PIPE CULVERTS WITH WINGWALLS SHALL CONFORM TO WDOH STANDARDS.

Civil & Environmental Consultants, Inc.
 600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
 Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
 www.cecinco.com

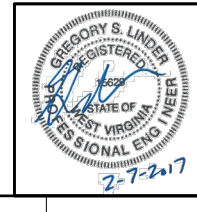
ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA

CONSTRUCTION DETAILS

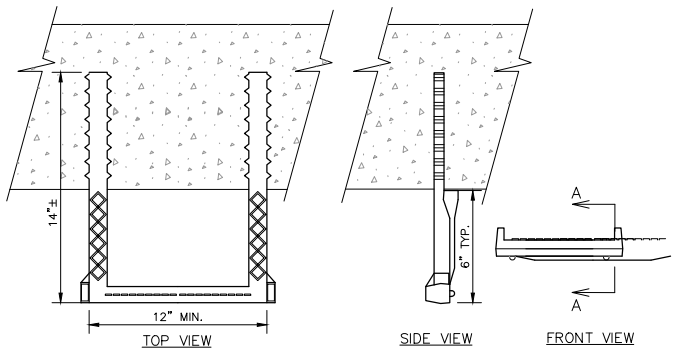
DATE: FEBRUARY 2017
 DRAWN BY: [Name]
 CHECKED BY: [Name]
 AS SHOWN

TGJ
 ARG
 CV01
 GSI

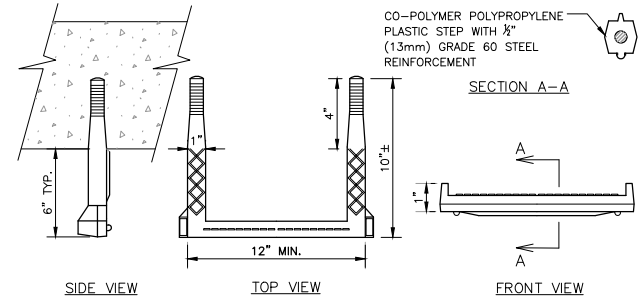
DRAWING NO.: **C800**



2-7-2017



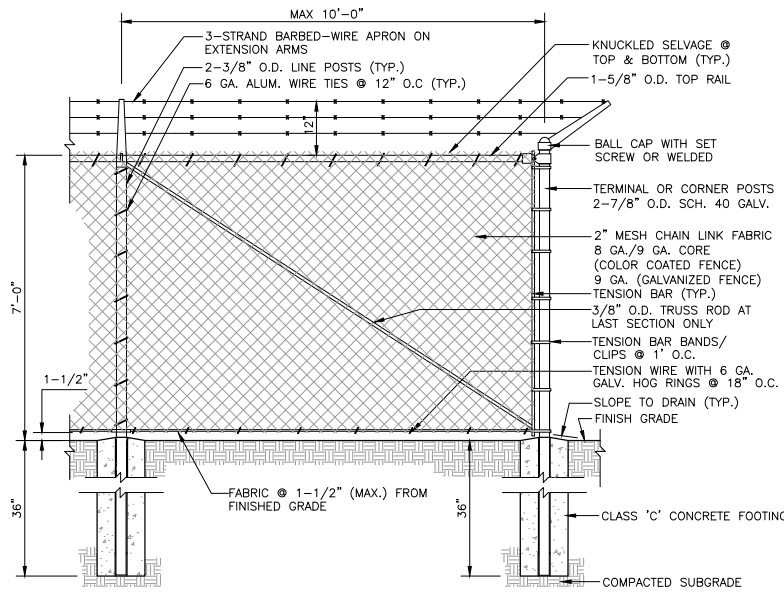
TYPE 1 CAST-IN-PLACE



TYPE 2 PRE-DRILLED HOLE

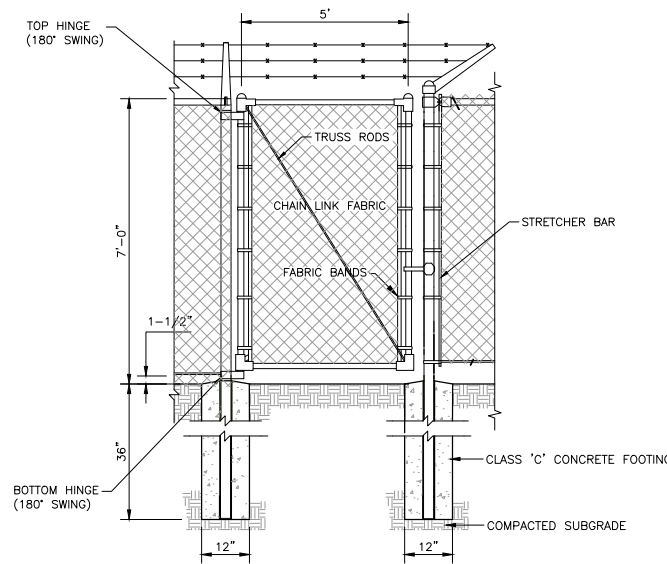
- NOTES:**
- TYPICAL STEPS, SPACING AND MATERIAL AS PER ASTM DESIGNATION C-478, AASHTO M-199.
 - PLASTIC SHALL BE A CO-POLYMER POLYPROPYLENE MEETING THE REQUIREMENTS OUTLINED IN ASTM DESIGNATION D-4101 UNDER TYPE II, GRADE 49108.
 - STEEL REINFORCING BAR SHALL BE A 1/2" (13mm) DEFORMED BAR, GRADE 60 AND CONFORMING TO THE REQUIREMENTS OF ASTM DESIGNATION A-615.
 - USE TYPE 1 FOR CAST-IN-PLACE VAULTS. USE TYPE 2 FOR NEW PRECAST MANHOLES/INLETS OR WHEN ADDING STEPS TO EXISTING STRUCTURES.
 - ALL STEPS SHALL BE SET VERTICALLY AT 12" CENTER TO CENTER.

**DETAIL 4
PLASTIC INLET STEP DETAIL
NOT TO SCALE**

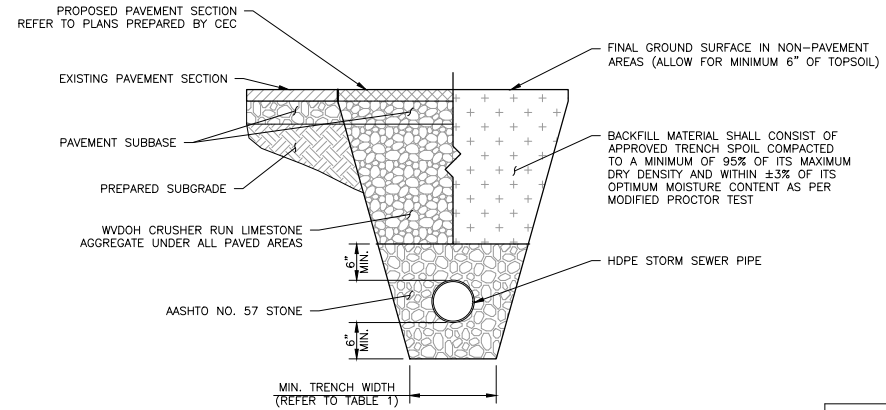


- NOTES:**
- FOOTING WIDTH TO BE (4)X POST WIDTH. MINIMUM DEPTH TO BE 36".
 - FENCE BY MASTER HALCO OR APPROVED EQUAL.

**DETAIL 6
CHAINLINK FENCE DETAIL
NOT TO SCALE**



**DETAIL 7
CHAINLINK FENCE MAN GATE DETAIL
NOT TO SCALE**



- NOTES:**
- ALL MATERIALS EXCAVATED DURING TRENCHING SHALL BE STOCKPILED A SUFFICIENT DISTANCE FROM ALL TRENCHES TO PREVENT SLIDES OR CAVE-INS.
 - ALL BACKFILL MATERIALS SHALL BE APPROVED BY THE OWNER'S ENGINEER OR THEIR REPRESENTATIVE BEFORE BEING PLACED. BACKFILL MATERIAL SHALL BE PLACED IN MAXIMUM 10" THICK LIFTS FOR FULL-SIZE COMPACTION EQUIPMENT OR 4"-6" THICK LIFTS IF USING WALK-BEHIND OR REMOTELY OPERATED COMPACTION EQUIPMENT.
 - AASHTO NO. 57 CRUSHED LIMESTONE AGGREGATE SHALL SATISFY THE REQUIREMENTS OF AASHTO M43-05, STANDARD SPECIFICATION OF AGGREGATE FOR ROAD AND BRIDGE CONSTRUCTION. WDOH CRUSHER RUN LIMESTONE AGGREGATE SHALL SATISFY THE REQUIREMENTS OF WDOH DIVISION 400, STANDARD SPECIFICATIONS ROADS AND BRIDGES.
 - REFER TO TABLE 2 FOR TRENCH BACKFILL COMPACTION REQUIREMENTS.
 - THE CONTRACTOR SHALL CONSTRUCT TRENCHES AND PROVIDE ADEQUATE SHORING (WHERE NECESSARY) IN CONFORMANCE WITH THE LATEST OSHA REQUIREMENTS FOR CONSTRUCTION STANDARD FOR EXCAVATIONS (29 CFR PART 1926.650-652 SUBPART P).
 - THE CONTRACTOR SHALL VERIFY THAT THE MINIMUM SPECIFIED PIPE COVER IS PROVIDED BETWEEN THE FINAL GROUND SURFACE AND TOP OF PIPE BEFORE LAYING PIPE. PROVIDE A MINIMUM OF 2 FEET OF COVER ABOVE ALL PIPES DURING CONSTRUCTION.
 - INCREASE TRENCH WIDTH AS NECESSARY TO ALLOW FOR PROPER COMPACTION OF BEDDING/BACKFILL.
 - RECOMMENDED MANUFACTURER: ADVANCED DRAINAGE SYSTEMS, INC. (ADS), OR APPROVED EQUAL.

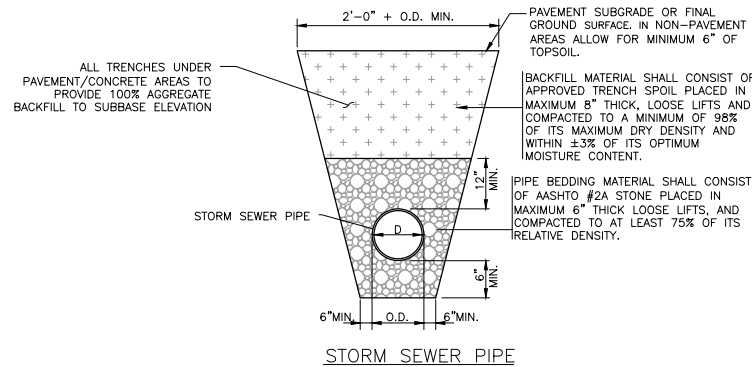
**DETAIL 5
TYPICAL HDPE STORM SEWER TRENCH
NOT TO SCALE**

TABLE 1: MINIMUM TRENCH WIDTHS

PIPE DIAMETER (in.)	TRENCH WIDTH (in.)
4-10	28
12	30
15	34
18	39
24	48
30	56
36	64
42	72
48	80
54	88
60	96

TABLE 2: BACKFILL MATERIAL AND COMPACTION REQUIREMENTS

DESCRIPTION	SOIL CLASSIFICATIONS			MIN. MODIFIED PROCTOR DENSITY %
	ASTM D2321	ASTM D487	AASHTO M43	
GRADED OR CRUSHED STONE, GRAVEL	CLASS I	-	5 56	N/A SEE NOTES FOR VISUAL CRITERIA
WELL-GRADED SAND, GRAVELS AND GRAVEL/SAND MIXTURES; POORLY GRADED SAND, GRAVELS AND GRAVEL/SAND MIXTURES; LITTLE TO NO FINES	CLASS II	GW GP SW SP	57 6	N/A SEE NOTES FOR VISUAL CRITERIA
SILTY OR CLAYEY GRAVELS, GRAVEL/SAND/SILT OR GRAVEL AND CLAY MIXTURES; SILTY OR CLAYEY SANDS, SAND/CLAY OR SAND/SILT MIXTURES	CLASS III	GM, GC, SM, SC, ML, CL	N/A	95%

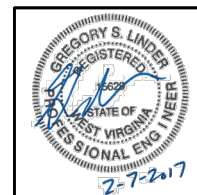


COVER REQUIREMENTS	
UTILITY	MINIMUM COVER REQUIRED = 2.0 FT.
STORM SEWER	2.0 FT.

AS MEASURED FROM TOP OF PIPE TO FINAL GROUND SURFACE

**DETAIL 8
TYPICAL REINFORCED CONCRETE STORM SEWER TRENCH
NOT TO SCALE**

- NOTES:**
- ALL MATERIALS EXCAVATED FROM THE UTILITY TRENCH SHALL BE STOCKPILED A MINIMUM SUFFICIENT DISTANCE FROM ALL TRENCHES TO PREVENT SLIDES OR CAVE-INS.
 - ALL BACKFILL MATERIALS SHALL BE APPROVED BY THE OWNER OR HIS REPRESENTATIVE BEFORE BEING PLACED.
 - THE AASHTO NO. 2A STONE SHALL SATISFY THE REQUIREMENTS OF WDOH STANDARD SPECIFICATIONS.
 - THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT FOR THE BACKFILL MATERIALS SHALL BE DETERMINED BY ASTM D698.
 - THE GENERAL CONTRACTOR SHALL CONSTRUCT THE UTILITY TRENCHES AND PROVIDE ADEQUATE SHORING (WHERE NECESSARY) IN CONFORMANCE WITH THE LATEST REQUIREMENTS FOR CONSTRUCTION STANDARD FOR EXCAVATIONS (29 CFR PART 1926.650-652 SUBPART P) PROMULGATED BY OSHA.
 - THE GENERAL CONTRACTOR SHALL VERIFY THAT THE MINIMUM SPECIFIED PIPE COVER IS PROVIDED BETWEEN THE FINAL GROUND SURFACE AND TOP OF PIPE BEFORE LAYING PIPE. PROVIDE A MINIMUM OF 2 FT. OF COVER ABOVE ALL PIPES DURING CONSTRUCTION.



DRAWING NO.: **C801**

Civil & Environmental Consultants, Inc.
 600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
 Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
 www.cecinc.com

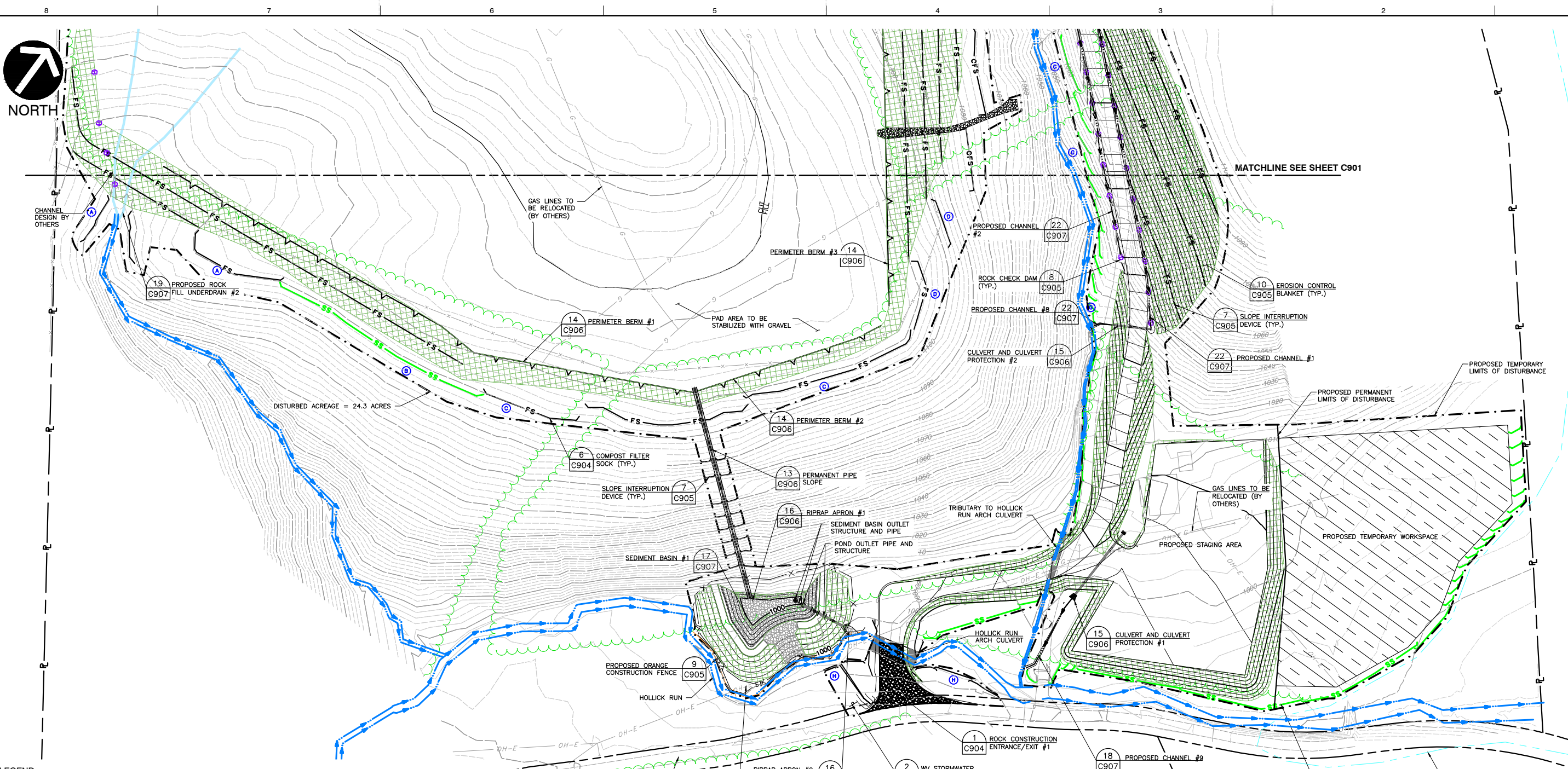
**ATLANTIC COAST PIPELINE, LLC
 MARTS COMPRESSOR STATION
 KINCHELOE MS
 LEWIS COUNTY, WEST VIRGINA**

CONSTRUCTION DETAILS
 DATE: FEBRUARY 2017
 DRAWN BY: [Signature]
 AS SHOWN CHECKED BY: [Signature]
 PROJECT NO: 160-781 CV01
 G.S.L.

P:\2016\160-781-CD01\DWG\C01\160781-CV01-C800.dwg(2/26/2017 1:45 PM) - LF: 2/24/2017 1:45 PM



NORTH



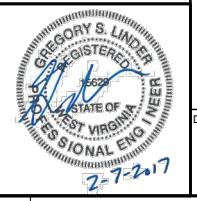
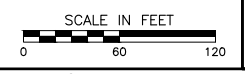
DISTURBED ACREAGE = 24.3 ACRES

MATCHLINE SEE SHEET C901

LEGEND	
	EXISTING INDEX CONTOUR
	EXISTING CONTOUR (INTER)
	EXISTING TREE LINE
	EXISTING FENCE
	EXISTING ROADS (PAVED)
	EXISTING ROADS (UNPAVED)
	EXISTING TREE
	EXISTING GUARDRAIL
	EXISTING UTILITY POLE
	EXISTING GAS LINE
	EXISTING STREET SIGN
	EXISTING OVERHEAD UTILITY
	PROPOSED LIMIT OF DISTURBANCE
	WDEP STORMWATER PERMIT SIGN
	PROPOSED COMPOST FILTER SOCK/ SLOPE INTERRUPTION DEVICE
	PROPOSED COMPOST FILTER SOCK SEDIMENT TRAP
	PROPOSED CONCRETE WASHOUT
	PROPOSED TEMPORARY/PERMANENT CHANNEL
	EXISTING RIGHT-OF-WAY
	EXISTING TAX PARCEL LINE
	DELINEATED STREAM
	PROPOSED INDEX CONTOUR
	PROPOSED CONTOUR (INTER)
	EDGE OF PAVEMENT
	PROPOSED SUPER SILT FENCE
	PROPOSED ROCK CHECK DAM
	PROPOSED STORM SEWER/PIPE SLOPE
	PERIMETER BERM
	PROPOSED RIPRAP APRON
	SEDIMENT BARRIER ID
	PROPOSED INDEX CONTOUR (BY OTHERS)
	PROPOSED INTERMEDIATE CONTOUR (BY OTHERS)
	PROPOSED ROCK CONSTRUCTION ENTRANCE
	PROPOSED EROSION CONTROL BLANKET
	PROPOSED EMERGENCY SPILLWAY
	PROPOSED ROCK FILL UNDERDRAIN
	PROPOSED ORANGE CONSTRUCTION FENCE
	PROPOSED UNDERDRAIN

SEDIMENT BARRIER TABLE		
BARRIER ID	SIZE	DETAIL
A	32" FILTREXX SILT SOCK	6 ON C904
B	SUPER SILT FENCE	4 ON C904
C	32" FILTREXX SILT SOCK	6 ON C904
D	32" FILTREXX SILT SOCK	6 ON C904
E	SUPER SILT FENCE	4 ON C904
F	SUPER SILT FENCE	4 ON C904
G	SUPER SILT FENCE	4 ON C904
H	18" FILTREXX SILT SOCK	6 ON C904

REFERENCE
1. TOPOGRAPHIC INFORMATION BASED ON MAPPING PROVIDED BY DOMINION TRANSMISSION, INC.



NO.	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
www.cecinco.com

**ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA**

EROSION AND SEDIMENTATION CONTROL PLAN
DRAWING NO: **C900**
DATE: FEBRUARY 2017
DWG SCALE: 1"=60'
PROJECT NO: 160-781-CV01
APPROVED BY: [Signature]
T.G.L. ARG
160-781-CV01
G.S.L.

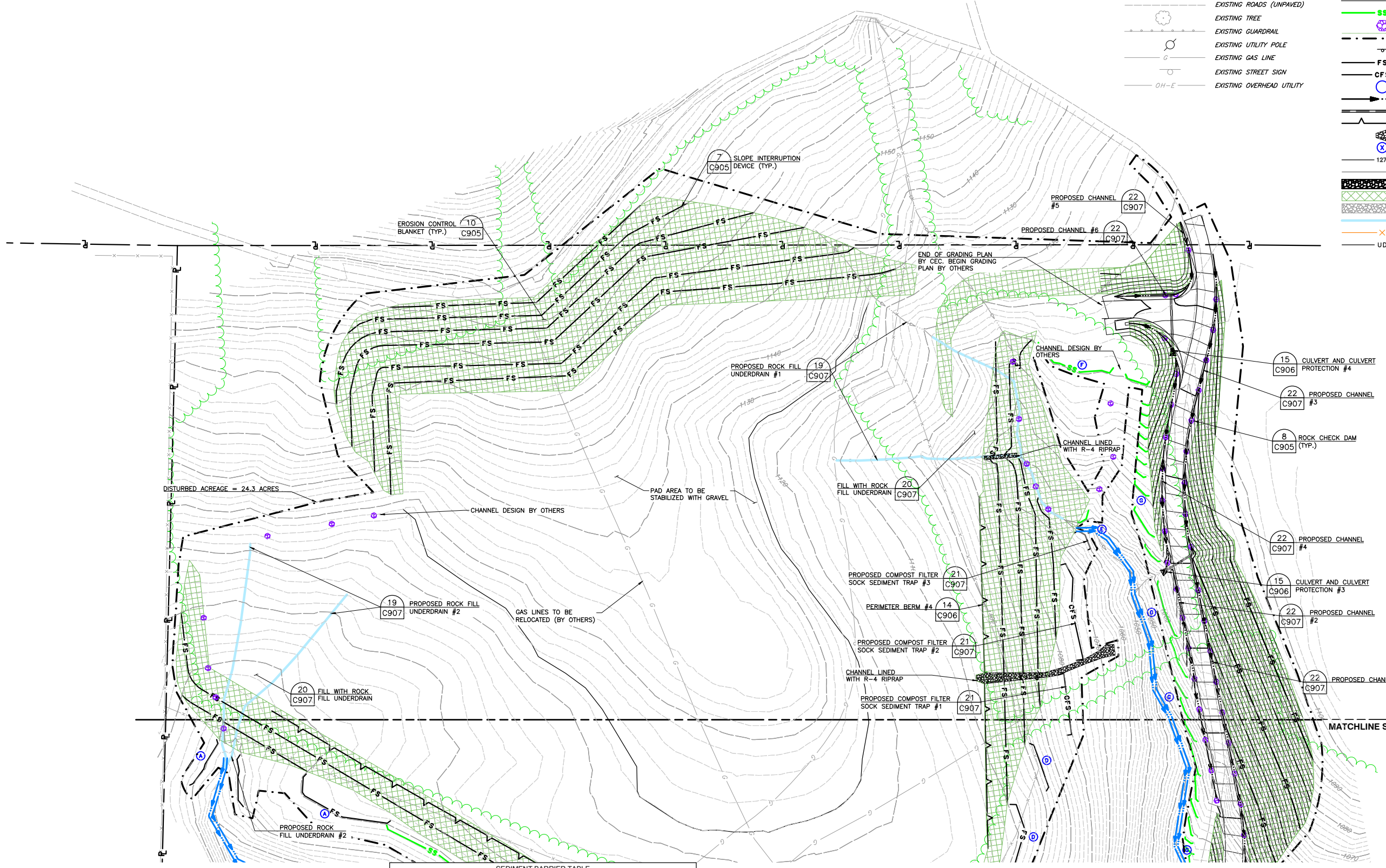
P:\2016\160-781-CV01\DWG\C900\160-781-CV01-C900.dwg (3/21/2017 1:46 PM) - LP: 2/24/2017 1:46 PM



NORTH

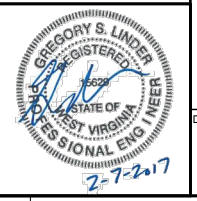
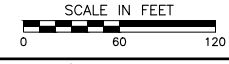
LEGEND

- EXISTING INDEX CONTOUR
- EXISTING CONTOUR (INTER)
- EXISTING TREE LINE
- EXISTING FENCE
- EXISTING ROADS (PAVED)
- EXISTING ROADS (UNPAVED)
- EXISTING TREE
- EXISTING GUARDRAIL
- EXISTING UTILITY POLE
- EXISTING GAS LINE
- EXISTING STREET SIGN
- EXISTING OVERHEAD UTILITY
- EXISTING RIGHT-OF-WAY
- DELINEATED STREAM
- PROPOSED INDEX CONTOUR
- PROPOSED CONTOUR (INTER)
- EDGE OF PAVEMENT
- PROPOSED SUPER SILT FENCE
- PROPOSED ROCK CHECK DAM
- PROPOSED LIMIT OF DISTURBANCE
- WDEP STORMWATER PERMIT SIGN
- PROPOSED COMPOST FILTER SOCK/SLOPE INTERRUPTION DEVICE
- PROPOSED COMPOST FILTER SOCK
- SEDIMENT TRAP
- PROPOSED CONCRETE WASHOUT
- PROPOSED TEMPORARY/PERMANENT CHANNEL
- PROPOSED STORM SEWER/PIPE SLOPE
- PERIMETER BERM
- PROPOSED RIPRAP APRON
- SEDIMENT BARRIER ID
- PROPOSED INDEX CONTOUR (BY OTHERS)
- PROPOSED INTERMEDIATE CONTOUR (BY OTHERS)
- PROPOSED ROCK CONSTRUCTION ENTRANCE
- PROPOSED EROSION CONTROL BLANKET
- PROPOSED EMERGENCY SPILLWAY
- PROPOSED ROCK FILL UNDERDRAIN
- PROPOSED ORANGE CONSTRUCTION FENCE
- PROPOSED UNDERDRAIN



SEDIMENT BARRIER TABLE		
BARRIER ID	SIZE	DETAIL
A	32" FILTREXX SILT SOCK	6 ON C904
B	SUPER SILT FENCE	4 ON C904
C	32" FILTREXX SILT SOCK	6 ON C904
D	32" FILTREXX SILT SOCK	6 ON C904
E	SUPER SILT FENCE	4 ON C904
F	SUPER SILT FENCE	4 ON C904
G	SUPER SILT FENCE	4 ON C904

- REFERENCE**
- TOPOGRAPHIC INFORMATION BASED ON MAPPING PROVIDED BY DOMINION TRANSMISSION, INC.



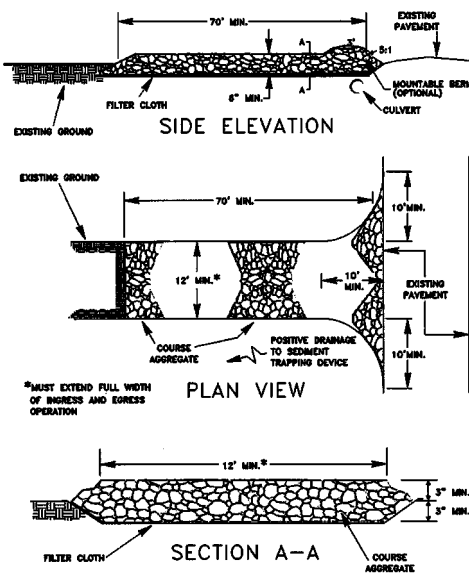
NO.	DATE	DESCRIPTION

C&E
Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA

EROSION AND SEDIMENTATION CONTROL PLAN
DATE: FEBRUARY 2017 (DRAWN BY: TGJ) (ARG)
DWG SCALE: 1"=60' (CHECKED BY: T-607) (CV01) (160-781) (GSI)
PROJECT NO.: 160-781 CV01
APPROVED BY: [Signature]
DRAWING NO.: **C901**

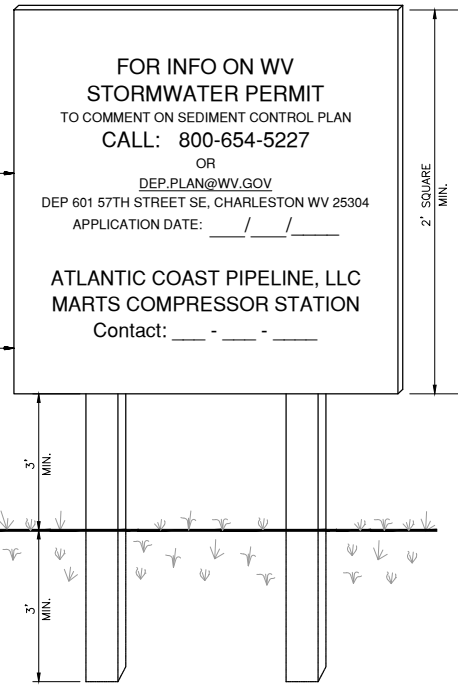
STONE CONSTRUCTION ENTRANCE



**DETAIL 1
ROCK CONSTRUCTION ENTRANCE/EXIT**
NOT TO SCALE

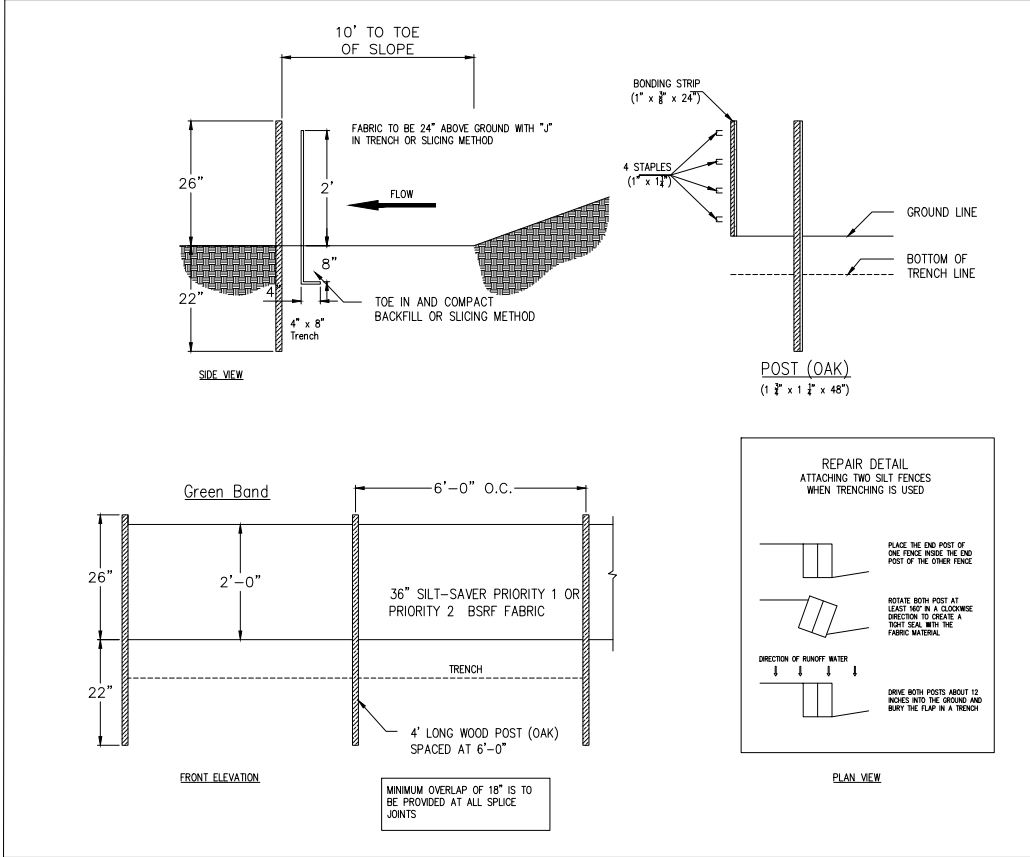
SIGN TO BE CONSTRUCTED OF A RIGID MATERIAL, SUCH AS PLYWOOD OR OUTDOOR SIGN BOARD. SIGN MUST BE CONSTRUCTED IN A MANNER TO PROTECT DOCUMENTS FROM DAMAGE DUE TO WEATHER (WIND, SUN, MOISTURE, ETC.).

SIGN TEXT SHALL BE 1.6" AND 0.8" LETTERS

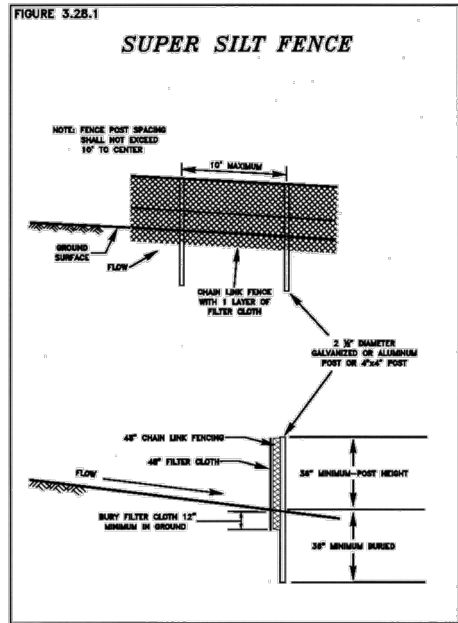


- NOTES:**
1. THE WV STORMWATER PERMIT SIGN MUST BE LOCATED NEAR THE CONSTRUCTION ENTRANCE OF THE SITE, SUCH THAT IT IS ACCESSIBLE AND VIEWABLE BY THE GENERAL PUBLIC, BUT NOT OBSTRUCTING VIEWS AS TO CAUSE A SAFETY HAZARD.
 2. ALL POSTED DOCUMENTS MUST BE MAINTAINED IN A CLEARLY READABLE CONDITION AT ALL TIMES THROUGHOUT CONSTRUCTION AND UNTIL THE NOTICE-OF-TERMINATION (N.O.T.) IS FILED FOR THE PERMIT.
 3. CONTRACTOR SHALL POST OTHER STORMWATER AND/OR EROSION AND SEDIMENTATION CONTROL RELATED PERMITS ON THE SIGN AS REQUIRED BY THE GOVERNING AGENCY.
 4. SIGN SHALL BE LOCATED OUTSIDE OF PUBLIC RIGHT-OF-WAY AND EASEMENTS UNLESS APPROVED BY THE GOVERNING AGENCY.
 5. CONTRACTOR IS RESPONSIBLE FOR ENSURING STABILITY OF THE WV STORMWATER PERMIT SIGN.

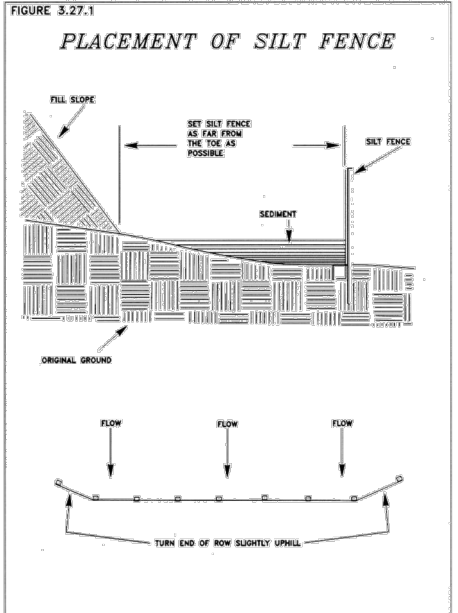
**DETAIL 2
WV STORMWATER PERMIT SIGN**
NOT TO SCALE



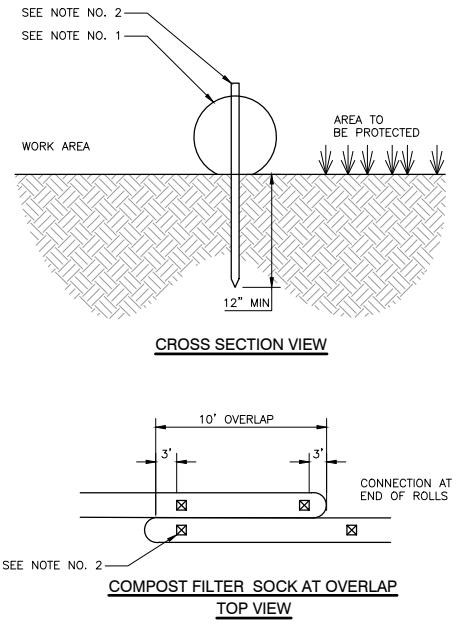
**DETAIL 3
BELTED SILT RETENTION FENCE**
NOT TO SCALE



**DETAIL 4
SUPER SILT FENCE**
NOT TO SCALE

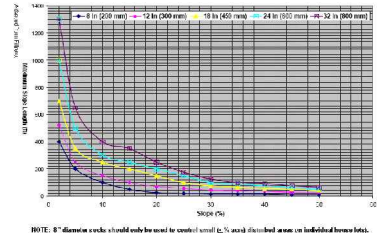


**DETAIL 5
SUPER SILT FENCE PLACEMENT**
NOT TO SCALE



- NOTES:**
1. ALL MATERIAL TO MEET WDEP SPECIFICATIONS.
 2. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE COMPOST FILTER SOCK ON 10 FOOT CENTERS, USING 2-INCH BY 2-INCH WOODEN STAKES.
 3. COMPOST MATERIAL TO BE DISPERSED ON SITE AS DETERMINED BY ENGINEER.

