RECOMMENDATIONS FOR INSTALLATION AND USE OF SOILS AND AGGREGATES FOR FOUNDATION, EMBEDMENT AND BACKFILL

SOIL CLASS

	CLASS IA	CLASS IB	CLASS II	CLASS III
GENERAL RECOMMENDATIONS AND RESTRICTIONS	DO NOTE USE WHERE CONDITIONS MAY CAUSE MIGRATION OF FINES FROM ADJACENT SOIL AND LOSS OF PIPE SUPPORT, SUITABLE FOR USE AS A DRAINAGE BLANKET AND UNDERDRAIN IN ROCK CUTS WHERE ADJACENT MATERIAL IS SUITABLY GRADED	PROCESS MATERIAL AS REQUIRED TO OBTAIN GRADATION WHICH WILL MINIMIZE MIGRATION OF ADJACENT MATERIALS SUITABLE FOR USE AS DRAINAGE BLANKET AND UNDERDRAIN.	WHERE HYDRAULIC GRADIENT EXISTS CHECK GRADATION TO MINIMIZE MIGRATION. "CLEAN" GROUPS SUITABLE FOR USE AS DRAINAGE BLANKET AND UNDERDRAIN.	DO NOT USE WHERE WATER CONDITIONS IN TRENCH MAY CAUSE INSTABILITY
FOUNDATION	SUITABLE AS FOUNDATION AND FOR REPLACING OVER-EXCAVATED AND UNSTABLE TRENCH BOTTOM AS RESTRICTED ABOVE. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS.	SUITABLE AS FOUNDATION AND FOR REPLACING OVER-EXCAVATED AND UNSTABLE TRENCH BOTTOM. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS.	SUITABLE AS FOUNDATION AND FOR REPLACING OVER-EXCAVATED AND UNSTABLE TRENCH BOTTOM AS RESTRICTED ABOVE. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS.	SUITABLE AS FOUNDATION AND FOR REPLACING OVER-EXCAVATED TRENCH BOTTOM AS RESTRICTED ABOVE. DO NOT USE IN THICKNESSES GREATER THAN 12 IN. TOTAL. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS
BEDDING	SUITABLE AS RESTRICTED ABOVE. INSTALL IN 6-IN. MAXIMUM LAYERS. LEVEL FINAL GRADE BY HAND. MINIMUM DEPTH 4 IN. (6 IN. IN ROCK CUTS).	INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS LEVEL FINAL GRADE BY HAND. MINIMUM DEPTH 4 IN. (6 IN. IN ROCK CUTS).	SUITABLE AS RESTRICTED ABOVE. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS. LEVEL FINAL GRADE BY HAND MINIMUM DEPTH 4 IN. (6 IN. IN ROCK CUTS).	SUITABLE ONLY IN DRY TRENCH CONDITIONS. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS. LEVEL FINAL GRADE BY HAND. MINIMUM DEPTH 4 IN. (6 IN. IN ROCK CUTS).
HAUNCHING	SUITABLE AS RESTRICTED ABOVE. INSTALL IN 6-IN. MAXIMUM LAYERS. WORK IN AROUND PIPE BY HAND TO PROVIDE UNIFORM SUPPORT	INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS WORK IN AROUND PIPE BY HAND TO PROVIDE UNIFORM SUPPORT.	SUITABLE AS RESTRICTED ABOVE. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS. LEVEL FINAL GRADE BY HAND. MINIMUM DEPTH 4 IN. (6 IN. IN ROCK CUTS).	SUITABLE AS RESTRICTED ABOVE. INSTALL AND COMPACT IN 6-IN. MAXIMUM LAYERS. WORK AROUND PIPE BY HAND. TO PROVIDE UNIFORM SUPPORT
INITIAL BACKFILL	SUITABLE AS RESTRICTED ABOVE. INSTALL TO A MINIMUM OF 6 IN. ABOVE PIPE CROWN.	INSTALL AND COMPACT TO A MINIMUM OF 6 IN. ABOVE PIPE CROWN	SUITABLE AS RESTRICTED ABOVE. INSTALL AND COMPACT TO A MINIMUM OF 6 IN. ABOVE PIPE CROWN.	SUITABLE AS RESTRICTED ABOVE. INSTALL AND COMPACT TO A MINIMUM OF 6 IN. ABOVE PIPE CROWN.
EMBEDMENT COMPACTION	PLACE AND WORK BY HAND TO INSURE ALL EXCAVATED VOIDS AND HAUNCH AREAS ARE FILLED. FOR HIGH DENSITIES USE VIBRATORY COMPACTORS.	MINIMUM DENSITY 85 % STD. PROCTOR[C] USE HAND TAMPERS OR VIBRATORY COMPACTORS.	MINIMUM DENSITY 85 % STD. PROCTOR[C] USE HAND TAMPERS OR VIBRATORY COMPACTORS.	MINIMUM DENSITY 90 % STD. PROCTOR. [C]USE HAND TAMPERS OR VIBRATORY COMPACTORS. MAINTAIN MOISTURE CONTENT NEAR OPTIMUM TO MINIMIZE COMPACTIVE EFFORT.
FINAL BACKFILL	COMPACT AS REQUIRED BY THE ENGINEER.	COMPACT AS REQUIRED BY THE ENGINEER.	COMPACT AS REQUIRED BY THE ENGINEER.	COMPACT AS REQUIRED BY THE ENGINEER.

