

TABLE OF TRENCHING AND  
STANDARD BEDDING MATERIAL QUANTITIES

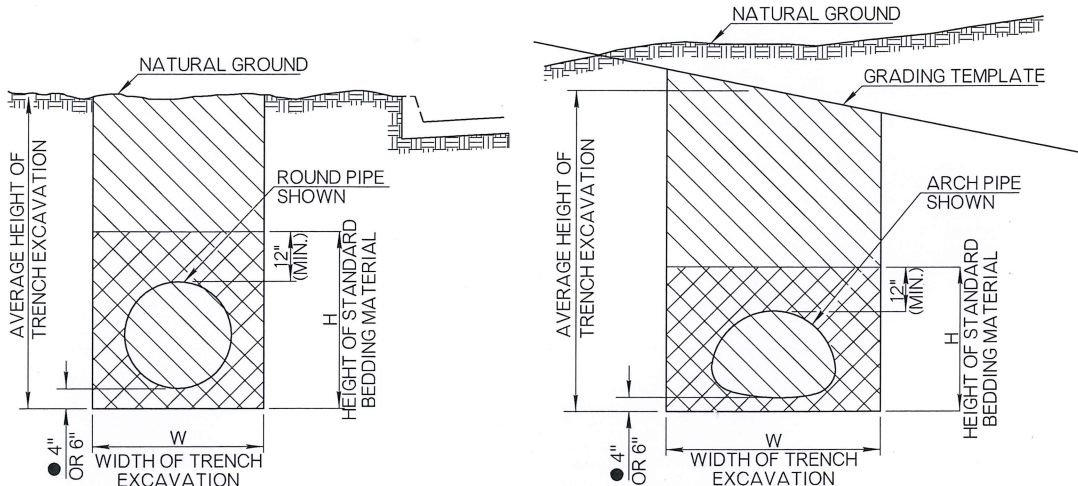
|                 | PIPE<br>DIAM.<br>OR<br>DESIGN<br>EQUIV. | H<br>■ | SINGLE PIPE<br>INSTALLATION |                                      | DOUBLE PIPE<br>INSTALLATION |                                      | TRIPLE PIPE<br>INSTALLATION |                                      | CLEAR<br>SPACE<br>BETWEEN<br>PIPES |
|-----------------|-----------------------------------------|--------|-----------------------------|--------------------------------------|-----------------------------|--------------------------------------|-----------------------------|--------------------------------------|------------------------------------|
|                 |                                         |        | W                           | STANDARD<br>BEDDING<br>MATERIAL<br>■ | W                           | STANDARD<br>BEDDING<br>MATERIAL<br>■ | W                           | STANDARD<br>BEDDING<br>MATERIAL<br>■ |                                    |
|                 |                                         |        | FT.                         | CY/LF                                | FT.                         | CY/LF                                | FT.                         | CY/LF                                |                                    |
| ROUND PIPE      | 18"                                     | 3.10   | 3.20                        | 0.28                                 | 6.10                        | 0.52                                 | 9.00                        | 1.00                                 | 14                                 |
|                 | 24"                                     | 3.60   | 4.00                        | 0.39                                 | 7.70                        | 0.73                                 | 11.40                       | 1.50                                 | 17                                 |
|                 | 30"                                     | 4.20   | 4.80                        | 0.51                                 | 9.30                        | 0.97                                 | 13.80                       | 2.15                                 | 20                                 |
|                 | 36"                                     | 4.75   | 5.50                        | 0.63                                 | 10.80                       | 1.23                                 | 16.20                       | 2.85                                 | 23                                 |
|                 | 42"                                     | 5.30   | 7.00                        | 0.92                                 | 13.20                       | 1.67                                 | 19.30                       | 3.80                                 | 26                                 |
|                 | 48"                                     | 6.20   | 7.50                        | 1.03                                 | 14.75                       | 2.00                                 | 21.70                       | 4.70                                 | 29                                 |
|                 | 54"                                     | 6.20   | 8.00                        | 1.20                                 | 15.30                       | 2.20                                 | 22.70                       | 5.10                                 | 32                                 |
|                 | 60"                                     | 6.75   | 9.50                        | 1.60                                 | 17.60                       | 2.75                                 | 25.90                       | 6.30                                 | 35                                 |
| METAL ARCH PIPE | 66"                                     | 7.20   | 10.00                       | 1.70                                 | 18.80                       | 3.10                                 | 27.70                       | 7.35                                 | 38                                 |
|                 | 18"                                     | 2.80   | 3.20                        | 0.27                                 | 6.20                        | 0.52                                 | 9.20                        | 0.77                                 | 14                                 |
|                 | 24"                                     | 3.25   | 4.00                        | 0.38                                 | 7.83                        | 0.74                                 | 11.67                       | 1.09                                 | 17                                 |
|                 | 30"                                     | 3.60   | 5.50                        | 0.57                                 | 10.20                       | 1.03                                 | 14.87                       | 1.49                                 | 20                                 |
|                 | 36"                                     | 4.00   | 6.25                        | 0.69                                 | 11.75                       | 1.27                                 | 17.25                       | 1.84                                 | 23                                 |
|                 | 42"                                     | 4.40   | 7.00                        | 0.82                                 | 13.33                       | 1.53                                 | 19.66                       | 2.24                                 | 26                                 |
|                 | 48"                                     | 4.80   | 8.10                        | 1.02                                 | 15.35                       | 1.88                                 | 22.60                       | 2.75                                 | 29                                 |
|                 | 54"                                     | 5.25   | 9.50                        | 1.32                                 | 17.58                       | 2.36                                 | 25.66                       | 3.40                                 | 32                                 |
|                 | 60"                                     | 5.60   | 10.00                       | 1.40                                 | 18.92                       | 2.62                                 | 27.84                       | 3.82                                 | 35                                 |
|                 | 66"                                     | 6.00   | 10.90                       | 1.63                                 | 20.65                       | 3.00                                 | 30.40                       | 4.39                                 | 38                                 |

