

Summary of Research on Evaluation of Abrasion Resistance of Pipe and Pipe Lining Materials



Why We Pursued this Research

Many existing culverts (primarily metal and concrete) that were placed during the height of the state highway building projects of the 1950's and 60's have now reached their service life expectancy and are in need of replacement or rehabilitation. Current guidance on abrasion resistance is inadequate because it is not specific enough and also does not cover the wide range of pipe and lining materials now available.

Studies performed by others in laboratory settings have been limited and have not sufficiently reproduced real-world conditions for the entire range of pipe, and pipe lining products available today.

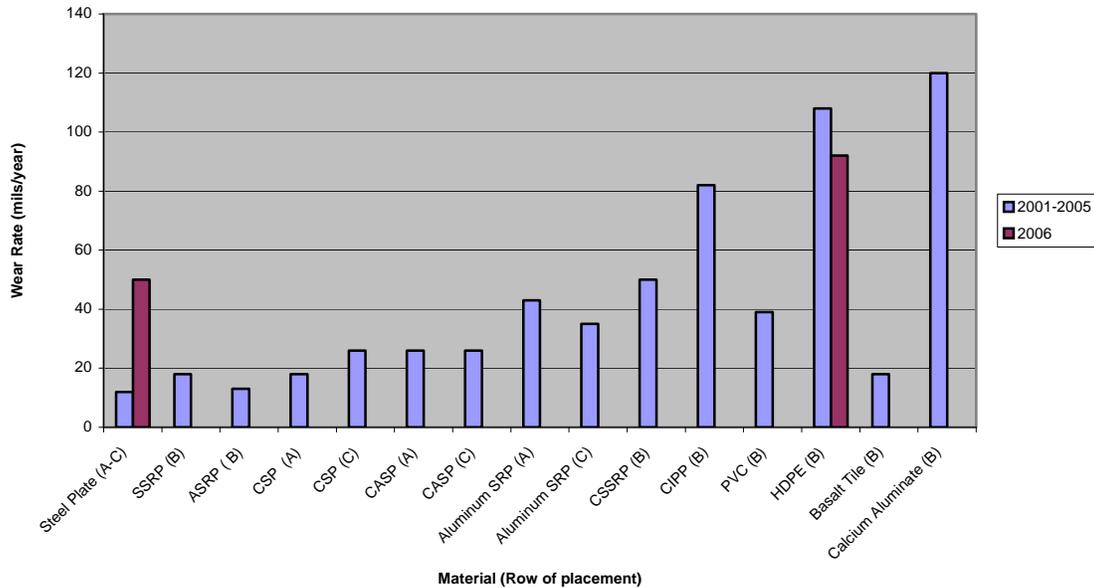
The objective of this research project was to evaluate various pipe and pipe liner products for their relative resistance to abrasion at a real-world abrasive test site. Results obtained from measurement and field observation will provide a major portion of the basis to update current design guidance and abrasion related input for Caltrans alternative pipe material service life predictions.

What We Did

This project evaluated the relative resistance to abrasion over a 5 year period in a natural stream setting of seventeen different material types consisting of concrete, plastic, resin or metal along with various coatings and linings combined with metal. In addition, the results and conclusions from the test site were

compared with numerous known abrasive sites around the state and other abrasion studies as the basis to update current design guidance.

Selected Peak Annual Wear Rates (Rows A-C)



The Researchers Concluded

This project demonstrated that abrasion wear to pipes, liners and linings in the field is not linear with time, but is event driven and dependent on the number and size of events during any given year. None of the protective coatings for steel are suitable in abrasive environments with high velocities. The test site used for this project was extremely abrasive when compared to other sites statewide; therefore, limited data is transferable to other sites for service life estimates.

The Researchers Recommended

This project recommended specific updates to Caltrans guidance on abrasion for service life estimates including the adoption of a new table as the primary reference. It also recommended conducting further abrasion testing at other sites with different abrasion potential to supplement the data in this study along with further research to better understand associated bedload and transport rates for a wider variety of watershed types in California.

For More Information About This Research

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