Innovative Traffic Control Devices—Request for Experimentation

BEFORE ANY CHANGE IS MADE TO THE MUTCD, IMPACTS OF CHANGES ON SAFETY, OPERATIONS AND ECONOMICS MUST BE CAREFULLY WEIGHED. THIS FEATURE DESCRIBES THE ADVANTAGES OF EXPERIMENTATION AND THE PROCESS OF OBTAINING EXPERIMENTAL STATUS FROM FHWA—AN IMPORTANT STEP IN IMPLEMENTING A NEW OR INNOVATIVE TCD.

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TRANSPORTATION ENGINEERS typically use signs, signals and pavement markings as tools for traffic control. In the United States, national standards for the design, application and placement of traffic control devices (TCDs) are found in the *Manual on Uniform Traffic Control Devices* (MUTCD).[1] The Federal Highway Administration (FHWA) is responsible for the standards and for publishing the MUTCD.

Generally, the standards and guidance contained in the MUTCD have evolved over many years and have been the result of practical experience, research and experimentation, with the best and most effective devices and practices being implemented. However, the MUTCD is a constantly evolving document, and all standards contained in it are subject to change. Continuing advances and innovations in technology will produce changes in highways, vehicles and driver proficiency. Consequently, portions of the system of TCDs in the MUTCD will require updating. Before any change is made to the MUTCD, the impact of that change on safety, operations and economics must be carefully weighed. Thus, it is important that appropriate evaluation studies be planned and executed to assess the effectiveness of a new TCD or application.

This feature describes the advantages and the process of one of the primary steps in implementing a new or innovative TCD or application—obtaining experimental status. The feature also defines what a successful experiment is and provides information regarding funding. The feature's focus is on the importance of conducting research and evaluation of innovative TCDs before incorporating them into the MUTCD.

THE ADVANTAGES OF EXPERIMENTAL STATUS

It is important to understand and follow the established procedures for experimental use of innovative TCDs or applications. Localities often install innovative TCDs with the intention of improving the safety or operation of a particular roadway. These devices should be in compliance with the MUTCD and should only be installed after the locality has received permission to experiment from the FHWA. There are four very important reasons for conducting an experiment and for obtaining permission to experiment:

Safety. Many localities that install noncompliant TCDs have no information or data regarding the effectiveness and safety of the TCD. An experiment with a positive outcome provides evidence that the device will be successful in promoting the safety and mobility of all roadway users.

Liability. The state or local jurisdiction may be held responsible for crashes, deaths, injuries, or property damage that could occur as a result of the noncompliant TCD.

Uniformity. Recognition by the traveling public plays a key role in the safety and effectiveness of TCDs. Nonstandard devices can be confusing to the traveling public. Uniformity is a key element for drivers' and other road users' understanding of various TCDs across the nation.

Sharing. When experiments are successful and lead to changes in the MUTCD, other states and localities benefit by being able to use the new TCD or application. State and local agencies also benefit by learning about others' unsuccessful experiences with a device. They can avoid the time and expense of trying devices that have already been shown to be ineffective in improving safety or operations.

The FHWA wants to ensure that experimental data support the claims that a new or innovative TCD does improve the safety and mobility of the traveling public.

EXPERIMENTAL STATUS

With permission from the FHWA, it is allowable to test and implement TCDs currently not included in the MUTCD on an experimental basis. Successful experimentation with an innovative TCD is one of the primary steps in effecting a change to the MUTCD. Figure 1 illustrates the experimentation process.

Requesting Experimental Status

Requests for experimentation must originate with the state/local highway agency or toll operator responsible for the operation of the road or street on which the experiment is to take place. The responsible organization must submit the request to the FHWA for approval before the experimentation can take place. Depending on the policy of the state's FHWA Division Office, requests to experiment should be submitted to either (Figure 1):

- The FHWA Headquarters Office of Transportation Operations (400 7th St., SW, HOTO, Room 3401, Washington, DC 20590 USA) with a copy sent to the FHWA Division Office in the state, or
- The FHWA Division Office in the state for it to review and forward the request to the FHWA Headquarters Office of Transportation Operations.

