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March 8, 2005

Regina McElroy, Director
Federal Highway Administration
Office of Transportation Operations (HOTO)
400 Seventh Street, SW
Washington, DC 20590

Dear Ms. McElroy:

Attached is the New York State Department of Transportation's (NYSDOT) request for experimentation with roundabout signs and pavement markings. Included in the request are the requirements set forth under Section 1A.10 of the *Manual on Uniform Traffic Control Devices* (MUTCD).

NYSDOT research shows that the designs used for these signs and pavement markings are not protected by any patents or copyrights.

The NYSDOT agrees to restore the sites of the experiment to a condition that complies with the provisions in the MUTCD within three months following the issuance of a final rule on these traffic control devices. The NYSDOT also agrees to terminate the use of these devices installed under experimental approval if at any time the NYSDOT detects any significant safety concerns attributable to them. Furthermore, the NYSDOT acknowledges that the Federal Highway Administrations's Office of Transportation Operations has the authority to terminate this experimentation at any time if there is an indication of safety concerns.

The NYSDOT would appreciate a response to this request by April 8, 2005. If you have any questions or concerns regarding this request, please contact Barbara Abrahamer, of our Traffic Operations Bureau, at (518) 457-2095 or babrahamer@dot.state.ny.us.

BRUCE W. SMITH
Director
Traffic Engineering & Highway Safety Division
Attachments
NYSDOT Request to Experiment Roundabout Signs & Pavement Markings

Nature of the Problem
Unlike traditional intersections roundabout intersections require motorists desiring to make a left turn to first enter the roundabout drive counterclockwise around the roundabout central island. and then exit the roundabout at their appropriate egress. At traditional intersections that incorporate an auxiliary lane for left turn only and/or other left turn movement combinations symbols such as those shown in Figure 1 are employed as pavement markings. and as part of regulatory signs to inform the approaching motorist which lane they should place themselves in for their desired intersection movement.

Using these same left turn pavement markings and signs at roundabouts. as shown in Figure 2 however creates the potential for the motorist to be misled into believing they should make a left turn in front of the center island thereby leading themselves into the circulatory roadway in a clockwise manner facing oncoming traffic. Even though roundabouts are designed to physically discourage incorrect movements we note that New York State law (NYS Vehicle & Traffic Law. § 1127 b) allows a traffic control device to direct motorists to pass to the left of a rotary traffic island.

Figure I: Typical Signing &- Markings at Traditional Intersection

[*Image not shown:* Square sign illustrating an intersection with typical signage and markings. The intersection is two roads, one traveling north-south and one traveling east-west. The north-south road is three lanes one the left side and two lanes on the right side. The bottom right section of the road has a left turn only lane and a turn left and straight lane. The top left section of the road has a no passing zone approaching the intersection. The east-west road has two lanes on each side. The bottom section of the left portion of the road opens up into four-lane section approaching the intersection, as does the top left portion of the road. *(See the PDF version to view images)*]

Figure 2: Typical Signing (Markings at Roundabout)

[*Image not shown:* Sketched picture indicating traffic movement and road markings in a roundabout. Four roads enter the roundabout at north, east south and west. All roads are two lanes approaching and exiting the intersection, and have crosswalk indicators where the road meets the roundabout. *(See the PDF version to view images)*]

Proposed Change
NYSDOT proposes to use the fishhook-style pavement markings and signs in several multi-lane roundabouts being constructed beginning in Fall 2005. As noted by Kinzel (I) and Jacquemart (2), the fishhook symbol represents an alternative to the conventional left-turn arrow, and more accurately represents the movement that drivers encounter at a roundabout. A typical plan view of the roundabout with the fishhook symbol used for pavement markings and signs is shown in the Appendix.

Development of the Signs and Pavement Markings
Concern over the use of the conventional left turn arrow first arose when NYSDOT was designing some of the first multilane roundabouts in New York. Since NYSDOT was

among the first states to mark multi-lane roundabouts with turn arrows there was not a lot of history to the practice from which to draw. We met with our Legal Affairs Bureau and they shared the concern that use of the conventional turn arrow could possibly lead to drivers turning left in front of the center island legal Affairs also advised us that if we had an alternative symbol that better indicated the correct turning maneuver then we should use that symbol even though it would be new to drivers.

