



**Washington State
Department of Transportation**

Paula J. Hammond, P.E.
Secretary of Transportation

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October 21, 2010

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

Dear Mr. Kehrli:

The Washington State Department of Transportation (WSDOT) requests permission to supplement experimentation 2(09)-4 (E) with the use of Active Traffic Management signing on State Route 520. The planned turn on date for the State Route 520 system is November 16, 2010.

Per your staff request enclosed is information regarding the use of yellow diagonal arrows for the Active Traffic Management system on Interstate 5 in the Seattle area. Also enclosed is the original proposed experiment request submitted for Interstate 5. The State Route 520 system will follow the same protocol for evaluation as the Interstate 5 system. If you need any additional information or have any revisions to the proposed experiment and evaluation plan, please contact Rick Mowlds of our Headquarters Traffic Office, at (360) 705-7988.

Thank you for your consideration of this matter.

Sincerely,

A handwritten signature in black ink, appearing to read 'John Nisbet'.

John Nisbet, P.E.
State Traffic Engineer

JN: rm

Enclosures

cc: Don Petersen, FHWA – Olympia 40943
James Colyar, FHWA – Olympia 40943
Mark Leth, NB82-120
Morgan Balogh, NB82-120



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February 16, 2011

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

Dear Mr. Kehrli:

The Washington State Department of Transportation (WSDOT) requests permission to supplement experimentation 2(09)-4 (E) with the use of Active Traffic Management signing on Interstate 90. The planned turn on date for the Interstate 90 system is mid-April.

Enclosed is the original proposed experiment request submitted for Interstate 5. The Interstate 90 system will follow the same protocol for evaluation as State Route 520 and Interstate 5 systems. If you need any additional information or have any revisions to the proposed experiment and evaluation plan, please contact Rick Mowlds of our Headquarters Traffic Office, at (360) 705-7988.

Thank you for your consideration of this matter.

Sincerely,

A handwritten signature in blue ink, appearing to read 'John Nisbet'.

John Nisbet, P.E.
State Traffic Engineer

JN: rm

Enclosures

cc: Don Petersen, FHWA – Olympia 40943
James Colyar, FHWA – Olympia 40943
Mark Leth, NB82-120
Morgan Balogh, NB82-120

MUTCD - Experimental Use Request for Active Traffic Management Signing

A. Issue

The focus of this experimental sign usage will be to develop lane control signage which will provide effective, accurate, reliable, up-to-date information with quicker comprehension by the driver compared to comprehension of standard MUTCD signage.

Within the Washington State Puget Sound Metropolitan Area the highways of I-5, I-90, and SR-520 all experience major congestion. A high percentage of collisions on urban freeways are resulting when traffic flowing at highway speeds encounters unexpected stopped traffic.

Freeway traffic can be queued due to recurrent congestion, construction, maintenance, collisions or other incidents. Drivers encountering queues are often faced with rapidly changing conditions in terms of speed and queue length. The panic braking and maneuvering that occurs cause rear-end, sideswipe collisions, and rollover collisions.

WSDOT is installing dynamic message signs at intervals of approximately ½ mile. These signs will inform drivers, in real-time, about roadway conditions and enable drivers to make informed choices; minimize sudden braking; minimize number and severity of crashes; reduce the speed of vehicles during incidents and within work zones; and achieve more efficient flow of traffic.

Dynamic message signs are being installed over each travel lane to be used as lane control signs. These lane control signs will inform drivers of the current regulatory speed and the status of the specific lane (open, closed ahead, or closed.) The regulatory lane speed will change in reaction to existing conditions.

Separate dynamic message signs will be placed either overhead or to the sides of the road. These signs will inform drivers of road conditions (delays, lane closures, causes, detours) and action(s) to take.

With this many signs the time required for drivers to process information will increase. The driver may become overwhelmed by the amount of information and may experience difficulty comprehending and responding to the information. There is a need to develop alternative lane control signage which will provide effective, accurate information, and minimize comprehension and response time.

Experimental Request:

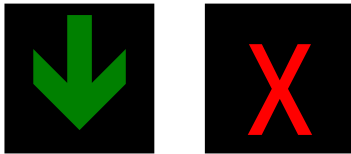
- Modifications of Lane Control signs.

