State of the Industry

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My Contact Information

State of Florida
Department of Transportation

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State Highway System

- 44,424 lane miles
  - 8,495 interstate lane miles (19%)
  - 33,665 arterial lane miles (76%)
  - 2,264 Turnpike lane miles (5%)
- 97.4% of pavement is asphalt
- 2.6% of pavement is concrete
- 1.6% of the system lane miles are bridges
Asphalt Surfaces

- 50.2% of asphalt surfaces are dense graded
- 49.8% of asphalt surfaces are open graded
## Asphalt Producers for Florida

<table>
<thead>
<tr>
<th></th>
<th>In-State</th>
<th>Out-of-State</th>
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</thead>
<tbody>
<tr>
<td>Asphalt Plants</td>
<td>92</td>
<td>2</td>
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<td>Asphalt Contractors</td>
<td>37</td>
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<td>Asphalt Binder Terminals</td>
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<td>9</td>
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<tr>
<td>Asphalt Emulsion Terminals</td>
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<td>8</td>
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</table>
## Asphalt Mix Tonnage (FY 18/19)

<table>
<thead>
<tr>
<th>Friction</th>
<th>Structural</th>
<th>Total</th>
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<tbody>
<tr>
<td>FC-5</td>
<td>SP-9.5</td>
<td>502,486</td>
</tr>
<tr>
<td>FC-12.5</td>
<td>SP-19.0</td>
<td>654,027</td>
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<tr>
<td>FC-9.5</td>
<td>SP-12.5</td>
<td>208,026</td>
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<tr>
<td></td>
<td></td>
<td>125,554</td>
</tr>
<tr>
<td></td>
<td></td>
<td>124,699</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,849,898</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>4,464,690</strong></td>
</tr>
</tbody>
</table>

- 3.10 million tons of structural/base course
- 1.36 million tons of friction course
Historical FDOT Asphalt Tonnage

Asphalt Mix Tonnage

- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018

Florida Department of Transportation
Asphalt Tonnage By Producer (FY 18/19)

Asphalt Production > 100,000 Tons

Asphalt Mix Tonnage

<table>
<thead>
<tr>
<th>Producer</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson</td>
<td>800,000</td>
</tr>
<tr>
<td>Hubbard</td>
<td>600,000</td>
</tr>
<tr>
<td>Community</td>
<td>400,000</td>
</tr>
<tr>
<td>Ajax</td>
<td>300,000</td>
</tr>
<tr>
<td>PMI</td>
<td>200,000</td>
</tr>
<tr>
<td>Ranger</td>
<td>150,000</td>
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<td>CWR</td>
<td>100,000</td>
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<td>Duval</td>
<td>80,000</td>
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<tr>
<td>General</td>
<td>50,000</td>
</tr>
<tr>
<td>DAB</td>
<td>40,000</td>
</tr>
<tr>
<td>P &amp; S Paving</td>
<td>30,000</td>
</tr>
<tr>
<td>Asphalt Group</td>
<td>20,000</td>
</tr>
<tr>
<td>Middlesex</td>
<td>10,000</td>
</tr>
</tbody>
</table>
Asphalt Tonnage By Producer (FY 18/19)

Asphalt Production < 100,000 Tons

Asphalt Mix Tonnage

Whitehurst, Masi, Halley, Peavy, Midsouth, Roads Inc, Halifax, Okeechobee, Weekley, Mitchell Brothers, Group III, JW Cheatham, VA Paving, Lane, Coastal Bridge, H & J Asphalt, ETM Solutions, H & R Asphalt, Superior
Mix Tonnage By Traffic Level (FY 18/19)

Asphalt Mix Tonnage

Traffic Level

0% 0.5% 53% 38% 8.5%
Mix Tonnage By Binder Type (FY 18/19)

Total mix tonnage
4,464,690
Binder Tonnage (FY 18/19)

Total binder tonnage
247,671
- 765,000 Tons of RAP
- 49,700 Tons of Binder from RAP
- 715,300 Tons of Aggregate from RAP
## RAP Usage