**DETAIL 6
COMPOST FILTER SOCK**
NOT TO SCALE



COMPOST FILTER SOCK SIZING TABLE



NO.	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 • 855.488.9539 • Fax: 304.933.3327
www.cecin.com

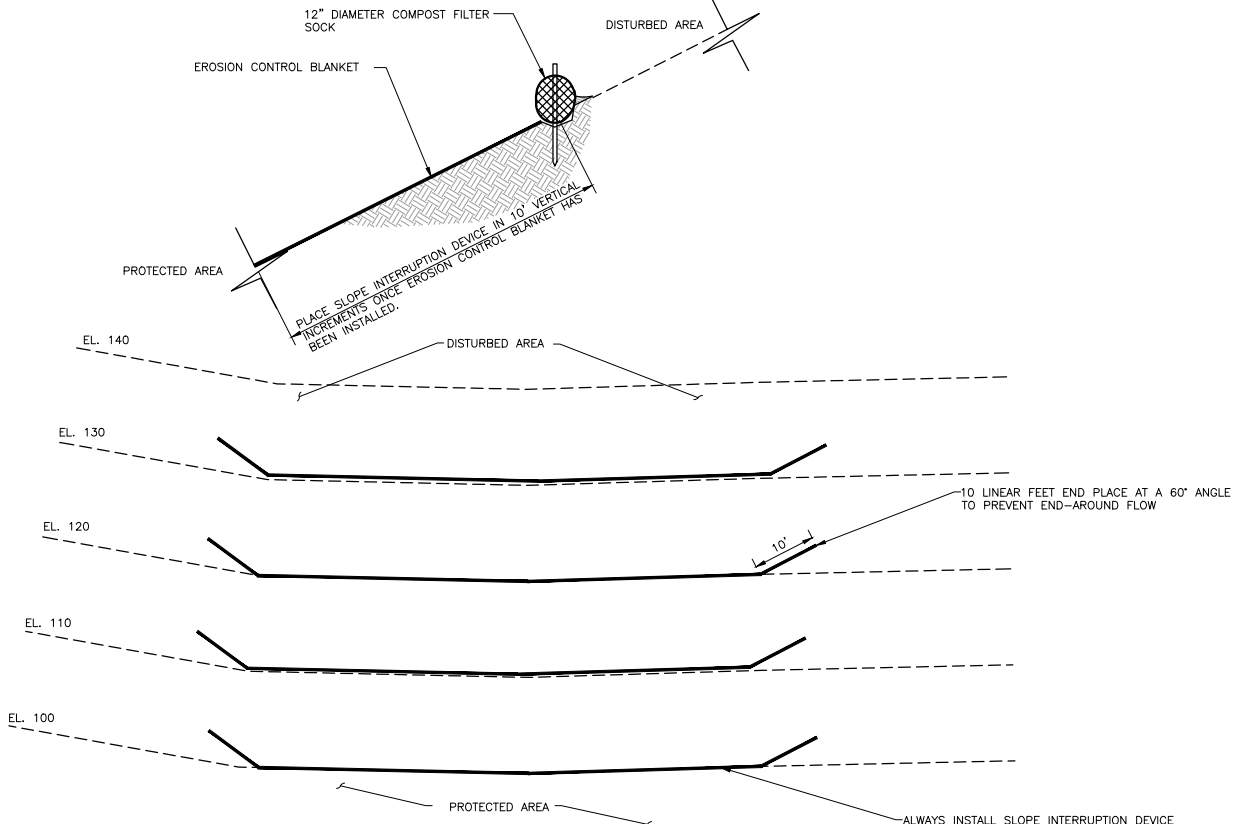
**ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA**

EROSION AND SEDIMENT CONTROL DETAILS

DATE: FEBRUARY 2017
DRAWN BY: TGL
AS SHOWN
CHECKED BY: ARG
PROJECT NO: 160-781 CV01
APPROVED BY: GSL

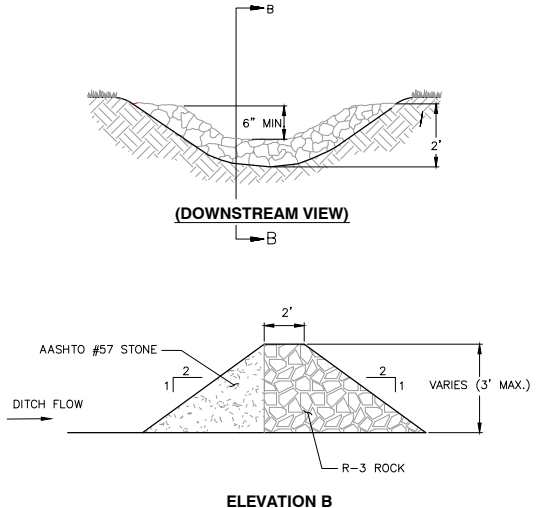
DRAWING NO: **C904**

P:\2016\160-781-CV01\DWG\C904.dwg (1/26/2017 1:47 PM) - LP: 2/24/2017 1:47 PM



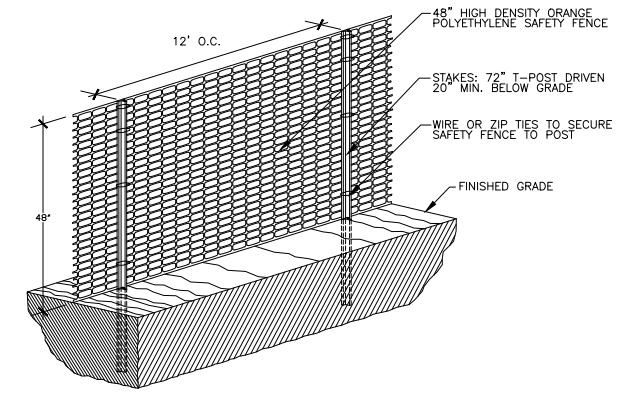
- NOTES:
- SEE COMPOST FILTER SOCK DETAIL FOR SPECIFICATIONS AND INSTALLATION REQUIREMENTS.
 - MAINTENANCE SHALL BE IN ACCORDANCE WITH THE COMPOST FILTER SOCK REQUIREMENTS.

DETAIL 7
SLOPE INTERRUPTION DEVICE
NOT TO SCALE



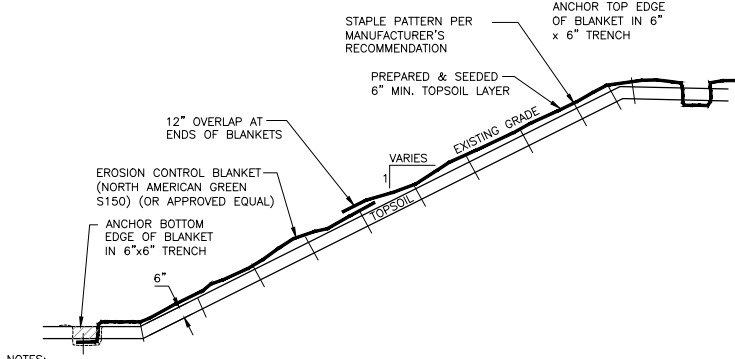
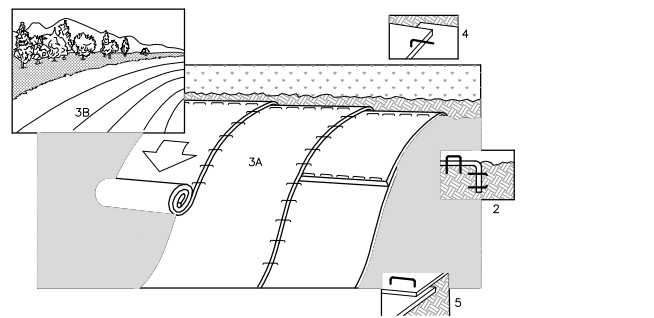
- NOTES:
- SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTERS.
 - IMMEDIATELY UPON STABILIZATION OF EACH CHANNEL, REMOVE ACCUMULATED SEDIMENT, REMOVE ROCK FILTER, AND STABILIZE DISTURBED AREAS.
 - THE MAXIMUM SPACING BETWEEN THE DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM. THE MAXIMUM DISTANCE BETWEEN ROCK CHECK DAMS IS 300 FEET.

DETAIL 8
ROCK CHECK DAM
NOT TO SCALE



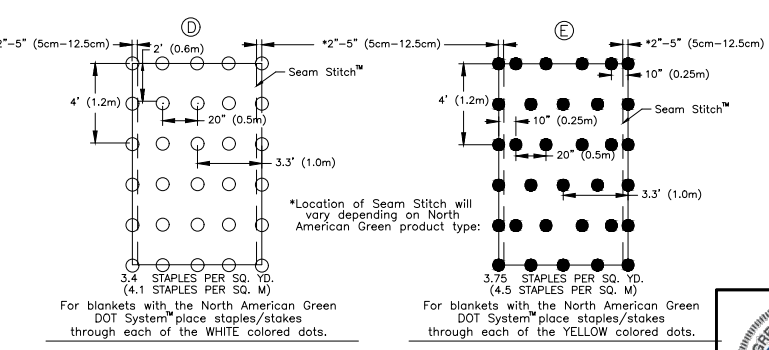
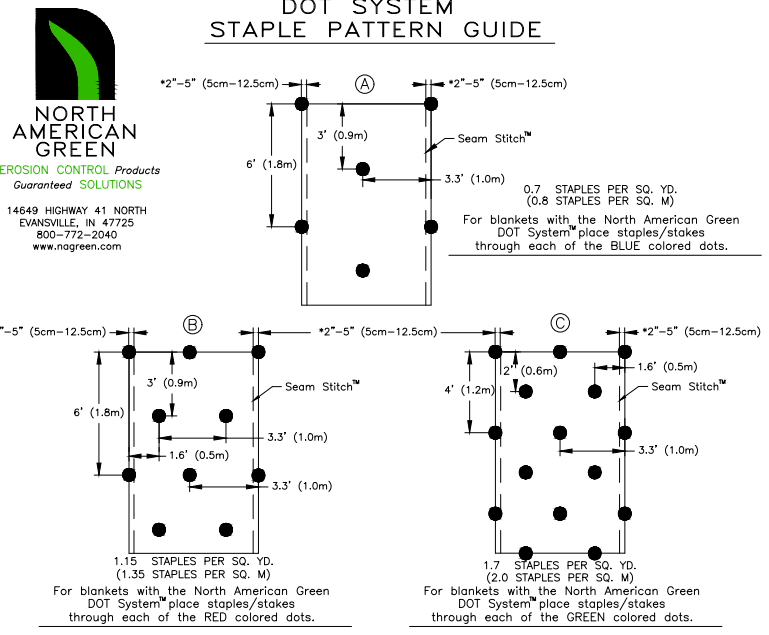
- NOTES:
- ALL SENSITIVE AREAS SHALL BE PROTECTED AS PER PLAN.
 - SAFETY FENCE SHOULD BE FASTENED SECURELY TO THE T-POSTS.
 - THE FENCING MUST REMAIN IN PLACE DURING ALL PHASES OF CONSTRUCTION; ANY CHANGE OF THE PROTECTIVE FENCING MUST BE APPROVED.

DETAIL 9
ORANGE CONSTRUCTION FENCE
NOT TO SCALE



- NOTES:
- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER, AND SEED.
 - BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
 - ROLL THE BLANKETS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE.
 - THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" OVERLAP.
 - WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 12" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
 - EROSION CONTROL BLANKETS SHALL BE INSTALLED ON ALL 3:1 OR STEEPER SLOPES.
 - REFER TO DETAIL, THIS SHEET FOR STAPLE PATTERN.

DETAIL 10
EROSION CONTROL BLANKET
NOT TO SCALE



DETAIL 11
EROSION CONTROL BLANKET STAPLE PATTERN
NOT TO SCALE

NO.	DATE	DESCRIPTION

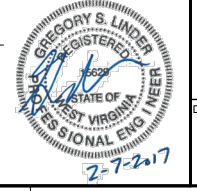
C&E
Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
www.ceinc.com

ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA

EROSION AND SEDIMENT CONTROL DETAILS

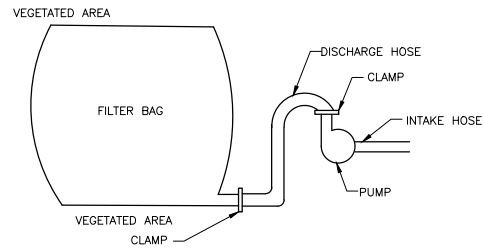
TGJ
ARG
CV01
GSL

FEBRUARY 2017 [DRAWN BY]
AS SHOWN [CHECKED BY]
160-781
APPROVED BY:



DRAWING NO.: **C905**

P:\2016\160-781-C&E\DWG\C905\160781-CV01-C&E.dwg [2/26/2017 1:47 PM] - LP: 2/24/2017 1:47 PM

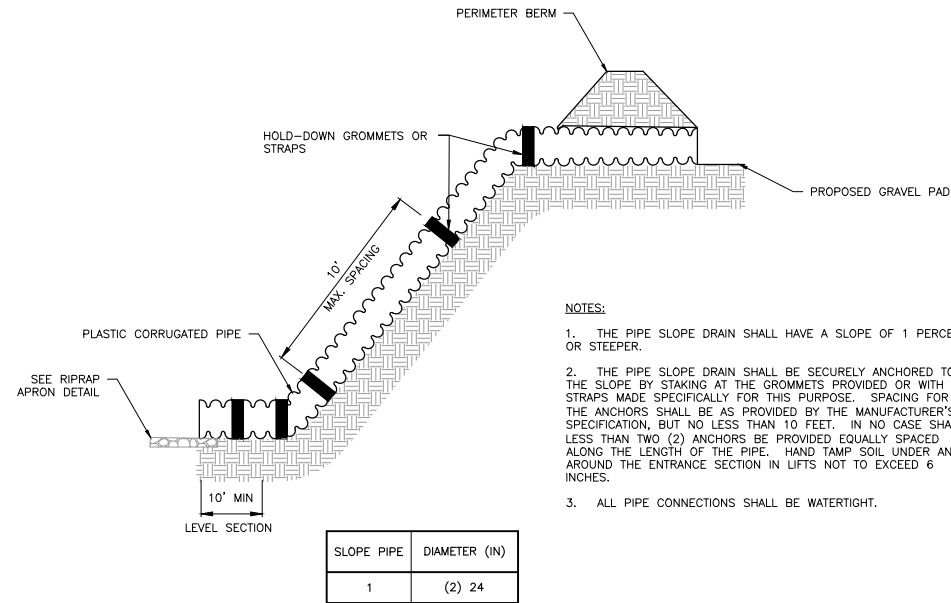


PLAN VIEW

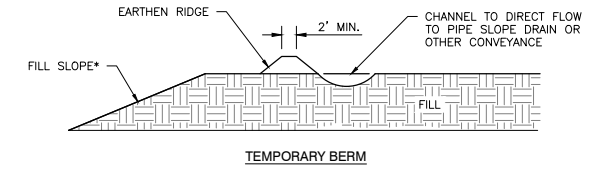
NOTES:

1. FILTER BAGS MAY BE USED TO FILTER WATER PUMPED FROM DISTURBED AREAS SUCH AS UTILITY TRENCHES AND FOOTERS.
2. FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
3. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE FILLED OR FAILED. FILTER BAGS WILL BE DISPOSED OF AT A WQEP APPROVED FACILITY.
4. BAGS SHALL BE LOCATED IN WELL VEGETATED (GRASSY) AREAS, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE LINED FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5 PERCENT.
5. THE PUMP RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.
6. FILTER BAGS SHALL BE INSPECTED DURING PUMPING OPERATIONS AND ANY CORRECTIVE ACTION REQUIRED SHALL BE DONE IMMEDIATELY.

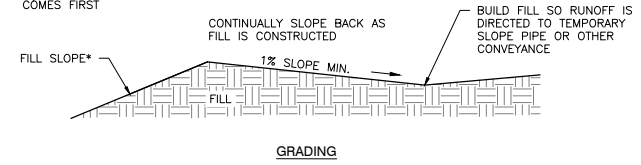
**DETAIL 12
GEOTEXTILE FILTER BAG
NOT TO SCALE**



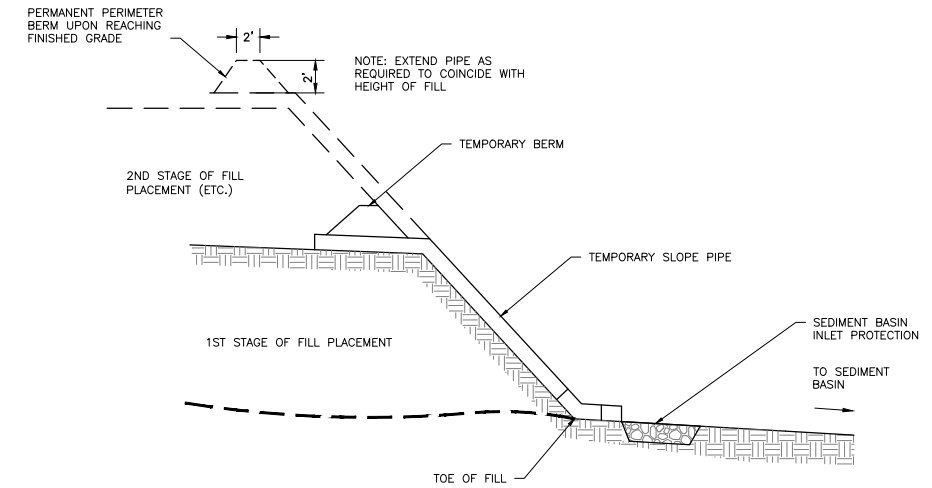
**DETAIL 13
PERMANENT SLOPE PIPE
NOT TO SCALE**



*SEED AND MULCH FILL SLOPE EVERY 10 FEET OF FILL OR EVERY 7 DAYS, WHICHEVER COMES FIRST

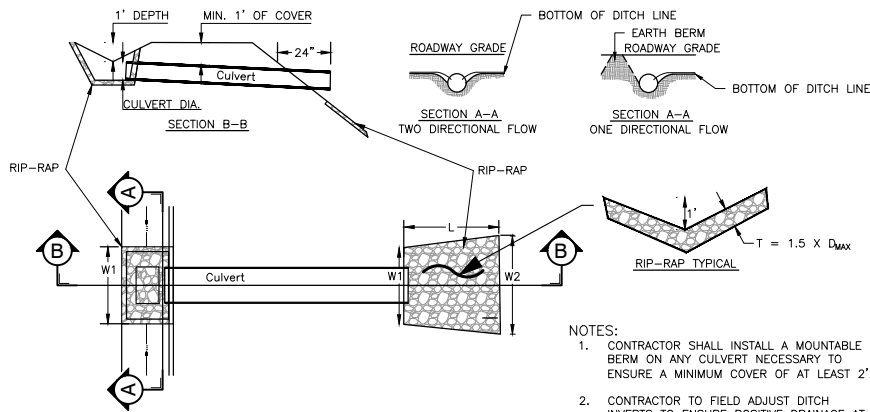


TEMPORARY BERM	CHANNEL TOP WIDTH (FT)	CHANNEL DEPTH (FT)
1	6	1.50
2	4	1.00
3	4	1.00
4	4	1.00



- NOTE:**
1. SEE SECTION 3.15 OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL FOR ADDITIONAL INFORMATION.

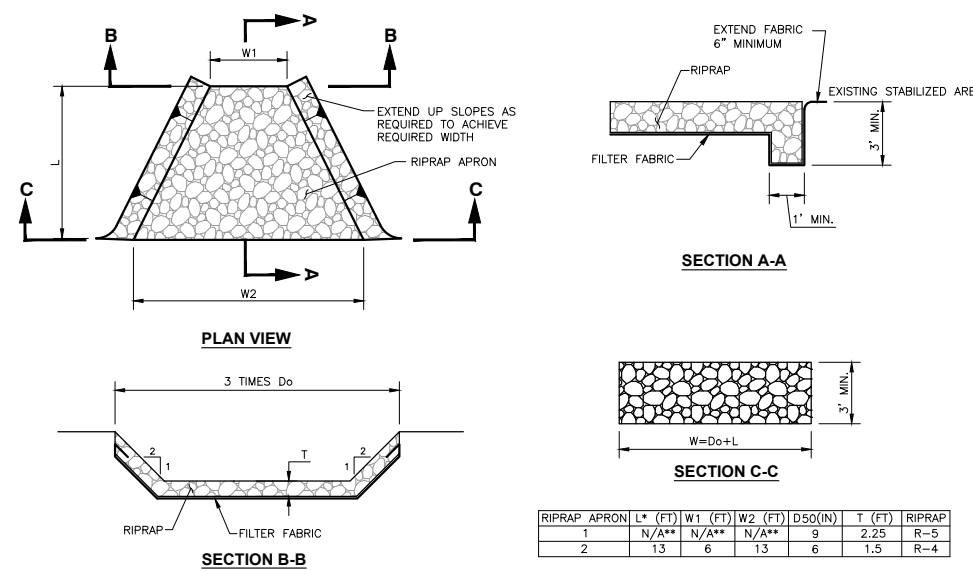
**DETAIL 14
PERIMETER BERM
NOT TO SCALE**



NOTES:

1. CONTRACTOR SHALL INSTALL A MOUNTABLE BERM ON ANY CULVERT NECESSARY TO ENSURE A MINIMUM COVER OF AT LEAST 2'.
2. CONTRACTOR TO FIELD ADJUST DITCH INVERTS TO ENSURE POSITIVE DRAINAGE AT CULVERT INLETS.
3. CONTRACTOR SHALL INSTALL PIPE PER MANUFACTURER SPECIFICATIONS.

MAIN DRIVEWAY CULVERTS									
PIPE NAME	STATION	CULVERT SIZE	LENGTH (LF)	W1 (FT)	W2 (FT)	L (FT)	D50 (IN)	Dmax (IN)	T (IN)
1	13+50	18" DIA.	88	4.5	10.5	9	6	12	18
2	16+04	18" DIA.	32	4.5	10.5	9	9	18	27
3	19+68	18" DIA.	37	4.5	10.5	9	9	18	27
4	23+00	24" DIA.	65	6	15.0	13	9	18	27



* RIPRAP APRON LENGTHS REPRINTED IN THIS TABLE ARE MINIMUM REQUIRED BY DEP. REFER TO PLAN DRAWING FOR ACTUAL LENGTHS TO BE CONSTRUCTED WITH THIS PROJECT.

** SEE SHEET C900 FOR LAYOUT OF RIPRAP.

**DETAIL 16
RIPRAP APRON OUTLET PROTECTION
NOT TO SCALE**

RIPRAP APRON	L* (FT)	W1 (FT)	W2 (FT)	D50 (IN)	T (FT)	RIPRAP
1	N/A**	N/A**	N/A**	9	2.25	R-5
2	13	6	13	6	1.5	R-4

REVISION RECORD

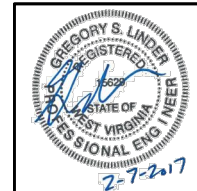
NO.	DATE	DESCRIPTION

C&E
Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 • 855.488.9539 • Fax: 304.933.3327
www.ccecinc.com

**ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA**

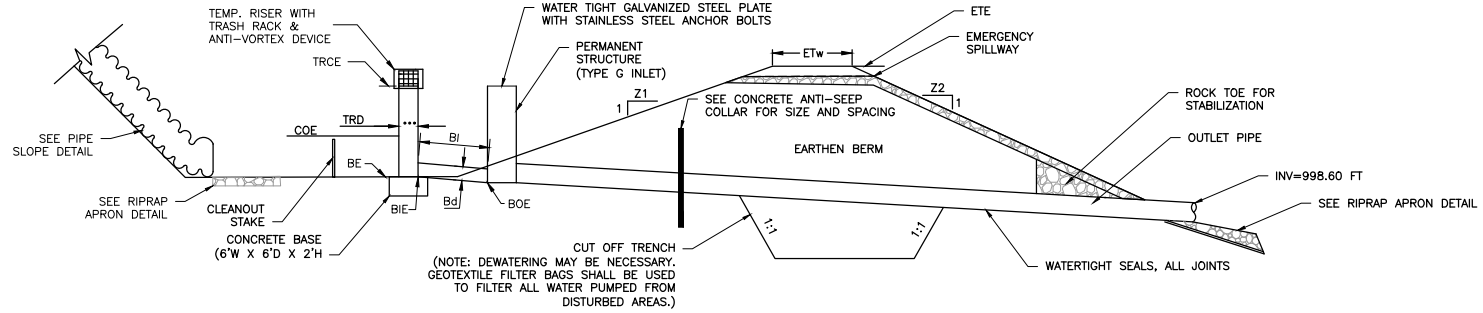
EROSION AND SEDIMENT CONTROL DETAILS

DATE:	TG:
FEBRUARY 2017	ARG
DWG SCALE:	AS SHOWN
PROJECT NO:	160-781 CV01
APPROVED BY:	GSL



DRAWING NO.: **C906**

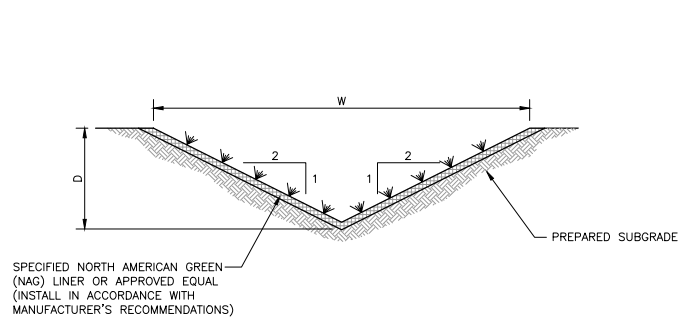
P:\2016\160-781-CV01-C906.dwg | CV01 | 160781-CV01-C906.dwg | LST | 2/26/2017 1:47 PM



EMBANKMENT SECTION ALONG PRINCIPLE SPILLWAY*

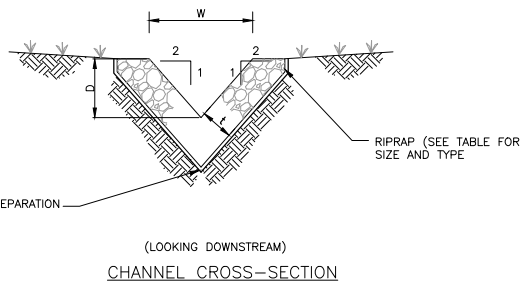
BASIN NO.	TEMP. PRINCIPAL RISER							BARREL		EMBANKMENT		EMERGENCY SPILLWAY		CLEAN OUT ELEV COE (FT)	BOTTOM ELEV BE (FT)			
	Z1 (FT)	Z2 (FT)	DIA TRD (FT)	CREST ELEV TRCE (FT)	ORIFICE TRD (IN)	ORIFICE ELEV TRD (FT)	MAT'L	DIA Bd (IN)	INLET ELEV BIE (FT)	MAT'L	LENGTH BI (FT)	OUTLET ELEV BOE (FT)	TOP ELEV ETE (FT)			TOP WIDTH ETW (FT)	E.S. ELEV (FT)	E.S. WIDTH (FT)
1	2.0	3.0	3	1008.6	(4) 1.0*	1005.6	CMP	24	1000	HDPE	10	999.9	1010	8	1008.6	35	1003.57	1000

A CLEAN OUT STAKE SHALL BE PLACED NEAR THE CENTER OF EACH BASIN. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT HAS REACHED THE CLEAN OUT LEVEL MARKED ON THE STAKE.



CHANNEL	D (FT)	W (FT)
9	1.0	4.0

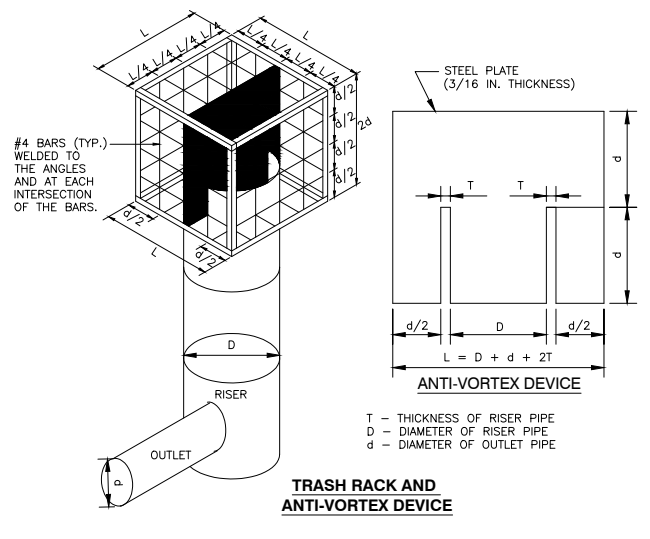
DETAIL 18
TEMPORARY/PERMANENT CHANNELS
NOT TO SCALE



CHANNEL NO.	DEPTH D (FT)	W (FT)	D50 (IN)	TYPE
1	1.0	4.0	12	GROUTED R-4 RIPRAP
2	1.0	4.0	12	R-4 RIPRAP
3	1.0	4.0	12	R-4 RIPRAP
4	2.0	8.0	12	GROUTED R-4 RIPRAP
5	2.5	10.0	12	R-4 RIPRAP
6	2.5	10.0	12	R-4 RIPRAP
8	1.0	4.0	12	R-4 RIPRAP

- NOTES:**
- FILTER STONE UNDERLAYMENT FOR BED SLOPES ≥ 0.10 FT/FT (10%) SHALL BE USED.
 - CHANNEL DIMENSIONS ARE FOR THE COMPLETED CHANNEL AFTER ROCK PLACEMENT. CHANNEL MUST BE OVER-EXCAVATED A SUFFICIENT AMOUNT TO ALLOW FOR THE VOLUME OF ROCK PLACED WITHIN THE CHANNEL WHILE PROVIDING THE SPECIFIED FINISHED DIMENSIONS.
 - CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE.
 - DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.
 - THE MINIMUM ROCK THICKNESS (t) SHALL BE 1.5 TIMES THE MAX ROCK SIZE.

DETAIL 22
RIPRAP CHANNEL
NOT TO SCALE

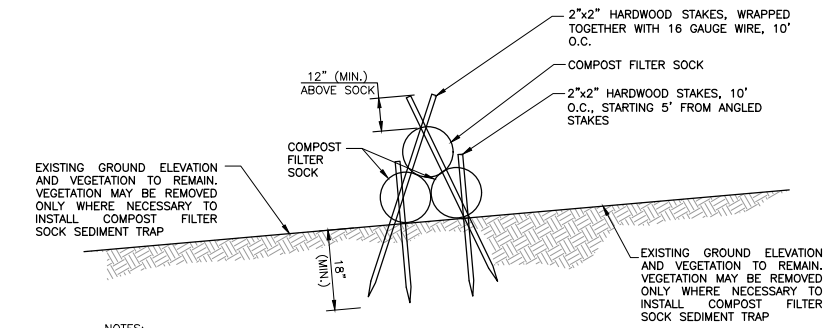


DETAIL 17
SEDIMENT BASIN
NOT TO SCALE

Elevation (FT)	Area		Volume	
	(SF)	(CF)	(ACRE-FT)	
1000	1066	0	0.000	
1001	1438	1252	0.029	
1002	1844	2893	0.066	
1003	2283	4957	0.114	
1004	2766	7481	0.172	
1005	3279	10504	0.241	
1006	3823	14055	0.323	
1007	4396	18164	0.417	
1008	4998	22861	0.525	
1009	5631	28176	0.647	
1010	6292	34137	0.784	

CONTRIBUTING DRAINAGE AREA = 7.1 ACRES

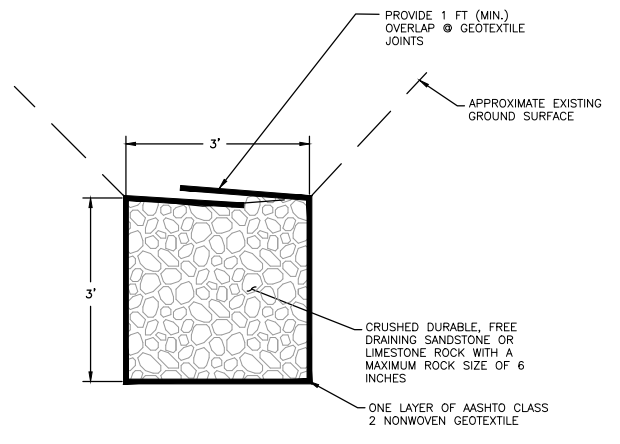
	CLEAN-OUT VOLUME (cf)	WET VOLUME (cf)	DRY VOLUME (cf)
REQUIRED STORAGE	6,390	12,780	12,780
PROVIDED STORAGE	6,390	12,780	12,780



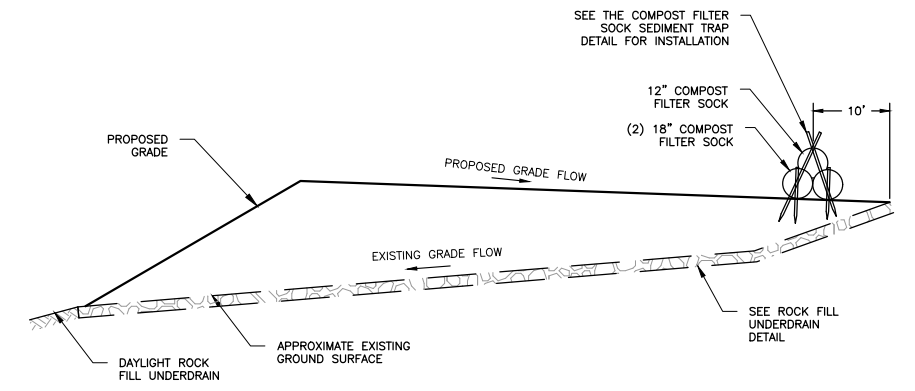
- NOTES:**
- CONTRACTOR TO CLEAR ONLY THE VEGETATION REQUIRED TO PLACE THE FILTER SOCKS. ALL OTHER VEGETATION TO REMAIN.
 - SEE COMPOST FILTER SOCK DETAIL FOR SPECIFICATIONS.
 - SEDIMENT TRAP SHALL BE CONSTRUCTED SO THAT THE MINIMUM BASE WIDTH IS EQUIVALENT TO THE HEIGHT (1H:1V).
 - SOCKS SHALL BE A LARGER DIAMETER AT THE BASE OF THE SEDIMENT TRAP AND DECREASE IN DIAMETER FOR SUCCESSIVE LAYERS.
 - ENDS OF THE SEDIMENT TRAP SHALL BE A MINIMUM 1 FT. HIGHER IN ELEVATION THAN THE MID-SECTION, WHICH SHALL BE AT THE LOWEST ELEVATION.
 - COMPOST SHALL MEET THE COMPOST STANDARDS TABLE PROVIDED IN THE COMPOST FILTER SOCK DETAIL.
 - COMPOST SOCK SEDIMENT TRAPS SHALL NOT EXCEED THREE SOCKS IN HEIGHT AND SHALL BE STACKED IN PYRAMIDAL FORM AS SHOWN ABOVE. MINIMUM TRAP HEIGHT IS ONE 24" DIAMETER SOCK. ADDITIONAL STORAGE MAY BE PROVIDED BY MEANS OF AN EXCAVATED SUMP 12" DEEP EXTENDING 1 TO 3 FEET UPSLOPE OF THE SOCKS ALONG THE LOWER SIDE OF THE TRAP.
 - COMPOST SOCK SEDIMENT TRAPS SHALL PROVIDE 2,000 CUBIC FEET STORAGE CAPACITY WITH 12" FREEBOARD FOR EACH TRIBUTARY DRAINAGE ACRE.
 - THE MAXIMUM TRIBUTARY DRAINAGE AREA IS 5.0 ACRES. SINCE COMPOST SOCKS ARE "FLOW THROUGH", NO SPILLWAY IS REQUIRED.

