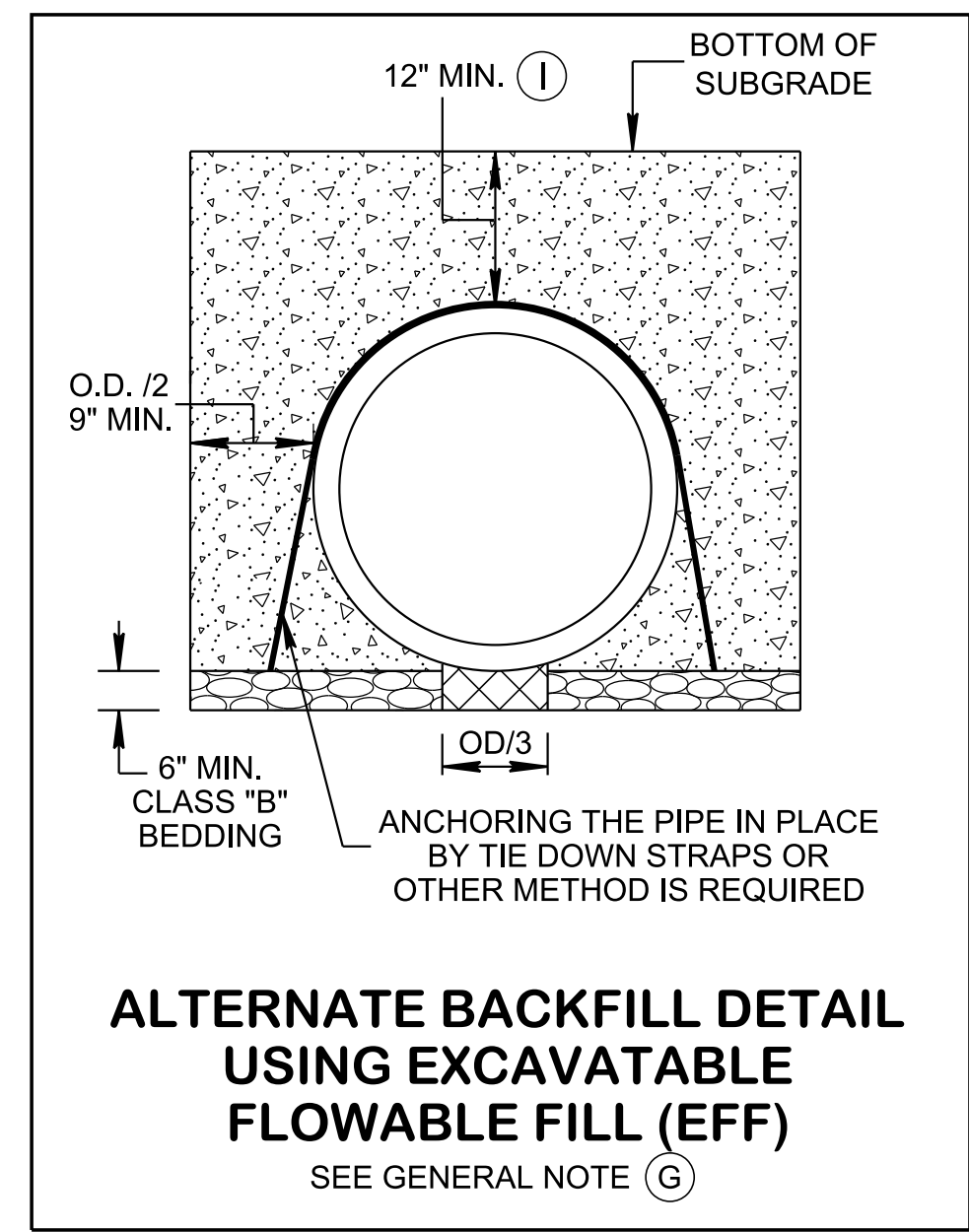
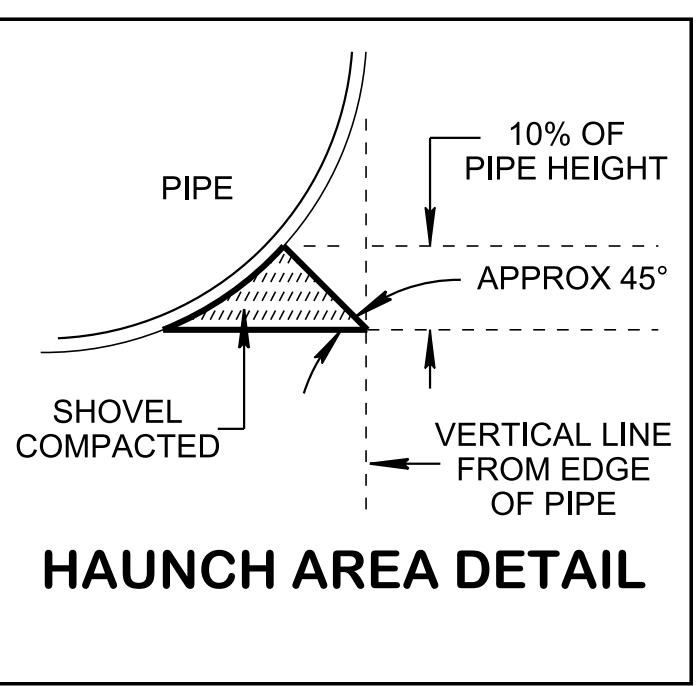
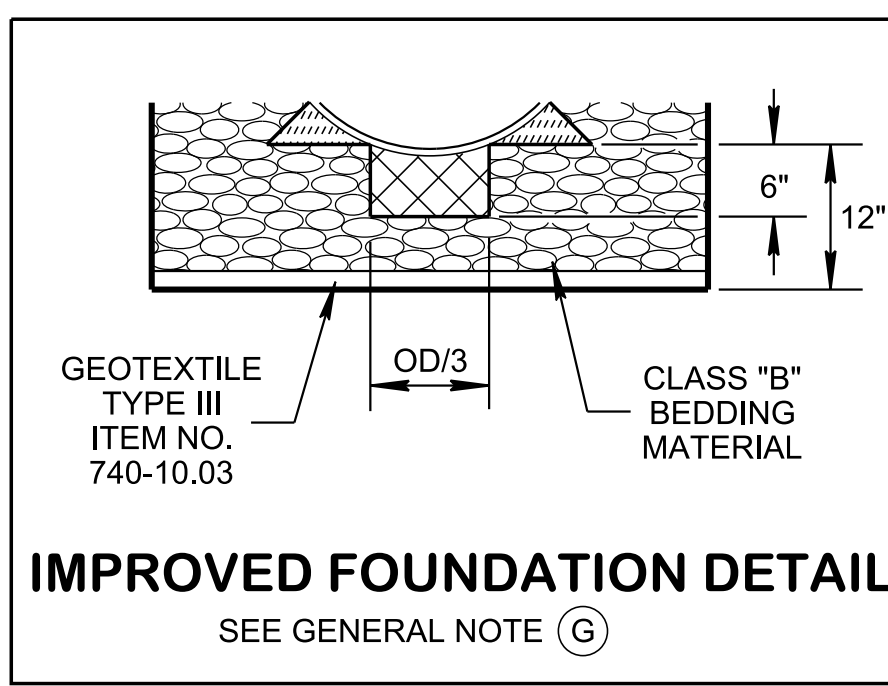


