



Avoid That Siphon! Use an Aerial Pipe Bridge Instead

Glenn Hermanson, PE | February 8, 2024



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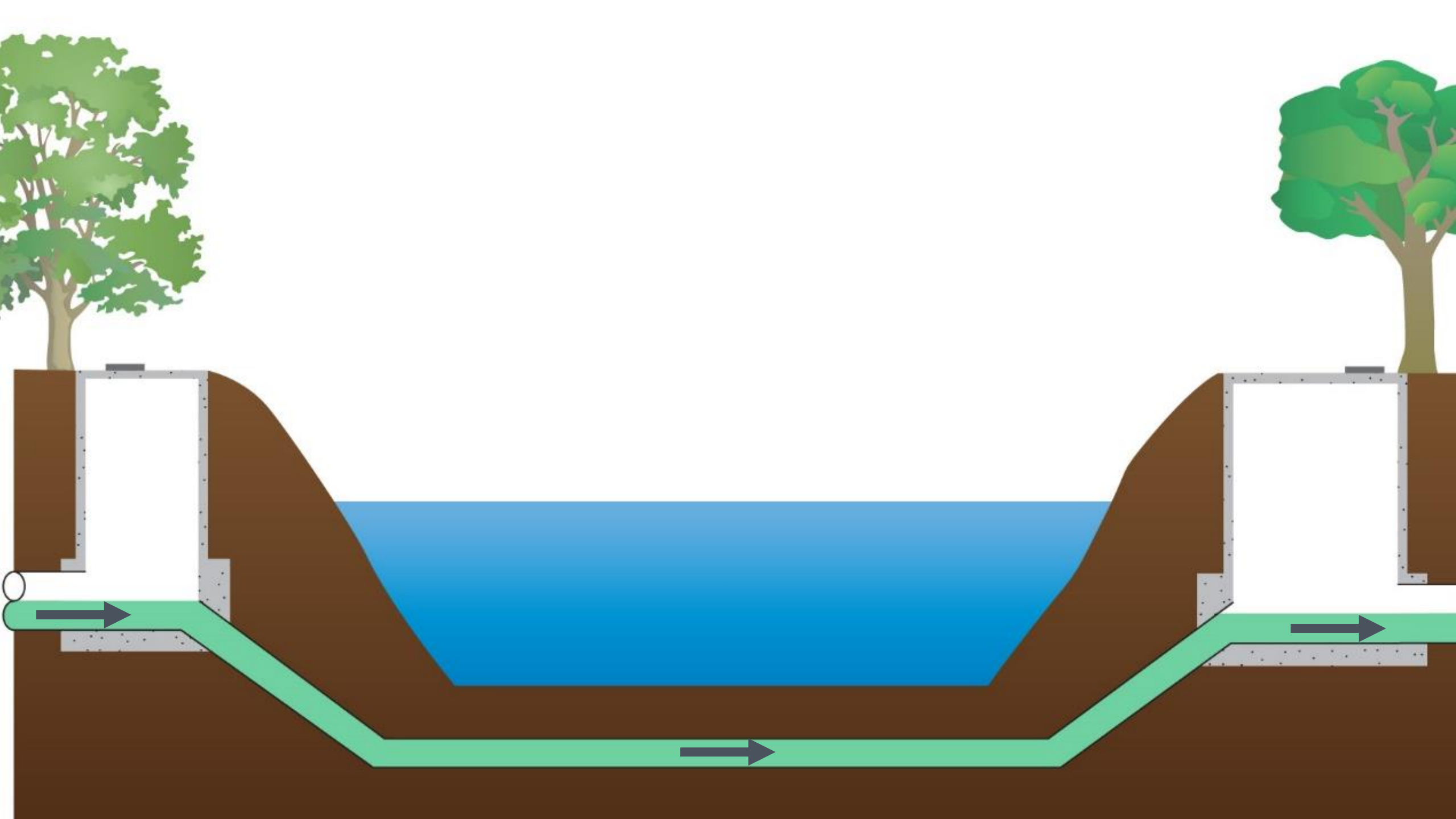
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What is an Inverted Siphon and Why Avoid Them?





What are we going to
talk about...



Medium Span Bridges & Gravity Sewers



Medium Span vs Long Span Bridges



Flaming Gorge Reservoir Pipeline Bridge

- ▶ 34 diameter natural gas pipeline
- ▶ 1,919 foot span
Longer than the Brooklyn bridge
- ▶ Constructed in 1962
- ▶ Wyoming
- ▶ Suspension Bridge with lateral stiffeners





Templeton to Paso Robles Force Main (10" dia.)

