STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Michael P. Lewis
Director

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March 12, 2010

Mr. Mark R Kehrli
Director Office of Transportation Operations
Federal Highway Administration
1200 New Jersey Avenue, S.E.
HOTO-1, Room E86-310
Washington, DC 20590

RE: Request for Permission to Experiment
Use of Symbols with Portable Dynamic Message Sign

Dear Mr. Kehrli:

The Rhode Island Department of Transportation formally requests, as outlined in Section 1A.10 of the Manual of Uniform Traffic Control Devices (MUTCD), to experiment with the use of symbols, rather than standard word messages, on dynamic message signs in conjunction with the dynamic lane merging system. This system will be used for any emergency maintenance operations that may arise that would otherwise cause congestion. The Department has coordinated with the Rhode Island Division of FWHA and is sending this request at their direction. Attached is a detailed request for experimentation.

Thank you for considering this request. Please do not hesitate to contact us if you need additional information to process this request. We look forward to hearing from you.

Sincerely,

Michael P. Lewis
Director

cc: Peter Osborn, RI-Division FHWA Administrator
Daniel Burman, RI-Division FHWA Assistant Administrator
Jacinda Russell, RI-Division FHWA Safety and Operations Engineer
Phillip Kydd, Assistant Director, Administrative Services, RIDOT
Annarummo, Corrao, Farhoumand, Rocchio, Smith, file. (all w/attachments)

A. Problem Statement

The Rhode Island Department of Transportation has identified several areas within the field of transportation that could use improvement to enhance transportation in the state. One of these areas is aggressive driving, and the delay associated with long queue lengths, within construction work zones where the number of travel lanes is reduced. This desire to reduce aggressive driving, delay, and queue lengths has caused the Department to consider implementing a portable, dynamic lane merging system with real-time data collection capabilities. However the Department would like to further experiment with this system in using symbols/graphics on the message boards, rather than the typical standard messages. Studies performed by the University of Rhode Island suggest that graphics were preferred by motorists and could enhance their comprehension of the messages on variable message boards.

Although this system utilizes a combination of approved devices included in the Manual on Uniform Traffic Control Devices (MUTCD), the Department would like to experiment with using various symbols on the dynamic message boards, as opposed to the standard approved messages in the MUTCD.

Research has been done on the benefits of dynamic lane merging systems in the United States, and has proven to be successful for freeway type facilities during the peak hours where the maximum throughput within a single lane was approximately 1600 veh/hr. However this is typically done using standard messages. Currently the Czech Republic has utilized symbols to portray the merge information to motorists, and has been successful. The Department feels that this dynamic merge system, combined with the use of symbols, could be successful if used on a facility with similar parameters. It is also a great opportunity to explore the effective means to encourage and educate drivers to merge at work zones and discourage inappropriate behavior, such as "queue jumping".

Lastly, this style of message board fits nicely with the scope of research being done at the University of Rhode Island. URI has done a great deal of research on the combination of image and text messages on variable message signs. This will be a further opportunity for the university to experiment with such images and provide information to the Department on how to best utilize these message boards throughout the state.

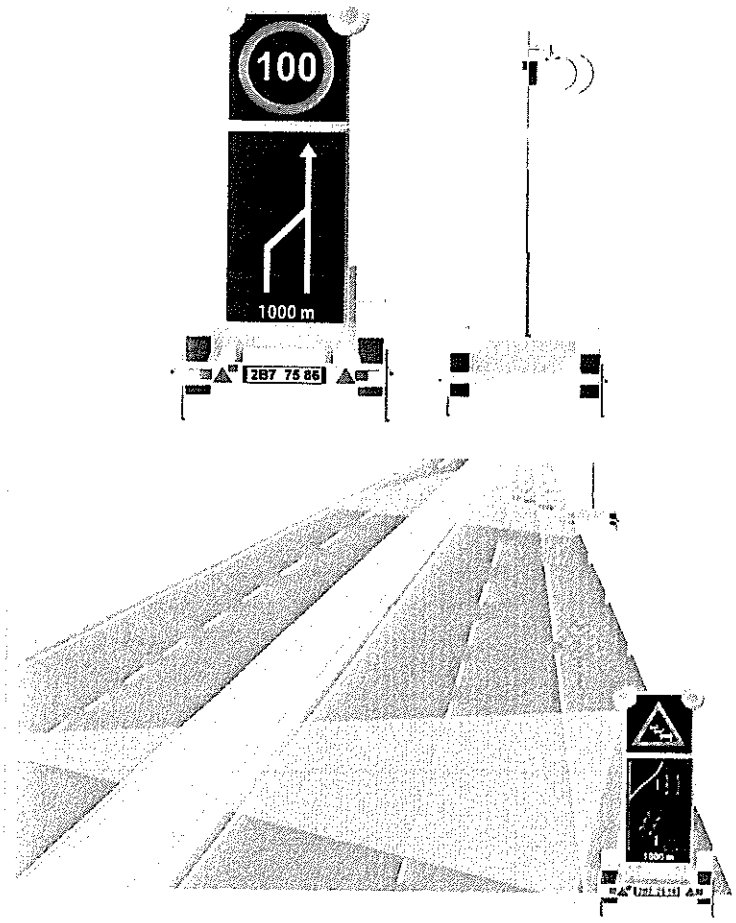
B. Description of Proposed Change and Illustration of Use

