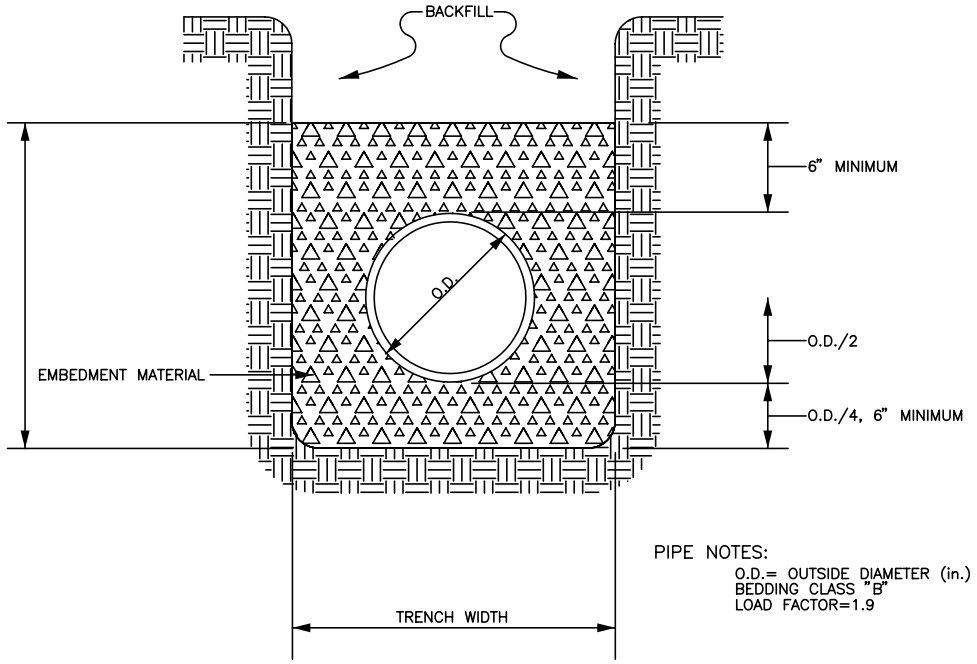
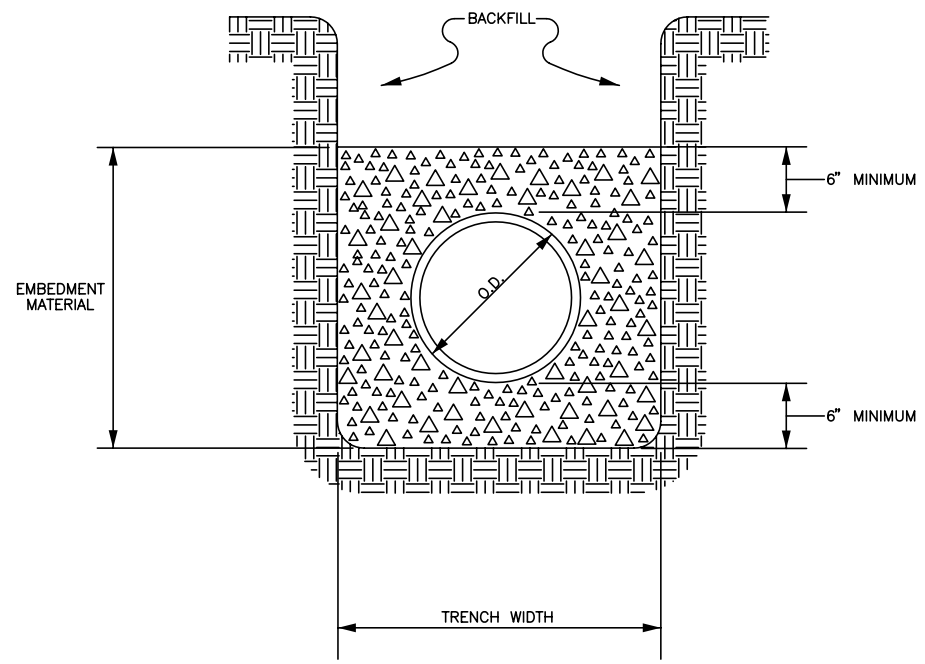
RIGID PIPE INSTALLATION
(DIP)



PIPE NOTES:
O.D.= OUTSIDE DIAMETER (in.)
BEDDING CLASS "B"
LOAD FACTOR=1.9

FLEXIBLE PIPE INSTALLATION
(HDPE, PVC, RFP)



TRENCH WIDTH TABLE

Pipe Nominal Size (inches)	Minimum Trench Width (feet)	Maximum Trench Width (feet)
≤12	3.00	5.00
15	3.25	5.00
18	3.50	5.00
21	3.75	5.25
24	4.00	6.00
27	4.25	6.25
30	4.50	6.75
33	4.75	8.25
36	5.25	9.00
42	6.25	9.50
48	7.00	11.00
54	8.00	11.50
60	9.00	12.00
66	9.75	13.00
72	10.50	13.00
78	10.50	13.50
84	11.00	14.00
90	11.50	14.50
96	12.00	15.00
102	12.50	15.50

EMBEDMENT MATERIAL

Embedment is that material to be placed from a minimum of six (6") inches below bottom of the pipe to the springline (half pipe diameter) or to a minimum of six (6") inches above top of pipe for rigid and flexible pipes, respectively. The remaining material to be placed over the embedment is considered backfill.

