

Technical Note

TN 2.11 Duraslot® and Duraslot® XL Burial Depth and Backfill Conditions

Overview

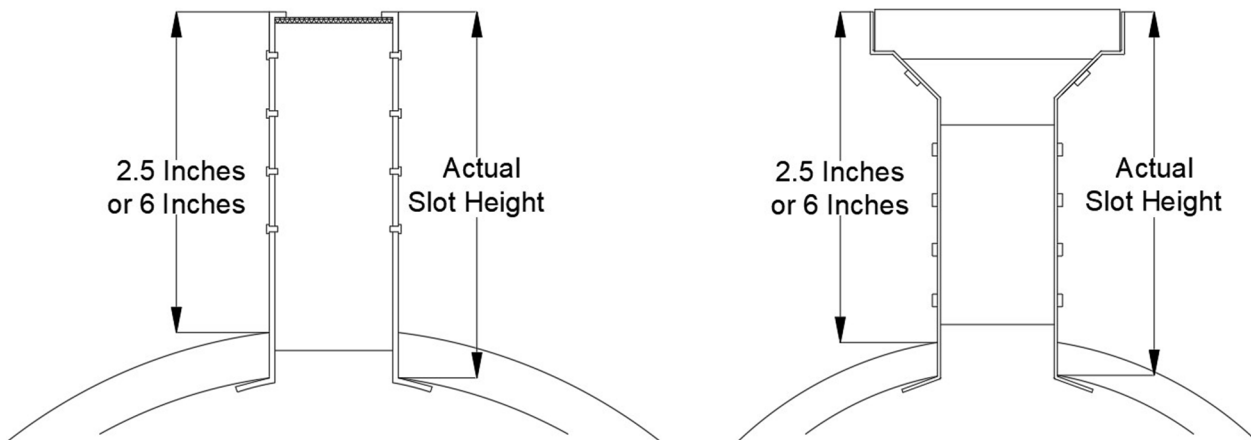
The purpose of this technical memo is to provide general design information about Duraslot and Duraslot XL's slot height, burial depth requirements and backfill conditions. The backfill envelope around the Duraslot or Duraslot XL drain is the primary structural system to resist surface loads. Requirements for the backfill envelope and installation depth varies depending on loads anticipated in the application. This tech note provides basic configuration details, including burial depth limits for three typical application classes: pedestrian-only, roadway projects, and airport projects. However, it is the responsibility of the design engineer to specify backfill and other installation details which meet their project requirements.

Burial Depth and Slot Height Limits

Duraslot and Duraslot XL's standard slot height is referenced two different ways, from grate to outside crown of pipe and the actual slot height as depicted in **Figure 1**. ADS recommends a minimum slot height (from grate to crown of pipe) of 2.5 inches (64 mm) for pedestrian-only applications and 6 inches (153 mm) for installations subject to H-20 loads. The actual slot height is the measurement taken from the top of the grate to the inside crown of the pipe and accounts for the height of the pipe corrugation. Actual slot height should be used when calculating invert elevations (see **Table 1** and **Table 2** below).

Figure 1

Actual Slot Height for Duraslot and Duraslot XL



In addition to the burial depth, Duraslot's grates should be recessed into the pavement to provide protection for the slot. For a pedestrian only application, the grate should be recessed into the pavement 0.25 inches (7 mm). For a H-20 loading applications, the slot should be recessed 0.25 inches – 0.5 inches (7 mm – 13 mm) into the pavement. Heavier loading applications shall have a 0.5 inches (13 mm) recess into the pavement. Similarly, Duraslot XL should be recessed 0.125 inches (3 mm) into the pavement to ensure proper drainage into the grate.

Table 1 provides the minimum invert depth required for Duraslot and Duraslot XL, given the pipe size and application. Invert depths (denoted as “H” in **Figures 2 – 6**) are calculated by adding the inside diameter of the pipe, approximate corrugation thickness and minimum slot height from grate to inside crown of pipe. Please note the required slot recess into the finished pavement is not accounted for.