■ FOR PIPES UNDER PAVEMENT, THE H DIMENSION AND THE STANDARD BEDDING MATERIAL QUANTITY, SHALL BE INCREASED TO GO TO THE TOP OF THE TRENCH.

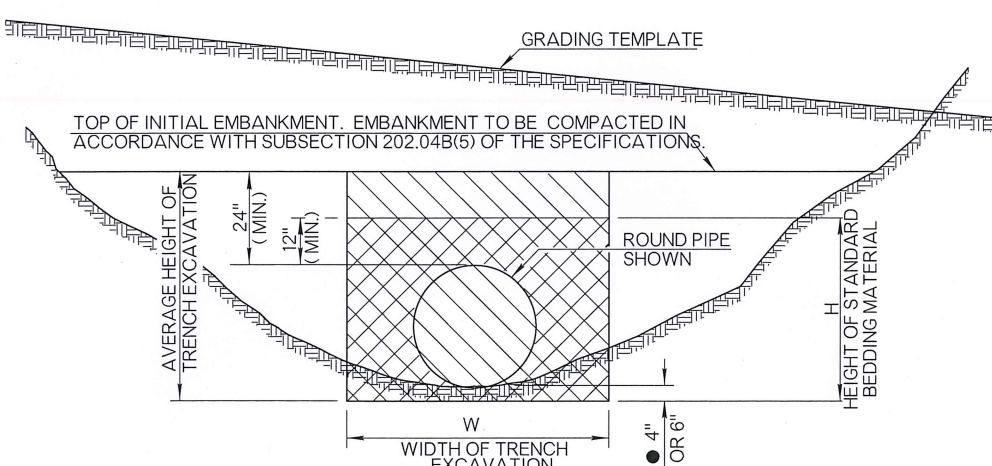
TABLE OF FILL HEIGHTS

|            | PIPE SIZE         |                             | MINIMUM<br>COVER OVER<br>TOP OF PIPE<br>(BUOYANCY) | MAXIMUM COVER |                                          | MINIMUM METAL PIPE<br>GAGE REQUIREMENT |                                          |
|------------|-------------------|-----------------------------|----------------------------------------------------|---------------|------------------------------------------|----------------------------------------|------------------------------------------|
|            | POLYETH.<br>ROUND | EQUIVALENT<br>METAL<br>ARCH |                                                    | POLYETHYLENE  | METAL                                    | UNDER<br>PAVEMENT                      | ALL<br>OTHERS                            |
|            |                   |                             |                                                    |               |                                          |                                        |                                          |
| ROUND PIPE | 18"               | 21" x 15"                   | 15"                                                | 10'           | REFER<br>TO RDY.<br>STANDARD<br>FHTMPP-1 | 14                                     | REFER<br>TO RDY.<br>STANDARD<br>FHTMPP-1 |
|            | 24"               | 28" x 20"                   | 20"                                                | 10'           |                                          | 14                                     |                                          |
|            | 30"               | 35" x 24"                   | 25"                                                | 10'           |                                          | 14                                     |                                          |
|            | 36"               | 42" x 29"                   | 30"                                                | 10'           |                                          | 14                                     |                                          |
|            | 42"               | 49" x 33"                   | 35"                                                | 10'           |                                          | 12                                     |                                          |
|            | 48"               | 57" x 38"                   | 40"                                                | 10'           |                                          | 12                                     |                                          |
|            | 54"               | 64" x 43"                   | 45"                                                | 10'           |                                          | 12                                     |                                          |
|            | 60"               | 71" x 47"                   | 50"                                                | 10'           |                                          | 10                                     |                                          |
|            | 66"               | 77" x 52"                   | 55"                                                | N/A           |                                          | 10                                     |                                          |

● UNDER PAVEMENT IS DEFINED TO INCLUDE ALL P.C. OR A.C. SURFACING UNDER MAINLINE TRAFFIC AND MAJOR STREET RETURNS. A MINIMUM PIPE GAGE OF 16 MAY BE USED FOR INSTALLATIONS REQUIRING 30 INCH EQUIVALENT ROUND CONDUITS (MAX.) AND LIMITED TO LOW VOLUME COUNTY OR OFF-SYSTEM ROADS, MINOR STREET RETURNS, DRIVEWAYS OR TEMPORARY DETOURS, AS APPROVED BY THE ENGINEER.



