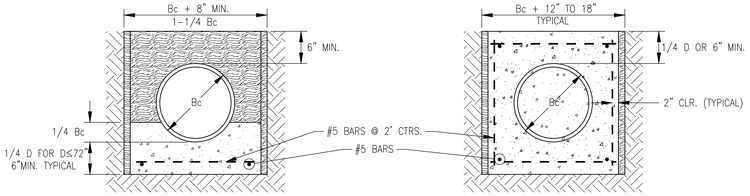
SCALE: NONE



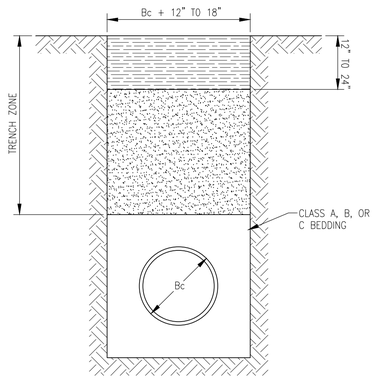

CONCRETE CRADLE



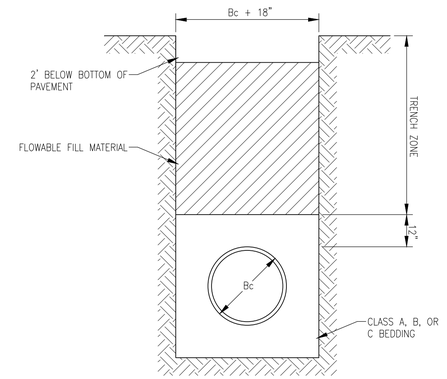

CONCRETE ENCASEMENT

CLASS A

| | | |
|---|---|---|
| Bc | = | OUTSIDE PIPE DIAMETER |
| H | = | BACKFILL FROM TOP OF PIPE TO EXISTING GROUND |
| D | = | INSIDE PIPE DIAMETER |
| d | = | DEPTH OF BEDDING MATERIAL BELOW PIPE |
| | = | GRANULAR BEDDING MATERIAL OR SAND-GRAVEL BEDDING |
| | = | COMPACTED EMBEDMENT |
| | = | CONCRETE |

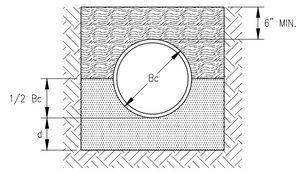



BACKFILL TYPE I

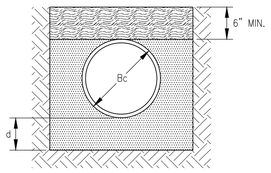



BACKFILL – FLOWABLE FILL

| DEPTH OF BEDDING MATERIAL BELOW PIPE | | |
|---|---|---|
| D | d (MIN.) SOIL | d (MIN.) ROCK |
| 27" & SMALLER | 4" | 6" |
| 30" TO 60" | 5" | 9" |
| 66" & LARGER | 6" | 12" |

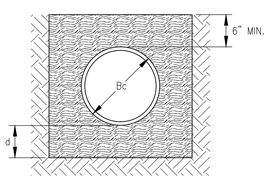



NORMAL BEDDING

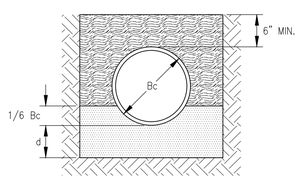



IMPROVED BEDDING

CLASS B




ORDINARY BEDDING




IMPROVED BEDDING

CLASS C

PIPE ZONE BACKFILLING

GRANULAR BEDDING MATERIAL SHALL BE AN APPROVED MATERIAL CONSISTING OF DURABLE CRUSHED ROCK CONFORMING WITH THE REQUIREMENTS OF THE LATEST REVISION OF ASTM C-33 SIZE NO. 67 (3/4" TO NO. 4); TO BE PLACED IN NOT MORE THAN 6" LAYERS AND COMPACTED BY SLICING WITH A SHOVEL OR VIBRATING.

