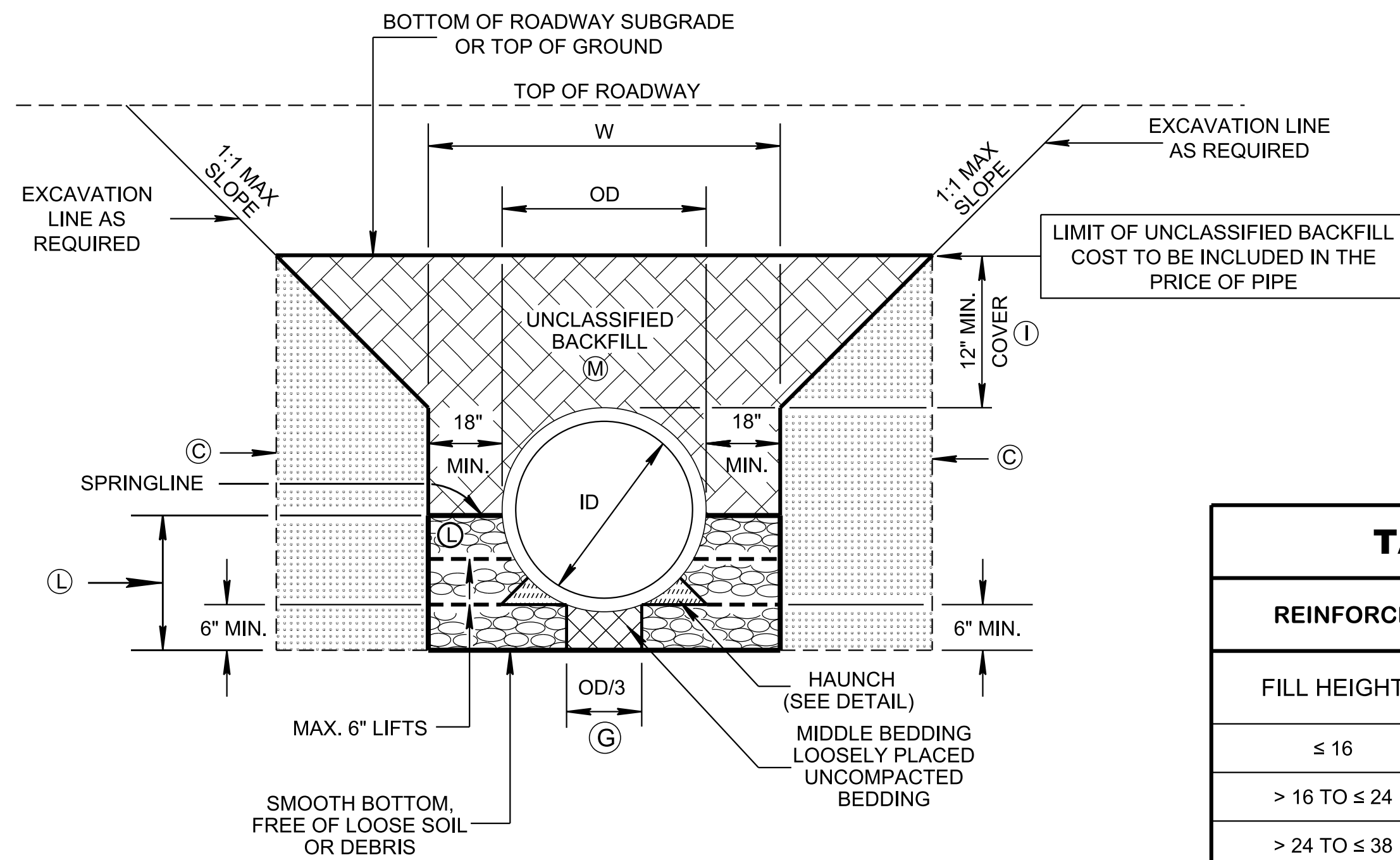


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