The requesting jurisdiction should contact the FHWA Division Office in the state to determine the Division Office's policy regarding submission of requests to experiment and to coordinate activities related to the experimental TCD.

Part 1A-6 of the MUTCD provides basic information regarding requests for permission to experiment.[1] All requests for experimentation must contain the following:

Problem Statement. A brief statement indicating the nature of the problem that the experimental device is expected to improve.

Description of the Experimental Device or Proposed Change. A description of how it was developed, the manner in which it deviates from the standard and how it is expected to be an improvement over existing standards.

Illustrations. Graphics that would be helpful to understand the experimental device or its use (i.e., photographs, engineering drawings of the device and location where the device will be installed, phase diagrams, etc.).

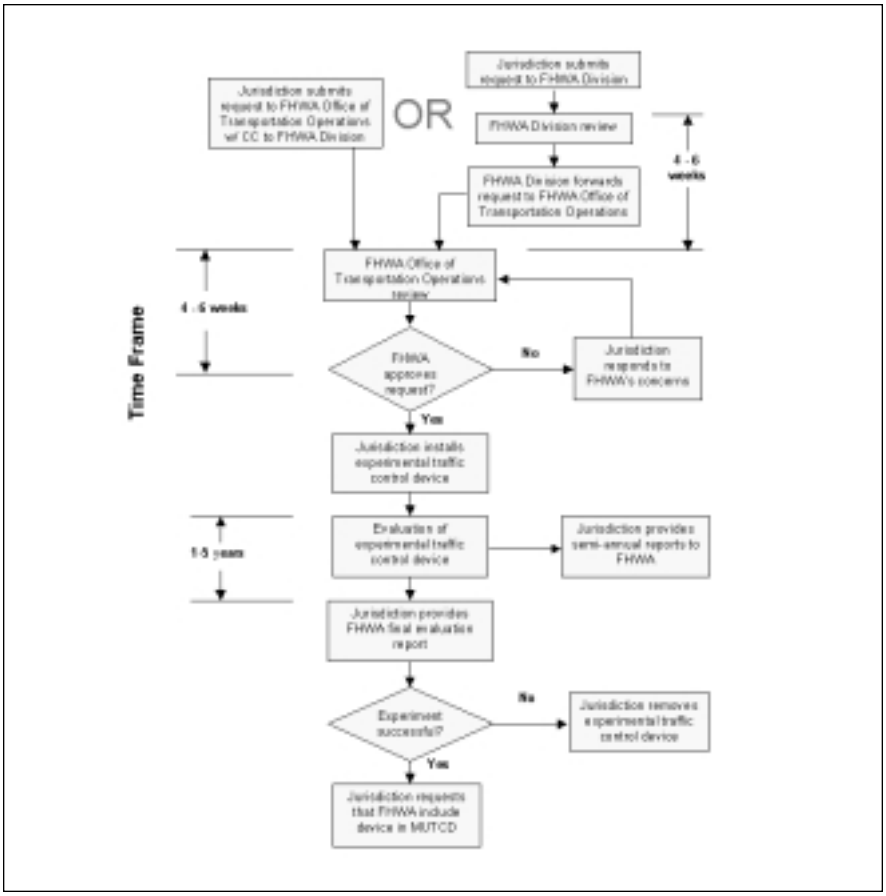

Figure 1. Experimentation with innovative traffic control devices.

Supporting Data. An explanation of how the experimental device was developed; if it has been tested or used, in what ways it was found to be adequate or inadequate; and how this choice of device or application was derived.

Detailed Research or Evaluation Plan. This detailed plan should include the time period and location(s) of the experiment. This plan must also provide for close monitoring of the experimentation, especially in the early stages of its field implementation. The evaluation plan should clarify what measures of effectiveness will be used, what data will be collected, how and when it will be collected, and how it will be analyzed.

