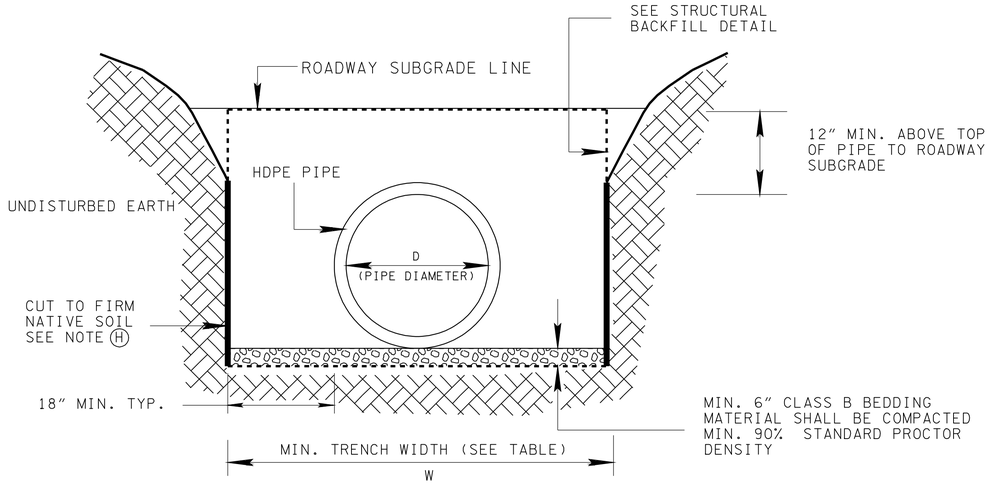
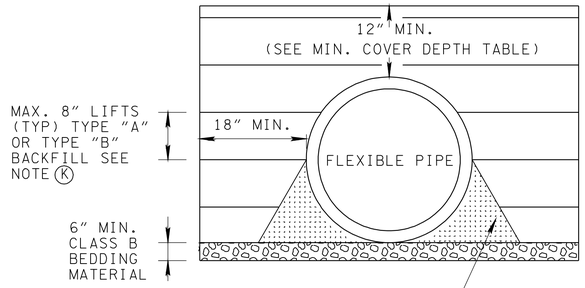


OPEN DITCH INSTALLATION (TYPICAL CROSS-SECTION)

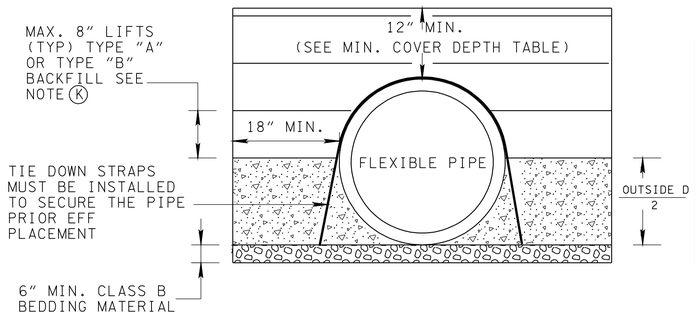


STRUCTURAL BACKFILL DETAIL (TYPE "A" OR TYPE "B" AGGREGATE, GRADING D OR E)

BEDDING AND BACKFILL FOR FLEXIBLE PIPE CULVERTS

PIPE MATERIAL	D PIPE DIAMETER (INCHES)	W TRENCH WIDTH (MIN.) (INCHES)	CY. OF BACKFILL MATL. PER LIN. FT	CY. OF BEDDING MATL.(CLASS B) PER LIN. FT
CMP, HDPE, PVC/SRTRP	12	53	0.337	0.082
	15	57	0.395	0.088
	18	60	0.439	0.093
	24	66	0.531	0.102
	30	77	0.711	0.218
	36	84	0.831	0.259
	42	91	0.957	0.304
	48	97	1.070	0.324
	54	104	1.206	0.374
	60	110	1.328	0.396
	66	116	1.453	0.418
	72	112	1.582	0.439

SRTRP: STEEL REINFORCED THERMOPLASTIC RIBBED PIPE



ALTERNATE STRUCTURAL BACKFILL DETAIL USING EXCAVATABLE FLOWABLE FILL (EFF)

SEE GENERAL NOTE (H)

MINIMUM COVER DEPTHS, DURING CONSTRUCTION FOR INDICATED AXLE LOADS, (IN.)

