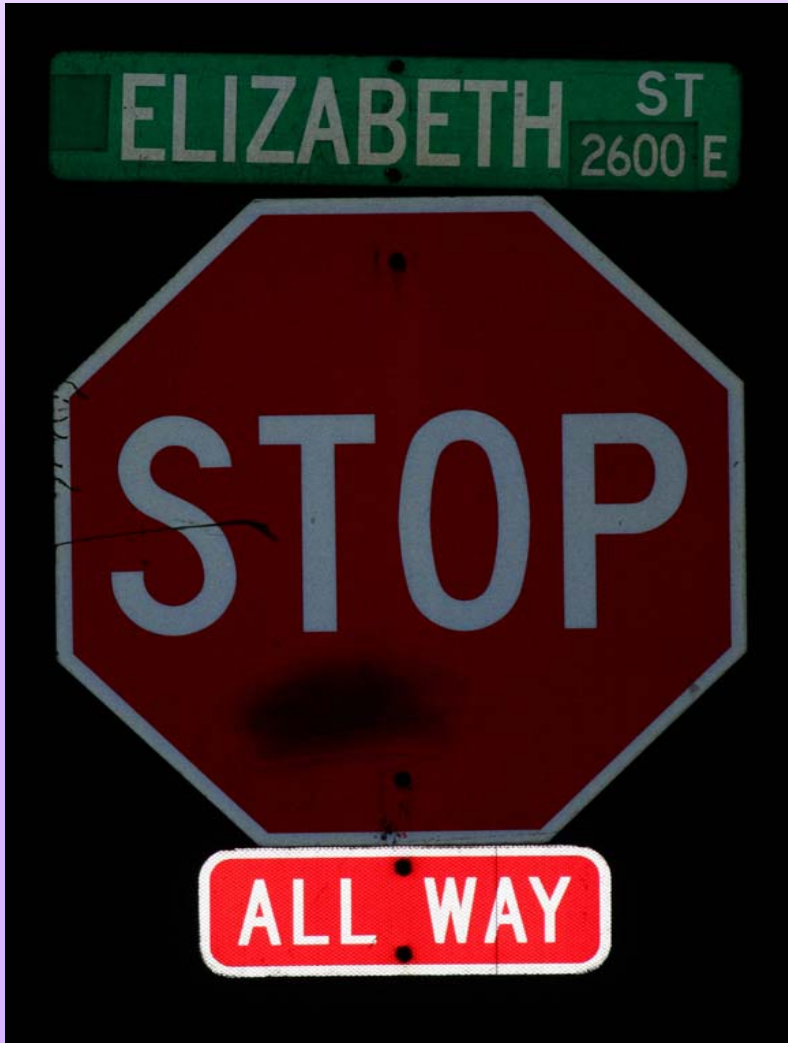
# Minimum Sign Retroreflectivity Requirements