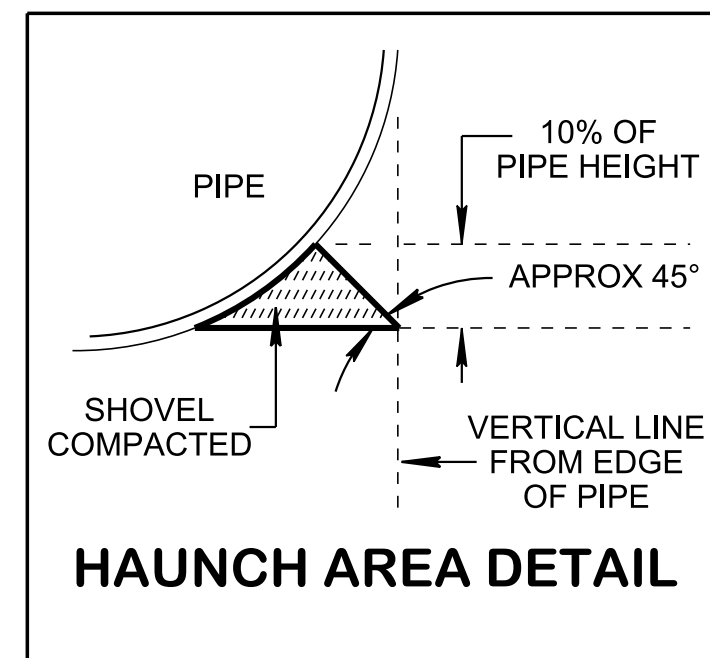
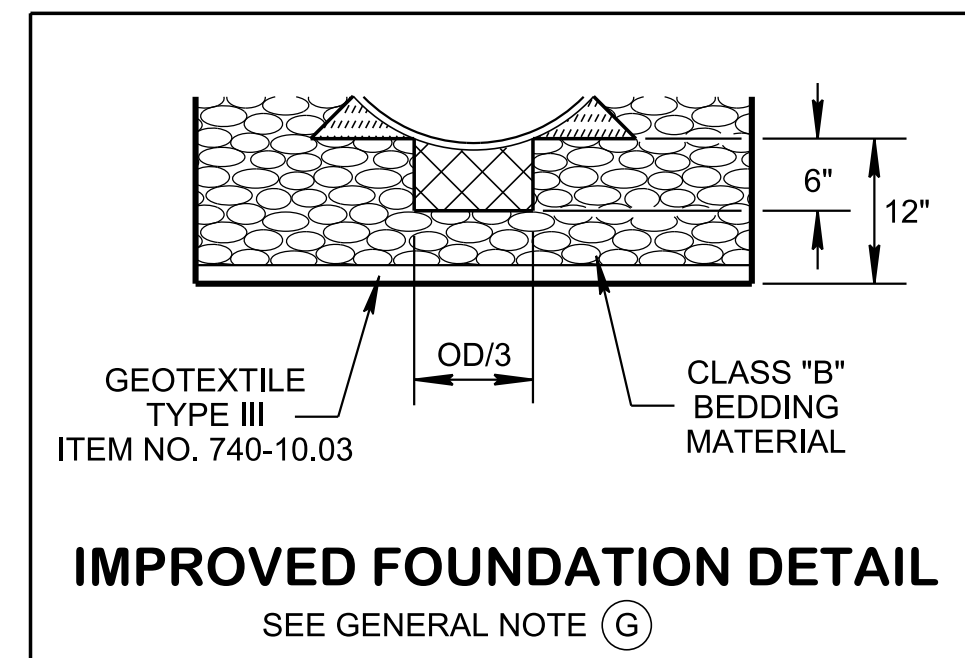
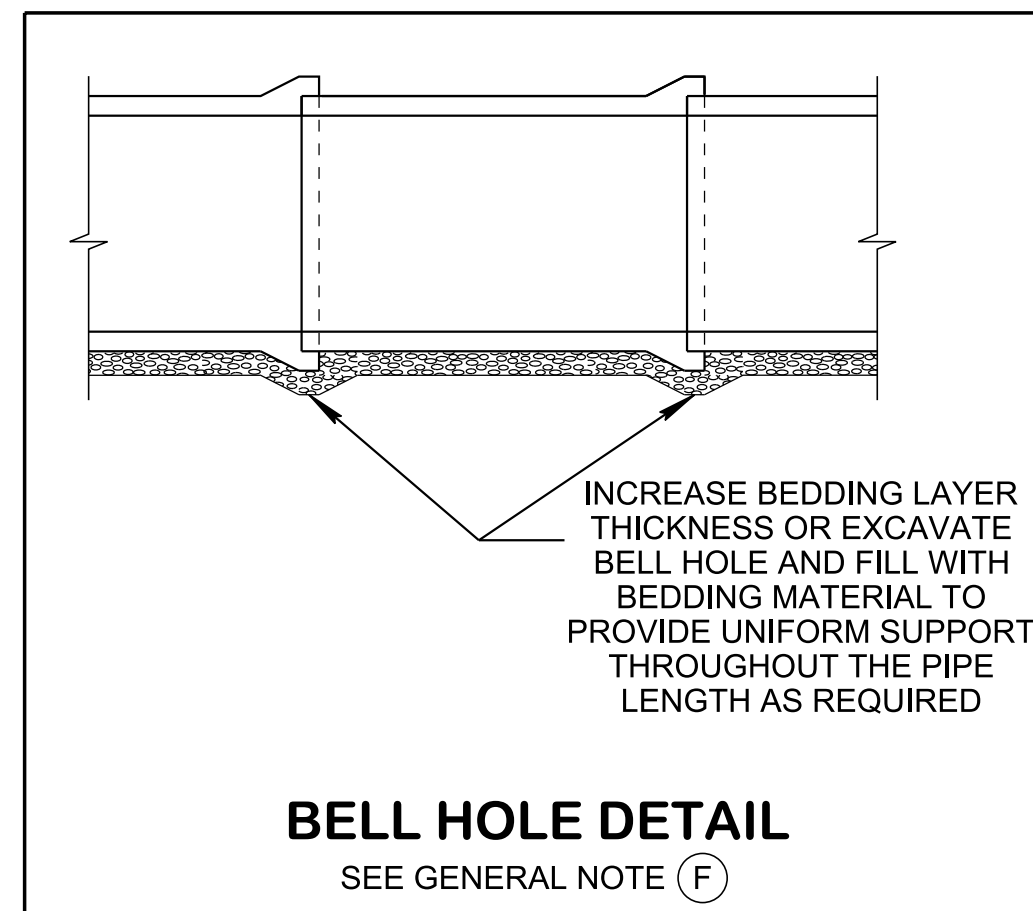