Medium Span vs Short Span Bridges





Gravity Sewer

VS

Water / Recycled Water / Other





Stanford
University
NEXT EXIT

HOSPITAL

NO LEFT TURN

55

EXIT







Alternative Configurations



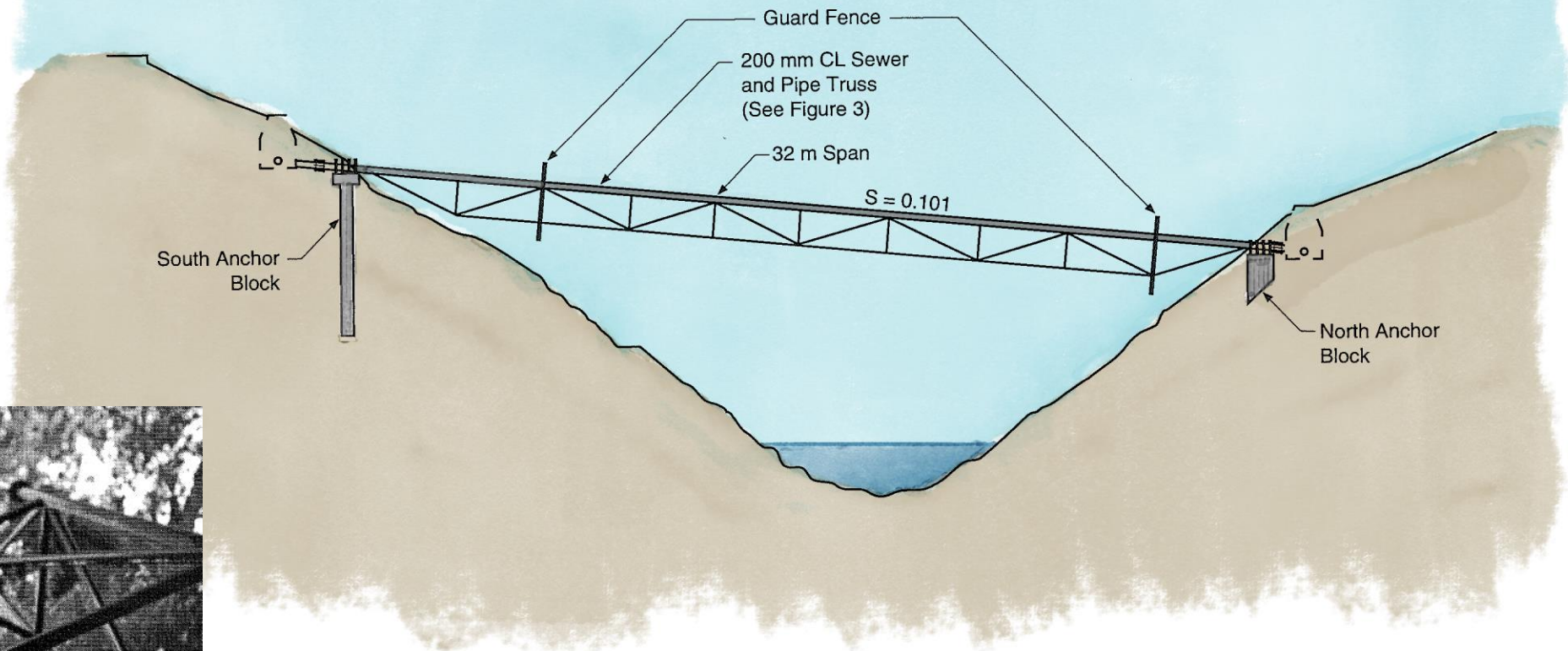
Three Alternative Configurations

- ▶ Space Truss Bridge
- ▶ Box Girder Bridge
- ▶ Pipe-Within-A-Pipe Bridge

Space Truss

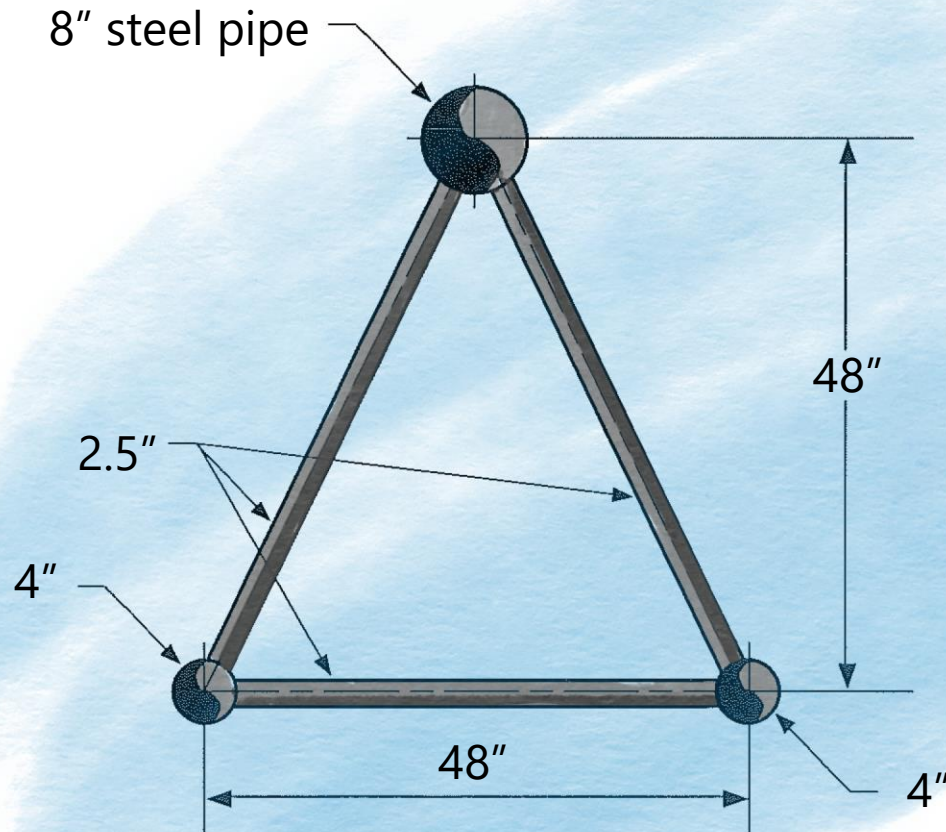


Space Truss



- ▶ Schedule 40 steel pipe
- ▶ Interior cement lining
- ▶ Exterior polyurethane pain

Advantages and Disadvantages



Advantages

- ▶ Relatively light and strong structure

Disadvantages

- ▶ Difficult field assembly
- ▶ Large silhouette
- ▶ Potential attraction to adventuresome children

Manufactured in three sections. Assembled on site and lifted into place.

