Alternative Pipe Material Choice provides Trenchless Solution

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Case Study

City of Edmonton
Alberta, Canada
Case Study

Proposed 48” Diameter Sewer Pipeline
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Original Design

Specified Materials: PVC
RCP w/ Liner

Installation Method: Direct Bury

Burial Depth: Min. Depth 12 feet
Max. Depth 33 feet

Project Length: 2240 ft
Why do you need a liner?
Corrosion Resistant Pipe Materials

- PVC
- Fiberglass Pipe
- High Density Polyethylene (HDPE)
- Ductile Iron with Epoxy Liner
- Concrete with Plastic Liner
HDPE Lined Concrete Pipe

Concrete pipe

GSE StudLiner

Partial Section Thru Pipe

Concrete Pipe With GSE StudLiner
PVC Lined Concrete Pipe
PVC/HDPE Lined Concrete Pipe
PVC/HDPE Lined Concrete Pipe
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Difficult conditions

- Poor Soil Conditions
- High Water Table
- Potential High Sulphide Concentration

Significant risks caused bids to be considerably higher than expected.
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Alternate Proposal – Michels Canada

Â Trenchless Installation

Â Pipe Materials: 1. FRP Jacking Pipe

2. Steel Jacking Pipe w/ FRP Carrier Pipe (Two-Pass)

This Alternate Bid was Less Expensive than the Direct Bury Original Proposals
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FRP Jacking Pipe

Steel Jacking Pipe (Casing) for Two-Pass Tunnel Section
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Construction began April 2012 with a 20 months construction schedule
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Shafts
Â 11 shaft locations
Â Interlocking Steel Sheets
Â Dewatering Wells
Â Concrete Floor Slabs
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End Seal

- Low Strength Concrete
- Steel Face Plate
- 1 inch Thick Rubber

Launch Seal
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Akkerman SL52
Microtunneling Boring Machine (MTBM)
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Akkerman Jacking Frame
840 Tons Capacity
Case Study

11 Shafts for Microtunneling Operation
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Difficult conditions become more difficult

- Peat located directly above pipe zone
- Potential for pipe flotation
- Required additional geotechnical investigation
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What is Peat?

- Peat is highly organic soil derived mainly from plant remains.
- Extremely compressible
- Known to be problematic for pipe installations
FRP Lined Concrete Pipe
FRP Lined Concrete Pipe

The graphic is an example. The joint design can be customized to each project.
# Product Comparisons

<table>
<thead>
<tr>
<th>Liner RCP Product</th>
<th>Corrosion Resistance</th>
<th>Joint Corrosion Protection Required</th>
<th>Gravity Sewer</th>
<th>Pressure Sewer</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Liner</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>HDPE Liner</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>FRP Liner</td>
<td>Yes</td>
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</tr>
</tbody>
</table>
FRP Lined Jacking Pipe
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Change of Microtunneling Pipe

• To reduce the risk of buoyancy due to peat zones, FRP Lined RCP Jacking Pipe in lieu of FRP Jacking Pipe

• FRP Lined RCP Jacking Pipe used in two of the five final tunnel drives.

• FRP Liner provided same corrosion resistance as FRP jacking pipe.
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- 1400 LF DN48 Flowcrete Jacking Pipe (FRP Lined RCP)
- Long jacking drive of 1000 ft
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Lessons Learned

- Value Engineering (creative solutions) can provide considerable cost savings.
- Alternate Materials provide added value to project and can reduce risk.
- Microtunneling (trenchless technology) can be a more cost effective solution than traditional open cut installation. Especially in poor soil conditions.
- Microtunneling can be successfully installed in difficult ground conditions.
Acknowledgements

Å The City of Edmonton Drainage Services Department

Å Michels Canada Co.

Å Stantec Consulting Ltd.

Å Alberta Transportation

Å My Special Thanks to “Peat”