STANDARD TRENCH INSTALLATION

(PIPE CULVERT INSTALLATION DETAIL)

NOTE: CENTER PIPE IN TRENCH
SEE GENERAL NOTE (B)

REINFORCED CONCRETE PIPE	
FILL HEIGHT	CLASSIFICATION (AASHTO M170)
≤ 16	III
> 16 TO ≤ 24	IV
> 24 TO ≤ 38	V
> 38	SPECIAL DESIGN



CONCRETE PIPE CULVERT				CLASS "B" BEDDING MATERIAL (CY/LF)	UNCLASSIFIED BACKFILL MATERIAL (CY/LF)
PIPE DIA	PAYMENT ITEM NO (PER L.F.)	CLASS**	MIN.* W		
18"	607-03.02 THRU 607-03-04	III THRU V	59"	0.216	0.336
24"	607-05.02 THRU 607-05-04	III THRU V	66"	0.266	0.479
30"	607-06.02 THRU 607-06-04	III THRU V	73"	0.283	0.581
36"	607-07.02 THRU 607-07-04	III THRU V	80"	0.302	0.683
42"	607-08.02 THRU 607-08-04	III THRU V	87"	0.323	0.787
48"	607-09.02 THRU 607-09-04	III THRU V	94"	0.344	0.891
54"	607-10.02 THRU 607-10-04	III THRU V	101"	0.363	0.989
60"	607-11.03 THRU 607-11-05	III THRU V	108"	0.386	1.105

* FOR " WALL B" WALL THICKNESS.

** NOTE: CONCRETE PIPE CLASSES FOR REQUIRED D-LOAD CAPACITY. MINIMUM CLASS III SHALL BE USED UNDER ROADWAYS.

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)

GENERAL NOTES

PIPE MATERIALS:

(A) REINFORCED CONCRETE PIPE SHALL MEET THE REQUIREMENTS OF AASHTO M-170. THE WALL THICKNESS SHALL BE "WALL B" (EXCEPT FOR STRUCTURES DEEPER THAN THE MINIMUM DEPTH, "WALL C" MAY BE USED) AND THE RCP CLASS SHALL BE AS LISTED IN "TABLE A". ALL PIPE MANUFACTURING PLANTS SHALL BE CERTIFIED BY EITHER ACPA OR NPCA. REFER SOP 5-3 FOR MORE INFORMATION.