B. Proposed Change - Modification of Lane Control Signs

The non-standard sign and implementation arrangement for which we are requesting experimentation is a modification of MUTCD 4J.02/.03 Sign "LANE CONTROL SIGNS" to incorporate the use of slanted arrow and double arrows similar to those used in MUTCD W12-1.

Illustrations (Modification of Lane Control Signs)

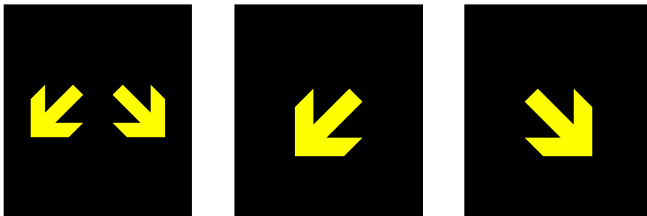
MUTCD 4M.02/.03
LANE CONTROL SIGNS



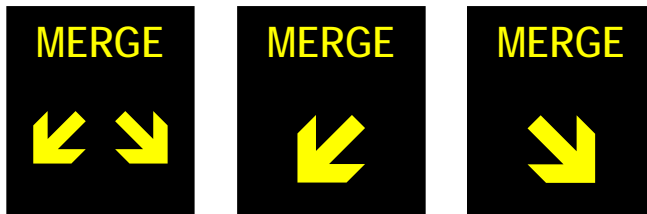
MUTCD W12-1
Warning Sign



Experimental Use



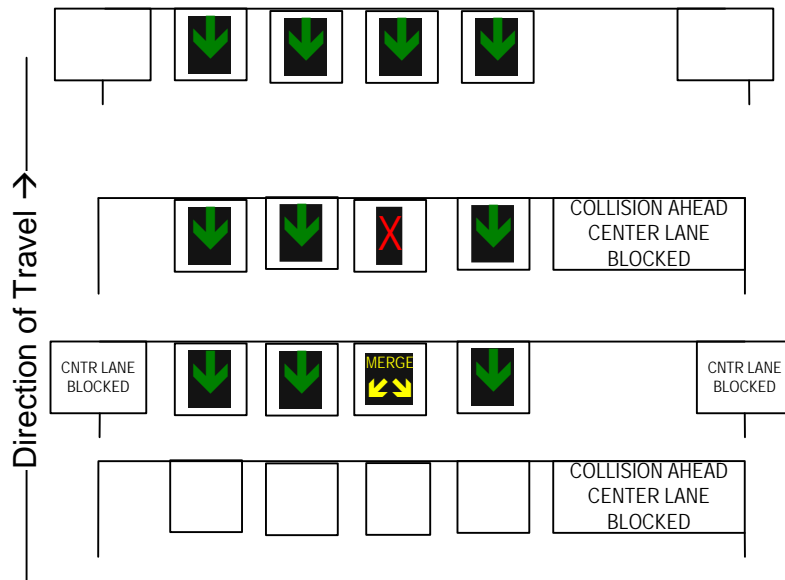
OR



The expected improvement in utilizing the double diagonal down arrows is during an incident that involves one of the interior lanes. This application will give us the ability to move traffic to either the left or right lanes around the impacted lane and maximize the capacity of the non-impacted lanes.

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The following sign layout is the proposed signing need to move traffic around a center lane closure. It is reference to depict an obstacle (collision) in a center lane.



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Supporting Data

FHWA-PL 07 012 "Active Traffic Management"

Recommends implementing ATM including the use of lane control signs to minimize the impact of queues, congestion, and incidents.

FHWA-RD-01-051 "Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians"

Recommends that where there is increased complexity in the information to be processed by drivers the most relevant information must be communicated in a dramatic manner to ensure that it receives a high priority by older individuals.

FHWA-RD-94-069 "Symbol Signing Design For Older Drivers"

Provides information on the advantages of symbols - identification at farther distances, identified more rapidly, recognized more accurately with a shorter viewing time, and understood by people who don't read the language of the country they're in.

