

FY 2010 RESEARCH PROBLEM STATEMENT

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TITLE ([more info](#))

Analysis and Design of Pipe Ramming Installations

PROBLEM (Description of need) ([more info](#))

Large diameter steel culverts (pipes) are often installed beneath fills or embankments using trenchless technology techniques such as pipe ramming. Pipe ramming typically involves installing the new pipe sections using hydraulic hammers, similar to those used for installing bridge foundation piles. The process of pipe ramming induces large compressive stresses in the pipe. Currently there are no proven methods of estimating these driving stresses and therefore the wall thickness of the steel pipes are very conservatively estimated to avoid possible pipe damage during installation. This results in increased materials cost because of the uncertainty in design.

There is a need to develop a reliable method to evaluate the thickness and strength requirements of steel pipe culverts installed using the pipe ramming process. The method would allow designers to evaluate the pipe installation process to determine the minimum wall thickness required to withstand the driving stresses during installation. Such a method would result in less conservative culvert designs and the potential for significant cost savings.

PROPOSED RESEARCH, DEVELOPMENT OR TECHNOLOGY TRANSFER ACTIVITY ([more info](#))

Evaluate the potential of applying the same principals used in evaluating driven pile foundations to pipe ramming. The use of the Wave Equation Analysis Program (WEAP) would be evaluated for it's potential application and use in evaluating the driving stresses of steel culverts installed using pipe ramming methods. Other installation methods could also be investigated as well. The Pile Driving Analyser (PDA) would be used to verify the driving stresses predicted by the WEAP program. Procedures and guidelines would be developed to assist designers in sizing steel pipe culverts to the minimal dimension and strength requirements for safe pipe ramming installation.

BENEFITS ([more info](#))

Significant cost savings could be realized by being able to design and specify steel pipe culverts for pipe ramming projects with the minimum wall thickness necessary for safe, undamaged installation. Welding time and costs would also be reduced as well as some other secondary cost savings associated with locating and handling smaller, lighter pipe sections.

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