Snap-Tite
Culvert Rehab

DOT & PF Quarterly Design Meeting

Mark Kleven

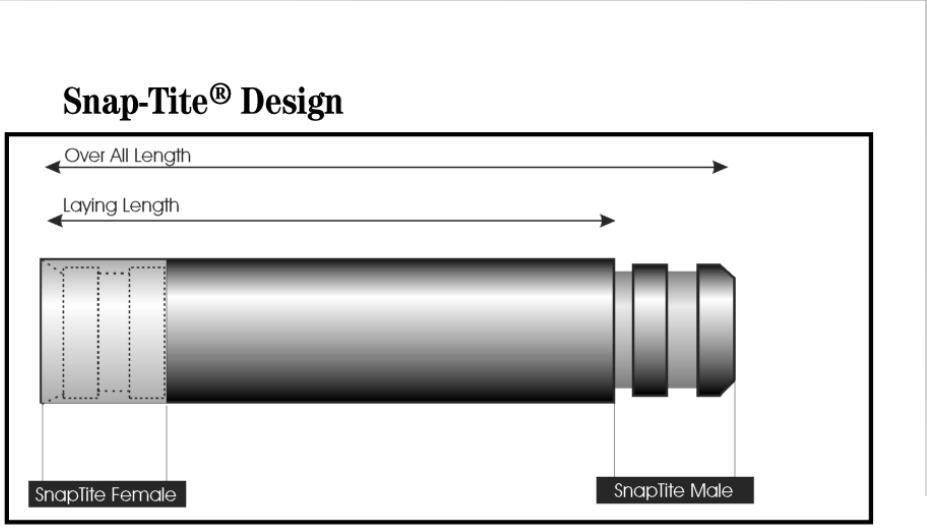
Northwest Regional Sales Manager

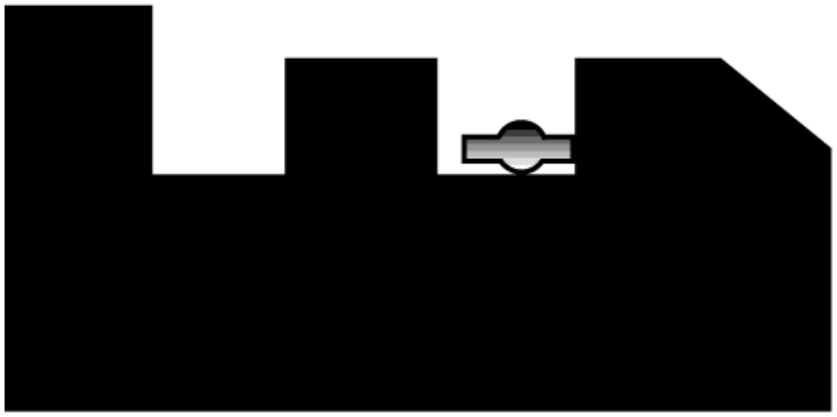
Snap-Tite

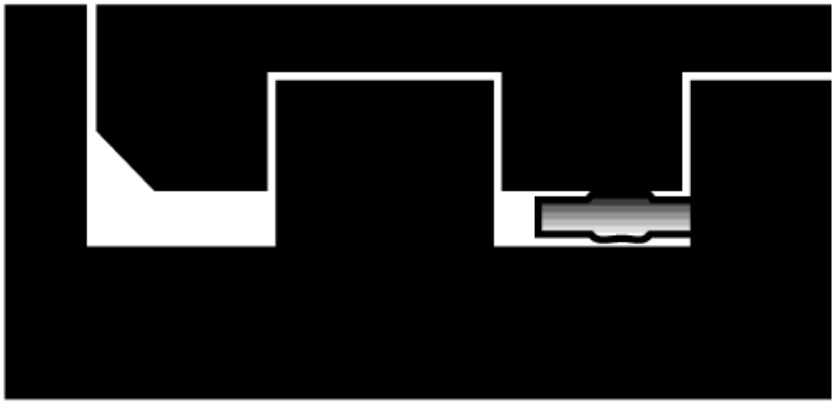
Product Data

Cross Section

- Typical Cross Section of Snap-Tite HDPE Pipe







Product Data

Design Life

- Snap-Tite HDPE Pipe has a design life of 100 years as designated by the Plastic Pipe Institute.
  - www.plasticpipe.org

Product Data

Hydraulic Characteristics

- The Snap-Tite joint allows sections of pipe to be joined mechanically in the field without increasing the OD or decreasing the ID of the liner at the joint
- The smoothness of the surface of HDPE pipe actually increases flow rates, despite reducing the size of the culvert
- Snap-Tite has a Manning “n” factor of 0.00914, whereas CMP has an “n” factor of 0.024.
  - This allows Snap-Tite to be sliplined inside a failing CMP and in most cases, increase the flow of water in that culvert.

