

STUB INFORMATION		
PIECE	STUB INVERT	SYSTEM INVERT
Ø18" STUB A1	570.19	569.44
Ø18" STUB B1	569.24	569.24
Ø18" STUB D1	570.64	569.89
Ø6" STUB D2	571.07	569.82

RISER INFORMATION		
PIECE	RIM ELEVATION	SYSTEM INVERT
Ø36" RISER E1	TSD	569.25
Ø36" RISER F1	TSD	569.89

THE UNDERSIGNED HEREBY APPROVES THE ATTACHED (3) PAGES INCLUDING THE FOLLOWING:

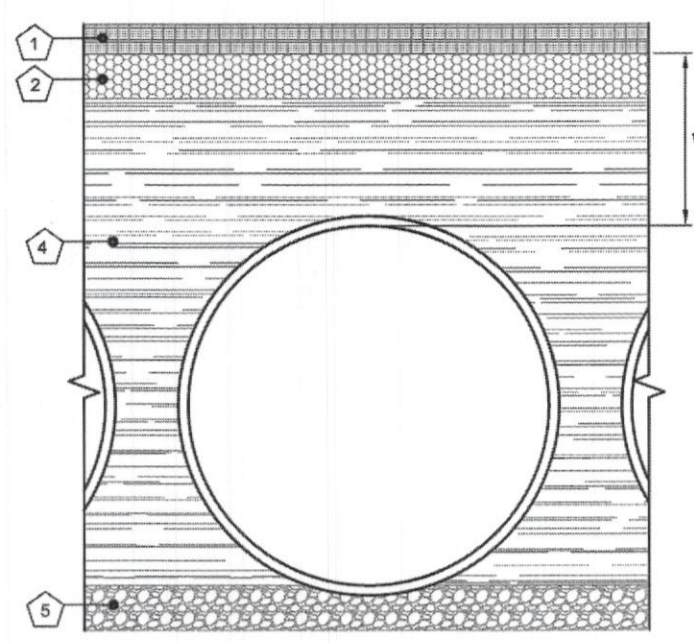
- VOLUME = 3,858 CF
- MAINLINE PIPE GAUGE = 16
- WALL TYPE = SOLID
- DIAMETER = 48"
- FINISH = ALT2

CUSTOMER _____ DATE _____

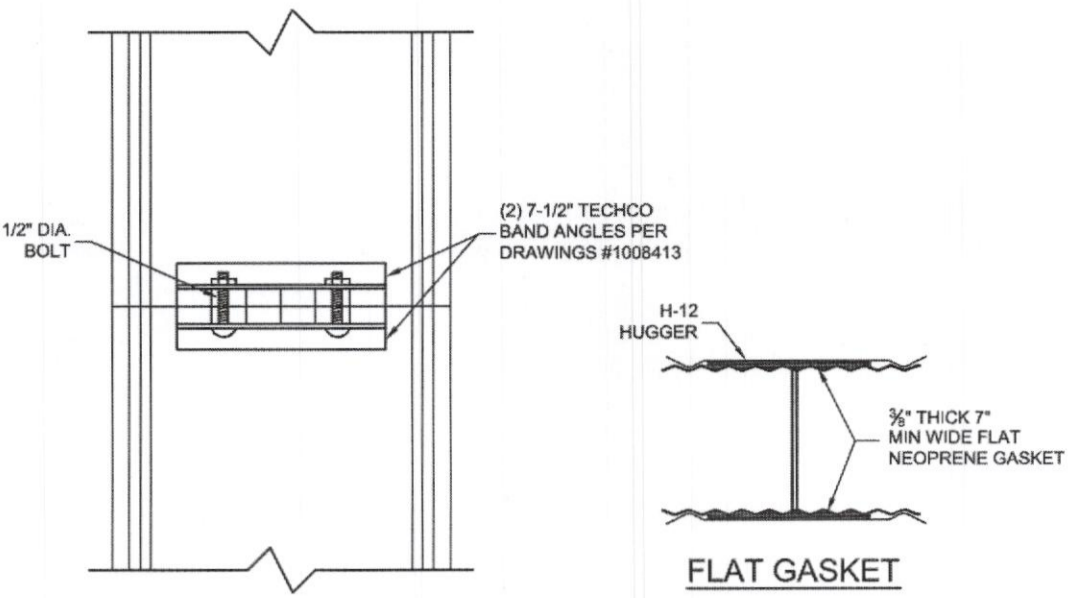
ASSEMBLY
SCALE: 1"=10'
VOLUME: 3,858
LOADINGS: H20/H25
SYSTEM INV = VARIES

- NOTES**
- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE.
 - ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
 - ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
 - ALL RISERS AND STUBS ARE 2 1/2" x 3" CORRUGATION AND 1/4" GAUGE UNLESS OTHERWISE NOTED.
 - RISERS TO BE FIELD TRIMMED TO GRADE.
 - QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.

