CASE STUDY:

SASKATCHEWAN CITY LARGE DIAMETER STORM SEWER FIRST INSTALLATION OF 42" (1050 MM) AND 48" (1200 MM) PVC PIPE IN THE WORLD

In August, 1992 the City of Estevan, SK experienced a 100-year flood event. To address future flooding, land in the eastern part of the city was allocated for construction of a new industrial subdivision which included a major drainage system with multiple detention ponds and large-diameter sewer pipes. Construction occurred from July 27, 1999 to October 25, 1999. A total of 32,000 ft. (9,700 m) of PVC pipe was installed for the East Industrial Subdivision, including 8,500 ft. (2,600 m) of water main, 10,000 ft. (3,000 m) of sanitary sewer, and 13,000 ft. (4,000 m) of storm sewer pipe. Of the storm sewer pipe, 4,700 ft. (1,400 m) was 42" (1050 mm) and 48" (1200 mm) in diameter – the largest PVC pipes ever installed at the time.

LARGE DIAMETER PVC DR51 SEWER PIPE: COST SAVINGS AND MORE RAPID INSTALLATION

Design and construction of the East Industrial Subdivision was supervised entirely by City of Estevan employees. City Engineer Mr. Firoz Kara selected PVC DR51 pipe for the 42" (1050 mm) and 48" (1200 mm) storm sewer lines. PVC DR51's thinner wall provided cost savings to the owner and enabled the Saskatchewan-based contractor to install the pipe quickly (in just three months).

The storm sewer pipe was installed with Class II sand bedding, haunching, and initial backfill material compacted to 95% Standard Proctor Density. Final backfill was from native materials on site.

PVC DR51 SEWER PIPE'S THINNER WALL IDEAL FOR DEEP BURY

At the deepest point on the site along Superior Avenue, 42" (1050 mm) diameter PVC DR51 pipe was buried under 22 ft. (6.7 m) of fill. Considering the site conditions and the construction specifications, predicted long-term deflection using the Modified Iowa Formula was expected to be no more than 1.5%. It was clear that PVC pipe thicker than DR51 would not be required, even for such a deep bury.

LONG-TERM PERFORMANCE PROVEN AFTER 16 YEARS

Sixteen years later, in February 2016, the pipe under Superior Avenue was inspected by an Edmonton-based sewer infrastructure inspection company. A total of 950 ft. (290 m) of pipewas inspected using a Panoramo 3D Optoscanner, capable of capturing a complete 360° perspective view for the entire length of the survey. The pipe looked to be in good shape, with little out-of-roundness.

A deflection measurement was taken at the point of deepest burial (22 ft. or 6.7 m). The vertical measurement versus the theoretical diameter of 42.6 in. (1083 mm) was measured to be 0.5 in. (12.6 mm), which works out to be 1.2% vertical deflection. Given that the pipe-soil system only continues to deflect as long as the soil around the pipe is consolidating during the first few years after installation, the pipe is expected to remain stable with very little deflection over the long term.

CITY OF ESTEVAN, SK

LARGE DIAMETER STORM SEWER FIRST INSTALLATION OF 42" AND 48" PVC PIPE IN THE WORLD

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