TRENCH EXCAVATION IN CUT SECTIONS



TRENCH EXCAVATION IN EMBANKMENT SECTIONS

■ LIMITS OF STANDARD BEDDING MATERIAL.  
QUANTITIES FOR BEDDING MATERIAL DO NOT  
INCLUDE THE SPACE WITHIN AND BOUNDED BY  
THE OUTER SURFACE OF THE PIPE CONDUIT.

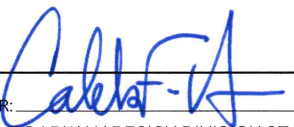
■ LIMITS OF TRENCH EXCAVATION.

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE 2009 ODOT STANDARD SPECIFICATIONS.
2. TRENCH EXCAVATION & STANDARD BEDDING WILL NOT BE REQUIRED FOR PIPE INSTALLATIONS ON SIDE DRAINS UNLESS OTHERWISE SPECIFIED ON THE PLANS.
3. TRENCH EXCAVATION WILL BE PAID FOR ON PIPE UNDERDRAIN. SEE ROADWAY STANDARD PUD-3.
4. TRENCHING REQUIREMENTS FOR DEPTHS OVER 5 FEET SHALL BE IN ACCORDANCE WITH, & DEFINED BY, O.S.H.A. REGS., TITLE 29 CFR, STANDARDS 1926.650, 1926.651 & 1926.652.
5. NORMAL BACKFILLING OPERATIONS SHALL FOLLOW BEDDING AND PIPE INSTALLATION AS CLOSELY AS PRACTICAL. IN NO CASE SHALL A PIPE INSTALLATION SUBJECT TO SUDDEN FLOW DEVELOPMENT BE LEFT WITHOUT SUFFICIENT BACKFILL TO RESTRAIN THE CONDUIT AND PREVENT JOINT SEPARATION AND/OR PIPING SCOUR. PHYSICALLY RESTRAINING THE CONDUIT MAY BE USED TO AUGMENT OR REPLACE THIS IMMEDIATE BACKFILL REQUIREMENT.
6. ANY EXCESS EXCAVATION NOT USED FOR BACKFILL WILL BECOME THE PROPERTY OF THE CONTRACTOR AND DISPOSED OF, BY HIM, IN A MANNER APPROVED BY THE ENGINEER.
7. INSTALLATION OF FLEXIBLE PIPE SHALL CONFORM TO SECTION 26 - DIVISION II OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
8. JOINTS IN METAL PIPES SHALL CONFORM TO SECTION 26.4.2.4 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES. IF A WATERTIGHT JOINT IS SPECIFIED ON THE PLANS, A 12" WIDE BY 3/4" THICK NEOPRENE SLEEVE GASKET MEETING ASTM D1056 REQUIREMENT SHALL BE USED.
9. JOINTS IN CORRUGATED POLYETHYLENE PIPES SHALL CONSIST OF A GASKETED SYSTEM WHICH CAN PASS MINIMUM OF 2 PSI HYDROSTATIC TEST WITHOUT LEAKAGE AND CONFORM TO AASHTO M 294 & SECTION 26.4.2.4 OF AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES. GASKET MATERIAL SHALL CONFORM TO EITHER ASTM D1056 OR ASTM F477 REQUIREMENTS. SIDE DRAINS ARE EXCLUDED FROM THE LEAKAGE RESISTANCE REQUIREMENTS UNLESS OTHERWISE SPECIFIED.
10. TYPE C POLYETHYLENE PIPE SHALL BE USED ONLY IN SIDE-DRAIN & SLOPLINING APPLICATIONS.
11. STANDARD BEDDING MATERIAL QUANTITIES ARE BASED ON THE TRENCH WIDTH (W), TRENCH HEIGHT (H) AND EFFECTIVE DIAMETER (D) OF ROUND CORRUGATED POLYETHYLENE PIPE MEETING THE REQUIREMENTS OF AASHTO M 294 (18"-60").
12. SPLIT COLLAR COUPLERS ARE NOT APPROVED FOR USE IN ALL CORRUGATED POLYETHYLENE PIPE INSTALLATIONS.
13. EQUIVALENT PIPE SIZES 66 INCHES AND LARGER REQUIRE 6 INCHES OF BEDDING MATERIAL BELOW PIPE CONDUIT.

BASIS OF PAYMENT

| ITEM NO. | ITEM                               | UNIT |
|----------|------------------------------------|------|
| 613 (R)  | STANDARD BEDDING MATERIAL, CLASS A | CY   |
| 613 (S)  | STANDARD BEDDING MATERIAL, CLASS B | CY   |
| 613 (T)  | STANDARD BEDDING MATERIAL, CLASS C | CY   |
| 613 (V)  | TRENCH EXCAVATION                  | CY   |

APPROVED BY  
ROADWAY ENGINEER:  DATE: 07/14/15  
ROADWAY DESIGN DIVISION STANDARD

 FLEXIBLE PIPE INSTALLATION