Caltrans has been implementing cold in-place recycling (CIR) for a number of years on many projects across the State, mainly using asphalt emulsion. CIR with foamed-asphalt is an attractive alternative that has proved to provide similar performance to the traditional CIR with asphalt emulsion. There currently is no specification available for using foamed asphalt for cold in-place recycling.

Recently Caltrans has taken initiatives to increase the use of recycling on pavement projects. However, the existing non-standard special provision (NSSP) for CIR has only incorporated asphalt emulsion. In recent years, a new recycling technology utilizing foamed asphalt as the stabilization agent has been used in asphalt recycling projects. In this technology, foamed asphalt is used in lieu of asphalt emulsion.

The idea of asphalt foaming dates back to 1956 and is attributed to L. Csanyi of Iowa State University. The expansion in the use of the foaming technique in construction activities for roadway rehabilitation applications began in the 1990’s and the technology has since gained wider acceptance among equipment manufacturers and roadway contractors. Foamed asphalt has been successfully used in full depth reclamation (FDR) and CIR projects.

In addition to placing a number of FDR projects using foamed asphalt, Caltrans has successful applied this technology on a CIR project in 2005 on I-80 in Placer County (District 3) between PM 14.3 and PM 33.3 covering over 87 lane miles with excellent performance. Counties and cities throughout California have used this technology successfully. During the time period 2010-2013 over 10,000,000 ft² (1,111,111 SQYD) of CIR foamed asphalt projects have been constructed on roadways of various cities and counties in California.
Purpose

Revise existing CIR NSSP to include provisions for using foamed asphalt so that CIR pilot projects may be constructed using foamed asphalt.

Objectives/Deliverables

The objectives are to revise the current CIR NSSP and mix design laboratory procedure for CIR to provide for use of foamed asphalt in addition to asphalt emulsion on pilot projects.

The deliverables necessary to accomplish these objectives are:

- Cold Foam CIR NSSP
- Revised Laboratory Procedure LP-8

Timeline

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Description</th>
<th>Start Date</th>
<th>End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Draft Revised CIR NSSP</td>
<td>Revise existing CIR NSSP to include use of foamed asphalt.</td>
<td>7/01/14</td>
<td>9/30/14</td>
</tr>
<tr>
<td>2. Final Revised CIR NSSP</td>
<td>Complete NSSP specification for use on pilot projects.</td>
<td>10/01/14</td>
<td>12/01/14</td>
</tr>
<tr>
<td>3. Test Method</td>
<td>Update Caltrans Laboratory Procedure LP-8, “CIR Mix Design Procedure”, to include use of foamed asphalt.</td>
<td>7/01/14</td>
<td>12/01/14</td>
</tr>
</tbody>
</table>
Benefits

A major benefit of revising CIR NSSP to include foamed asphalt is that it will provide the engineer another choice to select from when using CIR strategy for a particular project. CIR technology, whether with traditional asphalt emulsion or foamed asphalt, is considered a sustainable pavement rehabilitation technique with significant environmental and cost benefits. Some of the benefits of using foamed asphalt for CIR include:

- Allows construction under some adverse weather conditions such as light rain or cold weather.
- Accelerated construction timeline because it allows for extending the window for construction. It also allows for nighttime CIR construction.

Impacts

- Cold In-Place Recycling Non-Standard Special Provision must be revised
- Caltrans Laboratory Procedure LP-8 must be revised

Resource Requirements

The effort of incorporating foamed asphalt into the specifications will be minimal as it will only require revisions to the existing CIR NSSP and Laboratory Procedure LP-8.

<table>
<thead>
<tr>
<th>Task</th>
<th>Caltrans Staff</th>
<th>Hours/Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revise NSSP</td>
<td>Pavement</td>
<td>0.15 PY’s</td>
</tr>
<tr>
<td></td>
<td>METS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Construction Office Engineer</td>
<td></td>
</tr>
<tr>
<td>Revise Laboratory Procedure LP-8</td>
<td>METS</td>
<td>0.10 PY’s</td>
</tr>
</tbody>
</table>

Impediments to Completion of Deliverables

None
Recommendation and Approval

This scoping document for Cold In-Place Recycling Using Foamed Asphalt was prepared by the Pavement Preservation Task Group to address a priority issue that has statewide significance and it is within the Rock Products Committee mission. The Task Group Co-Chairs have determined the scope, resources required and timeline for delivery of this project to ensure that the deliverables are achievable in a timely manner.

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Approval Date: 6-16-14