



# OTEC 2009

Ohio Transportation Engineering Conference

October 27 – 28, 2009

# 404-LVT

(Low Volume Traffic)

Asphalt Concrete



# 404-LVT Asphalt Concrete

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



# 404-LVT Asphalt Concrete

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- 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

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- 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

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- 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

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- General
- Description of Candidate Projects



# 404-LVT Asphalt Concrete

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- 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.





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- 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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- General
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- Materials Characterization



# 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%



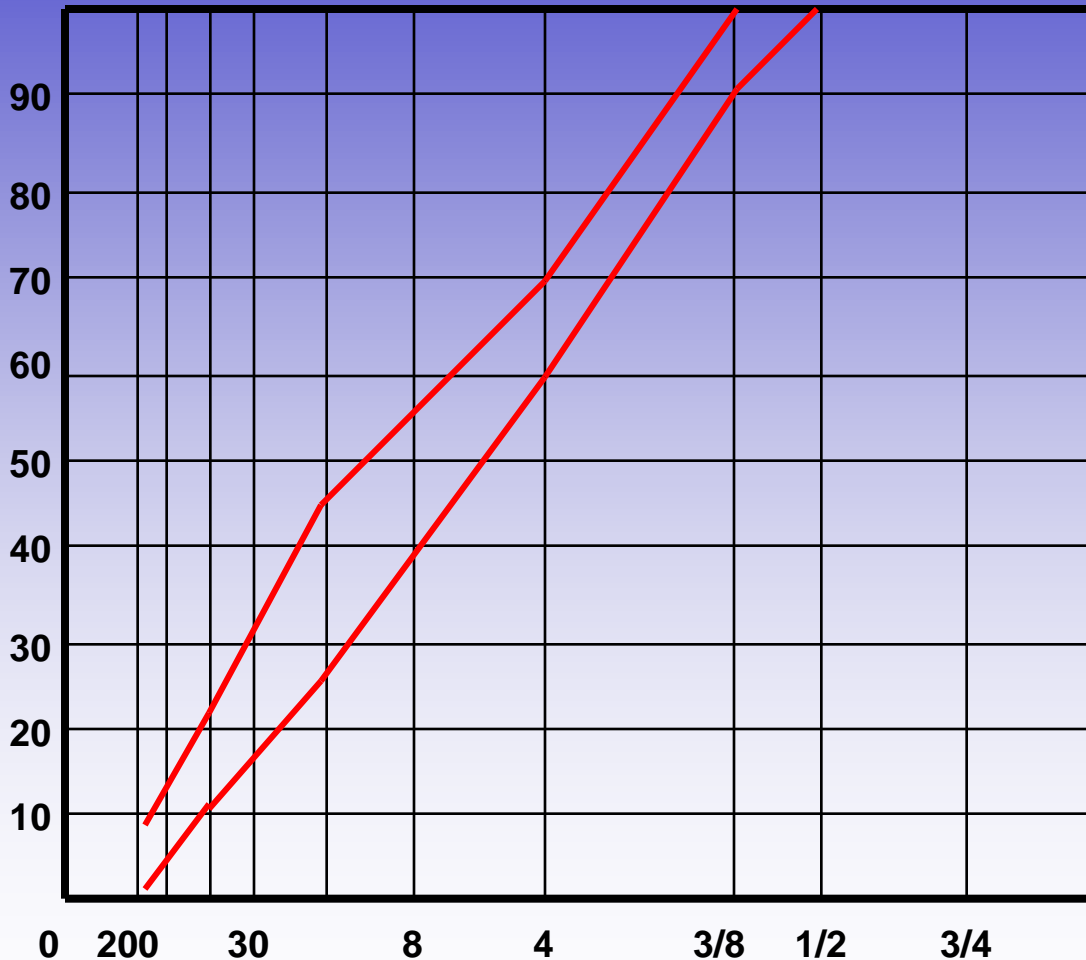
# 404-LVT Asphalt Concrete

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- 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



Item 404-LVT	
1/2 inch	100
3/8 inch	90-100
No. 4	60-70
No. 8	-
No. 16	27-45
No. 30	-
No. 50	10-22
No. 100	-
No. 200	0-8

# 404-LVT Asphalt Concrete

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- General
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- Thickness Guidelines

# 404-LVT Asphalt Concrete

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- Overlay Thickness Guidelines
  - ▶ Gradation established for placement in thin lifts.
  - ▶ 100 percent of material must pass the 1/2-inch sieve.
  - ▶ Desired thickness = 2 X max. agg. Size  
= **1 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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- General
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- Thickness Guidelines
- Manufacturing and Placement



# 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.

# 404-LVT Asphalt Concrete

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- 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

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- Quality Assurance

# 404-LVT Asphalt Concrete

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

Quality Control Testing Schedule		
Daily Frequency	Tests	Sample Type
Within first 100 tons	Binder content, gradation	Completed mix
Each 300 tons thereafter	Binder content, gradation	Completed mix

# 404-LVT Asphalt Concrete

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- Quality Assurance
- Method of Acceptance

# 404-LVT Asphalt Concrete

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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 (Weighted average – Last 12 months)

	\$ per CY	\$ per SY	Lift Thickness
404-LVT Fayette County	\$ 111.60	\$ 3.10	1 inch
404-LVT City of Cincinnati	\$ 140.00	\$ 3.88	1 inch
Single Course Chip Seal	--	\$ 1.64	--
Microsurfacing – Surface Course	--	\$2.17	--

# 404-LVT Asphalt Concrete

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- Costs (Annualized)

	Life (years)	\$ per SY Annualized	Lift Thickness
404-LVT Fayette County	10	\$0.31	1inch
404-LVT City of Cincinnati	10	\$ 0.39	1 inch
Single Course Chip Seal	5	\$ 0.33	--
Microsurfacing – Surface Course	7	\$0.31	--

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- Field Trip...

# Fayette County



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# Fayette County



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# Fayette County





# Fayette County



# Fayette County





# City of Cincinnati



# City of Cincinnati





# City of Cincinnati



# City of Cincinnati



# City of Cincinnati





# City of Cincinnati





# City of Cincinnati



# City of Cincinnati



# 404-LVT Asphalt Concrete

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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 ?