The Rhode Island Department of Transportation would like to implement the use of a portable lane merger system with the use of symbols for emergency maintenance operations that may require longer duration setups, or would otherwise cause congestion. This system would include the use of the symbols that have already been successfully implemented in the Czech Republic in conjunction with this dynamic lane merger system.

Although this system has been tested in some states within the United States, the use of the symbols and graphics as opposed to the word messages has not. The Department has seen the use of symbols in the lane merger system in the Czech Republic during a technology exchange. This, combined with the success of the URI studies on the use of graphics, has lead the Department to propose this change as an experimental system within the State.

The use of this system utilizing symbols and graphics will be similar to the Czech Republic system as can be seen in the Figures below. A series of dynamic messages boards strategically placed at certain distances from the merge point will convey the appropriate messages through

the use of symbols. The activation of the message boards is triggered by preset criterion based on speed collected through the use of radar units, which communicate wirelessly with the message boards.



C. Supporting Data for Use of Symbols

Research conducted at the University of Rhode Island in 2007 examined the feasibility of using graphics to aid message display on dynamic message boards. The study focused on how various people reacted to the graphics, and if they were able to comprehend the graphic messages. The results were based on a questionnaire survey and a lab simulation. The questionnaire collected drivers' preferences regarding the design of the graphic images, while the lab simulation measured drivers' response to a selected group of test messages.

The following conclusions resulted from this study:

- Questionnaire survey found that the graphic-aided DMS messages are significantly preferred over their text-only counterparts
- Driving simulation showed that graphic-aided messages are significantly better than text-only ones in terms of response time and accuracy.
- Understanding and response time of elder drivers and non-native English speakers were significantly improved by graphic-aided messages.
- Graphic-aided DMS messages did improve subjects understanding of and response to the messages.

D. Patent

Dynamic lane merging systems, or symbols, are not protected by a patent or copyright. However, there are multiple vendors available that could provide this system. The Czech Republic system off which this report was is not a patented system.

E. Duration and Location of the Experiment

The Rhode Island Department of Transportation proposes to evaluate and experiment with the use of the symbols and graphics in conjunction with the dynamic lane merging system for emergency maintenance operations that would otherwise cause congestion. The exact location for the experiment has not yet been determined, however we anticipate using this system in one stationary location for a two week period while construction operations commence.

F. Evaluation Plan

The Rhode Island Department of Transportation will collect and evaluate the following data in an attempt to evaluate the functionality of the roadway and traffic for this experiment:

- Traffic Data will be collected during lane closures for construction on multiple days/nights
- Volume Data
- Speed Data
- Travel Time data

Half of the time that data is collected the lane merging system will utilize word messages. The remainder of the time that this system is used, symbols and graphics will be used. Once statistically significant amounts of data is collected the RIDOT will analyze the data and make decisions regarding future use of symbols and graphics as opposed to word messages.

G. Agreement to Restore

In the event that safety becomes a concern and is attributable to the dynamic message system, the Rhode Island Department of Transportation is willing to terminate the experimentation and restore the site to its original condition, in compliance with the MUTCD.

H. Progress Reports

The Rhode Island Department of Transportation agrees to provide a final report following the conclusion of the experiment.

I. Project Management

The Rhode Island Department of Transportation is responsible for all project management, administration, funding and implementation. The project manager will be:

Jill J Silva
Civil Engineer
Rhode Island Department of Transportation
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