TRAP	LAYER 1 (BOTTOM)	LAYER 2	LAYER 3
1	(3) 32"	(2) 18"	(1) 12"
2	(2) 32"	(1) 12"	
3	(3) 32"	(2) 18"	(1) 12"

DETAIL 21
COMPOST FILTER SOCK SEDIMENT TRAP
NOT TO SCALE



DETAIL 19
ROCK FILL UNDERDRAIN
NOT TO SCALE



DETAIL 20
FILL WITH ROCK FILL UNDERDRAIN
NOT TO SCALE

NO	DATE	DESCRIPTION

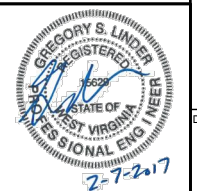
Civil & Environmental Consultants, Inc.
600 Marketplace Ave - Suite 200 - Bridgeport, WV 26330
Ph: 304.933.3119 - 855.488.9539 - Fax: 304.933.3327
www.cedinc.com

ATLANTIC COAST PIPELINE, LLC
MARTS COMPRESSOR STATION
KINCHELOE MS
LEWIS COUNTY, WEST VIRGINIA

EROSION AND SEDIMENT CONTROL DETAILS

FEBRUARY 2017 [DRAWN BY: TGL] ARG
AS SHOWN [CHECKED BY: 160-781 CV01] GSI
DATE: PROJECT NO:
APPROVED BY:

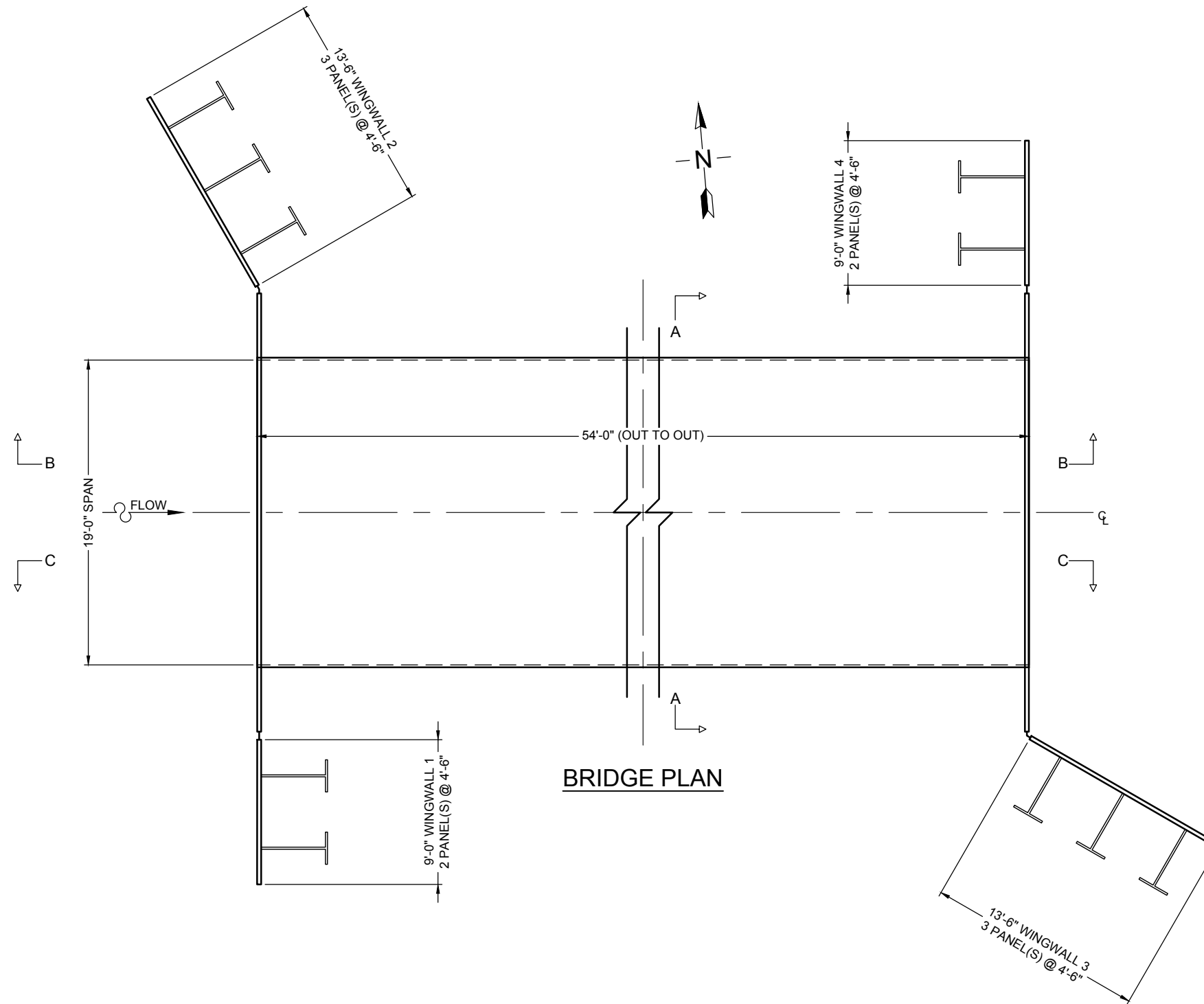
DRAWING NO.: **C907**



P:\2016\160-781-C907\Draw\2017\2017-02-24\2017-02-24.dwg - LP, 2/24/2017 1:47 PM

NOTES:

1. CULVERT DETAILS PROVIDED ARE FOR BIDDING PURPOSES ONLY. CONTECH TO PROVIDE FINAL CONSTRUCTION DRAWINGS AND FOUNDATION DETAILS.
2. CONTRACTOR SHALL CONTACT ENGINEER OF RECORD TO HAVE A GEOTECHNICAL ENGINEER EVALUATE THE FOUNDATION SUBGRADE TO ASSURE A 4,000 PSF NET ALLOWABLE SOIL BEARING CAPACITY BEFORE PLACING THE FOOTINGS.



P:\2016\160-781-CADD\DWG\CV01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

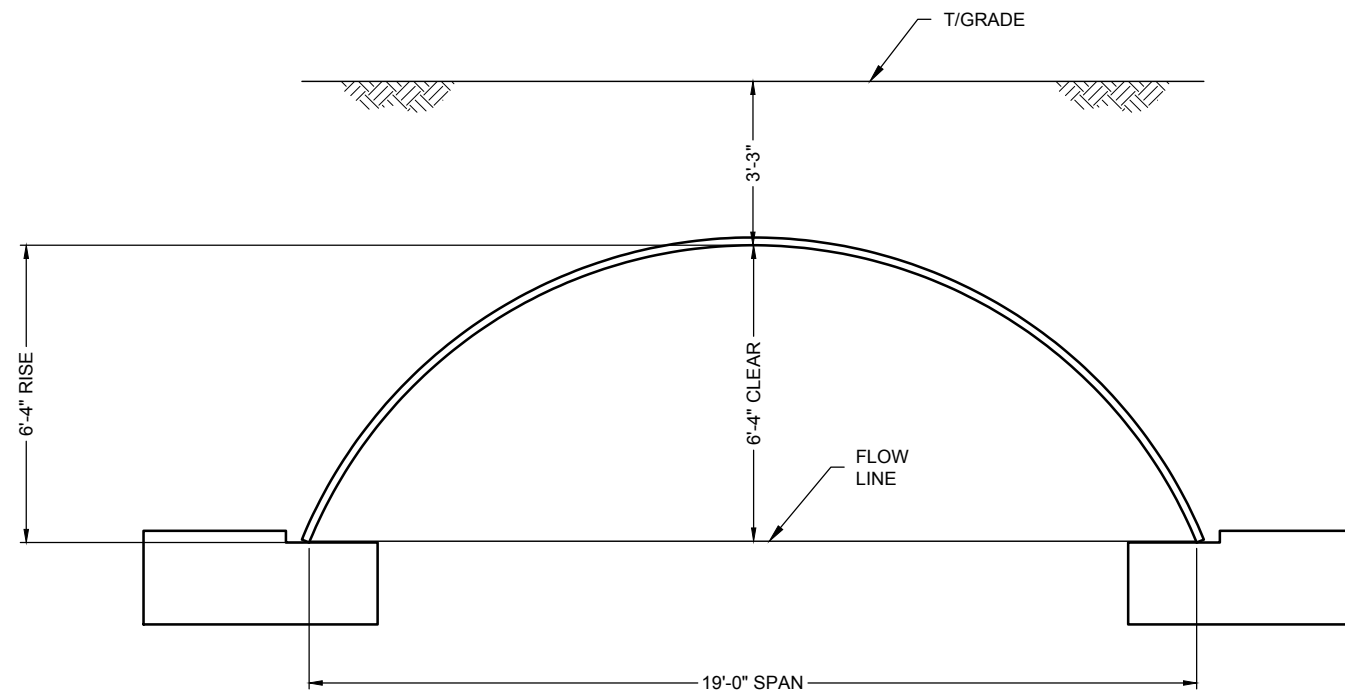
CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 1 OF 11		



CROSS SECTION A-A

Approximate Area: 86 sq. ft. used, 87 sq. ft. total

NOTES

- MEASUREMENTS ARE TO THE INSIDE CRESTS OF THE CORRUGATION
- DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES
- MAXIMUM COVER HEIGHT FOR THIS APPLICATION is 3.2 FT.

P:\2016\160781-CADD\DWG\C01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

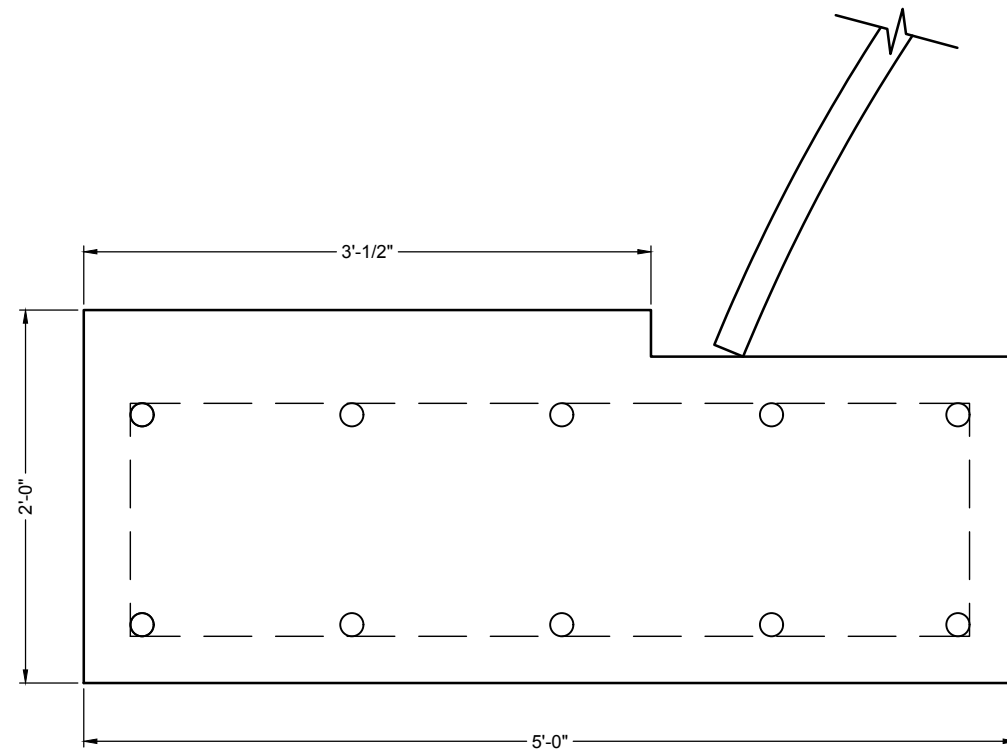
CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 2 OF 11		



TYPICAL FOOTING DETAIL

NOTES

- FOOTING DIMENSIONS AND DETAILS SHOWN ARE CONCEPTUAL ONLY
- FINAL DIMENSIONS & DETAILS TO BE FURNISHED BY THE PROJECT ENGINEERS
- FOUNDATION REINFORCING TO BE DETERMINED

P:\2016\160781-CADD\DWG\CAD\160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

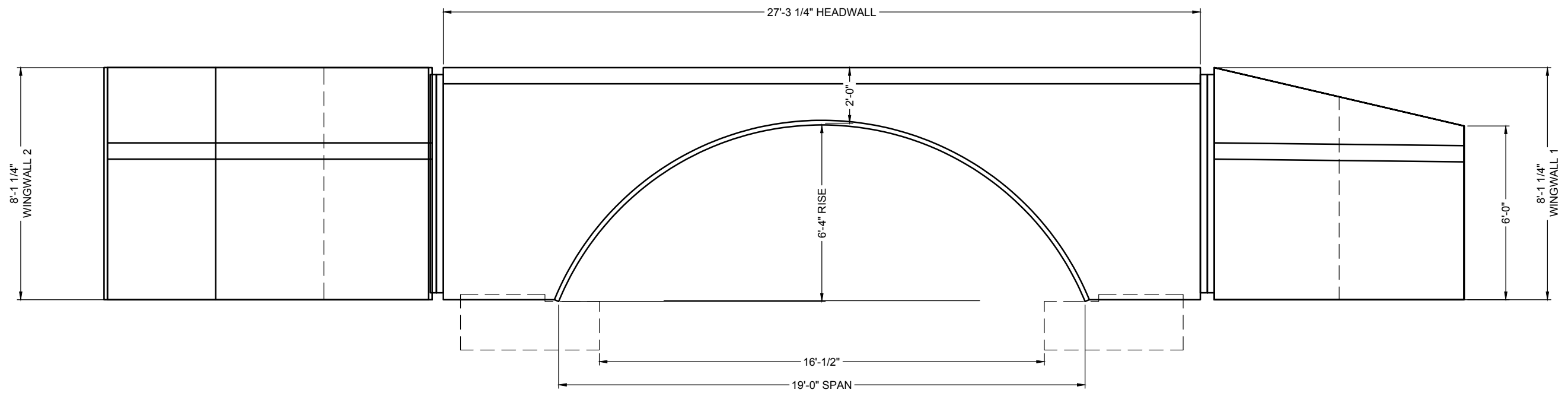
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 3 OF 11		



INLET END ELEVATION

ALUMINUM HEADWALL TO BE FIELD CUT AT TIME OF INSTALLATION (BY OTHERS)

P:\2016\160781-CADD\DWG\C\01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

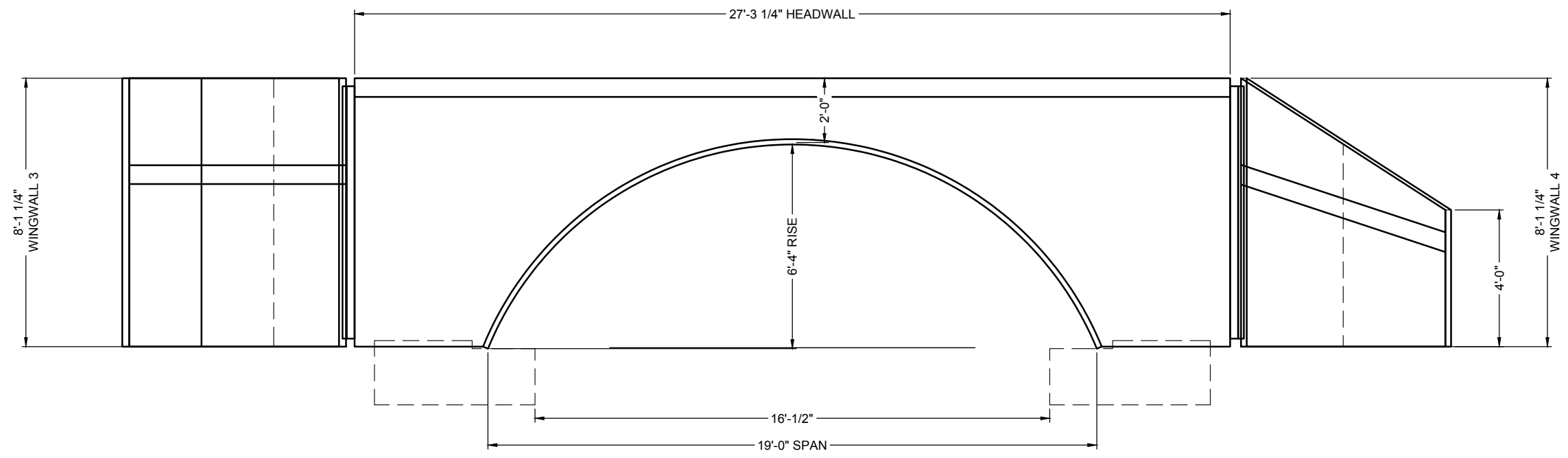
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 4 OF 11		



OUTLET END ELEVATION

P:\2016\160781-CADD\DWG\C01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

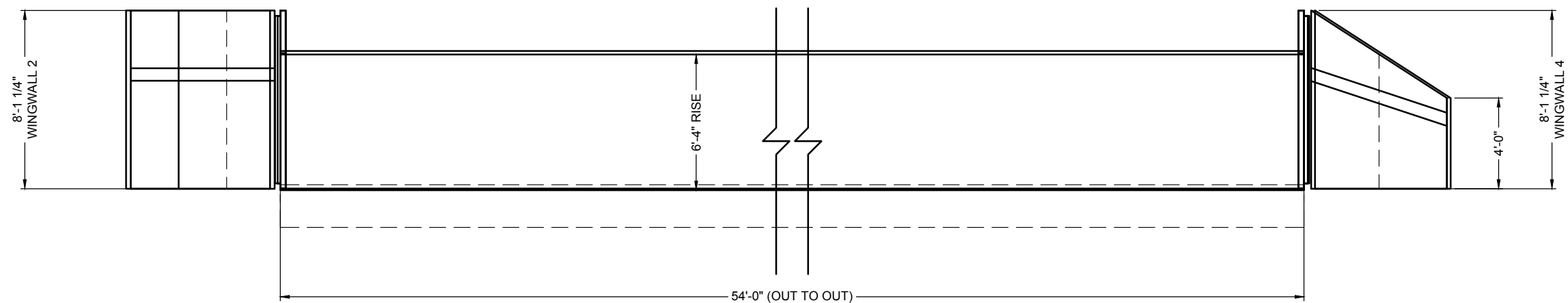
CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 5 OF 11		



PROFILE SECTION B-B

P:\2016\160781-CADD\DWG\C\01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

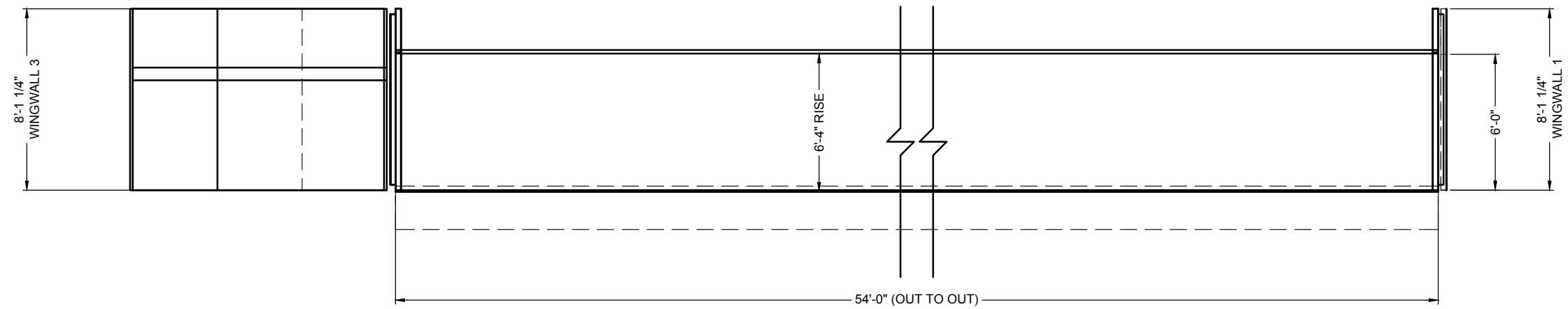
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 6 OF 11		



PROFILE SECTION C-C

P:\2016\160781-CADD\DWG\CV01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

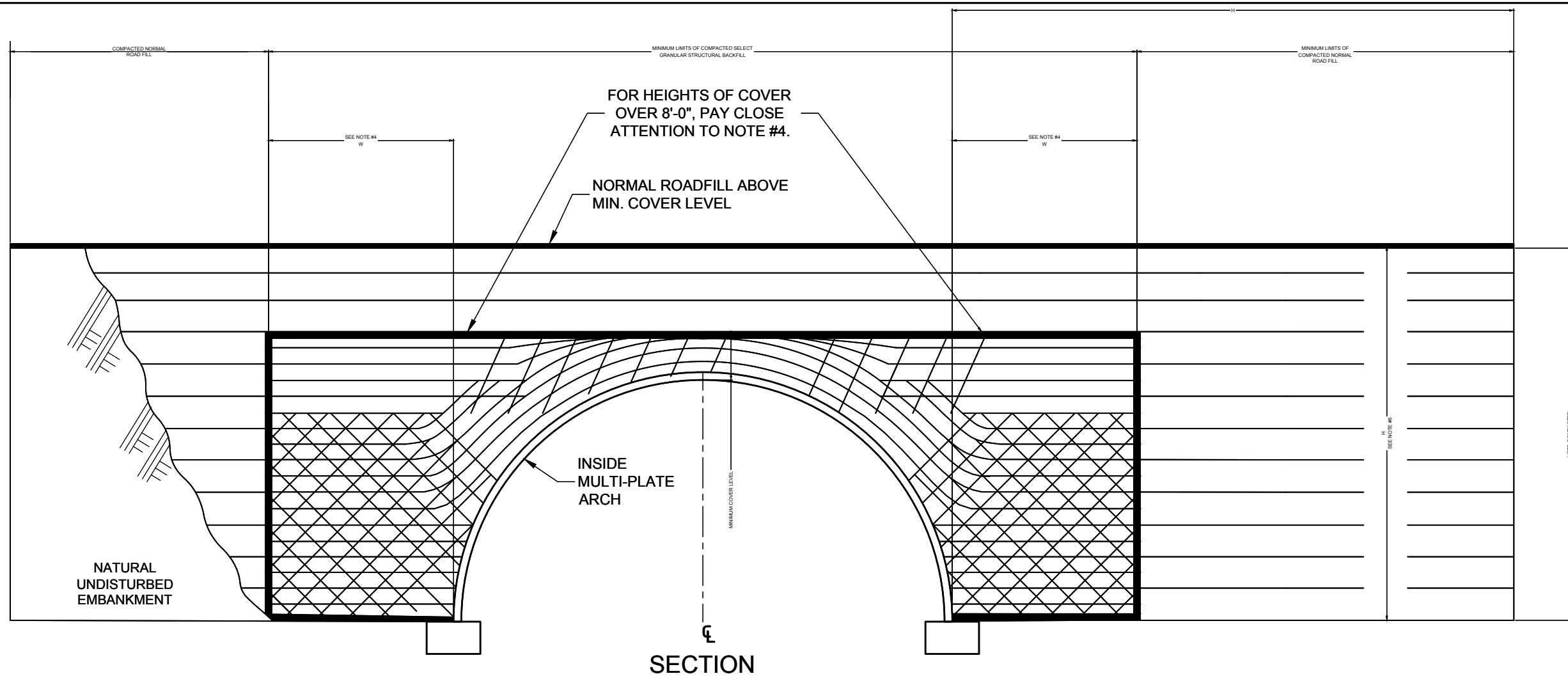
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE




PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 7 OF 11		



SECTION

-  CRITICAL BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.
-  INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR (D-4 OR SMALLER) DRAWN EQUIPMENT.
-  SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

NOTES:

1. ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (6"-8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
2. COMPLETE AND REGULAR MONITORING OF THE ARCH IS NECESSARY DURING ALL BACKFILLING STEPS.
3. PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
4. TRENCH WIDTH AND / OR SELECT FILL ENVELOPE WIDTH SHALL BE BY DIRECTION OF THE ENGINEER OF RECORD. A TYPICAL WIDTH OF 4 FEET IS DEPICTED, BUT GREATER OR LESSER DISTANCE MAY BE REQUIRED DEPENDING UPON SITE-SPECIFIC CONDITIONS. THIS WIDTH DEPENDS ON FACTORS SUCH AS THE LATERAL PRESSURES EXERTED BY THE STRUCTURE ONTO THE ADJACENT SOIL FOR THE GIVEN LOADING CONDITIONS, THE STRUCTURE SHAPE, THE QUALITY OF THE SELECT FILL MATERIAL AND THE STRENGTH OF THE IN SITU EMBANKMENT / TRENCH MATERIAL. THESE FACTORS MUST BE EVALUATED BY THE PROJECT ENGINEER FOR EACH SPECIFIC SITUATION.
5. H = STRUCTURE RISE + COVER.

ADDITIONAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2, A-3. BACKFILL MUST BE REPLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 6" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION.

DURING BACKFILL, ONLY SMALL TRACKED VEHICLES (D-4 OR SMALLER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE.

P:\2016\160-781-CADD\DWGS\CV01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE
PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 8 OF 11		

SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CONTECH MULTI-PLATE® SINGLE RADIUS ARCH

I - GENERAL

1.0 STANDARDS AND DEFINITIONS

- 1.1 STANDARDS - All standards refer to latest edition unless otherwise noted.
- 1.1.1 ASTM A-761 "Corrugated Steel Structural Plate, Zinc Coated for Field-Bolted Pipe, Pipe-Arches and Arches" (AASHTO Designation M-167).
- 1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12.
- 1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26.
- 1.2 DEFINITIONS
- 1.2.1 Owner - In these specifications the word "Owner" shall mean Atlantic Coast Pipeline LLC.
- 1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.
- 1.2.3 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH Construction Products Inc. 800-338-1122 Michael D'Agostino.
- 1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.
- 1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.
- 1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

- 2.1 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.
- 2.2 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.
- If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.
- 2.3 The construction shall be performed under the direction of the Engineer.
- 2.4 All aspects of the structure design and site layout including foundations, backfill, end treatments and necessary scour consideration shall be performed by the Engineer.
- Any installation guidance provided herein shall be endorsed by the Engineer or superceded by the Engineer's plans and specifications.

II - MULTI-PLATE SINGLE RADIUS ARCH.

1.0 GENERAL

- 1.1 Manufacturer shall fabricate the MP Single Radius Arch culvert as shown on the plans. Fabrication shall conform to the requirements of ASTM A-761 and shall consist of plates, fasteners, and appurtenant items.
- Plate thickness, end treatment and type of invert and foundation shall be as indicated on the plans. All manufacturing processes including corrugating, punching, curving and required galvanizing shall be performed within the United States of America.
- 1.2 The contractor shall verify all field dimensions and conditions prior to ordering materials.

2.0 DIMENSIONS

- 2.1 The proposed structure shall be a MP Single Radius Arch with the following dimensions:
- Span: 19'-0" Rise: 6'-4"
Gage: 12
- 2.2 All plan dimensions on the contract drawings are measured in a true horizontal plan unless otherwise noted.

3.0 ASSEMBLY AND INSTALLATION

- 3.1 Bolts and nuts shall conform to the requirements of ASTM A-449. The structure shall be assembled in accordance with the plate layout drawings provided by the manufacturer and per the manufacturer's recommendations.
- Bolts shall be tightened using an applied torque of between 100 and 300 ft.-lbs.
- 3.2 The structure shall be installed in accordance with the plans and specifications, the manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26.
- 3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.
- 3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.
- 3.5 Bedding shall provide a minimum of 4,000 psf bearing capacity. Foundation details for bearing capacity less than 4,000 psf shall be approved by the Engineer.
- 3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloading and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.
- When assembled on a cast in place spread footing, the structure shall be assembled in the footing starting at the upstream end. When assembled on a full invert or on flexible footing pads, the invert or footing pad shall be placed starting at the downstream end. The structure shell shall be assembled on the invert or footing pad starting at the inlet end. Circumferential seams shall be installed with the plate laps shingled downstream as viewed from the inside of the structure.
- The structure shall be backfilled using clean well graded granular material that meets the requirements of AASHTO M-145 for soil classifications A-1, A-2 or A-3.
- Backfill must be placed symmetrically on each side of the structure in 6 to 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180
- 3.7 Construction loads that exceed highway load limits are not allowed to cross the structure without approval from the Engineer.
- Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.

GROUP CLASSIFICATION	A-1	A-2	A-3*
Sieve Analysis Percent Passing			
No. 10 (2.000 mm)	----	----	----
No. 40 (0.425 mm)	50 max.	----	51 max.
No. 200 (0.075 mm)	25 max.	35 max.	10 max.
Characteristics of Fraction			
Passing No. 40 (0.425 mm)			
Liquid Limits			
	----	40 max.	----
Plasticity Index			
	6 max.	10 max.	Non Plastic
Usual Materials			
	Stone Fragment, Gravel and Sand	Gravel or Sand With Silt or clay	Sand
Adapted from AASHTO M-145			
* Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 material should be avoided.			

P:\2016\160781-CADD\DWG\C01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY



CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX



CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

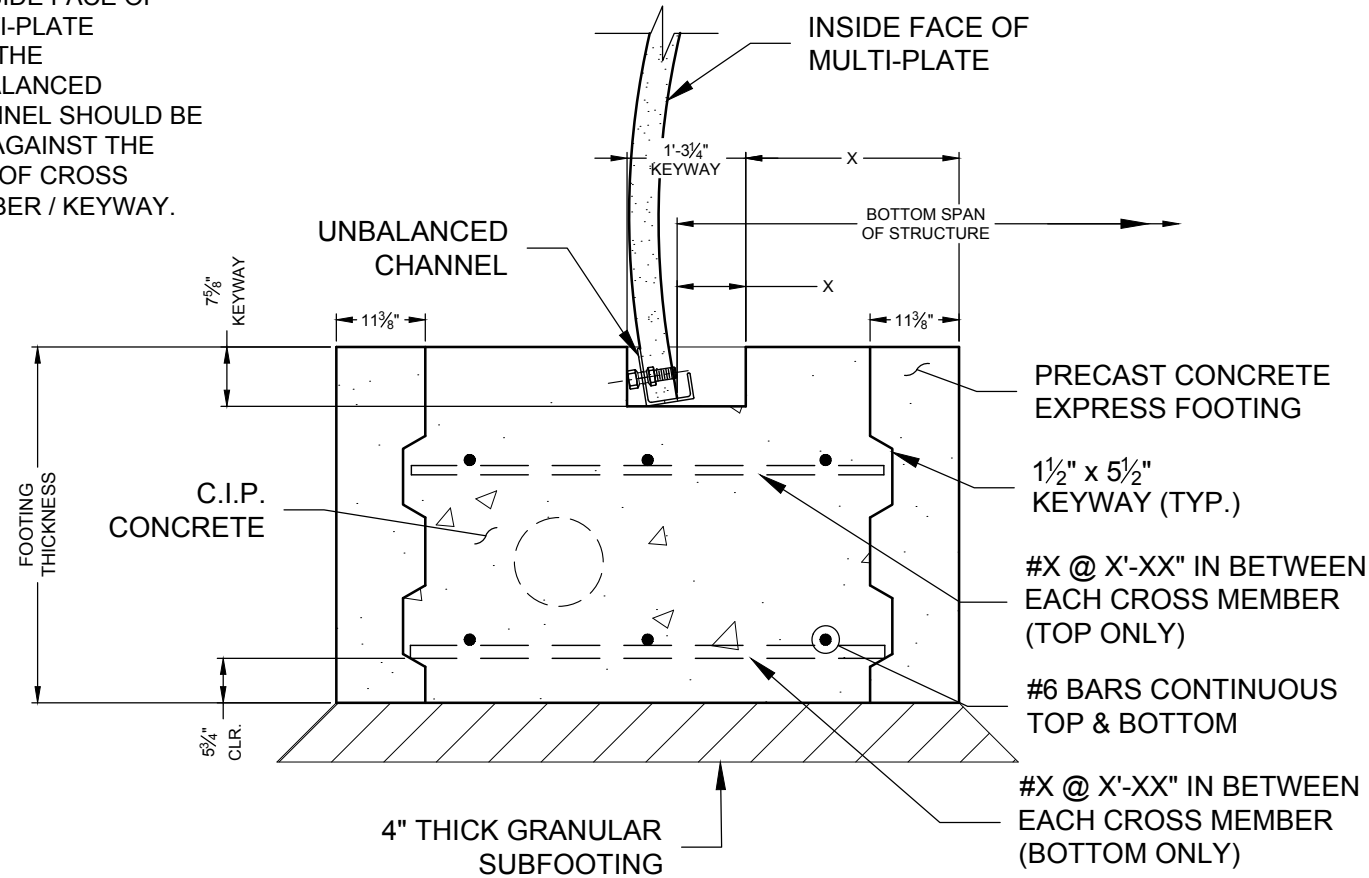
MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 9 OF 11		

MULTI-PLATE OR SUPER SPAN STRUCTURE, W/ UNBALANCED CHANNELS ON EXPRESS FOOTINGS.

NOTE:
OUTSIDE FACE OF
MULTI-PLATE
AND THE
UNBALANCED
CHANNEL SHOULD BE
SET AGAINST THE
SIDE OF CROSS
MEMBER / KEYWAY.



OPTION 1 (PREFERRED):

1. SET PRECAST EXPRESS FOOTINGS.
2. TIE REBAR INTO EXPRESS FOOTINGS.
3. ASSEMBLE PLATE STRUCTURE ON CROSS-MEMBERS OF EXPRESS FOOTINGS. (OR ASSEMBLE PLATE STRUCTURE TO THE SIDE AND LIFT IT AND SET IT ON THE PRECAST.) THE UNBALANCED CHANNEL SHOULD BE ATTACHED TO THE MULTI-PLATE.
4. POUR CAST-IN-PLACE CONCRETE IN EXPRESS FOOTINGS. THE CAST-IN-PLACE CONCRETE WILL COVER THE BOTTOM 4" OF PLATE STRUCTURE.

OPTION 2:

1. SET PRECAST EXPRESS FOOTINGS.
2. TIE REBAR INTO EXPRESS FOOTINGS.
3. POUR CAST-IN-PLACE CONCRETE IN EXPRESS FOOTING. FORM A KEYWAY IN THE FOOTING MATCHING THE KEYWAY NOTCHES IN THE EXPRESS FOOTINGS.
4. ASSEMBLE PLATE STRUCTURE IN THE KEYWAYS OF THE FOOTING. (OR ASSEMBLE PLATE STRUCTURE TO THE SIDE AND SET IT ON THE FOOTING.)

PRECAST REINFORCED CONCRETE EXPRESS™ FOUNDATION NOTES:

1. PRECAST FOUNDATION UNITS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF EXPRESS FOOTINGS.
2. PRECAST AND CAST-IN-PLACE CONCRETE FOR EXPRESS FOUNDATIONS SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI. REINFORCING STEEL FOR FOUNDATIONS SHALL CONFORM TO ASTM A615 OR A996, GRADE 60.
3. PRECAST FOUNDATION UNITS SHALL BE SET ON A MINIMUM 4-INCH THICK BASE LAYER OF COMPACTED GRANULAR MATERIAL THE FULL WIDTH OF THE FOUNDATION.
4. COMPACTED BACKFILL MATERIAL MUST BE PLACED UP TO THE TOP OF THE PRECAST FOUNDATION UNITS ON BOTH SIDES PRIOR TO PLACING CAST-IN-PLACE CONCRETE PORTION OF FOUNDATIONS.
5. CONCRETE SURFACES WHICH CAST-IN-PLACE CONCRETE WILL BE PLACED AGAINST SHALL BE CLEAN, FREE OF LAITANCE, DIRT, STANDING WATER AND ANY OTHER MATERIAL THAT MAY IMPAIR THE BOND BETWEEN THE PRECAST CONCRETE AND CAST-IN-PLACE CONCRETE.
6. CAST-IN-PLACE CONCRETE MIX USED TO FILL FOUNDATION SHALL BE ABLE TO FLOW INTO ARCH SHIM SPACE OR NON-SHRINK GROUT SHALL BE PLACED UNDER ARCH UNIT LEG AT FOUNDATION CROSS MEMBERS PRIOR TO PLACEMENT OF CAST-IN-PLACE PORTION OF FOUNDATION.
7. IF THE AMBIENT TEMPERATURE AT THE TIME OF PLACEMENT OF CAST-IN-PLACE CONCRETE IS ABOVE 90°F OR EXPECTED TO GO BELOW 35°F DURING THE CURE PERIOD, THE CONTRACTOR SHALL FOLLOW THE REQUIREMENTS OF THE LATEST EDITION OF THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS, SECTION 8.6.2 HOT WEATHER PROTECTION OR SECTION 8.6.4 COLD WEATHER PROTECTION.
8. IF CAST-IN-PLACE CONCRETE PORTION OF FOUNDATION IS TO BE PLACED PRIOR TO SETTING OF MULTI-PLATE ARCH, CAST-IN-PLACE CONCRETE SHALL REACH A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI BEFORE PLACEMENT OF MULTI-PLATE ARCH.
9. FOUNDATION CONCRETE SHALL REACH ITS FULL DESIGN STRENGTH BEFORE BACKFILLING OF MULTI-PLATE ARCH.

P:\2016\160781-CADD\DWG\CAD\160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.			
MARK	DATE	REVISION DESCRIPTION	BY



9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX



PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 10 OF 11		

SAMPLE DRAWING ONLY



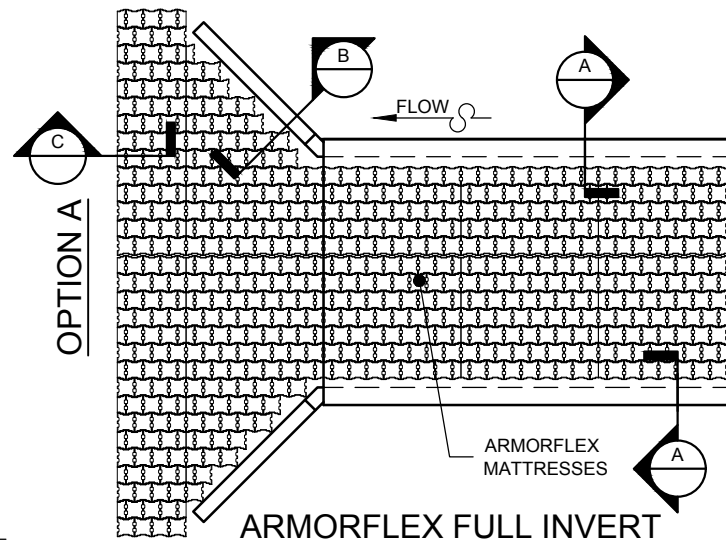
ARMORFLEX FULL INVERT
N.T.S.



