



STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION  
DESIGN DIVISION  
NASHVILLE, TENNESSEE 37243-0348

**INSTRUCTIONAL BULLETIN NO. 07-13**

**Regarding Standard Drawings for Class “B” Bedding and Culvert Excavation  
And Standard Details for HDPE Pipe Installation**

**Effective for the October 19, 2007 letting (August 15, 2007 Plans Turn-In Date)**, standard drawing D-PB-1 is revised and standard drawing D-PB-2 is approved for use on projects where HDPE pipe is an approved alternate. Designers shall include both standard drawings in plans on projects allowing HDPE as a pipe alternate. Designers are to refer to the Design Division Drainage Manual, Chapter 6, Section 6.04.2.2 and Table 6A-1, for pipe selection criteria and allowed alternates for roadway classes.

Until the drawing is added to the standard drawings, it is to be printed with the plans. The drawings shall be identified on the lower left side of the index sheet **“To be printed with plans”**.

**Designers should note that bedding material will no longer be paid for as a separate item but will be included in the cost of the proposed pipe culvert.**

Copies of the English drawings are attached. Metric drawings will be developed at a later date. Design managers should contact Mr. Ali Hangul, C.E. Manager 1, Standards, Guidelines, and Quality Assurance Section prior to holding the construction field review if metric drawings are needed.

**DRAINAGE – CULVERTS AND ENDWALLS – ENGLISH**

<b><u>Drawing Number</u></b>	<b><u>Current Revision Date</u></b>	<b><u>Drawing Title</u></b>
D-PB-1	3-15-07	STANDARD DETAILS, CLASS “B’ BEDDING AND CULVERT EXCAVATION
D-PB-2		STANDARD DETAILS FOR HDPE PIPE INSTALLATION

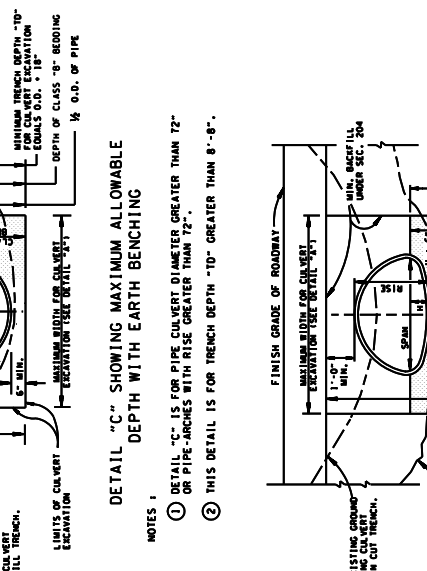
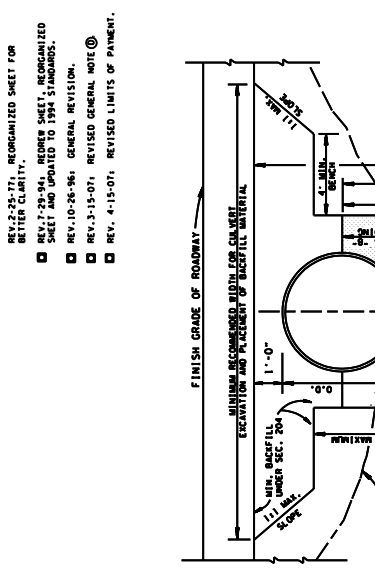
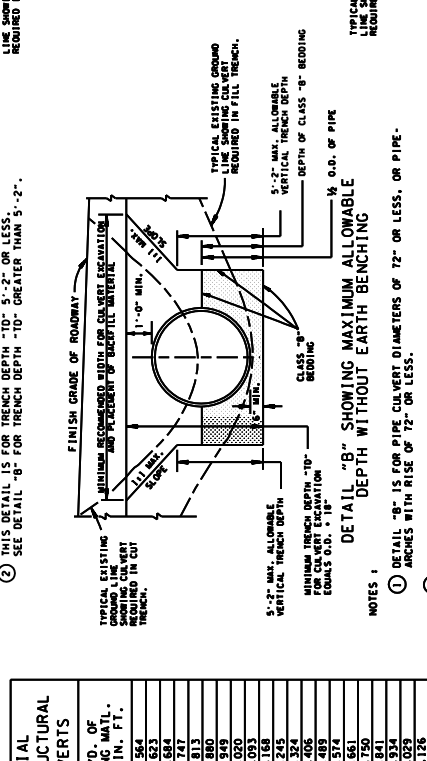
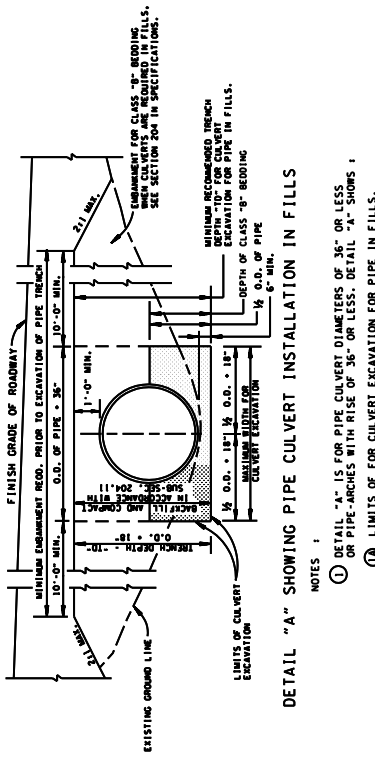
Original signed by Jeff C. Jones  
Jeff C. Jones, Civil Engineering Director  
Design Division

