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A Guide for Local Government:

Sign Management

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Agencies that manage our roadways often struggle with tracking, assessing, and managing physical, technological, and human assets. In particular, the maintenance and replacement of street signs is an important task with its own particular challenges. Yet accurate assessment, management, and replacement of road signs is particularly important.

According to Federal Highway Administration (FHWA) statistics, approximately 42,000 people die annually on U.S. roads. Some of these fatalities are due to poor sign maintenance, especially during evening driving hours. Because of this, effective sign management has become essential to driver safety.

One of the key components of sign management is following sign retroreflectivity standards for certain types of traffic signs, as outlined by the FHWA. This is especially important since about one-half of all traffic fatalities occur during nighttime drive hours, while only a quarter of vehicle travel occurs at night.

Retroreflectivity is a term used to describe a type of reflection that redirects incident light from headlights back toward the source. The 2003 edition of the Manual on Uniform Traffic Control Devices (MUTCD), along with Revision 1 from November of 2004 and Revision 2 from June 2009, outlines retroreflective requirements for street signs, which helps improve sign visibility, especially at night. These improvements to nighttime sign visibility are of particular significance to older drivers whose visual capabilities and response times tend to diminish over time.

While there are certain requirements for sign retroreflectivity, there are also numerous ways to manage, maintain, and improve traffic signs' retroreflectivity. These improvements to nighttime sign visibility are of particular significance to older drivers whose visual capabilities and response times tend to diminish over time.

The FHWA has outlined maintenance methods intended to provide agencies a flexible means of conformance with the MUTCD requirements for minimum retroreflectivity of traffic signs. These methods provide protection from potential tort-liability. In order to minimize the risk of an agency being found negligent in meeting the requirements for minimum traffic sign retroreflectivity, a sign maintenance program must be provided in order to ensure the visibility of signs at night.

The FHWA provides two optional methods: the Assessment Method and Maintenance Method. Both methods feature optional approaches. A third option provided by the FHWA can consist of a combination of the Assessment and Maintenance Methods or can be based on acceptable engineering principles.

Assessment Method:

Visual Nighttime Inspection

Visual inspections are perceived to be the most likely means to find nighttime visibility problems with signs. Using this approach, it is possible to assess more than just the retroreflectivity of a sign.

The Visual Nighttime Inspection method entails a formal visual inspection by a trained sign inspector from a moving vehicle during nighttime conditions. Ideally, the inspector should be older with nighttime visual capabilities similar to older drivers. While visual inspections reveal night visibility problems not discernible by any other method, they are subjective and more difficult to tie to a benchmark value of retroreflectivity. Signs identified by the inspector as having retroreflectivity at or below the minimum levels should be replaced.

Another major element regarding nighttime visual inspection is the retroreflectivity rating system scale. At a minimum, the scale should include three designations: good, fair, and poor. Signs rated as poor should be scheduled for replacement as soon as possible. Signs rated as fair can be fixed during the next set of scheduled inspections or be scheduled for replacement. Alternately, these signs can be identified for additional assessment, such as measurement at a later date using a handheld retroreflectometer.

Probably the most important element of the nighttime inspection is documenting the process and results. This can be done with a voice or video recorder, paper and pencil, or with a Sign Information Management System (SIMS), such as Cartegraph's Sign Management System. Whatever the selected method, it is imperative that inspections be properly documented and archived to provide tort protection.

Assessment Method:

Measured Sign Retroreflectivity

The Measured Sign Retroreflectivity method requires that sign retroreflectivity be measured using a retroreflectometer and signs with retroreflectivity below the minimum levels be replaced. Retroreflectivity Compliance using ASTM (American Society for Testing and Materials) procedures for the measurement of sign retroreflectivity require multiple measurements on the face and legend of the sign.

Measuring retroreflectivity using a contact instrument should be performed as specified in ASTM Standard Test Method E1709-00e1, which requires a minimum of four retroreflectivity measurements to be taken of the sign background and legend, if applicable. The four measurements for each color are averaged to obtain an overall measurement of the retroreflectivity for each color on the sign.

With the Measured Sign Retroreflectivity method, other factors should be considered when determining if a sign is adequate. These factors include ambient light levels, presence of glare, location relative to the road, and the complexity of the visual background.

A sign management system can document a specific sign's retroreflectivity or Ra reading and can also be used to create sign groupings. When tied to sign life-cycle performance curves, these sign groupings can be used to predict when a type of sign will fall below the minimum required Ra standard.

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Management Method:

Expected Sign Life

The Expected Sign Life method entails replacing signs before they reach the end of their expected service life. The expected service life of a sign can be based on sign sheeting warranties, test deck measurements, retroreflectivity measurements of signs in the field (control signs), retroreflectivity measurement of signs taken out of service, or information from other agencies.

The key to this method is identifying the age of individual signs and the sheeting material used. This is often accomplished by placing a sticker or other label on the sign that identifies the year of fabrication or installation along with a sheeting material code. By recording the date of installation and sheeting material used in a sign management system, sign managers can report the number, type, and location of signs that need to be inspected and/or replaced for a given time frame.

This process requires the installation date be recorded when a sign is installed. The expected sign life is based on the experience of sign retroreflectivity degradation or life cycle in a geographic area, or it may come from a manufacturer warranty. Signs older than the expected life should be replaced. The process must, however, be geared to flag signs that need replacement early enough to ensure that the process of physical replacement can be completed before the signs drop below the minimum retroreflectivity levels.

This method provides insight into the installation date of every sign in an agency's jurisdiction, along with the type of retroreflective sheeting material used on the sign face. It is also necessary to define an expected sign service life for each type of retroreflective sheeting material.

One of the easiest ways to assign expected sign service life to retroreflective sheeting materials is to use the manufacturer's warranty. Most retroreflective sheeting materials have a warranty provided by the designated ASTM material type. Degradation rates differ by region of the country, type, and color of sheeting material, and sign orientation.

Furthermore, under this method, the actual retroreflectivity of a sign is not assessed—only the age of the sign is monitored. The expected sign life method allows agencies to help develop local service life requirements based on actual end-of-service-life retroreflectivity measurements and comparisons to minimum required levels. An effective sign management solution allows agencies to start scheduling sign replacements using the manufacturer or ASTM warranty information for expected sign life, while building more accurate regional sign deterioration curves for your geographic region.

Regional sign deterioration curves for a geographic region are useful since regional elements can have different deterioration effects on materials based on geography. Sunlight, angle of sun hitting the sign, elevation, moisture, salt water, moisture in the air versus humidity, ice, and other environmental elements all have different effects. In different combinations, these elements can cause a sign's useful retroreflectivity to be shorter or longer, than a manufacturer's warranty.

Management Method:

Blanket Replacement

The Blanket Replacement method is similar to the Expected Sign Life method, but executed on a spatial or strategic basis. On a spatial basis, all the signs in a specific area or corridor are slated for replacement when the effective service life is reached. On a strategic basis, all the signs of a specific type are scheduled for replacement at the same time across the entire jurisdiction.

All signs in an area/corridor, or of a given sign type, are replaced at specified intervals. This eliminates the need to assess retroreflectivity or track the life of individual signs. The replacement interval is based on the expected sign life for the shortest-life material used in the area/corridor or on a given sign type.

The Blanket Replacement method still requires that an agency inventory signs and track installation and/or replacement dates. This method also requires an agency to know the warranty or service life for the different ASTM material types. The difference between the standard Expected Sign Life and the Blanket Replacement method is that the Blanket Replacement method allows an agency to track sign data related to age, type, and replacement dates in groups rather than individually.

Management Method:

Control Signs

The Control Sign method is based on retroreflectivity measurements made from a subset of signs with the same material, which represent an agency's inventory. A minimum of three signs per type of sheeting material and color should be monitored per age group. These signs are measured periodically to monitor actual degradation of retroreflectivity. Performance curves can be developed from the periodic measurement information that enables predictions of where a sign is within the service life.

The control signs must be measured at given intervals with a retroreflectometer to determine how they are performing. These values should then be compared to the minimum retroreflectivity levels in order to trigger sign replacement actions. Once the retroreflectivity levels of the control signs reach the minimum retroreflectivity levels, all signs should be replaced.

Agencies must evaluate the number of signs of each type within their jurisdiction and establish guidelines on the number of control signs that are needed to appropriately represent signs in the field. An effective sign management solution should have the functionality and the flexibility to accommodate any variances that may arise when employing the Control Sign method.

Combination of Methods/Other Methods

Combinations of two or more methods may be viable for some agencies. In addition, agencies are not limited to the proposed maintenance methods listed above. According to the FHWA, agencies may develop their own methods using documented engineering studies that demonstrate appropriate deviations. Oftentimes, agencies either employ a combination of methods or start with one method as they establish regional performance data.

Estimate Capital Costs and Operating Budget

Under the new Federal Highway Administration rule that went into effect in May 2012, agencies should have a sign management plan in place by June 14, 2014. A plan should outline ways to maintain minimum levels of regulatory and warning sign retroreflectivity at or above the levels specified in Table 2A-3 of the 2009 MUTCD.

The compliancy dates are based on the June 13th, 2012 effective date of the Final Rule for Revision 2 of the 2009 MUTCD, which provides:

- Two years for implementation and continued use of an assessment or management method that is designed to maintain traffic sign retroreflectivity at or above the established minimum levels.
- There is no specified compliance date for guide signs (including street name signs) to be addressed by an agency's method. There is an expectation for agencies to add guide signs to their management or assessment method as resources allow.
- Schedules for replacement of signs not meeting the established minimum retroreflectivity levels are based on agencies' resources and relative priorities rather than specific compliance dates.

Agencies may exclude the following signs from the retroreflectivity maintenance guidelines described in Revision 2 or the 2009 MUTCD:

- Parking, Standing, and Stopping signs (R7 and R8 series)
- Walking, Hitchhiking, and Crossing signs (R9 series, R10-1 through R10-4b)
- Acknowledgment signs
- All signs with blue or brown backgrounds
- Bikeway signs intended for exclusive use by bicyclists or pedestrians

Choosing Sign Management Technology

A single solution dedicated to managing signs and sign inventory is counterproductive to your organization's goals. The technology you choose for managing these assets should be part of a broader approach to work and asset management and exhibit the following qualities:

1

A Simple User Interface

A clean and simple interface enables workers to concentrate on the task at hand, rather than trying to muddle their way through poorly designed software that makes tasks more difficult to manage and complete.

2

Prioritization Features

Transportation assets are high priority items. A downed, damaged, or vandalized sign and support can quickly make an organization susceptible to liability claims. Your software should help you prioritize requests so that your team is focused on the right challenges at the right time.

3

Adaptability

Identify your technology needs today and consider how those needs might evolve in the future. Use that knowledge to choose technology that has the ability to expand and grow with the needs of your community and the operations that service it.

4

Mobility

The facilities management system you choose needs to provide optimal power and functionality for the mobile workforce. Look for a system that performs as well, or better, on a mobile device as it does in the office. That way, no matter where the asset is located, your mobile workforce has everything it needs to access and complete work accurately and on time.

5

Data Organization

Does the system make it easy to input, view, and find data? If not, look elsewhere. Quick, easy access to well-organized data, such as a particular asset's work and inspection history, empowers workers—especially those in the field—to make well-informed decisions when performing their work.

6

Integration Capabilities

It takes more than one enterprise system to keep and organization running efficiently. The right software integrates easily with your other enterprise systems and has the ability to share data with them in real-time.

7

Flexibility

Customizable issue lists and submission forms should enable you to create tailored experiences for internal and external requests.

8

Compliance

Within the context of enterprise asset management, a sign management solution should simplify an organization's ability to comply with the FHWA's retroreflectivity requirements for traffic signs by providing a simple interface for inspecting signs, capturing inventory attributes—including origin/change dates, visibility, and retroreflectivity—assessing condition, and scheduling the necessary follow-up actions.

Now You Know

Even though the MUTCD mandates have shifted from "hard deadlines" to "suggested compliance," sign management should be a focal point of every local government organization. With the right strategy and technology, effective sign and retroreflectivity management will become the natural byproduct of your overall asset management initiatives.

Cartegraph™

Every Sign. Every Support. Everywhere.

Cartegraph is a user-centric, Esri-enabled Operations Management System designed especially for local governments. It is used to manage assets and infrastructure in direct tandem with the work, requests, and resources necessary to maintain and sustain them. Its rich toolset includes specialized solutions for capturing, accessing, and analyzing exceptionally detailed asset data—such as maintenance history, inspection information, and predicted asset health—for your entire inventory of signs, sign supports, and related transportation assets.

Learn More Now

About Cartegraph

Cartegraph technology is designed and built to help public sector organizations save time and money. With its emphasis on adoptability, user experience, and return on investment, Cartegraph helps local governments effectively manage the work, requests, resources, and enterprise assets at the center of their day-to-day operations.