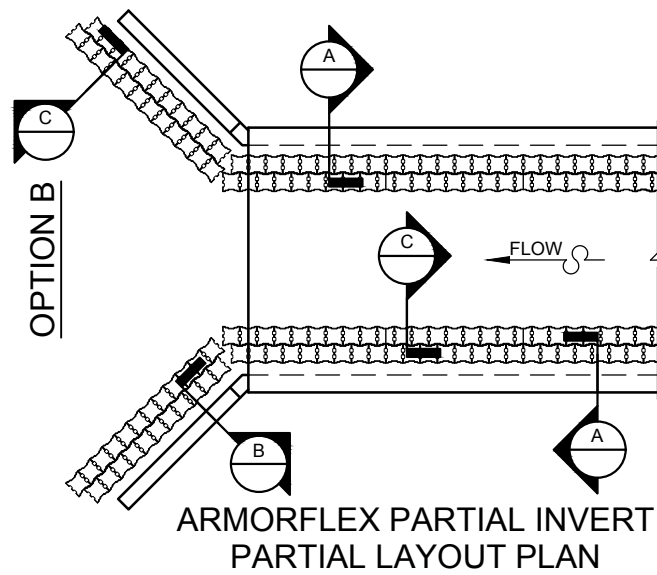
ARMORFLEX PARTIAL INVERT
N.T.S.



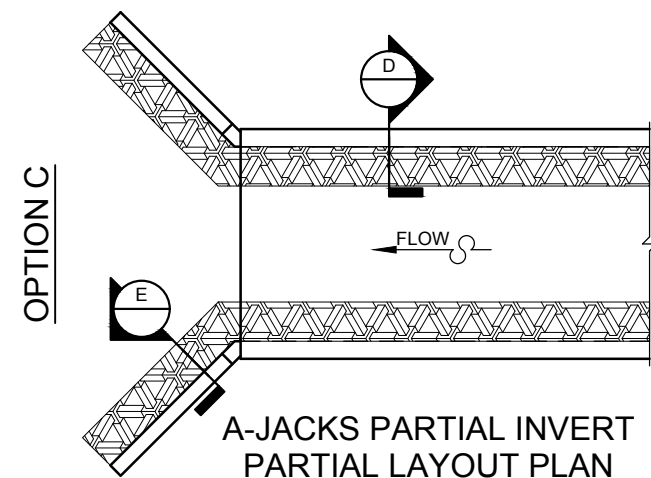
A-JACKS PARTIAL INVERT
N.T.S.



ARMORFLEX FULL INVERT PARTIAL LAYOUT PLAN
N.T.S.

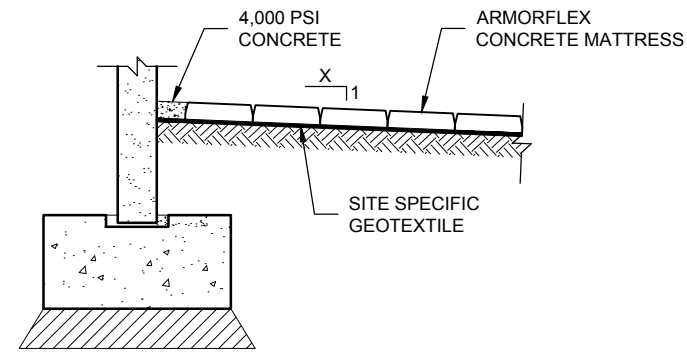


ARMORFLEX PARTIAL INVERT PARTIAL LAYOUT PLAN
N.T.S.

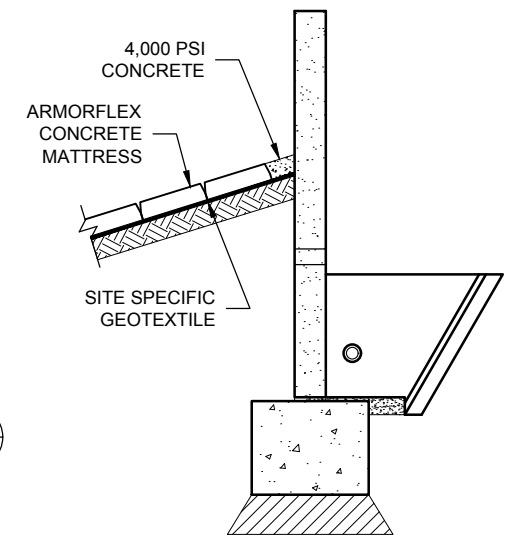


A-JACKS PARTIAL INVERT PARTIAL LAYOUT PLAN
N.T.S.

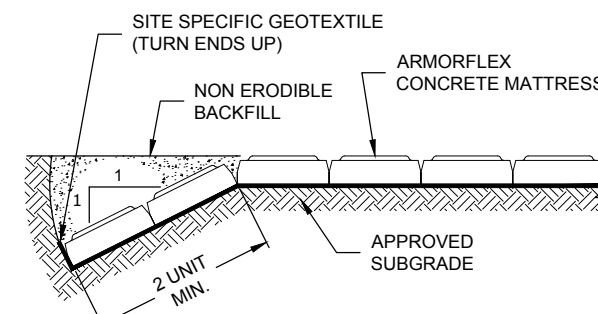
CONSIDER A COMPLETE SYSTEM WITH ARMORTEC REVETMENT



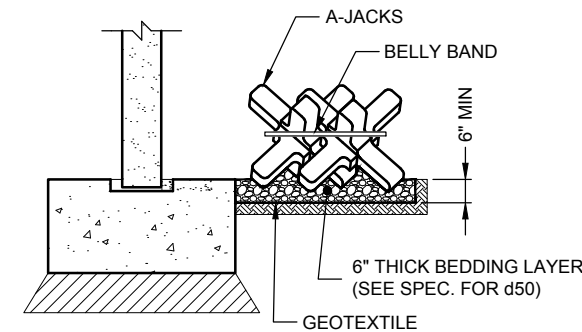
ARMORFLEX STRUCTURE TERMINATION
N.T.S.



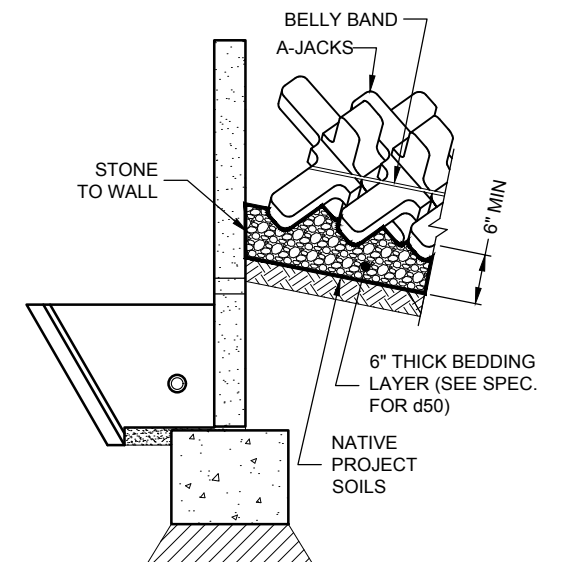
ARMORFLEX WINGWALL TERMINATION
N.T.S.



STANDARD TERMINATION
N.T.S.



A-JACKS STRUCTURE TERMINATION
N.T.S.



A-JACKS WINGWALL TERMINATION
N.T.S.

P:2016/16/1607-81-CADD/DWG/CV01160781-CULVERT 1.DWG 2/2/2017 8:31 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.			
If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.			
MARK	DATE	REVISION DESCRIPTION	BY

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

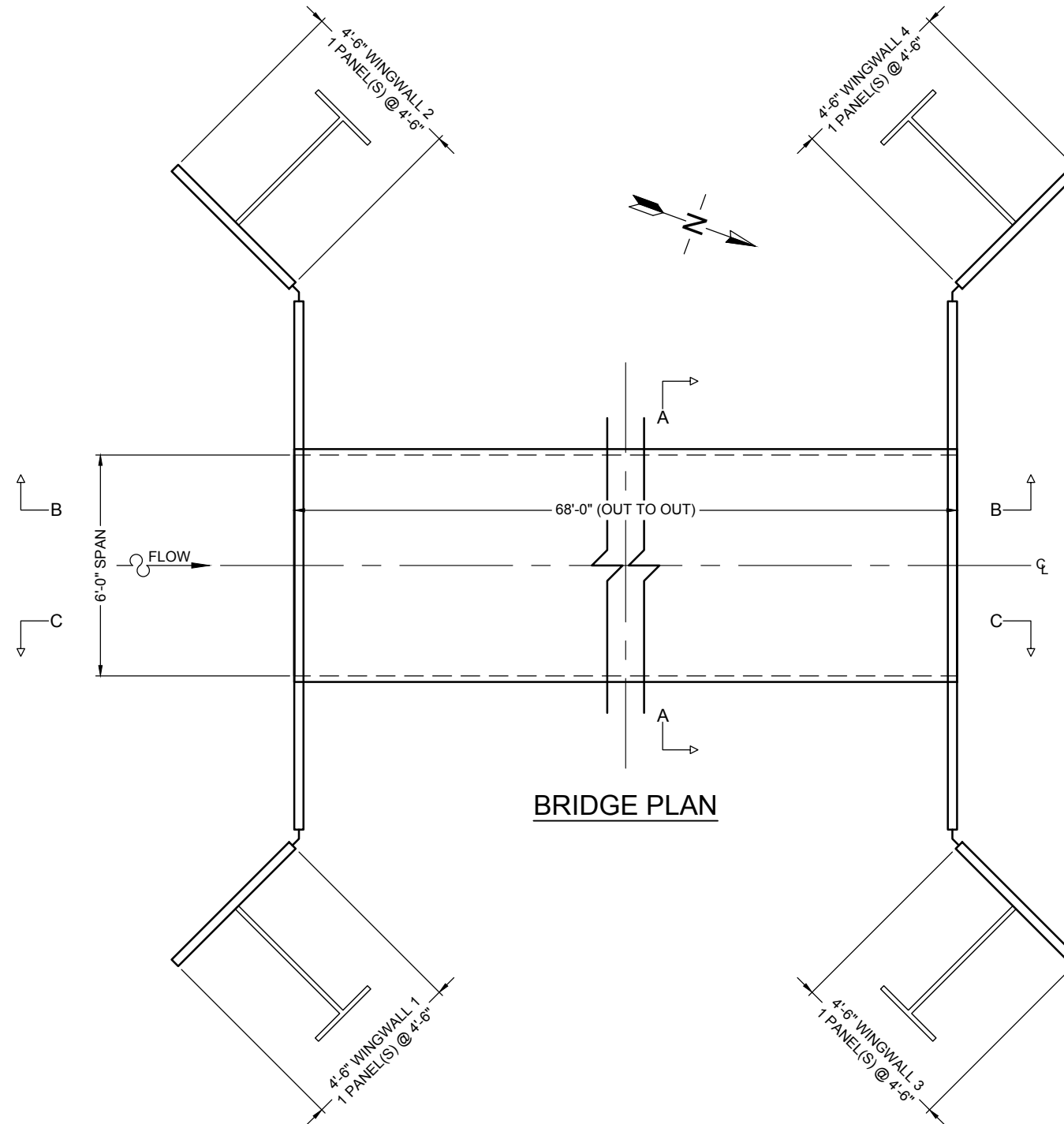
MULTIPLATE SINGLE RADIUS ARCH 19'-0" X 6'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 010	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 11 OF 11		

NOTES:

1. CULVERT DETAILS PROVIDED ARE FOR BIDDING PURPOSES ONLY. CONTECH TO PROVIDE FINAL CONSTRUCTION DRAWINGS AND FOUNDATION DETAILS.
2. CONTRACTOR SHALL CONTACT ENGINEER OF RECORD TO HAVE A GEOTECHNICAL ENGINEER EVALUATE THE FOUNDATION SUBGRADE TO ASSURE A 4,000 PSF NET ALLOWABLE SOIL BEARING CAPACITY BEFORE PLACING THE FOOTINGS.



P:\2016\160-781-CADD\DWG\C01160781-CULVERT 2.DWG 2/2/2017 8:34 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

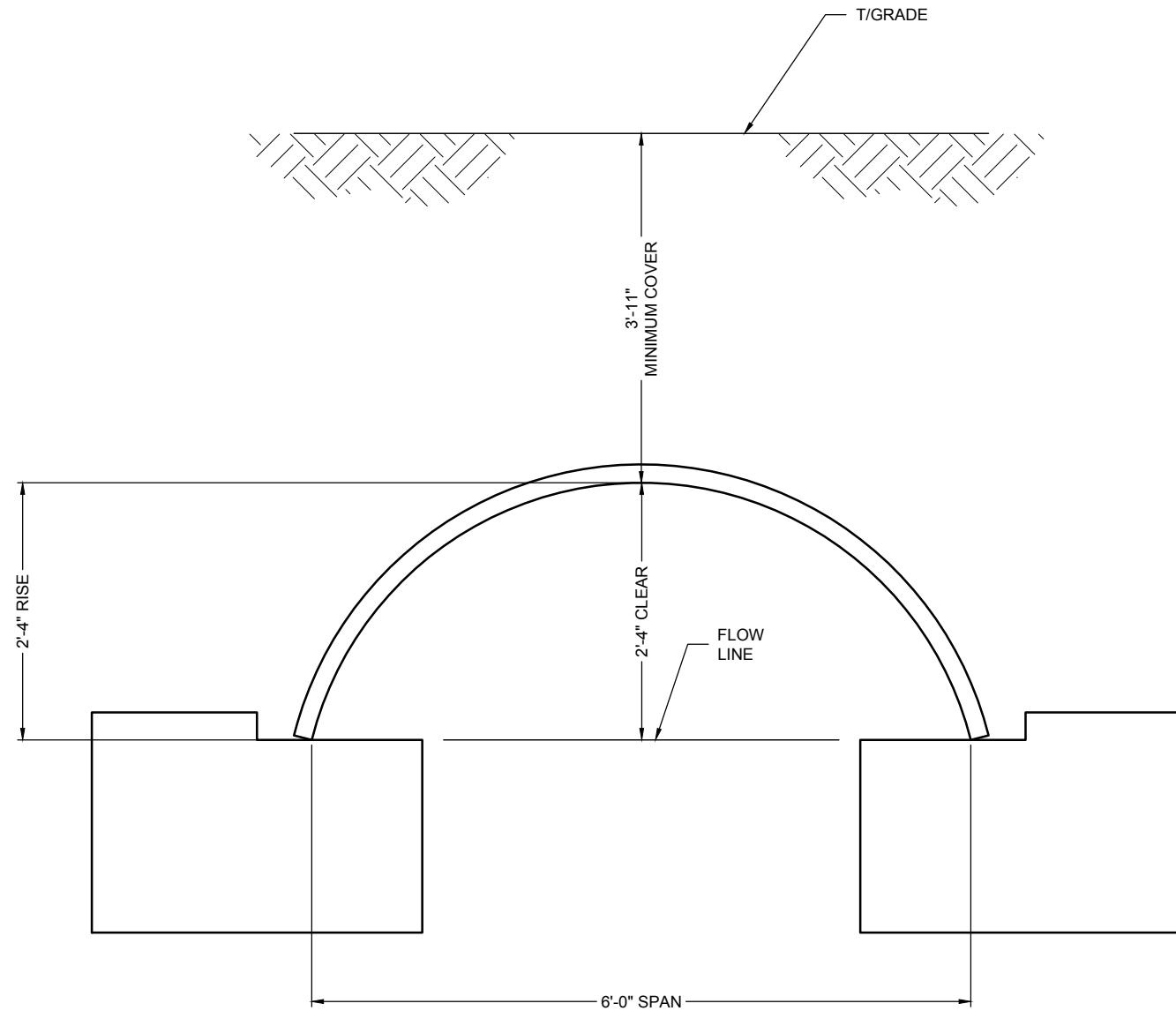
CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 1 OF 11		



CROSS SECTION A-A

Approximate Area: 10 sq. ft. used, 10 sq. ft. total

NOTES

- MEASUREMENTS ARE TO THE INSIDE CRESTS OF THE CORRUGATION
- DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES
- MAXIMUM HEIGHT OF COVER FOR THIS APPLICATION IS 5.2 FT.

P:\2016\160781-CADD\DWG\CV01160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----



9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX



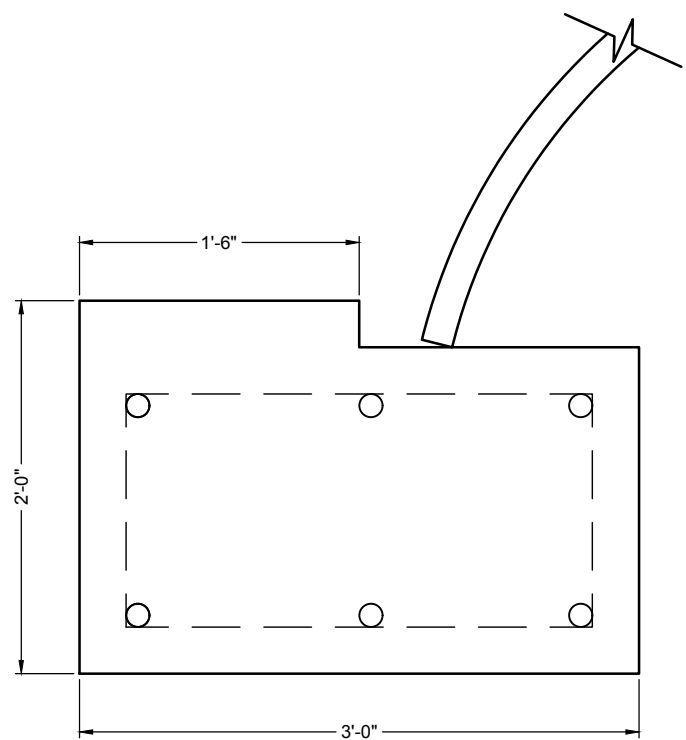
PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 2 OF 11		

P:\2016\160781-CADD\DWG\C01160781-CULVERT 2.DWG 2/2/2017 8:35 AM



TYPICAL FOOTING DETAIL

NOTES

- FOOTING DIMENSIONS AND DETAILS SHOWN ARE CONCEPTUAL ONLY
- FINAL DIMENSIONS & DETAILS TO BE FURNISHED BY THE PROJECT ENGINEERS
- FOUNDATION REINFORCING TO BE DETERMINED

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

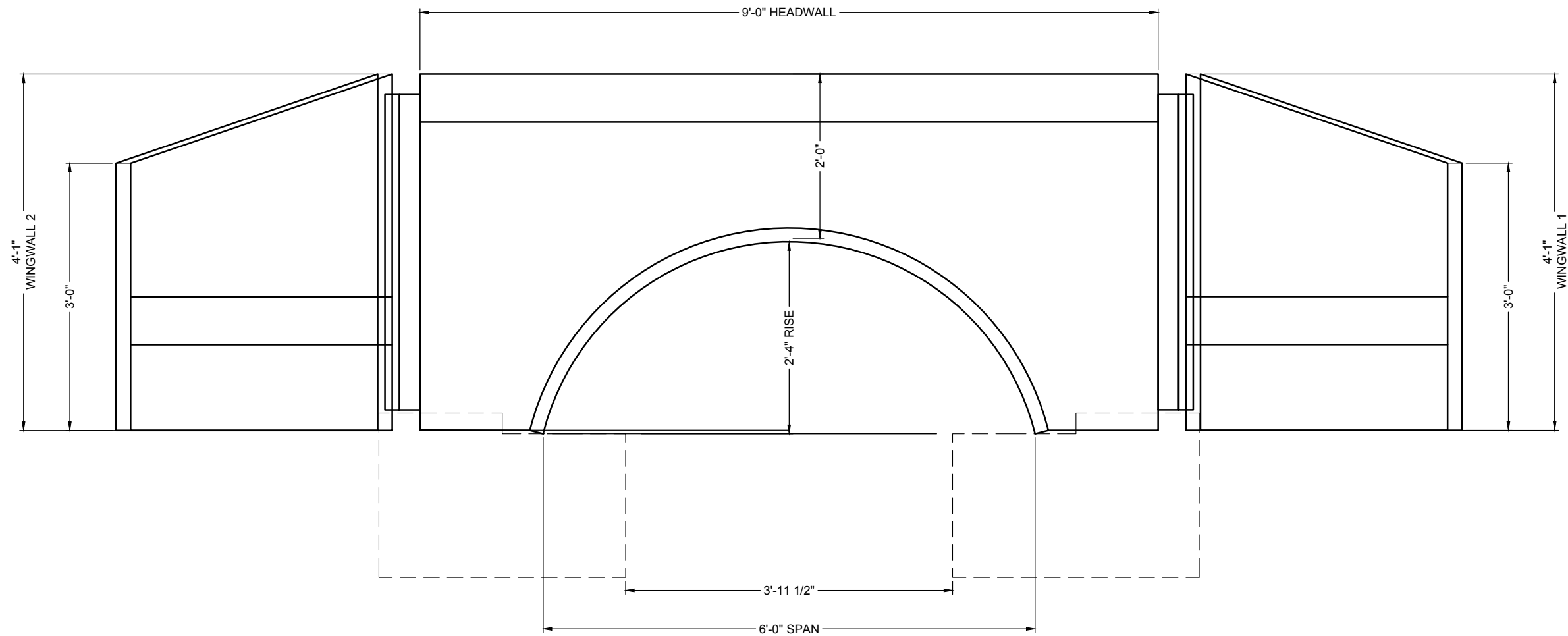
CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 3 OF 11		



INLET END ELEVATION

ALUMINUM HEADWALL TO BE FIELD CUT AT TIME OF INSTALLATION (BY OTHERS)

P:\2016\160781-CADD\DWG\CAD\160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

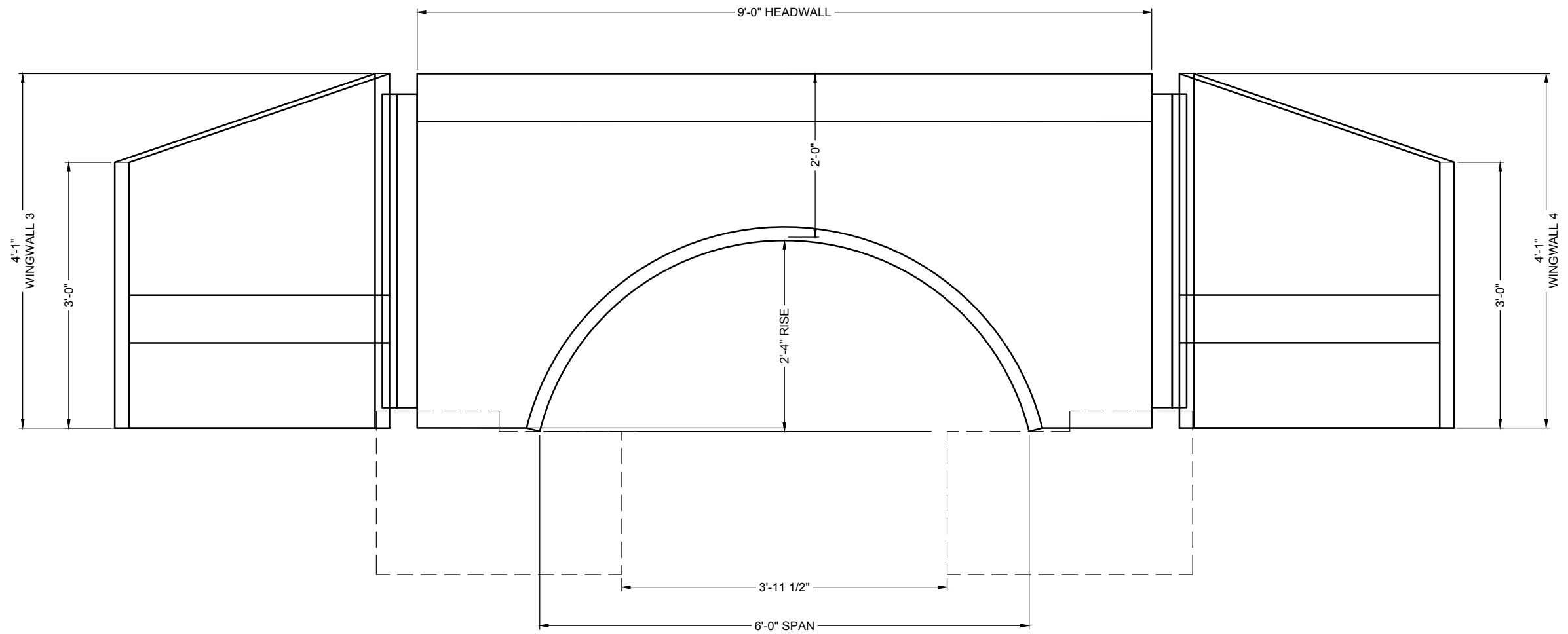
CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 4 OF 11		



OUTLET END ELEVATION

P:\2016\160781-CADD\DWG\CAD\160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

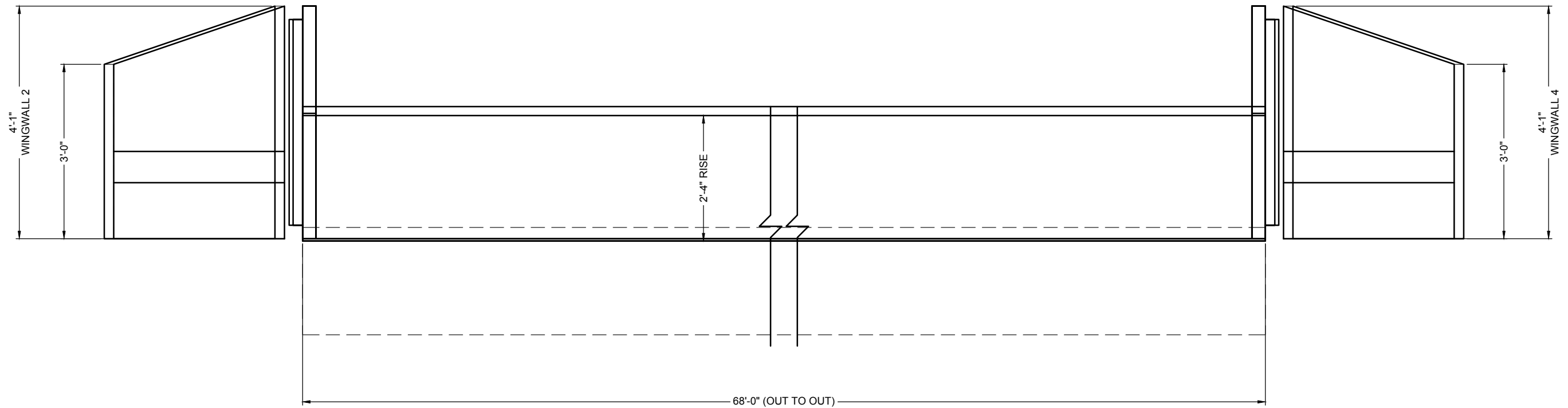
CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 5 OF 11		



PROFILE SECTION B-B

P:\2016\160-781-CADD\DWG\CV01160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----



9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
 800-338-1122 513-645-7000 513-645-7993 FAX

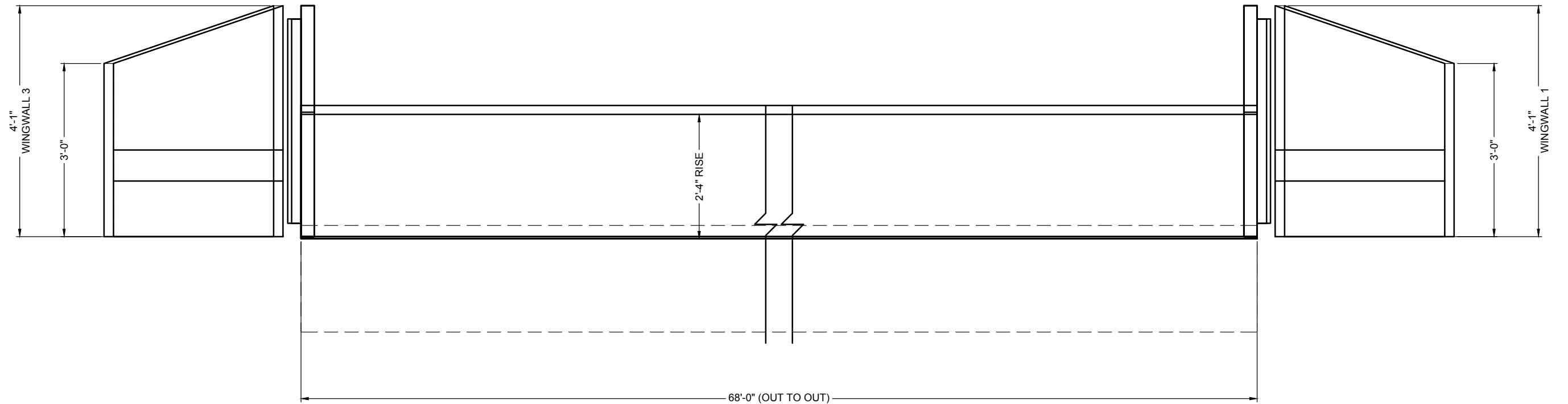


PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
 MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 6 OF 11		



PROFILE SECTION C-C

P:\2016\160781-CADD\DWG\C01160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

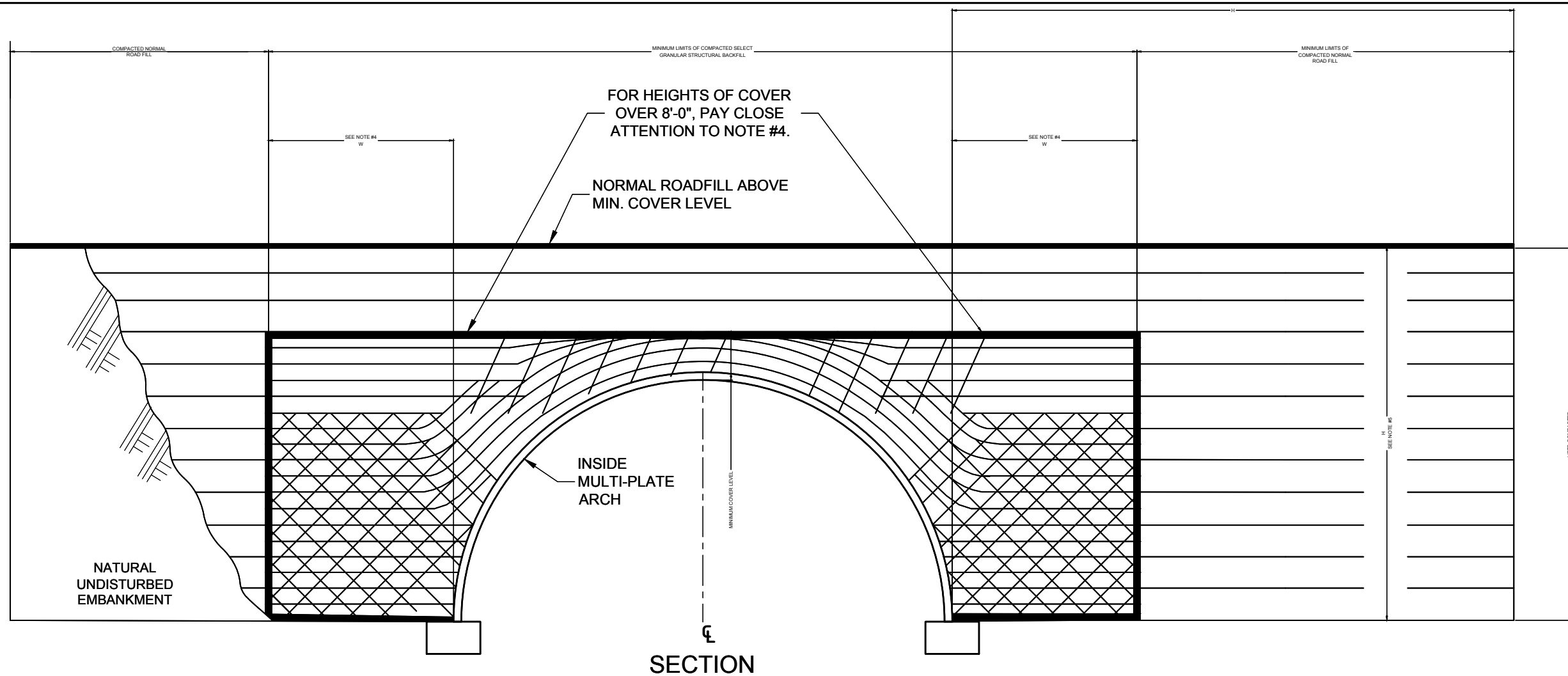
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE


PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 7 OF 11		



 CRITICAL BACKFILL ZONE, PRESSURE ON SOIL GREATEST HERE.
  SELECT GRANULAR STRUCTURAL BACKFILL LIMITS.

 INITIAL LIFTS OVER CROWN OF STRUCTURE AS INDICATED BY SHADED AREA TO BE COMPACTED TO REQUIRED DENSITY WITH HAND OPERATED EQUIPMENT OR WITH SMALL TRACTOR (D-4 OR SMALLER) DRAWN EQUIPMENT.

NOTES:

- ALL SELECT GRANULAR BACKFILL TO BE PLACED IN A BALANCED FASHION IN THIN LIFTS (6"-8" LOOSE TYPICALLY) AND COMPACTED TO 90 PERCENT DENSITY PER AASHTO T-180.
- COMPLETE AND REGULAR MONITORING OF THE ARCH IS NECESSARY DURING ALL BACKFILLING STEPS.
- PREVENT EXCESSIVE DISTORTION OF SHAPE AS NECESSARY BY VARYING COMPACTION METHODS AND EQUIPMENT.
- TRENCH WIDTH AND / OR SELECT FILL ENVELOPE WIDTH SHALL BE BY DIRECTION OF THE ENGINEER OF RECORD. A TYPICAL WIDTH OF 4 FEET IS DEPICTED, BUT GREATER OR LESSER DISTANCE MAY BE REQUIRED DEPENDING UPON SITE-SPECIFIC CONDITIONS. THIS WIDTH DEPENDS ON FACTORS SUCH AS THE LATERAL PRESSURES EXERTED BY THE STRUCTURE ONTO THE ADJACENT SOIL FOR THE GIVEN LOADING CONDITIONS, THE STRUCTURE SHAPE, THE QUALITY OF THE SELECT FILL MATERIAL AND THE STRENGTH OF THE IN SITU EMBANKMENT / TRENCH MATERIAL. THESE FACTORS MUST BE EVALUATED BY THE PROJECT ENGINEER FOR EACH SPECIFIC SITUATION.
- H = STRUCTURE RISE + COVER.

ADDITIONAL BACKFILL NOTES:

SATISFACTORY BACKFILL MATERIAL, PROPER PLACEMENT, AND COMPACTION ARE KEY FACTORS IN OBTAINING MAXIMUM STRENGTH AND STABILITY.

THE BACKFILL MATERIAL SHOULD BE FREE OF ROCKS, FROZEN LUMPS, AND FOREIGN MATERIAL THAT COULD CAUSE HARD SPOTS OR DECOMPOSE TO CREATE VOIDS. BACKFILL MATERIAL SHOULD BE WELL GRADED GRANULAR MATERIAL THAT MEETS THE REQUIREMENTS OF AASHTO M-145 FOR SOIL CLASSIFICATIONS A-1, A-2, A-3. BACKFILL MUST BE REPLACED SYMMETRICALLY ON EACH SIDE OF THE STRUCTURE IN 6" LOOSE LIFTS. EACH LIFT IS TO BE COMPACTED TO A MINIMUM OF 90% DENSITY PER AASHTO T-180.

A HIGH PERCENTAGE OF SILT OR FINE SAND IN THE NATIVE SOILS SUGGESTS THE NEED FOR A WELL GRADED GRANULAR BACKFILL MATERIAL TO PREVENT SOIL MIGRATION.

DURING BACKFILL, ONLY SMALL TRACKED VEHICLES (D-4 OR SMALLER) SHOULD BE NEAR THE STRUCTURE AS FILL PROGRESSES ABOVE THE CROWN AND TO THE FINISHED GRADE.

P:\2016\16160-781-CADD\DWG\CAD\160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY
----	----	----	----
----	----	----	----
----	----	----	----
----	----	----	----


CONTECH
 ENGINEERED SOLUTIONS LLC
 www.ContechES.com
 9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
 800-338-1122 513-645-7000 513-645-7993 FAX


CONTECH
 STRUCTURAL PLATE
 PROPOSAL DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
 MARTS COMPRESSOR STATION
 LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 8 OF 11		

SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CONTECH MULTI-PLATE® SINGLE RADIUS ARCH

I - GENERAL

1.0 STANDARDS AND DEFINITIONS

- 1.1 STANDARDS - All standards refer to latest edition unless otherwise noted.
 - 1.1.1 ASTM A-761 "Corrugated Steel Structural Plate, Zinc Coated for Field-Bolted Pipe, Pipe-Arches and Arches" (AASHTO Designation M-167).
 - 1.1.2 AASHTO Standard Specification for Highway Bridges - Section 12.
 - 1.1.3 AASHTO Standard Specification for Highway Bridges - Section 26.
- 1.2 DEFINITIONS
 - 1.2.1 Owner - In these specifications the word "Owner" shall mean Atlantic Coast Pipeline LLC.
 - 1.2.2 Engineer - In these specifications the word "Engineer" shall mean the Engineer of Record or Owner's designated engineering representative.
 - 1.2.3 Manufacturer - In these specifications the word "Manufacturer" shall mean CONTECH Construction Products Inc. 800-338-1122 Michael D'Agostino.
 - 1.2.4 Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any installation work under the terms of these specifications.
 - 1.2.5 Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.
 - 1.2.6 As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.

