NTPEP – Pavement Marking Materials
Grooved in Transverse Lines Pilot Project
Outline

- Why was this tried
- How things were set up
- Getting a contract in place
- Getting the work done
- Problems encountered
- Getting the lines placed
- What we are seeing so far
- What is the end product
In discussions between industry and agencies there was interest in having some of the products with a larger profile or expensive / bigger optics more protected when evaluating these materials on an accelerated test deck

- Some of these products would not ordinarily be surface applied
- Will the grooving be effective in protecting the higher cost material and optics packages
What we are doing:

- A manufacturer wishing to put a product into grooves would also have to do the standard surface application.
- Each product would have 4 lines placed in the grooves on both the asphalt and concrete surface.
- Lines would be evaluated using the same methods as the surface applied lines.
- The spray box is also being used on the grooved lines to take continuous wetting readings.
- Reports will be published outside of Data Mine because this is a pilot project.
Where to Place the Grooves?

- Deck Layout
## Products Placed in the Grooves

<table>
<thead>
<tr>
<th>NTPEP Number</th>
<th>Company</th>
<th>Product Name</th>
<th>PMM Product Type</th>
<th>Requested Groove Depth</th>
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</thead>
<tbody>
<tr>
<td>PMM-2013-01-007</td>
<td>Brite-Line Technologies, Inc</td>
<td>Deltaline XRP-R (Extended Reflective Performance—Wet Reflective)</td>
<td>4a Permanent Tape</td>
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<td>PMM-2013-01-008</td>
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<td>PMM-2013-01-010</td>
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<td>PMM-2013-01-017</td>
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<td>3M Liquid Pavement Marking 5000 – White</td>
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<td>PMM-2013-01-018</td>
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<td>PMM-2013-01-024</td>
<td>3M</td>
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<td>MARK–55.9 WH</td>
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<td>Ennis</td>
<td>HPS 2 YELLOW</td>
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<td>50</td>
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<td>PMM-2013-01-043</td>
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<td>WHITE WB 982321</td>
<td>1c WB 3yr</td>
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<td>PMM-2013-01-044</td>
<td>Ennis</td>
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<td>1c WB 3yr</td>
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<tr>
<td>PMM-2013-01-035</td>
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<td>13W2</td>
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<tr>
<td>PMM-2013-01-036</td>
<td>SW</td>
<td>13Y2</td>
<td>1c WB 3yr</td>
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GROOVING BITUMINOUS AND CONCRETE PAVEMENT SURFACES FOR 2013 NTPEP PAVEMENT RECESSED MARKING PILOT PROJECT

Location: Project will be on NB I-35E, from 50ft south of RP 126 to RP 126.6. The grooving test sections will be 400 feet in the middle of the project. Work shall be completed by July 12, 2013.

The pavement markings are to be grooved into the pavement surfaces. GRINDER-TYPE CUTTING HEADS CANNOT BE USED. The goal of the grooving process is to protect the pavement marking from snowplow damage and ultimately extend the service life of the pavement markings.

Grooving will be in outside (driving lane) lane only and will be in transverse orientation (perpendicular to centerline). Groove will be from edge line to skip area. Grooving will be on both HMA and PCC. Grooves shall be 6” in width and spaced every foot with 6” space between grooves. MnDOT personnel will be on-site to document and mark grooves.

The Contractor has the option to dry or wet groove the pavement while the roadway is closed to traffic. The bid shall include a separate line item for traffic control on a per day basis.

(A) Grooving Equipment
The grooving shall be performed by a self-propelled machine equipped with gang stacked diamond cutting blades mounted on a floating head with controls capable of providing uniform depth and alignment.

The cutting heads shall consist of stacked diamond tipped cutting blades. The spacers between each blade must be such that the raise in the bottom of the finished groove between the blades is less than 25% of the groove depth. The resulting bottom of the groove shall have a fine corduroy finish. If a coarse tooth pattern is present, the Contractor shall increase the number of blades and/or decrease the thickness of the spacers on the cutting head.

The equipment shall be capable of grooving the total width of the groove in one pass.