<table>
<thead>
<tr>
<th>Condition</th>
<th>FY 10/11</th>
<th>FY 11/12</th>
<th>FY 12/13</th>
<th>FY 13/14</th>
<th>FY 14/15</th>
<th>FY 15/16</th>
<th>FY 16/17</th>
<th>FY 17/18</th>
<th>FY 18/19</th>
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<tbody>
<tr>
<td>Unrestricted (no limit)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Average</td>
<td>25%</td>
<td>26%</td>
<td>25%</td>
<td>29%</td>
<td>24%</td>
<td>29%</td>
<td>27%</td>
<td>24%</td>
<td>25%</td>
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<tr>
<td>Maximum</td>
<td>40%</td>
<td>38%</td>
<td>39%</td>
<td>45%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Restricted (Max 20%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Average</td>
<td>17%</td>
<td>18%</td>
<td>16%</td>
<td>19%</td>
<td>20%</td>
<td>20%</td>
<td>19%</td>
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<td>19%</td>
</tr>
<tr>
<td>Maximum</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>
Asphalt Mix Weighted Average Cost ($/ton)
Pay Factor Data
Composite Pay Factor (CPF) Data

- Statewide Average CPF
  - FY 18/19: 1.016
  - FY 17/18: 1.016
  - FY 16/17: 1.013
  - FY 15/16: 1.009
  - FY 14/15: 1.018
  - FY 13/14: 1.019
  - FY 12/13: 1.011
  - FY 11/12: 1.015
## Composite Pay Factor (CPF) Data

### Dense Graded Pay Factor Data

<table>
<thead>
<tr>
<th>FY</th>
<th>Density</th>
<th>AC</th>
<th>Air Voids</th>
<th>#8 Sieve</th>
<th>#200 Sieve</th>
<th>CPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>18/19</td>
<td>0.992</td>
<td>1.025</td>
<td>1.021</td>
<td>1.001</td>
<td>1.028</td>
<td>1.015</td>
</tr>
<tr>
<td>17/18</td>
<td>0.999</td>
<td>1.032</td>
<td>1.023</td>
<td>1.002</td>
<td>1.027</td>
<td>1.016</td>
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<tr>
<td>16/17</td>
<td>0.992</td>
<td>1.031</td>
<td>1.024</td>
<td>0.997</td>
<td>1.025</td>
<td>1.013</td>
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<tr>
<td>15/16</td>
<td>0.994</td>
<td>1.023</td>
<td>1.013</td>
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<td>1.009</td>
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<tr>
<td>14/15</td>
<td>1.004</td>
<td>1.029</td>
<td>1.024</td>
<td>0.998</td>
<td>1.031</td>
<td>1.018</td>
</tr>
<tr>
<td>13/14</td>
<td>1.003</td>
<td>1.031</td>
<td>1.026</td>
<td>1.011</td>
<td>1.030</td>
<td>1.020</td>
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</table>
## Composite Pay Factor (CPF) Data

### Open Graded Pay Factor Data

<table>
<thead>
<tr>
<th>FY</th>
<th>AC</th>
<th>3/8” Sieve</th>
<th>#4 Sieve</th>
<th>#8 Sieve</th>
<th>CPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>18/19</td>
<td>1.007</td>
<td>1.021</td>
<td>1.019</td>
<td>1.011</td>
<td>1.018</td>
</tr>
<tr>
<td>17/18</td>
<td>1.012</td>
<td>1.017</td>
<td>1.013</td>
<td>1.013</td>
<td>1.014</td>
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<tr>
<td>16/17</td>
<td>1.011</td>
<td>1.012</td>
<td>1.015</td>
<td>1.018</td>
<td>1.014</td>
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<tr>
<td>15/16</td>
<td>1.004</td>
<td>1.005</td>
<td>1.002</td>
<td>1.013</td>
<td>1.004</td>
</tr>
<tr>
<td>14/15</td>
<td>1.019</td>
<td>1.021</td>
<td>1.018</td>
<td>1.026</td>
<td>1.019</td>
</tr>
<tr>
<td>13/14</td>
<td>1.015</td>
<td>1.007</td>
<td>1.009</td>
<td>1.032</td>
<td>1.014</td>
</tr>
</tbody>
</table>
FY 18/19 Top Producer CPF (>100,000 tons)

