Kanaflex®

Flowable Fill for Kanapipe™ SRPE Pipe

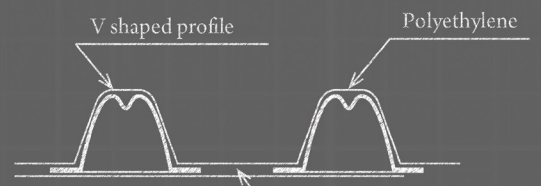


Figure 2

12" – 42"

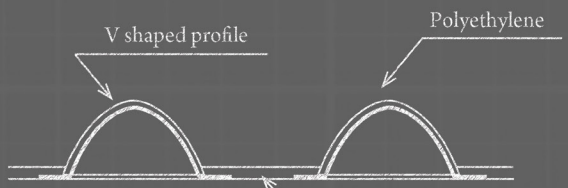


Figure 3

>48"

KanaPipe 12" Spec

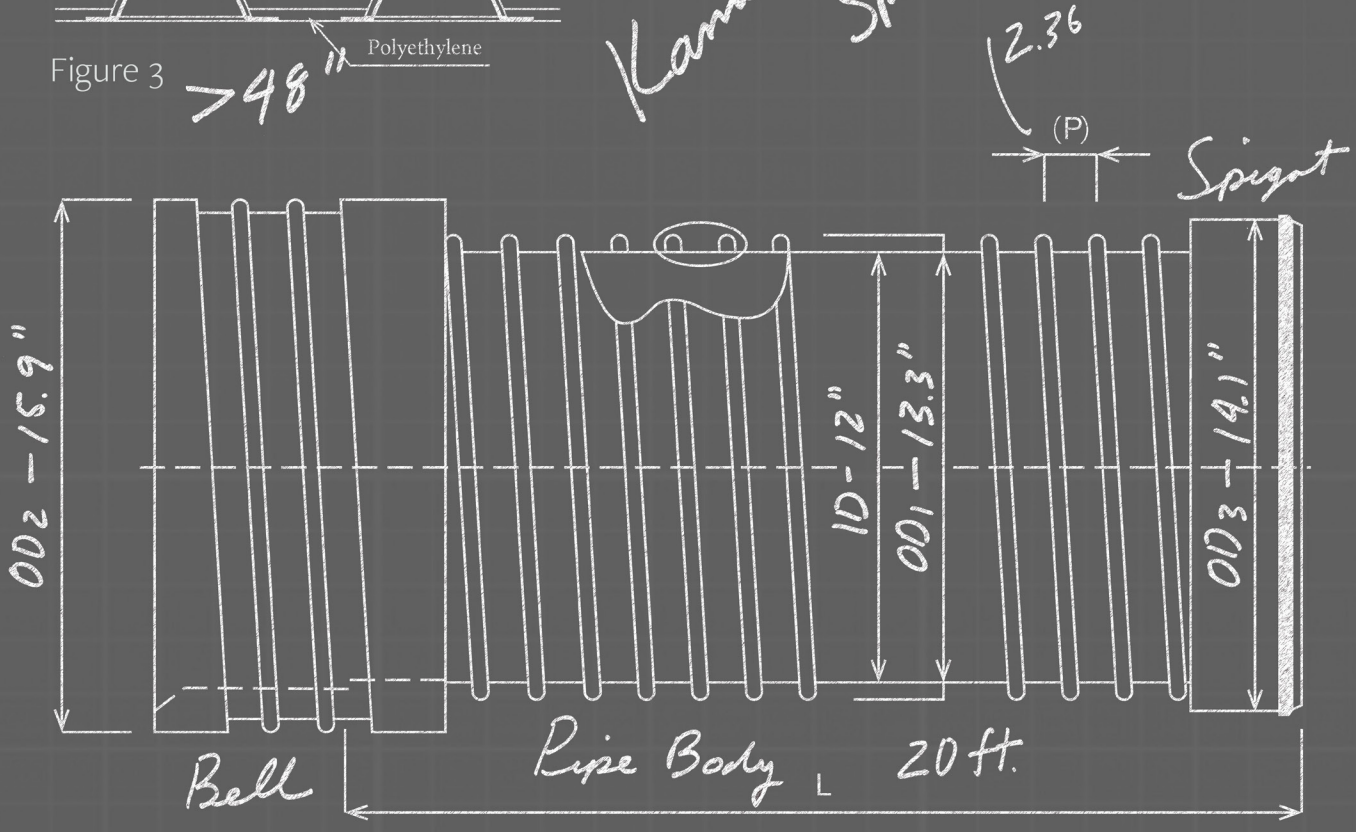


Figure 1

Introduction

Performing a successful installation of Steel Reinforced Polyethylene (SRPE) pipe requires building a stable and permanent support through the compaction of proper bedding and backfill granular materials. Materials used for foundation, embedment and backfill are classified into types in accordance with ASTM standard D2321 and they include natural, processed, and manufactured aggregates. A potential alternative to these materials is flowable fill, also referred to as Controlled Low Strength Material (CLSM). Flowable fill is comprised of a mixture of sand, cement, fly ash and water. As its name implies, it is typically a flowable and self-leveling material. ASTM D4832 "Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders will offer you additional information about this material.

Flowable Fill Properties

When access to and cost of soil and aggregates is either difficult, complicated or prohibitive, flowable fill can be used as an alternative backfill material. Before deciding on using flowable fill or not, we should look at its advantages and disadvantages.