April 20, 2007  
JCJ:MJA:mja  
Attachment

BEDDING MATERIAL (CLASS B) FOR CONCRETE, C.M. AND CORRUGATED ALUMINUM PIPE CULVERTS		
PIPE DIAMETER (INCHES)	CONCRETE PIPE CU. YD. OF BEDDING MATL. PER LIN. FT.	C.M. AND ALUM. PIPE CU. YD. OF BEDDING MATL. PER LIN. FT.
12	0.162	0.140
15	0.187	0.161
18	0.212	0.183
24	0.266	0.227
30	0.321	0.273
36	0.380	0.322
42	0.442	0.372
48	0.507	0.424
54	0.573	0.478
60	0.641	0.533
66	0.716	0.593
72	0.790	0.653
78	0.868	0.716
84	0.949	0.783
90	1.032	0.851
96	1.118	0.923
102	1.206	0.998
108	1.298	1.076

BEDDING MATERIAL (CLASS B) FOR PIPE - ARCH CULVERTS		
SPAN - RISE (INCHES)	DIMENSION "H" (INCHES)	CU. YD. OF BEDDING MATL. PER LIN. FT.
18" x 11"	4.50	0.133
22" x 13"	4.75	0.143
25" x 15"	5.25	0.154
29" x 18"	5.50	0.163
35" x 22"	6.25	0.185
43" x 27"	7.00	0.206
53" x 35"	8.25	0.242
65" x 40"	10.50	0.297
81" x 44"	11.75	0.331
6.1" x 4.7"	20.0	0.427
6.4" x 4.9"	21.5	0.442
6.9" x 4.11"	22.0	0.461
7.0" x 5.1"	21.4	0.456
7.3" x 5.3"	20.8	0.451
7.1" x 5.7"	21.7	0.485
8.2" x 5.9"	20.9	0.473
8.7" x 6.11"	22.7	0.525
8.10" x 6.1"	21.9	0.510
9.4" x 6.3"	23.8	0.559
9.9" x 6.5"	22.9	0.554
10.2" x 6.7"	24.0	0.591
10.8" x 6.9"	25.0	0.629
10.11" x 7.1"	25.1	0.645
11.5" x 7.3"	27.4	0.723
11.7" x 7.5"	26.3	0.700
11.10" x 7.7"	25.2	0.677
12.4" x 7.9"	27.5	0.758
12.6" x 7.11"	26.4	0.731
12.8" x 8.1"	25.2	0.701
12.9" x 8.5"	25.0	0.712
13.11" x 8.7"	28.9	0.852
14.1" x 8.9"	27.6	0.817
14.3" x 8.11"	26.3	0.785
14.10" x 9.1"	28.9	0.851
15.4" x 9.3"	31.6	0.955
15.6" x 9.5"	30.2	0.933
15.8" x 10.7"	32.8	0.973
16.5" x 11.1"	30.1	0.945
16.7" x 10.1"	28.7	0.942

BEDDING MATERIAL (CLASS B) FOR STRUCTURAL PLATE PIPE CULVERTS		
PIPE DIAMETER (INCHES)	CU. YD. OF BEDDING MATL. PER LIN. FT.	
60	0.564	
66	0.623	
72	0.684	
78	0.747	
84	0.813	
90	0.880	
96	0.949	
102	1.023	
108	1.103	
114	1.188	
120	1.245	
126	1.324	
132	1.406	
138	1.489	
144	1.574	
150	1.661	
156	1.751	
162	1.841	
168	1.934	
174	2.029	
180	2.126	



REV. 2-25-77: REORGANIZED SHEET FOR BETTER CLARITY.

REV. 7-29-94: REORDER SHEET, REORGANIZED SHEET AND UPDATED TO 1994 STANDARDS.

REV. 10-28-96: GENERAL REVISION.

REV. 3-15-07: REVISED GENERAL NOTE (C)

REV. 4-15-07: REVISED LIMITS OF PAYMENT.