New MUTCD Standard



# Why Do We Install Signs?

*Required by MUTCD?*

*NO*

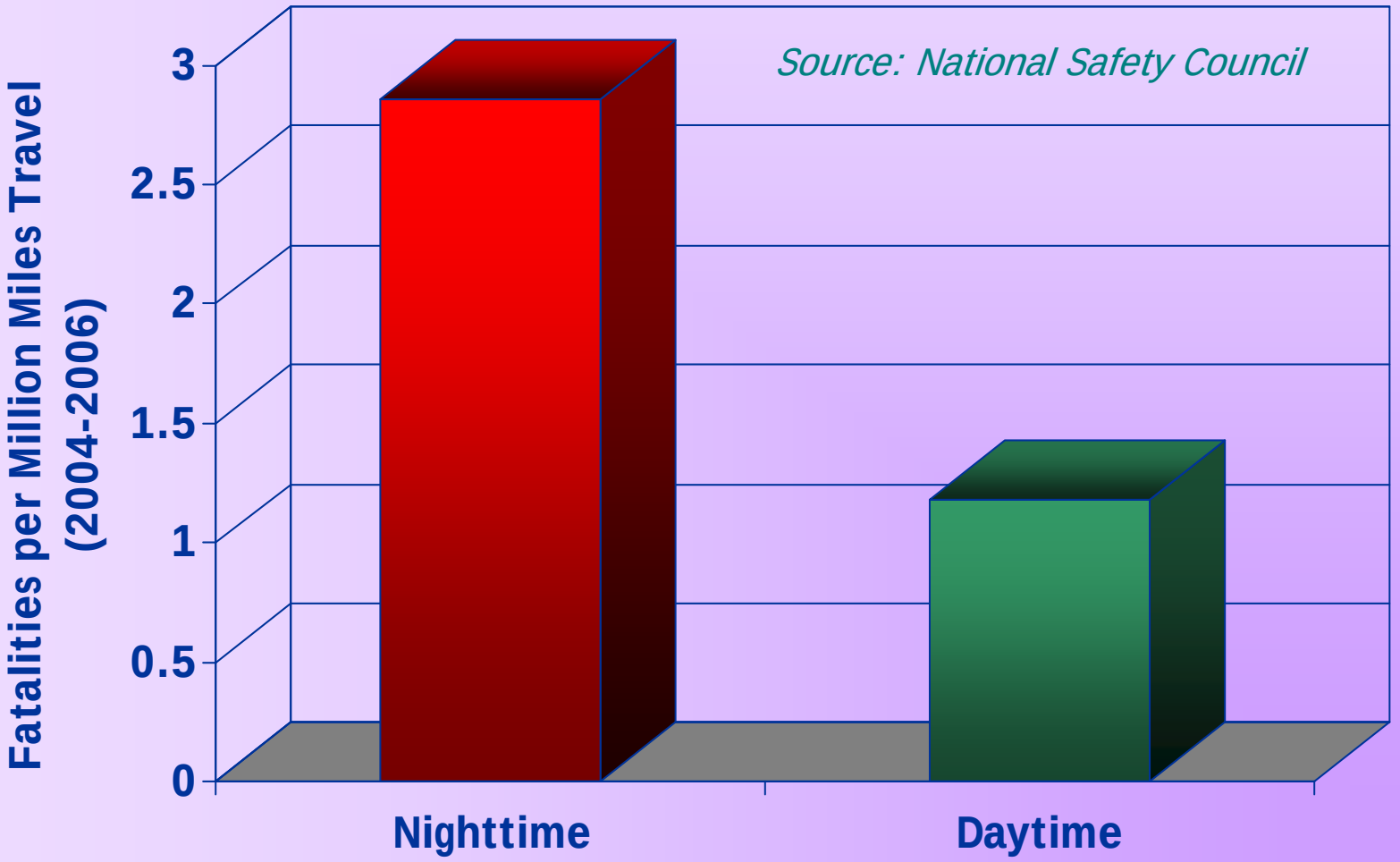
*Engineering Decision?*

*YES!*

*Why?*

*To help drivers*
*(including older)*

# Night Travel and Crashes




# Signs Provide Critical Information to Drivers

## But, Retroreflectivity Degrades Over Time

Retroreflectivity

## When Do We Replace Signs?

# Final Rule


- Published on Dec 21, 2007
  - Vol 72, No. 245
- Revision #2 of the 2003 Edition of the MUTCD
- Effective Jan 22, 2008

# New MUTCD Language

## Section 2A.09 Maintaining Minimum Retroreflectivity

- “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 Table 2A-3”

# New MUTCD Table 2A.3
# Minimum Maintained Retroreflectivity Levels

| Sign Color | Sheeting Type (ASTM D4956-04) ① | | | | Additional Criteria |
|---|---|---|---|---|---|
| | Beaded Sheeting | | | Prismatic Sheeting | |
| | I | II | III | III, IV, VI, VII, VIII, IX, X | |
| White on Green | W* G ≥ 7 | W* G ≥ 15 | W* G ≥ 25 | W ≥ 250; G ≥ 25 | Overhead |
| | W* G ≥ 7 | W ≥ 120; G ≥ 15 | | | Ground-mounted |
| Black on Yellow or Black on Orange | Y*; O* | Y ≥ 50; O ≥ 50 | | | ② |
| | Y*; O* | Y ≥ 75; O ≥ 75 | | | ③ |
| White on Red | W ≥ 35; R ≥ 7 | | | | ④ |
| Black on White | W ≥ 50 | | | | — |

