OTEC 2009
Ohio Transportation Engineering Conference
October 27 – 28, 2009
404-LVT
(Low Volume Traffic)
Asphalt Concrete
404-LVT Asphalt Concrete

- General
- Description of Candidate Projects
- Materials Characterization
- Thickness Guidelines
- Manufacturing and Placement
- Quality Assurance
- Method of Acceptance
- Costs
- Field Trip
404-LVT Asphalt Concrete

• General
  ‣ Item 404, Asphalt Concrete
    ▪ A staple of Ohio asphalt paving since 1965
    ▪ A prescriptive specification vs. end result spec.
    ▪ A specification having experienced the benefit of refinement over time
404-LVT Asphalt Concrete

- General
  - Item 404-LVT
    - LVT implies for use on Low Volume Traffic pavements
    - An industry initiative
    - Experimental specification
    - Builds on success of 404
404-LVT Asphalt Concrete

• General

  ‣ Item 404-LVT

    ▪ Intended as a cost-competitive solution for...
      - Maintaining low volume roads (ADT < 2500)
      - Restoring ride quality
        » Smoothness
        » Longitudinal profile & transverse slope
      - Improving safety
        » Asphalt stabilized, skid resistant wearing course capable of resisting aggregate dislodging and surface delaminating
404-LVT Asphalt Concrete

- General
- Description of Candidate Projects
404-LVT Asphalt Concrete

- Description of Candidate Projects
  - Pavements suitable for 404-LVT treatment show the following distresses:
    - Dry-looking, “bony” pavements that are porous or permeable,
    - Pavements that have begun to ravel,
    - Pavements with extensive cracking too fine for crack sealing,
    - Pavements with cracking of the surface too extensive for crack sealing alone,
    - Pavements previously chip or cape sealed but have lost aggregate or show thin delamination.
Description of Candidate Projects

- Candidate pavements will have...
  - no unrepaired structural (fatigue) damage
  - no appreciable rutting (< $\frac{1}{4}$ inch),
  - sufficient remaining structural capacity to last the life of the 404-LVT treatment.
404-LVT Asphalt Concrete

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Materials Characterization

Recipe mix

- Total asphalt binder content prescribed in the specification
  - Based on coarse aggregate type
    - Limestone: 6.4%
    - Gravel: 6.2%
    - Limestone / Gravel blend: 6.3%

- Minimum virgin binder content:
  - Based on coarse aggregate type
    - Limestone: 3.9%
    - Gravel: 3.7%
    - Limestone / Gravel blend: 3.8%
404-LVT Asphalt Concrete

• Materials Characterization
  ▸ Recipe mix
    ▪ Binder type: Performance Grade (PG) 64-22
    ▪ Permissive use of “processed” Recycled Asphalt Pavement (RAP) to promote economy
      ➢ 30% allowance without change to asphalt binder type
      ➢ 40% allowance if polymers are used
404-LVT Asphalt Concrete

- Materials Characterization

<table>
<thead>
<tr>
<th>Item 404-LVT</th>
<th>1/2 inch</th>
<th>90-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch</td>
<td>90-100</td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td>60-70</td>
<td></td>
</tr>
<tr>
<td>No. 8</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>No. 16</td>
<td>27-45</td>
<td></td>
</tr>
<tr>
<td>No. 30</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>No. 50</td>
<td>10-22</td>
<td></td>
</tr>
<tr>
<td>No. 100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>No. 200</td>
<td>0-8</td>
<td></td>
</tr>
</tbody>
</table>
404-LVT Asphalt Concrete

• General
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• Materials Characterization
• Thickness Guidelines
404-LVT Asphalt Concrete

Overlay Thickness Guidelines

- Gradation established for placement in thin lifts.
- 100 percent of material must pass the ½-inch sieve.
- Desired thickness = 2 \times \text{max. agg. Size} = 1 \text{ inch}

Note: Pavement surfaces having significant irregularity will require a leveling course or milling prior to placement of 404-LVT.
404-LVT Asphalt Concrete

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• Manufacturing and Placement
  ‣ Requirements of ODOT C&MS, Item 401 **DO NOT** apply except where noted in the specification,
  ‣ Specification directly incorporates or references applicable Item 401 language,
  ‣ 404-LVT can utilize conventional or Warm Mix Asphalt (WMA) manufacturing processes,
  ‣ Placement and compaction follow traditional requirements as outlined in Item 401.
Manufacturing and Placement