Table 1
Minimum Invert Depth below Finish Grade by Pipe Size and Loading Condition

Inside Diameter of Pipe, in. (mm)		4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)
Minimum Invert Depth, in. (mm)	<i>Pedestrian Only:</i>	6.75 (171)*	9.00 (229)	11.00 (279)	13.00 (330)	15.50 (394)	18.75 (476)	22.00 (559)	28.75 (730)	35.00 (889)	41.25 (1048)
	<i>Roadway Projects:</i>	10.25 (260)*	12.50 (318)	14.50 (368)	16.50 (419)	19.00 (483)	22.00 (559)	25.00 (635)	31.25 (794)	38.25 (972)	44.25 (1024)
	<i>*Airport Projects:</i>	13.25 (337)*	15.50 (394)	17.50 (445)	19.50 (495)	22.00 (559)	25.00 (635)	28.00 (711)	34.25 (870)	41.25 (1048)	47.25 (1200)

**Duraslot XL is not available with a 4-inch diameter pipe or airport traffic rated applications*

Duraslot and Duraslot XL can also be made to order with a custom or variable slot height. **Table 2** provides the maximum invert depth by pipe diameter. Invert depths are calculated by adding the inside diameter of the pipe, maximum actual slot height and the recess into the pavement.

Table 2
Maximum Invert Depth below Finish Grade by Pipe Size

Inside Diameter of Pipe, in. (mm)	4 (100)	6 (150)	8 (200)	10 (250)	12 (300)	15 (375)	18 (450)	24 (600)	30 (750)	36 (900)
Maximum Invert Depth, in. (mm)	28.00 (711)*	30.00 (762)	32.00 (813)	34.00 (864)	48.00 (1219)	51.00 (1295)	54.00 (1372)	60.00 (1524)	66.00 (1676)	72.00 (1829)

**Duraslot XL is not available with a 4-inch diameter pipe*

Installation Considerations

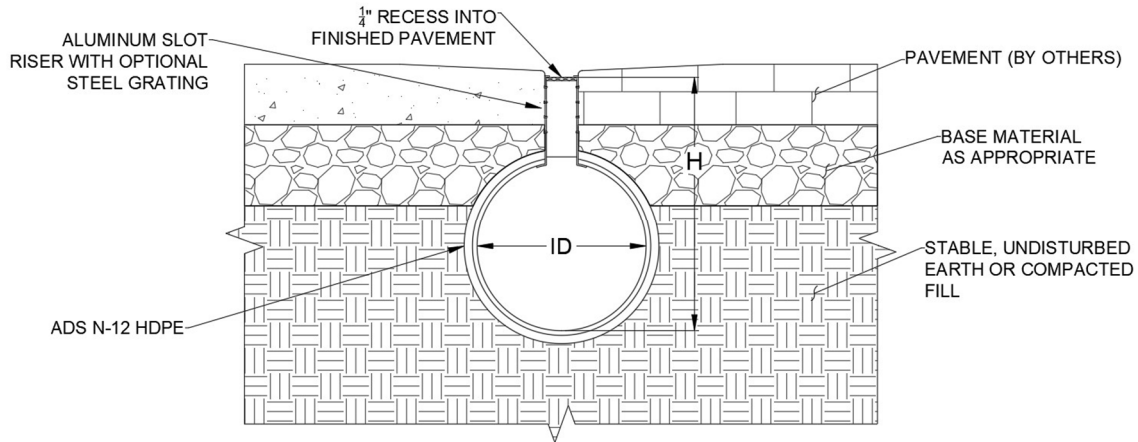
Installation conditions of Duraslot and Duraslot XL, especially the backfill envelope, drive the structural performance and longevity of the installation. Thus, minimum installation requirements will vary based on the application and project conditions. In particular, the backfill conditions and surface treatment should be specified to resist the project design loads. This section of the technical note provides general installation recommendations for three typical application classes: pedestrian only, roadway projects, and airport projects. Please note that these recommendations are intended as guidance only, and that it is the responsibility of the design engineer to produce installation details appropriate to the project conditions.

Pedestrian Only Installation

For Duraslot in light duty applications (i.e., pedestrian traffic only), properly compacted soil or gravel may be used to backfill most of the trench. The slot should be recessed at least 0.25 inch (7 mm) below the top of the pavement overlay. ADS recommends a slot height no less than 2.5 inches (64 mm) from grate to crown of pipe. For invert depth (H) limits per pipe size, refer to **Tables 1 – 2**. The surface conditions surrounding the Duraslot should be paved to support correct drainage and prevent erosion around the slot. The design of the pavement should be determined by the design engineer to meet the project requirements. Please note that the standard Duraslot coupler connections are only soiltight. A neoprene sheet or mastic filler provided by others can be used to achieve watertight joints. **Figure 2** shows an example profile view of what a final backfill design may look like.