2.0 GENERAL CONDITIONS

- 2.1 The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein. This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications. This work is to be accomplished under the observation of the Owner or his designated representative.

If conditions other than those indicated are discovered by the Contractor, the Owner shall be notified immediately. The material which the Contractor believes to be a changed condition shall not be disturbed so that the owner can investigate the condition.
- 2.2 Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.
- 2.3 The construction shall be performed under the direction of the Engineer.
- 2.4 All aspects of the structure design and site layout including foundations, backfill, end treatments and necessary scour consideration shall be performed by the Engineer.

Any installation guidance provided herein shall be endorsed by the Engineer or superceded by the Engineer's plans and specifications.

II - MULTI-PLATE SINGLE RADIUS ARCH.

1.0 GENERAL

- 1.1 Manufacturer shall fabricate the MP Single Radius Arch culvert as shown on the plans. Fabrication shall conform to the requirements of ASTM A-761 and shall consist of plates, fasteners, and appurtenant items.

Plate thickness, end treatment and type of invert and foundation shall be as indicated on the plans. All manufacturing processes including corrugating, punching, curving and required galvanizing shall be performed within the United States of America.
- 1.2 The contractor shall verify all field dimensions and conditions prior to ordering materials.

2.0 DIMENSIONS

- 2.1 The proposed structure shall be a MP Single Radius Arch with the following dimensions:

Span: 6'-0"	Rise: 2'-4"
Gage: 12	
- 2.2 All plan dimensions on the contract drawings are measured in a true horizontal plan unless otherwise noted.

3.0 ASSEMBLY AND INSTALLATION

- 3.1 Bolts and nuts shall conform to the requirements of ASTM A-449. The structure shall be assembled in accordance with the plate layout drawings provided by the manufacturer and per the manufacturer's recommendations.

Bolts shall be tightened using an applied torque of between 100 and 300 ft.-lbs.
- 3.2 The structure shall be installed in accordance with the plans and specifications, the manufacturer's recommendations, and AASHTO Standard Specification for Highway Bridges - Section 26.
- 3.3 Trench excavation shall be made in embankment material that is structurally adequate. The trench width shall be shown on the plans. Poor quality in situ embankment material must be removed and replaced with suitable backfill as directed by the Engineer.
- 3.4 Bedding preparation is critical to both structure performance and service life. The bed should be constructed to uniform line and grade to avoid distortions that may create undesirable stresses in the structure and/or rapid deterioration of the roadway. The bed should be free of rock formations, protruding stones, frozen lumps, roots, and other foreign matter that may cause unequal settlement.
- 3.5 Bedding shall provide a minimum of 4,000 psf bearing capacity. Foundation details for bearing capacity less than 4,000 psf shall be approved by the Engineer.
- 3.6 The structure shall be assembled in accordance with the Manufacturer's instructions. All plates shall be unloading and handled with reasonable care. Plates shall not be rolled or dragged over gravel rock and shall be prevented from striking rock or other hard objects during placement in trench or on bedding.

When assembled on a cast in place spread footing, the structure shall be assembled in the footing starting at the upstream end. When assembled on a full invert or on flexible footing pads, the invert or footing pad shall be placed starting at the downstream end. The structure shell shall be assembled on the invert or footing pad starting at the inlet end. Circumferential seams shall be installed with the plate laps shingled downstream as viewed from the inside of the structure.

The structure shall be backfilled using clean well graded granular material that meets the requirements of AASHTO M-145 for soil classifications A-1, A-2 or A-3.

Backfill must be placed symmetrically on each side of the structure in 6 to 8 inch loose lifts. Each lift shall be compacted to a minimum of 90 percent density per AASHTO T-180
- 3.7 Construction loads that exceed highway load limits are not allowed to cross the structure without approval from the Engineer.

Normal highway traffic is not allowed to cross the structure until the structure has been backfilled and paved. If the road is unpaved, cover allowance to accommodate rutting shall be as directed by the Engineer.

GROUP CLASSIFICATION	A-1	A-2	A-3*
Sieve Analysis Percent Passing			
No. 10 (2.000 mm)	----	----	----
No. 40 (0.425 mm)	50 max.	----	51 max.
No. 200 (0.075 mm)	25 max.	35 max.	10 max.
Characteristics of Fraction			
Passing No. 40 (0.425 mm)			
Liquid Limits			
	----	40 max.	----
Plasticity Index			
	6 max.	10 max.	Non Plastic
Usual Materials			
	Stone Fragment, Gravel and Sand	Gravel or Sand With Silt or clay	Sand
Adapted from AASHTO M-145			
* Fine beach sands, windblown sands, stream deposited sands, etc., exhibiting fine, rounded particles and typically classified by AASHTO M-145 as A-3 material should be avoided.			

P:\2016\160781-CADD\DWG\CAD\DWG\CAD\160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY



www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX



PROPOSAL
DRAWING

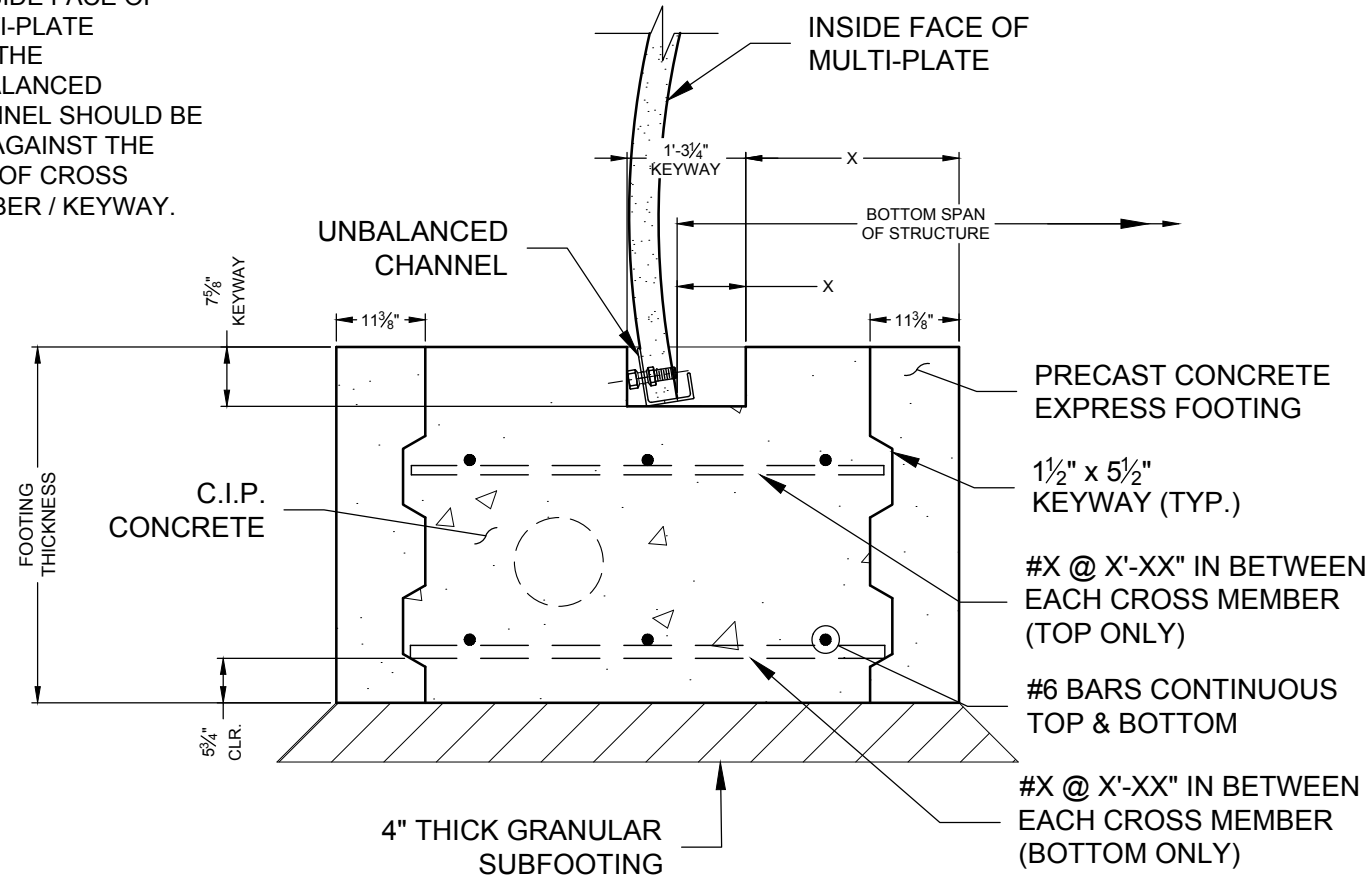
MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 9 OF 11		

MULTI-PLATE OR SUPER SPAN STRUCTURE, W/ UNBALANCED CHANNELS ON EXPRESS FOOTINGS.

NOTE:
OUTSIDE FACE OF
MULTI-PLATE
AND THE
UNBALANCED
CHANNEL SHOULD BE
SET AGAINST THE
SIDE OF CROSS
MEMBER / KEYWAY.



OPTION 1 (PREFERRED):

1. SET PRECAST EXPRESS FOOTINGS.
2. TIE REBAR INTO EXPRESS FOOTINGS.
3. ASSEMBLE PLATE STRUCTURE ON CROSS-MEMBERS OF EXPRESS FOOTINGS. (OR ASSEMBLE PLATE STRUCTURE TO THE SIDE AND LIFT IT AND SET IT ON THE PRECAST.) THE UNBALANCED CHANNEL SHOULD BE ATTACHED TO THE MULTI-PLATE.
4. POUR CAST-IN-PLACE CONCRETE IN EXPRESS FOOTINGS. THE CAST-IN-PLACE CONCRETE WILL COVER THE BOTTOM 4" OF PLATE STRUCTURE.

OPTION 2:

1. SET PRECAST EXPRESS FOOTINGS.
2. TIE REBAR INTO EXPRESS FOOTINGS.
3. POUR CAST-IN-PLACE CONCRETE IN EXPRESS FOOTING. FORM A KEYWAY IN THE FOOTING MATCHING THE KEYWAY NOTCHES IN THE EXPRESS FOOTINGS.
4. ASSEMBLE PLATE STRUCTURE IN THE KEYWAYS OF THE FOOTING. (OR ASSEMBLE PLATE STRUCTURE TO THE SIDE AND SET IT ON THE FOOTING.)

PRECAST REINFORCED CONCRETE EXPRESS™ FOUNDATION NOTES:

1. PRECAST FOUNDATION UNITS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF EXPRESS FOOTINGS.
2. PRECAST AND CAST-IN-PLACE CONCRETE FOR EXPRESS FOUNDATIONS SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI. REINFORCING STEEL FOR FOUNDATIONS SHALL CONFORM TO ASTM A615 OR A996, GRADE 60.
3. PRECAST FOUNDATION UNITS SHALL BE SET ON A MINIMUM 4-INCH THICK BASE LAYER OF COMPACTED GRANULAR MATERIAL THE FULL WIDTH OF THE FOUNDATION.
4. COMPACTED BACKFILL MATERIAL MUST BE PLACED UP TO THE TOP OF THE PRECAST FOUNDATION UNITS ON BOTH SIDES PRIOR TO PLACING CAST-IN-PLACE CONCRETE PORTION OF FOUNDATIONS.
5. CONCRETE SURFACES WHICH CAST-IN-PLACE CONCRETE WILL BE PLACED AGAINST SHALL BE CLEAN, FREE OF LAITANCE, DIRT, STANDING WATER AND ANY OTHER MATERIAL THAT MAY IMPAIR THE BOND BETWEEN THE PRECAST CONCRETE AND CAST-IN-PLACE CONCRETE.
6. CAST-IN-PLACE CONCRETE MIX USED TO FILL FOUNDATION SHALL BE ABLE TO FLOW INTO ARCH SHIM SPACE OR NON-SHRINK GROUT SHALL BE PLACED UNDER ARCH UNIT LEG AT FOUNDATION CROSS MEMBERS PRIOR TO PLACEMENT OF CAST-IN-PLACE PORTION OF FOUNDATION.
7. IF THE AMBIENT TEMPERATURE AT THE TIME OF PLACEMENT OF CAST-IN-PLACE CONCRETE IS ABOVE 90°F OR EXPECTED TO GO BELOW 35°F DURING THE CURE PERIOD, THE CONTRACTOR SHALL FOLLOW THE REQUIREMENTS OF THE LATEST EDITION OF THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS, SECTION 8.6.2 HOT WEATHER PROTECTION OR SECTION 8.6.4 COLD WEATHER PROTECTION.
8. IF CAST-IN-PLACE CONCRETE PORTION OF FOUNDATION IS TO BE PLACED PRIOR TO SETTING OF MULTI-PLATE ARCH, CAST-IN-PLACE CONCRETE SHALL REACH A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI BEFORE PLACEMENT OF MULTI-PLATE ARCH.
9. FOUNDATION CONCRETE SHALL REACH ITS FULL DESIGN STRENGTH BEFORE BACKFILLING OF MULTI-PLATE ARCH.

P:\2016\160-781-CADD\DWG\CV01160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.			
MARK	DATE	REVISION DESCRIPTION	BY

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com

9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE

PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION

LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 10 OF 11		

SAMPLE DRAWING ONLY



ARMORFLEX FULL INVERT

N.T.S.



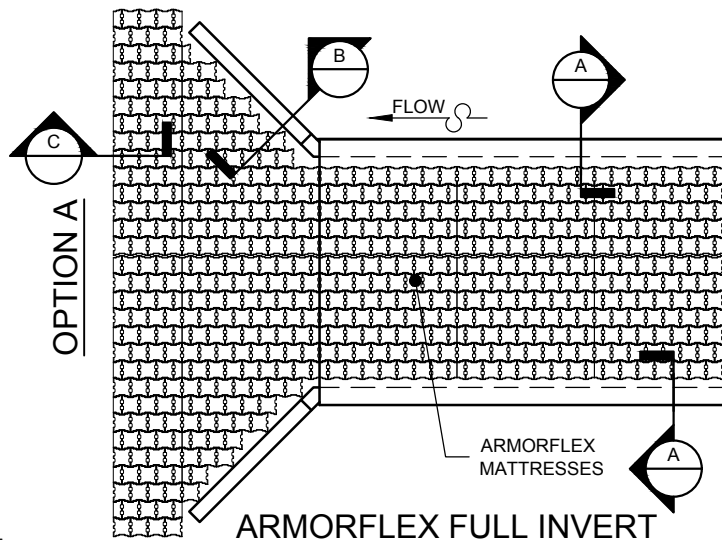
ARMORFLEX PARTIAL INVERT

N.T.S.



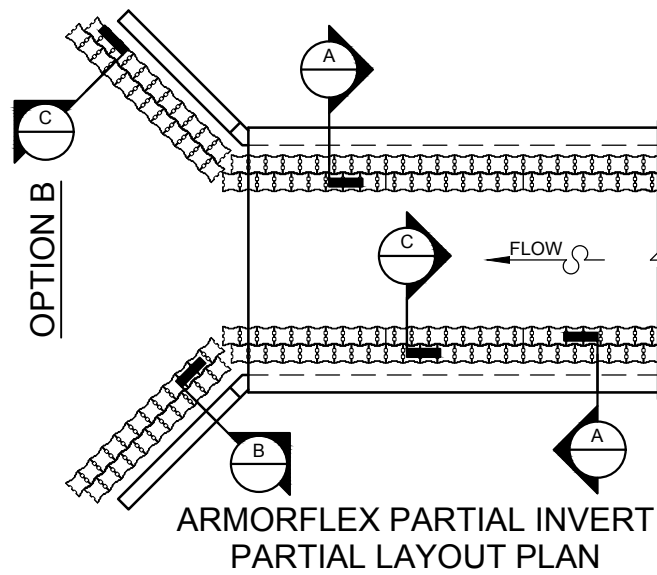
A-JACKS PARTIAL INVERT

N.T.S.



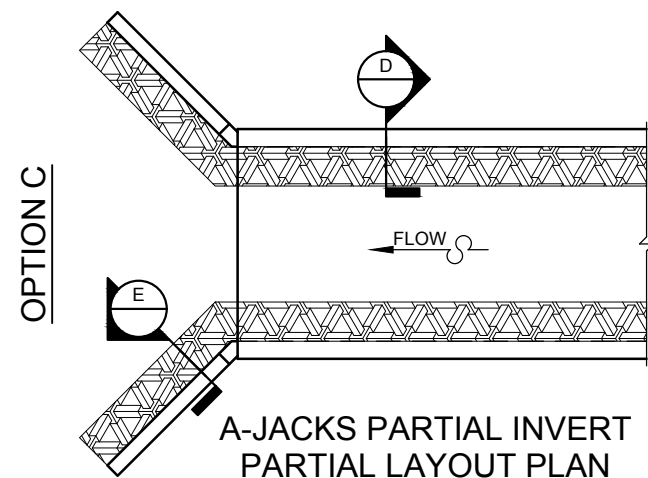
ARMORFLEX FULL INVERT PARTIAL LAYOUT PLAN

N.T.S.



ARMORFLEX PARTIAL INVERT PARTIAL LAYOUT PLAN

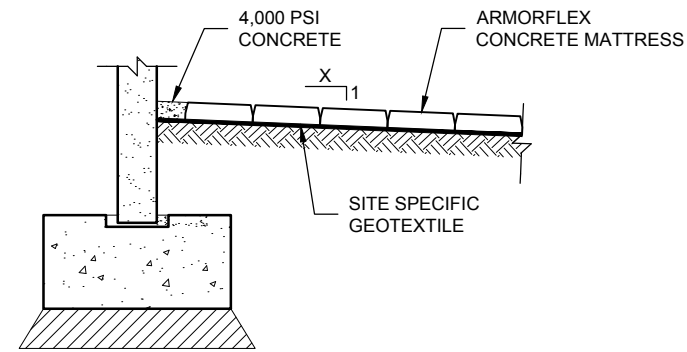
N.T.S.



A-JACKS PARTIAL INVERT PARTIAL LAYOUT PLAN

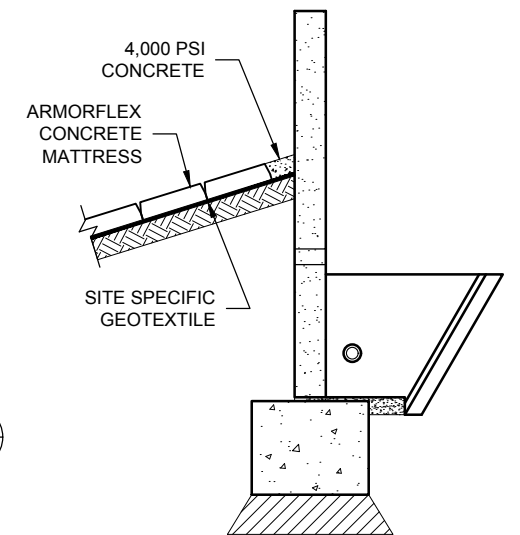
N.T.S.

CONSIDER A COMPLETE SYSTEM WITH ARMORTEC REVETMENT



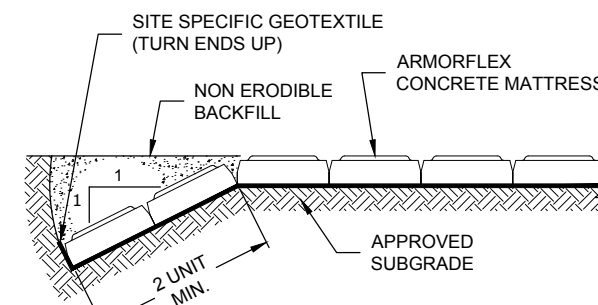
ARMORFLEX STRUCTURE TERMINATION

N.T.S.



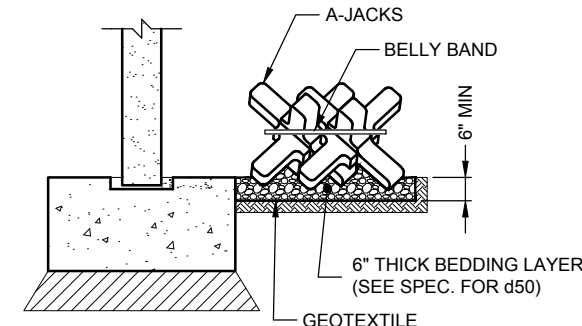
ARMORFLEX WINGWALL TERMINATION

N.T.S.



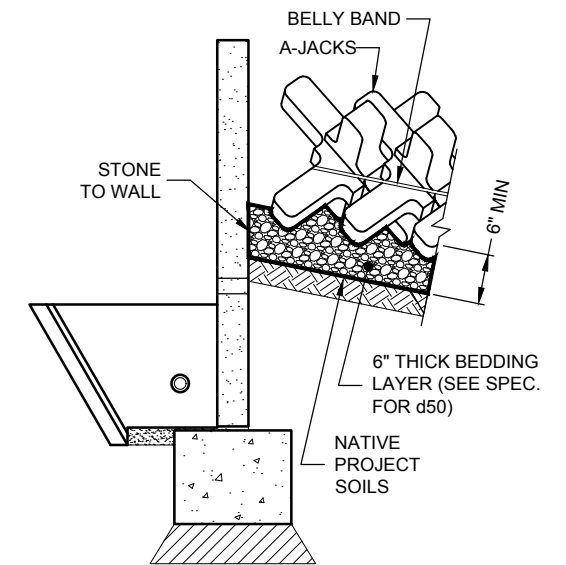
STANDARD TERMINATION

N.T.S.



A-JACKS STRUCTURE TERMINATION

N.T.S.



A-JACKS WINGWALL TERMINATION

N.T.S.

P:2016/16/160781-CADD/DWG/CV01160781-CULVERT 2.DWG 2/2/2017 8:35 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH
ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH
STRUCTURAL PLATE
PROPOSAL
DRAWING

MULTIPLATE SINGLE RADIUS ARCH 6'-0" X 2'-4"
MARTS COMPRESSOR STATION
LEWIS COUNTY, WV

PROJECT No.: 548650	SEQ. No.: 020	DATE: 8/26/2016
DESIGNED: MJD	DRAWN: MJD	
CHECKED:	APPROVED:	
SHEET NO.: 11 OF 11		

Stormwater Analysis - Outlet Protection Sizing
 Marts Compressor Station
 160-781

Created By: GSZ
 Date: 10/7/2016

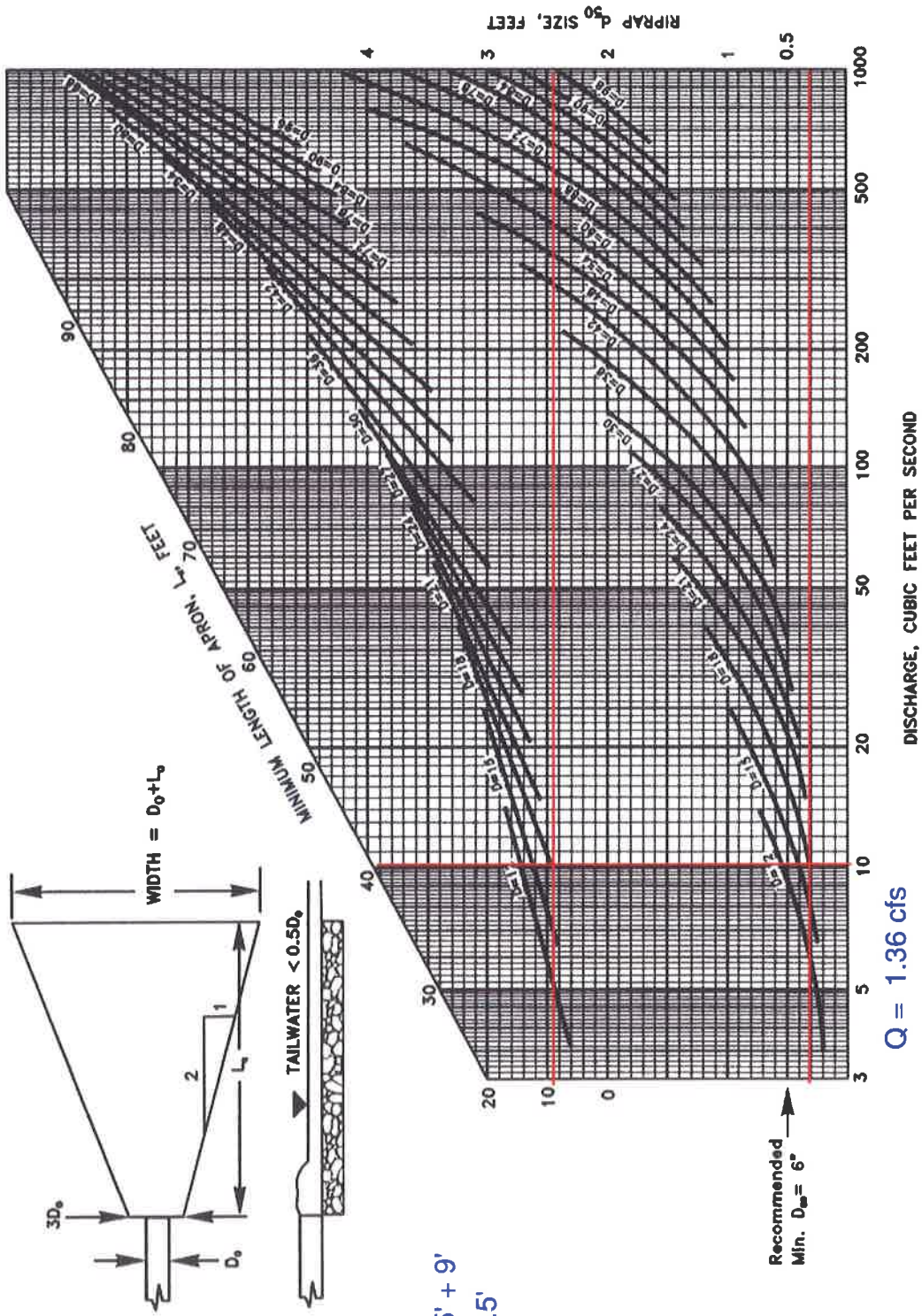
Checked By: TJS
 Date: 10/7/2016

RIPRAP NO.	FACILITY	FLOW (cfs)	PIPE SIZE (in)	Tw (ft)	AREA (sf)	VELOCITY (ft/s)	Do (ft)	d (in)	La (ft)	W (ft)	Tailwater Conditions	RIP RAP	DIAMETER (in)	THICKNESS (ft)
1	Culvert 1 (13+50)	1.36	18	0.50	0.16	8.74	1.50	18	9	10.5	Minimum	R-4	12	1.50
2	Culvert 2 (16+00)	2.81	18	0.50	0.28	10.57	1.50	18	9	10.5	Minimum	R-5	18	2.25
3	Culvert 3 (19+75)	1.97	18	0.50	0.21	9.37	1.50	18	9	10.5	Minimum	R-5	18	2.25
4	Culvert 4 (23+00)	13.31	24	0.75	1.47	9.06	2.00	24	13	15.0	Minimum	R-5	18	2.25
5	Pipe Slope (Apron 1)	31.85	24	0.75	3.14	10.18	2.00	24	13	17.0	Minimum	R-5	18	2.25
6	Basin Outlet (Apron 2)	9.89	24	0.75	3.14	3.15	2.00	24	13	15.0	Minimum	R-4	12	1.50

Name: Culvert #1

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER) (USDA-NRCS)



$L_a = 9'$
 $W = 1.5' + 9'$
 $W = 10.5'$

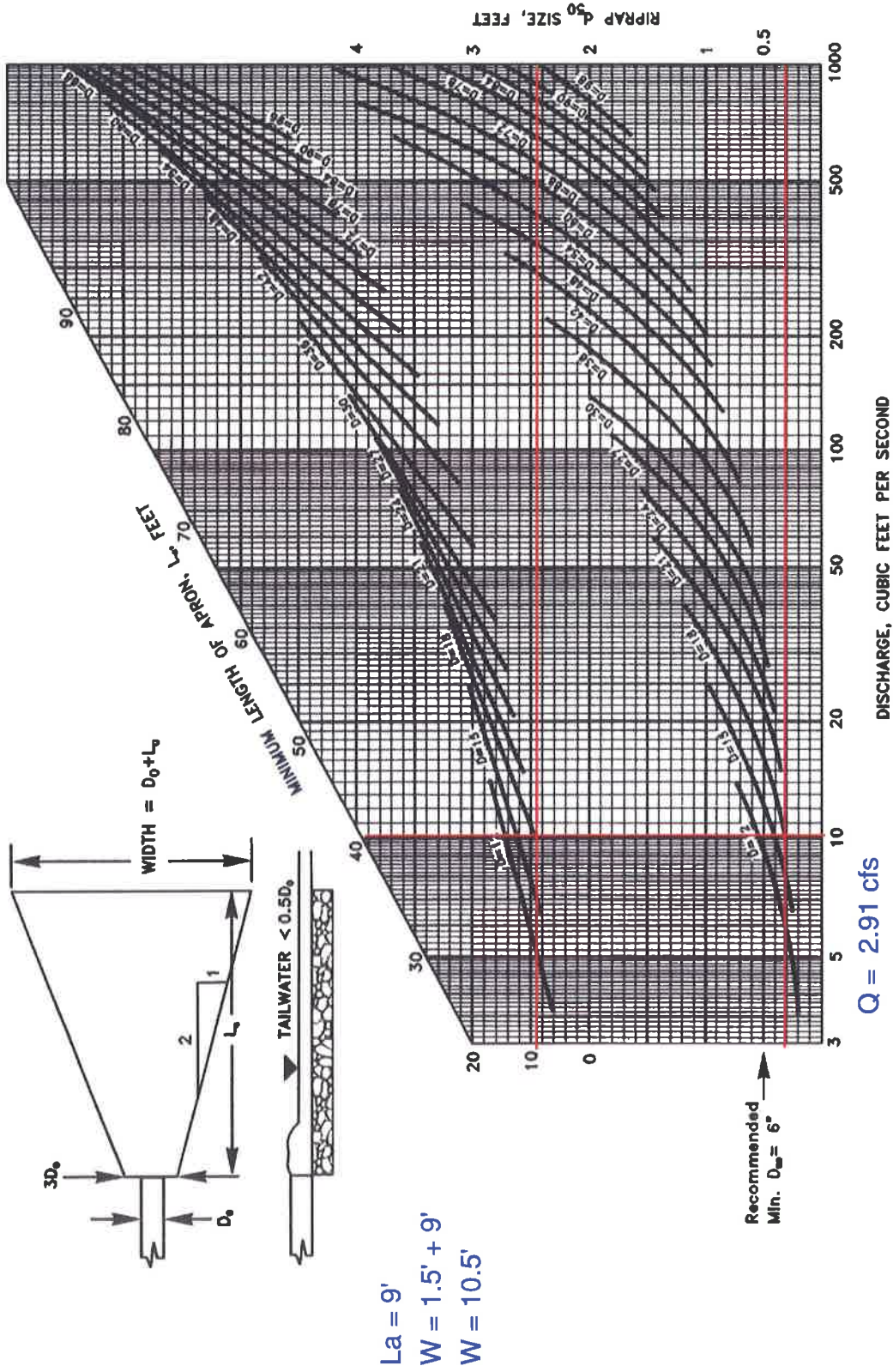
$Q = 1.36$ cfs

Velocity = 8.74 ft/s > V_{max} for R-3 = 6.5 ft/s =====> Use R-4

Name: Culvert #2

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_v < 0.5$ DIAMETER) (USDA-NRCS)

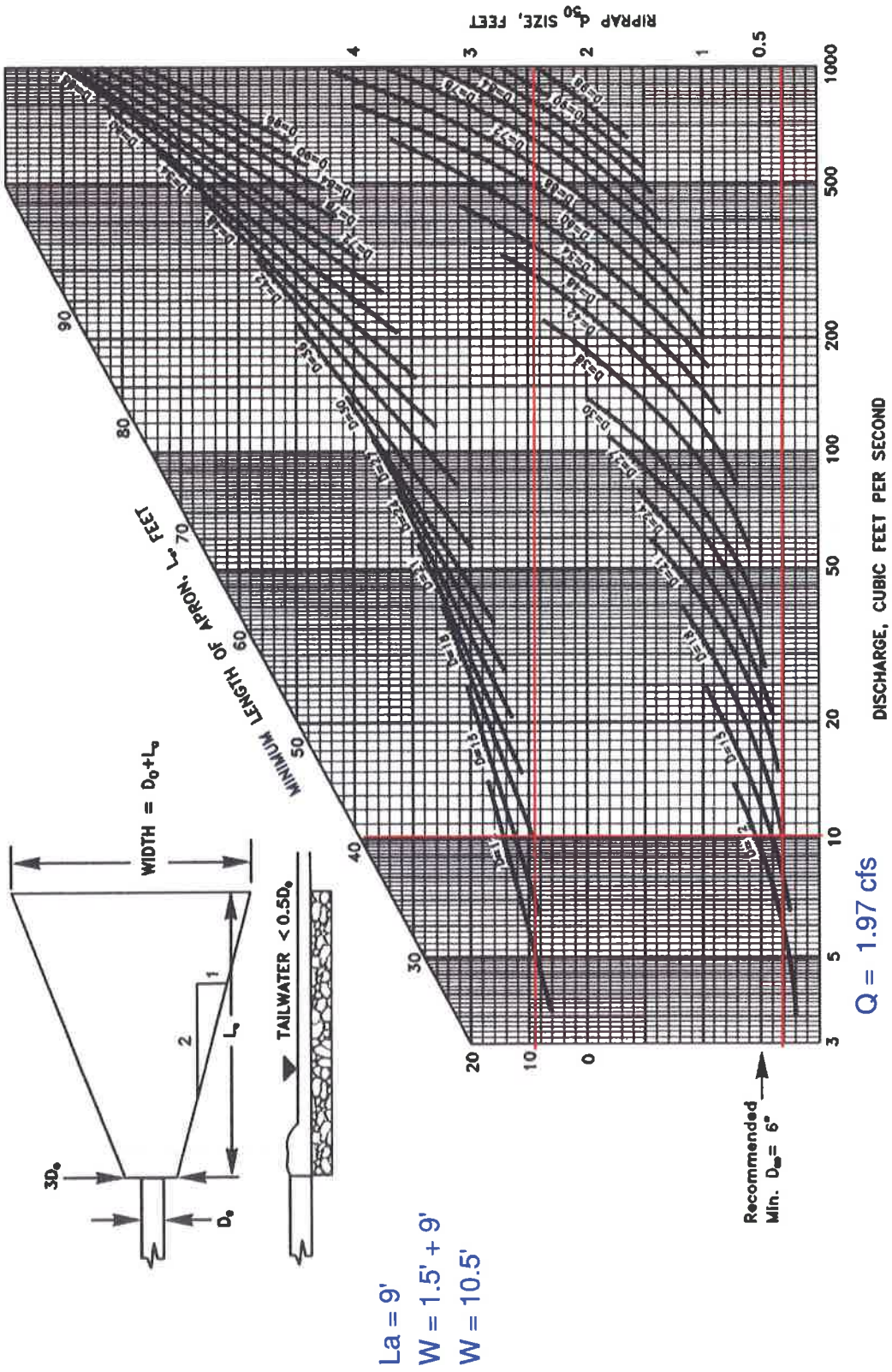


Velocity = 10.57 ft/s > Vmax for R-4 = 9.00 ft/s =====> Use R-5

Name: Culvert #3

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER) (USDA-NRCS)

