2015 PILOT PROJECTS

GRAVEL ROAD CONVERSIONS
(AC GRINDINGS AND OTTA SEAL)

OCTOBER 14, 2015
BOCC BUSINESS MEETING
System Data:
- 200 miles of gravel road
- Maintenance demand/service levels:

<table>
<thead>
<tr>
<th>Activity/Data</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading frequency</td>
<td>2 or 3 times per year</td>
<td>Annually or every other year</td>
<td>Infrequent/upon request</td>
</tr>
<tr>
<td>Dust palliative</td>
<td>Annual</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Material add</td>
<td>8/10 years</td>
<td>12/16 years</td>
<td>&gt;20 years</td>
</tr>
<tr>
<td>$/Mile/Year</td>
<td>$5,000/$7,500</td>
<td>$2,500/$3,500</td>
<td>&lt;$1,500</td>
</tr>
<tr>
<td># of miles +/-</td>
<td>50</td>
<td>70</td>
<td>80</td>
</tr>
</tbody>
</table>

Local/Residential road annual surface maintenance (paved): $6,000/$8,000/mi/yr.
Deschutes County has used magnesium chloride as a dust palliative on County road facilities for the last 10-15 years.

Many dust palliative products on the market and Deschutes County has experimented with many of these products.

Magnesium Chloride determined to provide the best dust palliative for roads in the high desert.

Added benefit of soil stabilization.

Magnesium Chloride is hygroscopic. It draws and attracts moisture from the atmosphere to provide a wet looking surface and reduce airborne dust particles.
THE PROBLEM:
HIGH MAINTENANCE GRAVEL ROADS

1.  Negative attributes of Magnesium Chloride dust palliative.
   - Draws fines to surface which create slick and mucky conditions during freeze/thaw periods. Sticks to tires/wheels and tracks into driveway/garage.
   - Can impact some roadside vegetation (Juniper kill).

2. Customer dissatisfaction with road condition and negative attributes:
   - Leads to more service requests
   - Higher costs

3. Rural gentrification
   - City folk moving to the country

4. Other issues
ROAD TREATED WITH MAGNESIUM CHLORIDE FREEZE/THAW
ROAD TREATED WITH MAGNESIUM CHLORIDE
TREE KILL
ROAD TREATED WITH MAGNESIUM CHLORIDE
POTHOLING
TYPICAL GRAVEL ROAD
WASHBOARDING
THE GOAL

Find an improved low-cost surface treatment with annual surface maintenance costs that are at or near that of a high maintenance gravel road ($5,000/$7,500/mi/yr.)

- Target low-volume Local/Residential facilities.
- Evaluate/estimate long-term maintenance costs and strategies.
- Potentially develop/evaluate partnership opportunities with adjacent property owners (ie, a “maintenance LID”) to fund the upgrade.
**Otta Seal**
- Developed in Norway in 1960s. Relatively new to USA.
- Aggregate (1”-minus) rolled into a layer of high-float liquid asphalt.
- Life Expectancy: 8-12 yrs.
- A poor-man’s oil mat.

**Paving with Asphalt Grindings**
- Asphalt grindings are milled from County roads prior to certain overlay projects.
- Asphalt grindings are becoming more frequently used in a variety of maintenance applications.
  - From “high-end gravel” replacement to reconstituted asphalt mix.
- Life Expectancy: Varies
Plainview Road:
- East of Sisters (Fryrear Road)
- 0.90 mile segment, 18’ wide
- Local/Residential classification, dead end.
- Low ADT (110± vpd)
- Frequent calls for maintenance
  - Dust complaints (residences are close to the road).
  - Grading requests.
  - Juniper tree kill.
OTTA SEAL INSTALLATION
OTTA SEAL INSTALLATION
OTTA SEAL INSTALLATION
**OTTA SEAL INSTALLATION COST**