NOMINAL PIPE DIA. FT	18.0-50.0 KIP	50.0-75.0 KIP	75.0-110.0 KIP	110.0-150.0 KIP
2.0-3.0	24.0	30.0	36.0	36.0
3.5-4.0	36.0	36.0	42.0	48.0
4.5-5.0	36.0	36.0	42.0	48.0

(AASHTO, SECTION 30)

GENERAL NOTES

PIPE MATERIALS:

(A) FLEXIBLE PIPE MATERIALS ARE HDPE, PVC, CMP, AND THERMOPLASTIC STEEL REINFORCED RIBBED PIPE INCLUDING CORRUGATED ALUMINUM PIPE. ONLY PRODUCTS LISTED ON QPL MAY BE USED.

(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 AND VERIFIED THROUGH THE PLASTIC PIPE INSTITUTE (PPI) THIRD PARTY CERTIFICATION PROGRAM. ALL HDPE PIPE DELIVERED AND USED SHALL BE PARTICIPATED IN NTPEP. MAX. PIPE DIA. FOR HDPE PIPE IS 48 INCHES.

(C) PVC (POLY VINYL CHLORIDE) PROFILE WALL DRAINAGE PIPE SHALL MEET AASHTO DESIGNATION M-304(2007). THE MAXIMUM PIPE DIAMETER FOR PVC PIPE IS 36 INCHES.

(D) STEEL REINFORCED THERMOPLASTIC RIBBED PIPE SHALL MEET AASHTO DESIGNATION MP-20. THE MAXIMUM PIPE DIAMETER FOR THE PIPE IS 36".

INSTALLATIONS REQUIREMENTS:

(E) ALL PIPES SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. PIPE SHALL BE PLACED IN THE BED STARTING AT THE DOWNSTREAM END. (FOR MIN. INSTALLATION REQUIREMENTS REFER TO AASHTO SECTION 30 OR ASTM D2321)

(F) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY.

(G) JOINTS FOR FLEXIBLE PIPE SHALL MEET THE PERFORMANCE REQUIREMENT FOR SOIL TIGHTNESS UNLESS WATER TIGHTNESS IS SPECIFIED. JOINTS SHALL BE INSTALLED SO THAT THE CONNECTION OF PIPE SECTIONS, FOR A CONTINUOUS LINE, WILL BE FREE FROM IRREGULARITIES IN THE FLOW LINE.

(H) FOR HDPE PIPE INSTALLATIONS, THE STIFFNESS OF IN SITU SOIL FOR THE VERTICAL SIDE WALLS OF THE TRENCH SHALL BE VERIFIED BY ENGINEER. EFF SHOULD BE USED WHEN IN SITU SOIL IS NOT STABLE AND FIRM IN ACCORDANCE WITH SECTION 204-06(B) OF THE STANDARD SPECIFICATIONS.

(I) ALL PIPE INSTALLATIONS REQUIRE CONCRETE ENDWALLS.

(J) PIPE SHALL NOT BE INSTALLED IF WATER IS PRESENT IN THE TRENCH OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH. ALSO, AT THE SITES WHERE THE INLET OR THE OUTLET OF THE DRAINAGE PIPE WILL BE SUBMERGED DUE TO PONDING PIPE SHALL NOT BE INSTALLED.

GRANULAR COMPACTABLE BACKFILL REQUIREMENTS:

(K) THE BACKFILL SHALL BE TYPE "A" OR TYPE "B" AGGREGATE, GRADING D OR E MATERIAL MEETING THE REQUIREMENTS OF SUBSECTION 903.05. A MINIMUM OF 6 INCHES OF BEDDING COMPACTED TO A MIN. 90% STANDARD PROCTOR DENSITY SHALL BE PROVIDED PRIOR TO PLACEMENT OF THE PIPE UNLESS OTHERWISE SPECIFIED.

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 ONE FOOT ABOVE THE TOP OF THE PIPE.

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. APPROPRIATE REMEDIATION, IF ANY, WILL DEPEND UPON THE SEVERITY OF THE DEFLECTION.

(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 ADOPED BY THE AASHTO SUBCOMMITTEE ON BRIDGES AND STRUCTURES, JUNE 29, 2005)

PAYMENT:

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 "A" OR TYPE "B" BACKFILL AND/OR EXCAVATABLE FLOWABLE FILL INCLUDING BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.

(L) ALL PIPE INSTALLATION REQUIRE A RUBBER GASKET PROVIDED BY THE PIPE MANUFACTURER AND CONFORMING TO ASTM D3212 AT ALL CONNECTIONS WITH CONCRETE STRUCTURE.

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

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

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

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION

3-15-07 | D-PB-2