

**GENERAL NOTES**

**PIPE MATERIALS:**

- (A) FLEXIBLE PIPE MATERIALS ARE HDPE, PVC, CMP, AND THERMOPLASTIC STEEL REINFORCED RIBBED PIPE.
- (B) ALL HIGH-DENSITY POLYETHYLENE (HDPE) PIPE USED FOR CULVERT AND STORMDRAIN APPLICATIONS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M294, TYPE S, CURRENT EDITION ALL HDPE PIPE DELIVERED AND USED SHALL BE A PARTICIPANT IN NTPEP. MAX. PIPE DIA. FOR HDPE PIPE IS 60 INCHES.
- (C) POLY VINYL CHLORIDE (PVC) PROFILE WALL DRAINAGE PIPE SHALL MEET AASHTO DESIGNATION M304. THE MAXIMUM PIPE DIAMETER FOR PVC PIPE IS 36 INCHES.
- (D) STEEL REINFORCED THERMOPLASTIC RIBBED PIPE (SRTRP) SHALL MEET AASHTO DESIGNATION MP-20. THE MAXIMUM PIPE DIAMETER FOR THE PIPE IS 36".
- (E) CORRUGATED METAL PIPE (CMP) SHALL BE ALUMINIZED COATED CORRUGATED METAL PIPE SHALL MEET AASHTO M274, MAXIMUM DIA IS 72".

**INSTALLATIONS REQUIREMENTS:**

- (F) FOR EMBANKMENT AREAS OR WHERE TRENCH CONDITIONS DO NOT EXIST, AN INDUCED TRENCH SHALL BE CONSTRUCTED SEE D-PB-3.
- (G) FOR TRENCHES WITH IN SITU SOIL WALLS, ANY PORTION OF THE WALL SHALL BE AT LEAST AS FIRM AS THE MAJORITY OF THE SUBGRADE. SOIL NOT MEETING THIS REQUIREMENT SHALL BE REMOVED AND REPLACED.
- (H) FOR ADDITIONAL INSTALLATION INFORMATION SEE AASHTO SECTION 30 OR ASTM D2321 ALL PIPES SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. PIPE SHALL BE PLACED IN THE BED STARTING AT THE DOWNSTREAM END.
- (I) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED TO THE MINIMUM COVER DEPTH "D" ABOVE THE PIPE AND COMPACTED AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY.
- (J) JOINTS FOR FLEXIBLE PIPE SHALL MEET THE PERFORMANCE REQUIREMENT OF ASTM D3212. JOINTS SHALL BE INSTALLED SO THAT THE CONNECTION OF PIPE SECTION, FOR A CONTINUOUS LINE WILL BE FREE FROM IRREGULARITIES IN THE FLOW LINE. JOINTS BETWEEN FLEXIBLE PIPE AND STRUCTURE SHALL HAVE A GASKET MEETING ASTM C923 OR ASTM F2510. FOR PIPE TO STRUCTURE CONNECTIONS AT A SKEW GREATER THAN 15° WHERE A GASKET WILL NOT WORK, NON-SHRINK GROUT APPLIED IN TWO STAGES MAY BE SUBSTITUTED.
- (K) WHERE THE TRENCH FOUNDATION IS FOUND UNACCEPTABLE OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH:
  - (1) IMPROVED FOUNDATION OR EFF MAY BE USED AT ENGINEER'S INSTRUCTION.
  - (2) MAX FILL HEIGHTS AND JOINT SPECIFICATIONS SHALL BE REVIEWED TO VERIFY CONDITIONS MEET WITH THE MANUFACTURER'S SPECIFICATIONS.
- (L) ALL PIPE INSTALLATIONS REQUIRE CONCRETE ENDWALLS.
- (M) MINIMUM SPACING BETWEEN MULTIPLE PIPES IS:
  - 36" PIPES AND SMALLER: EQUAL TO THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
  - PIPES LARGER THAN 36": EQUAL TO HALF THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
- (N) MAXIMUM ALLOWABLE FILL HEIGHTS ARE AS DEFINED IN THE DRAINAGE MANUAL TABLE 6A-1.
- (O) FOR MINIMUM COVER DEPTHS FOR CONSTRUCTION LOADS SEE D-PB-3.

**GRANULAR COMPACTABLE BACKFILL REQUIREMENTS:**

- (P) THE BACKFILL SHALL BE TYPE "B" GRADING D OR E MATERIAL MEETING THE REQUIREMENTS OF SUBSECTION 903.05.

STRUCTURAL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING AN 8 INCH LOOSE LIFT THICKNESS AND BROUGHT UP EVENLY AND SIMULTANEOUSLY ON BOTH SIDES OF THE PIPE TO AN ELEVATION NOT LESS THAN 6 INCHES ABOVE THE TOP OF THE PIPE.

UNCLASSIFIED BACKFILL TO THE LIMIT OF PIPE BACKFILL LINE SHALL BE COMPACTED IN ACCORDANCE TO STANDARD SPECIFICATION 204.11.