Figure 2

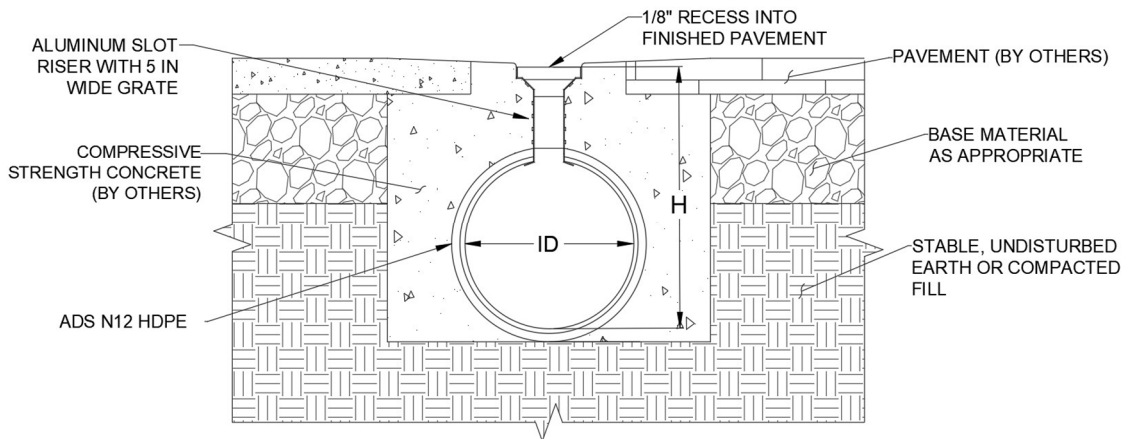
Example Installation Detail for Duraslot in a Pedestrian Only Application



For Duraslot XL in light duty applications (i.e., pedestrian traffic only), the trench should be backfilled in concrete. It is important that the lip under the grate frame has proper support to handle any surface loading. The slot height should be recessed at least 0.125 inch (3 mm) below the top of the pavement overlay. ADS recommends a slot height no less than 2.5 inches (64 mm) from grate to crown of pipe. For invert depth (H) limits per pipe size, refer to **Tables 1 – 2**. The design of the concrete backfill and any surrounding pavement should be determined by the design engineer to meet the project requirements. **Figure 3** shows an example profile view of what a final backfill design may look like.

Figure 3

Example Installation Detail for Duraslot XL in a Pedestrian Only Application



Roadway Installation

For Duraslot and Duraslot XL applications that involve H-20 design loads, a trench should be excavated so that there is a minimum clearance of 6" on either side of the pipe once lowered into the trench. ADS recommends a slot height no less than 6 inches (153 mm) from grate to crown of pipe. For invert depth (H) limits per pipe size, refer to **Tables 1 – 2**. Bedding material should be added to the trench bottom as necessary to create a stable base for installation. The rest of the trench, from pipe invert to ground surface, should be backfilled in concrete. The concrete material requirements should be specified as required for the application by the designer. As a point of reference, testing conducted by Advanced Drainage Systems has proven a 4000-psi concrete mix is sufficient for H-20 traffic loading application. An expansion joint is recommended between the concrete backfill and the abutting pavement to protect the slot. **Figure 4 – 5** shows an example profile view of what a final backfill design may look like. In addition, Duraslot's slot should be recessed 0.25 – 0.5 inches (7- 13 mm) and Duraslot XL's slot should be recessed 0.125 inches (3mm) below the top of the pavement overlay.