INSTALLATIONS REQUIREMENTS:

- (B) FOR EMBANKMENT AREAS OR WHERE TRENCH CONDITIONS DO NOT EXIST, AN INDUCED TRENCH SOIL EMBANKMENT SHALL BE CONSTRUCTED SEE D-PB-3.
- (C) FOR TRENCHES WITH IN SITU SOIL WALLS, THE SOIL SHALL BE AT LEAST AS FIRM AS THE MAJORITY OF THE SUBGRADE AS DETERMINED BY THE ENGINEER. SOIL NOT MEETING THIS REQUIREMENT SHALL BE REMOVED AND REPLACED.
- (D) FOR ADDITIONAL INSTALLATION INFO SEE SECTION 27 "CONCRETE CULVERTS" OF THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES AND ASTM C-1479-10.
- (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 12" ABOVE THE PIPE AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY IN ACCORDANCE WITH THE COMPACTED REQUIREMENTS.
- (F) JOINTS BETWEEN PIPES REQUIRE A RUBBER GASKET MEETING ASTM C443. AT CONNECTIONS TO STRUCTURES USE NON-SHRINK GROUT OR RUBBER GASKET PER C923 OR C1478. WHERE PIPE WITH BELLS ARE INSTALLED, BELL HOLES SHALL BE EXCAVATED IN BEDDING TO SUCH DIMENSIONS THAT THE ENTIRE LENGTH OF THE BARREL OF THE PIPE WILL BE SUPPORTED BY THE BEDDING WHEN PROPERLY INSTALLED AS SHOWN IN BELL HOLE DETAIL.
- (G) 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 TO CONFIRM TYPICAL BEDDING AS SHOWN IS ADEQUATE TO PROVIDE STRUCTURAL SUPPORT OR FOUNDATION IMPROVEMENT IS REQUIRED.

(H) FOR MULTIPLE PIPES MINIMUM SPACING BETWEEN 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.

- (I) FOR MINIMUM COVER DEPTHS FOR CONSTRUCTION LOADS SEE D-PB-3.
- (J) CLASS "B" BEDDING MAY NOT BE REQUIRED UNDER SIDE DRAINS FOR PRIVATE DRIVES, FIELD ENTRANCES, PIPES OUTSIDE THE SHOULDER LIMITS OF INTERCHANGE RAMP, OR PIPES OUTSIDE NORMAL SLOPE LINES. BEDDING TYPE AS PER STANDARD SPECIFICATION 204.10.B.
- (K) ARCH AND OVAL SHAPED PIPE CULVERTS SHALL BE INSTALLED THE SAME AS CIRCULAR WITH O.D. EQUAL TO THE WIDEST HORIZONTAL DIMENSION ON THE PIPE. TO ESTIMATE BEDDING MATERIAL FOR THESE PIPES WITH INTERNAL WIDTH THE SAME AS DIAMETER IN THE TABLE, MULTIPLY BEDDING QUANTITY BY 0.5 FOR THE SHOWN MINIMUM TRENCH DIMENSIONS.

BEDDING AND BACKFILL REQUIREMENTS:

- (L) CLASS "B" BEDDING MATERIAL MEETING THE REQUIREMENTS OF CONSTRUCTION SPECIFICATION SUBSECTION 204.04 SHALL BE PLACED IN LIFTS, NOT TO EXCEED 6 INCHES, TO THE PIPE SPRINGLINE. 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 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.
- UNCLASSIFIED BACKFILL TO THE LIMIT OF PIPE BACKFILL LINE SHALL BE COMPACTED IN ACCORDANCE TO STANDARD SPECIFICATION 204.11. HYDRO-HAMMER TYPE OF COMPACTORS MAY BE USED AROUND THE PIPE HOWEVER THEY SHALL NOT BE USED DIRECTLY OVER THE PIPE TO PREVENT ANY DAMAGE. ALL COMPACTION EQUIPMENT USED SHALL BE APPROVED BY THE ENGINEER.
- (N) 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.

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).

INSPECTION REQUIREMENTS:

ALL PIPES SHALL UNDERGO INSPECTION ACCORDING TO SECTION 607.09 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OR PER SECTION 27 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES OR PER ASTM C1840.

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 B FOR PIPE CULVERT ITEM NUMBERS.

PAYMENT FOR CLASS "B" BEDDING MATERIAL, UNCLASSIFIED BACKFILL TO THE LIMIT LINE, AND/OR IF REQUIRED EXCAVATABLE FLOWABLE FILL 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 DETAILS REVISED BEDDING TABLE.

REV. 3-16-17: CLARIFIED PAYMENT ITEM NO. IN TABLE B.

REV. 06-28-19: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE B AND GENERAL NOTES. REDREW SHEET.

REV. 11-30-20: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE B AND GENERAL NOTES. ADDED BELL HOLE DETAIL.

REV. 03-04-21: REVISED TABLE B.

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 CONCRETE
PIPE
INSTALLATION

D-PB-1

NOT TO SCALE