**STANDARD TRENCH INSTALLATION**

(PIPE CULVERT INSTALLATION DETAIL)  
NOTE: CENTER PIPE IN TRENCH  
SEE GENERAL NOTE (B)



**ALTERNATE BACKFILL DETAIL USING EXCAVATABLE FLOWABLE FILL (EFF)**  
SEE GENERAL NOTE (G)

TABLE A			
PIPE CULVERT		CLASS "B" BEDDING MATERIAL (CY/LF)	UNCLASSIFIED BACKFILL MATERIAL (CY/LF)
PIPE DIA	PAYMENT ITEM NO		
18"	607-03.30	0.371	0.095
24"	607-05.30	0.463	0.104
30"	607-06.30	0.595	0.117
36"	607-07.30	0.703	0.127
42"	607-08.30	0.814	0.137
48"	607-09.30	0.932	0.148
54"	607-10.30	1.055	0.158
60"	607-11.30	1.183	0.168
66"	607-12.30	1.315	0.178
72"	607-13.30	1.453	0.188

NOTE: SEE TDOT DESIGN DIVISION DRAINAGE MANUAL SECTION 6, APPENDIX, TABLE 6A-1 FOR PIPE SELECTION CRITERIA BASED ON SYSTEM AND FILL HEIGHT.