Advantages

- Allows for a narrower trench and less disturbances to the native surrounding soil
- Reduces the amount of material excavated on a project
- Ensures equal distribution of support around the pipe
- Eliminates the need for backfill compaction
- Flowable fill could potentially be made on-site using native soil as part of the mix where sands or silty sands are present
- Time, personnel, and equipment required to install flowable fill are typically less than those required for proper placement and compaction of conventional backfill material, particularly when dealing with fine-grained soil
- Time and equipment required for compressive strength testing is often less than those required to validate granular soil compaction and density

Disadvantages

- Typically, more expensive than granular backfill because of the many components required and specialized delivery
- Cannot be stockpiled on-site like granular backfill. Time saved during placement of the flowable fill could be wasted waiting for ready-mix delivery.
- Proper mix design including selection and proportioning of the constituent materials is critical in order to provide adequate strength all the while retaining the option for future excavation should the need arise
- This can only be tested and validated by measuring the 28 days compressive strength since the mechanical strength of flowable fill develops with time
- Unless specific precautions are taken, the potential for pipe flotation is high during the installation process
- Watertight joints are recommended to prevent infiltration into the pipe system

Installation

Flowable fill should not be used when outside temperatures fall below 39° F (4° C) as it is not designed to withstand the freeze-thaw cycle. Flowable will either be delivered to site by a ready-mix concrete truck mixer or mixed on-site as the pipe installation work progresses. The mix should always be tested prior to installation in addition to field batch testing. The trench bottom shall be stable and free of protruding rocks, therefore over-excavation and replacement with suitable bedding material is recommended to ensure adequate pipe support.

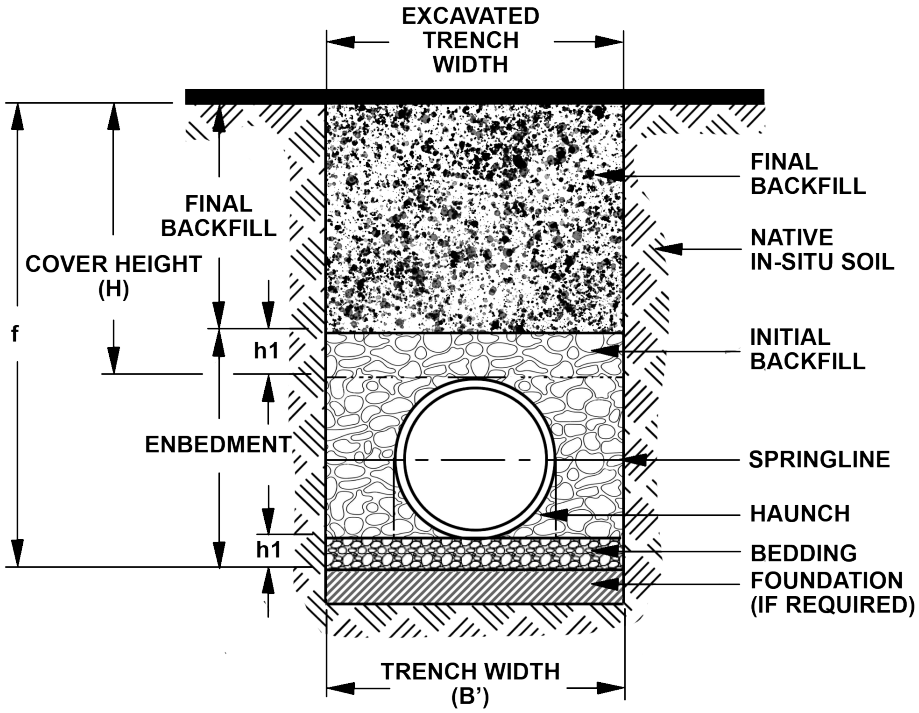
With flowable fill backfill, AASHTO Section 30 permits a reduction in trench width compared to standard backfill material. The minimum allowed width is the pipe's outside diameter plus 12" (300 mm). Needless to say the in-situ soil must be adequately load bearing and not a soft material. There must be adequate access to ensure the flowable fill material is fully present in the haunch area. Table 1 lists recommended trench widths for Kanapipe™ when using flowable fill backfill and figure 1 shows a typical trench layout.

Table 1
Recommended Trench Widths for Flowable Backfill

Kanapipe Nominal Diameter inch (mm)	Kanapipe Outside Diameter inch (mm)	Minimum Trench Width inch (mm)
12 (300)	13.3 (338)	26 (660)
15 (375)	16.3 (413)	29 (740)
18 (450)	19.3 (489)	32 (815)
24 (600)	25.7 (653)	38 (965)
30 (750)	32.2 (817)	45 (1145)
36 (900)	38.2 (970)	51 (1300)
42 (1050)	44.4 (1128)	57 (1450)
48 (1200)	52.0 (1320)	64 (1625)
60 (1500)	65.2 (1656)	78 (1980)
72 (1800)	77.2 (1961)	90 (2285)

Care should be taken to ensure that flowable fill is placed evenly on both sides of the pipe to prevent misalignment. Flowable fill should be placed in lifts as recommended by the project Engineer. The mix supplier should be consulted to recommend the appropriate waiting period between lifts. Anchoring systems are recommended to prevent pipe flotation and should also be determined by the project Engineer. You will find additional information about pipe flotation in Kanaflex Technical Bulletin KANTB-001 0324.

Figure 1
Typical Trench Layout



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