Previous MUTCD Experimental Requests Using Yellow Arrows

Requestor	Subject	Sections	Date Received	Status	MUTCD Request Number
NORTH CAROLINA DOT	YELLOW DIAGONAL SLOPING ARROW LANE-USE CTRL SIGNAL FOR REVERSIBLE LANE OPS		3/4/1998	Approved	4-144-EX
CITY OF LOS ANGELES, CA	FLASHING YELLOW RIGHT ARROW LANE-USE CTRL SIGNAL FOR REVERSIBLE LANE OPS		12/15/1997	Approved	4-143-EX
TX DOT	DIAGONAL AND DOWNWARD YELLOW ARROW LANE USE CONTROL SIGNALS			Completed 1996	4-126-EX
AZ-DOT	STEADY & FLASHING LANE USE CONTROL SIGNALS W/YELLOW ARROW	4E-12	8/12/1991	PENDING	4-116-EX
MN-DOT	USE OF STEADY AND FLASHING DOWNWARD YELLOW ARROWS LANE CONTROL SIGNALS (SG-100)	4B-12	11/21/1977	Completed	4-5-EX

NCHRP 3-54 Research Study

Study was on the use of the Flashing Yellow Arrow for permissive left turn movements. While this study wasn't directly related to the use of yellow arrows for lane control it did show that the flashing yellow arrow display was well understood and correctly interpreted by drivers.

C. Proposed time period and location(s) of the experiment

Time Period

The experimental signage will be in use from August 1, 2010 to August 1, 2012.

Location

The proposed Active Traffic Management (ATM) with MUTCD compliant signage will be installed on the three corridors shown below.

- a. I-5 Corridor ATM Zone
Northbound from MP 157.23 to MP 164.46

- b. I-90 Corridor ATM Zone
Eastbound from MP 2.81 to MP 11.33
Westbound from MP 11.71 to MP 3.19

- c. SR-520 Corridor ATM Zone
Eastbound from MP 0.19 to MP 6.53
Westbound from MP 7.85 to MP 0.93

D. Legal Statement Certifying that concept is not protected by a patent or copyright.

There are no public or private patents or copyrights on the proposed signing.

E. Research/Evaluation

Project Administration

The Washington State Department of Transportation will be responsible for administering this experiment under the direction of the WSDOT State Traffic Engineer.

Deployment Plan (under development, dates are approximate)

ATM System implemented using experimental lane signing:	
I-5 NB	August 2010
SR-520 EB/WB	October 2010
I-90 EB/WB	March 2011

Study the use of the yellow arrow signing in a simulated environment at Turner-Fairbanks Laboratory:	TBD
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MUTCD - Experimental Use Request for Active Traffic Management Signing

Education/Outreach

Prior to ATM implementation and experimental use WSDOT will implement an outreach plan for public education and outreach will be developed and carried out. The goal is that the signs will be easily understood so the motorists will know how to respond to it.

Evaluation Criteria (Modification of Lane Control Signs)

Evaluation

The MUTCD experimental use will first be evaluated in a laboratory setting. The laboratory evaluation scope will be coordinated with the FHWA. WSDOT will participate with the FHWA so that the design characteristics of the ATM system in Seattle are fully accounted for in the laboratory setting.

Laboratory Evaluation Criteria:

- easily detected by the driver;
- legible at the appropriate distance so that the driver has time to take the necessary action;
- legible when seen for a very brief time; and
- easily understood so the user will know how to respond to it.

Baseline Data:

- Number of lanes
- Lane widths
- Sight Line
- Lane use (HOV/GP)
- Level of access control (On/Off Ramps)
- Use of side mount and dynamic message signs.

Before-and-After Implementation Field Data Collected:

- Speeds
- Collisions

Driving Behavior Data Collected from Field Observation:

- Lane control sign information (speed, lane control)
- Behavioral effects on driver performance, decision making.
- Unintended consequences (conflicts, abrupt lane changes, etc.)

Data Collected from Surveys and Driver Correspondence:

- Safety or operational concerns, suggested improvements.

F. Agreement to restore the experimental site to the MUTCD if needed

The Washington State Department of Transportation will agree to restore the experiment site to a state complying with the provisions of the MUTCD:

- within 3 months following the end of the time period of the experiment, or
- at any time that the participating agency determines that significant hazards are directly or indirectly attributable to the experimentation, or

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- if requested to do so by the FHWA Office of Transportation Operations.

The Washington State Department of Transportation will provide semi-annual progress reports until the experiment is completed. A copy of the final results will be sent to FHWA's Office of Transportation Operations within 3 months following completion of experimentation. All reports will be submitted to: Director of the Office of Transportation Operations, HOTO Room 3401 400 7th Street, S.W. Washington, D.C. 20590. The FHWA's Office of Transportation Operations has the right to terminate approval of the experimentation if reports are not provided in accordance with this schedule."