- #1 Atlantic Coast Asphalt (1.032)
- #2 Asphalt Group (1.028)
- #3 General Asphalt (1.026)
FY 18/19 Top Producer CPF (25,000-100,000 tons)

• #1 Lynch Paving (1.028)
• #2 Roads Inc (1.026)
• #3 Halley Engineering (1.018)
FY 18/19 District Top Producer CPF (>25,000 tons)

- District 1: PMI (1.031)
- District 2: PMI (1.043)
- District 3: Roads Inc (1.026)
- District 4: General Asphalt (1.030)
- District 5: CW Roberts (1.030)
- District 6: Community Asphalt (1.034)
- District 7: CW Roberts (1.032)
- Turnpike: DAB (1.030)
High Polymer Binder

- Completed 17 projects with high polymer binder
- Placed over 280,000 tons of high polymer mix in Florida
- First two demonstration projects were built in 2015
- Contractors have averaged a bonus on all projects except one.
- Smoothness data has been good
  - Average IRI for completed projects has ranged from 33 to 47 at acceptance.
Severe Rutting
Bottom Up (Alligator) Cracking
Raveling (FC-5)
US 90 Midway Project

- US 90 pilot project was paved in August 2015
- Westbound travel lanes at the I-10 interchange
  - Between two truck stops
  - Rutting over two inches in places
- Maintenance project that was programmed to be reconstructed with concrete pavement
- Resurfaced top 2.5” with a single lift of FC-12.5 containing high polymer binder
- Concrete reconstruction delayed
US 90 Midway Project
US 90 Project Rut Data

US 90 High Polymer Test Section Rut Data

- Conventional Mix (2014 PCS)
- High Polymer Binder Mix (2019 PCS)

US 90 WB Outside Travel Lane (MP 11.482 - 12.458)
# 2020 High Polymer Binder Forecast

<table>
<thead>
<tr>
<th>Dist.</th>
<th>County</th>
<th>FIN</th>
<th>Description</th>
<th>Let Date</th>
<th>Est HP Mix</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Jackson</td>
<td>439722-1</td>
<td>SR 75 (US 231) from SR 73 to CR 162</td>
<td>12/4/19</td>
<td></td>
<td>959</td>
</tr>
<tr>
<td>5</td>
<td>Marion</td>
<td>435660-2</td>
<td>SR 326 from RXR Crossing to CR 25A</td>
<td>12/4/19</td>
<td></td>
<td>630</td>
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<tr>
<td>4</td>
<td>Palm Beach</td>
<td>439843-1</td>
<td>SR 15 from Morgan Road to Shirley Drive</td>
<td>1/3/20</td>
<td></td>
<td>16,213</td>
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<tr>
<td>7</td>
<td>Pinellas</td>
<td>440245-1</td>
<td>SR 693 from SR 688 to 138th Avenue</td>
<td>4/8/20</td>
<td></td>
<td>6,079</td>
</tr>
<tr>
<td>5</td>
<td>Lake</td>
<td>439139-1</td>
<td>SR 25 from Arlington Ridge Blvd to CR 33</td>
<td>5/20/20</td>
<td></td>
<td>895</td>
</tr>
<tr>
<td>2</td>
<td>Suwannee</td>
<td>441337-1</td>
<td>I-10 from the Madison C/L to US 90 (Ag. stations)</td>
<td>7/29/20</td>
<td></td>
<td>4,248</td>
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<tr>
<td>2</td>
<td>Taylor</td>
<td>441059-1</td>
<td>SR 55 (US 19/27A/98) MP 7.8 to Fenholloway River</td>
<td>8/26/20</td>
<td></td>
<td>40,000</td>
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<tr>
<td>1</td>
<td>Highlands</td>
<td>439434-1</td>
<td>SR 25 (US 27) from Cloverleaf Road to SR 66</td>
<td>8/27/20</td>
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<td>13,301</td>
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<td>5</td>
<td>Marion</td>
<td>441136-1</td>
<td>US 301/441 from CR 25A to US 301/441 Interchange</td>
<td>10/28/20</td>
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<td>65,000</td>
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<tr>
<td>2</td>
<td>Duval</td>
<td>437319-1</td>
<td>US 90 from Edgewood Avenue to McDuff Avenue</td>
<td>12/2/20</td>
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<td>5,300</td>
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<td>5</td>
<td>Osceola</td>
<td>439487-1</td>
<td>SR 15/US 441 from Okeechobee C/L to SR 60</td>
<td>12/2/20</td>
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<td>12,712</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>165,337</td>
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</table>
2019 Delta Tc / REOB Testing