Product Data

Corrosion / Abrasion

- Corrosion
  - Snap-Tite HDPE Pipe is corrosion resistant which makes it ideal for drainage of hostile effluents, such as acid rain, road salts, fuels and motor oil.
- Abrasion
  - HPDE pipe has demonstrated wear rates up to 10x less than steel.
  - HDPE was originally designed for use in the aggregate mining industry which is a highly abrasive industry on pipes. HDPE was chosen because of its high resistance to abrasion of materials traveling through it.
- Ultraviolet (UV) Stabilizers
  - 2% Carbon Black is used in HDPE for UV protection.

The Culvert Inlet Device

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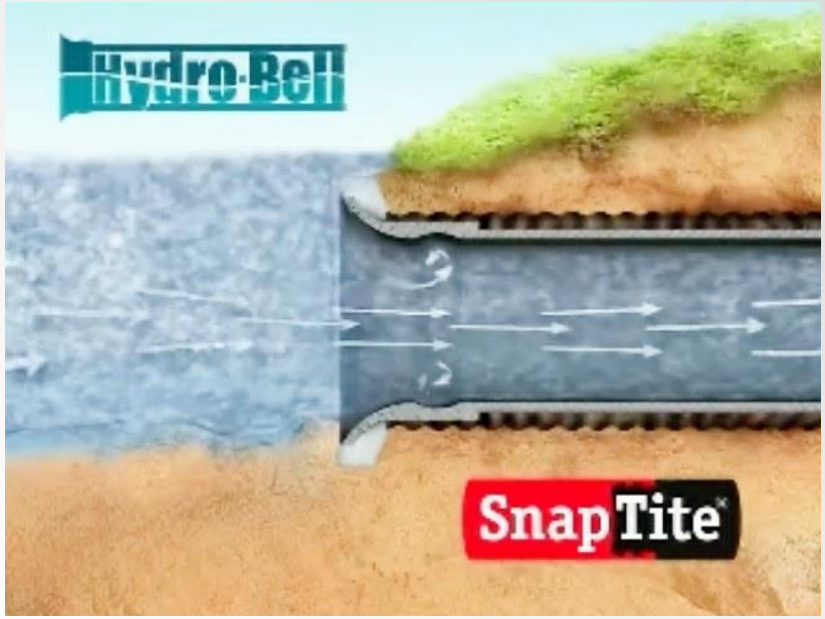
Hydro-Bell



An average flow increase of 30% compared to plain end headwalls under inlet control conditions

Hydro-Bell

- As head pressure increases, the Snap-Tite® Hydro-Bell system flow rate increases

- “Snaps” onto the inlet end of the Snap-Tite culvert liner

Hydro-Bell

- No special training or tools required to install
- Hydro-Bell makes Snap-Tite® *the ideal hydraulic option to line failing RCP culverts*
- Available in all Snap-Tite® *liner sizes 6” through 63”*

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Slip-Lining Pipe

12” to 63” diameter meets AASHTO M 326 requirements

Standard Specification for

Polyethylene (PE) Liner Pipe, 300- to 1600-mm Diameter, Based on Controlled Outside Diameter

