RIDOT Pavement Preservation Monitoring Program

2000 - 2007
Monitoring of pavement preservation treatments began in 2000 as a result of the Pavement Preservation Program (PPP) moving to a Federal Aid Program that year—one of the requirements being that monitoring be performed as a standard component.
Monitoring – Performed by the Pavement Management Engineer and assisted by an R&T Technician.

- 2 sections of 100’ of roadway were chosen randomly [for each treatment], with each lane representing a monitoring segment within each section.
- Distress assessments were conducted per the LTPP Distress Manual, with some modifications.
- Fall and spring were chosen as the times to inspect each section.
- Photographic records are also maintained.
Data Management

All data is stored in RIDOT’s Pavement Management software (dTims CT) for Deighton Associates. It is also entered in Arcview 9.2 for geographic location, graphic display and database manipulation.
Monitored Treatments

- Block Crack Sealant (ASTM D 6690)
- CMCRA crack sealant: Chemically Modified Crumb Rubber Asphalt (CMCRA) with fibers
- Microsurfacing
- Rubberized Asphalt Chip Seal (20% RACS) with five different stone/binder combinations
- Novachip
- CMCRA Paver Placed Elastomeric Surface Treatment (PPEST)-Thin Overlay
- CMCRA open graded friction course
- Cape seal – Microsurfacing over 20% RACS
- SAMI 1 – Novachip over 20% RACS
- SAMI 2 – PPEST over 20% RACS
Monitoring Sections

RIDOT Pavement Preservation Monitoring Program
Roads Crack
Sealed
1998-2007
Surface Treatments 2000-2007
Distresses/Measurements Monitored

- Joint Opening (Linear feet)
- Longitudinal Cracking (Linear feet)
- Transverse Cracking (Linear feet)
- Edge Cracking (Linear feet)
- Alligator Cracking (Area)
- Block Cracking (Area)
- Reflection Cracking from rigid base (Linear feet)
- Potholes (Number and Area)
- Utility Patches (Number and Area)
- Rutting
- Shoving
- Raveling (Area)
- Bleeding (Area)
- Polished Aggregate (Area)
- Skid Data
- IRI (mm/m)
**Section Crack Map 2000**

<table>
<thead>
<tr>
<th>MONITORING TYPE</th>
<th>YEAR PLACED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROAD</td>
<td>2000</td>
</tr>
<tr>
<td>TOWN - JAMESTOWN</td>
<td>LIMITS</td>
</tr>
<tr>
<td>SECTION ID</td>
<td>REVIEW DATE - FALL 2000</td>
</tr>
</tbody>
</table>

RIDOT Pavement Preservation Monitoring Program
Section Crack Map 2001

MONITORING TYPE - 
ROAD - 
TOWN - JAMESTOWN 
SECTION ID -

YEAR PLACED - 2000 
LIMITS - 
REVIEW DATE - FALL 2001 

RIDOT Pavement Preservation Monitoring Program
Section Crack Map 2004

RIDOT Pavement Preservation Monitoring Program
Frenchtown Road – 2000 (prior to chip seal)
Frenchtown Road – 2000 (after chip seal)
Frenchtown Road – Fall 2001
Frenchtown Road – Fall 2004

RIDOT Pavement Preservation Monitoring Program
Frenchtown Road – Fall 2005
Frenchtown Road – Fall 2006
### Sample Monitoring Section Data

