Chris Shea
President
PK Contracting
Pavement markings are used to provide safety for the motoring public, pedestrians and bicyclists, traffic control on roadways, and traffic-flow management at road construction sites.
The Next 30 Minutes: Discussion

- History of Pavement Marking
- Terms & Definitions
- Materials: Binders with Optics
- Selecting Appropriate Materials for Desired Service Life
- Get What You Pay For: Specifications, Contractors, Inspection, Verify
History of Pavement Markings

- Woodward Ave – 1st paved mile of concrete road (U.S.)
- Davison Freeway – 1st depressed freeway (U.S.)
MI County Engineers Set the Trend

- **River Road, Trenton**
  1911: Edward Hines, 1st use of painted centerline (U.S.)

- **County Rd 492, Marquette**
  1917: Kenneth Sawyer, 1st use of painted centerline on rural highway, “Dead Man’s Curve”
Terms & Definitions
Presence or Delineation

- The ability to see a marking.
Daytime Presence

The ability to see a marking in daytime.
Nighttime Presence

The ability to see a marking in nighttime.
Nighttime Presence in Rain – Wet Reflective

- The ability to see a marking in nighttime during rain.
Binders

- Liquid or solid material provides color for daytime presence.
  - Paint
  - Thermoplastic
  - Plural Component Liquids
  - Cold Plastic Tape
Optics

- Glass beads applied on top of binder to provide nighttime presence.
- Add elements for nighttime WET REFLECTIVITY.
  - Standard Glass Beads – special coatings (depending on what binder)
  - Higher Reflectivity Beads (Big Beads)
  - Elements
Double Drop

The application of both standard beads and big beads for enhanced reflectivity.
Recessing

Cutting a groove in pavement to protect marking from snow plows.
Service Life

How long a marking will provide desired level of delineation.
Longlines

Longitudinal markings that separate lanes of traffic.

» Centerlines
» Edge Lines
» Skip Lines & Lane Lines
» Gores
Special Markings

- Markings that delineate intersections and provide info for motorists.
  - Stop Bars
  - Cross Walks
  - Cross Hatching
  - Turning Guide Lines
  - Symbols
  - Legends
Damage caused to pavement markings by vehicles crossing them before they are cured.
Convoys & Line Protection

Provides advance warning to motorists and protection to the marking as it cures to avoid tracking.
Data Logging System (DLS)

- Monitors in real time all specification parameters:
  - Material Application Rates
  - Striping Speed
  - Weather Parameters
- Provides detailed reports on a road by road basis.
Materials:
Binders with Optics
One-Year Maintenance Materials

- **Traffic Paint** – Waterborne or regular dry, using paint as binder and standard beads.
  - Most widely-used material.
  - Lowest initial cost marking.
  - Lasts one year.
  - Best used as a maintenance marking on low ADT roads in poor condition or when budget constraints dictate.
One-Year Maintenance Materials

» Sprayable Thermoplastic – Granular material melted to ~400° before application to road.
  » Formulated to spray at 30-mil thickness with standard beads producing an overall 40-mil line.
  » Best used as maintenance marking on high ADT roads in poor condition or when budget constraints dictate.
  » Lasts one year – dries in less than one minute.
  » Fast dry time – virtually eliminates tracking.
  » Fast dry time – virtually eliminates coning or long convoys.
Multi-Year Maintenance Materials

Plural Component Liquids – Resin and catalyst components are mixed at the gun nozzle prior to being sprayed on the road.

» Pump meters ensure exact mix.
» Lasts 3 to 5 years.
» Std beads produce better reflectivity than one year materials.
» Double-drop optics produce a higher level of reflectivity.
» Std beads with elements produce an even higher level of reflectivity that is WET REFLECTIVE, as well.
» Markings should be recessed.
» Best for new construction or pavements paved within 5 years.
» Can be used as a longline or special marking.
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Multi-Year Maintenance Materials

Types of Plural Component Materials

- **Epoxy** – Original plural component. Lasts 3+ years.
- **Modified Urethane (MU)** – Better than epoxy in color retention with a slightly longer life.
- **Polyurea** – Superior color retention, longer life vs. epoxy or MU. Lasts five years.
- **MMA** – Originally used in the Pacific Northwest. Now formulated to work well in the Michigan climate. Similar in performance to polyurea.
Multi-Year Maintenance Materials

100 mil Thermoplastic – Granular material melted to ~400° before application to road.
- Same optic options as plural components.
- 100 mils thick – best to recess for maximum service life.
- Lasts five years when recessed.
- Bond created by melting into pavement surface.
- Only use on new asphalt or asphalt three-years old or less.
- Can be used as a longline or special marking.
Multi-Year Maintenance Materials