① The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/$m^2$ measured at an observation angle of 0.2° and an entrance angle of -4.0°.
②For text and fine symbol signs measuring at least 1200 mm (48 in) and for all sizes of bold symbol signs
③For text and fine symbol signs measuring less than 1200 mm (48 in)
④Minimum Sign Contrast Ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity)
* This sheeting type should not be used for this color for this application.

# Methods to Maintain Retro


- Visual Nighttime Inspection
  - Calibration Signs
  - Comparison Panels
  - Consistent Parameters
- Measured Sign Retro
- Expected Sign Life
- Blanket Replacement
- Control Signs
- Future Method Based On Engineering Study
- Combination Of Any

# New MUTCD Language

## Section 2A.09 Maintaining Minimum Retroreflectivity

- “Support:

  Compliance… is achieved by having a method in place and using the method to maintain the minimum levels established in Table 2A-3. Provided that… a method is being used, an agency would be in compliance… even if there are some individual signs that do not meet the… levels at a particular point in time.

# Exempt Signs

- Parking/Standing/Stopping
- Walking/Hitchhiking
- Adopt-A-Highway
- Blue or Brown Backgrounds
- Exclusive Use of Bikes or Peds

Note: Must still meet other requirements in MUTCD (inspections, retroreflective, etc,)

# Compliance Period: From “Effective” Date of Final Rule (January 22, 2008):

- 4 yrs (January, 2012)

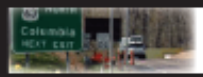
  Establish and implement method(s)
- 7 yrs (January, 2015)

  Replace identified regulatory, warning, ground-mounted guide signs (except street-name)
- 10 yrs (January, 2018)

  Replace identified street name & overhead guide signs

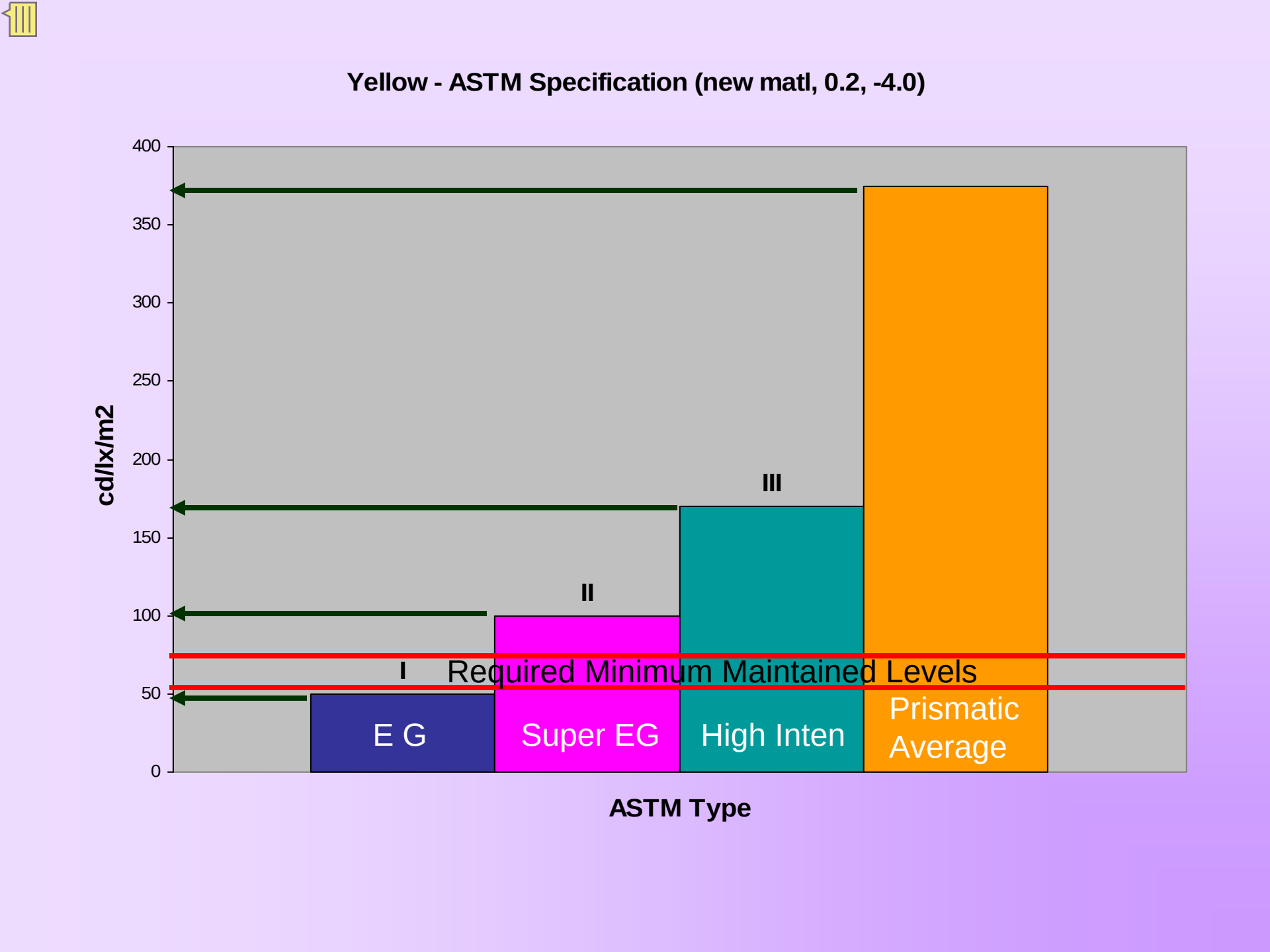
# What do the numbers mean for selecting sheeting type?

