

Introduction

Cover height is one of the determining factors when calculating the load carrying capacity of the installation. The two most common cover height concerns are the minimum cover height in areas exposed to vehicular traffic and the maximum cover heights. These two cover heights are considered the worst case scenarios from a loading perspective, depending on the project conditions.

The information in this document is intended to provide quick access to many cover height questions with a degree of conservatism. This data is not intended to be used for project design. Refer to Prinsco’s *Structures Design Guide* for detailed information for analyzing the intended design conditions.

Minimum Cover Heights in Trafficked Conditions

Pipe with diameters of 12- to 48-inch installed subjected to AASHTO HL-93, H-25 or HS-25 traffic loads must have at least one foot cover over the pipe crown, while 60-inch diameter pipe must have at least 18 inches of cover. Table 1 below summarizes these minimum burial depth recommendations. These minimum cover heights are measured from the top of the pipe to the bottom of flexible paving or from the top of the pipe to the top of rigid paving. Structural backfill should be placed as directed by the design engineer. However, structural fill should extend (at a minimum) to the top of the pipe. See Prinsco’s *Installation Guide* for additional information.

Inside Diameter, ID, in.(mm)	Minimum Cover, H, ft. (m)	Inside Diameter, ID, in.(mm)	Minimum Cover, H, ft. (m)
12 (300)	1 (0.3)	36 (900)	1 (0.3)
15 (375)	1 (0.3)	42 (1050)	1 (0.3)
18 (450)	1 (0.3)	48 (1200)	1 (0.3)
24 (600)	1 (0.3)	60 (1500)	1.5 (0.46)
30 (750)	1 (0.3)		

Table 1: Minimum Trafficked Burial Depth

Note: Minimum covers for AASHTO HL-93, H-25 or HS-25 traffic loads, Class III backfill material compacted to 95% standard Proctor density around the pipe. Refer to *GOLDPRO Storm Trench Installation Detail D-2-100* for more information about installation requirements.

In cases where temporary construction traffic is necessary for paving or other special construction operations, Table 2 summarizes the minimum allowable covers based on the surface ground pressure.

Vehicular Load At Surface, psi (kPa)	Temporary Minimum Cover, in. (mm) for 4” – 48” diameters	Temporary Minimum Cover, in. (mm) for 60” diameter
75 (517)	9 (230)	12 (300)
50 (345)	6 (150)	9 (230)
25 (172)	3 (80)	6 (150)

Table 2: Minimum Temporary Cover

Note: Temporary minimum cover should only be employed during construction when the vehicle load is less than 75 psi.

Maximum Cover

The maximum burial depth is significantly influenced by the type of backfill and level of compaction. Other factors influencing the burial depth includes the pipe diameter and pipe section properties. Table 3 summarizes the maximum allowable burial depths for Prinsco GOLDPRO Storm (dual wall corrugated polypropylene) based on the backfill material, compaction level, and pipe diameters.

The maximum burial depths found in Table 3 assume that the pipe was installed in accordance with Prinsco’s *Installation Guide* and the requirements of ASTM D2321. The calculations used incorporate the maximum safety factors represented in Prinsco’s *Structures Design Guide* and assume that the material properties are consistent with the requirements of ASTM F2881 and AASHTO M330 Type S pipe as shown in Table 4. Also the calculations assume zero hydrostatic loading and assume that the native soils are of adequate strength and are suitable for installation. For applications requiring fill heights greater than those listed in Table 3 or where hydrostatic is anticipated, contact your local Prinsco Representative.

Maximum Burial Depth for GOLDPRO Storm Pipe, ft (m)							
Diameter	Class 1	Class 2			Class 3		Class 4
in (mm)	Compacted	95%	90%	85% *	95%	90% *	95% *
12 (300)	50+ (15.2+)	39 (11.9)	28 (8.5)	18 (5.5)	27 (8.2)	21 (6.4)	19 (5.8)
15 (375)	50+ (15.2+)	41 (12.5)	28 (8.5)	16 (4.9)	28 (8.5)	19 (5.8)	17 (5.2)
18 (450)	50+ (15.2+)	41 (12.5)	29 (8.8)	15 (4.6)	28 (8.5)	19 (5.8)	17 (5.2)
24 (600)	50+ (15.2+)	40 (12.2)	28 (8.5)	14 (4.3)	27 (8.2)	17 (5.2)	16 (4.9)
30 (750)	50+ (15.2+)	36 (10.9)	25 (7.6)	14 (4.3)	25 (7.6)	17 (5.2)	15 (4.6)
36 (900)	50+ (15.2+)	38 (11.6)	26 (7.9)	13 (3.9)	25 (7.6)	16 (4.9)	14 (4.3)
42 (1050)	50+ (15.2+)	31 (9.5)	21 (6.4)	13 (4.0)	21 (6.4)	15 (4.6)	14 (4.3)
48 (1200)	50+ (15.2+)	32 (9.8)	22 (6.7)	13 (4.0)	22 (6.7)	16 (4.9)	14 (4.3)
60 (1500)	50+ (15.2+)	35 (10.7)	23 (7.0)	11 (3.4)	23 (7.0)	14 (4.3)	12 (3.7)

Table 3: Maximum Burial Depth for GOLDPRO Storm Pipe

Notes:

- 1) Calculations assume no hydrostatic pressure and a density of 120 pcf (1922 kg/m3) for overburden material. Hydrostatic pressure may result in a reduction of allowable cover heights.
- 2) Backfill materials as defined by ASTM D2321 and compaction levels are standard proctor densities.
- 3) Installation assumed to be a trench installation in accordance with ASTM D2321 and Prinsco’s *Installation Guide*. Backfill material must be uniformly distributed around the pipe and between the corrugations. Refer to the *GOLDPRO Storm Trench Installation Detail D-2-100* and *Structures Design Guide* for more information.
- 4) Contact your local Prinsco Representative for special designs or deeper burial depths.
- 5) *For installations using a lower quality backfill material or lower compaction levels, pipe deflection may exceed the 5% design limit, however with proper control of the installation, the deflection may not be a limiting factor for the pipe. For installations where deflection limits are critical, higher compaction levels and/or a higher quality backfill material is recommended.
- 6) For installations exceeding the cover heights listed in the table, contact your local Prinsco Representative for additional design considerations.

Prinsco Product	Factored Tension Strain Limit ϵ_{yt} (%)	Factored Comp. Strain Limit ϵ_{yc} (%)	Initial		75 Year	
			Fu psi (MPa)	E psi (MPa)	Fu psi (MPa)	E psi (MPa)
Corrugated HP	2.5	3.7	3500 (24.1)	175000 (1207)	1000 (6.9)	28000 (193)

Table 4: Prinsco GOLDPRO Storm Dual Wall Pipe Mechanical Properties