TxDOT Chip Seal Over Geotextile Fabric Research Project
Project Background

- FHWA Pavement Preservation International Scanning Tour Identified potential use of Treatment in the U.S.
- TxDOT agrees to conduct a research project to evaluate the performance of Chip Seals over Geotextile Fabrics
- Project initiated by Mr. Zane Webb, P.E. – Director, TxDOT Maintenance Division
- Project based on the work performed in Australia and the County of San Diego, California
Australian Experience
Australian Experience
Australian Experience
County of San Diego, CA.
County of San Diego, CA.
County of San Diego, CA.
TxDOT Background Information

- TxDOT has a $250 million per year dedicated “Preventive Maintenance Program”.

- There are approximately 41,000 centerline miles of Farm to Market roads in Texas.

- 90% of these Farm to Market roads are paved with chip seals. 10% of these roads are seal coated every year.
# Texas Roadway System

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<thead>
<tr>
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<tbody>
<tr>
<td>40,868.567</td>
<td>84,276.279</td>
<td>34,855.072</td>
<td>14,988.483</td>
<td>730.047</td>
<td>13,565.199</td>
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<td>Lane</td>
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<td>107,332,874</td>
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<td>111,104,769</td>
<td>140,118,081</td>
<td>721,996</td>
<td>18,129,841</td>
<td>442,211,318</td>
<td>Daily Vehicle</td>
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TxDOT Project Scope

- Construct six test sites in TxDOT’s Waco District. Each test site has a control section.
- TxDOT Materials and Pavements Section developed testing plan and will perform analysis
- Use various combinations of asphalt binders and aggregate sources.
- Evaluate performance of treatment under various traffic volumes and existing pavement conditions.
- Compare performance of test sites vs. control sections.
Test Sites Typical Section

- **Chip Seal**
- **Asphalt-Fabric Barrier**
- **Old Pavement**
- **Base Course**
- **Subgrade**
Objective and Benefits

• Project Objective:
  – Assess the performance of using non-woven geotextile fabric material underneath chip seal surface treatment

• Expected benefits:
  – Reduction in reflective cracking
  – Improved moisture barrier benefits
  – Reduction of crack-sealing operations
  – Improved overall pavement life-cycle costs

• Possible benefits:
  – Increase in pavement structural stability
  – Improvement in ride quality
Pre-Assessment Measurements

- Automated Pavement Condition Survey (TxDOT and Fugro-BRE)
- Manual Condition Surveys (FHWA using LTPP-DIM)
- Video (roadway and right-of-way)
- Rutting and Ride Quality measurements
- Falling Weight Deflectometer (FWD)
- Ground Penetrating Radar (GPR)
Pavement Condition at Test Sites
Pavement Condition at Test Sites
Pavement Condition at Test Sites
Description of Materials

- Non-woven polypropylene fabric (AMOCO Petromat®). Each role is 300’x 12’
- Liquid asphalt for tack coat (fabric): PG 64-22 and CRS-2P
- Liquid asphalt for seal coat (chips): AC20-5TR and CRS-2P
- Three pre-coated Aggregates Sources (including a lightweight aggregate)
- LTPP will keep samples of aggregate and asphalt material.
## Test Sites Information

<table>
<thead>
<tr>
<th>Controlling CSJ</th>
<th>Project Description</th>
<th>Length (ft)</th>
<th>County</th>
<th>ADT</th>
<th>Location</th>
<th>Typical Section</th>
<th>Fabric Location</th>
<th>Tack Coat</th>
<th>Seal Coat Binder</th>
<th>Aggregate Source</th>
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</thead>
<tbody>
<tr>
<td>0055-02-021</td>
<td>November 2003 Letting</td>
<td></td>
<td>Hamilton</td>
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<tr>
<td>0049-01-080</td>
<td>SH 6 From FM 1860 in Riesel To .5 mi West</td>
<td>2640</td>
<td>McLennan</td>
<td>2700</td>
<td>East of IH 35</td>
<td>Divided Highway with Two 12-ft lanes with inside and outside shoulders</td>
<td>Northbound Lanes only</td>
<td>PG 64-22</td>
<td>AC20 - 5TR</td>
<td>Martin Marrietta</td>
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<tr>
<td>1835-02-048</td>
<td>FM 1741 From FM 93 To .5mi. North</td>
<td>2640</td>
<td>Bell</td>
<td>3100</td>
<td>East of IH 35</td>
<td>Four 12-ft lanes with 16-ft continuous left turn lane (C&amp;G section) (67-ft total width)</td>
<td>Entire Roadway Width</td>
<td>PG 64-22</td>
<td>AC20 - 5TR</td>
<td>Capitol Aggregates</td>
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<tr>
<td>0232-02-017</td>
<td>SH 53 From Bell/Fall CL To .5 mi East</td>
<td>2640</td>
<td>Falls</td>
<td>1300</td>
<td>East of IH 35</td>
<td>Two 12-ft lanes with 6-ft shoulders</td>
<td>Both Travel Lanes</td>
<td>PG 64-22</td>
<td>AC20 - 5TR</td>
<td>Martin Marrietta</td>
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<tr>
<td>0413-04-031</td>
<td>SH 164 From 200' east of Navasota River</td>
<td>3960</td>
<td>Limestone</td>
<td>2200</td>
<td>East of IH 35</td>
<td>Two 12-ft lanes with 10-ft shoulders</td>
<td>Both Travel Lanes</td>
<td>PG 64-22</td>
<td>AC20 - 5TR</td>
<td>TXI Lightweight</td>
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<td></td>
<td>Bridge To 3/4 mi. East</td>
<td></td>
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### Project CSJ