The symbol was developed through research of the marking of roundabouts in other countries. It was learned that at some roundabouts in Australia and The Netherlands (not all-inclusive) a curved arrow was utilized for pavement markings at multi-lane roundabout approaches. In the U.S.. the fishhook style symbol is used on regulatory signs in Colorado. Maryland and Florida (and possibly other states). We do not know of U.S. states using the fishhook marking on the pavement. but at least two reports would seem to endorse its use (see Kinzel (1) and Jacquemart (2)). We refined the fishhook symbol from other countries by adapting the Federal MUTCD alphanumeric symbols for left and through-left turn arrows to the currently-proposed symbol. Similarly. the regulatory signing for exclusive turn lanes was modified to include the fishhook arrows.

Experiment Locations
We propose to use the fishhook markings and signs at 6 roundabouts to be constructed during Fall 2005. 2006 and 2007. The locations are as follows:

NY 67 at State Farm Rd.. Town of Malta
NY 67 at 581-87 Interchange Ramps. Town of Malta
NY 67 at NB 1-87 Interchange Ramps. Town of Malta
NY 67 at Kelch Drive. Town of Malta
NY 67 at US 9/Dunning St. Town of Malta
Johnson City Traffic Circle Roundabout Conversion. City of Johnson City

Evaluation Plan and Time Periods
The evaluation plan will consist of two main parts: Part 1 will be completed prior to actual construction of the roundabouts and Part 2 will Occur after construction.

Part 1: A computer simulation of driving through roundabouts with the conventional and fishhook symbols will be shown to volunteer members of the public with an evaluation of their reactions. Part 1 will be conducted during Summer 2005. \

Part 2: A comparison will be made of the reported numbers of drivers (if any) at the above roundabouts who turned in advance of the center island with available statistics at other already-built multilane roundabouts. We will also study any other problems at the roundabouts that might be attributable to the fishhook symbols. Part 2 will begin in late fall 2005 (or whenever the first roundabout listed above is completed) and continue for a period of at least one year following the opening of the last roundabout listed above. (This period will likely not be complete until 2008).

NYSDOT believes that the proposed fishhook symbols will not cause any confusion or contribute to any safety problem. Should any of the results from either Part I or Part 2 above cause concern of a *possible* safety problem however the symbols will not be used, or replaced if already installed. and a substitute method of marking and signing will be implemented.

Conclusion
Should the installation and use of the fishhook symbol prove successful, it is hoped that a future edition of the Federal MUTCD will include its use as an option for signing and marking at roundabouts and other circulatory roadways.

[*Image not shown:* Header: NYS Request to Experiment; Roundabout Signs and Pavement Markings Appendix *(See the PDF version to view images)*]

Figure 1: NY 67 at US 9 Roundabout. Locations of Fishhook markings and signs

[*Image not shown:* Blueprint drawing of NY 67 at US 9 Roundabout. Two-lane roads enter the roundabout from northeast, southeast, southwest, and northwest. *(See the PDF version to view images)*]

Figure 2: NY 67 at US 9 Roundabout. colored image

[*Image not shown:* Color picture of NY 67 at US 9 roundabout of a roundabout and traffic markings. Four roads enter the roundabout at north, east south and west. All roads are two lanes approaching and exiting the intersection, and have crosswalk indicators where the road meets the roundabout. *(See the PDF version to view images)*]

Figure 3: Fishhook Symbol Details

ROUNDABOUT APPROACH LANE USE PAVEMENT MARKINGS
(FOR USE ON MULTI -LANE APPROACHES ONLY)

Figure 4: Fishhook Symbols & Signs in Allwood, New Jersey

[*Image not shown:* Drawn street map of fishhook symbols and signs in Allwood, NJ *(See the PDF version to view images)*]

[*Image not shown:* Photograph of crosswalk sign at roundabout in Allwood, NJ. *(See the PDF version to view images)*]

REFERENCES

1. Kinzel. Christopher S., P.E., Signing and Pavement-Marking Strategies for Multi-lane Roundabouts: An Informal Investigation; Urban Street Symposium, July 2003

2. Georges Jacquemart. Draft Chapter 2 of ITE ToolBox - "Designing and Operating Safer Roundabouts"; May 17, 2004