

MicroTraxx Tunnel Mucker Evaluation

Outcome – Deployment and evaluation of a unique remote controlled machine used to remove debris from culverts in Caltrans maintenance operations.

Benefits - Improves worker safety and improves efficiency of maintenance work on culverts not easily cleaned with the vacuum truck system.

AHMCT researchers are working with Caltrans maintenance operations to evaluate a small remote control loader to clean sand, gravel and other debris from culverts. Remote control operation allows the operator to work from outside of the culvert being cleaned thereby avoiding the hazards of the confined space environment. By working at a distance from machines and equipment, the operator is less exposed to the potential for injuries. The culverts that the tunnel mucker can access are cleared in much less time than operations using a vacuum truck.



Figure 1- Tunnel mucker in 4 ft high box culvert.

Why We Are Pursuing This Research

The use of the tunnel mucker has the potential to improve safety and efficiency in the culvert cleaning operations. The culverts channel water under roads and highways and can be rectangular concrete box style culverts or round culverts large enough for the mucker to enter. Debris builds up in the culverts during storm and water flow events. If the debris is not removed, flooding and flow related damage may occur.

The culverts can be hazardous or difficult to access. Most medium sized culverts are cleaned by crews using vacuum trucks with a high pressure nozzle, a ‘rodder’, to wash the debris materials back to the suction hose. Significant manual labor is required to manipulate these tools.

In vacuum truck operations the water logged dirt must be collected and transported to specific collection areas that can be miles away from the job site. No water is used during the operation of the tunnel mucker which is a

significant advantage and larger rocks and debris, often found in the culverts, are more easily removed.

There are walk behind earth moving machines that can be used in taller culverts, but they require the operator to enter the culvert. Due to “confined space” issues, the remote controlled mucker provides a distinct advantage to any cleaning methods where crew members have to enter the culvert. “Confined spaces” require additional training for crews and require the use of special ventilation equipment and monitoring procedures. The remote controlled mucker allows the operator to stand outside the culvert being cleaned.

Description

The Microtraxx tunnel mucker is a small radio remote controlled loader on steel tracks manufactured by Rohmac Inc. The unit is 42” high, 42” wide and 120” long. It weighs approximately 6000 lbs and the bucket has a capacity of 1550 lbs and can hold 1/3 cubic yard of material. The engine has a 50 hp capacity and meets tier 4 emissions requirements providing reduced particulate emissions. It drives the hydraulic system which uses a biodegradable oil to reduce the possibility of contaminating water ways. It is controlled by a seven-function wireless remote control with safe shut off features.

It removes materials from culverts by driving in, scooping a bucket load, backing out and then dumping near the culvert entrance. A loader or backhoe would then be used to move the material to the final location. Support equipment for operations typically require 3 crew members and the following: a 6 ton dedicated trailer, a one ton truck to tow the mucker trailer, a loader or backhoe and its trailer, and a dump body truck.

The tunnel mucker operates in box culverts with a minimum 4 ft height or round culverts at least 5 ft in diameter. Average production quantities for debris removal are 5 cubic yards per hour. Removal rates can exceed 10 cubic yards per hour for a short culvert found under a 2-lane road. Production capabilities are highly variable due to site specific factors such as access, type of debris (soft / hard), support equipment and length of culvert. The time involved in driving in and out of the culvert slows down the removal rates. The mucker has been used in culverts over 250 ft long. It is most efficient to clean out half way from each end of the culvert.



Figure 2- Tunnel mucker at job site with excavator.



Figure 3- Tunnel mucker in 5 ft round culvert.

As mentioned, the typical method for clearing debris from culverts requires a vacuum truck with the high pressure rodder to wash the debris back to the suction hose. This operation is shown in the Figure 4.

A much less common method to clear a culvert is to use a dragline system in which a bucket is pulled through the culvert with a system of cables and pulleys. The least

preferred option is using a pick and a shovel and is seldom done.



Figure 4 - Culvert cleaning with a vacuum truck.

What We Are Doing

AHMCT has deployed a unit with the Caltrans Statewide Equipment Managers group and is monitoring and evaluating the use of the machine within the culvert cleaning operations. Feedback from the users has been collected through site visits and regular direct contact. The unit has been outfitted with a GPS tracking system and usage is also being tracked through the Caltrans IMMS system. AHMCT has provided all technical and equipment support and has implemented various improvements based on user feedback.

Current Status

The Caltrans Statewide Equipment Manager's office is rotating the tunnel mucker throughout the Caltrans districts. The machine is assigned to each district about 4 weeks a year depending on need. AHMCT is continuing to provide technical support and will be finalizing the evaluation.

For Additional Information

Bob Meline	(916) 227-7031, bob_meline@dot.ca.gov, Caltrans Project Manager
Steve Velinsky	(530) 752-4166, savelinsky@ucdavis.edu, Principal investigator
Wil White	(530) 752-1455, wawhite@ucdavis.edu, Primary contact

Visit us at www.ahmct.ucdavis.edu

This document is disseminated in the interest of information exchange. The contents do not necessarily reflect the official views or policies of the AHMCT Research Center, the University of California, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, regulation, or imply endorsement of the conclusions or recommendations. (rev. Mar 2012)