SAND-GRAVEL BEDDING MATERIAL – SAND-GRAVEL MIX MEETING TYPE BD-2 OF THE 1990 KANSAS STANDARD SPECIFICATIONS FOR STATE ROAD AND BRIDGE CONSTRUCTION.

COMPACTED EMBEDMENT SHALL BE AN APPROVED SAND MATERIAL FREE FROM DEBRIS, ORGANIC MATERIAL, AND STONES WITH 100 PERCENT PASSING THE 3/4" SIEVE TO BE PLACED IN UNIFORM LAYERS NOT MORE THAN 6" THICK AND COMPACTED TO 95 PERCENT MAXIMUM DENSITY AS DETERMINED BY ASTM D698. GRANULAR BEDDING MATERIAL MAY BE SUBSTITUTED FOR ALL OR PART OF COMPACTED EMBEDMENT MATERIALS.

CLASS A "CONCRETE CRADLE" AND/OR CLASS A "CONCRETE ENCASEMENT" IS NOT REQUIRED UNLESS SPECIFIED ON THE PLANS. HOWEVER, WHERE UNEXPECTED TRENCH CONDITIONS EXIST OR IMPROPER TRENCHING IS PERFORMED CLASS A BEDDING MAY BE REQUIRED AS DETERMINED BY THE ENGINEER.

CLASS B BEDDING SHALL BE USED FOR ALL FLEXIBLE PIPE.

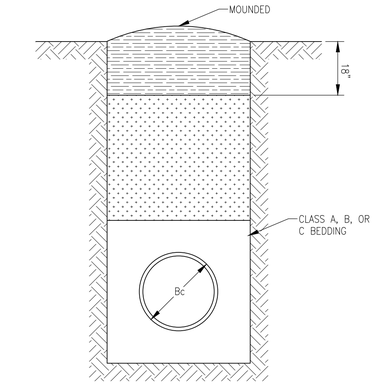
A. CLASS B NORMAL BEDDING SHALL BE USED FOR PVC PIPE UNLESS WET CONDITIONS ARE ENCOUNTERED.

B. CLASS B IMPROVED BEDDING SHALL BE USED FOR OTHER FLEXIBLE PIPE, AND FOR PVC PIPE IN WET CONDITIONS.

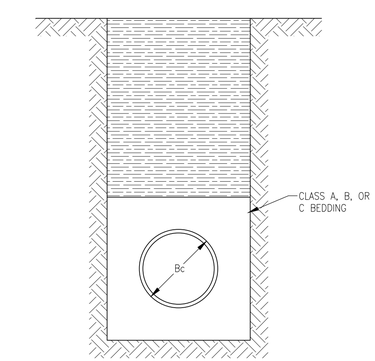
CLASS C BEDDING SHALL BE USED FOR ALL RIGID PIPE.

A. CLASS C ORDINARY BEDDING SHALL BE USED FOR ALL RIGID PIPE UNLESS WET CONDITIONS ARE ENCOUNTERED.

B. CLASS C IMPROVED BEDDING SHALL BE USED FOR WET CONDITIONS EXISTING IN THE TRENCH, AS DIRECTED BY THE ENGINEER, AT NO ADDITIONAL COST TO THE OWNER. THE DIMENSIONS SHALL BE EQUAL TO THAT REQUIRED FOR "ROCK" EXCAVATION (SEE SPECIFICATIONS).




BACKFILL TYPE II




BACKFILL TYPE III

TRENCH ZONE BACKFILLING

| | | |
|---|---|---|
| Bc | = | OUTSIDE PIPE DIAMETER |
| | = | UNCOMPACTED EARTH BACKFILL |
| | = | COMPACTED GRANULAR BACKFILL |
| | = | COMPACTED EARTH BACKFILL |

COMPACTED GRANULAR BACKFILL MATERIAL SHALL BE AN APPROVED SAND MATERIAL FREE FROM DEBRIS, ORGANIC MATERIAL AND STONES WITH 100 PERCENT PASSING THE 3/4" SIEVE AND NOT MORE THAN 15 PERCENT PASSING A NO. 200 SIEVE; TO BE JETTED AND MECHANICALLY VIBRATED INTO PLACE AND COMPACTED TO 95 PERCENT DENSITY AS DETERMINED BY ASTM D698.