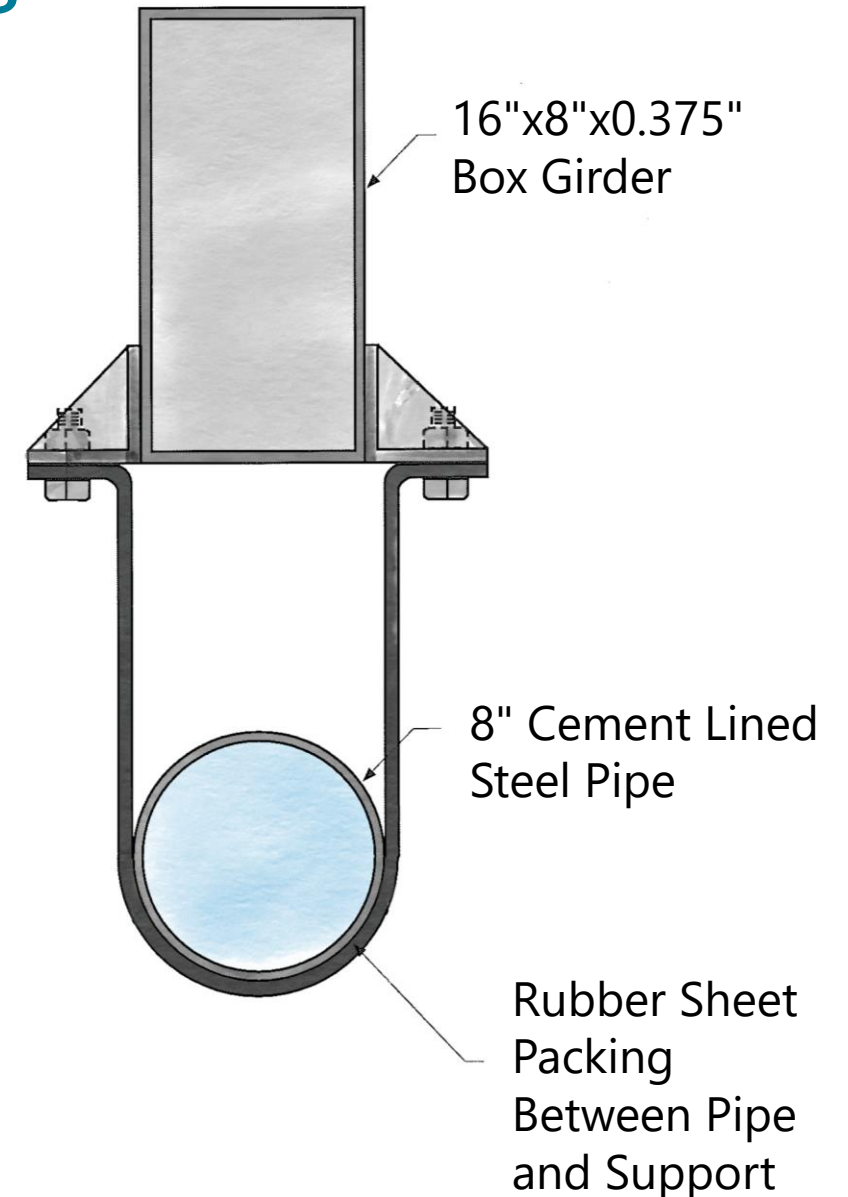
Box Girder



Advantages and Disadvantages

A Close 2nd Place

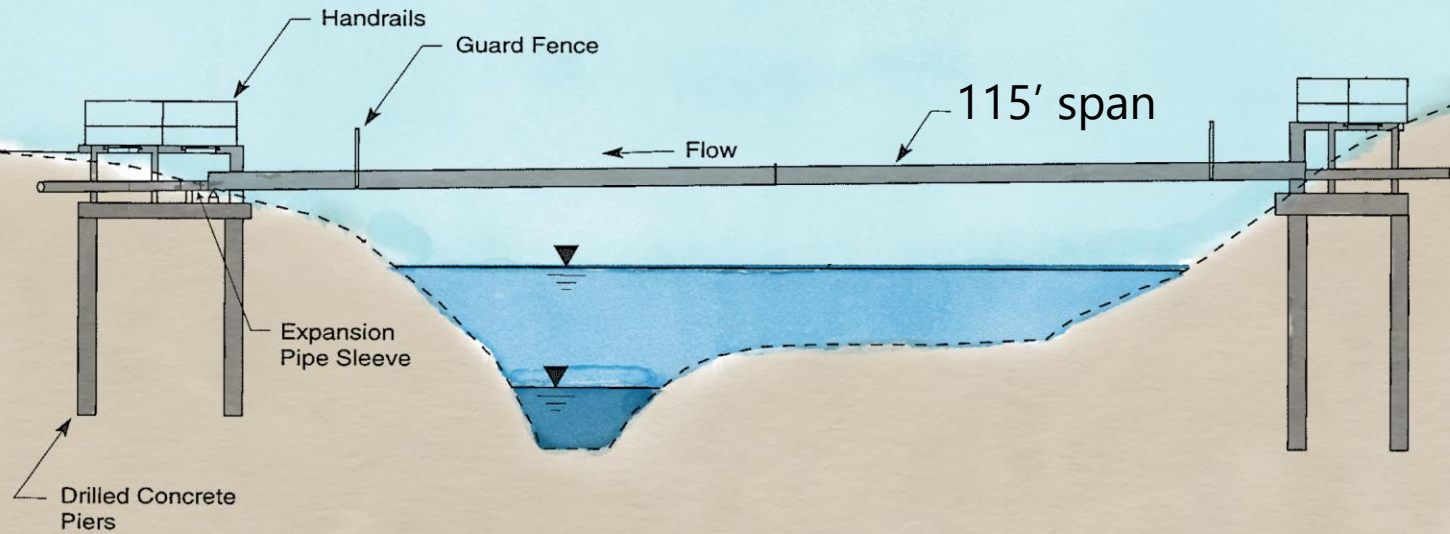
- ▶ Sewer more exposed than Alternative 3
- ▶ Less aesthetic than Alternative 3
- ▶ Alt 3 conveyed sewage in non-corrodible pipe



