

JANUARY 2009

PVC SEWER PIPE BURIAL DEPTH CHART

This burial depth chart was developed using standard industry practices for predicting diametric deflection. The burial depths provided are based on the industry recommendation for the maximum deflection of gravity-flow PVC sewer pipe of 7½%. This chart does not apply for other values of deflection.

The burial depths were calculated assuming proper installation procedures, a soil density of 120 lbs/ft³, and H20 highway loading. For shallow burials, the actual magnitude of the predicted deflection should be investigated to check for the possibility of road surface damage.

| PVC SEWER PIPES MEETING ASTM D 3034, ASTM F 679, OR ASTM F 794 (MINIMUM PIPE STIFFNESS OF 46 PSI) | | | | |
|--|---------------------------|----------------|------------------------------|------------------------------|
| SOIL CLASS | COMPACTION (% PROCTOR) | E' VALUE (PSI) | MAXIMUM BURIAL DEPTH (FT) | MINIMUM BURIAL DEPTH (FT) |
| I | > 95% | 3,000 | 50 + | 1 |
| | 85% - 95% | 3,000 | 50 + | 1 |
| | < 85% | 3,000 | 50 + | 1 |
| | Loose | 1,000 | 50 + | 1 |
| II | > 95% | 3,000 | 50 + | 1 |
| | 85% - 95% | 2,000 | 50 + | 1 |
| | < 85% | 1,000 | 50 + | 1 |
| | Loose | 200 | 177 | 1 |
| III | > 95% | 2,000 | 50 + | 1 |
| | 85% - 95% | 1,000 | 50 + | 1 |
| | < 85% | 400 | 288 | 1 |
| | Loose | 100 | 12 | 2 |
| IV | > 95% | 1,000 | 50 + | 1 |
| | 85% - 95% | 400 | 288 | 1 |
| | < 85% | 200 | 177 | 1 |
| | Loose | 50 | 9 | 2 |
| V | NOT RECOMMENDED | | | |

Soil Classifications and E' Values are from the following table.

| AVERAGE VALUES OF MODULUS OF SOIL REACTION, E' (FOR INITIAL FLEXIBLE PIPE DEFLECTION) | | | | | |
|--|---|---|--|--|--|
| SOIL CLASS | PIPE BEDDING MATERIALS SOIL TYPE (Unified Classification System ^a) | E' FOR DEGREE OF COMPACTION OF PIPE ZONE BACKFILL (PSI) | | | |
| | | Loose | Slight < 85% Proctor, < 40% relative density | Moderate 85%-95% Proctor, 40%-70% relative density | High > 95% Proctor, > 70% relative density |
| Class V | Fine-grained Soils (LL > 50) ^b Soils with medium to high plasticity CH, MH, CH-MH | No data available; consult a competent soils engineer; Otherwise use E' = 0 | | | |
| Class IV | Fine-grained Soils (LL < 50) Soils with medium to no plasticity CL, ML, ML-CL, with less than 25% coarse-grained particles | 50 | 200 | 400 | 1,000 |
| Class III | Fine-grained Soils (LL < 50) Soils with medium to no plasticity CL, ML, ML - CL, with less than 25% coarse-grained particles Coarse-grained soils with Fines GM, GC, SM SC ^c contains more than 12% fines | 100 | 400 | 1,000 | 2,000 |
| Class II | Coarse-grained Soils with Little or No Fines GW, GP, SW, SP ^c contains less than 12% fines | 200 | 1,000 | 2,000 | 3,000 |
| Class I | Crushed Rock | 1,000 | 3,000 | 3,000 | 3,000 |
| | Accuracy in Terms of Percentage Deflection ^d | ± 2 | ± 2 | ± 1 | ± 0.5 |

^a ASTM Designation D 2487, USBR Designation E-3

^b LL = Liquid limit

^c Or any borderline soil beginning with one of these symbols (i.e. GM-GC, GC-SC)

^d For ± 1% accuracy and predicted deflection of 3%, actual deflection would be between 2% and 4%.

Note: Values applicable only for fills less than 50ft (15m). Table does not include any safety factor. For use in predicting initial deflections only; appropriate Deflection Lag Factor must be applied for long-term deflections. If bedding falls on the borderline between two compaction categories, select lower E' value or average the two values. Percentage Proctor based on laboratory maximum dry density from test standards using about 12,500 ft-lb/cu ft (598,000 J/m³) (ASTM D 698, AASHTO T-99, USBR Designation E-11). 1 psi = 6.9kN/m².

SOURCE: "Soil Reaction for Buried Flexible Pipe" by Amster K. Howard, U.S. Bureau of Reclamation, Denver Colorado. Reprinted with permission from American Society of Civil Engineers Journal of Geotechnical Engineering Division, January 1977, pp. 33-43.