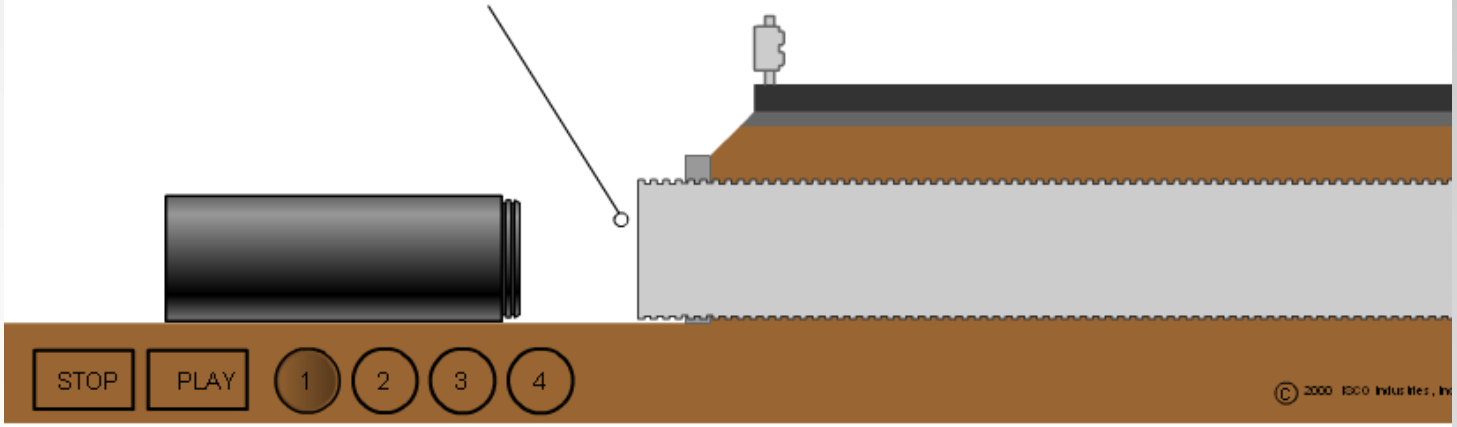
AASHTO Designation: M 326-08

American Association of State Highway and Transportation Officials
444 North Capitol Street N.W., Suite 249

Unload liner - No special care in handling needed

Clean Culvert of Debris and Rocks

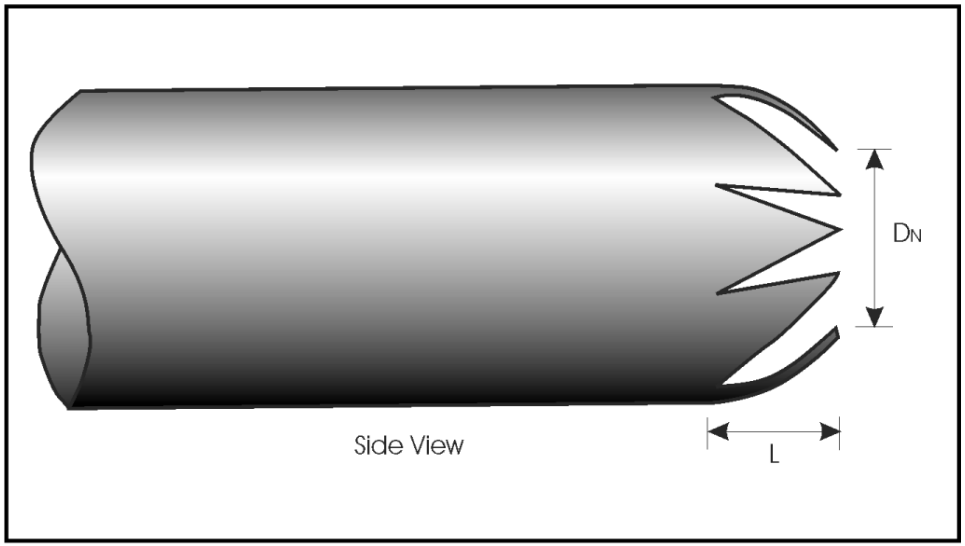
Culvert must first be cleared of any objects that may obstruct the insertion of the liner.