MATERIAL MINIMUM REQUIREMENTS

1. GENERAL – Embedment material for all rigid and flexible pipes shall be crushed rock meeting the requirements either of ASTM D–2321, Class 1A, or ASTM C–33, No. 57 or 67 and gradations shown below:

Nominal Sieve Size	Percent Passing		
	ASTM D–2321	ASTM C–33	
	Class 1A	No. 57	No. 67
1 1/2 inch	100%	100%	·····
1 inch	·····	95 to 100%	100%
3/4 inch	·····	·····	90 to 100%
1/2 inch	·····	25 to 60%	·····
3/8 inch	·····	·····	20 to 55%
No. 4	≤ 10%	0 to 10%	0 to 10%
No. 8	·····	0 to 5%	0 to 5%
No. 200	< 5%	·····	·····

2. COMPACTION REQUIREMENTS – All embedment material shall be placed and compacted in six (6") inch lifts to the following minimum percent of Standard Proctor Density as determined by ASTM D–698, "Tests for Moisture–Density Relations of Soil–Aggregate Mixtures", and ASTM D–2049, "Test for Related Density of Cohesionless Soils", respectively.

Compaction Test	Compaction Requirement
Standard Proctor Density	95%
Relative Density	75%

3. COMPACTION METHODS – All embedment material shall be compacted in accordance with the methods described in Part "3" of "Backfilling".

BACKFILLING

1. DESCRIPTION – Backfill is that portion of the total trench backfill down to but not including the pipe embedment material. The backfill shall be only material approved by the Engineer consisting of loose earth, free of clods, stones, organic matter, debris or other objectionable materials.

All backfilling shall be done in such a manner as not to disturb or injure the pipe or structures over or against which it is being placed. Any pipe or structure injured, damaged or moved from its proper proper line or grade during backfilling operations shall be opened up and repaired and then rebackfilled as herein specified.

The placing of backfill material shall not begin until approval for so doing has been given by the Engineer, but backfilling about structures or portions of structures shall be done immediately when so ordered by the Engineer. The top surface or slopes of all backfill shall be neatly graded off where select top soil, sod or other material is removed and piled separately. Such material shall be carefully placed in a manner satisfactory to the Engineer. The top twelve (12") inches of backfill material shall be of as good quality as the original top soil which was removed.

2. COMPACTION REQUIREMENTS – All backfill shall be placed and compacted in six (6") inch lifts for hand–tamped equipment and thirty (30") inch lifts of self–propelled or power driven equipment to the following minimum percent of Standard Proctor Density or Related Density as determined by ASTM D–698, "Tests for Moisture–Density Relations of Soils and Soil Aggregate Mixtures", and ASTM D–2049, "test for Relative Density of Cohesionless Soils", respectively. ASTM Test D–2049 shall be preformed on cohesionless (Granular) soils.

Cohesive backfill material shall reach the indicated compaction levels at plus or minus (+) or (–) three (3%) percent of optimum moisture content. The lift thickness shall be reduced, if necessary, to meet the compaction requirements specified herein.

General Location	Percent Compaction (%)	
	Standard Proctor Density (ASTM D–698)	Relative Density Test (ASTM D–2049)
Under Traffic Area or Improved Existing Surfaces	95	75
Urban & Residential Areas	90	70
Undeveloped & other Areas	85	70

3. COMPACTION METHODS – Compaction methods may vary depending on the material or as approved by the Engineer.

a. COHESIVE MATERIALS – Compaction of cohesive materials may be obtained by use of impact type equipment. In confined areas, pneumatic tampers and engine driven rammers may also be used. In relatively narrow trenches, self–propelled rammers may be used. In wide trenches, sheepsfoot rollers may be used.

b. COHESIONLESS MATERIALS – Cohesionless materials are granular materials classified as non–plastic. In general, vibratory equipment may be used for proper compaction. In confined areas, vibratory plates may be used. For wider trenches, vibratory rollers may be used.

c. FLOODING (JETTING) – When approved by the Engineer, materials may also be compacted or settled by flooding where adequate quantities of water are available from th City's water system, privately owned ponds, creeks or other sources located within three hundred (300') feet of the trench. Water shall be used to produce a semi–fluid mass along and out of the trench at stream crossings or other places of abrupt changes in ground profile. The Contractor shall make necessary arrangements with the City for purchase of water from the City mains, and with owners of water procured from privately owned sources. No additional compensation shall be allowed the Contractor for settling the backfill by flooding. The cost of such work shall be absorbed in the unit bid price for trench excavation and backfill or other pay units the Contractor may elect.

4. TESTING OF BACKFILL – All backfill shall be tested by an approved laboratory for compliance of the compaction requirements.

5. SURFACE RESTORATION – Upon completion of backfill, the Contractor shall replace all surface materials and shall restore paving, curbing, sidewalks, gutters, shrubbery, fences, sod and other surfaces disturbed to a condition equal to that before the work began.

The City of MOORE Oklahoma

Sanitary Sewer Standard Details No. 305

APPROVED BY: Donald Vick DATE 03/06/2008
DONALD VICK, P.E.
CITY ENGINEER

REVISED:
03/05/2008