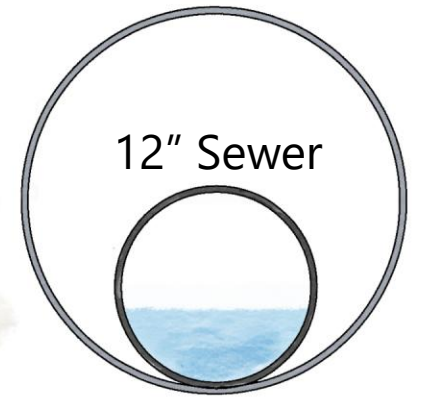
Pipe-Within-A-Pipe



Pipe-Within-A-Pipe



24" Steel casing



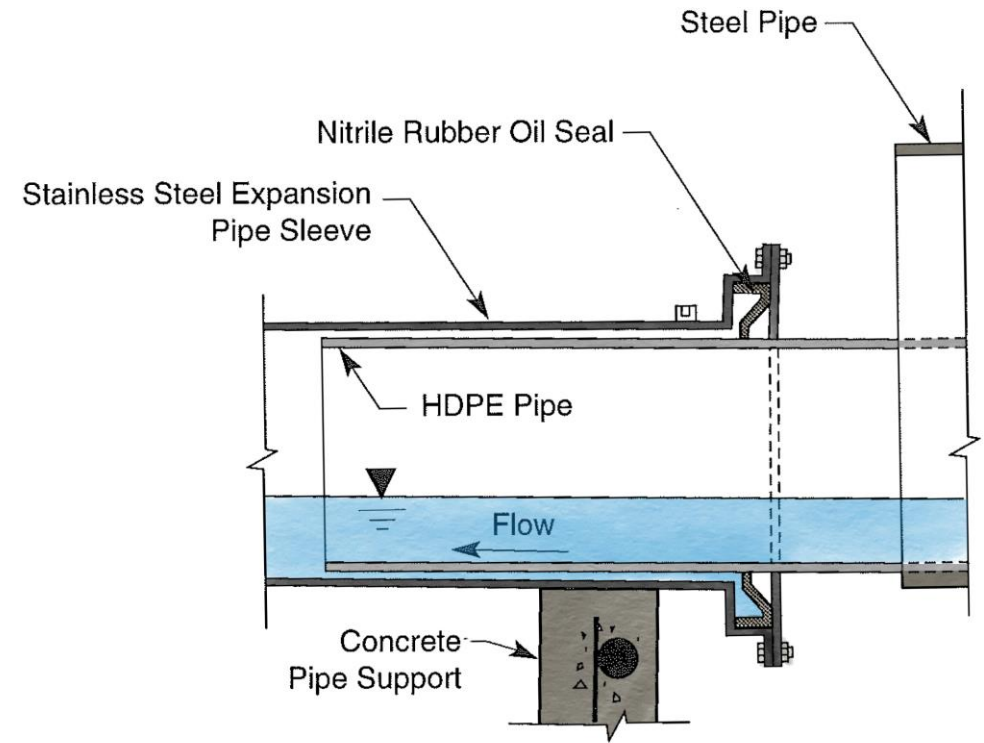
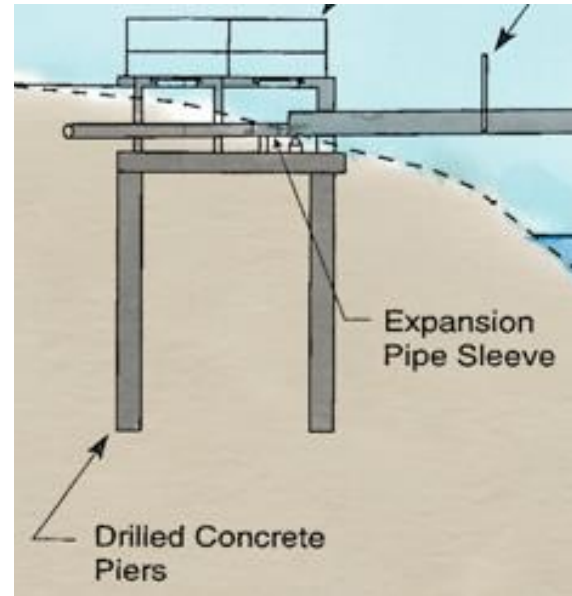
Sewer pipe is HDPE (SDR 17)