Prepare culvert for lining and install anti-flotation strips if desired

Nosecone required with section or alignment problems

Nose-Cone Typical:



Side View
L = about 12" to 16"
DN = about 3/4 Dia. of pipe

Example: 24" pipe, DN = 18"
36" pipe, DN = 27"
42" pipe, DN = 32"

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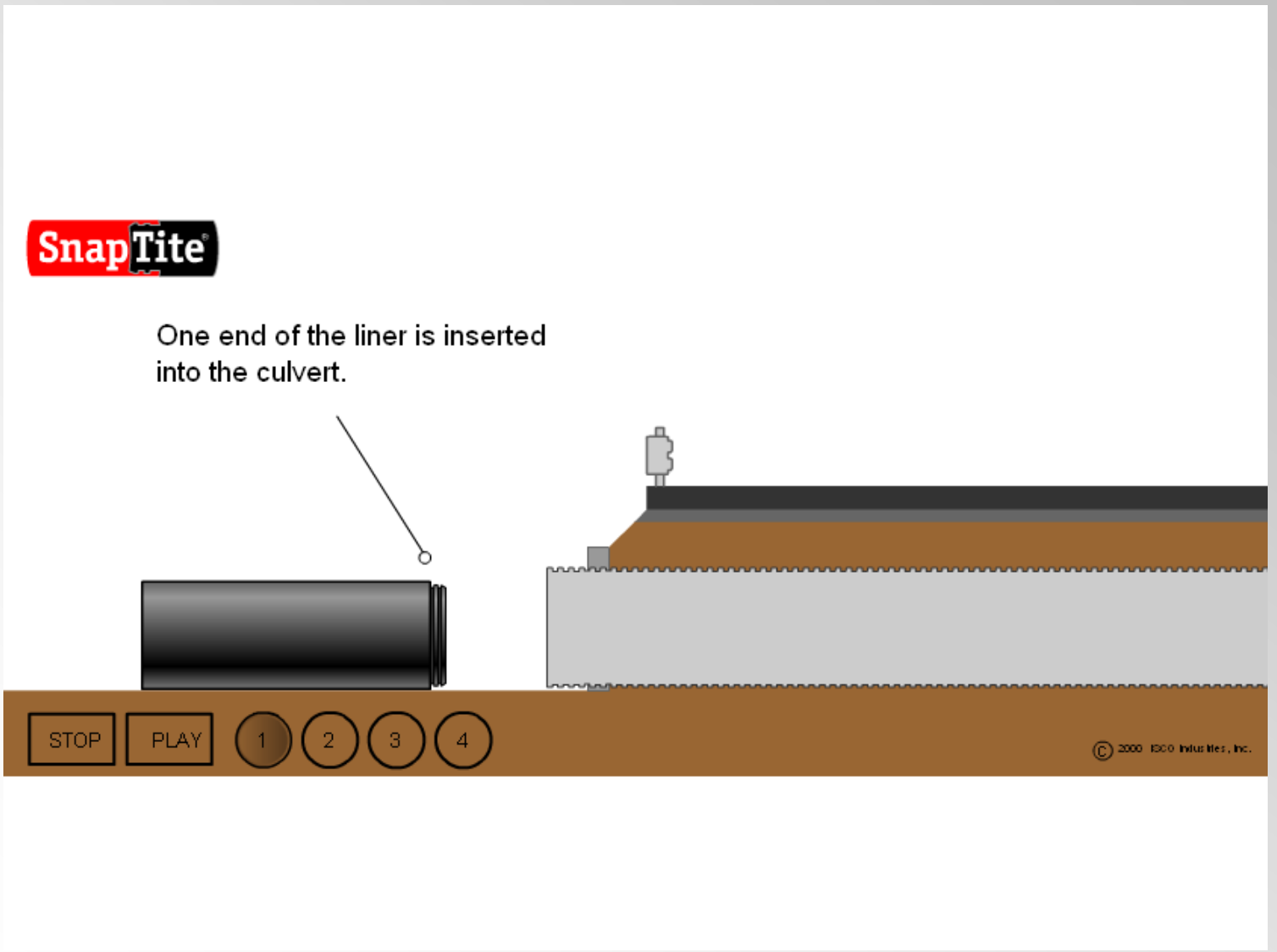
Insert first liner section into the culvert



Insert first liner section into the culvert

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Add Gasket to Male End of Snap-Tite Pipe