A MINIMUM COMPACTION LEVEL OF 90% STANDARD PROCTOR DENSITY PER AASHTO T99 SHALL BE ACHIEVED BY USE OF VIBRATORY PLATE. HYDROHAMMER TYPE COMPACTORS SHALL NOT BE USED OVER THE PIPE. ALL COMPACTION EQUIPMENT USED SHALL BE APPROVED BY THE ENGINEER.

**INSPECTION REQUIREMENTS:**

- (1) ALL PIPES SHALL UNDERGO INSPECTION DURING INSTALLATION.
- (2) FINAL INSPECTIONS SHALL BE CONDUCTED NO SOONER THAN 30 DAYS AFTER COMPLETIONS OF INSTALLATION AND FINAL FILL.
- (3) THE PIPE SHALL BE EVALUATED TO DETERMINE WHETHER THE INTERNAL DIAMETER OF THE BARREL HAS BEEN REDUCED MORE THAN 5% WHEN MEASURED NOT LESS THAN 30 DAYS FOLLOWING COMPLETION OF THE INSTALLATION.
- (4) FOR LOCATIONS WHERE PIPE DEFLECTION EXCEEDS 5% OF THE INSIDE DIAMETER, AN EVALUATION SHALL BE CONDUCTED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL CONSIDERING THE SEVERITY OF THE DEFLECTION, STRUCTURAL INTEGRITY, ENVIRONMENTAL CONDITIONS, AND THE DESIGN SERVICE LIFE OF THE PIPE. PIPE REMEDIATION OR REPLACEMENT SHALL BE REQUIRED FOR LOCATIONS WHERE THE EVALUATION FINDS THAT THE DEFLECTION COULD BE PROBLEMATIC.
- (5) INSTALLED PIPE DEFLECTIONS THAT EXCEED 5% OF THE INITIAL INSIDE DIAMETER MAY INDICATE THAT THE INSTALLATION WAS SUBSTANDARD. SEE SECTION 607.09.
- (6) IN ALL PIPE INSTALLATIONS, AT LEAST 10% OF THE TOTAL NUMBER OF PIPE RUNS REPRESENTING AT LEAST 10% OF THE TOTAL PROJECT FOOTAGE ON THE PROJECT SHALL BE RANDOMLY SELECTED BY THE ENGINEER AND INSPECTED FOR DEFLECTION. ALSO AS DETERMINED BY THE 100% VISUAL INSPECTION IN AASHTO SECTION 30.5.6.1, ALL AREAS IN WHICH DEFLECTION CAN BE VISUALLY DETECTED SHALL BE INSPECTED FOR DEFLECTION. (REFER TO AASHTO, SECTION 30.5.6 AS ADOPTED BY THE AASHTO SUBCOMMITTEE ON BRIDGES AND STRUCTURES, JUNE 29, 2005)

**PAYMENT:**

- (Q) EXCAVATION FOR PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT THE COST WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT.
- PAYMENT FOR GRANULAR COMPACTABLE TYPE "B" BACKFILL, UNCLASSIFIED BACKFILL TO THE LIMIT LINE, AND/OR EXCAVATABLE FLOWABLE FILL INCLUDING BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.
- GEOTEXTILE TYPE III WILL BE PAID UNDER ITEM NO. 740-10.03 IF IMPROVED FOUNDATION IS REQUIRED.

REV. 7-12-07: REVISED GENERAL NOTE (Q).

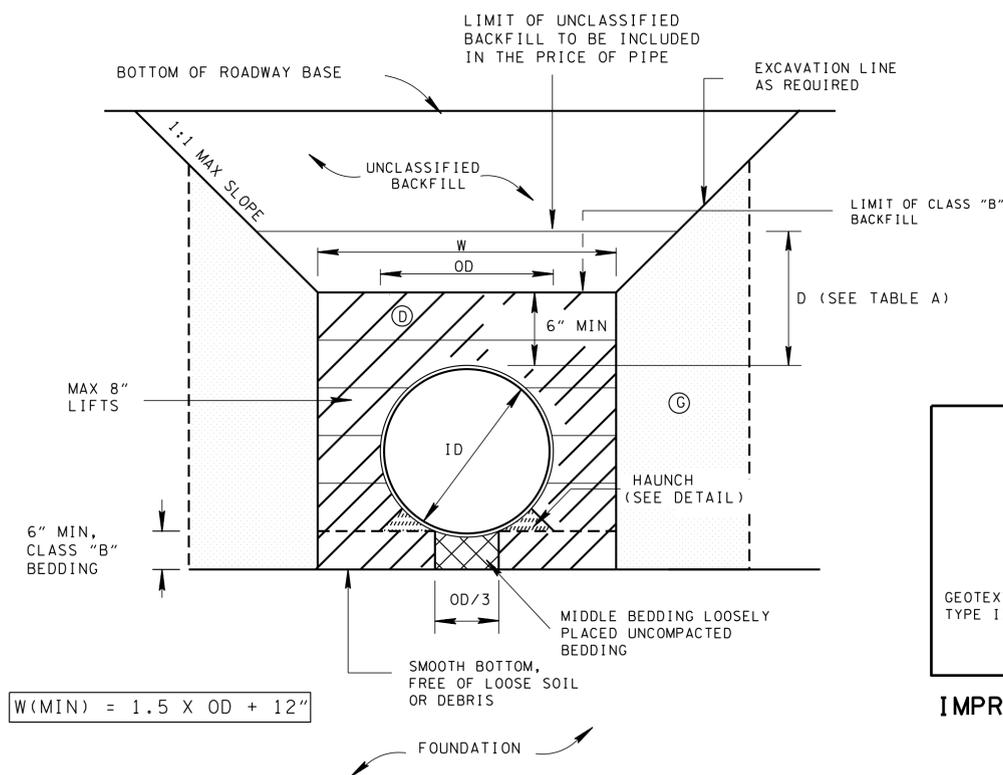
REV. 6-1-09: REVISED GENERAL NOTE (I) AND TITLE NAME. ADDED GENERAL NOTE (Q).