- 56 binder sources
- 9 Suppliers / 7 grades
  - PG 52-28
  - PG 58-22
  - PG 67-22
  - PG 76-22 (PMA)
  - PG 76-22 (ARB)
  - PG 82-22 (PMA)
  - High Polymer Binder
% REOBs vs. 20 HR PAV Delta Tc
After Specification Implementation
Resurfacing Program

• Statutory Requirement
  – Ensure 80% of pavement on the State Highway System meets Department standards.

• Internal Objective
  – Ensure 90% of interstates and the turnpike meet Department standards.
  – Ensure 85% of pavement on the SHS meets Department standards.

• Resurface enough lane miles annually to maintain these two requirements.
# Statewide Pavement Performance

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<tbody>
<tr>
<td>Overall</td>
<td>14.4</td>
<td>12.4</td>
<td>11.1</td>
<td>9.4</td>
<td>8.4</td>
<td>7.3</td>
<td>7.7</td>
<td>8.5</td>
<td>8.2</td>
<td>8.7</td>
<td>12.6</td>
</tr>
<tr>
<td>Ride</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>1.9</td>
<td>2.1</td>
<td>1.7</td>
<td>2.0</td>
<td>1.3</td>
<td>1.2</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Crack</td>
<td>13.0</td>
<td>10.9</td>
<td>9.7</td>
<td>7.9</td>
<td>6.8</td>
<td>6.0</td>
<td>6.4</td>
<td>7.3</td>
<td>7.1</td>
<td>7.7</td>
<td>11.4</td>
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<tr>
<td>Rut</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
<td>0.3</td>
<td>0.2</td>
<td>0.3</td>
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# Deficient Pavements by Facility Type

Based on 2019 Pavement Condition Condition Survey

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Interstate</th>
<th>Arterials</th>
<th>Turnpike</th>
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</thead>
<tbody>
<tr>
<td>Lane Miles</td>
<td>8,495</td>
<td>33,665</td>
<td>2,264</td>
</tr>
<tr>
<td>Deficient Lane Miles</td>
<td>676</td>
<td>4,637</td>
<td>265</td>
</tr>
<tr>
<td>% Lane Miles Deficient</td>
<td>8.0%</td>
<td>13.8%</td>
<td>11.7%</td>
</tr>
</tbody>
</table>
Lane Miles Resurfaced and Deficient Lane Miles

% Deficient Lane Miles

2001: 2179
2002: 1985
2003: 2,160
2004: 2,061
2005: 2,151
2006: 2,463
2007: 2,434
2008: 1,861
2009: 2,488
2010: 1,867
2011: 2,001
2012: 1,946
2013: 1,729
2014: 1,456
2015: 1,863
2016: 1,706
2017: 1,252
2018: 1,430
2019: 1,360

Lane miles resurfaced
% Deficient lane miles
District 1 Historical Performance

% of SHS Deficient

PCS Year

1995 - 2019

Crack
Ride
Rut
District 2 Historical Performance

% of SHS Deficient

PCS Year


Crack Ride Rut

0% 2% 4% 6% 8% 10% 12% 14% 16% 18% 20% 22% 24% 26%
District 3 Historical Performance

