Kanaflex®

Composite Embedment for Steel Reinforced Polyethylene (SRPE)pipes

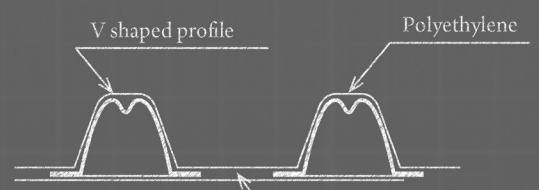


Figure 2

12" – 42"

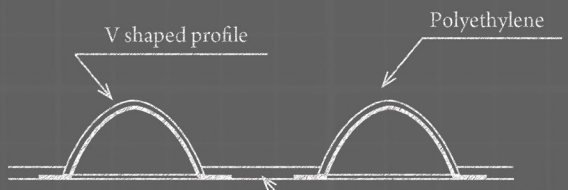


Figure 3

>48"

KanaPipe 12" Spec

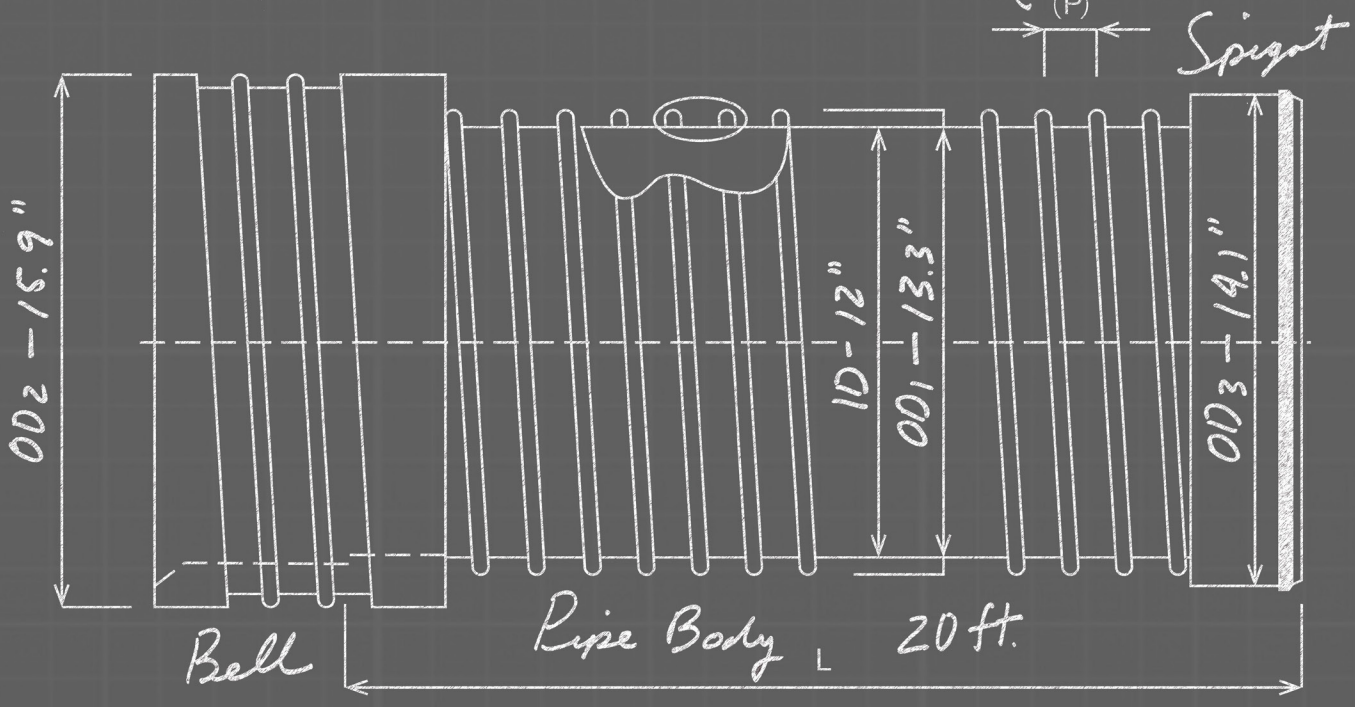


Figure 1

Introduction

This technical bulletin is presented to owners and consulting engineers to inform them about the superior ring stiffness of Steel Reinforced Polyethylene (SRPE) pipe technology. Knowing this, they can decide to take advantage of it by implementing an alternate composite trench design to reduce installed costs while maintaining the highest standards of safety, durability and reliability for the sewer conveyance projects.

Product Description

Kanapipe™ is an advanced pipe design combining the strength of steel with the unparalleled durability of high-density polyethylene. This Steel Reinforced Polyethylene (SRPE) pipe technology, combined with its high-performance bell & spigot joint rated for 20 psi, is used to build gravity fed sanitary and storm sewer systems, as well as stormwater management underground detention tanks. The pipe can also be used to build low-pressure irrigation transmission mains. Detailed information on pipe dimensions and weights is available in our Kanapipe brochure and in our Kanapipe Installation Guide (KANTB-008 0324).

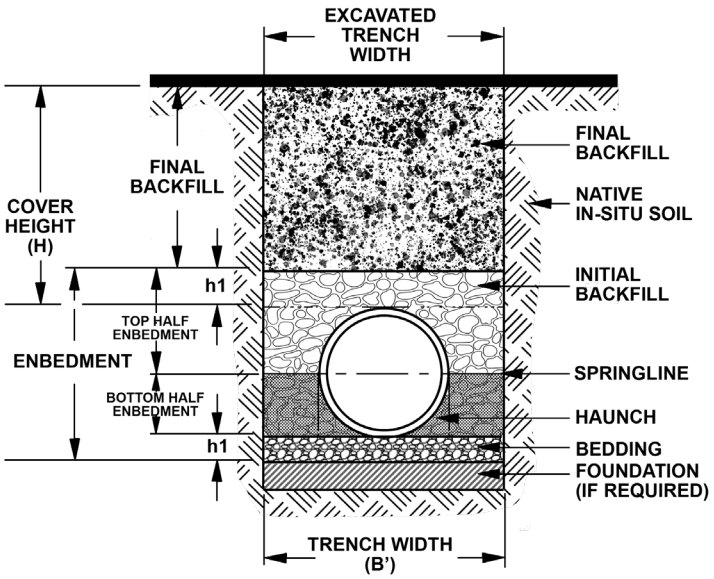
Superior Pipe Design

Even though it is categorized as a flexible pipe product, Kanapipe has a ring stiffness greater than most traditional flexible pipe products. Its design, which relies on an HDPE encapsulated steel profile to provide structural strength and load bearing capacity, allows end-users to install the pipe using a composite embedment.

Composite Embedment Trench Terminology

When using a composite embedment, the trench terminology will vary slightly, as shown in Figure 1.

Figure 1
Trench and Embedment Terminology for Composite Embedment



Composite Embedment Concept

This composite embedment combines two quality granular materials to create a cost-effective backfill capable of ensuring pipe performance and reliability and strong structural integrity all the way to the top grade. The strongest of the two granular materials is used from the bedding all the way up to the springline of the pipe. Make sure the material is "knifed" under the pipe haunches and compacted in accordance with the project's requirements. This is the critical area where the backfill contributes to the pipe-soil mechanism to transfer vertical loads through the pipe and maximize bearing capacity.

Then the second granular material, selected to meet the structural requirements to provide a solid foundation, is used from the springline up to the initial backfill. Make sure it is installed respecting appropriate lifts and compaction requirements.

Composite Embedment Soil Group Numbers

Because we are using two different granular materials to create this more cost-effective composite embedment, it is necessary to identify these materials by Composite Embedment Soil Group Numbers, as shown in Table 1 below. These same group numbers are used to determine the maximum allowable depth of cover as shown in Table 2.