		Ø48" UNDERGROUND DETENTION SYSTEM - 523683-10 503 N GOLIAID ROCKWALL, TX SITE DESIGNATION: UGDS		PROJECT NO: 523683 REV. NO: 10 DATE: ---
11815 NE Green Winding Drive, Portland, OR 97220 503-548-4667 503-240-3393 800-561-1271 FAX				DESIGNED: SDS DRAWN: MEM CHECKED: APPROVED:
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- KEY**
- RIGID OR FLEXIBLE PAVEMENT
 - GRANULAR ROAD BASE
 - 12" MIN. FOR DIAMETERS THROUGH 60" 18" MIN. FOR DIAMETERS FROM 60" AND LARGER MEASURED TO TOP OF RIGID OR BOTTOM OF FLEXIBLE PAVEMENT
 - SELECT GRANULAR FILL PER AASHTO M145 A1, A2 OR A3, OR APPROVED EQUAL. PLACED IN 2" LIFTS COMPACTED TO MIN. 90% STANDARD DENSITY PER AASHTO T99.
 - GRANULAR BEDDING, ROUGHLY SHAPED TO FIT THE BOTTOM OF PIPE, 4" TO 6" IN DEPTH



CONNECTION DETAIL
SINGLE
7-1/2" TECHCO ANGLE

- GENERAL NOTES**
- BANDS ARE NORMALLY FURNISHED AS FOLLOWS:
12" THRU 48" 1-PIECE
56" THRU 96" 2-PIECE
100" THRU 144" 3-PIECE
 - BAND FASTENERS ARE ATTACHED WITH SPOT WELDS, RIVETS OR HAND WELDS
 - REROLLED ANNUAL END CORRUGATIONS ARE NORMALLY 2 1/2" x 3/4" DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES

FOUNDATION BEDDING PREPARATION
PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, 4" OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

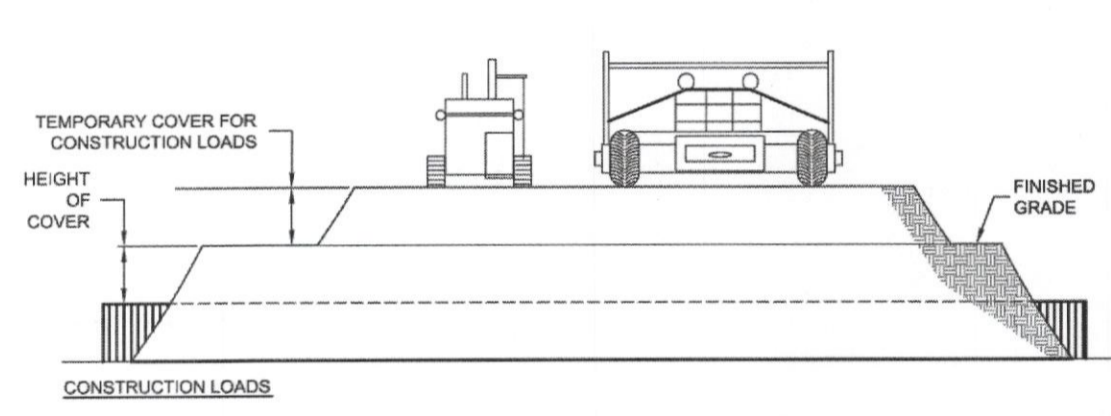
BACKFILL
THE BACKFILL SHALL BE AN A1, A2 OR A3 GRANULAR FILL PER AASHTO M145, OR A WELL-GRADED GRANULAR FILL AS APPROVED BY THE SITE ENGINEER (SEE INSTALLATION GUIDELINES). THE MATERIAL SHALL BE PLACED IN 2" LOOSE LIFTS AND COMPACTED TO 90% AASHTO T99 STANDARD PROCTOR DENSITY. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.