# Types that meet Minimums

| Common Sheeting Name ▶ | Engineer Grade | Super Engineer Grade | High Intensity Beaded | Prismatic (many common names) |
|---|---|---|---|---|
| ASTM Sheeting Type ▶ | I | II | III | III, IV, V, VII, VIII, IX, X |
| Type of Sign ▼ | | | | |
|  Warning (Yellow & Orange) | NO | ● | ● | ● |
|  White Legend On Overhead Green Guide | NO | NO | NO | ● |
|  White Legend On Ground-Mounted Green Guide | NO | ● | ● | ● |
|  Green Background on All Guide Signs | ● | ● | ● | ● |
|  White Regulatory with black legend | ● | ● | ● | ● |
|  Red and White Regulatory* | ● | ● | ● | ● |
|  White on Blue<br>White on Brown<br>Parking<br>Bikeway | Excluded from minimum maintained retro regulation but must still be retroreflective | | | |

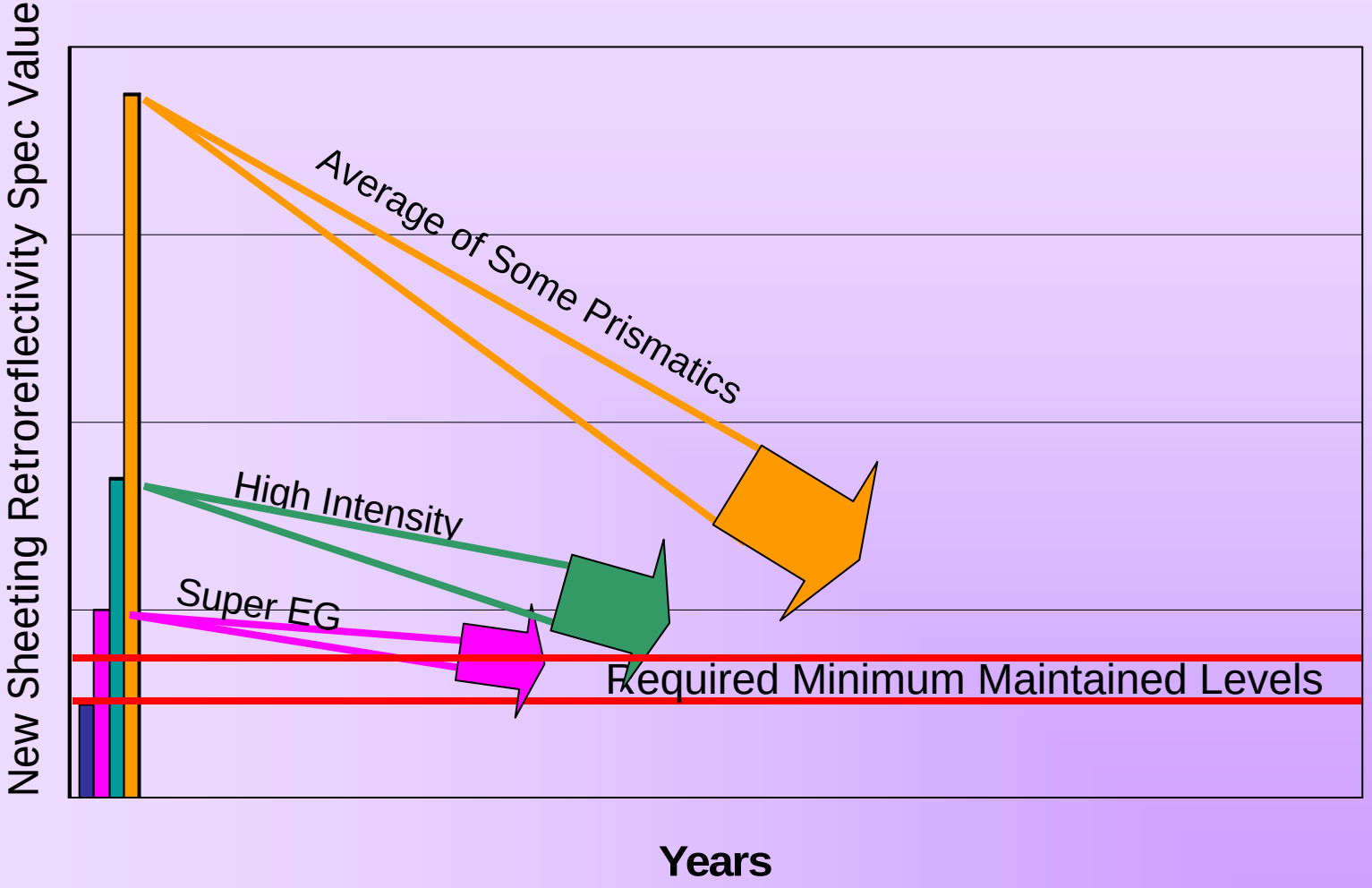
*Except Parking Signs

● YES ● NO


Yellow - ASTM Specification (new matl, 0.2, -4.0)
cd/lx/m2
400
350
300
250
200
150
100
50
0
I
II
III
Required Minimum Maintained Levels
E G
Super EG
High Inten
Prismatic
Average
ASTM Type

# Generalized Life of Yellow Sheeting

**(no data)**



# EXAMPLE of Life/Cycle Costs

- Assume $160 to replace a sign with EG sheeting (substrate, sheeting, labor)
- If so, then
  - SEG might be $164
  - HI might be $168
  - Pris might be $192
- Cost per year might look like:
  EG: $160 / 0 = Can not calculate
  SEG: $164 / 12?* = $14 / yr ??
  HI: $168 / 12?* = $14 / yr ??
  Pris: $192 / 16?* = $12 / yr ??
- Add in potential cost of traffic hazard

* Generalized numbers based on information from sign test racks

# More Information

- FHWA fhwa.dot.gov/retro
  - Summary Brochure
  - Final Rule
  - Power Point Presentations
  - Newsletter Articles
- TTI tcd.tamu.edu
  - Research Reports
- ATSSA www.retroreflectivity.net
  - Q&A