UNCOMPACTED EARTH BACKFILL MATERIAL MAY BE NATURAL SOIL FREE FROM LARGE CLODS OR STONES, BRUSH, ROOTS MORE THAN 2" IN DIAMETER, DEBRIS, AND JUNK. FLOODING WITH WATER SHALL BE PROVIDED AS DIRECTED BY THE ENGINEER.

COMPACTED EARTH BACKFILL SHALL CONSIST OF MATERIAL EXISTING PRIOR TO TRENCHING OR SELECTED MATERIAL AS DIRECTED BY THE ENGINEER, AND SHALL BE COMPACTED TO 90 PERCENT DENSITY AS DETERMINED BY ASTM D698.

BACKFILL:

BACKFILL MATERIAL AND COMPACTION REQUIREMENTS SHALL CONFORM TO EITHER TYPE I, TYPE II, OR TYPE III AS SPECIFIED IN THE PLANS. ONE YEARS MAINTENANCE WILL BE REQUIRED ON ALL BACKFILL, UNLESS OTHERWISE SPECIFIED IN THE PROJECT SPECIFICATIONS.

BACKFILLING THROUGH ROCK:

BACKFILLING THROUGH ROCK SHALL BE PERFORMED AS SPECIFIED IN THE PARAGRAPH "BACKFILL" ABOVE, EXCEPT THAT THE PIPE ZONE IS INCREASED TO PROVIDE 18" OF COVER OVER THE PIPE. WHEN APPROVED BY THE ENGINEER THE REMAINDER OF THE BACKFILL MAY BE EXCAVATED ROCK PROVIDED THE EXCAVATED ROCK HAS BEEN BROKEN UP SO THAT EARTH AND ROCK WILL THOROUGHLY MIX AND NOT RESULT IN VOIDS AROUND THE LARGER PIECES OF ROCK. ANY EXCESS ROCK REMAINING AFTER THE TRENCH HAS BEEN BACKFILLED SHALL BE REMOVED OR WASTED AS DIRECTED BY THE ENGINEER.

BACKFILLING UNDER PAVEMENT:

BACKFILLING UNDER EXISTING OR PROPOSED PAVEMENT SHALL BE PERFORMED AS BACKFILL TYPE I TO A LEVEL OF 2' FROM THE BOTTOM OF THE PAVEMENT. THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED WITH SELECTED MATERIAL, SUFFICIENTLY DAMP TO BE COMPACTED IN LAYERS NOT EXCEEDING 6" IN DEPTH. COMPACTION SHALL BE PERFORMED WITH MECHANICAL TAMPERS AND CONTINUED UNTIL A RELATIVE DENSITY OF 100 PERCENT OF STANDARD DENSITY IN CONFORMANCE WITH ASTM D698 IS ATTAINED.

BACKFILLING UNDER GRAVEL STREETS:

WHERE THE TRENCH CROSSES OR IS IN EXISTING GRAVEL SURFACED STREETS, THE BACKFILL SHALL BE COMPACTED AS IN THE PARAGRAPH "BACKFILLING UNDER PAVEMENT".

CITY OF ARKANSAS CITY, KANSAS

# TRENCH & BACKFILL DETAILS

SMITH & OAKES, INC.
CIVIL ENGINEERING / LAND SURVEYING
P.O. Box 696 / 107 North Summit / Arkansas City, KS 67005
620-442-4756 / FAX 620-442-0461 / info@smithandoakes.com

| DATE: 2/29/2012 | DRAWN BY: JDS | PROJECT #: |
|---|---|---|
| | CHECKED BY: CAM | SHEET: |