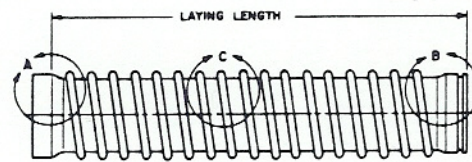
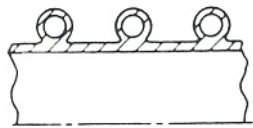


EXCESSIVE DEFLECTION IN HDPE PIPE 2 YEARS AFTER INSTALLATION --- ACTUAL CASE STUDY ---

A major sanitary sewer collection system was constructed in Salt Lake City in mid-1989 using Large Diameter Polyethylene Profile Wall Sewer Pipe (ASTM F 894) for the installation.



The contract specifications required deflection testing to be conducted ***"within five days after installation and shall not exceed three percent. A second deflection test shall be conducted 11 months after the completion of the project and shall not exceed five percent"***.

In July 1992, two years after installation, eight locations were selected for evaluation as being representative of the entire project. Deflection measurements were conducted on approximately 2,800 LF of 30-inch to 42-inch PE Class 100 pipe. The Pipe Stiffness ranged from 31 psi to 12 psi, which was less than the Industry's generally established minimum stiffness of 46 psi.

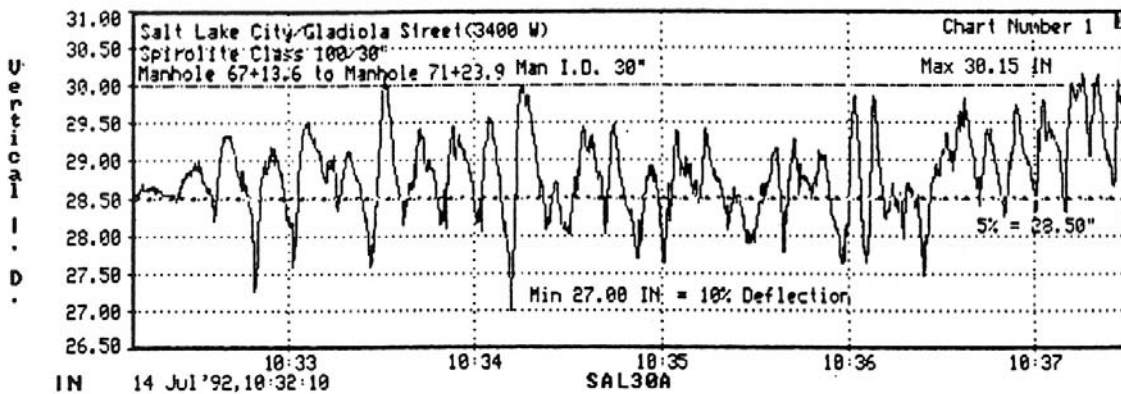
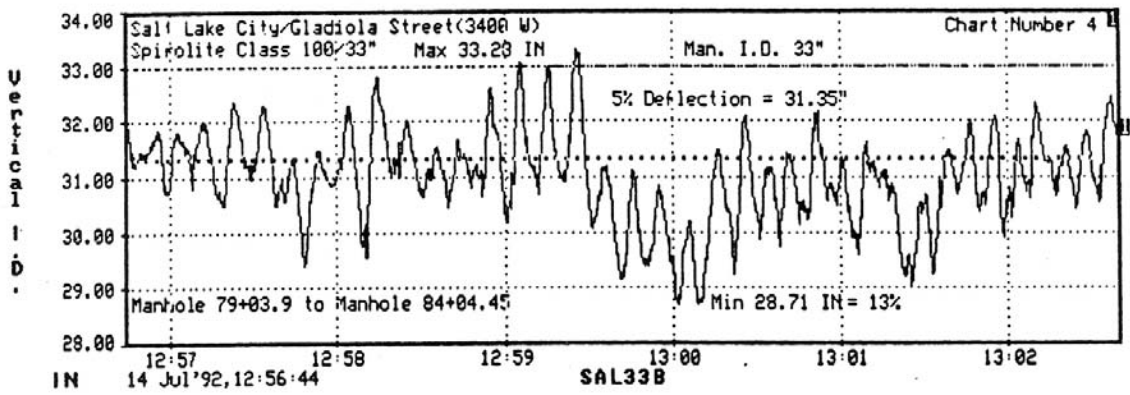
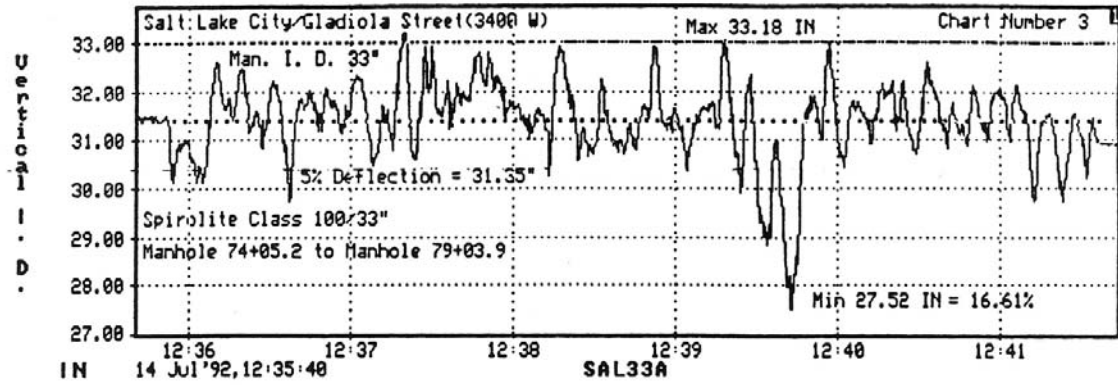
A deflection survey was performed on four different pipe diameters, the results of which showed approximately 152 occurrences where the deflection exceeded 5 percent (5%). Over 1,070 feet of the 2,800 feet investigated exceeded the specified allowable 5 percent deflection with the maximum deflection measured at 16.6 percent. This amounted to 40 percent of the footage surveyed.

SUGGESTED RECOMMENDATIONS:

- Time dependent factors should be evaluated in design for long-term (50 years) material properties.
- Plastic pipe deformation increases with time.
- Only pipes with Pipe Stiffness of 46 psi or greater should be used.
- Flexible pipe installations demand greater efforts in compaction of backfill materials.
- Only high quality granular backfill material should be used.
- Mandatory deflection testing at 30 days and again at 11 months after installation.

- No rerounding efforts on installed pipe allowed.
- Trench width of 5 pipe diameters when trench boxes are used or unstable soil conditions are encountered.

-- DEFLECTOMETER READINGS --



NOTE

Each chart represents a different Street distance, however the station limits are shown on each chart. Due to space constraints, only three charts out of eight total are shown.