TXDOT SIGNING AND MARKINGS

REVIEW OF MATERIALS & PRACTICES
Traffic Marking Specifications

- **Standard Specification Items:**
  - 666, “Reflectorized Pavement Markings”
  - 668, “Prefabricated Pavement Markings”
  - 672, “Raised Pavement Markers”
  - SS 6473, “Multipolymer Pavement Markings”
  - SS 8094, “Mobile Retroreflectivity Data Collection for Pavement Markings”

- **Departmental Material Specifications:**
  - DMS-4200, “Pavement Markers (Reflectorized)”
  - DMS-4300, “Traffic Buttons”
  - DMS-8200, “Traffic Paint”
  - DMS-8220, “Hot Applies Thermoplastic”
  - DMS-8240, “Permanent Prefabricated Pavement Markings”
  - DMS-8290, “Glass Traffic Beads”

- **Traffic Engineering Standard Plan Sheets:**
  - Pavement Markings (PM)
  - Freeway Pavement Markings (FPM)
Traffic Marking Practices

Concrete Roadways:
- Multipolymer PM (epoxy)
- Prefab Tape
- Profile Thermoplastic PM

Rural and Asphaltic Roadways:
- Traffic Paint
- Thermoplastic PM
- Profile Thermoplastic PM
TxDOT Seal Coat Surfaces

- Grade 3 or 4 Rock
  - Rock can average ½ in.

- Gap-graded Grade 3 is toughest on markings

- Note the color difference between the yellows

← 80 mil marking - 185mcd/lux/m² @ 6mo.
← 120 mil marking – 230mcd/lux/m² @ 6mo.
Traffic Markings

- **Standard:**
  - New thermoplastic markings – 100 mils
  - Retrace of existing thermoplastic markings - 60 mils
  - Minimum Retroreflectivity:
    - White: 250 mcd/lux/m²
    - Yellow: 175 mcd/lux/m²
    - 3 – 10 days
    - AASHTO Type II and III beads

- **New Specification**
  - SS 8999, “High Performance Pavement Markings w/Retroreflective Requirements”
    - White: 400 mcd/lux/m²
    - Yellow: 250 mcd/lux/m²
    - 30 - 40 days
    - No bead requirements
Mobile Retroreflectivity Data

- SS 8094, “Mobile Retroreflectivity Data Collection for Pavement Markings”
- Mobile Retroreflectivity Best Practices Handbook
- TTI Mobile Retroreflectometer Certification Program
Data Interpretation

- A marking meets the retroreflectivity requirements if:
  - the combined average retroreflectivity measurement for a one-mile segment meets the minimum retroreflectivity values specified, and
  - no more than 30% of the retroreflectivity measurement values are below the minimum retroreflectivity requirements value within the one-mile segment.

- The Engineer may accept failing one-mile segments if no more than 20% of the retroreflectivity measurements within that mile segment are below the minimum retroreflectivity requirement value.

- The one-mile segment will start from the beginning of the data collection and end after a mile worth of measurements have been taken; each subsequent mile of measurements will be a new segment. Centerlines with two stripes (either solid or broken) will result in 2 miles of data for each mile segment. Each centerline stripe must be tested for compliance as a stand-alone stripe.

![GIS Map of Retroreflectivity Values](image)
Signing Specifications

- **Standard Specification Items:**
  - 636, “Aluminum Signs”
  - 644, “Small Roadside Sign Supports and Assemblies”
  - 647, “Large Roadside Sign Supports and Assemblies”
  - 650, “Overhead Sign Supports”

- **Departmental Material Specification:**
  - DMS-8300, “Sign Face Materials”
  - DMS-8305, “Fiberglass Sign Substrate”
  - DMS-8600, “Delineators and Object Markers”

- **Traffic Engineering Standard Plan Sheets**
  - Typical Sign Requirements (TSR)
  - Delineator and Object Marker Standards (D&OM)
Retroreflective Sheeting

- Prismatic
  - ASTM Type VIII, IX, XI
  - AASHTO Type B, C, D

- Beaded High Intensity
  - ASTM Type III, IV
  - AASHTO Type A

- Engineering Grade
  - ASTM Type I, II
  - No AASHTO Designation
Prismatic Sheetings Issues

- Blooming
- Contrast
- Orientation Sensitivity
- Overbrightness
Retroreflectivity

- Sheet types defined by retroreflectivity tables
- Retroreflectivity determined from entrance and observation angles
- Each table initially derived for a particular product as it entered the market.
Research has shown that the typical driver will look at a sign three times using the third, closest, look to actually read the sign for its message.

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- Collaboration between AASHTO, DOT officials and TTI
- Developed using human performance factors
- Sheeting designations determined from the 0.5/-4.0 angle set and progress from beaded high intensity sheeting (Type A) upward using increasing multipliers to set thresholds for Type distinctions
Sheeting Performance

Retroreflectivity
(White Sign Sheeting)

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Overbrightness

- Can overbrightness can affect the legibility of a sign

- This phenomena was initially characterized as causing “discomfort glare”, as compared to “disability glare”
TTI researched the effects of sign brightness on the detection distance of various objects along the road: a human, a small box, and a replica deer.
Based on the findings presented above, there is evidence that shoulder-mounted signs can be too bright in rural areas with low or no visual complexity. While there was no measured reduction in legibility, there was a large reduction in the overall ability to detect potentially hazardous objects near the roadway.
The performance of Type A, beaded, sheeting is equal to the current Type B products sold for the Texas market at the legibility angle sets.
DMS/Standards Revisions

- **DMS-8300**
  - References AASHTO M268
  - Incorporates orientation requirements and single classification requirement
  - Exempts the AASHTO M268 Delta E color requirements
  - Warranty for Type D sheeting is extended to 8 years full replacement with an additional 4 years material replacement
  - Signs made with screen ink must be fabricated using the same manufacturer for both the screen ink and the background sheeting

- **TRF Standards**
  - Sheeting references correspond to AASHTO Type categorizations
  - All large ground-mount and overhead signs are to be made with Type D cut-out legend over Type B or C background sheeting
  - All white regulatory signs are to be made with Type A sheeting, except red and white signs
  - Only acrylic black film is allowed