The equipment shall be self-vacuuming and leave the cut groove ready for pavement marking installation. Dry cut grooving without a vacuum will only be allowed if cleanup of cutting dust is done prior to opening the lane to traffic.
(B) **Grooves**

Each groove shall be 6" wide with a tolerance of ± 1/8". The following tables indicate the depths and numbers of grooves to be installed. The groove depth tolerance shall be ± 10 mils:

<table>
<thead>
<tr>
<th>CONCRETE GROOVE DEPTHS AND LINEAR FEET/GROOVE DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groove Depths (mils)</td>
</tr>
<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>80</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>125</td>
</tr>
<tr>
<td>Totals</td>
</tr>
</tbody>
</table>

*12 foot lane width x (5 grooves/product) x # products

<table>
<thead>
<tr>
<th>HMA GROOVE DEPTHS AND LINEAR FEET/GROOVE DEPTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groove Depths (mils)</td>
</tr>
<tr>
<td>-----------------------</td>
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<tr>
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<tr>
<td>80</td>
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<td>100</td>
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<tr>
<td>125</td>
</tr>
<tr>
<td>Totals</td>
</tr>
</tbody>
</table>

*12 foot lane width x (5 grooves/product) x # products

Since pavements are irregular, the depth of groove across the width may vary. To compensate for this, the depth of the groove shall be measured from the bottom of the groove to a straight edge extended over the groove from the pavement surface opposite the pavement joint.

<table>
<thead>
<tr>
<th>FULL DEPTH GROOVE LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Depth Groove Length</td>
</tr>
<tr>
<td>Space Between Grooves</td>
</tr>
</tbody>
</table>
Contracting the Work

- **Initial Estimates**
  - Standard grooving is $0.45 / ft
  - First contractor contacted put an estimate in of $15 per foot
  - This would blow our budget / costs out of the water

- **Decision Time! – we would go ahead**
  - Thought we would bid the project through the standard goods and services purchasing process
  - Was good in theory but ... others got involved
Contracting the Work

- The grooving ended up being a mini construction project
  - Standard letting / bid process was used
  - A construction SP number (State Project Number) was issued: SP 0282–36
  - A Metro District construction engineer was assigned and a standard pre-con was held

- Though there were initial concerns about the process and getting the project done on time it all worked out and was a good learning experience
Getting the Work Done

- Two bids were received with the low bid coming in at $1.84 / ft (2880 feet) plus traffic control for a project cost of 12k
- Work progressed quickly and was finished in 3 days
- Diamond cutter blades were used dry with a vacuum system to contain the dust
- Contractor used milled aluminum plates of various mil thicknesses to set and monitor groove depth
Layout of the Grooves

PCC/HMA Transition between Test Section 13 & 14

24 products x 10 = 240
240/40 = 6
3 decks Bit and PCC

Lane 12'

Profile View

Transition 125 μ 80 μ 100 μ 60 μ

Top View

6" Gap

1" sides 4" line
Construction Photos

- Grooves Being Cut
- Finished Section
Construction Photos

- Groove on the Asphalt after cutting
- Checking depth of cleaned groove

- Groove on the Asphalt after cutting

Checking depth of cleaned groove
Summary of Problems / Issues

- Initial estimate of work was way different than expected
- Lost control of the bid / contracting process due to conversion into a construction project
  - Both Items above raised concern about getting the grooving pilot project done

- BIGEST unforeseen PROBLEM:
  - Noise complaints!
Noise Complaints

› Emails began coming into various people in the department from both motorists and neighbors about what was going on
  ◦ Why were we putting rumble strips on the freeway?
  ◦ How long were these going to be there?
  ◦ Can’t you move the testing to a different area?

› Main concern was the neighbors
  ◦ Despite the area looking rural, there were some near by houses that were not visible from the road
  ◦ Explained to them what the project was and why it was being done
  ◦ Told them it was for three years and that the surface would be corrected afterwards

› The noise may have been an issue even without the grooves as the surface applied markings generate some noise
Spraying of Lines

- Had to be careful of traffic (live lane)
Installation Photos

- Several Lines Installed – Surface Preparation

- Some lines missed the mark a little but most were good
Install Photos – Bituminous

- MMA’s

- Latex / Multi
Install Photos – Concrete

- MMA’s
- Latex / Multi
What we have SEEN so far:

- This past winter was especially cold with heavier than normal snowfall
- The grooved lines in general looked undamaged compared to the surface applied lines (more prevalent with some products than others)
- Some products showed minor adhesion issues to the exposed/ground aggregate surfaces in the wheel paths
Comparison Photos – 1st Year

- Tapes – Grooved
- Tapes – Surface
What is going to be the Finished Product

- An annual report will be issued as a PDF document
- Will be reviewed by manufacturers prior to release
- Final format is yet to be determined but will have side by side comparison of the test data between the surface and grooved lines with some photos
Thank You

Questions?