Initial and Final Backfills

Initial and final backfills are then put in place and compacted to meet the structural requirements of the project. For detailed information about assembly, installation, trench width requirements and backfill procedures, for Kanapipe, please refer to the Kanapipe Installation Guide (KANTB-008 0324).

Maximum Allowable Depth of Cover

Detailed calculations for maximum allowable depth of cover for Kanapipe per diameter are summarized in Table 2. Results of the structural analysis indicate the pipe can be safely installed for the burial depths shown below when installed in accordance with the manufacturer's recommendation and in accordance with ASTM D2321. Table 2 specifies the specific diameters of the Kanaflex SRPE pipe and the associated maximum recommended burial depth for each composite soil group defined in Table 1.

Table 1
Composite Embedment Soil Group Numbers

Composite Embedment Soil Group Numbers										
Top Half[1] / Bottom Half[2]	Class I		Class II			Class III			Class IV	
	Compacted	Dumped	95%	90%	85%	95%	90%	85%	95%	90%
Class I Compacted	1	2	3	3	4	5	5	7	8	9
Class I Dumped	NR[4]	2	2	2	2	2	2	7	8	9
Class II 95%	NR	NR	3	4	4	4	5	7	7	9
Class II 90%	NR	NR	NR	4	4	4	5	7	8	9
Class II 85%	NR	NR	NR	NR	5	5	5	7	7	9
Class III 95%	NR	NR	NR	NR	NR	6	7	7	7	9
Class III 90%	NR	NR	NR	NR	NR	NR	7	7	8	9
Class III 85%	NR	NR	NR	NR	NR	NR	NR	8	8	9
Class IV 95%	NR	NR	NR	NR	NR	NR	NR	NR	8	9
Class IV 90%	NR	NR	NR	NR	NR	NR	NR	NR	NR	10

Notes:
1 Top half is defined as the backfill material used above the springline in the embedment shown in Figure 1 below.
2 Bottom half is defined as the backfill material used below the springline in the embedment shown in Figure 1 below.
3 Class I, II, III and IV soils are defined in ASTM D2321. Percent compactions are based on standard proctor density.
4 NR is defined as Not Recommended.

Table 2
Maximum Allowable Depth of Cover

Allowable Burial Depth (feet)										
Diameter (in)	Composite Soil Group (see Table 1)									
	1	2	3	4	5	6	7	8	9	10
12	67	37	54	37	35	38	30	27	27	25
15	59	30	47	30	26	30	22	18	18	16
18	50	28	45	28	23	29	19	15	14	12
24	64	27	45	27	22	29	20	16	16	14
30	42	25	38	25	23	26	17	13	13	11
36	27	22	25	22	19	23	15	11	10	8
42	41	22	36	22	22	23	15	11	11	9
48	31	18	27	18	16	18	12	9	9	8
60	28	19	22	19	12	16	11	8	8	7

Note: Composite soil group materials and density are defined in Table 1.

The depths of cover shown in Table 2 are conservative. Contact Kanaflex to achieve deeper burial depths when using a composite embedment.

Summary

This bulletin is intended for trench installations applications only and provides an alternative cost-effective trench detail for the use of Kanaflex pipe based on a composite embedment concept. It is the responsibility of the project engineer to evaluate and decide is a composite embedment is an appropriate and cost effective solution for his specific site conditions.

Additional installation guidance can be found in the following industry practices and standards:

1 ASTM F449 “Practice for Subsurface Installation of Corrugated Polyethylene Pipe for Agricultural Drainage or Water Table Control.”
2 ASTM F1417 “Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.”
3 ASTM F1668 “Construction of Buried Plastic Pipe.”
4 ASTM D2321 “Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.”
5 ASTM F2435 “Standard Specification for Steal Reinforced Polyethylene (PE) corrugated pipe”

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