POLYETHYLENE PIPE

PLASTICS
The Ideal Piping Solution

Flexible, durable, corrosion resistant, leak free using PE4710 with HDPE

CASE STUDY

SIOUX FALLS, SD SANITARY FORCE MAIN LINING

The City of Sioux Falls, SD has an active sanitary sewer maintenance program to line or replace sanitary sewer collection lines that have severe structural issues, root intrusion, and significant inflow and infiltration. Sioux Falls budgets for this work annually. Pipe lining is used to reduce environmental and community impact and to reduce construction costs.

In 2022, 8,709 feet of 36-inch ductile iron (DI) sewer force main needed to be lined or replaced. The sewer force main traversed through 3 city parks, along Covell Lake, through major commercial districts and under state highway SD 115 (see Figure 1). Cement mortar lining failure and air pockets in the low pressure force main (~15psig) lead to internal corrosion causing multiple leaks along the DI pipe that was installed in 1997. The city 's engineering consultant, HDR Inc., proposed to line the existing 36-inch main per ASTM F3508 using HDPE (PE4710). ASTM F3508 descibes an installation method where the liner is pulled into the host pipe while radially reducing its diameter so that after the pull-in and tension is removed from the pipe, the liner contracts and expands to press against the ID of the host pipe forming a tight friction fit. This lining method was selected because HDR determined it could maintain the force mains' original design flow rate using smooth wall HDPE that has a Hazen-Williams friction coefficient 15% to 20% smoother than cement mortar lined DI.

***Figure 1**: Vicinity Map of 36-in DI Sewer Force Main in Sioux Falls, SD*

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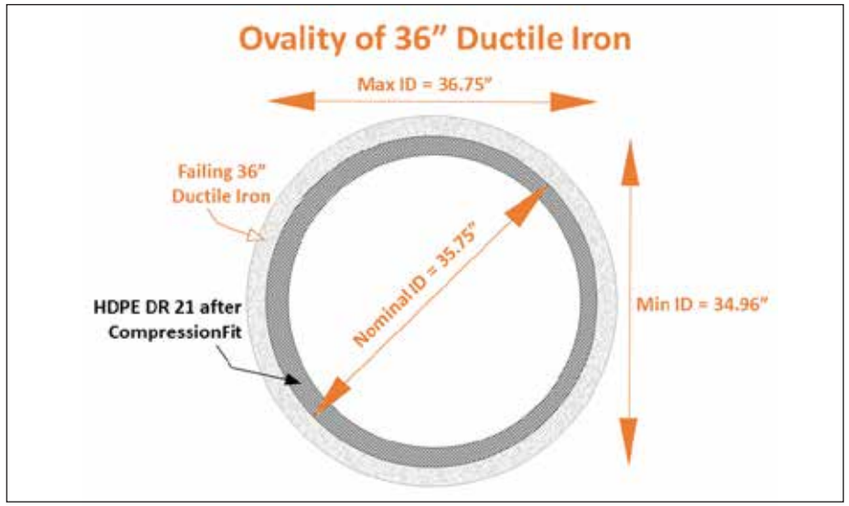
IPS 36 DR 21 HDPE (PE4710) manufactued by **WL Plastics** was selected as the liner. HDPE provides corrosion resistance and is the only piping material that can be stretched to reduce its diameter so it fits tightly against the interior of a host pipe. Murphy Pipeline Contractors (MPC) installed the PE4710 liner. Prior to installing the liner, MPC discovered that the DI main had ovaled in several locations but the ovality would not stop the project. MPC confirmed that the ovality would not effect the installation and that the HDPE pipe would still form a tight compression fit within the host pipe. Before pulling the liner into place, the fittings along the DI pipe were cut out and the exterior fusion beads on the HDPE were removed. Pipe was pulled in section by section along the existing DI pipe alignment and connected with flange fittings where DI fittings had been removed. **Figure 2** shows the the HDPE (PE4710) pipe being pulled through a reduction die before entering the 36-inch DI host pipe. **Figure 3** shows a cross-section of HDPE liner tightly fit against the interior of the DI pipe.

***Figure 2**: 36-inch HDPE pipe is pulled through a reduction die before entering 36" DI host pipe*



Compared to full replacement and installation by opencut, this lining project:

- significantly reduced impact to the surrounding community
- Significantly reduced the carbon footprint of the work
- Reduce environmental impact during construction
- Reduced digging by 86%