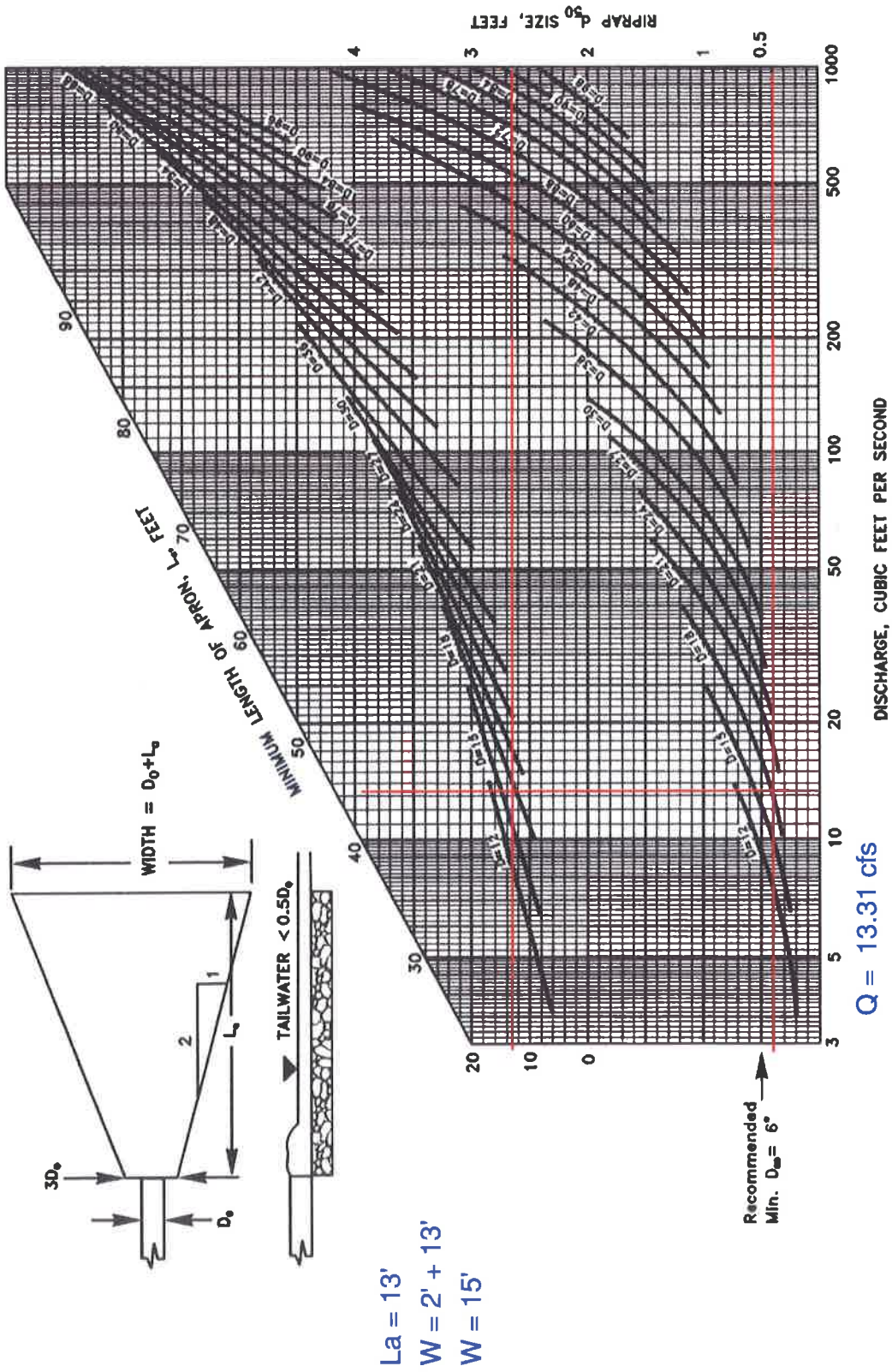


Velocity = 9.37 ft/s > V_{max} for R-4 = 9.00 ft/s =====> Use R-5

Name: Culvert #4

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER) (USDA-NRCS)



$L_a = 13'$

$W = 2' + 13'$

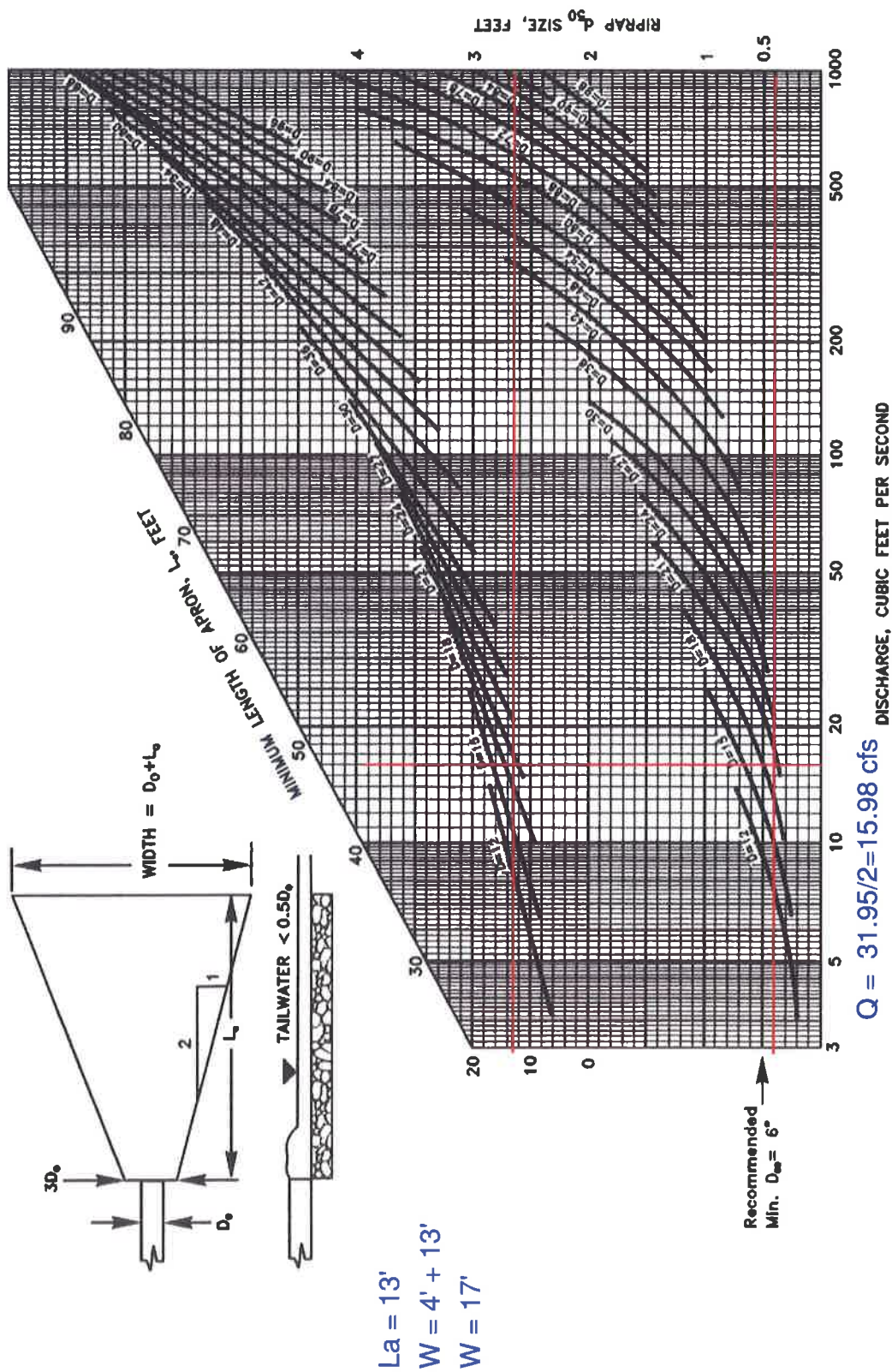
$W = 15'$

Velocity = 9.06 ft/s > V_{max} for R-4 = 9.00 ft/s =====> Use R-5

Name: Rip Rap Apron #1

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER) (USDA-NRCS)

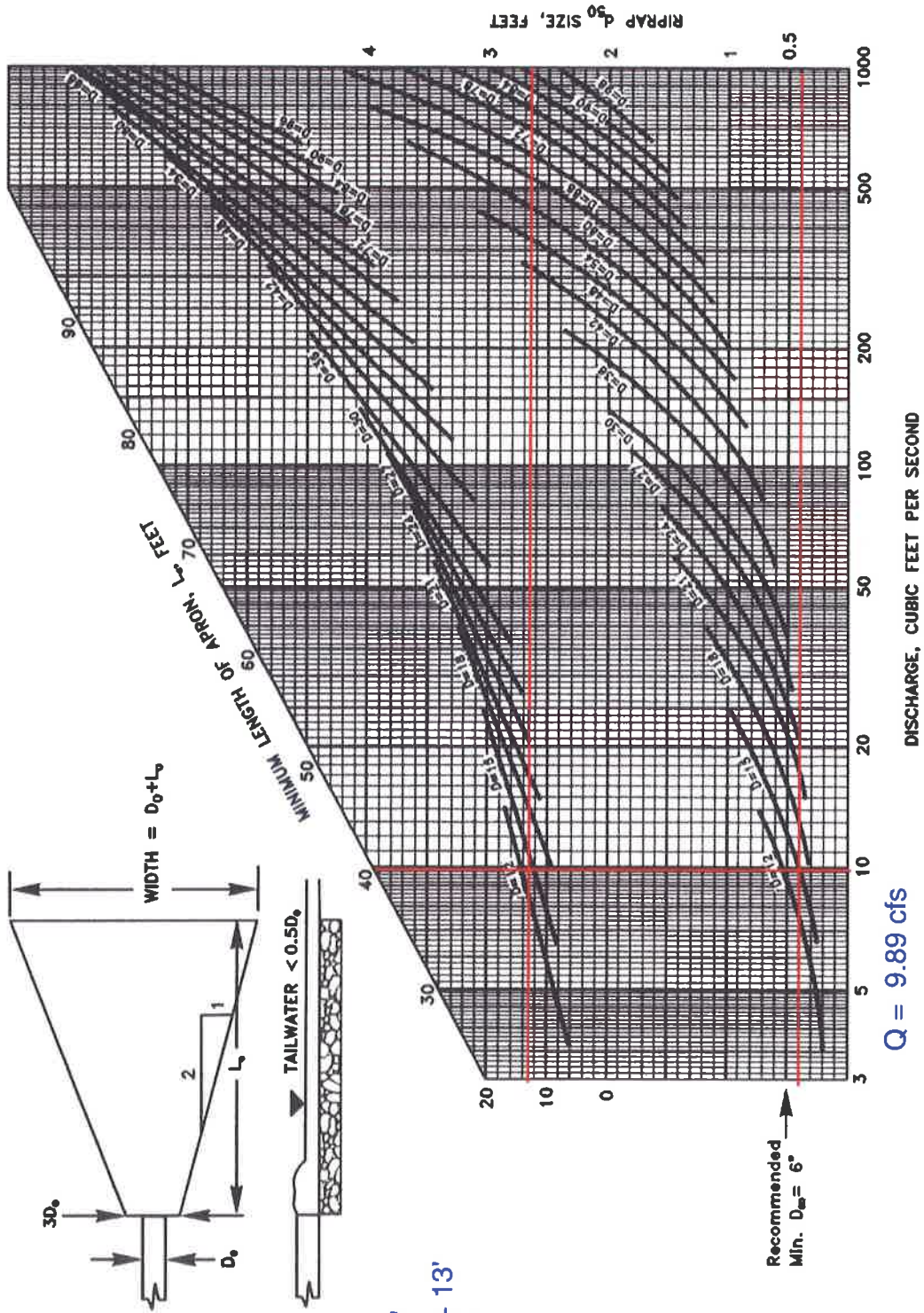


Velocity = 10.18 ft/s > V_{max} for R-4 = 9.00 ft/s =====> Use R-5

Name: Rip Rap Apron #2

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
 MINIMUM TAILWATER CONDITION ($T_w < 0.5$ DIAMETER) (USDA-NRCS)



$L_a = 13'$
 $W = 2' + 13'$
 $W = 15'$

Velocity = 3.15 ft/s < V_{max} for R-4 = 9.0 ft/s =====> Use R-4

COMPOST SOCK SEDIMENT TRAP #1
MARTS COMPRESSOR STATION
CEC PROJECT NUMBER 160-781

PREPARED BY: GSZ DATE: 10/3/2016
CHECKED BY: *mrc* DATE: 10/5/16

TRIBUTARY DRAINAGE AREA (ac): 0.6
REQUIRED STORAGE CAPACITY (cf): 1200 (TRIBUTARY DRAINAGE AREA x 2,000 cf/acre)

TRAP BASE ELEVATION: 1082
TRAP TOP ELEVATION: 1086.2 (TRAP BASE ELEVATION + PROPOSED EFFECTIVE TRAP HEIGHT)

ELEVATION	AREA (sf)	AVERAGE AREA (sf)	STORAGE VOLUME (cf)	
			INCREMENTAL	TOTAL
1082	0	0	0	0
1082.2	55	27	5	5
1082.4	110	82	16	22
1082.6	164	137	27	49
1082.8	219	192	38	88
1083	274	247	49	137
1083.2	329	301	60	197
1083.4	384	356	71	269
1083.6	438	411	82	351
1083.8	493	466	93	444
1084	548	521	104	548
1084.2	603	575	115	663
1084.4	657	630	126	789
1084.6	712	684	137	926
1084.8	766	739	148	1,074
1085	821	793	159	1,232
1085.2	875	848	170	1,402
1085.4	930	902	180	1,582
1085.6	984	957	191	1,774
1085.8	1,039	1,011	202	1,976
1086	1,093	1,066	213	2,189
1086.2	1,149	1,121	224	2,413
1086.4	1,205	1,177	235	2,649
1086.6	1,261	1,233	247	2,895
1086.8	1,317	1,289	258	3,153
1087	1,374	1,345	269	3,422
1087.2	1,430	1,402	280	3,703
1087.4	1,486	1,458	292	3,994
1087.6	1,542	1,514	303	4,297
1087.8	1,598	1,570	314	4,611
1088	1,654	1,626	325	4,936

REQUIRED TRAP HEIGHT

1085	EL. @ REQ'D STORAGE CAPACITY
- 1082	TRAP BASE ELEVATION
+ 1	FOOT (FREEBOARD)
<hr/>	
4.0	FEET

PROPOSED TRAP CONFIGURATION

QTY	NOMINAL	EFFECTIVE
1	8 " SOCK	6.5 " SOCK
1	12 " SOCK	9.5 " SOCK
2	18 " SOCK	14.5 " SOCK
2	24 " SOCK	19 " SOCK
3	32 " SOCK	26 " SOCK
<hr/>		
TOTAL	50 " EFFECTIVE TRAP HEIGHT	4.2 ' EFFECTIVE TRAP HEIGHT

← REQUIRED STORAGE CAPACITY

COMPOST SOCK SEDIMENT TRAP #2
MARTS COMPRESSOR STATION
CEC PROJECT NUMBER 160-781

PREPARED BY: GSZ DATE: 10/3/2016
CHECKED BY: mmc DATE: 10/5/16

TRIBUTARY DRAINAGE AREA (ac): 0.51
REQUIRED STORAGE CAPACITY (cf): 1020 (TRIBUTARY DRAINAGE AREA x 2,000 cf/acre)

TRAP BASE ELEVATION: 1074
TRAP TOP ELEVATION: 1077.4 (TRAP BASE ELEVATION + PROPOSED EFFECTIVE TRAP HEIGHT)

ELEVATION	AREA (sf)	AVERAGE AREA (sf)	STORAGE VOLUME (cf)	
			INCREMENTAL	TOTAL
1074	0	0	0	0
1074.2	93	46	9	9
1074.4	185	139	28	37
1074.6	278	232	46	83
1074.8	370	324	65	148
1075	463	417	83	232
1075.2	556	509	102	333
1075.4	648	602	120	454
1075.6	741	695	139	593
1075.8	833	787	157	750
1076	926	880	176	926
1076.2	1,003	964	193	1,119
1076.4	1,079	1,041	208	1,327
1076.6	1,156	1,117	223	1,550
1076.8	1,232	1,194	239	1,789
1077	1,309	1,270	254	2,043
1077.2	1,385	1,347	269	2,313
1077.4	1,462	1,423	285	2,597
1077.6	1,538	1,500	300	2,897
1077.8	1,615	1,576	315	3,212
1078	1,691	1,653	331	3,543
1078.2	1,756	1,724	345	3,888
1078.4	1,821	1,789	358	4,245
1078.6	1,886	1,854	371	4,616
1078.8	1,951	1,919	384	5,000
1079	2,016	1,984	397	5,397
1079.2	2,081	2,049	410	5,806
1079.4	2,146	2,114	423	6,229
1079.6	2,211	2,179	436	6,665
1079.8	2,276	2,244	449	7,113
1080	2,341	2,309	462	7,575

REQUIRED TRAP HEIGHT

1076.2 EL. @ REQ'D STORAGE CAPACITY
- 1074 TRAP BASE ELEVATION
+ 1 FOOT (FREEBOARD)
3.2 FEET

PROPOSED TRAP CONFIGURATION

QTY	NOMINAL	EFFECTIVE
1	8" SOCK	6.5" SOCK
	12" SOCK	9.5" SOCK
1	18" SOCK	14.5" SOCK
	24" SOCK	19" SOCK
2	32" SOCK	26" SOCK
TOTAL	40.5" EFFECTIVE TRAP HEIGHT	3.4' EFFECTIVE TRAP HEIGHT

← REQUIRED STORAGE CAPACITY

COMPOST SOCK SEDIMENT TRAP #3
MARTS COMPRESSOR STATION
CEC PROJECT NUMBER 160-781

PREPARED BY: GSZ DATE: 10/3/2016
CHECKED BY: *mmc* DATE: 10/5/16

TRIBUTARY DRAINAGE AREA (ac): 0.18
REQUIRED STORAGE CAPACITY (cf): 360 (TRIBUTARY DRAINAGE AREA x 2,000 cf/acre)

TRAP BASE ELEVATION: 1060
TRAP TOP ELEVATION: 1064.5 (TRAP BASE ELEVATION + PROPOSED EFFECTIVE TRAP HEIGHT)

ELEVATION	AREA (sf)	AVERAGE AREA (sf)	STORAGE VOLUME (cf)	
			INCREMENTAL	TOTAL
1060	0	0	0	0
1060.2	13	7	1	1
1060.4	26	20	4	5
1060.6	39	33	7	12
1060.8	52	46	9	21
1061	66	59	12	33
1061.2	79	72	14	47
1061.4	92	85	17	64
1061.6	105	98	20	84
1061.8	118	111	22	106
1062	131	124	25	131
1062.2	144	138	28	159
1062.4	157	151	30	189
1062.6	170	164	33	221
1062.8	183	177	35	257
1063	196	190	38	295
1063.2	209	203	41	335
1063.4	222	216	43	378
1063.6	235	229	46	424
1063.8	248	242	48	472
1064	261	255	51	523
1064.2	270	265	53	576
1064.4	279	274	55	631
1064.6	287	283	57	688
1064.8	296	292	58	746
1065	305	301	60	806
1065.2	314	309	62	868
1065.4	323	318	64	932
1065.6	331	327	65	997
1065.8	340	336	67	1,064
1066	349	345	69	1,133

REQUIRED TRAP HEIGHT

1063.4 EL. @ REQ'D STORAGE CAPACITY
- 1060 TRAP BASE ELEVATION
+ 1 FOOT (FREEBOARD)
4.4 FEET

PROPOSED TRAP CONFIGURATION

QTY	NOMINAL	EFFECTIVE
1	8" SOCK	6.5" SOCK
1	12" SOCK	9.5" SOCK
2	18" SOCK	14.5" SOCK
3	24" SOCK	19" SOCK
3	32" SOCK	26" SOCK
TOTAL	54.5" EFFECTIVE TRAP HEIGHT	4.5' EFFECTIVE TRAP HEIGHT

← REQUIRED STORAGE CAPACITY

SEDIMENT BARRIER DESIGN

PROJECT NAME: MARTS COMPRESSOR STATION
 PROJECT #: 160-781

PREPARED BY GSZ DATE: 9/30/16
 BARRIER A

CHECKED BY *mmc*

DATE: *9/30/16*

SILT FENCE/SOCK TYPE: 32 INCH FILTREXX SILT SOCK

SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	50	SLOPE LENGTH =	40	60	20	33%	60	OK
SEGMENT B	SLOPE =	15	SLOPE LENGTH =	75	350	42	12%	117	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	

TOTAL ACTUAL SLOPE LENGTH (FT) 115

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH 32 INCH FILTREXX SILT SOCK IS ACCEPTABLE
 BARRIER B

SILT FENCE/SOCK TYPE: SUPER SILT FENCE

SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	12	SLOPE LENGTH =	90	200	110	55%	200	OK
SEGMENT B	SLOPE =	5	SLOPE LENGTH =	97	500	178	36%	275	OK
SEGMENT C	SLOPE =	10	SLOPE LENGTH =	20	300	87	29%	107	OK

TOTAL ACTUAL SLOPE LENGTH (FT) 207

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH SUPER SILT FENCE IS ACCEPTABLE

SEDIMENT BARRIER DESIGN

PROJECT NAME: MARTS COMPRESSOR STATION
 PROJECT #: 160-781

PREPARED BY: GSZ DATE: 9/30/16 CHECKED BY: *mmc* DATE: 9/30/16
 BARRIER C

SILT FENCE/SOCK TYPE: **32 INCH FILTREXX SILT SOCK**

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	11	SLOPE LENGTH =	94	350	256	73%	350	OK
SEGMENT B	SLOPE =	6	SLOPE LENGTH =	70	400	223	56%	293	OK
SEGMENT C	SLOPE =	13	SLOPE LENGTH =	165	350	30	8%	195	OK

TOTAL ACTUAL SLOPE LENGTH (FT) 329

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH **32 INCH FILTREXX SILT SOCK IS ACCEPTABLE**
 BARRIER D

SILT FENCE/SOCK TYPE: **32 INCH FILTREXX SILT SOCK**

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	11	SLOPE LENGTH =	130	350	220	63%	350	OK
SEGMENT B	SLOPE =	4	SLOPE LENGTH =	91	650	318	49%	409	OK
SEGMENT C	SLOPE =	19	SLOPE LENGTH =	116	250	6	2%	123	OK

TOTAL ACTUAL SLOPE LENGTH (FT) 337

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH **32 INCH FILTREXX SILT SOCK IS ACCEPTABLE**

SEDIMENT BARRIER DESIGN

PROJECT NAME: MARTS COMPRESSOR STATION
 PROJECT #: 160-781

PREPARED BY GSZ DATE: 9/30/16 CHECKED BY *mmc* DATE: *9/30/16*
 BARRIER E

SILT FENCE/SOCK TYPE: **SUPER SILT FENCE**

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	27	SLOPE LENGTH =	100	100	0	0%	100	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT) 100

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** IS ACCEPTABLE

BARRIER F

SILT FENCE/SOCK TYPE: **SUPER SILT FENCE**

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	7	SLOPE LENGTH =	67	300	233	78%	300	OK
SEGMENT B	SLOPE =	12	SLOPE LENGTH =	64	200	91	46%	156	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT) 131

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** IS ACCEPTABLE

SEDIMENT BARRIER DESIGN

PROJECT NAME: MARTS COMPRESSOR STATION
 PROJECT #: 160-781

PREPARED BY GSZ DATE: 9/30/16

CHECKED BY *mmc*

DATE: *9/30/16*

BARRIER G

SILT FENCE/SOCK TYPE: **SUPER SILT FENCE**

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	50	SLOPE LENGTH =	20	50	30	60%	50	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

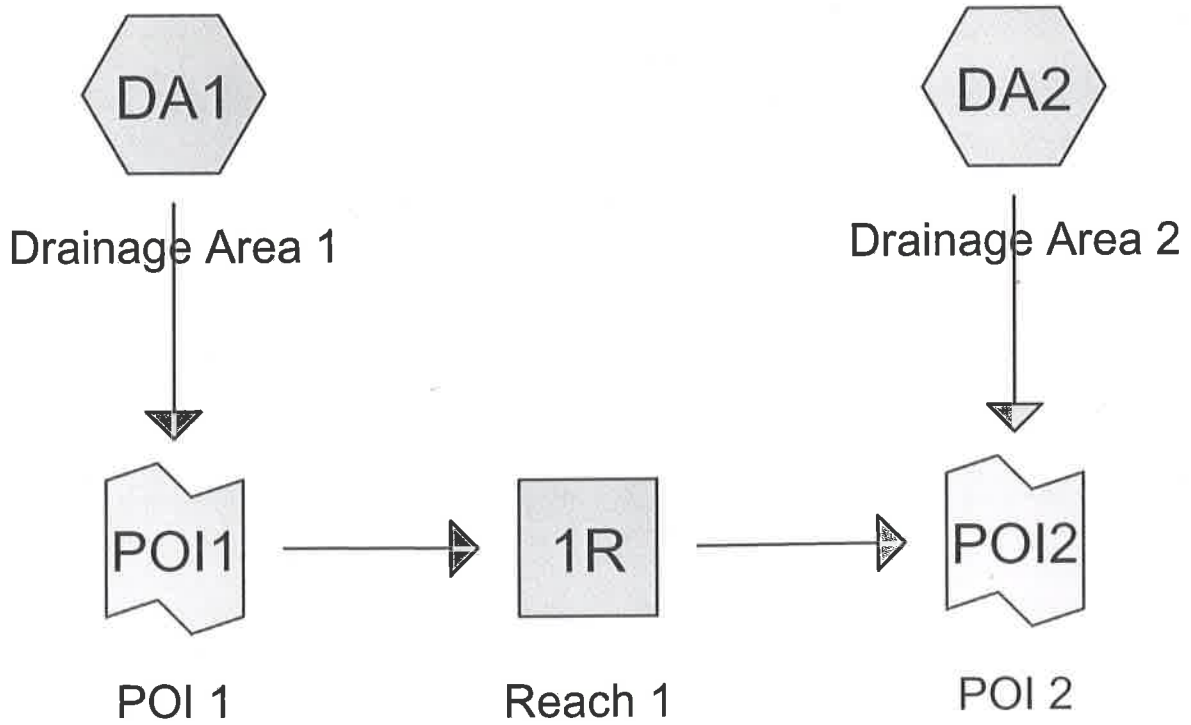
TOTAL ACTUAL SLOPE LENGTH (FT) 20
--

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMUM ALLOWABLE SLOPE LENGTH

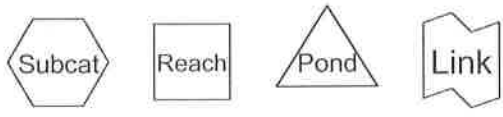
SUPER SILT FENCE

IS ACCEPTABLE

Pre-Development



PREPARED BY: TGS 10/5/2016
CHECKED BY: EJB 10/6/2016



160-781 Marts Hydrology

Prepared by Civil & Environmental Consultants, Inc.

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Type II 24-hr 10-year Rainfall=3.56"

Printed 10/5/2016

Page 2

Summary for Subcatchment DA1: Drainage Area 1

Runoff = 16.51 cfs @ 12.26 hrs, Volume= 1.737 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
9.930	70	Woods, Good, HSG C
0.200	77	Woods, Good, HSG D
8.660	71	Meadow, non-grazed, HSG C
0.120	89	Gravel roads, HSG C
18.910	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	100	0.0200	0.07		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 2.58"
3.9	589	0.2500	2.50		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
1.2	549	0.1400	7.95	11.93	Trap/Vee/Rect Channel Flow, C-D Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
1.4	669	0.1200	8.00	19.99	Trap/Vee/Rect Channel Flow, D-POI1 Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
30.4	1,907	Total			

Summary for Subcatchment DA2: Drainage Area 2

Runoff = 29.67 cfs @ 12.23 hrs, Volume= 2.868 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
15.500	70	Woods, Good, HSG C
0.320	77	Woods, Good, HSG D
14.680	71	Meadow, non-grazed, HSG C
0.620	89	Gravel roads, HSG C
* 0.110	98	Impervious
31.230	71	Weighted Average

160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/5/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 3

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0400	0.09		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 2.58"
2.5	394	0.2800	2.65		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
1.1	563	0.2100	8.89	8.89	Trap/Vee/Rect Channel Flow, C-D Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035
2.7	1,067	0.0800	6.53	16.32	Trap/Vee/Rect Channel Flow, D-E Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
2.5	375	0.0100	2.52	16.36	Trap/Vee/Rect Channel Flow, D-POI 2 Bot.W=12.00' D=0.50' Z= 2.0 '/' Top.W=14.00' n= 0.035
26.9	2,499	Total			

Summary for Reach 1R: Reach 1

Inflow Area = 18.910 ac, Inflow Depth = 1.10" for 10-year event
 Inflow = 16.51 cfs @ 12.26 hrs, Volume= 1.737 af
 Outflow = 15.29 cfs @ 12.36 hrs, Volume= 1.737 af, Atten= 7%, Lag= 5.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.74 fps, Min. Travel Time= 7.2 min
 Avg. Velocity = 0.90 fps, Avg. Travel Time= 22.1 min

Peak Storage= 6,651 cf @ 12.36 hrs
 Average Depth at Peak Storage= 0.43'
 Bank-Full Depth= 4.00' Flow Area= 80.0 sf, Capacity= 776.75 cfs

12.00' x 4.00' deep channel, n= 0.035
 Side Slope Z-value= 2.0 '/' Top Width= 28.00'
 Length= 1,191.0' Slope= 0.0141 '/'
 Inlet Invert= 1,005.36', Outlet Invert= 988.60'



Summary for Link POI1: POI 1

Inflow Area = 18.910 ac, Inflow Depth = 1.10" for 10-year event
 Inflow = 16.51 cfs @ 12.26 hrs, Volume= 1.737 af
 Primary = 16.51 cfs @ 12.26 hrs, Volume= 1.737 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/5/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

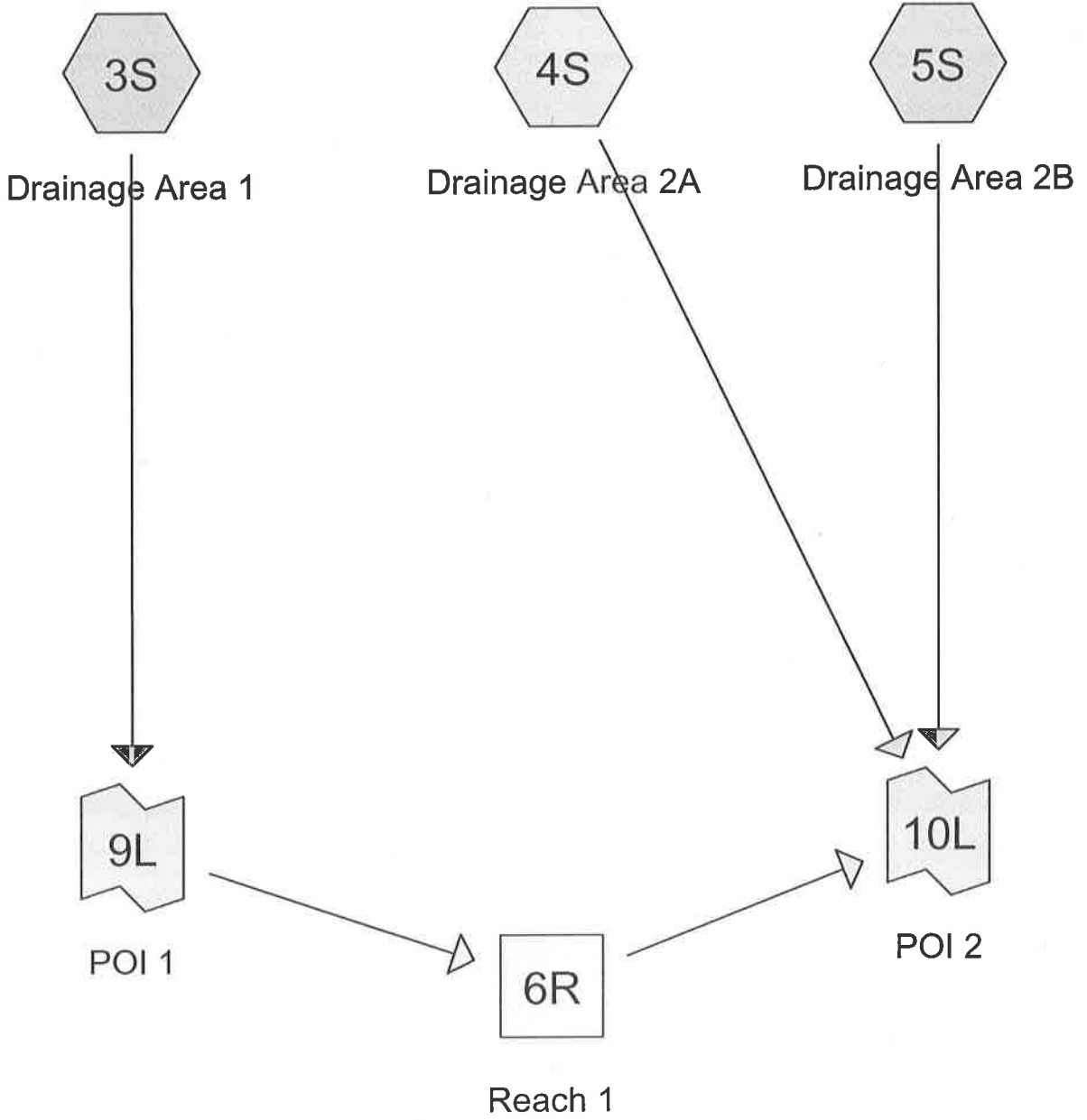
Page 4

Summary for Link POI2: POI 2

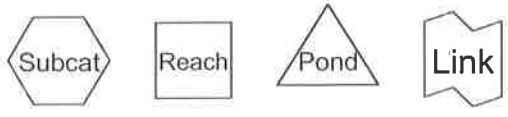
Inflow Area = 50.140 ac, Inflow Depth = 1.10" for 10-year event
Inflow = 42.76 cfs @ 12.28 hrs, Volume= 4.605 af
Primary = 42.76 cfs @ 12.28 hrs, Volume= 4.605 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Post-Development
(Undetained)



PREPARED BY: TGS 10/5/2016
CHECKED BY: EJB 10/7/2016



160-781 Marts Hydrology

Prepared by Civil & Environmental Consultants, Inc.

