Introduction:

The NTPEP program has successfully supplied material performance data to AASHTO member departments for these products for several years. With the reduction in staffing that most departments continue to experience the NTPEP data has become an integral part of many member departments qualification process. With few exceptions, developing criteria for product qualification has been a difficult task for individual states. This guide is offered as information for AASHTO member departments for interpretation and use of the data generated through the NTPEP evaluation program.

This document has been developed as a consensus document within the Snow Plowable Raised Pavement Marker (SPRPM) Technical Committee. State and industry representatives have collaborated on the parameters listed herein to provide a conservative assessment of the expected performance of both snow plowable raised pavement marker lenses and castings submitted for evaluation in this program.

Key Aspects of the Program:

Within the NTPEP Committee there is a SPRPM Technical Committee. Members of this committee are industry representatives along with member Departments of Transportation personnel with raised pavement marker expertise. The industry representatives have input in the development of committee documents, however they are not voting members of the committee.

The SPRPM program consists of a lab testing portion and a field testing portion. The lab portion includes a battery of tests which are run in accordance with ASTM D4383. Presently three state DOT test labs conduct the testing. The Florida DOT is responsible for testing the Coefficient of Luminous Intensity and Abrasion Resistance of the lens. The Georgia DOT is responsible for testing Lens Cracking, Compressive Strength, and Color of the lens. The Ohio DOT is responsible for testing Holder Ramp Hardness of the castings.

The field testing portion involves the installation of sixty complete (lens and castings) raised pavement markers. Thirty are installed on an asphalt pavement and thirty are installed on concrete pavement. Products are subjectively evaluated initially and every 6 months for 2 years.

All performance data collected through these evaluations is reported through an online data base - Datamine. Access to proprietary data is limited to the submitting manufacturer and the member departments of transportation.

While NTPEP works to make the product evaluation process comprehensive and meet the requirements for AASHTO member departments, all test data should be carefully reviewed by the specifying agency and in the context of field experience with these products. With this in mind the review of the independent data produced through this evaluation program should be viewed as a tool in making reasonable judgments and selections of raised pavement casting and lens materials for projects in any specific location.
Review of Evaluations and Significance of Lab Data Generated

Coefficient of Luminous Intensity:
Twenty five white lenses will be tested for initial specific intensity in accordance with ASTM D4383, Section 10.1. In addition, eighteen lenses that have been installed in the field will be pulled from the test deck after 1 year, and the remaining lenses will be pulled from the test deck after two years and tested in accordance with this test method. All instruments used to collect coefficient of luminous intensity measurements shall have up to date, one year calibration certifications. These measurements can be used to determine the retroreflectivity of the lenses over time. The required initial retroreflectivity is listed in this specification.

Abrasion resistance:
Abrasion resistance will be tested on five lenses in accordance with ASTM D4383, Section 10.2. The value reported is a ratio of the retroreflectivity of the abraded lens to the unabraded lens. These measurements can be used to determine the durability of the lens. The required abrasion resistance is listed in this specification.

Compressive Strength:
Five lenses will be tested in accordance with ASTM D4383, Section 10.5. The load applied is 6000 lbs. The lenses are required to show no breakage or significant deformation according to this specification.

Lens Cracking:
Five lenses will be subject to lens impact testing and five more to temperature cycling in accordance with ASTM D4383, Section 10.4. The lenses are evaluated for cracking and delamination. The lenses are required to show no radial cracks extending to edge of the abrasion resistant area and no delamination according to this specification.

Holder Ramp Hardness Test:
Five castings will be tested in accordance with ASTM D4383, Section 10.6. Castings are tested in a Rockwell Hardness tester using the “C” scale. Required hardness according this specification is 51-55.

Review of Evaluations and Significance of Field Data Generated

Site Selection Criteria:
– Fully access controlled freeway
– Should not require crack sealing or extensive patching during the evaluation period
– Average Daily Traffic over 35,000
– Generally free of horizontal and vertical curves
– Speed limit between 80 and 120 km/hr (50 and 75 mph)
– Minimum average snowfall of 25 inches/year controlled by a combination of plowing, salt, and grits (cinders or sand)

Product Layout:
Each sample of sixty RPM’s will be divided into 6 groups of 10 units. Thirty RPM’s will be installed on Portland cement concrete pavement and thirty RPM’s will be installed on asphalt concrete pavement.
Field Observations: Testing will commence upon completion of the installation and continue for two years. Field observations will be made biannually of each remaining marker. At the 1-year evaluation period, nine markers from the asphalt location and nine markers from the concrete location will be removed from the castings and laboratory tested for retroreflectivity. At the 2-year evaluation period, the remaining markers will be removed and laboratory tested for retroreflectivity. Field observations will use the following rating scales:

Casting:
5 = Excellent, Completely intact, in “Like New” condition, good adhesion
4 = Good, Minor scrapes/scratches visible on close examination of surfaces
3 = Fair, Some cuts but none larger than 10 mm
2 = Poor, Some cuts larger than 10 mm
1 = Very Poor, Showing significant wear, no longer protecting lens
0 = Missing or damaged beyond use

Lens:
5 = Excellent, Completely intact, in “Like New” condition
4 = Good, Minor scrapes/scratches visible on close examination of surfaces
3 = Fair, Some abrasion, none greater than 5 mm
2 = Poor, Some large cuts/cracks/chips greater than 5 mm
1 = Very Poor, Showing significant wear, significant discoloration
0 = Missing or damaged beyond use

Night Visibility*:
5 = Excellent, completely intact, Bright, in “Like New” condition
4 = Good, Clearly visible from greater than 100 m (328 ft)
3 = Fair, Some loss in reflectivity, barely visible from 100 m (328 ft)
2 = Poor, Significant loss of reflectivity, visible from 50 m (165 ft)
1 = Very Poor, Significant loss of reflectivity, barely visible, discoloration
0 = Missing or totally nonreflective

* Night visibility will be conducted during complete darkness by viewing the RPM’s starting from 122 meters (400 feet) from a typical automobile, using low-beam headlights.

Acceptable values for these subjective ratings will need to be determined by the individual State. As a guide, the castings should remain at a rating of 5 for the two year evaluation. The lens should show durability and nighttime visibility ratings greater than 3 for the two year evaluation.