#### Monitoring Section Data

<table>
<thead>
<tr>
<th>Element ID</th>
<th>ROAD NAME</th>
<th>ROUTE #</th>
<th>LOCATION</th>
<th>SEASON</th>
<th>DATE</th>
<th>JOINT CRK (FT)</th>
<th>EDGE CRK (FT)</th>
<th>LONG CRK (FT)</th>
<th>TOTAL LONG CRK W/EDGE (FT)</th>
<th>TOTAL LONG CRK W/O EDGE (FT)</th>
<th>TRAN CRK (FT)</th>
<th>REFLECTOR CRK (FT)</th>
<th>TOTAL TRANS CRK (FT)</th>
<th>TOTAL LINEAR CRK W/O EDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS40xx(02)XX-2N</td>
<td>E</td>
<td>RI. 1000</td>
<td>Pole 94 – SOUTHERN LIMIT</td>
<td>SPRING 2001</td>
<td>5/9/2001</td>
<td>5</td>
<td>0</td>
<td>48</td>
<td>53</td>
<td>53</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2001</td>
<td>9/24/2001</td>
<td>5</td>
<td>0</td>
<td>50</td>
<td>55</td>
<td>55</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPRING 2002</td>
<td>5/21/2002</td>
<td>5</td>
<td>4</td>
<td>64</td>
<td>73</td>
<td>69</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2002</td>
<td>10/24/2002</td>
<td>5</td>
<td>4</td>
<td>68</td>
<td>77</td>
<td>73</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>79</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPRING 2003</td>
<td>4/17/2003</td>
<td>5</td>
<td>4</td>
<td>129</td>
<td>138</td>
<td>134</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2003</td>
<td>11/24/2003</td>
<td>5</td>
<td>4</td>
<td>129</td>
<td>138</td>
<td>134</td>
<td>14</td>
<td>0</td>
<td>14</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPRING 2004</td>
<td>3/9/2004</td>
<td>8</td>
<td>4</td>
<td>172</td>
<td>184</td>
<td>180</td>
<td>17</td>
<td>0</td>
<td>17</td>
<td>207</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2004</td>
<td>11/9/2004</td>
<td>8</td>
<td>4</td>
<td>150</td>
<td>162</td>
<td>158</td>
<td>15</td>
<td>0</td>
<td>15</td>
<td>173</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPRING 2005</td>
<td>6/9/2005</td>
<td>8</td>
<td>4</td>
<td>127</td>
<td>172</td>
<td>168</td>
<td>16</td>
<td>0</td>
<td>18</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2005</td>
<td>12/20/2005</td>
<td>8</td>
<td>4</td>
<td>127</td>
<td>172</td>
<td>168</td>
<td>16</td>
<td>0</td>
<td>18</td>
<td>186</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPRING 2006</td>
<td>5/31/2006</td>
<td>8</td>
<td>4</td>
<td>179</td>
<td>179</td>
<td>179</td>
<td>19</td>
<td>0</td>
<td>21</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2006</td>
<td>12/14/2006</td>
<td>8</td>
<td>4</td>
<td>167</td>
<td>179</td>
<td>175</td>
<td>19</td>
<td>0</td>
<td>21</td>
<td>196</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPRING 2007</td>
<td>5/31/2007</td>
<td>8</td>
<td>4</td>
<td>173</td>
<td>218</td>
<td>214</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>234</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FALL 2007</td>
<td>10/15/2007</td>
<td>8</td>
<td>4</td>
<td>173</td>
<td>218</td>
<td>214</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>234</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TOTAL DISTRESS</td>
<td>8</td>
<td>4</td>
<td>173</td>
<td>218</td>
<td>214</td>
</tr>
</tbody>
</table>

#### Distress Results

<table>
<thead>
<tr>
<th>BLOCK CRACKING (FT²)</th>
<th>ALLIGATOR CRACKING (FT²)</th>
<th>RUTTING</th>
<th>SHOVING</th>
<th>RADELING (FT²)</th>
<th>BLEEDING (FT²)</th>
<th>POLISH (FT²)</th>
<th>POTHOLES</th>
<th>UTILITY PATCHES</th>
<th>AADT</th>
<th>IRI</th>
<th>SKID RESULTS</th>
<th>PAVEMENT STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>24</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>67</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>67</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>67</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>35</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
<tr>
<td>67</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>35</td>
<td>20</td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>0.5&quot; SURFACE TREATMENT 2&quot; CLASS I-1 5 1/4&quot; BINDER/BASE 12&quot; GRAVEL BORROW</td>
</tr>
</tbody>
</table>

RIDOT Pavement Preservation Monitoring Program
Initial Data Analysis

- Distress data that is most relevant to pavements in Rhode Island is cracking
- Decided to plot total cracking (linear) vs. time initially; severity of crack is not taken into account
- Block cracking – perimeter of the block as well as area is measured.
Linear Cracking Development – Sample Rubberized Chip Seal Section

RCS-2250(01)-1W2

- Total Longitudinal w/o Edge
- Total Transverse
- Total Linear
- Baseline Crack Data

Treatment applied in 2000
Linear Cracking Development – Sample Nova Chip Section

NC-1170-1S

Treatment applied in 2000

Baseline Crack Data

Total Linear

Total Longitudinal w/o Edge

Total Transverse

Inspection

Baseline Crack Data
Linear Cracking Development – Sample Thin Overlay Section

SS3080(02)TO-1W

- Total Longitudinal w/o Edge
- Total Transverse
- Total Linear
- Baseline Crack Data

Treatment applied in 2002

RIDOT Pavement Preservation Monitoring Program
Linear Cracking Development – Sample SAMI Section

123-SAMI-W

- Green dashed line: Total Longitudinal w/o Edge
- Blue line: Total Transverse
- Red line: Total Linear
- Green line: Baseline Crack Data

Treatment applied in 2000

Inspection

Linear Cracking (ft)

Next Steps

- Monitor
  - old sections to failure or overlay
  - new treatment types or materials will warrant monitoring

- Analysis
  - Continue to plot distress vs. time
  - Determine the times and crack density associated with crack progression from linear to block to alligator
  - Track Skid numbers/IRI over time if possible
  - Compare treatment distress with pavement structure and traffic loading