Pipe-Within-A-Pipe



- ▶ 24" dia. Steel Pipe is 0.688-inches thick
- ▶ Fabricated on-site. After coating and inspection, the
- ▶ Sewer pipe is solid wall HDPE

Concern with Thermal Expansion

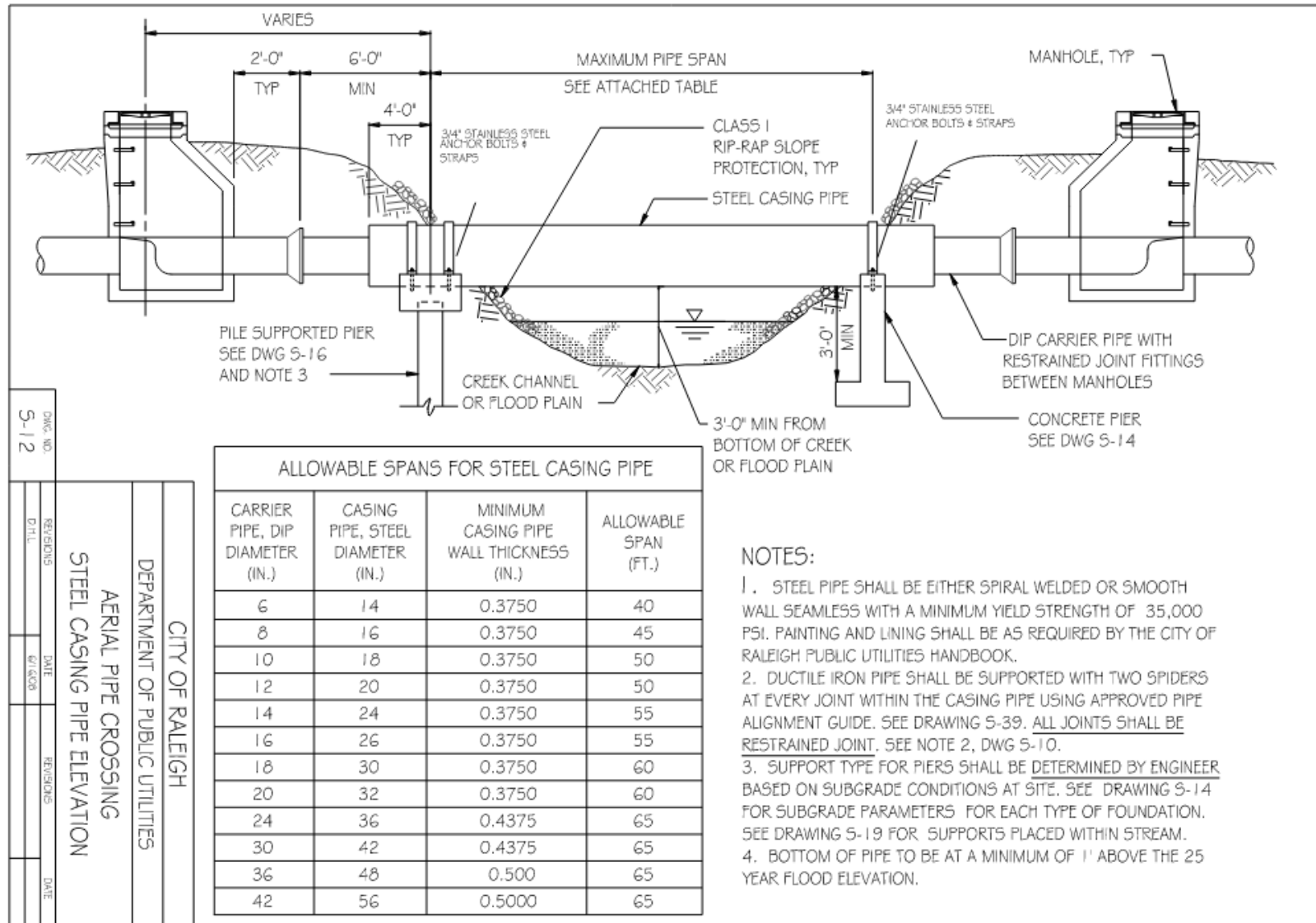


Surprisingly Aesthetic



Raleigh, North Carolina

Aerial Pipe Crossing Standard Detail



Lessons Learned



There is no “one size fits all”.

It is possible to span 100+ feet without an intermediate column.

A combination of steel casing and plastic pipe uses the advantages of both materials.

A Few More Gravity Sewer Pipe Bridges



































Questions?