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<tr>
<th>Controlling CSJ</th>
<th>Project Description</th>
<th>Length (ft)</th>
<th>County</th>
<th>ADT</th>
<th>Location</th>
<th>Typical Section</th>
<th>Fabric Location</th>
<th>Tack Coat</th>
<th>Seal Coat Binder</th>
<th>Aggregate Source</th>
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<tbody>
<tr>
<td>1187-01-024</td>
<td>December 2003 Letting</td>
<td></td>
<td>Coryell</td>
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<td>Project CSJ</td>
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<td>0386-04-012</td>
<td>FM 1991 From SH 22 South 3/4 mile</td>
<td>3960</td>
<td>Bosque</td>
<td>330</td>
<td>West of IH 35</td>
<td>Two 10-ft lanes NO shoulders</td>
<td>Both Travel Lanes</td>
<td>CRS-2P</td>
<td>CRS-2P</td>
<td>Capitol Aggregates</td>
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<tr>
<td>1187-01-024</td>
<td>FM 929 From SH 36 To 0.5 mi. East</td>
<td>2640</td>
<td>Coryell</td>
<td>2100</td>
<td>West of IH 35</td>
<td>Two 12-ft lanes with 10-ft shoulders (C&amp;G roadway)</td>
<td>Mainlanes and Shoulders</td>
<td>PG 64-22</td>
<td>CRS-2P</td>
<td>Capitol Aggregates</td>
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</tbody>
</table>

### County

- Hamilton
- McLennan
- Bell
- Falls
- Limestone
- Coryell
- Bosque
SH-164 Construction

• AC20-5TR was used as tack coat and seal coat binder.
  – Tack Coat: 0.10 to 0.15 gal./sq.yd.
  – Seal Coat: 0.36 to 0.42 gal./sq.yd.
• The fabric laydown rate was 16 rolls/hour.
• TXI Lightweight aggregate @ 1/120 cu.yd./sq.yd.
Laydown Process

1. Repair localized structural damage
2. Power broom pavement surface and remove RPMs
3. Spread tack coat
4. Place Geotextile fabric
5. Set fabric with pneumatic tire rollers
6. Place temporary RPMs
7. Spread seal coat binder
8. Spread chips
9. Set chips with pneumatic tire roller
10. Power broom chip seal surface to remove excess/loose chips
Laydown Process
Laydown Process
Laydown Process
Laydown Process
Laydown Process
Final Surface
Final Surface
## Treatment Cost

<table>
<thead>
<tr>
<th>Chip Seal</th>
<th>In-Place Cost</th>
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<tbody>
<tr>
<td>Without Fabric</td>
<td>$0.80 - $0.90/sq. yd.</td>
</tr>
<tr>
<td>With Fabric</td>
<td>~ $ 1.00/sq. yd.</td>
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</tbody>
</table>
Assessing Performance

SH6 Percent Cracking with Age (L2 - Left Lane)

IRI (in/mile)
Fatigue Cracking

ANY PMIS Distress

14% less cracking after 1 year

Fabric Section
Control Section

Pre-data  3 months  6 months  1 year
TxDOT Action Items

• Measurements will be taken at 3, 6, and 12 months from construction date and then at 1-year intervals
• Roadway cross-sectional information needed from the district to properly analyze data
• Cores
• Permeability test
• Skid test
• Markings of test section and control section on ROW line
• Maintenance Supervisor to inform CSTM&P of changes to roadway sections.
• Written reports
FHWA Action Items

• Produce a permanent record of pavement condition, material test results, construction records, TxDOT research reports.
• Monitor the condition of Test Sites Annually for five years
• Write Annual Status Reports
• Prepare a Final Report
• Conduct similar Research Project in other States (NC, CA, etc.)
• Educate transportation organizations through workshops, presentations, Internet site and field test participation.
Acknowledgment

• Mr. Zane Webb – TxDOT – Director Maintenance Division
• Mr. Gregory Cleveland – TxDOT – Materials and Pavements Section
• TxDOT Waco District
• Mr. Antonio Nieves- P&M TST- LTPP
• Fugro-BRE
For More Information

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  – Email: gclevela@dot.state.tx.us