» Cold Plastic Tape – Markings that are supplied in rolls of varying widths.
  » Precoated, pressure sensitive adhesive “sticks” to road.
  » Can be manufactured with wet reflective optics.
  » Lasts up to 10 years when recessed.
  » MDOT uses recessed, WET REFLECTIVE cold plastic for skip lines on new freeways.
  » Can be used as a longline or special marking.
Multi-Year Maintenance Materials

» Preformed Thermoplastic – Combines attributes of thermoplastic and cold plastic tape.
» Comes in varying widths, colors and shapes.
» Used as special markings at intersections, bike paths, airport runways and taxiways.
» Manufactured in any color – can be custom per project.
» Slow to apply.
» Used only as a special marking.
Selecting Appropriate Materials
Know What Affects Service Life

- Assuming that materials are applied according to specifications:
  - Type of binder used – one year or multi-year marking
  - ADT
  - Surface applied marking vs. recessed marking
  - Condition of pavement
Considerations

- Type of Marking
- Desired Service Life
- Condition of Pavement
- Initial Application Cost
- Snow Plowing Philosophy
- Annualized Application Costs
- Level of Desired Delineation
- Recessing vs. Not Recessing
Consider:

- Type of Marking
- Desired Service Life
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Keep in Mind...

- Different materials can be used on same road.
- Use long-life materials for special markings.
- Accident data shows where higher delineation is needed.
- Materials are determined by pavement condition.
- Try to recess long life materials on new pavements.
- A second application of a recessed, durable marking after the original five-year service life means a road is striped only twice in 10 years.
- When a project is federally funded, the direct cost to the agency is dramatically reduced.
## Consider: A Selection Matrix

### Guide to Appropriate Longline Pavement Marking Materials

**Assumption:** Bare Pavement Policy  
Minimum Level of Delineation – Nighttime Presence  
All Multi-Year Materials to be Recessed

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<td>40 mil STP with STD Optics</td>
<td>PAINT with STD Optics</td>
<td>Any Multi-Year Material with Double Drop Optics (No 100 mil Thermoplastic on concrete)</td>
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(No 100 mil Thermoplastic on concrete)
### Anticipated Bid Prices Per 4" LFT

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In a Perfect World...
Use the Best Material All the Time

Using recessed – WET REFLECTIVE durables provides twenty-four hour a day, seven day a week, three-hundred sixty-five day a year delineation – day or night, rain or shine.

But...
Reality:
Budgets Ultimately Determine Materials Selection

Imperative:
You MUST Get What You Pay For
Get What You Pay For: Specifications

Set specifications that are reasonable and you are able, and willing, to enforce.

The four requirements of a pavement marking spec:
- Binder and optic application rates.
- Striper speed during application.
- Weather parameters.
- Convoy requirements and line protection.

All four must be met simultaneously to...

Get what you pay for.
Get What You Pay For: Contractor

- Vet your striping contractor.
- Consider MDOT prequalification for contractor and equipment.
- Get references from other agencies and material suppliers.
- Remember, every profession has its small share of unethical folks.
Get What You Pay For: Inspection

Since pavement marking takes up such a small percentage of an agency's time, inspectors with an in-depth knowledge are few.

Many agencies don’t have the manpower to support a constant on-site inspector.

Even the most experienced equipment operator or inspector cannot tell the difference between 14 gal/mile and 16 gal/mile on the fly.
Get What You Pay For: Verify

Data Logging System (DLS)

- Provides accurate information on all specification parameters on a road-by-road basis.
- Information can be provided via real time or printed reports.
- Captures more data accurately with less chance of human error.
- MDOT requires use of DLS on all region-wide striping contracts.
- When enforced, appropriate penalty provisions ensure you’ll only pay for what you get.

- The actual cost to the agency is approximately $\frac{3}{10,000}$ of a cent per $4''$ LFT. That equates to merely $150$ on a project of a half-million LFT.
Data Logging System (DLS)

15.4 MPH

Job: M-49 From State Line North To US-12

Next Job

Begin Day
End Day

Last Set: 11/3/2015 7:44
Last Set: 11/1/2015 17:20

Latitude: 46.880422
Longitude: -96.855302
Miles Traveled: 21.44
Yellow Footage: 14230
White Footage: 85228

Yellow 14.88 Mils
15-Gallons
Stop Distance Record (F1)

White 15.02 Mils
11-Gallons
Log And Reset All Data (F12)

Beads 8.54 Lbs/Gal
0-lbs 5.4 lbs/gal
367-lbs 3.14 lbs/gal
Show The Current Excel Report

Main
Data Logging System (DLS)
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## Get What You Pay For: Verify

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Conclusion
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» Pavement markings are installed for the safety of motorists, pedestrians, bicyclists and workers.
» A myriad of striping materials are available to use.
» A multitude of factors dictate what to choose.
» Informed decisions allow for the right choice.
» Technology can provide 24/7/365 delineation – day or night, rain or shine.
» Budget ultimately determines material selection.
» Enforcement of project specs increases the likelihood of a project’s success.
» Most importantly – get what you pay for.
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Q & A