**LEGEND**

- ID = INSIDE DIAMETER
- OD = OUTSIDE DIAMETER
- CLASS "B" BEDDING 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
- UNCLASSIFIED BACKFILL (FINE COMPACTABLE SOIL)
- EXCAVATABLE FLOWABLE FILL (EFF)

**GENERAL NOTES**

- PIPE MATERIALS:**
- (A) FLEXIBLE PIPE MATERIALS ARE HDPE, PVC, CMP, SRTRP, AND PP.
- ALL HIGH DENSITY POLYETHYLENE (HDPE) PIPE USED FOR CULVERT AND STORM DRAIN 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".
- POLY VINYL CHLORIDE (PVC) PROFILE WALL DRAINAGE PIPE SHALL MEET AASHTO DESIGNATION M-304. THE MAXIMUM PIPE DIAMETER FOR PVC PIPE IS 36".
- STEEL REINFORCED THERMOPLASTIC RIBBED PIPE (SRTRP) SHALL MEET AASHTO DESIGNATION M335, THE MAXIMUM PIPE DIAMETER FOR THE PIPE IS 60".
- CORRUGATED METAL PIPE (CMP) SHALL BE ALUMINIZED COATED CORRUGATED METAL PIPE AND SHALL MEET AASHTO M274, MAXIMUM DIA IS 72".
- POLYPROPYLENE PIPE (PP) SHALL MEET AASHTO DESIGNATION M-330, THE MAXIMUM PIPE DIAMETER IS 60".
- INSTALLATIONS REQUIREMENTS:**
- (B) FOR EMBANKMENT AREAS OR WHERE TRENCH CONDITIONS DO NOT EXIST, AN INDUCED TRENCH SHALL BE CONSTRUCTED. SEE STD. DWG. NO. D-PB-3.
- (C) 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.
- (D) 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.
- (E) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED TO THE MINIMUM COVER DEPTH OF 12" ABOVE THE PIPE AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY IN ACCORDANCE WITH THE COMPACTION REQUIREMENTS.
- (F) **JOINT REQUIREMENTS:**
- CMP JOINING SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M36. HDPE, PP, SRTRP, AND PVC PIPE SHALL BE JOINED IN ACCORDANCE WITH ASTM D3212 AND MEET THE PERFORMANCE REQUIREMENT FOR SOIL-TIGHTNESS, UNLESS WATER-TIGHTNESS IS SPECIFIED. FOR A CONTINUOUS LINE OF PIPE, THE CONNECTIONS BETWEEN PIPE SECTIONS WILL BE FREE FROM IRREGULARITIES ALONG THE FLOW LINE. JOINTS BETWEEN PLASTIC FLEXIBLE PIPE AND STRUCTURE SHALL HAVE A GASKET MEETING ATM F2510. FOR CMP PIPE TO STRUCTURE CONNECTIONS OR PLASTIC PIPE AT A SKEW GREATER THAN 15°, WHERE A GASKET WILL NOT WORK, NON-SHRINK GROUT APPLIED IN TWO STAGES SHALL BE USED.
- (G) ONLY WHERE THE TRENCH FOUNDATION IS FOUND UNACCEPTABLE OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH:
- (1) IMPROVED FOUNDATION OR EXCAVATABLE FLOWABLE FILL (EFF) MAY BE USED AT ENGINEER'S INSTRUCTION AS SHOWN ON THIS SHEET. AS NEEDED, THE COST OF REMOVAL OF UNSATISFACTORY BEDDING MATERIAL AND REPLACEMENT WITH SATISFACTORY MATERIAL, INCLUDING GEOTEXTILE, WILL BE PAID SEPARATELY.
  - (2) FIELD ENGINEER SHALL REVIEW SITE CONDITIONS INCLUDING THE POSSIBLE EFFECTS OF WATER TABLE TO CONFIRM TYPICAL BEDDING AS SHOWN IS ADEQUATE TO PROVIDE STRUCTURAL SUPPORT OR FOUNDATION IMPROVEMENT IS REQUIRED.
- (H) MINIMUM SPACING BETWEEN MULTIPLE PIPES ARE:
- 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.
- (I) FOR MINIMUM COVER DEPTHS FOR CONSTRUCTION LOADS SEE D-PB-3.
- (J) MAXIMUM ALLOWABLE FILL HEIGHTS ARE AS DEFINED IN THE DRAINAGE MANUAL SECTION 6, APPENDIX, TABLE 6A-1.
- BEDDING AND BACKFILL REQUIREMENTS:**
- (K) PLACE 6 INCHES MINIMUM OF CLASS B BEDDING MATERIAL, ALONG WITH SUFFICIENT ADDITIONAL CLASS "B" BEDDING MATERIAL ACCURATELY SHAPED AS SHOWN IN HAUNCH AREA DETAIL.
- (L) CLASS "B" BEDDING MATERIAL MEETING THE REQUIREMENTS OF CONSTRUCTION SPECIFICATION SUBSECTION 204.04 SHALL BE PLACED IN LIFTS AND UP TO 6 INCHES ABOVE THE TOP OF PIPE. A MINIMUM COMPACTION LEVEL OF 90% OF THE STANDARD PROCTOR DENSITY PER AASHTO T99 SHALL BE ACHIEVED BY USE OF VIBRATORY PLATE.
