

## Cone Placement and Retrieval Vehicle

**Outcome**— Develop and support a commercially available automated machine to place and retrieve cones without a worker in the rear of the vehicle who handles the cones.

**Benefit** — Make available a commercial cone machine that meets Caltrans needs for cone laying operations to increase worker safety and efficiency.

AHMCT researchers developed a prototype machine that enables a single driver operator to place or retrieve a lane closure with up to 100 cones. Design of a high capacity machine for up to 300 cones was also developed. In 2005 the Traf-tech Corporation produced a commercial machine based on the AHMCT design. AHMCT is supporting the testing and evaluation of the Traf-tech machine in Caltrans operations.

### Why We Are Pursuing This Research

Cone laying is a common task in road maintenance and construction and it is hazardous to workers who work in the back of the truck to place and retrieve the cones. Handling the cones is physically strenuous and can cause injuries. Additionally the exposure to fast moving traffic is a worker hazard that Caltrans and others are seeking to avoid. The automated machine is operated from within the cab and removes the need for up to two workers in the back of a vehicle. This greatly increases safety and also can reduce the number of workers in the cone laying operation.



Figure 1 – Caltrans lane closure on Bay Bridge April 2007

### What We Are Doing

This type of machine is now commercially available and AHMCT is supporting the transfer of technology to the company involved, Traf-tech. Caltrans continues to have the opportunity to greatly influence the final configuration of the commercial machine. AHMCT has been supporting the evaluation and testing of the Traf-tech machine with Caltrans maintenance operations.



Figure 1 – Caltrans & AHMCT training and testing of Traf-tech machine in District 4 April 2007

Over the years, AHMCT has been supporting efforts for commercialization by promoting the concept through a strong web presence, engaging several companies in technology transfer, maintaining the design, and developing a high capacity design. Although a fully functional prototype unit has been built and was incorporated into the fleet for limited testing in 2003, lack of commercial availability of such a machine has been a primary hindrance to adoption.

Since 2005, Traf-tech, a California start up company, has been selling an automated cone machine of their own using a cone handling design similar to that developed at AHMCT. Traf-tech has licensed the technology and is marketing a machine that closely replicates the AHMCT prototype design. The first Traf-tech design has the features of full automation but has been optimized for carrying 250 cones. The original AHMCT machine was designed to be integrated into the Caltrans cone body and is more versatile and compact. It will carry about 100 cones which will allow a 1.6 mile closure.



Figure 2 – Original AHMCT prototype testing with Caltrans District 11 in year 2003.

During this time, AHMCT has developed a high capacity design that expands the carrying capacity of the AHMCT cone machine from 100 to 300 cones on a truck with a GVW under 26000 lb. It achieves the higher capacity by incorporating multiple layers of cone stacks. This feature adds cost to the basic AHMCT machine but the configuration allows the cone truck to conveniently carry a multitude of other items on either side of the cone stack allowing it to be used as a general purpose vehicle.

### Current Status

AHMCT is assisting in the testing and evaluation process with the Division of Research and Innovation. The Traf-tech machine is being rented for limited time periods in which Caltrans maintenance yards have the opportunity to try the commercial machine. Two different Traf-tech machines have been tested to date. Caltrans user experience is critical to continuing progress and the company is rapidly improving the design to improve reliability.

Presently there are two other companies offering partially automated cone machines. One is a truck based unit that requires a person on the bed to feed the cones in and out of a placement device and the second is based on a large trailer with limited carrying capacity. Neither of these designs provide the operational capabilities required by Caltrans.

AHMCT will continue to support Caltrans efforts to thoroughly evaluate the automated cone machine. Impediments to automation are being monitored and documented. Operator experience and knowledge is being used continuously to improve the product. Our goal is to facilitate effective transfer of the technology to a commercial firm and support deployment by dissemination of information.

### For Additional Information

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