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PREFACE

The application of warning lights on roadway operations equipment has been a concern of many agencies and, over the years, has resulted in a variety of applications. As a result, NCHRP Project 13-02 was funded to develop a recommended set of guidelines based on the effects on the responsiveness of motorists to warning lights on roadways. The basic results of the study have been reviewed and the guide has been approved by AASHTO for consideration for use by the member departments.

Introduction

Roadway operations equipment used for construction, maintenance, utility work, and other similar activities generally operates within the roadway right-of-way. These vehicles and mobile equipment operate on all types of roadways, during daytime and nighttime hours, and under all weather conditions. To improve motorist and work-crew safety, equipment must be readily seen and recognized and, therefore, warning lights are provided on the equipment to alert motorists of potentially hazardous situations. Amber warning lights have traditionally been used, although lights of other colors are often added with the intent of helping the traveling public better see the equipment. Combinations of amber, blue, and white lights and other forms of warning lights (e.g., lighted bars, lighted “arrow sticks,” strobes, light emitting diodes [LED], and alternating flashes) are used. There is a concern that this variety of lighting on roadway operations equipment has evolved without adequate consideration of the effects on the awareness and responsiveness of motorists.

These guidelines have been developed based on the results of a series of experiments that considered more than 40 lighting configurations in both static and dynamic environments. The presence of maintenance personnel, the identification of the maintenance vehicle, attention-getting, glare, peripheral detection, and urgency were all metrics in the experiments. Differing experimental conditions such as weather, the presence of other vehicles, and time of day were also considered in the experiments.



One of the primary considerations in the use of these guidelines is the purpose of the maintenance vehicle. For the purposes of these guidelines, the term “maintenance vehicle” refers to any type of vehicle used on the roadway, whether it is being used for new construction, inspection, or general maintenance. The design of the warning-light systems may differ based on the vehicle’s intended usage. For example, a snow plow will have different criteria than a small truck. The following are typical questions to be considered:

- Will the vehicle be used primarily while moving or stopped?
- Will the vehicle be used primarily in the daytime or nighttime?
- Will the vehicle be used primarily in bad weather or good weather?
- Will there be maintenance workers present around the vehicle as pedestrians?

Many vehicles are multi-purpose (i.e., they are used for many different tasks on the roadway). For example, a vehicle may be used for clearing snow in the winter and in construction and maintenance activities during the summer. The lighting system on these vehicles needs to be designed and laid out to include the considerations for all of the planned or expected vehicle uses.