- (M) UNCLASSIFIED BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING A 8 INCH LOOSE LIFT THICKNESS STARTING FROM THE CLASS B BEDDING, 6 INCHES ABOVE THE TOP OF PIPE, TO AN ELEVATION NOT LESS THAN ONE FOOT ABOVE THE TOP OF THE PIPE.
- (N) **END TREATMENTS:**
- (1) ALL CROSS DRAINS (PERPENDICULAR) PLACED UNDER A MAINLINE ROADWAY REQUIRE TYPE U ENDWALLS CONFORMING TO THE ROADWAY FILL SLOPE AS SHOWN ON STANDARD DRAWINGS D-PE-15A THROUGH D-PE-48A FOR END WALL GEOMETRY AND D-PE-99 FOR GRATE DETAILS. ALL CULVERT ENDWALLS LOCATED WITHIN THE CLEAR ZONE (S-CZ-1) REQUIRE A SAFETY GRATE (18" OR 24" PIPE ENDWALLS MAY OMIT THE STEEL GRATE). ALL CROSS DRAIN CULVERTS LARGER THAN 48" MUST BE PROTECTED BY A GUARDRAIL OR ENDWALL OR MUST BE PLACED OUTSIDE THE CLEAR ZONE. CROSS DRAIN ENDWALLS PLACED OUTSIDE THE CLEAR ZONE MAY USE TYPE A (D-PE-1), TYPE B (D-PE-9 THRU 9F), OR STRAIGHT HEADWALL (D-PE-4) IN LIEU OF TYPE U OR IF THE PIPE END WALL IS PROTECTED BY A GUARDRAIL.
  - (2) ALL SIDE DRAINS (PARALLEL) PLACED UNDER A SIDE ROAD, DRIVEWAY, OR FIELD ENTRANCE, ETC. THAT INTERSECT A MAINLINE ROADWAY, REQUIRE SAFETY ENDWALLS AS SHOWN ON THE D-SEW- SERIES STANDARD DRAWINGS WITH SAFETY GRATE (D-SEW-1A) WITH A MAXIMUM 6:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
  - (3) ALL MEDIAN CROSSOVER SIDE DRAINS (LONGITUDINAL) PLACED UNDER MEDIAN OPENINGS REQUIRE SAFETY ENDWALLS AS SHOWN ON D-SEW- 12D STANDARD DRAWING WITH SAFETY GRATE (D-SEW-1A) WITH MAXIMUM 12:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
- (O) **INSPECTION REQUIREMENTS:**
- ALL PIPES SHALL UNDERGO INSPECTION ACCORDING TO SECTION 607.09 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OR PER SECTION 30 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CURRENT EDITION.
- (P) **PAYMENT:**
- EXCAVATION FOR PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY AND ANY SOIL NOT MEETING REQUIREMENT FOR TRENCHES SHALL BE REMOVED AND REPLACED. ALL COST OF THIS WORK WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT. SEE TABLE A FOR PIPE CULVERT ITEM NUMBERS.
- PAYMENT FOR CLASS "B" BEDDING MATERIAL, UNCLASSIFIED BACKFILL TO THE LIMIT LINE, AND/OR IF REQUIRED EXCAVATABLE FLOWABLE FILL, TIE DOWN STRAPS AND BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.
- GEOTEXTILE TYPE III TO BE USED ONLY IF IMPROVED FOUNDATION IS REQUIRED, AND WILL BE PAID UNDER ITEM NO.
- 740-10.03                      GEOTEXTILE (TYPE III)(EROSION CONTROL)                      PER S.Y.

- REV. 7-12-07: REVISED GENERAL NOTE (I)
- REV. 6-1-09: REVISED GENERAL NOTE (I) AND TITLE NAME. ADDED GENERAL NOTE (I)
- 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.
- REV. 1-29-14: ADDED PP, RE LETTERED AND REVISED NOTES.
- REV. 06-28-19: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, AND GENERAL NOTES. REMOVED TABLE A AND RENAMED TABLE B TO A. REVISED TABLE A CONTENT AND LEGEND. REDREW SHEET.
- REV. 11-30-20: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE A AND GENERAL NOTES.
- REV. 03-04-21: REVISED TABLE A.
- REV. 01-28-22: REVISED GENERAL NOTE (F).
- REV. 03-01-23: REVISED GENERAL NOTE (G).

APPROVED BY FHWA  
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION  
STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION