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Current Requirements

- Signs have always been required to be retroreflective. No minimum values had previously been required.
- Language adopted in the MN MUTCD requires all agencies that maintain roadways open to public travel to adopt a sign maintenance program designed to maintain traffic sign retroreflectivity at or above specific levels.
- All agencies responsible for maintaining traffic signs are required to comply with the new MN MUTCD requirements.

**STANDARD** Public agencies or officials having jurisdiction **shall** use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in the MN MUTCD Table 2A-3 (page A-5).

**COMPLIANCE DATE:** June 13, 2014

Reminder

- In the MN MUTCD words have very specific meanings:
  1. **STANDARD** - a statement of required practice and the verb **SHALL** is used.
  2. **GUIDANCE** - a statement of recommended practice with deviations allowed based on engineering judgement. The verb **SHOULD** is used.
  3. **OPTION** - a statement of practice that is permissive. The verb **MAY** is used.
The minimum retroreflectivity levels are in units of – Candelas / lux / meter² measured at an observation angle of 0.2° and an entrance angle of -4.0°.

All Regulatory, Warning and Guide signs and object markers are required to be retroreflective or illuminated to show the same shape and similar color by both day and night. The requirement for sign illumination is not considered to be satisfied by street, highway or strobe lighting. An agency may exclude the following signs from the retroreflectivity maintenance policy. Guide signs should be added to an agency’s policy as resources allow.

- Guide Signs
- Parking, Standing and Stopping signs (R7 and R8 series)
- Walking/Hitchhiking/Crossing signs (R9 series, R10-1 through R10-b)
- Adopt-A-Highway signs
- All signs with blue (motor services) or brown (recreational) backgrounds
- Bikeway signs that are intended for exclusive use by bicyclists or pedestrians

### Specified Levels of Retroreflectivity

#### Table 2A-3: Minimum Maintained Retroreflectivity Levels

<table>
<thead>
<tr>
<th>Sign Color</th>
<th>Beaded Sheeting</th>
<th>Prismatic Sheeting</th>
<th>Additional Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>White or Green</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;0&lt;/sub&gt; = 7</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;2&lt;/sub&gt; = 15</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;22&lt;/sub&gt; = 25</td>
</tr>
<tr>
<td>Black on Yellow</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;0&lt;/sub&gt; = 7</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;50&lt;/sub&gt; = 50</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;15&lt;/sub&gt; = 15</td>
</tr>
<tr>
<td>Black on Orange</td>
<td>Y&lt;sup&gt;0&lt;/sup&gt; = 0</td>
<td>Y&lt;sup&gt;0&lt;/sup&gt; = 0</td>
<td>Y&lt;sup&gt;0&lt;/sup&gt; = 0</td>
</tr>
<tr>
<td>White on Red</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;30&lt;/sub&gt; = 30</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;30&lt;/sub&gt; = 30</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;30&lt;/sub&gt; = 30</td>
</tr>
<tr>
<td>Black on White</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;30&lt;/sub&gt; = 30</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;30&lt;/sub&gt; = 30</td>
<td>W&lt;sup&gt;2&lt;/sup&gt; G&lt;sub&gt;30&lt;/sub&gt; = 30</td>
</tr>
</tbody>
</table>

① The minimum maintained retroreflectivity levels shown in this table are in units of cd/ux/m² measured at an observation angle of 0.2° and an entrance angle of -4.0°.
② For text and line symbol signs measuring at least 48 inches and for all sizes of bold symbol signs.
③ For text and line symbol signs measuring less than 48 inches.
④ Minimum Sign Contrast ratio ≥ 3:1 (white retroreflectivity : red retroreflectivity).

* This sheeting type shall not be used for this color for this application except as noted in 2A.8

### Specified Levels of Retroreflectivity

#### Bold Symbol Signs

- W1-1, 2 – Turn and Curve
- W1-3, 4 – Reverse Turn and Curve
- W1-5 – Winding Road
- W1-6, 7 – Large Arrow
- W1-8 – Chevrons
- W1-10 – Intersection in Curve
- W1-11 – Hairpin Curve
- W1-15 – 270 Degree Loop
- W2-1 – Cross Road
- W2-2, 3 – Side Road
- W2-4, 5 – T and Y Intersection
- W2-6 – Circular Intersection
- W2-7, 8 – Double Side Roads

#### Fine Symbol Signs - Symbol signs not listed as Bold Symbol Signs.

- W3-1 – Stop Ahead
- W3-2 – Yield Ahead
- W3-3 – Signal Ahead
- W4-1 – Merge
- W4-2 – Lane Ends
- W4-3 – Add Exit
- W4-5 – Entering Roadway Merge
- W4-6 – Entering Roadway Add Exit
- W5-1 – Divided Highway
- W5-2 – Two-Way Traffic
- W6-1, 2 – Grade Crossing
- W6-2 – Flagger
- W7-1 – Worker

#### Special Cases

- W3-1 – Stop Ahead: Red retroreflectivity ≥ 2.7
- W3-2 – Yield Ahead: Red retroreflectivity ≥ 2.7
- W3-3 – Signal Ahead: Red retroreflectivity ≥ 2.7
- W3-4 – Diamond shaped signs such as W1-3 (No Passing Zone), W4-4 (Cross Traffic Does Not Stop)
- W3-5 – Speed Reduction: Red retroreflectivity ≥ 2.7
- W3-6 – Diamond shaped signs such as W1-3 (No Passing Zone), W4-4 (Cross Traffic Does Not Stop)
- W3-7 – Special Advisory Patches, use the largest sign dimensions to determine proper minimum retroreflectivity level.

Source: 2014 MN MUTCD
Comparison of Reflective Sheeting Material

Life Cycle Costs & Initial Retroreflectivity

<table>
<thead>
<tr>
<th>Sheeting Material (ASTM)</th>
<th>Type I</th>
<th>Type IV</th>
<th>Type IX</th>
<th>Type XI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Cost ($/SF)</td>
<td>$0.85</td>
<td>$1.20</td>
<td>$4.25</td>
<td>$3.50</td>
</tr>
<tr>
<td>Finished Sign Cost</td>
<td>$30</td>
<td>$25</td>
<td>$51</td>
<td>$45</td>
</tr>
<tr>
<td>Anticipated Life (years)</td>
<td>5 – 7</td>
<td>10-12</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Life Cycle Cost</td>
<td>$130</td>
<td>$50</td>
<td>$119</td>
<td>$45</td>
</tr>
<tr>
<td>Initial Retroreflectivity (white)</td>
<td>70</td>
<td>300</td>
<td>380</td>
<td>580</td>
</tr>
</tbody>
</table>

Source: 3M Traffic Safety Systems Division, August 2014

Typical Installation Cost

<table>
<thead>
<tr>
<th></th>
<th>Stop (30x30)</th>
<th>Warning (36x36)</th>
<th>Regulatory (24x30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material Cost</td>
<td>$240</td>
<td>$240</td>
<td>$260</td>
</tr>
<tr>
<td>Sheet Cost</td>
<td>$240</td>
<td>$260</td>
<td>$280</td>
</tr>
<tr>
<td>Labor Cost</td>
<td>$230</td>
<td>$230</td>
<td>$250</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$250</td>
<td>$275</td>
<td>$255</td>
</tr>
</tbody>
</table>

Source: MnDOT

- A comparison of the types of reflective sheeting material suggests:
  - The low initial cost material would meet most of the minimum retroreflectivity levels but would be expected to degrade quickly below minimum levels.
  - The higher performance sheeting, initially more expensive, provides a much longer anticipated life, much higher levels of retroreflectivity and superior life cycle costs.

- The fairly narrow range of typical sign installation costs (sign blank + sheeting + posts + labor) suggests that agencies would pay a premium of between 5% to 15% for using higher performance sheeting.

- Additional installation cost information provided by a number of agencies indicates that quantity discounts could reduce the per sign cost by 20% to 30%.
Regarding the anticipated life of signs – there is a high level of interest in establishing a specific value for each type of sheeting material. However, current research suggests that available data is inconclusive, but supports a life expectancy range of 12 to 20 years for beaded sheeting material (Types I, II and III) and 15 to 30 years for prismatic sheeting (Types III, IV, VI, VII, VIII, IX, X, XI). A summary of this research is provided in a recent report published by MnDOT (Traffic Sign Life Expectancy – Report No. 2014-20).

MnDOT Report No. 2014-20 analyzed retroreflectivity readings from approximately 400 signs in Minnesota and concluded that the results were similar to those reported in other states, but that the small sample size was not sufficient to produce statistically reliable results.

As part of this study, MnDOT established a sign sheeting test deck at the MnROAD facility and has indicated that they intend to maintain the test deck and continue recording the retroreflectivity until the sheeting material degrades below the established thresholds. This effort would help define the expected life of sheeting material in Minnesota.
Retroreflectivity Compliance Dates

- May 14, 2012 - 2009 MUTCD compliance dates revised (most eliminated).
- June 13, 2014 – All agencies must implement and use an assessment or management method that is designed to maintain Regulatory and Warning traffic sign retroreflectivity at or above the established minimum levels.
- ALL signs must now be at or above minimum retroreflectivity levels or illuminated to show the same shape and similar color by both day and night.
- Existing signs must be compliant as outlined in the sign assessment or management method.
### Maintenance Methods

**Assessment**
- Visual Nighttime Assessment
- Measured Sign Retroreflectivity

**Management**
- Expected Sign Life
- Blanket Replacement
- Control Signs

**What Are The Choices?**
- Assessment Methods
  - Visual Nighttime Assessment
  - Calibration Signs Procedure
  - Comparison Panels Procedure
  - Consistent Parameters Procedure
  - Measured Sign Retroreflectivity
- Management Methods
  - Expected Sign Life
  - Blanket Replacement
  - Control Signs
- Combination or Other Methods
  - Blanket Replacement & Expected Sign Life
  - Visual Nighttime Inspection & Control Signs
  - Other Methods documented in an Engineering Study

**How Do I Decide?**
Some examples include:
- Blanket Replacement & Expected Sign Life
- Visual Nighttime Inspection & Control Signs
- Other Methods documented in an Engineering Study
A typical small city has approximately 50 miles of streets with an average of 25 regulatory and warning signs per mile plus 6 guide signs per mile (both directions).

A typical cost for replacing the regulatory and warning signs is $200 per sign* and $250 per sign* for the guide (street name) signs.

The total cost to upgrade/replace ALL of the signs in a typical small city would be:

- 25 signs/mile × $200/sign × 50 miles = $325,000
- 6 signs/mile × $250/sign × 50 miles

All signs must be retroreflective or illuminated. Only Regulatory and Warning signs must be a part of your assessment or management method. Add Guide signs as resources allow.

Consider reducing your inventory of signs.

* Replacement costs include sign blank, sheeting material, sign posts, and installation. Constant 2014 $
Maintaining your system of signs has always been a good idea, but now it’s a required action.

Given the minimum level of required maintenance, agencies should re-evaluate their sign maintenance budgets.

Annual sign maintenance budget = cost to address retroreflectivity + cost to address vandalism, knockdowns and mother nature.

A study from the North Carolina Department of Transportation\(^1\) found that approximately 2.4% of signs are vandalized or knocked down in a year.

Annual cost to address degradation of retroreflectivity (Assuming a 15 year replacement cycle) = $21,650

Annual cost to address damage by vandalism and knockdowns = $7,800

A typical small city annual sign maintenance budget = $29,450

Reduce the sign maintenance budget by removing signs that are NOT required.

---

\(^1\) North Carolina Department of Transportation, “Designing an Efficient Nighttime Sign Inspection Procedure to Ensure Motorist Safety”
Financial Budgeting – Cities over 5,000 Population (1/2)

- A typical large city has approximately 200 miles of city streets with an average of 25 Regulatory and Warning signs per mile plus 6 guide signs per mile (both directions).
- A typical cost for replacing the Regulatory and Warning signs is $200 per sign* and $250 per sign* for the guide (street name) signs.
- The total cost to upgrade/replace ALL of the signs in a typical large city would be:

\[ \text{200 miles} \times \frac{25 \text{ signs/mile}}{1} \times \frac{200 \text{ signs}}{1} = \$1,300,000 \]

\[ \text{200 miles} \times \frac{6 \text{ signs/mile}}{1} \times \frac{250 \text{ signs}}{1} = \$1,300,000 \]

- All signs must be retroreflective or illuminated. Only Regulatory and Warning signs must be a part of your assessment or management method. Add Guide signs as resources allow.
- **Consider reducing your inventory of signs**

---

* Replacement costs include sign blank, sheeting material, sign posts, and installation.

Constant 2014 $
Maintaining your system of signs has always been a good idea, but now it’s a required action.

Given the minimum level of required maintenance, agencies should re-evaluate their sign maintenance budgets.

Annual sign maintenance budget = cost to address retroreflectivity + cost to address vandalism, knockdowns and mother nature.

A study from the North Carolina Department of Transportation\(^1\) found that approximately 2.4% of signs are vandalized or knocked down in a year.

Annual cost to address degradation of retroreflectivity (Assuming a 15 year replacement cycle) = $87,000

Annual cost to address damage by vandalism and knockdowns = $31,000

A typical large city annual sign maintenance budget = $118,000

Reduce the sign maintenance budget by removing signs that are NOT required.

\(^1\) North Carolina Department of Transportation, “Designing an Efficient Nighttime Sign Inspection Procedure to Ensure Motorist Safety”
Real Life Sign Removals – Stevens County Townships

How do I get my agency on board with removing signs?

- In 2011 and 2012, MnDOT piloted a program with Townships in Stevens County to inventory signs and conduct an engineering investigation to determine which signs could be removed.

- The investigation identified 285 Regulatory, Warning and Guide Signs (28% of the total number of signs in these townships) as candidates for removal. The townships have agreed to the removals!

- Of 285 signs to be removed:
  - 93% are Warning (i.e., STOP/YIELD Ahead, Cross Road, T-Intersection signs)
  - 4% are Regulatory (i.e., YIELD, Speed Limit signs)
  - 1% are Guide (i.e., Street signs)

- The townships then benefit from long term savings by reducing costs for installation, along with yearly inventory and maintenance.
Model Sign Maintenance Policy

- Which sign maintenance method is adopted? (Blanket Replacement - replace 1/15 of signs/year)
- Which **Roads** are to be covered by the policy?
  - All
  - Low Volume
  - Roadway Classifications
    - Residential
    - Collector
    - Minor Arterial
    - Principal Arterial
- Which **Signs** are to be covered by the policy?
  - All
  - Regulatory
  - Warning
  - Guide
  - All signs must conform to MN MUTCD

- What is the **Objective** of the policy?
  - Document the maintenance method
  - Exclude certain types of signs from usage (Not Required, Not Effective, i.e, No warning signs on residential streets, speed limit signs only on collectors and arterials, no marked pedestrian crossings at uncontrolled intersections, etc.)

- What **Actions** are required to implement the policy?
  - Inventory
  - Sign Replacement
  - Sign Removal
  - Engineering Study
  - Notification of Decisions/Actions
  - Sign Sheeting Material
  - Establish Budget

The following pages provide examples of signing policies from around Minnesota. Additional examples can be found in the Appendix.
Example Signing Policy – City of Eagan, MN

**IV. SIGN MAINTENANCE**

**Sign Maintenance**

A. Sign Installation: Signs will be installed and maintained to meet federal standards and in accordance with Minnesota Statutes, Minnesota Rules, and Minnesota Department of Transportation (MnDOT) Policies.

B. MinnStat Signing Overwrite Responsibility: Eagan sign maintenance practices are established to meet all requirements and ensure appropriate signing for the traveling public.

C. Sign Retro-Reflectivity: The City of Eagan has maintained a field sign inventory database since 2000. The city is currently analyzing the database to determine expected sign life.

D. Sign Maintenance Responsibility: Maintain signs and street identification signs on all City of Eagan roadways (specific agency name) highways, with the exception of:

   a. Signage on approaches to county highways are not installed or maintained by City of Eagan.
   b. Stop signs at Minnesota Department of Transportation (MnDOT) controlled intersections and highway ramps with state/highway.
   c. Specific signs installed by others (Mn/DOT, transit agencies, and private businesses), as agreed upon by the City of Eagan.
   d. Signs along county highways, within Mn/DOT right of way, unless specific agreement with Mn/DOT/Dakota County stipulates a city maintenance responsibility for signing.
   e. Bike path and other pedestrian-control signs not pertaining to vehicle traffic.
   f. Signs on approaches to city streets installed by private business and/or property owner.

**E. TRAFFIC SIGNALS**

**Traffic Signals**

A. Miscellaneous Signal Practices:

   a. City maintenance staff (streets Engineering Technicians) will respond to reports of signal damage or malfunctions as soon as possible after

   b. Expected Sign Life

      1. Expected sign life processes/practices will be established utilizing a combination of expected
         warranty life estimations of manufacturers/suppliers and "on the ground" experience in the field at the city.
         The city will develop and update as needed general criteria for life cycle replacement of signs in companion with
         calibration review and nighttime sign evaluations.

      2. The city began installing 3M High Intensity Prismatic (HIP) sheeting signs in 2002 and
         migrated to 3M Diamond Grade 3 (DG3) sheeting in 2005. A system wide evaluation will
         occur identifying all signs that are not scheduled for replacement between now and
         Jan 2015. Following review and planning, the city will implement a program to replace all
         signs having insufficient sheeting properties (engineer grade) incrementally between now
         and Jan 2015 to meet the new Fed retro-reflectivity standards. Additional planning (and
         implementation of plan) will occur to assure compliance for the Jan 2018 deadline at the
         same time.

      3. The city will plan for (budget for) replacement of all signs found via the control section/night sign
         checking process. The eventual goal will be that the majority of retro-reflective related sign
         replacement will be handled through the expected life cycle/sign life process.

   c. Night retro-reflectability sign check:

      1. As per Federal directives, a group of “calibration signs” is established to meet all requirements and
         ensure appropriate signing for the traveling public.

   d. Support staff will be informed and updated regarding sign maintenance procedures and
      deadlines.

   e. Sign staff may drive or park maintenance vehicles on the center
      lane of a two lane street.

   f. Sign staff may park a sign maintenance vehicle against traffic flow in
      a two lane street.

   g. Sign staff may drive or park maintenance vehicles on the center
      lane of a two lane street.

   h. Sign staff may park a sign maintenance vehicle against traffic flow in
      a two lane street.

Find more information at www.cityofeagan.com
Which Signs are Required by the 2014 MN MUTCD?

### Regulatory
- Speed Limits **IF** a speed zone (other than a statutory limit) has been established.
- ONE-WAY & DO NOT ENTER where applicable.
- The ALL-WAY STOP plaque at All-Way Stops.
- STOP or YIELD **IF** at a passive railroad crossing
- Prohibition signs where applicable

### Warning
- Rail Road Advance Warning and No Train Horn (if quiet zone established)
- Clearance **IF** clearance is less than 14'-6" (12" above the statutory minimum clearance height)
- Advance Traffic Control **IF** there is limited sight distance.
- Horizontal Alignmentment **IF** more than 1,000 AADT
- Minimum Maintenance

### Guide
- Route Numbers on ALL numbered highways
- Junction Assembly
- Advance Route Turn Assembly

Note: The determination as to which signs in the MN MUTCD are required is based on the 2014 version. Subsequent editions may result in additions to or deletions from the list.

- **If you have Low Volume roads, only the Warning signs listed above are required.**
- **Bottom Line – out of the hundreds of signs contained in the MN MUTCD – 15 types of signs are required.**
- **This suggests that if you decide to put up a sign – most of the time that action will be based on exercising your judgment and NOT on the requirements in the MN MUTCD.**
Sign Effectiveness Summary

<table>
<thead>
<tr>
<th>Regulatory</th>
<th>Signs that ARE proven to be effective</th>
<th>Signs that have not been tested for effectiveness</th>
<th>Signs that appear to be ineffective</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

OK, which signs have been proven effective at either reducing crashes or changing driver behavior?

- A search of the traffic safety literature found that the only types of signs that have been proven effective are the Horizontal Alignment Series (but only in a fairly narrow range of curve radii).
- Research published by NCHRP found that pedestrian warning signs in combination with marked crosswalks at uncontrolled intersections in fact resulted in greater numbers of pedestrian crashes.
- Guide Signs have been found to only have a minimal effect on intersection crashes but are assumed to improve way finding and navigation.
- Bottom line – if your decision to install a sign is based on an expectation of effectiveness – either reducing crashes or changing driver behavior – the literature in support is virtually non-existent.
- It appears that most signs fall into a category of hope - hope they do some good and an expectation that at least they don’t do any harm.
Sign Removal – Which Signs Are Candidates? (1/2)

- Speed Limit signs are only effective if the limit is near the 85th percentile speed. Speed Limit signs that merely state the statutory limit are not necessary.

- STOP and YIELD signs at low volume intersections are not safety devices, uncontrolled intersections have a lower expected crash frequency.

- Turn prohibitions relying solely on signage have only proven to be effective in the presence of law enforcement – you need to ask, how often will officers be present?

- The use of Turn Lane signs are linked to helping law enforcement get convictions and snow plow drivers clearing turn lanes. Ask law enforcement how much time they devote to going after passing on the shoulder? Would a delineator be sufficient to assist the plow drivers?

- Statements of the obvious are a waste of money if there is little or no enforcement of the law.

- Research suggests that typical drivers do NOT understand the concept of “CROSS TRAFFIC”. To traffic engineers “Cross Traffic” means traffic approaching from the right and left but some drivers thought that this referred to vehicles coming towards them (Crossing the highway) from the opposing minor leg approach to the intersection.
Sign Removal – Which Signs Are Candidates? (2/2)

- Static signs that warn drivers of hazardous conditions they rarely encounter quickly lose credibility and become part of the background noise that drivers tune out.

- MnDOT is removing DEER CROSSING Warning signs because they have not proven to be effective at reducing deer/vehicle collisions. (They also determined that the signs had proven ineffective at training the deer where to cross the highways.)

- Advance Curve Warning signs were found to be effective in only a fairly narrow range of curve radii – curves with radii between 1,000 feet and 1,800 feet. There was no safety effect in larger radius curves and in shorter radius curves it was found that a combination of Advance Curve Warning PLUS Chevrons was required to produce a crash reduction. Try to achieve consistency across your system. If you have curve warning signs in advance of long radius curves, those could be candidates for removal based on system wide considerations.

- A number of studies have found that marked pedestrian crosswalks and their Advance Warning signs are NOT safety devices when used at uncontrolled locations. Pedestrian crash rates are actually higher at marked locations.

- There is no evidence that special Warning signs of this type either change driver behavior (reduce travel speed) or improve safety.

- ONE WAY signs are not required in medians that are less than 30 feet wide if KEEP RIGHT signs are installed.

NOTE: On roads with 1,000 ADT or greater, the Horizontal Alignment sign series is required based on speed differentials.
Sign Removal – Managing Risk

Why Consider Removing Signs
- Maintenance Costs
- Problem → Solution Link
- Effectiveness/Ineffectiveness
- System Considerations
- Safety-Crosswalks, Unnecessary STOP signs, Children at Play – these types of signs could actually increase the number of crashes.

Process to Follow – Manage Risk
- Bring your decisions under an umbrella of immunity.
- Discretionary Immunity is generated by actions consistent with adopted policies and ordinances.
- Official Immunity is generated by exercising your engineering judgment as part of an engineering study and then documenting your actions.

DISCRETIONARY
- Have the highest decision making body (City Council, County Commission, Township Board) adopt a policy or pass a resolution – specifying types of sheeting material you use, expected sign life, signs to be installed and those that will not (candidates for removal).
- Document the outcome of your actions relative to installing/replacing signs vs. removing signs, consistent with the direction provided by your decision making body.

OFFICIAL
- Conduct an engineering study.
- Document the applicable guidelines in the MN MUTCD.
- Document the conditions in the field.
- Document your decision.
## Potential Cost Savings - Adoption of Best Sign Practices

<table>
<thead>
<tr>
<th>Scenario</th>
<th>System</th>
<th>Net Present Value of Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sign Reduction</strong></td>
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</tr>
<tr>
<td>City</td>
<td>$8.2 M</td>
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<tr>
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<td><strong>Total State</strong></td>
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<tr>
<td><strong>Sign Reduction &amp; Life Cycle</strong></td>
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