[B] WHEN USING MECHANICAL COMPACTORS AVOID CONTACT WITH PIPE. WHEN COMPACTING OVER PIPE CROWN MAINTAIN A MINIMUM OF 6 IN. COVER WHEN USING SMALL MECHANICAL COMPACTORS. WHEN USING LARGER COMPACTORS MAINTAIN MINIMUM CLEARANCES AS REQUIRED BY THE ENGINEER.
[C] THE MINIMUM DENSITIES GIVEN IN THE TABLE ARE INTENDED AS THE COMPACTION REQUIREMENTS FOR OBTAINING SATISFACTORY EMBEDMENT STIFFNESS IN MOST INSTALLATION CONDITIONS.

GENERAL NOTES:

1. MATERIALS: UNLESS OTHERWISE SPECIFIED ON THE PLANS OR HEREIN, CORRUGATED POLYETHYLENE PIPE SHALL CONFORM TO AASHTO M-294, LATEST EDITION, STANDARD SPECIFICATION FOR CORRUGATED POLYETHYLENE PIPE.
2. RESINS: CORRUGATED POLYETHYLENE PIPE SHALL BE MANUFACTURED FROM HIGH DENSITY POLYETHYLENE VIRGIN COMPOUNDS, AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM D-3350 FOR THE CELL CLASSIFICATION 324420C.
3. COUPLING BANDS: EXCEPT AS OTHERWISE REQUIRED HEREIN, COUPLING BANDS AND OTHER HARDWARE FOR CORRUGATED POLYETHYLENE PIPE SHALL DEMONSTRATE THAT THEY MEET THE SOIL TIGHTNESS REQUIREMENTS OF AASHTO SECTION 23.3.1.5.4 "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES."

   COUPLING BANDS SHALL LAP EQUALLY ON EACH OF THE PIPES BEING CONNECTED TO FORM A TIGHTLY CLOSED JOINT AFTER INSTALLATION.

   THE CORRUGATIONS IN THE BAND SHALL INDEX THE CORRUGATIONS IN THE PIPE ENDS TO ENGAGE THE FIRST OR SECOND CORRUGATION FROM THE END OF EACH PIPE.

   WHEN INFILTRATION OF EXFILTRATION IS A CONCERN, THE COUPLING MAY BE REQUIRED TO HAVE GASKETS. THE GASKET MATERIAL SHALL BE CLOSED-CELL EXPANDED RUBBER OR NEOPRENE.
4. DESIGNATION OF TYPE: THE TYPES OF PIPE WILL BE INDICATED BY THE FOLLOWING DESCRIPTIONS

   TYPE C: THIS PIPE WILL HAVE A FULL CIRCULAR CROSS-SECTION, WITH A CORRUGATED SURFACE BOTH INSIDE AND OUTSIDE.

   TYPE S: THIS PIPE WILL HAVE A FULL CIRCULAR CROSS-SECTION, WITH AN OUTER CORRUGATED PIPE WALL AND A SMOOTH INNER LINER.
5. INSTALLATION: CORRUGATED POLYETHYLENE PIPE SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D-2321, LATEST EDITION, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS."

TRENCH WIDTH BASED ON OUTSIDE DIAMETER

PIPE (INSIDE) DIA. IN. (MM)	TRENCH WIDTH FT. (M)
15 (375)	3.0 (1)
18 (450)	3.2 (1)
24 (600)	3.9 (1.2)
30 (750)	4.8 (1.5)
36 (900)	5.4 (1.7)

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REVISIONS

Number	Date	Description

Project Number:
Project Location:
Sheet Title: STANDARD HDPE 12" TO 36" CORRUGATED DRAINAGE PIPE TRENCH AND BACKFILL DETAILS
Project Title: DD-13 SHT. 1 OF 2

