

ASK THE TAC



Can the factor of safety be reduced from 2.0 to 1.5 when designing CIPP for large sewer rehabilitation?



The answer is “yes, sometimes.” CIPP wall thickness design for sewers using ASTM F 1216 Appendix X.1, especially small to medium diameter sewers, has often been a general approach where design parameters are estimated. At times, many manhole-to-manhole segments are grouped under one design. Because design input parameters can be variable and are often estimated, a conservative factor of safety, such as 2.0, is used to compensate where actual field parameters may differ from estimates.

Historically, large sewers, because of project cost, financial risk, and consequence of failure, were more closely examined during design, often through worker entry, to better determine inputs such as pipe parameters (size, shape, and condition), soil loads and characteristics, and groundwater elevations. With known material properties, the input parameters were well-known, thus the factor of safety could be reduced from the conservative 2.0 to, say, 1.5. Just because the sewer is large does not mean the factor of safety can automatically be reduced to 1.5; the work must be done investigating and determining more accurate design parameters. With the many tools now available for sewer assessment, much of this work in large sewers can often be completed without worker entry. However, in some cases, there is no substitute for close examination through worker entry.

For a reference on the same subject, see Dr. Mohammad Najafi’s textbook *“Trenchless Technology, Pipeline and Utility Design, Construction, and Renewal”*, 2004, page 141, which contains the following excerpt:

“Factor of Safety, N. Usually the factor of safety for trenchless pipeline renewal methods (TRM) is 2. However, in large-diameter, worker-entry pipes where more accurate data and thorough existing pipe investigations data such as ovality, groundwater pressure, and so on can be quantified, a value of 1.5 is acceptable.”

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