% of SHS Deficient

PCS Year


Crack Ride Rut

% of SHS Deficient
Work Program Funding by Source FY 2020-2024

- Federal-Aid: $12,864.9M (25%)
- Right of Way and State Infrastructure Bank Bonds: $2,455.4M (5%)
- Turnpike and Tolls: $9,658.4M (18%)
- Other Financing: $19.4M (0%)
- Local and Other Funds: $1,300.9M (2%)
- State: $25,912.0M (.50%)

Total 5-Year Adopted Work Program: $52,211M
Work Program Total Construction FY 2020 - 2024

**Five Year Summary**
- Capacity Improvement: 16,177.1 ($16.2 billion), 68%
- Safety: 729.3 ($0.7 billion), 3%
- Bridge: 2,372.0 ($2.4 billion), 10%
- Resurfacing: 4,480.2 ($4.5 billion), 19%

**Annual Program Levels**
- 2020: $5,178.2
- 2021: $4,222.8
- 2022: $4,923.5
- 2023: $4,810.0
- 2024: $4,624.2

(Fiscal Year)
Florida scored the 2nd best overall in the report
- The lowest percentage of roads in poor condition
- 6th lowest percentage of deficient bridges
- 22nd lowest in state highway spending / driver
- 10th highest for average travel time to work

https://www.usatoday.com/story/money/2019/07/08/states-that-are-falling-apart/39644781/
Recent Specification Changes
• Section 320 – Hot Mix Asphalt – Plant Methods and Equipment
  – FC-5 storage time increased to 1.5 hours when using cellulose fibers.

• Section 334 – Superpave Asphalt Concrete
  – SP-19.0 mixtures not allowed in the top layer of shoulders (clarification).
  – Anti-strip agents required in all mixtures.
  – Visual acceptance clarification. 2000 tons includes asphalt base.
Section 916 – Bituminous Materials

- REOBs limited to 8% maximum.
- $\Delta T_c \geq -5.0^\circ C$ (20 hours PAV)
July 2019 Workbook

- Section 334 – Superpave Asphalt Concrete
  - Density pay factor weighting increased to 40%
  - Upper specification limits for density increased

- Section 337 – Asphalt Concrete Friction Courses
  - For FC-5, minus 200 material range changed, 2 – 5%
• Section 330 – Prime and Tack Coats
  – Distributor cleaning every year and as needed.
  – Target tack rate = 0.05 gal/yd$^2$ for dense mixtures on newly constructed asphalt layers.
  – Verify the distributor meter daily.

• Section 334 – Superpave Asphalt Concrete
  – Lot closure time extended to 90 days with approval.

• High polymer binder memo language added to Sections 334, 337, and 916 as appropriate.
Case Study - Old Roosevelt Road Project

- Old Roosevelt Road was reconstructed in 2012.
  - Located in Jacksonville
- Existing 4-lane concrete road was demolished and a new 2-lane asphalt road was built.
- The prime contractor proposed a CSI to use the demolished concrete as the new base.
- The CSI was accepted and the demolished concrete was successfully used for the base material.
Old Roosevelt Road Project
Crushed Concrete Base
Plate Bearing Tests
New Asphalt Roadway
Project Findings

• Crushed Concrete makes a good base material.
  – The contractor was consistently able to achieve acceptable gradations and adequate density.
  – Plate bearing tests were good and similar to limerock base.
  – LBR tests ranged from 151 to 309
    • LBR average on the project was 244
Additional Findings*

• There are 1,120 lane miles of concrete pavement in Florida.

• Assuming an average width of 12’ and thickness of 10”, this equates to 2.2 million cubic yards of available base material.

• Should there be a shortage of base material in the future, the Department has access to significant amounts of crushed concrete base material.

— *These findings do not represent the views of the Florida Department of Transportation, but are intended for the enjoyment of the Asphalt Conference Audience.
Additional Findings*

- The Old Roosevelt Project shows that two lanes of asphalt pavement are better than four lanes of concrete pavement.

*These findings do not represent the views of the Florida Department of Transportation, but are intended for the enjoyment of the Asphalt Conference Audience.
Thank You

Questions?