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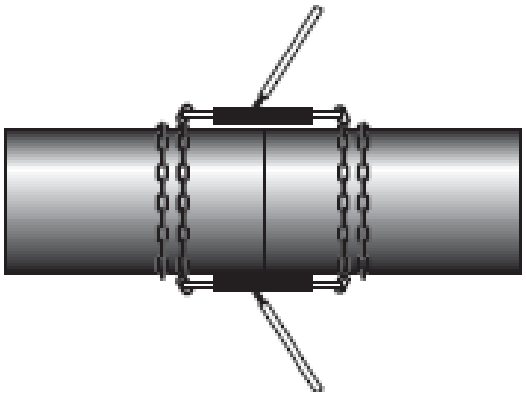
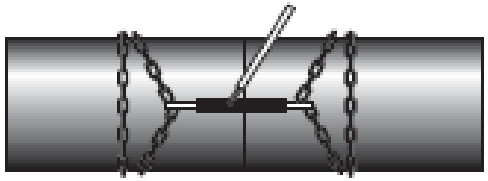
Position the next section

Preparing to snap sections together with either chains and come-alongs or use a cable as shown below

Come-Along and Chain Method



Position of chain before load
Top View



Chain under load
Side View

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Snapping Snap-Tite Together

Pulling the assembled sections into the culvert

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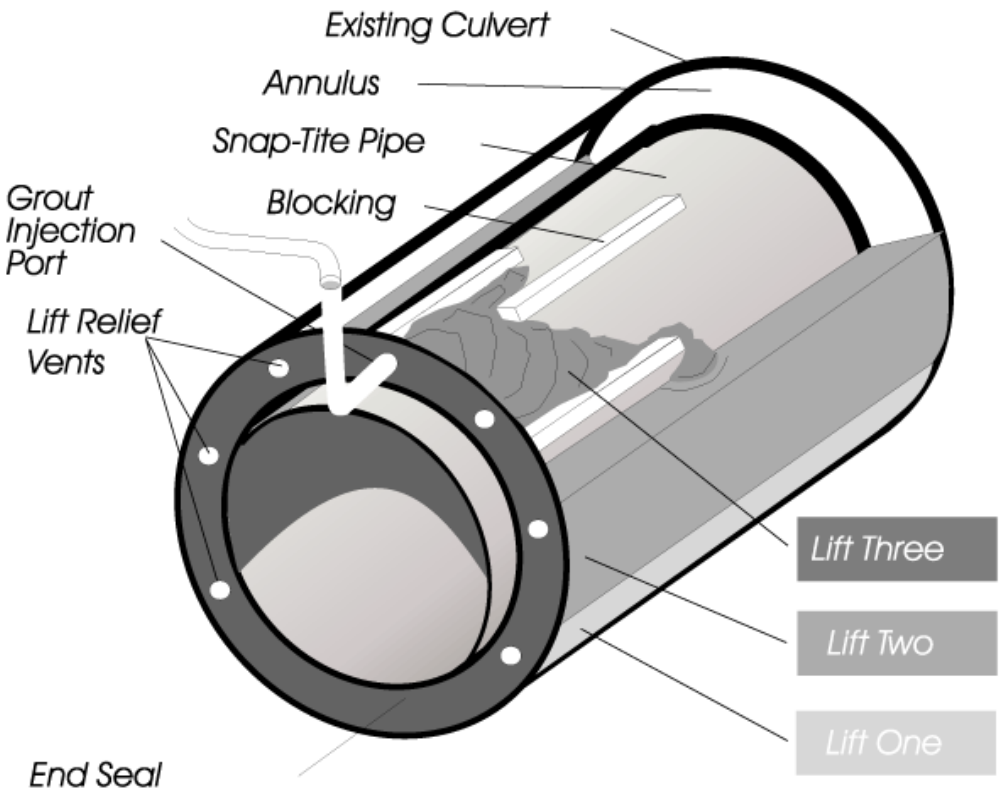
Bulkhead

Drawing 3



Build A Bulkhead Around End of Culvert

Grouting the annular space

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Determining Grout Requirements

- Grouting helps the liner stop leaks
- Grouting fills voids
- Grouting reinforces the liner inside the old culvert