Figure 4

Example Install Detail for Duraslot in a Roadway Application

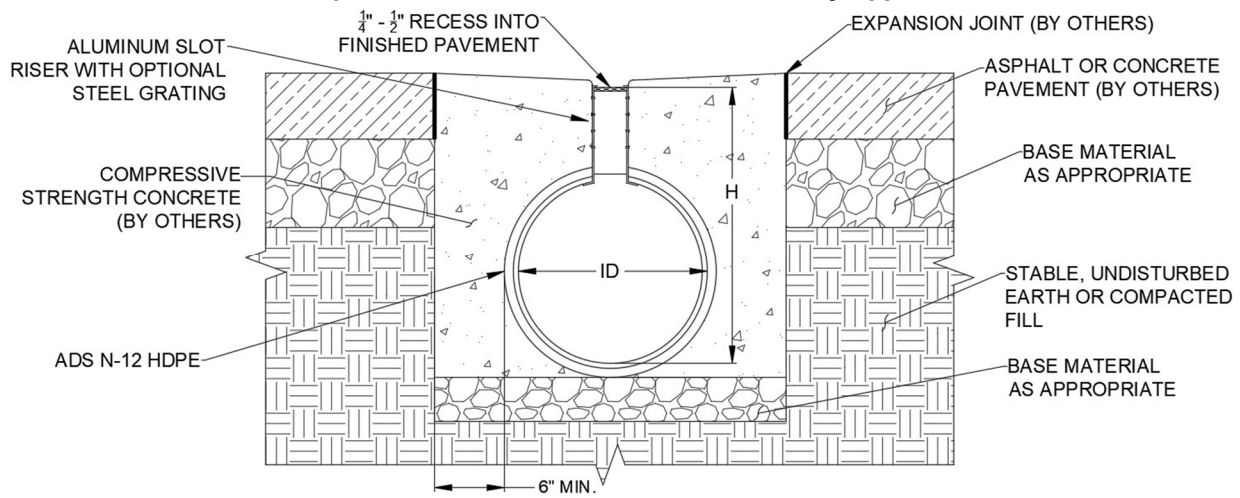
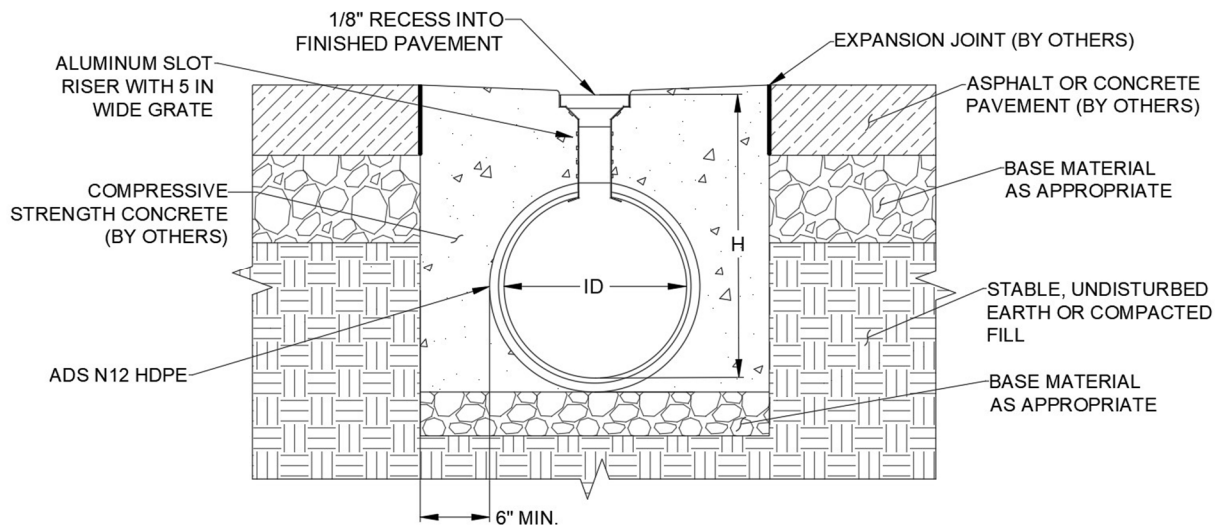


Figure 5

Example Install Detail for Duraslot XL in a Roadway Application



Airport Installations

ADS recommends additional installation considerations for critical infrastructure projects such as airports using Duraslot. The slot should be recessed at least 0.5 inch (13 mm) below the top of pavement. ADS recommends a slot height of no less than 9 inches (229 mm) from grate to crown of pipe. For invert depth (H) limits per pipe size, refer to **Tables 1 – 2**. On projects where design loads are comparable to H-20 traffic, **Figure 4** below may be referenced for minimum recommended installation conditions. For installation subject to heavier surface loading, the design engineer should prepare a site-specific design. In general, an installation trench should be excavated, leaving at least 6 inches (153 mm) of clearance on either side of the pipe. The trench subgrade should be compacted or remediated as necessary, including adding bedding material, to provide a stable base. The rest of the trench, from pipe invert to ground surface should be backfilled in concrete. The design of the concrete backfill, including potential use of reinforcement, should be specified by the design engineer according to the project requirements. An expansion joint is recommended between the concrete backfill and the abutting pavement to protect the slot.

Figure 6

Example Backfill Conditions for Duraslot in an Airport Application