<table>
<thead>
<tr>
<th>Otta Seal - Plainview</th>
<th>Amount</th>
<th>Unit</th>
<th>Unit $</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor/Equipment (excluding prep)</td>
<td>2 days</td>
<td>$25,710.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aggregate (1&quot;-minus, dirty)</td>
<td>190.00 ton</td>
<td>$5.70</td>
<td>$1,083.00</td>
<td></td>
</tr>
<tr>
<td>High float oil (HFMS-2)</td>
<td>22.33 ton</td>
<td>$450.00</td>
<td>$10,048.50</td>
<td></td>
</tr>
<tr>
<td>Fog seal (HFS-901s)</td>
<td>4.8 ton</td>
<td>$225.00</td>
<td>$1,080.00</td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td>20 ton</td>
<td>$15.00</td>
<td>$300.00</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$38,222.37</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Surface Area**

| | 9850 SY |

| **Total $/SY** | **$3.88** |

**Hypothetical break-even point: 7.3 years**

**Notes:**
- Personnel Rate Multiplier: 3.15 (fully loaded, with overhead)
- Equipment rates include depreciation.
Ivancovich Way:
- Northeast of Redmond
- Local/Residential classification, dead end.
- 0.60 mile, 24’ wide
- Low ADT (150± vpd)
- Frequent calls for maintenance
  - Grading requests to address washboarding.
  - Tracking of muck layer during freeze/thaw and wet periods.
AC GRINDINGS INSTALLATION
AC GRINDINGS INSTALLATION
AC GRINDINGS INSTALLATION
# AC GRINDINGS INSTALLATION COST

## Notes:
- Personnel Rate Multiplier: 3.15 (fully loaded, with overhead)
- Equipment rates include depreciation.

<table>
<thead>
<tr>
<th>AC Grindings - Ivancovich</th>
<th>Amount</th>
<th>Unit</th>
<th>Unit $</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor/Equipment (excluding prep)</td>
<td>2</td>
<td>days</td>
<td>$350.00</td>
<td>$30,509.84</td>
</tr>
<tr>
<td>Tack</td>
<td>2.5</td>
<td>ton</td>
<td>$350.00</td>
<td>$875.00</td>
</tr>
<tr>
<td>Fog Seal</td>
<td>7</td>
<td>ton</td>
<td>$325.00</td>
<td>$2,275.00</td>
</tr>
<tr>
<td>Sand</td>
<td>20</td>
<td>ton</td>
<td>$15.00</td>
<td>$300.00</td>
</tr>
<tr>
<td>Grindings (est unit $)</td>
<td>1088</td>
<td>ton</td>
<td>$3.00</td>
<td>$3,264.00</td>
</tr>
<tr>
<td>Paver Rental</td>
<td>1</td>
<td>ea</td>
<td>$1,800.00</td>
<td>$1,800.00</td>
</tr>
<tr>
<td>Material Re-grind</td>
<td>1088</td>
<td>ton</td>
<td>$7.90</td>
<td>$8,595.20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>$47,619.04</td>
</tr>
<tr>
<td>Surface Area</td>
<td>8210</td>
<td>SY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total $/SY</td>
<td></td>
<td></td>
<td></td>
<td>$5.80</td>
</tr>
</tbody>
</table>

Hypothetical break-even point: 10.6 years
1. Evaluation of Treatments
   - Monitor initial degradation and estimate near-term and long-term maintenance needs.
     - Is this a product we can chip seal and roll into our Pavement Management Program?
       - If so, at what interval for first chip seal and what is the subsequent frequency of treatments?
       - If not, what alternative maintenance treatments or strategies are necessary?

2. Cost Analysis
   - How do the initial and projected maintenance investment levels compare to the annual average maintenance investment for gravel roads?

3. Additional Projects/Products
   - Are there other products in existence that can address the issues at a lower cost?
   - What refinements can we make to our application technique to reduce the initial application cost of the Pilot Projects?