Mr. Jim Barry, AT&SA

U.S. Department
of Transportation
**Federal Highway
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

January 21, 2005

Refer to: HOTO-1

Mr. Nick Hutchins
Director, Sales and Marketing
HIL-Tech, Ltd.
2119 Devon Road
Oakville, Ontario L6J 5L9
CANADA

Dear Mr. Hutchins:

Thank you for your December 17 email to Mr. Scott Wainwright of our staff, requesting an interpretation of Part 3 of the Manual on Uniform Traffic Control Devices (MUTCD) regarding the use of light emitting diode (LED) devices, such as your firm's "LEDline" product, as raised pavement markings (RPMs.)

The MUTCD does not specify what methods should or shall be used to provide the light source to road users from an RPM. In a Support statement, Section 3B.11 refers to the availability of both retroreflective and internally illuminated markers. LEDs are one of several different possible methods of internal illumination of an RPM. The primary use of retroreflective or internally illuminated RPMs, currently and when this type of device was first incorporated into the MUTCD, is to provide markings that are visible at night when water covers the roadway surface, making normal retroreflective markings flush with the surface invisible or difficult to see. However, RPMs of all types are coming into increasing use as supplements to regular longitudinal markings in certain roadway geometric conditions because of their greater brightness at night even when the pavement is dry. LED-based RPMs are also being used even for some daytime conditions because of their brightness.

Section 1A.13 of the MUTCD contains this definition (number 60):

> "Raised Pavement Marker—a device with a height of at least 10 mm (0.4 in) mounted on or in a road surface that is intended to be used as a positioning guide or to supplement or substitute for pavement markings or to mark the position of a fire hydrant."

This definition, which is repeated in Section 3A.11, was developed at a time when LEDs were not yet practical as a light source for RPMs and retroreflective material was the predominant light source for this purpose. The definition does not clearly state how the minimum height of 10 mm (0.4 in) is to be measured. It does not specifically require the light source to be at least 10 mm high.

It is our determination that, as long as the height of the device itself, mounted on or in the roadway, is at least 10 mm and it provides approaching road users with a visual image reasonably similar to that of a retroreflective RPM, an LED-based internally illuminated marker can be considered an RPM for the purposes of Part 3 of the MUTCD.

Sections 3B.11 through 3B.14 provide detailed Standards, Guidance, Options, and Support governing the design, colors, location, spacing, and usage of RPMs in general and in specific applications as vehicle positioning guides, supplementing other markings, and substituting for other markings. LED-based internally illuminated RPMs may be used for the purposes described in these sections as long as they are placed to comply, as a minimum, with the requirements of these sections. Jurisdictions may place RPMs closer together than the prescribed minimum longitudinal spacings and they might consider doing so if that is a cost-effective solution to safety or operational issues related to line visibility at certain locations.

It is important to note that internally illuminated RPMs used as positioning guides or to supplement or substitute for other markings must operate in a steady (non-flashing) mode. Flashing LED lights in or on the roadway are considered to be an in-roadway version of a traditional flashing beacon warning signal. Chapter 4L of the MUTCD governs the use of flashing in-roadway lights and currently limits their use to uncontrolled marked crosswalks, although other uses are being experimented with by some jurisdictions in accordance with MUTCD Section 1A.10.

Literature for the "LEDline" product marketed by your firm indicates a potential use in which, during peak periods only, alternate lane lines (comprised of LED-based RPMs) would be illuminated to create more but narrower lanes on congested roadways or intersection approaches. This type of application may well have future potential; however, it does not comply with the current MUTCD and would require considerable human factors research and evaluation to determine road user understanding, behavior, and compliance. Since the "normal" (off-peak) lane lines would still be visible to road users at the same time the peak period lane lines were illuminated in a different lateral position on the roadway, there is concern that some road users would be confused and not follow the correct set of lines. Any jurisdiction wishing to deploy internally illuminated RPMs in a manner that does not correspond to the normal markings must request FHWA experimentation approval and should include with their request a detailed plan for how such markings will be scientifically evaluated, as well as the other information required by Section 1A.10.

Thank you for writing on this subject. If you have any questions, please call Mr. Scott Wainwright of our staff at 202-366-0857. Please note that we have assigned your request the following official interpretation number and title: "3-176 (I)—Use of LED Devices as Raised Pavement Markers." Please refer to this number in any future correspondence.

Sincerely yours,

Regina S. McElroy
Director, Office of Transportation
Operations

cc: Mr. Jim Baron, ATSSA