REV.2-1-12: REVISED DRAWING NAME ADDED EFF DETAIL. REVISED GENERAL NOTES AND TABLE. ADDED MINIMUM COVER TABLE.

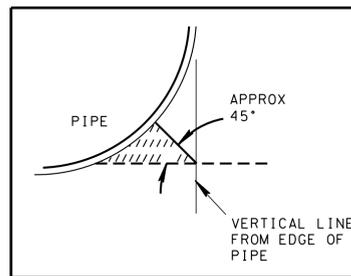
REV. 8-21-12: REVISED GENERAL NOTES. CHANGED BACKFILL MATERIAL.

REV. 1-2-13: REVISED TRENCH AND ADDED FILL DETAIL.

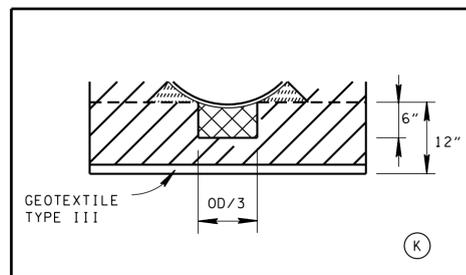
NOTE:  
CENTER PIPE IN TRENCH



**STANDARD TRENCH INSTALLATION (F)**



**MINIMUM HAUNCH AREA DETAIL**



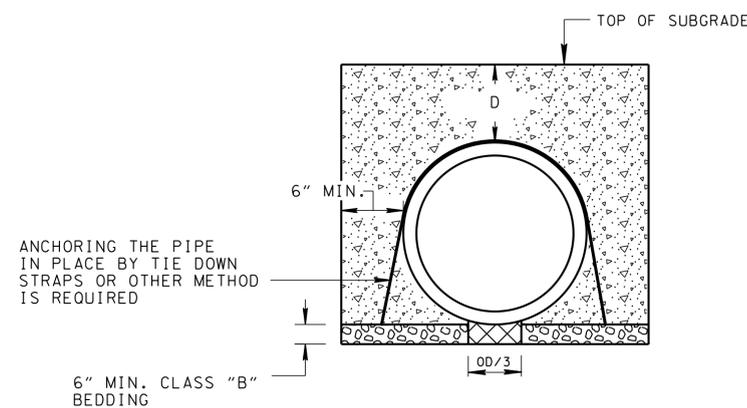
**IMPROVED FOUNDATION DETAIL**

**TABLE A**

MINIMUM DEPTH (D)	
MATERIAL	D
HDPE ID ≤ 36"	12"
HDPE ID > 36"	21"
PVC	12"
SRTRP	12"
CMP	12"

**TABLE B**

PIPE CULVERT		CLASS "B" BEDDING MATERIAL (CY/LF)
PIPE DIA	PAYMENT ITEM NO	
18"	607-03.30	0.313
24"	607-05.30	0.382
30"	607-06.30	0.497
36"	607-07.30	0.626
42"	607-08.30	0.767
48"	607-09.30	0.969
54"	607-10.30	1.141
60"	607-11.30	1.588
66"	607-12.30	1.805
72"	607-13.30	2.035



**ALTERNATE BACKFILL DETAIL USING EXCAVATABLE FLOWABLE FILL (EFF)**

SEE GENERAL NOTE (K)

OD=OUTSIDE DIAMETER  
ID=INSIDE DIAMETER



CLASS "B" STRUCTURAL BACKFILL COMPACTED TO 90% STANDARD PROCTOR DENSITY



CLASS "B" BEDDING UNCOMPACTED



FIRM INSITU SOIL OR CLASS "B" BEDDING COMPACTED TO 90% STANDARD PROCTOR DENSITY



HAUNCH AREA, SHOVEL COMPACTED

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION

**STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION**