

OFFICE MEMORANDUM



MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

December 12, 1969

To: L. T. Oehler
Engineer of Research

From: M. H. Janson

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Subject: Propane Warning Lights. Construction Project I 20052-001 Part 1.
Research Project 69 TI-4. Research Report R-724.

Lights operating from a propane gas source and installed on road closure barricades in the subject project were observed on November 25, 1969. The observation was requested to evaluate the effectiveness of propane lights and to evaluate their compliance with specifications.

The road closure barricades are located 2.5 miles south of Roscommon on M 18. A temporary, centerlined roadway has been built around the work area. Traffic volume in the area is very low. Advance warning signs have been installed on M 18 as required, but none of the signs have warning lights as required by section 6.31.09, MDSH Standard Specifications.

Electrical power is not readily available for lighting the closure barricades with 60-watt lights, and kerosene torches located on the ground would not have sufficient sight distance. At a distance of about 550 ft, only the upper half of the north barricade is visible to southbound traffic. Battery-operated lights were not mentioned in the contract proposal and area contractors are reluctant to use them due to excessive vandalism losses.

Considering the limitations noted above, the contractor (Bacco Construction Co.) in cooperation with the Project Engineer and the District Traffic Engineer, proposed use of a propane lighting system. According to the contractor, a Roscommon supplier made the complete installation of three lights on each of two barricades at a cost of \$400. Initially, gas supply tanks were located at the barricade; the lights had colorless lenses, and each light had a single mantle. For safety reasons, the Traffic Engineer and the Project Engineer suggested that the gas supply tanks be removed from the cleared work area and be located as shown in Figure 1. Copper connection tubing was covered with sand. Attempts were made to paint the lenses yellow to obtain conformance with color requirements but the Project Engineer indicated the paint absorbed too much light. The contractor installed yellow lenses and increased the source brightness by adding a second mantle to each light.

The propane lights as shown in Figures 2 and 3 are manufactured by the Bernz-O-Matic Corporation of Rochester, N.Y. They are approximately five inches in diameter and six inches high and use a pyrex glass lens. Each light is bracketed and secured to the barricade top (Figs. 2 and 3). Locks and chains were required to prevent theft; evidence of removal attempts have been observed. The contractor stated that all lenses have been replaced three times because of vandalism. On the basis of simple foot-candle meter measurements the intensities of the lights range from 20 to 40 candelas. Dirty lenses may have had the greatest influence on measurements. One of the lights, shown in Figure 3, had an attached reflector. The reflector had no effect on light intensity according to the field measurements. Color saturation of the lenses is not sufficient to produce an identifiable yellow color at night.

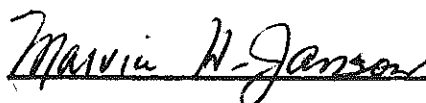
Propane-operated lights are effective warning lights though cost may be relatively high. In two weeks of operation the barricades were not hit and the lights apparently operate under all weather conditions. The contractor indicated that installation and two weeks operation had cost him \$600. Dangerous conditions could develop in the event of collision with the barricade. If the copper supply tubing is severed all of the lights on a barricade will be extinguished and the supply gas will escape. Vandalism has caused considerable lens breakage and may become an economic factor on this installation. The Project Engineer indicated that propane lighting was probably satisfactory for less inhabited areas but he would not recommend their use in suburban areas because of vandalism.

Propane lights do not conform to the requirements for warning lights on road closure barricades as specified in the Manual of Uniform Traffic Control Devices. It was suggested that three kerosene torches be placed on the ground in front of each barricade to comply with the law.

It is recommended that the safety section observe the installation and advise of possible danger due to escaping gas in the event of collision or vandalism. It is further recommended that propane lights be used as supplemental lights and that road closures be lighted in accordance with the Manual with consideration given to the following note.

It should be noted that the currently specified practice for lighting road closures with battery-operated or 60-watt light bulbs usually results in all of the lights being placed on one barricade. The entire warning system then relies on one assembled device. Collisions, high winds, vandalism, or other causes which destroy, partially destroy, or tip the barricades leave an unmarked road closure.

TESTING AND RESEARCH DIVISION



Supervisor

Spectroscopy and Photometry Unit



▲ Figure 1. Propane lights on M 18 road closure. Supply tanks at left center.



▲ Figure 2. Propane light (center mounted) showing attachment bracket and security lock.



◀ Figure 3. Side mounted propane light attachment (with reflector).