NOTE 1: DETAIL "C" IS FOR PIPE CULVERT DIAMETER GREATER THAN 72" OR PIPE ARCHES WITH RISE GREATER THAN 72".

NOTE 2: THIS DETAIL IS FOR TRENCH DEPTH "D" GREATER THAN 8'-8".

NOTE 1: DETAIL FOR FILL CONSTRUCTION, CULVERT EXCAVATION, SAFETY TRENCH CONSTRUCTION EXCAVATION IN CUTS AND BACKFILL AS SHOWN ELSEWHERE ON THIS SHEET, ALSO APPLICABLE TO PIPE - ARCH INSTALLATION.

MINOR REVISION -- FROM APPROVAL NOT REQUIRED.

STANDARD DETAILS CLASS "B" BEDDING AND CULVERT EXCAVATION D-PB-1

GENERAL NOTES

(A) CLASS "B" BEDDING WILL BE REQUIRED UNDER ALL CROSS DRAINS THROUGHOUT THE FULL LENGTH OF THE ROADWAY. THE BEDDING SHALL BE CONSTRUCTED TO THE FULL DEPTH OF THE BEDDING SIDEWALK TO BACK-OF-SIDEWALK, OR BACK-OF-CURB TO BACK-OF-CURB WHEN SIDEWALK IS NOT A PART OF THE PRESENT OR ULTIMATE PLANS, AND UNDER ALL CROSS DRAINS UNDER PUBLIC SIDE ROADS.

(B) CLASS "B" BEDDING WILL NOT BE REQUIRED UNDER SIDE DRAINS FOR PRIVATE DRIVES OR FIELD ENTRANCES. PIPES LINED PARALLEL TO THE DRAINAGE UNPAVED MEDIANS, PIPES OUTSIDE OF SHOULDER LIMITS IN INTERCHANGES, OR PIPES OUTSIDE NORMAL SLOPE LINES.

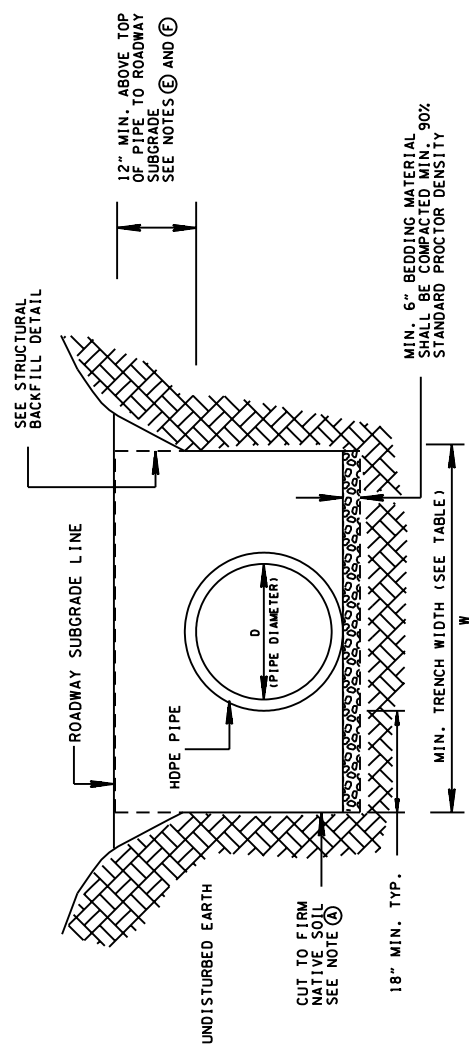
(C) IF NATURAL GROUND IS NOT AT LEAST ONE FOOT ABOVE TOP OF PIPE, ROADWAY EMBANKMENT SHALL BE CONSTRUCTED TO THE FINISH GRADE OF THE ROADWAY. THE MINIMUM DEPTH OF ONE FOOT ABOVE TOP OF PIPE PRIOR TO COMMENCEMENT OF EXCAVATION FOR PIPE TRENCH, SHALL BE MAINTAINED THROUGHOUT THE EXCAVATION.

(D) PAYMENT FOR CLASS "B" BEDDING MATERIAL (FOR CUBIC YARD) WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.

(E) EXCAVATION FOR PIPE CULVERTS, SEWERS, CONDUITS, ETC. WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT THE COST WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT.