- Polymer-modified 404-LVT mix may require...
  - Greater heat during production
  - Elevated mix temperature at the project site
    - Sufficiently hot to compact
    - Not so hot so as to cause binder draindown
404-LVT Asphalt Concrete

- General
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- Quality Assurance
Quality Assurance

- Quality control personnel and testing devices must meet ODOT requirements
- QC Testing:

<table>
<thead>
<tr>
<th>Quality Control Testing Schedule</th>
<th>Quality Control Testing Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Frequency</td>
<td>Tests</td>
</tr>
<tr>
<td>Within first 100 tons</td>
<td>Binder content, gradation</td>
</tr>
<tr>
<td>Each 300 tons thereafter</td>
<td>Binder content, gradation</td>
</tr>
</tbody>
</table>
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• Method of Acceptance
404-LVT Asphalt Concrete

- Method of Acceptance
- Acceptance based on the daily mean for gradation and binder content.
404-LVT Asphalt Concrete

- Method of Acceptance
- Acceptance based on the daily mean for gradation and binder content.
- Binder content $\pm 0.5\%$
404-LVT Asphalt Concrete

• Method of Acceptance
• Acceptance based on the daily mean for gradation and binder content.
• Binder content +/- 0.5%
• Binder Range 1.0
404-LVT Asphalt Concrete

- Method of Acceptance
- Acceptance based on the daily mean for gradation and binder content.
- Binder content +/- 0.5%
- Binder Range 1.0
- # 4 Sieve + / 6 %
404-LVT Asphalt Concrete

- Method of Acceptance
- Acceptance based on the daily mean for gradation and binder content.
  - Binder content  +/- 0.5%
  - Binder Range 1.0
  - # 4 Sieve  + / 6 %
  - # 4 Sieve Range 12
404-LVT Asphalt Concrete

- Method of Acceptance
- Material exceeding gradation tolerances = 90% pay.
- Material exceeding binder content tolerances = 70% pay.
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- Costs
# 404-LVT Asphalt Concrete

- Costs (Weighted average – Last 12 months)

<table>
<thead>
<tr>
<th></th>
<th>$ per CY</th>
<th>$ per SY</th>
<th>Lift Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>404-LVT Fayette County</td>
<td>$111.60</td>
<td>$3.10</td>
<td>1 inch</td>
</tr>
<tr>
<td>404-LVT City of Cincinnati</td>
<td>$140.00</td>
<td>$3.88</td>
<td>1 inch</td>
</tr>
<tr>
<td>Single Course Chip Seal</td>
<td>--</td>
<td>$1.64</td>
<td>--</td>
</tr>
<tr>
<td>Microsurfacing - Surface Course</td>
<td>--</td>
<td>$2.17</td>
<td>--</td>
</tr>
</tbody>
</table>
# 404-LVT Asphalt Concrete

- **Costs (Annualized)**

<table>
<thead>
<tr>
<th>Method</th>
<th>Life (years)</th>
<th>$ per SY Annualized</th>
<th>Lift Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>404-LVT Fayette County</td>
<td>10</td>
<td>$0.31</td>
<td>1 inch</td>
</tr>
<tr>
<td>404-LVT City of Cincinnati</td>
<td>10</td>
<td>$0.39</td>
<td>1 inch</td>
</tr>
<tr>
<td>Single Course Chip Seal</td>
<td>5</td>
<td>$0.33</td>
<td>--</td>
</tr>
<tr>
<td>Microsurfacing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Surface Course</td>
<td>7</td>
<td>$0.31</td>
<td>--</td>
</tr>
</tbody>
</table>
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- Field Trip...
Fayette County
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• Issues Yet to Resolve…
  ‣ How fine is fine enough?
    ▪ Desire is to ensure sufficient fineness to facilitate compaction and closure of mix texture.
    ▪ Percent passing no. 4 sieve adjustment may be needed.
  ‣ Should fine aggregate be comprised of blended materials?
    ▪ Natural sand addition to 100 percent limestone mixes could facilitate compaction and mix density.
Questions ?