Table 2: Determining Grout Requirements

Grout Requirements

Culvert Size	Liner Size OD	Cu Ft/Ft	Cu Yd/10 Ft
12" ID	10.75"	0.25	0.10
15" ID	12.75"	0.34	0.13
18" ID	16"	0.7	0.26
18" ID	16"	0.37	0.14
21" ID	16"	1.01	0.37
21" ID	18"	0.63	0.24
24" ID	20"	0.96	0.36
24" ID	22"	0.5	0.19
27" ID	22"	1.34	0.49
27" ID	24"	0.83	0.31
30" ID	24"	1.77	0.65
30" ID	28"	0.63	0.23
36" ID	28"	2.79	1.03
36" ID	30"	2.16	0.80
36" ID	32"	1.48	0.55
42" ID	34"	3.31	1.23
42" ID	36"	2.55	0.95
48" ID	39.37"	4.11	1.52
48" ID	42"	2.94	1.09
54" ID	42"	6.28	2.33
54" ID	47.25"	3.73	1.38
60" ID	47.25"	7.46	2.76
60" ID	54"	3.73	1.38
72" ID	54"	12.36	4.60
72" ID	63"	6.63	2.46
84" ID	63"	16.83	6.30


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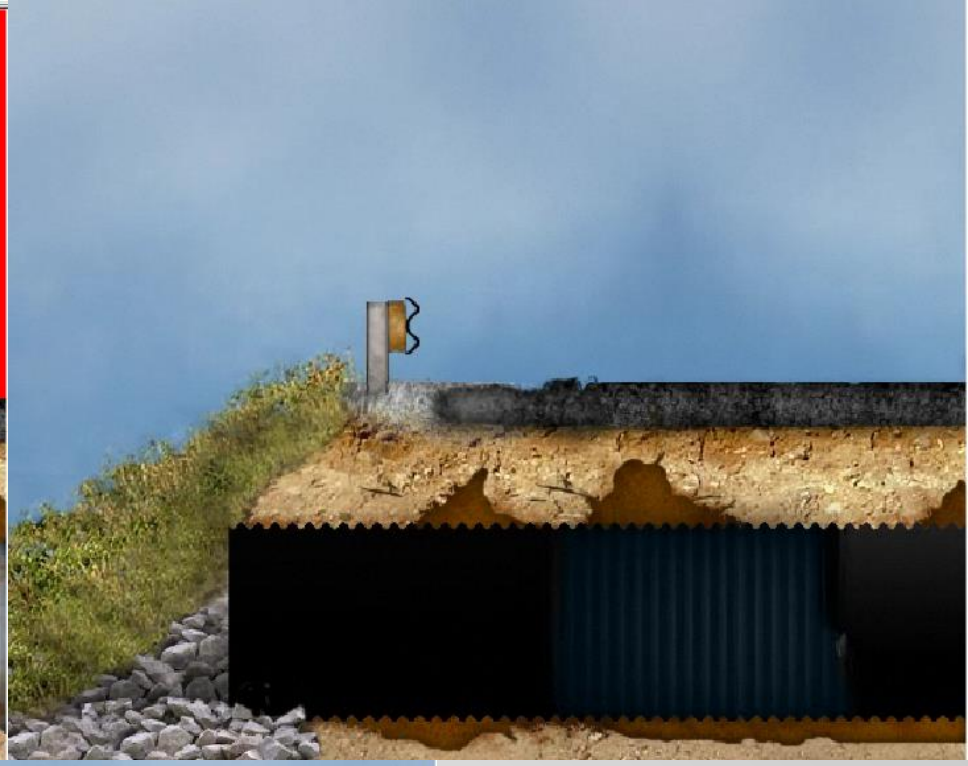


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Culvert ends after grouting completed

Oval Snap-Tite Pipe

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Product Advantages

- HDPE pipe is not brittle – it works well in cold weather climates compared to other plastic piping materials
- Snap-Tite HDPE Pipe can be pushed or pulled through existing culvert with ease
  - Hard to damage during installation
- Snap-Tite HDPE Pipe meets ASTM D-3212
  - The joint must be water-tight with gaskets to prevent infiltration or exfiltration
- Snap-Tite HDPE Pipe meets AASHTO M-326-08
- “N” factor of Snap-Tite HDPE Pipe is .00914

Summary

- Snap-Tite HDPE Pipe provides a feasible alternative to replacement of failing culverts
- Hydraulic capacity is usually maintained or increased
- HDPE liners provide structural strength and are very durable even in extreme conditions
- Grouting the annular space and filling in the voids that are present is the most critical step in rehabilitating a failing culvert. Skipping this step does not solve the problem at hand