1 BACKFILL DETAIL
P2 SCALE: N.T.S.

2 H-12 HUGGER BAND DETAIL
P2 SCALE: N.T.S.

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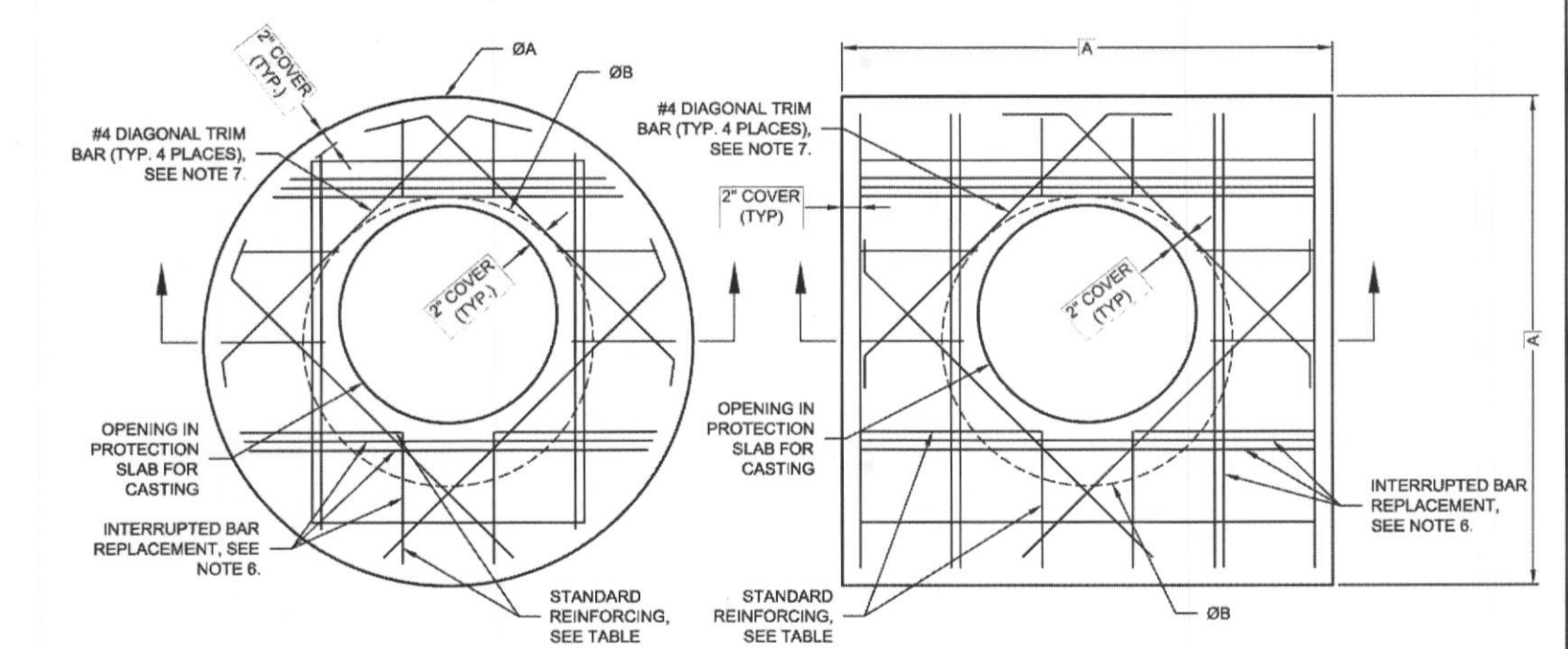
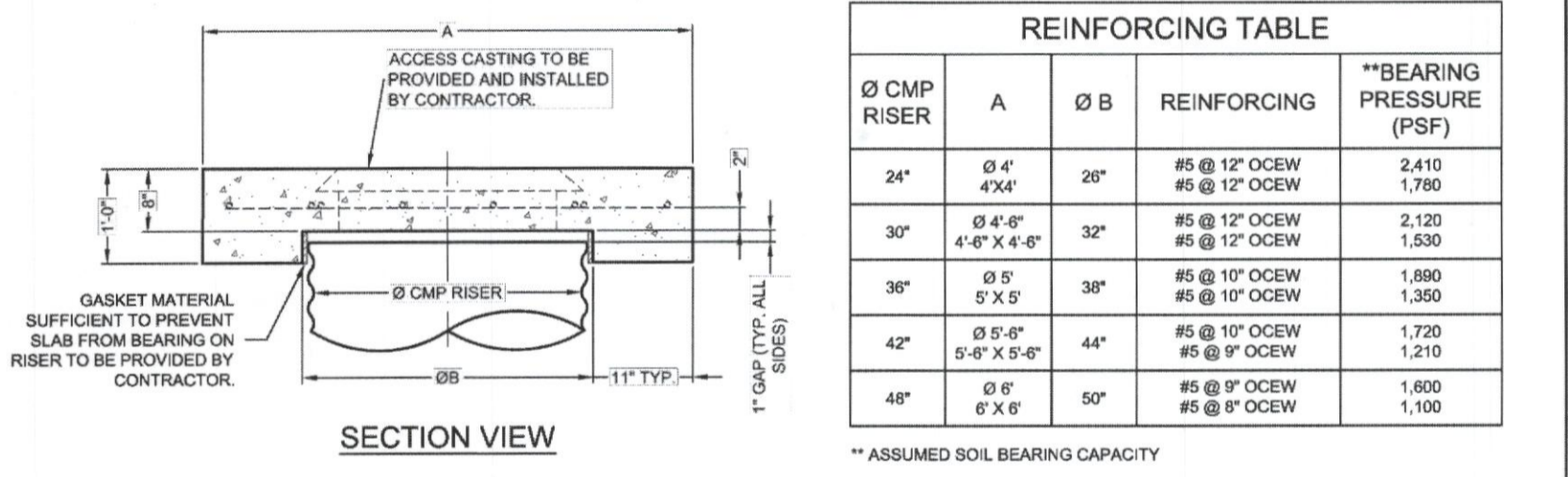


FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)		
	18-50	50-75	75-110 / 110-150
12-42	2.0	2.5	3.0 / 3.0
48-72	3.0	3.0	3.5 / 4.0
78-120	3.0	3.5	4.0 / 4.0
126-144	3.5	4.0	4.5 / 4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

3 CONSTRUCTION LOADING DIAGRAM
P3 SCALE: N.T.S.



REINFORCING TABLE				
Ø CMP RISER	A	Ø B	REINFORCING	**BEARING PRESSURE (PSF)
24"	Ø 4" 4"x4"	Ø 6"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	Ø 4" 4"x4"	Ø 6"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	Ø 5" 5"x5"	Ø 6"	#5 @ 10" OCEW #5 @ 10" OCEW	1,880 1,350
42"	Ø 5" 5"x5"	Ø 6"	#5 @ 10" OCEW #5 @ 10" OCEW	1,720 1,210
48"	Ø 6" 6"x6"	Ø 6"	#5 @ 9" OCEW #5 @ 9" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY

- NOTES**
- DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
 - DESIGN LOAD HS25
 - EARTH COVER = 1' MAX.
 - CONCRETE STRENGTH = 3,500 psi
 - REINFORCING STEEL = ASTM A615, GRADE 60.
 - PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
 - TRIM OPENING WITH DIAGONAL #4 BARS. EXTEND BARS A MINIMUM OF 12" BEYOND OPENING. BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
 - PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
 - DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

4 MANHOLE CAP DETAIL
P3 SCALE: N.T.S.

SPECIFICATION FOR CORRUGATED STEEL PIPE-ALUMINIZED TYPE 2 STEEL

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE CORRUGATED STEEL PIPE (CSP) DETAILED IN THE PROJECT PLANS.

MATERIAL
THE ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M274 OR ASTM A929.

PIPE
THE CSP SHALL BE MANUFACTURED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF AASHTO M35 OR ASTM A790. THE PIPE SIZES, GAGES AND CORRUGATIONS SHALL BE AS SHOWN ON THE PROJECT PLANS.

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH RECOMMENDATIONS OF THE NATIONAL CORRUGATED STEEL PIPE ASSOCIATION (NCSIPA).

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II OR ASTM A798 AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

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No.	Date	Revision Description



SHEET NO.