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Type II 24-hr 10-year Rainfall=3.56"

Printed 10/5/2016

Page 2

Summary for Subcatchment 3S: Drainage Area 1

Runoff = 12.24 cfs @ 12.28 hrs, \Volume= 1.286 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
8.390	70	Woods, Good, HSG C
0.200	77	Woods, Good, HSG D
5.290	71	Meadow, non-grazed, HSG C
0.120	89	Gravel roads, HSG C
14.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	100	0.0200	0.07		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 2.58"
3.5	527	0.2500	2.50		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
1.5	704	0.1300	7.66	11.49	Trap/Vee/Rect Channel Flow, C-D Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
1.4	669	0.1200	8.00	19.99	Trap/Vee/Rect Channel Flow, D-POI1 Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
30.3	2,000	Total			

Summary for Subcatchment 4S: Drainage Area 2A

Runoff = 33.25 cfs @ 12.00 hrs, Volume= 1.757 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
0.280	70	Woods, Good, HSG C
0.420	71	Meadow, non-grazed, HSG C
6.880	89	Gravel roads, HSG C
* 1.160	98	Impervious
8.740	89	Weighted Average

160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/5/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 3

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow, A-B Smooth surfaces n= 0.011 P2= 2.58"
4.7	453	0.0100	1.61		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
2.5	315	0.0100	2.13	3.19	Trap/Vee/Rect Channel Flow, C-D Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
0.1	249	0.4700	53.48	168.02	Pipe Channel, D-E 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
8.6	1,117	Total			

Summary for Subcatchment 5S: Drainage Area 2B

Runoff = 31.26 cfs @ 12.22 hrs, Volume= 2.926 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
10.840	70	Woods, Good, HSG C
0.320	77	Woods, Good, HSG D
12.300	71	Meadow, non-grazed, HSG C
2.170	89	Gravel roads, HSG C
* 1.770	98	Impervious
27.400	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0400	0.09		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 2.58"
2.5	394	0.2800	2.65		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
1.2	581	0.1800	8.23	8.23	Trap/Vee/Rect Channel Flow, C-D Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035
0.3	197	0.2000	10.32	25.81	Trap/Vee/Rect Channel Flow, D-E Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
2.2	868	0.0800	6.53	16.32	Trap/Vee/Rect Channel Flow, E-F Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
2.5	375	0.0100	2.52	16.36	Trap/Vee/Rect Channel Flow, F-POI 2 Bot.W=12.00' D=0.50' Z= 2.0 '/' Top.W=14.00' n= 0.035
26.8	2,515	Total			

160-781 Marts Hydrology

Prepared by Civil & Environmental Consultants, Inc.
HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Type II 24-hr 10-year Rainfall=3.56"

Printed 10/5/2016

Page 4

Summary for Reach 6R: Reach 1

Inflow Area = 14.000 ac, Inflow Depth = 1.10" for 10-year event
Inflow = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af
Outflow = 11.15 cfs @ 12.37 hrs, Volume= 1.286 af, Atten= 9%, Lag= 5.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.44 fps, Min. Travel Time= 8.1 min
Avg. Velocity = 0.82 fps, Avg. Travel Time= 24.2 min

Peak Storage= 5,451 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 4.00' Flow Area= 80.0 sf, Capacity= 776.75 cfs

12.00' x 4.00' deep channel, n= 0.035
Side Slope Z-value= 2.0 ' / ' Top Width= 28.00'
Length= 1,191.0' Slope= 0.0141 ' / '
Inlet Invert= 1,005.36', Outlet Invert= 988.60'



Summary for Link 9L: POI 1

Inflow Area = 14.000 ac, Inflow Depth = 1.10" for 10-year event
Inflow = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af
Primary = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af, Atten= 0%, Lag= 0.0 min

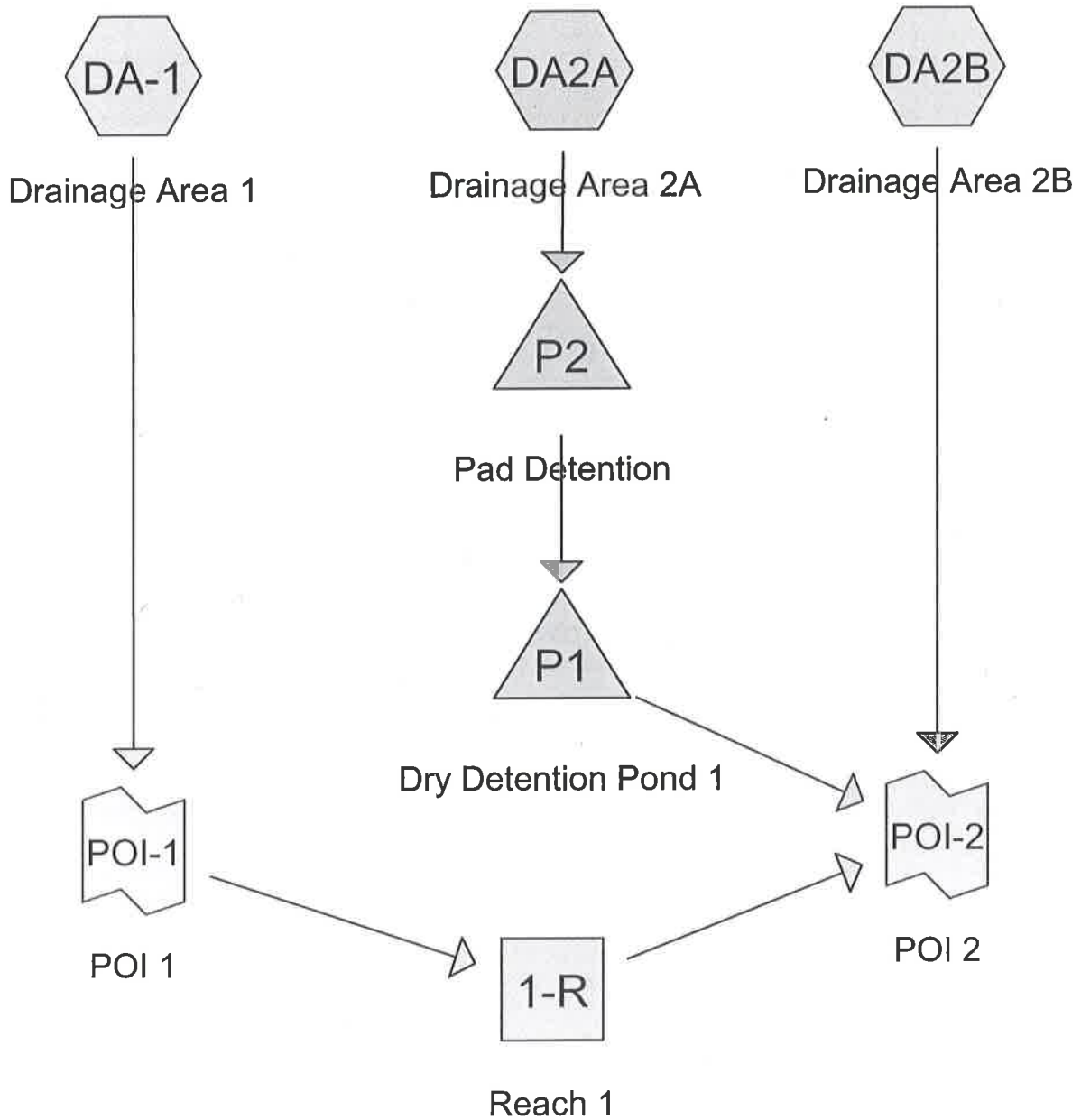
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 10L: POI 2

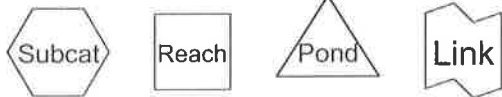
Inflow Area = 50.140 ac, Inflow Depth = 1.43" for 10-year event
Inflow = 49.30 cfs @ 12.03 hrs, Volume= 5.969 af
Primary = 49.30 cfs @ 12.03 hrs, Volume= 5.969 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Post-Development



PREPARED BY: TGT 10/5/2016
CHECKED BY: EJB 10/7/2016



160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/6/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 2

Summary for Subcatchment DA-1: Drainage Area 1

Runoff = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
8.390	70	Woods, Good, HSG C
0.200	77	Woods, Good, HSG D
5.290	71	Meadow, non-grazed, HSG C
0.120	89	Gravel roads, HSG C
14.000	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.9	100	0.0200	0.07		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 2.58"
3.5	527	0.2500	2.50		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
1.5	704	0.1300	7.66	11.49	Trap/Vee/Rect Channel Flow, C-D Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
1.4	669	0.1200	8.00	19.99	Trap/Vee/Rect Channel Flow, D-PO11 Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
30.3	2,000	Total			

Summary for Subcatchment DA2A: Drainage Area 2A

Runoff = 33.38 cfs @ 12.00 hrs, Volume= 1.757 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
0.280	70	Woods, Good, HSG C
0.420	71	Meadow, non-grazed, HSG C
6.880	89	Gravel roads, HSG C
* 1.160	98	Impervious
8.740	89	Weighted Average

160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/6/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 3

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow, A-B Smooth surfaces n= 0.011 P2= 2.58"
4.7	453	0.0100	1.61		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
2.5	315	0.0100	2.13	3.19	Trap/Vee/Rect Channel Flow, C-D Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035
8.5	868	Total			

Summary for Subcatchment DA2B: Drainage Area 2B

Runoff = 31.26 cfs @ 12.22 hrs, Volume= 2.926 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-year Rainfall=3.56"

Area (ac)	CN	Description
10.840	70	Woods, Good, HSG C
0.320	77	Woods, Good, HSG D
12.300	71	Meadow, non-grazed, HSG C
2.170	89	Gravel roads, HSG C
* 1.770	98	Impervious
27.400	74	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1	100	0.0400	0.09		Sheet Flow, A-B Woods: Light underbrush n= 0.400 P2= 2.58"
2.5	394	0.2800	2.65		Shallow Concentrated Flow, B-C Woodland Kv= 5.0 fps
1.2	581	0.1800	8.23	8.23	Trap/Vee/Rect Channel Flow, C-D Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035
0.3	197	0.2000	10.32	25.81	Trap/Vee/Rect Channel Flow, D-E Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
2.2	868	0.0800	6.53	16.32	Trap/Vee/Rect Channel Flow, E-F Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035
2.5	375	0.0100	2.52	16.36	Trap/Vee/Rect Channel Flow, F-POI 2 Bot.W=12.00' D=0.50' Z= 2.0 '/' Top.W=14.00' n= 0.035
26.8	2,515	Total			

Summary for Reach 1-R: Reach 1

Inflow Area = 14.000 ac, Inflow Depth = 1.10" for 10-year event
 Inflow = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af
 Outflow = 11.15 cfs @ 12.37 hrs, Volume= 1.286 af, Atten= 9%, Lag= 5.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Max. Velocity= 2.44 fps, Min. Travel Time= 8.1 min
 Avg. Velocity = 0.82 fps, Avg. Travel Time= 24.2 min

Peak Storage= 5,451 cf @ 12.37 hrs
 Average Depth at Peak Storage= 0.36'
 Bank-Full Depth= 4.00' Flow Area= 80.0 sf, Capacity= 776.75 cfs

12.00' x 4.00' deep channel, n= 0.035
 Side Slope Z-value= 2.0 '/' Top Width= 28.00'
 Length= 1,191.0' Slope= 0.0141 '/'
 Inlet Invert= 1,005.36', Outlet Invert= 988.60'



Summary for Pond P1: Dry Detention Pond 1

Inflow Area = 8.740 ac, Inflow Depth = 2.41" for 10-year event
 Inflow = 18.16 cfs @ 12.10 hrs, Volume= 1.757 af
 Outflow = 9.89 cfs @ 12.42 hrs, Volume= 1.757 af, Atten= 46%, Lag= 19.3 min
 Primary = 9.89 cfs @ 12.42 hrs, Volume= 1.757 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 1,008.52' @ 12.42 hrs Surf.Area= 5,328 sf Storage= 25,557 cf

Plug-Flow detention time= 77.8 min calculated for 1.757 af (100% of inflow)
 Center-of-Mass det. time= 77.7 min (899.1 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,000.00'	34,137 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/6/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 5

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,000.00	1,066	0	0
1,001.00	1,438	1,252	1,252
1,002.00	1,844	1,641	2,893
1,003.00	2,283	2,064	4,957
1,004.00	2,766	2,525	7,481
1,005.00	3,279	3,023	10,504
1,006.00	3,823	3,551	14,055
1,007.00	4,396	4,110	18,164
1,008.00	4,998	4,697	22,861
1,009.00	5,631	5,315	28,176
1,010.00	6,292	5,962	34,137

Device	Routing	Invert	Outlet Devices
#1	Primary	999.90'	24.0" Round Culvert L= 54.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 999.90' / 998.60' S= 0.0241 ' S= 0.0241 ' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1,000.00'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	1,008.20'	24.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	1,008.60'	35.0' long x 15.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=9.89 cfs @ 12.42 hrs HW=1,008.52' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Passes 9.89 cfs of 41.76 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 2.72 cfs @ 13.85 fps)
- 3=Orifice/Grate (Weir Controls 7.17 cfs @ 1.86 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,000.00' TW=0.00' (Dynamic Tailwater)

- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P2: Pad Detention

Inflow Area = 8.740 ac, Inflow Depth = 2.41" for 10-year event
 Inflow = 33.38 cfs @ 12.00 hrs, Volume= 1.757 af
 Outflow = 18.16 cfs @ 12.10 hrs, Volume= 1.757 af, Atten= 46%, Lag= 5.9 min
 Primary = 18.16 cfs @ 12.10 hrs, Volume= 1.757 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 1,118.59' @ 12.10 hrs Surf.Area= 20,391 sf Storage= 16,797 cf

Plug-Flow detention time= 15.2 min calculated for 1.757 af (100% of inflow)
 Center-of-Mass det. time= 15.3 min (821.4 - 806.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,117.00'	58,272 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

160-781 Marts Hydrology

Type II 24-hr 10-year Rainfall=3.56"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/6/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 6

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,117.00	885	0	0
1,118.00	13,004	6,945	6,945
1,119.00	25,523	19,264	26,208
1,120.00	38,605	32,064	58,272

Device	Routing	Invert	Outlet Devices
#1	Primary	1,117.00'	24.0" Round Culvert X 2.00 L= 249.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 1,117.00' / 1,000.00' S= 0.4699 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=18.15 cfs @ 12.10 hrs HW=1,118.59' TW=1,005.96' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 18.15 cfs @ 3.39 fps)

Summary for Link POI-1: POI 1

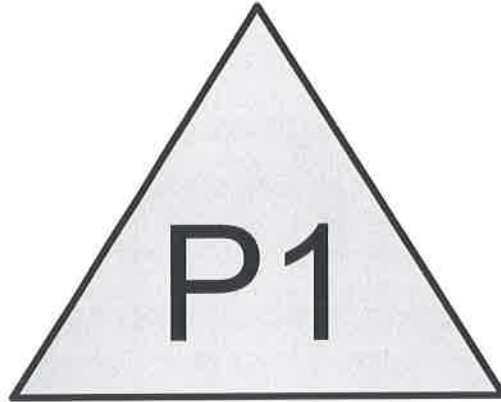
Inflow Area = 14.000 ac, Inflow Depth = 1.10" for 10-year event
Inflow = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af
Primary = 12.24 cfs @ 12.28 hrs, Volume= 1.286 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link POI-2: POI 2

Inflow Area = 50.140 ac, Inflow Depth = 1.43" for 10-year event
Inflow = 44.50 cfs @ 12.36 hrs, Volume= 5.969 af
Primary = 44.50 cfs @ 12.36 hrs, Volume= 5.969 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

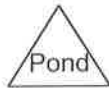


Dry Detention Pond 1

100-YEAR FREEBOARD CALCULATION

PREPARED BY: TGS 10/5/2016

CHECKED BY: EJB 10/7/2016



Routing Diagram for 160-781 Marts Hydrology
Prepared by Civil & Environmental Consultants, Inc., Printed 10/5/2016
HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

160-781 Marts Hydrology

Prepared by Civil & Environmental Consultants, Inc.

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Type II 24-hr 100-year Rainfall=5.19"

Printed 10/5/2016

Page 2

Summary for Pond P1: Dry Detention Pond 1

Inflow Area = 8.740 ac, Inflow Depth = 3.95" for 100-year event
 Inflow = 25.15 cfs @ 12.11 hrs, Volume= 2.880 af
 Outflow = 24.06 cfs @ 12.20 hrs, Volume= 2.880 af, Atten= 4%, Lag= 5.3 min
 Primary = 18.69 cfs @ 12.20 hrs, Volume= 2.773 af
 Secondary = 5.36 cfs @ 12.20 hrs, Volume= 0.107 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 1,008.75' @ 12.20 hrs Surf.Area= 5,472 sf Storage= 26,779 cf

Plug-Flow detention time= 63.5 min calculated for 2.880 af (100% of inflow)
 Center-of-Mass det. time= 63.4 min (871.3 - 808.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,000.00'	34,137 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,000.00	1,066	0	0
1,001.00	1,438	1,252	1,252
1,002.00	1,844	1,641	2,893
1,003.00	2,283	2,064	4,957
1,004.00	2,766	2,525	7,481
1,005.00	3,279	3,023	10,504
1,006.00	3,823	3,551	14,055
1,007.00	4,396	4,110	18,164
1,008.00	4,998	4,697	22,861
1,009.00	5,631	5,315	28,176
1,010.00	6,292	5,962	34,137

Device	Routing	Invert	Outlet Devices
#1	Primary	999.90'	24.0" Round Culvert L= 54.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 999.90' / 998.60' S= 0.0241 '/' Cc= 0.900 n= 0.013, Flow Area= 3.14 sf
#2	Device 1	1,000.00'	6.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	1,008.20'	24.0" x 48.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Secondary	1,008.60'	35.0' long x 15.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=18.69 cfs @ 12.20 hrs HW=1,008.75' (Free Discharge)

- ↑ 1=Culvert (Passes 18.69 cfs of 42.38 cfs potential flow)
- ↑ 2=Orifice/Grate (Orifice Controls 2.76 cfs @ 14.04 fps)
- ↑ 3=Orifice/Grate (Weir Controls 15.93 cfs @ 2.42 fps)

Secondary OutFlow Max=5.36 cfs @ 12.20 hrs HW=1,008.75' (Free Discharge)

- ↑ 4=Broad-Crested Rectangular Weir (Weir Controls 5.36 cfs @ 1.03 fps)

**MARTS COMPRESSOR STATION
CEC PROJECT NUMBER 160-781
SEDIMENT BASIN DESIGN**

PREPARED BY: TGJ
 DATE: 10/5/2016
 CHECKED BY: ARL
 DATE: 10/6/16

Contributing Drainage Area: (ac) 7.1

Total Sediment Storage Volume Needed (Wet and Dry): (cf) 25,560 (drainage area * 3,600 cf/acre)

Sediment Storage Volume Needed (Wet): (cf) 12,780

Cleanout Volume Needed: (cf) 6,390

Total Volume Needed: (cf)	25,560
Total Volume Needed: (ac-ft)	0.59

Bottom Elevation of Basin 1000
 Top Elevation of Basin 1010

Elevation (FT)	Area (SF)	Volume	
		(CF)	(ACRE-FT)
1000	1066	0	0.000
1001	1438	1252	0.029
1002	1844	2893	0.066
1003	2283	4957	0.114
1004	2766	7481	0.172
1005	3279	10504	0.241
1006	3823	14055	0.323
1007	4396	18164	0.417
1008	4998	22861	0.525
1009	5631	28176	0.647
1010	6292	34137	0.784

Clean-out Storage Volume EL	1003.57
Clean-out Storage Surface Area (sf)	2557.26
Wet Storage Volume EL	1005.64
Wet Storage Surface Area (sf)	3627.75
Dry Storage Volume EL	1008.57
Dry Storage Surface Area (sf)	5343.92

MARTS COMPRESSOR STATION
 CEC PROJECT NUMBER 160-781
 SEDIMENT BASIN DESIGN
 PRINCIPAL SPILLWAY FLOW CALCULATION

PREPARED BY: TGI
 DATE: 10/5/2016
 CHECKED BY: ARC
 DATE: 10/14/16

PERF. DIA. (FT) = 3
 RISER DIA. (FT) = 1008.6
 RISER ELEV. = 7.07
 GRATE AREA (SQ FT) = 3.1
 WEIR COEFF. = 0.6
 ORIFICE COEFF. = 0.42
 WEIR LENGTH (FT) = 1000.0

OUTLET PIPE SIZE (IN): 24
 MANNING n = 0.012
 PIPE LENGTH (FT) = 50
 PIPE INSIDE DIA. (FT) = 2.00
 OUTLET INVERT ELEV. = 998.6
 INLET INVERT ELEV. = 1000.0

EM. SP. WIDTH (FT) = 35
 EM. SP. ELEV. = 1008.6
 C = 2.3

PERF. DIA. (FT) = 0.08
 NO. OF PERF./ROW = 4.00
 ROW 1 INVERT ELEV. = 1005.6
 ROW 2 INVERT ELEV. =
 ROW 3 INVERT ELEV. =
 ROW 4 INVERT ELEV. =
 ROW 5 INVERT ELEV. =

WS EL (FT)	PERMANENT RISER STRUCTURE						OUTLET PIPE			EMERGENCY SPILLWAY			TOTAL DISCHARGE (CFS)
	HEAD ON RISER (FT)	PERF. FLOW (CFS)	WEIR FLOW (CFS)	ORIFICE FLOW (CFS)	DISCHARGE (CFS)	INLET CONTROL		HEAD ON SPILLWAY (FT)	DISCHARGE (CFS)	TOTAL DISCHARGE (CFS)			
						HEAD (FT)	PIPE FLOW (CFS)						
1010.00	1.1	0.22	49.69	40.61	40.83	9.00	45.36	10.40	51.12	1.40	162.34	203.17	
1009.90	1.3	0.22	44.56	39.16	39.38	8.90	45.10	10.30	50.88	1.30	145.26	184.64	
1009.80	1.2	0.21	39.61	37.66	37.87	8.80	44.85	10.20	50.63	1.20	128.82	166.70	
1009.70	1.1	0.21	34.86	36.09	35.07	8.70	44.59	10.10	50.38	1.10	113.06	148.14	
1009.60	1.0	0.21	30.32	34.45	30.53	8.60	44.34	10.00	50.13	1.00	98.00	128.53	
1009.50	0.9	0.21	26.00	32.72	26.20	8.50	44.08	9.90	49.88	0.90	83.67	109.88	
1009.40	0.8	0.20	21.90	30.91	22.10	8.40	43.82	9.80	49.63	0.80	70.12	92.22	
1009.30	0.7	0.20	18.04	28.97	18.24	8.30	43.56	9.70	49.37	0.70	57.39	75.64	
1009.20	0.6	0.20	14.44	26.90	14.64	8.20	43.29	9.60	49.12	0.60	45.55	60.19	
1009.10	0.5	0.20	11.12	24.66	11.32	8.10	43.03	9.50	48.86	0.50	34.65	45.96	
1009.00	0.4	0.19	8.10	22.19	8.29	8.00	42.76	9.40	48.60	0.40	24.79	33.09	
1008.90	0.3	0.19	5.42	19.40	5.61	7.90	42.49	9.30	48.35	0.30	16.10	21.71	
1008.80	0.2	0.19	3.12	16.15	3.31	7.80	42.23	9.20	48.08	0.20	8.77	12.08	
1008.70	0.1	0.18	1.30	12.05	1.48	7.70	41.95	9.10	47.82	0.10	3.10	4.58	
1008.60	0.0	0.18	0.00	8.30	0.00	7.60	41.68	9.00	47.56	0.00	0.00	0.30	
1008.50	0.0	0.18	0.00	6.00	0.18	7.50	41.41	8.90	47.29	0.00	0.00	0.18	
1008.40	0.0	0.17	0.00	4.00	0.17	7.40	41.13	8.80	47.03	0.00	0.00	0.17	
1008.30	0.0	0.17	0.00	2.00	0.17	7.30	40.85	8.70	46.76	0.00	0.00	0.17	
1008.20	0.0	0.17	0.00	0.00	0.17	7.20	40.57	8.60	46.49	0.00	0.00	0.17	
1008.10	0.0	0.16	0.00	0.00	0.16	7.10	40.29	8.50	46.22	0.00	0.00	0.16	
1008.00	0.0	0.16	0.00	0.00	0.16	7.00	40.00	8.40	45.95	0.00	0.00	0.16	
1007.90	0.0	0.16	0.00	0.00	0.16	6.90	39.71	8.30	45.67	0.00	0.00	0.16	
1007.80	0.0	0.15	0.00	0.00	0.15	6.80	39.43	8.20	45.40	0.00	0.00	0.15	
1007.70	0.0	0.15	0.00	0.00	0.15	6.70	39.13	8.10	45.12	0.00	0.00	0.15	
1007.60	0.0	0.15	0.00	0.00	0.15	6.60	38.84	8.00	44.84	0.00	0.00	0.15	
1007.50	0.0	0.14	0.00	0.00	0.14	6.50	38.55	7.90	44.56	0.00	0.00	0.14	
1007.40	0.0	0.14	0.00	0.00	0.14	6.40	38.25	7.80	44.28	0.00	0.00	0.14	
1007.30	0.0	0.14	0.00	0.00	0.14	6.30	37.95	7.70	43.99	0.00	0.00	0.14	
1007.20	0.0	0.13	0.00	0.00	0.13	6.20	37.65	7.60	43.70	0.00	0.00	0.13	
1007.10	0.0	0.13	0.00	0.00	0.13	6.10	37.34	7.50	43.42	0.00	0.00	0.13	
1007.00	0.0	0.12	0.00	0.00	0.12	6.00	37.03	7.40	43.12	0.00	0.00	0.12	
1006.90	0.0	0.12	0.00	0.00	0.12	5.90	36.72	7.30	42.83	0.00	0.00	0.12	
1006.80	0.0	0.11	0.00	0.00	0.11	5.80	36.41	7.20	42.54	0.00	0.00	0.11	
1006.70	0.0	0.11	0.00	0.00	0.11	5.70	36.10	7.10	42.24	0.00	0.00	0.11	
1006.60	0.0	0.10	0.00	0.00	0.10	5.60	35.78	7.00	41.94	0.00	0.00	0.10	
1006.50	0.0	0.10	0.00	0.00	0.10	5.50	35.46	6.90	41.64	0.00	0.00	0.10	
1006.40	0.0	0.09	0.00	0.00	0.09	5.40	35.13	6.80	41.34	0.00	0.00	0.09	
1006.30	0.0	0.09	0.00	0.00	0.09	5.30	34.81	6.70	41.03	0.00	0.00	0.09	
1006.20	0.0	0.08	0.00	0.00	0.08	5.20	34.48	6.60	40.73	0.00	0.00	0.08	
1006.10	0.0	0.07	0.00	0.00	0.07	5.10	34.14	6.50	40.42	0.00	0.00	0.07	
1006.00	0.0	0.06	0.00	0.00	0.06	5.00	33.81	6.40	40.11	0.00	0.00	0.06	
1005.90	0.0	0.05	0.00	0.00	0.05	4.90	33.47	6.30	39.79	0.00	0.00	0.05	
1005.80	0.0	0.04	0.00	0.00	0.04	4.80	33.12	6.20	39.47	0.00	0.00	0.04	
1005.70	0.0	0.03	0.00	0.00	0.03	4.70	32.78	6.10	39.15	0.00	0.00	0.03	
1005.60	0.0	0.00	0.00	0.00	0.00	4.60	32.43	6.00	38.83	0.00	0.00	0.00	

25-Year Storm (cfs)
32.74

0

**MARTS COMPRESSOR STATION
CEC PROJECT NUMBER 160-781
SEDIMENT BASIN DESIGN
DEWATERING ORIFICE SIZE AND TIME DESIGN**

$$A_o = A_s \times (2h)^{0.5} / (T \times C_d \times 20,428)$$

Where

A_o = total area of dewatering holes, ft²

A_s – surface area of the basin, sq.ft.

H = head of water above the hole, ft

C_d = coefficient of contraction for an orifice, ~ 0.6

T = detention time needed to dewater the basin, hours

48 HOURS	
As*	5344
H	2.93
T	48
Cd	0.6
A _o REQUIRED	0.022
72 HOURS	
As*	5344
H	2.93
T	72
Cd	0.6
A _o REQUIRED	0.015

* Determined by Interpolation

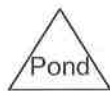
ORIFICE DESIGN	
Perforation Dia (in)	1.00
Perforation Dia (ft)	0.0833
Perforation Area (sf)	0.005
Number of Perforations	4
Total Area of Perforations (sf)	0.022
Total Dewatering Time (hours)	48



Sediment Basin Drainage Area

PREPARED BY: TGS 10/5/2016

CHECKED BY: ARC 10/6/2016



Routing Diagram for 160-781 Sediment Basin
Prepared by Civil & Environmental Consultants, Inc., Printed 10/5/2016
HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

160-781 Sediment Basin

Type II 24-hr 25-year Rainfall=4.18"

Prepared by Civil & Environmental Consultants, Inc.

Printed 10/5/2016

HydroCAD® 10.00-18 s/n 01006 © 2016 HydroCAD Software Solutions LLC

Page 2

Summary for Subcatchment DA: Sediment Basin Drainage Area

Runoff = 32.74 cfs @ 12.00 hrs, Volume= 1.771 af, Depth= 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=4.18"

Area (ac)	CN	Description
0.280	70	Woods, Good, HSG C
0.420	71	Meadow, non-grazed, HSG C
5.280	89	Gravel roads, HSG C
* 1.120	98	Impervious
7.100	89	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.94		Sheet Flow, A-B Smooth surfaces n= 0.011 P2= 2.58"
4.6	440	0.0100	1.61		Shallow Concentrated Flow, B-C Unpaved Kv= 16.1 fps
2.1	315	0.0100	2.48	3.72	Trap/Vee/Rect Channel Flow, C-D Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.030 Earth, grassed & winding
0.1	248	0.4700	53.48	168.02	Pipe Channel, D-E 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012
8.6	1,103	Total			

160-781
MARTS COMPRESSOR STATION
Dry Detention Basin #1
Anti-Seep Collar

MADE BY: TGJ
DATE: 10/5/2016
CHECKED BY: MEL
DATE: 10/6/2016

$$L_s = y(z + 4) \left[1 + \frac{\text{pipe slope (ft/ft)}}{0.25 - \text{pipe slope}} \right]$$

Where:

y = Distance from upstream invert of outlet pipe to top of dewatering volume

$$= 1008.75 - 999.9$$

$$= 8.85 \text{ ft}$$

z = Horizontal component of upstream embankment slope

$$= 3$$

p = Pipe slope

$$= 0.0241 \text{ ft/ft}$$

$$L_s = 8.85 \text{ ft} (3 + 4) [1 + 0.0241 / (0.25 - 0.0241)]$$

$$= 68.56 \text{ ft}$$

For a permanent basin, the increase in flow path is 15%

$$L_r = 68.56 \text{ ft} \times 1.15$$

$$= 78.84 \text{ ft}$$

Minimum collar projection (V_{\min}) = flow path increase/twice the number of collars

Using 3 collars:

$$V_{\min} = (78.84 \text{ ft} - 68.56 \text{ ft}) / 2 (3)$$

$$= 1.70 \text{ ft}$$

Space collars evenly along length of pipe in phreatic zone

$$\text{Spacing} = L_s / (\text{No. of collars} + 1)$$

$$= 68.56 \text{ ft} / (3 + 1)$$

$$= 17.14 \text{ ft}$$

Check minimum and maximum collar spacing

$$L_{s \min} = 5 \times V = 5 \times 1.7 \text{ ft}$$

$$= 8.5 \text{ ft}$$

$$L_{s \max} = 14 \times V = 14 \times 1.7 \text{ ft}$$

$$= 23.8 \text{ ft}$$

Use 3 collars spaced 9 ft apart with one placed 9.0 ft from upstream end of the culvert with overall dimensions of 6' by 6'



**NORTH
AMERICAN
GREEN®**

Tensar International Corporation
5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

**Erosion Control Materials Design Software
Version 5.0**

**Project Name: Marts Compressor Station
Project Number: 103102
Spillway Name: Sediment Basin 1**

*Prepared by: TGT 10/6/10
Checked by: MEC 10/6/10*

Discharge	24.79
Peak Flow Period	12
Channel Slope	0.33
Channel Bottom Width	35
Left Side Slope	
Right Side Slope	
Low Flow Liner	
Retardance Class	
Vegetation Type	
Vegetation Density	
Soil Type	Silt Loam

Rock Riprap (R-5)

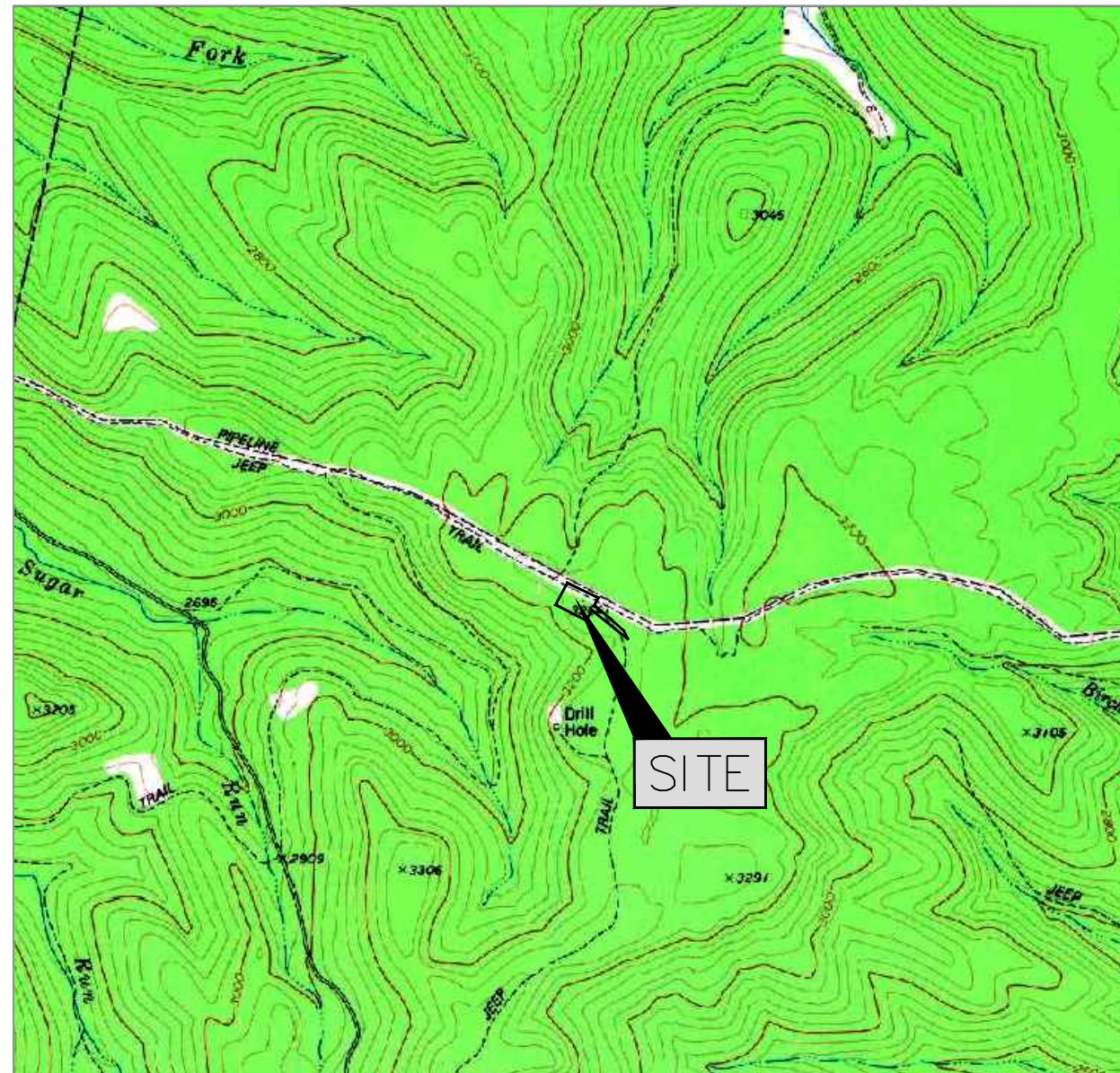
Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	24.79 cfs	6.23 ft/s	0.11 ft	0.032	3 lbs/ft ²	2.34 lbs/ft ²	1.28	STABLE	--

Long Run M&R Station Plans

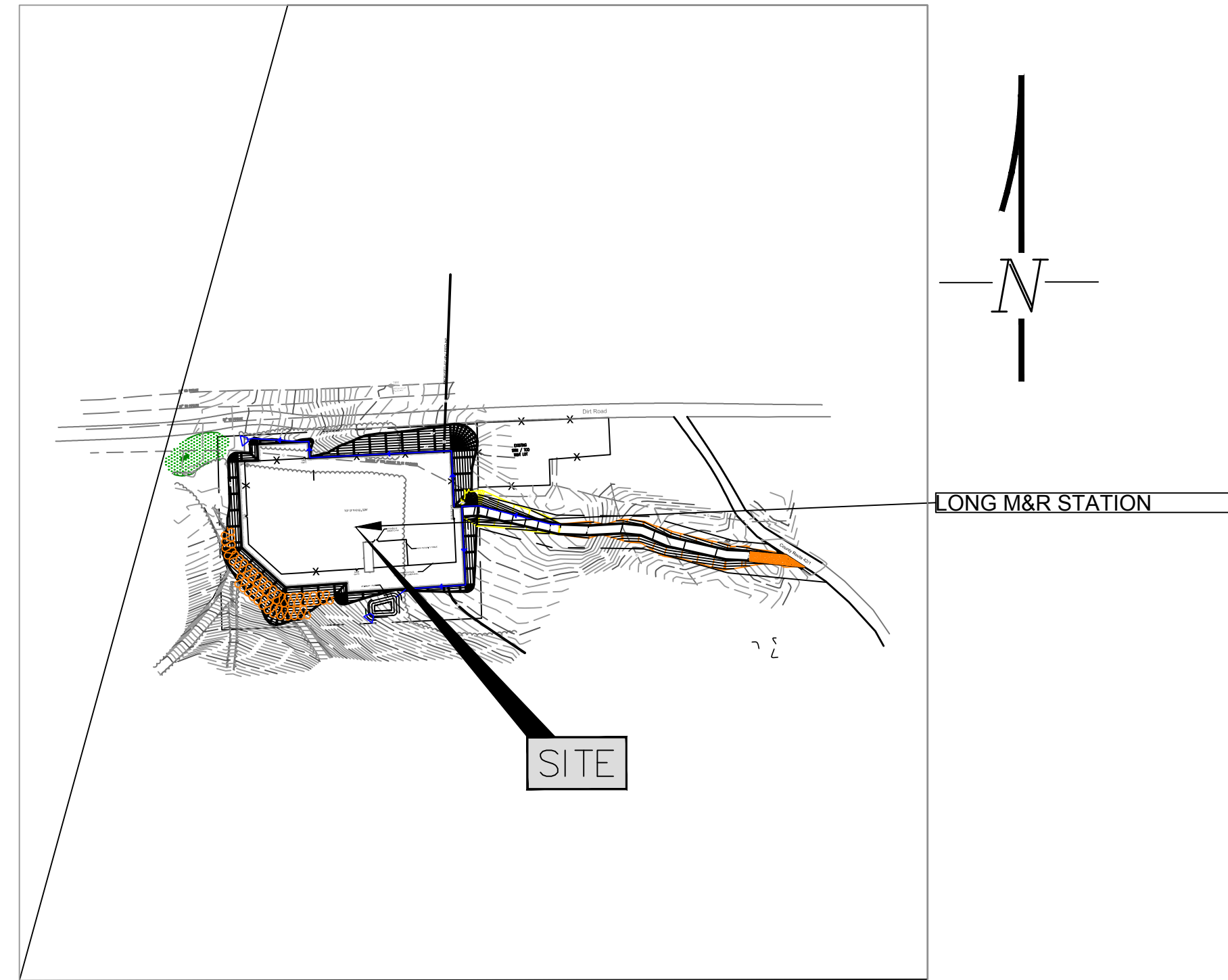
LONG RUN M&R STATION EROSION AND SEDIMENT CONTROL PLAN



ADAPTED FROM USGS
CASSITY, WEST VIRGINIA - 1977



38° 46' 17.57"N
80° 05' 35.25"W (NAD83)
RANDOLPH COUNTY, WEST VIRGINIA
SITE LOCATION MAP
0 2000 4000
APPROXIMATE
SCALE (IN FEET)



SITE VICINITY MAP
0 200 400
APPROXIMATE
SCALE (IN FEET)

GENERAL NOTES

- UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES MANUAL, 2006.
- ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.
- A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN AND NPDES INFORMATION SIGN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.
- PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF-SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.
- THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE PLAN APPROVING AUTHORITY.
- ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
- DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.
- THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.

LIST OF DRAWINGS

DRAWING NO.	TITLE
PD Z9948B	EROSION AND SEDIMENT CONTROL COVER SHEET
PD Z9948C	EROSION AND SEDIMENT CONTROL SITE PLAN
PD Z9948D	EROSION AND SEDIMENT CONTROL DETAILS

PROJECT NARRATIVE

PROJECT AND SITE DESCRIPTION

AS PART OF THE ATLANTIC COAST PIPELINE (ACP) PROJECT, DOMINION TRANSMISSION INC. (DTI) IS PROPOSING TO CONSTRUCT AN APPROXIMATELY 2.2-ACRE ABOVEGROUND METERING AND REGULATING STATION IN RANDOLF COUNTY, WEST VIRGINIA. THIS STATION, REFERRED TO AS THE LONG RUN M&R STATION (M&R STATION), WILL BE LOCATED NEAR LONG RUN ROAD (CR #42). THE M&R STATION WILL BE LOCATED NEAR MILEPOST 47.5 OF THE AP-1 LATERAL SECTION OF THE ACP PIPELINE, WITHIN RANDOLPH COUNTY, WV. THE APPROXIMATELY 2.2-ACRE RECTANGULAR TRACT OF LAND IS LOCATED ALONG THE NORTHERN PROPERTY BOUNDARY OF A LARGER PARCEL. THE LARGER PARCEL IS IDENTIFIED AS LL-04-002-A006, TAX MAP # 11-144000100000000. THE GENERAL VICINITY AROUND THE M&R STATION IS UNDEVELOPED/FORRESTED PROPERTY.