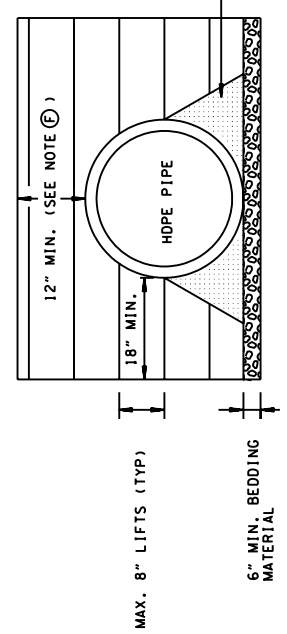
(F) ALL COST OF BACKFILL OTHER THAN CLASS "B" BEDDING AS DESCRIBED IN THE STANDARD SPECIFICATIONS UNDER SECTION 204 WILL BE INCLUDED IN THE PRICE BID FOR OTHER ITEMS.

- GENERAL NOTES**
- (A) THE STIFFNESS OF INSITU SOIL FOR THE VERTICAL SIDE WALLS OF THE TRENCH SHALL BE VERIFIED BY ENGINEER. HDPE PIPE SHOULD NOT BE INSTALLED IF THE INSITU SOIL IS NOT STABLE AND FIRM.
  - (B) HDPE PIPE SHALL BE ASSEMBLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. JOINTS SHALL BE MADE UPSTREAM AND DOWNSTREAM FROM THE DOWNSTREAM END. FOR MIN. INSTALLATION REQUIREMENTS REFER TO ASTM D2321 OR AASHTO SECTION 30.
  - (C) JOINTS FOR HDPE 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.
  - (D) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED, BUT NOT LATER THAN THE END OF EACH WORKING DAY.
  - (E) BACKFILL REQUIREMENTS: THE BACKFILL SHALL BE GRANULAR COMPACTABLE MATERIAL. THE BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 6 INCHES OF BEDDING REQUIREMENTS OF SUBSECTION 903.05. A MINIMUM OF 6 INCHES OF BEDDING SHALL BE PROVIDED PRIOR TO PLACEMENT OF THE PIPE UNLESS OTHERWISE SPECIFIED.
  - (F) STRUCTURAL BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING AN 8 INCH LOOSE LIFT THICKNESS AND BROUGHT UP EVENLY AND COMPACTED TO AN ELEVATION NOT LESS THAN ONE FOOT ABOVE THE TOP OF THE PIPE.
  - (G) 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.
  - (H) ALL COMPACTION EQUIPMENT USED SHALL BE APPROVED BY THE ENGINEER. COVER OF AT LEAST 24 INCHES SHALL BE PROVIDED BEFORE ALLOWING CONSTRUCTION EQUIPMENT TO CROSS THE HDPE PIPE.
  - (I) ALL HDPE PIPE INSTALLATIONS REQUIRE CONCRETE ENDWALLS.
  - (J) HDPE PIPE SHALL NOT BE INSTALLED IF WATERS 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 HDPE PIPE SHALL NOT BE INSTALLED.
  - (K) ALL HIGH-DENSITY POLYETHYLENE (HDPE) PIPE USED FOR CULVERT AND STORMDRAIN APPLICATIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1216. ALL HDPE PIPE SHALL BE MANUFACTURED BY A COMPANY WITH A PLASTIC PIPE INSTITUTE (PPI) THIRD PARTY CERTIFICATION PROGRAM. ALL HDPE PIPE DELIVERED AND USED SHALL BEAR THE THIRD PARTY ADMINISTERED PPI SEAL.
  - (L) ACCEPTANCE REQUIREMENTS: HDPE PIPE PER AASHTO, SECTION 30.5.6 (AS ADOPTED BY THE AASHTO SUBCOMMITTEE ON BRIDGES AND STRUCTURES, JUNE 20, 2005) ARE AS FOLLOWS:
    - (1) ALL PIPES SHALL UNDERGO INSPECTION DURING INSTALLATION.
    - (2) 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.
    - (3) FOR LOCATIONS WHERE PIPE DEFLECTION EXCEEDS 7.5% OF THE INSIDE DIAMETER, PIPE REMEDIATION OR REPLACEMENT SHALL BE REQUIRED.
  - (M) EXCAVATION FOR HDPE PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY, BUT THE COST WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULTERT.
  - (N) PAYMENT FOR TYPE "A" OR TYPE "B" BACKFILL INCLUDING BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE HDPE PIPE.



OPEN DITCH INSTALLATION  
 (TYPICAL CROSS-SECTION)

PIPE DIAMETER (INCHES)	TRENCH WIDTH (MIN.) (INCHES)	W	CY. OF BEDDING MATL. (CLASS B) PER LIN. FT
12	50		0.356
15	53		0.404
18	57		0.462
24	63		0.563
30	68		0.657
36	80		0.848
42	85		0.954
48	92		1.095



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

HAUNCHING TO SPRINGLINE OF PIPE. STRUCTURAL BACKFILL MUST BE WORKED INTO THE HAUNCH AREA AND COMPACTED BY HAND. SPECIAL COMPACTION MEANS MAY BE NECESSARY IN THE HAUNCH AREA.