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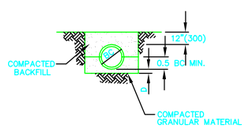
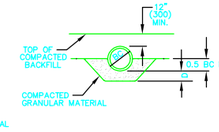
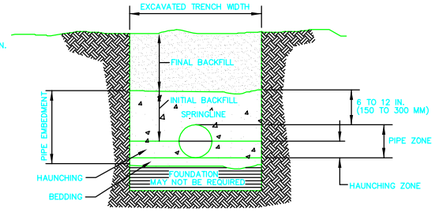


GRANULAR FOUNDATION TRENCH

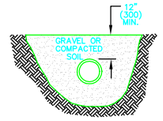


GRANULAR FOUNDATION EMBANKMENT

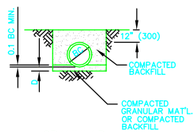
CLASS B



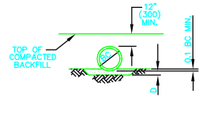
TRENCH CROSS SECTION SHOWING TERMINOLOGY



OPEN DITCH INSTALLATION



GRANULAR FOUNDATION TRENCH



GRANULAR FOUNDATION EMBANKMENT

CLASS C

HIGH DENSITY CORRUGATED POLYETHYLENE PIPE HEIGHT OF COVER H-20 AND E-80 LIVE LOADS

NOMINAL DIAMETER IN. (MM)	MINIMUM COVER IN. &(MM) H-20	E-80	MAXIMUM COVER FT. (M)
12 (300)	12 (300)	24 (600)	58 (18)
15 (375)	12 (300)	24 (600)	59 (18)
18 (450)	12 (300)	24 (600)	62 (19)
24 (600)	12 (300)	24 (600)	61 (19)
30 (750)	12 (300)	24 (600)	61 (19)
36 (900)	12 (300)	24 (600)	61 (19)

STRUCTURAL DESIGN CALCULATIONS BASED UPON LOAD FACTOR DESIGN METHODOLOGY PER AASHTO.

MULTIPLE INSTALLATION OF POLYETHYLENE PIPES

DIAMETER OF PIPE IN. (MM)	CLEAR DISTANCES BETWEEN PIPES FT. (M)
18 (450)	1' 2" (0.36)
24 (600)	1' 5" (0.44)
30 (750)	1' 8" (0.52)
36 (900)	1' 11" (0.60)

CLASSES OF EMBEDMENT AND BACKFILL MATERIALS

CLASS	TYPE	SOIL GROUP SYMBOL D 2487	DESCRIPTION	PERCENTAGE PASSING SIEVE SIZES 1 1/2 IN. (40 MM)	NO. 4 (4.75 MM)	NO. 200 (0.075 MM)
IA	MANUFACTURED AGGREGATES OPEN-GRADED, CLEAN.	NONE	ANGULAR, CRUSHED STONE OR ROCK, CRUSHED GRAVEL, BROKEN CORAL, CRUSHED SLAG, CINDERS OR SHELLS; LARGE VOID CONTENT, CONTAIN LITTLE OR NO FINES.	100 %	≤10 %	<5 %
IB	MANUFACTURED, PROCESSED AGGREGATES; DENSE-GRADED, CLEAN	NONE	ANGULAR, CRUSHED STONE (OR OTHER CLASS IA MATERIALS) AND STONE/SAND MIXTURES WITH GRADATIONS SELECTED TO MINIMIZE MIGRATION OF ADJACENT SOILS; CONTAIN LITTLE OR NO FINES (SEE X1.8.).	100 %	≤50 %	<5 %
II	COARSE-GRAINED SOILS, CLEAN	GW	WELL-GRADED GRAVELS AND GRAVEL-SAND MIXTURES; LITTLE OR NO FINES.	100 %	<50 % "COARSE FRACTION"	<5 %
		GP	POORLY-GRADED GRAVELS AND GRAVEL-SAND MIXTURES; LITTLE OR NO FINES.			
		SW	WELL-GRADED SANDS AND GRAVELY SANDS; LITTLE OR NO FINES.		>50 % OF "COARSE FRACTION"	
		SP	POORLY-GRADED SANDS AND GRAVEL SANDS; LITTLE OR NO FINES.			
	COARSE-GRAINED SOILS, BORDERLINE CLEAN TO W/FINES	E.G. GW-GC, SP-SM.	SANDS AND GRAVELS WHICH ARE BORDERLINE BETWEEN CLEAN AND WITH FINES.	100 %	VARIES	5 % TO 12 %
III	COARSE-GRAINED SOILS, WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND SILT MIXTURES.	100 %	<50 % OF "COARSE FRACTION"	12 % TO 50 %
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES.			
		SM	SILTY SANDS, SAND-SILT MIXTURES.		>50 % OF "COARSE FRACTION"	
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES.			

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