Agreement to Restore Experimental Site to MUTCD Compliance. This agreement should state that the requesting jurisdiction will return the experimental site to a condition that complies with the provisions of the MUTCD within three months following the end of experimentation period. If the experiment demonstrates an improvement, the device or application may remain in place while a request is made to revise the MUTCD and an official rulemaking action occurs. This agreement must also state that the agency sponsoring the experimentation will terminate experimentation at any time that it determines significant safety hazards are directly or indirectly attributable to the experimentation. The FHWA Office of Transportation Operations may also terminate approval of the experimentation at any time if there is indication of a hazard.

Agreement to Provide Progress Reports. This agreement should state that the requesting jurisdiction will provide semiannual progress reports for the duration of the experimentation and a copy of the final results of the experimentation to the FHWA Office of Transportation Operations, within three months following completion of the

experimentation. The Office of Transportation Operations may terminate approval of the experimentation if reports are not provided in accordance with this schedule.

FHWA Review and Approval

After the request is sent to the Office of Transportation Operations (either from the jurisdiction or through the Division Office), the Office of Transportation Operations will review the experimentation request. The Office of Transportation Operations will notify the Division Office and requesting jurisdiction whether or not the experimentation has been approved. If the experimentation has not been approved, the locality may address any concerns raised by the FHWA (such as an incomplete experimentation plan) and resubmit its request.

Installation and Evaluation

The locality must collect baseline or "before" data to demonstrate the existing problem [e.g., measures of effectiveness (MOEs)], such as vehicle approach speeds, brake applications, operator behaviors, etc.) before installing the TCD. Collecting crash and/or conflict data at the experimental location is also strongly encouraged to help in the assessment of safety.

After the "before" data have been collected, and approval is obtained from the FHWA, the locality may install the experimental TCD. The experimental TCD should remain in place for a minimum time period approved by the FHWA, usually one year. During the experimental period, the local jurisdiction should continue to collect the same types of data as collected before installation to see how effectively the experimental device performs. In addition, the evaluation might include surveys of drivers, pedestrians, and/or bicyclists to determine if they noticed and understood the experimental TCD and whether they felt the device improved conditions in terms of safety, mobility, operation, and/or comprehension.

During the evaluation period, the requesting jurisdiction must provide semi-annual reports to both the FHWA Office of Transportation Operations and the FHWA Division Office in the state in which the jurisdiction is located. At the end of the experimentation period, a copy of the final evaluation report also must be submitted to the FHWA within three months of completion.

Experimentations conducted over a wide geographic area and under varying conditions, rather than a single location, serve as better indicators as to how the TCDs may perform with widespread use if included in the MUTCD. Members of the National Committee on Uniform Traffic Control Devices (NCUTCD) have helped to solicit other jurisdictions around the United States that are willing to apply for permission to experiment with an innovative TCD or application. The NCUTCD, comprised of traffic-engineering and related professionals, has been instrumental in communicating to practitioners activities regarding ongoing experimentations.

DEFINITION OF A "SUCCESSFUL EXPERIMENT"

In addition to evaluating conditions both prior to and after installation of the experimental device, the FHWA requires that the experiment must describe the MOEs, the safety benefits and the traffic benefits (i.e., better visibility, less delay, fewer conflicts, etc.) An experiment is considered successful when the results of the research indicate the experimental TCD or application:

- Is well understood by the public,
- Does not cause any adverse conditions and
- Performs as it was intended.

If the experimental TCD provides little or no improvement in safety or operations, the evaluation will likely conclude that the experimental TCD is not effective and the locality should remove it. This would end the experiment. If, however, there has been an improvement, the local jurisdiction can then request a change be made to include this application in the MUTCD. If the FHWA agrees to start the process to change the MUTCD, the device or application may remain in place until a Final Rule is issued regarding that device.

Using the results of the experiment, the FHWA develops proposed text on the application of the experimental TCD. The FHWA seeks public comments through a Notice of Proposed Amendment (NPA) in the *Federal Register*. The NCUTCD also provides comments regarding proposed changes to the MUTCD by responding to the NPA.

The *Federal Register* is a government agency document published and available for inspection every business day. The *Federal Register* can be viewed online at www.nara.gov/fedreg/. The MUTCD Web site (mutcd.fhwa.dot.gov) also provides the latest notices in the *Federal Register*.

