Robert Card wins the 2015 ASCE Bechtel Award

See:
http://www.slideshare.net/Lucho2255/welded-steel-pipe-101007

Chief Pipe Engineer
Lockwood, Andrews & Newnam, Inc., Houston, Texas

Steel Tank Institute/Steel Plate Fabricators Association (STI/SPFA) Pipe Committee

Selected Publications:
Geyer, W (1). and Card, R. (2)
(1) Executive Vice President, STI/SPFA, 944 Donata Court, Lake Zurich, IL 60047.
(2) Chief Pipe Engineer, Lockwood, Andrews & Newnam, Inc., 2925 Briarpark Drive, Suite 400, Houston, TX 77042.
"Performance Testing of Underground Storage Tank against Buckling", ASCE Pipelines 2012: pp. 1-10, doi: 10.1061/9780784412480.001
ABSTRACT: The Steel Tank Institute (STI) performed testing to demonstrate the stiffening effects from the soil-structure interface with an underground storage tank. The test demonstrated the importance of the soil in calculating the resistance to buckling in a buried environment. Current third party listing agencies do not take the stiffening effect of the soil support into consideration with standardized steel wall thickness calculations. Performance characteristics of a tank are similar to pipelines, although the tank heads provide additional stiffness to the structure. As a result, atmospheric tank wall thicknesses are thinner than typical pressurized potable water pipelines. Tanks are normally buried 4'-5' at petroleum service stations, however, sometime the tanks need to be buried deeper. STI buried a 64-inch diameter by 24-foot long steel tank 7 foot below grade, compacting the angular gravel backfill during placement to grade. A camera was placed in the tank to record

deformations during the actual test. The excavation was filled with water such that the bottom of the tank was subjected to 12 feet-4 inches of static water head pressure. A vacuum pump was connected to a tank riser and a vacuum was pulled. The intent was to pull the vacuum until the tank buckled. A vacuum of 16.5 inches Hg was established and the pump was unable to pull additional vacuum. The backfill was removed and the tank examined and the video of the inside of the tank reviewed. The tank did not buckle. The shell did not deform. The heads experienced approximately 2 inches of permanent deformation. Calculations indicate that the tank was subjected to a 15.0 psi total buckling load. Formulations suggest that the soil-structure would provide resistance to buckling up to 21.0 psi. Third party standard formulations that do not take the soil support into consideration suggest that the tank would buckle in a range from 1.3 psi to 6.0 psi. The test clearly demonstrates the importance of the soil in calculating the resistance to buckling in a buried environment. The soil-structure interaction provides significant additional stiffness to the structure, whether the structure is a pipeline or a tank, as demonstrated in this test.

Anonymous, Welded Steel Pipe 10.10.07: Welded Steel Pipe Design Manual, Merits, Design Standards, Technical Data and References, American Iron and Steel Institute and Steel Tank Institute/Steel Plate Fabricators Association (STI/SPFA), Publication Number D631-0807-e, October 29, 2014
ABSTRACT: A compilation of useful information for the design of water transmission lines and distribution systems using welded steel pipe
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