EXISTING SITE CONDITIONS

THE TOPOGRAPHY AT THE M&R STATION IS CHARACTERIZED BY GENTLY SLOPING TERRAIN WITH AN ELEVATION OF APPROXIMATELY 3240 FEET ABOVE MEAN SEA LEVEL. THE PROPOSED DEVELOPMENT WILL RETAIN THE EXISTING TOPOGRAPHY OF FLAT TO GENTLY SLOPING TERRAIN WITH GRADING TO DIRECT STORMWATER TOWARD A RETENTION POND PLANNED TO BE LOCATED SOUTH OF THE PROPOSED M&R STATION.

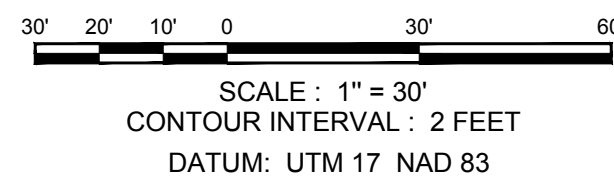
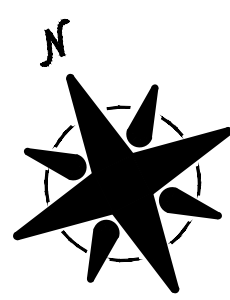
THE FULL PROJECT NARRATIVE HAS BEEN PROVIDED IN THE STORMWATER POLLUTION PREVENTION PLAN, APPENDIX F, EROSION AND SEDIMENT CONTROL AND STORMWATER MANAGEMENT PLAN FOR THE LONG RUN M&R STATION.

NOTE:

SYM.	DATE	BY	REVISION INFORMATION	PROJECT/TASK	APP.	SEAL
3	02/08/17	JEY	ISSUED FOR REVIEW			

Environmental Resources Management	
DRAWN:	JEY 02/08/17
CHECKED:	JH 02/08/17
APP. FOR BID:	
APP. FOR CONST.:	
SCALE:	AS NOTED

<h2>Atlantic Coast Pipeline, LLC</h2> <p>925 White Oaks Blvd. Bridgeport, West Virginia 26330 / 681-842-8000</p>					
LONG RUN M&R STATION					
EROSION AND SEDIMENT CONTROL COVER SHEET					
DISTRICT:	MIDDLE FORK	COUNTY:	RANDOLPH	STATE:	WV
GROUP:	PD	DWG. NO.:	Z9948B	REV.:	0
DIR/FILE:	ACP\West Virginia\M&R Stations\Long Run				



LEGEND

- — — — — PROPERTY LINE
- - - - - EXISTING PIPELINE
- G - - - - - PROPOSED PIPELINE
- - - - - STANDARD FENCE
- x - x - x HIGH SECURITY FENCE
- - - - - DRAIN
- E/T - - - - - OVERHEAD ELECTRIC & TELEPHONE

SITE LOCATION

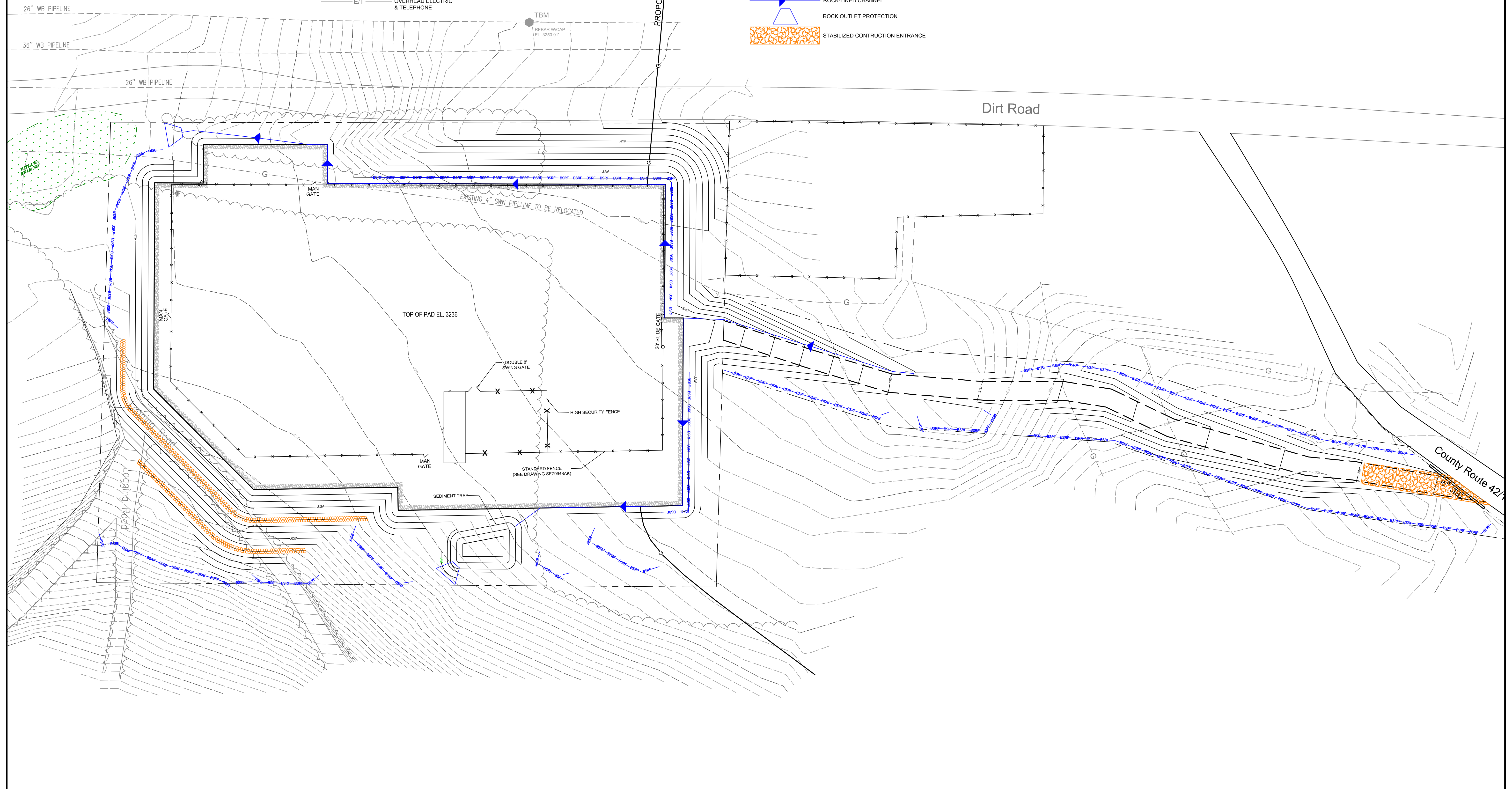
LAT : 38°46'17.57"
 LONG: 80°05'35.2483"
 MILE POST: 45.6 (APPROX)

E&S LEGEND

- - - - - EXISTING MINOR CONTOUR
- - - - - EXISTING MAJOR CONTOUR
- - - - - PROPOSED CONTOUR
- - - - - LOD AND PROPERTY LINE
- 8" COMPOST FILTER SOCK
- BSRF - BSRF BELTED SILT RETENTION FENCE
- ROCK-LINED CHANNEL
- ROCK OUTLET PROTECTION
- STABILIZED CONSTRUCTION ENTRANCE

NOTES:

1. EROSION CONTROL MATTING SHALL BE APPLIED TO ALL SLOPES EQUAL TO OR GREATER THAN 3H:1V.
2. SOIL AND DEBRIS FROM THE CONSTRUCTION SITE TRACKED ONTO COUNTY ROUTE 42 SHALL BE CLEAN ON A DAILY BASIS OR MORE FREQUENTLY AS NEEDED.



GENERAL NOTES AND COMMENTS:

1. BASE MAP PROVIDED BY IS ENGINEERING AND CONSULTING, LLC.
2. LIMITS OF CLEARING AND GRADING IS APPROXIMATELY 2.2 ACRES WITHIN THE LIMIT OF DISTURBANCE SHOWN.
3. THE M&R STATION IS LOCATED WITHIN THE TYGART VALLEY WATERSHED. NO CRITICAL OR SENSITIVE AREAS WILL BE IMPACTED BY THE CONSTRUCTION OF THIS SITE.
4. SOIL TYPES THAT ARE PRESENT AT THE M&R STATION INCLUDE BUCHANAN, ERNEST, DEKALB, KILPIN-DEKALB, AND LILY SERIES.
5. FINAL CONTOURS WILL BE GRADED AS SHOWN IN THE OVERALL DESIGN GRADING PLAN.

SYM.	DATE	BY	REVISION INFORMATION	PROJECT/TASK	APP.
△	02/08/17	JJEY	ISSUED FOR REVIEW		

SEAL

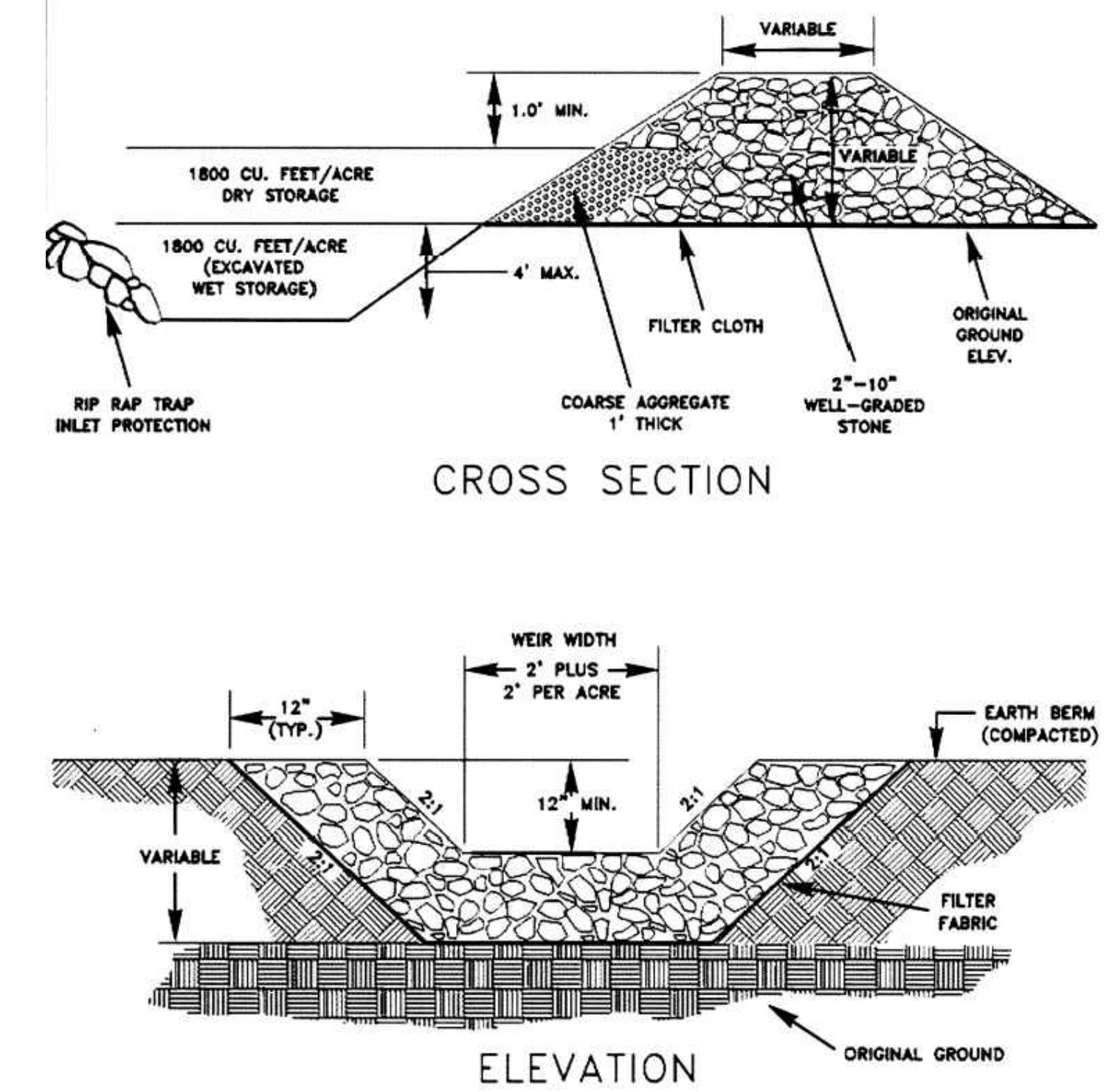
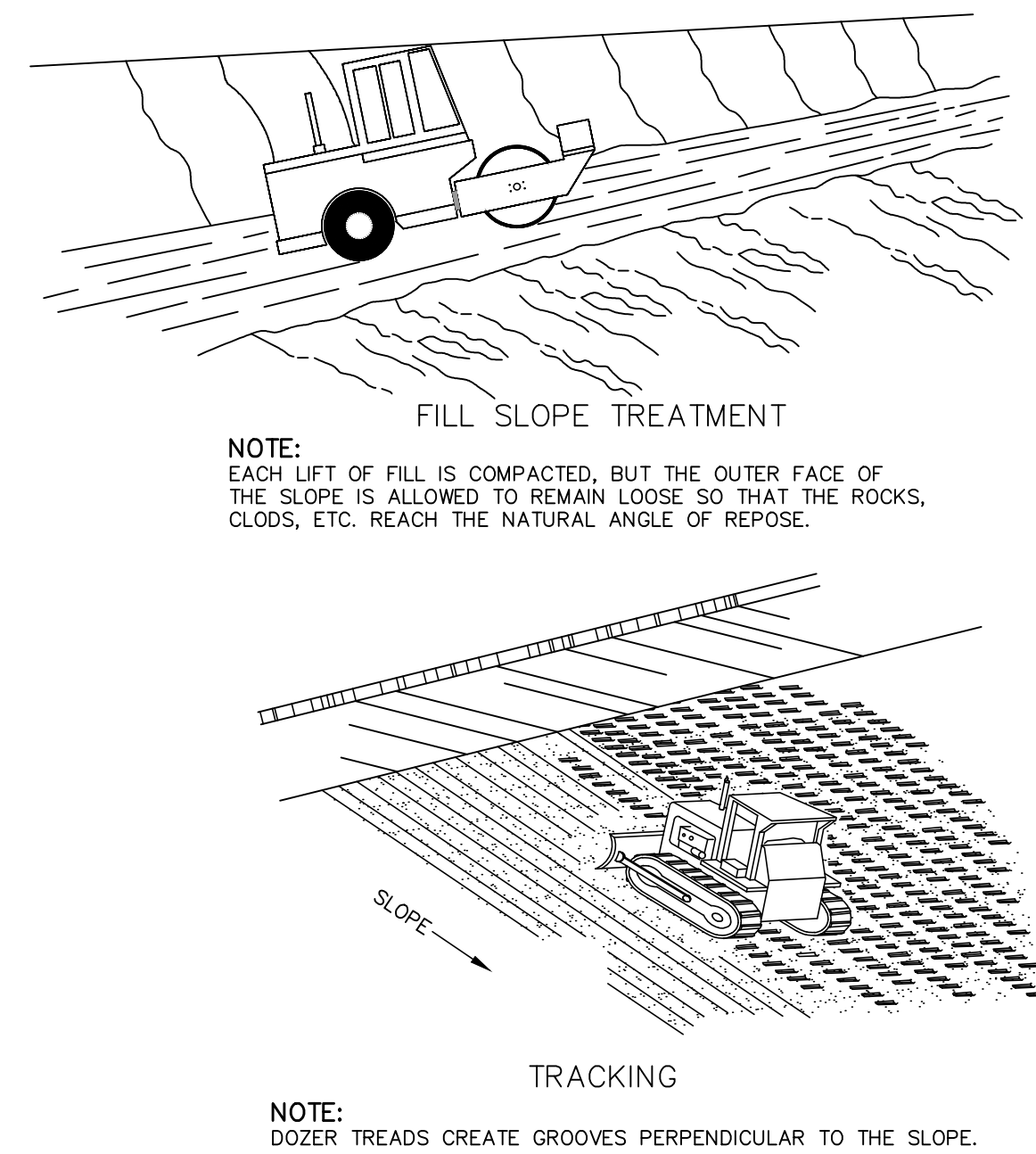
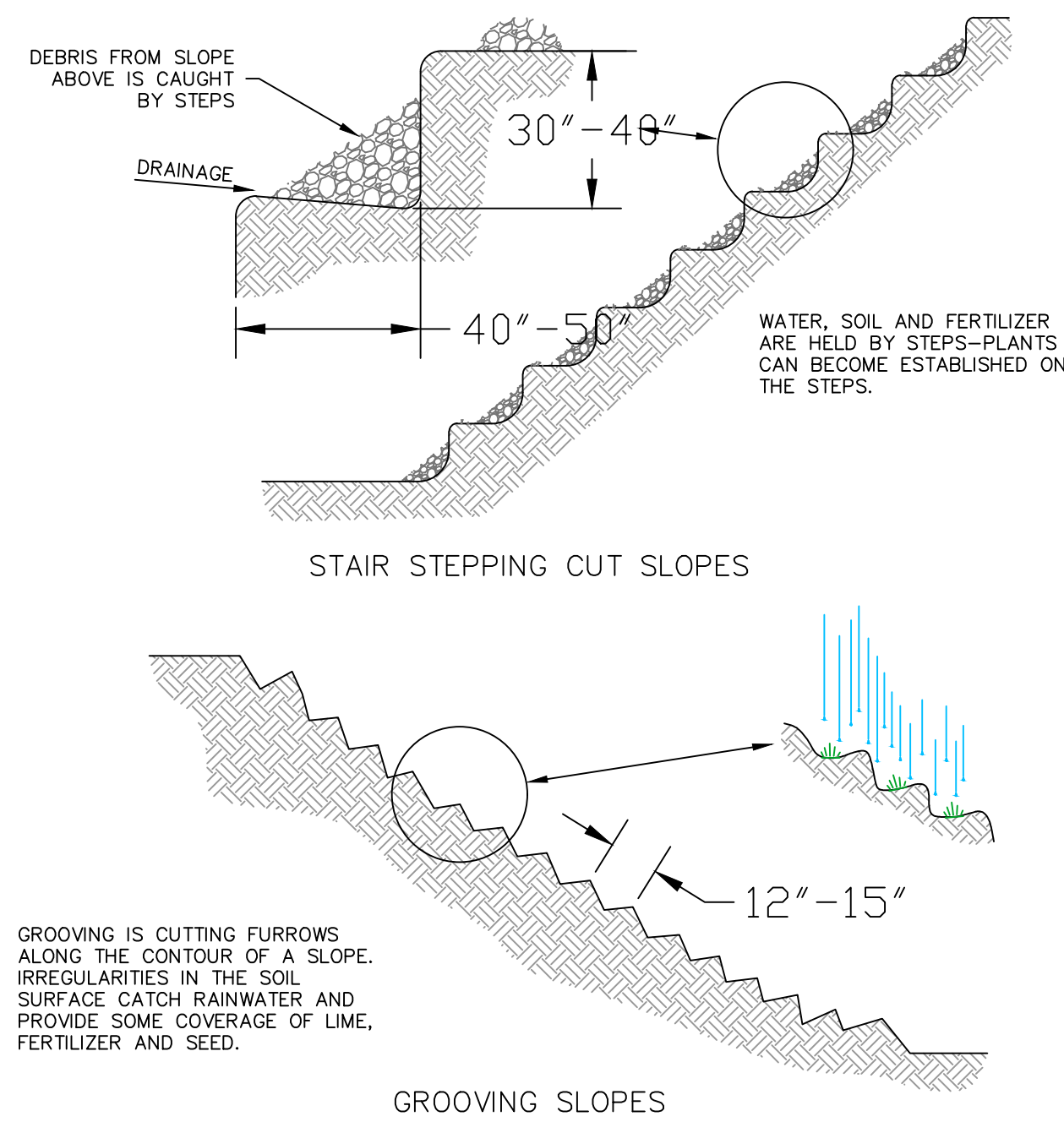
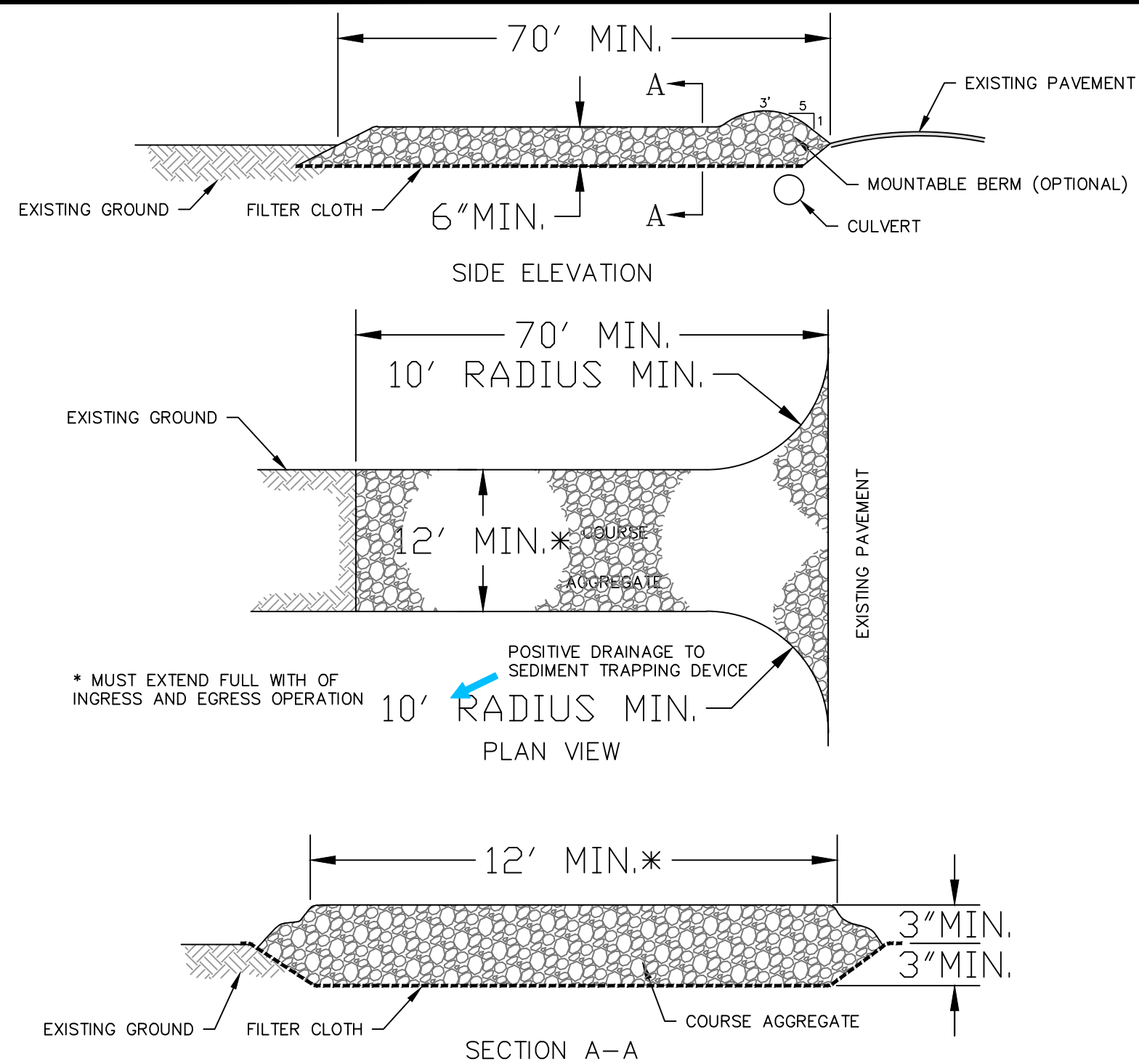
ERM Environmental Resources Management

DRAWN:	JJEY	02/08/17
CHECKED:	JH	02/08/17
APP. FOR BID:		
APP. FOR CONST.:		
SCALE:	AS NOTED	

Atlantic Coast Pipeline, LLC
 925 White Oaks Blvd. Bridgeport, West Virginia 26330 / 681-842-8000

**TITLE: LONG RUN M&R STATION
 EROSION AND SEDIMENT CONTROL SITE PLAN**

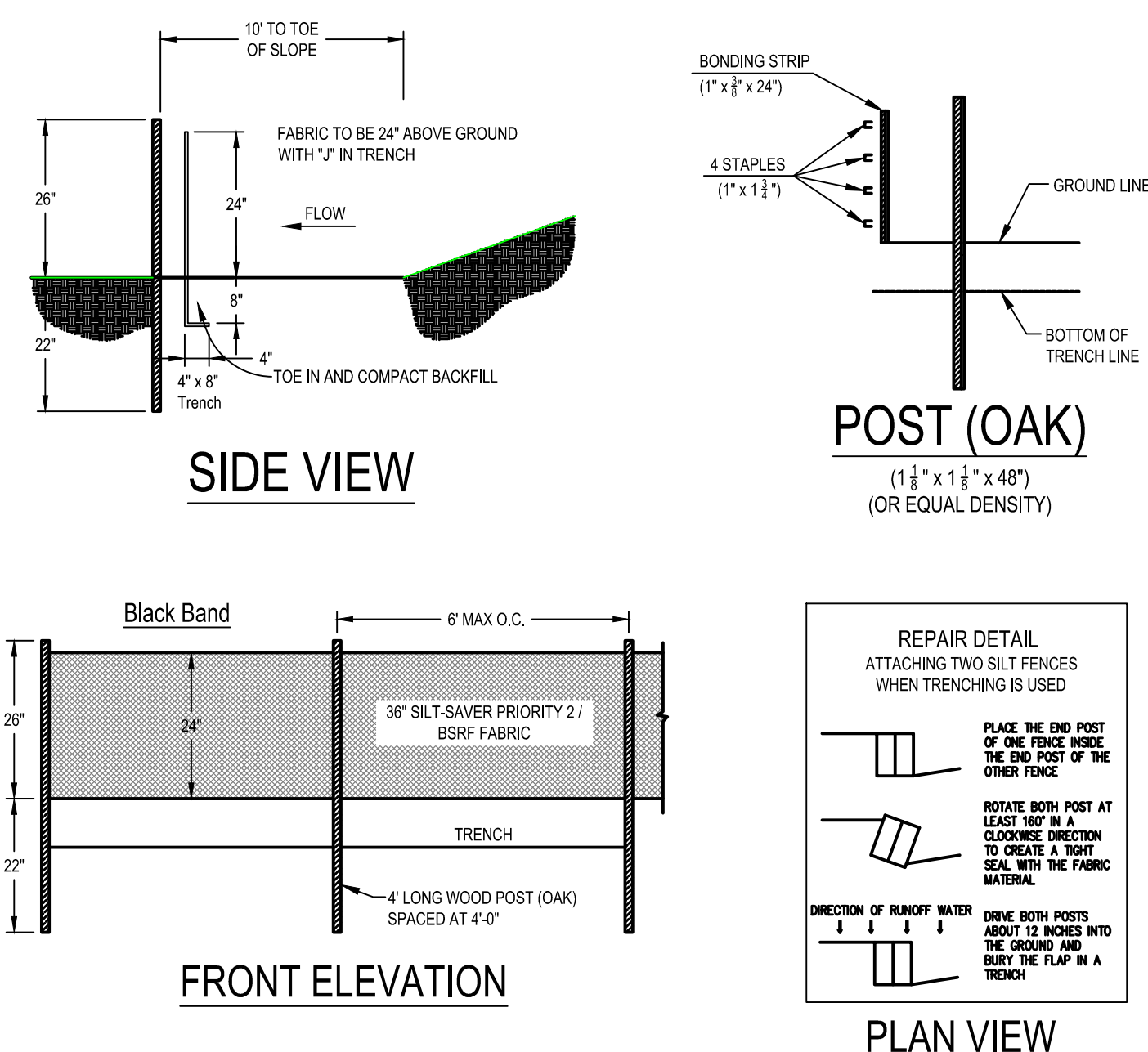
DISTRICT:	MIDDLE FORK	COUNTY:	RANDOLPH	STATE:	WV	GROUP:	PD	DWG. NO.:	Z9948C	REV.:	0
DIR/FILE:	ACPWest VirginiaM&R StationsLong Run										



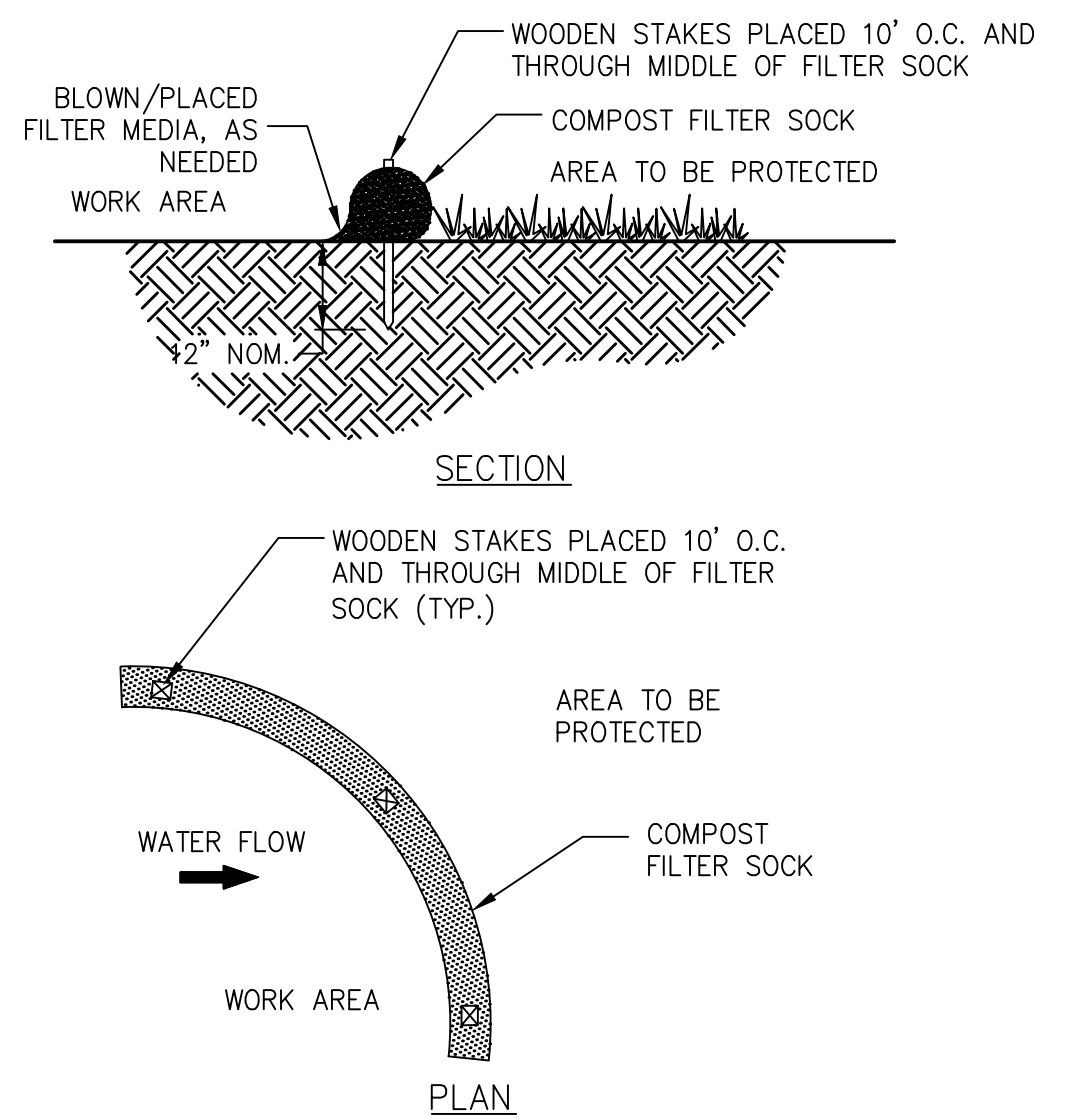
STONE CONSTRUCTION ENTRANCE DETAIL
NOT TO SCALE

SURFACE ROUGHENING DETAIL
NOT TO SCALE

ROCK OUTLET SEDIMENT TRAP
NOT TO SCALE



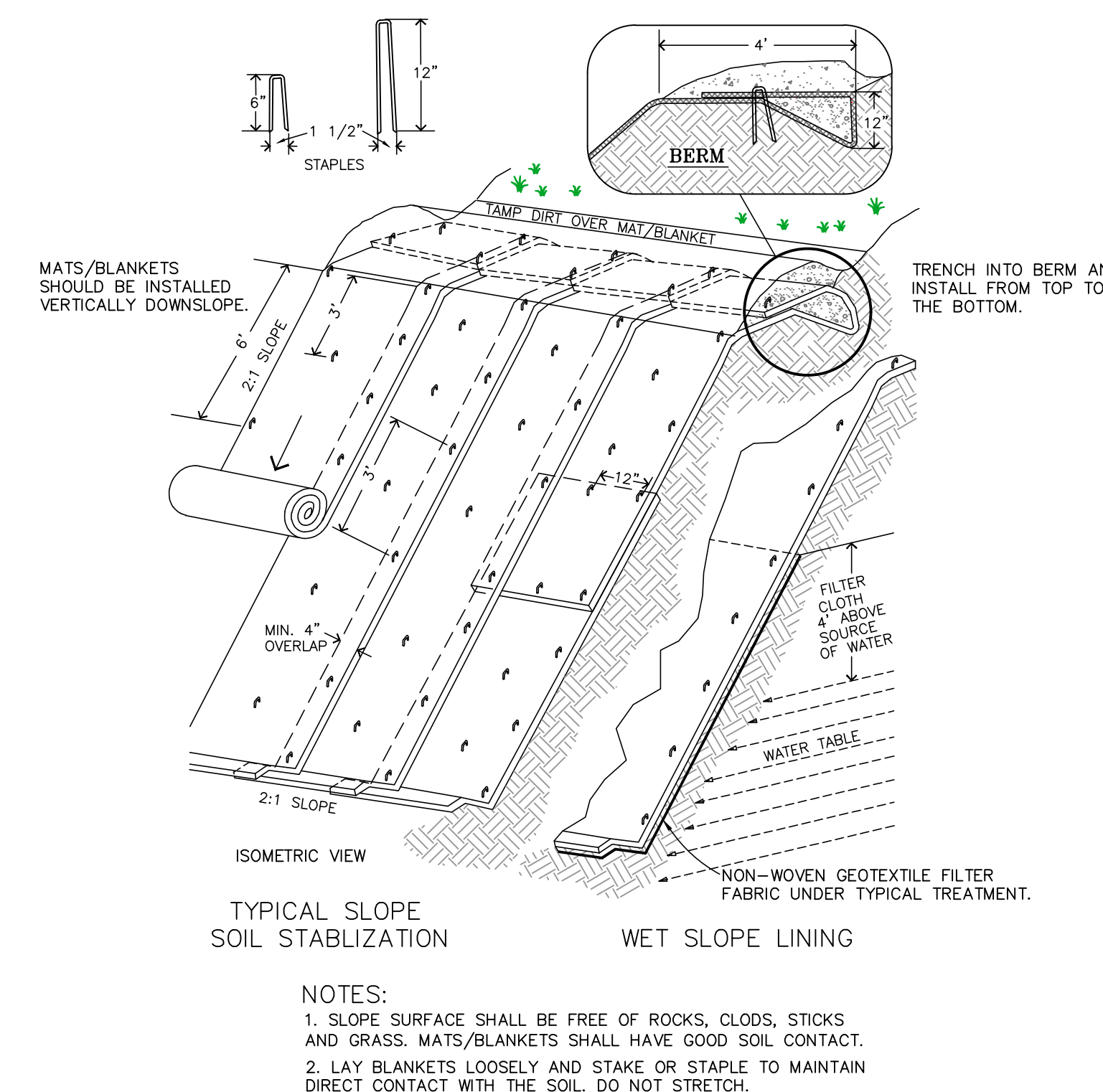
BELTED SILT RETENTION FENCE (BSRF)
PRIORITY 2 - BLACK BAND
NOT TO SCALE



NOTES:

- FILTER SOCK TO BE FILTREXX SEDIMENT CONTROL SILTSOXX OR APPROVED EQUAL. FILTER MEDIA INSIDE AND, AS NECESSARY UP-SLOPE OF FILTER SOCK, TO BE FILTREXX FILTERMEDIA OR APPROVED EQUAL.
- SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FILTER SOCK.

COMPOST FILTER SOCK DETAIL
NOT TO SCALE



ROLLED EROSION CONTROL DETAIL
NOT TO SCALE

SEDIMENT TRAP SIZING TABLE

Volume per Acre	3600 cubic feet
Drainage Area	0.85 Acres
Volume Needed	3060 cubic feet
Input Top Width	29 ft
Input Top Length	44 ft
Input Depth	5 ft
Input Side Slopes	2:1

Depth (ft)	Width (ft)	Length (ft)	Storage Volume
0	29	44	0 cf
0.5	27	42	567 cf
1	25	40	500 cf
1.5	23	38	437 cf
2	21	36	378 cf
2.5	19	34	323 cf
3	17	32	272 cf
3.5	15	30	225 cf
4	13	28	182 cf
4.5	11	26	143 cf
5	9	24	108 cf
Total Vol			3135 cf

GENERAL NOTES AND COMMENTS:	SYM.	DATE	BY	REVISION INFORMATION	PROJECT/TASK	APP.	SEAL	Environmental Resources Management	Atlantic Coast Pipeline, LLC 925 White Oaks Blvd. Bridgeport, West Virginia 26330 / 681-842-8000
	02/08/17		JEY	ISSUED FOR REVIEW				DRAWN: JEY 02/08/17 CHECKED: JH 02/08/17 APP. FOR BID: APP. FOR CONST.: SCALE: AS NOTED	TITLE: LONG RUN M&R STATION EROSION AND SEDIMENT CONTROL DETAILS DISTRICT: MIDDLE FORK COUNTY: RANDOLPH STATE: WV GROUP: PD DWG. NO.: Z9948D REV: 0