A Successful Example

An example of a successful experiment is the fluorescent yellow green (FYG) warning sign. A nationwide problem with pedestrian-vehicle crashes (approximately 82,000 injuries and 5,000 deaths per year) and bicycle-vehicle crashes (approximately 59,000 injuries and 800 deaths per year) prompted the need for more "attention-getting" signs to warn motorists of the presence of pedestrians and bicyclists. Use of the highly visible FYG color for pedestrian, bicycle and school warning signs was seen as a possible treatment to reduce these crashes.

In 1993, FHWA conducted a two-year study nationwide to evaluate the FYG color as an option for the pedestrian (W11-2), bicycle and school-crossing signs. Accordingly, several localities conducted in-depth studies on the use of FYG warning signs. In order to experiment with FYG, each locality developed and submitted an experimental plan describing the work to be conducted. The FHWA approved 57 requests and gave permission to experiment to these localities.[2]

The localities collected before data to show the existing problem. The collected MOEs included vehicle speeds on the approach to the crosswalks and pedestrian-vehicle conflicts. The localities also collected crash data involving cars and pedestrians at the experimental sites. After the before data were collected, the localities installed the FYG signs, which remained in place for at least one year. During the experimentation period, data continued to be collected. Random surveys of drivers also were conducted to determine if they noticed the signs and

whether they felt the signs improved pedestrian safety. Twenty-four jurisdictions completed the experimentation and provided final reports to FHWA.

The results of the evaluation indicated that the FYG signs produced a significant reduction in pedestrian-vehicle conflicts and a significant increase in the percentage of vehicles stopping or yielding. Public-opinion surveys indicated that the FYG warnings were conspicuous and were associated with the need for caution. Overall, the FYG warning signs produced some improvement in perceived safety at pedestrian crossing sites.

Experimentation with the FYG warning signs was deemed successful, and a request to include them in the MUTCD was made. The request successfully went though the rulemaking process, and FYG was approved as an optional color in the MUTCD for pedestrian, bicycle and school crossings. As a result, the FYG warning sign can be seen at many of these crossings across the United States.

FUNDING EXPERIMENTATIONS

Requests for funding the experimentation should be directed to the state highway agency or local jurisdiction responsible for the roadway location where the experimental device is installed. Funding for the experimentation may also come from cooperative agreements with universities, private companies, or others interested in conducting research. In general, the FHWA cannot directly fund the installation of an experimental TCD. In some situations, it is possible for the FHWA to participate in the evaluation of an experimental device or application. Please contact your state's FHWA Division Office for more specific information regarding funding.

CONCLUSION

The standards, guidelines and options for traffic signs, signals and pavement markings contained in the MUTCD are subject to change to reflect advances in technology and changes in the transportation system. The FHWA considers scientific and quantitative data from experimentation crucial for support of any proposed change in the MUTCD. Anecdotal evidence should not be the only basis of support for a modification to the MUTCD. In light of liability considerations, the importance of safety and uniformity, and the benefits of sharing experimentation experience and data, local jurisdictions should conduct FHWA-approved experiments when contemplating installing a TCD not contained in the MUTCD. For contact information, please visit the following Web site: mutcd.fhwa.dot.gov/res-who-tcd.htm. The end result of successful experimentations is the optimization of performance by improved safety and mobility for all road users—a goal not only of the FHWA but also of the entire transportation profession. ■

Editor's Note: In next month's issue of ITE Journal*, the authors will explain how changes, such as incorporating a new device into the MUTCD, are adopted through the* Federal Register *rulemaking process.*

References

1. *Manual on Uniform Traffic Control Devices for Streets and Highways.* Washington, DC, USA: U.S. Department of Transportation, FHWA, 2000. See p. 61 of this issue of *ITE Journal* for information on ordering the MUTCD.

2. Kittle, C. "Fluorescent Yellow Green Warning Signs for Schools, Pedestrian and Bicycle Crossings." *Wyoming T2 Newsletter, Local Technical Assistance Program*. Vol. 16, No. 2, Summer 2000, pp. 6–7.

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