Memorandum

To: ALL DISTRICT DIRECTORS
   Attention District Materials Engineers

Date: February 28, 1992
File:

From: DEPARTMENT OF TRANSPORTATION
       Division of New Technology, Materials and Research

Subject: DESIGN GUIDE FOR ARHM-GG

Attached is a Guide for your use when considering one type of asphalt concrete containing reclaimed tire rubber that is eligible for Federal funding on pavement rehabilitation projects. The Guide contains the procedure we will be using to select asphalt rubber hot mix-gap graded (ARHM-GG) design thicknesses. ARHM-GG is the only type of rubber modified pavement addressed herein because it appears to be the most promising of those we have studied. The use of ARHM-GG as set forth in this Guide should be considered non-experimental. ARHM-GG pavement designs that do not conform to this Guide should, therefore, be considered as experimental. Other types of asphalt concrete containing reclaimed tire rubber are also eligible for Federal funding. However, the data currently available regarding these other mixes is inconclusive. When data supports their routine use, a design guide will be developed for them.

FHWA has approved our proposal to use this Guide. However, it is important to note that this is an Interim Guide and that it will be modified as suggested by the results of current and future research by Caltrans and others. We must, therefore, continue to construct experimental sections based on equivalences other than those implied by this Interim Guide. If you have any questions regarding the use of this Guide, contact Joe Hannon or Jack Van Kirk of my staff at 8-497-2353 and 8-497-2357 respectively.

The attached specifications should be used for ARHM-GG. If you have any questions regarding these specifications, please contact Jack.

[Signature]
FARL. SHIRLEY, Chief,
Division of New Technology
Materials and Research

Attachments

cc: JBednar - FHWA
    JMassucco - FHWA
    BManning - LSR
    DMayer - OE
    KMori - OPPD
    TBressette
    JHannon
    JVanKirk
Asphalt Rubber Hot Mix-Gap Graded
Thickness Determination Guide
(Interim)

Procedure:

1. Determine the thickness of conventional DGAC required for the structural needs of the pavement (based on deflections and structural section stiffening using current Caltrans procedures).

2. Determine the thickness of conventional DGAC required to retard reflection cracking (using current Caltrans procedure).

3. Select a DGAC overlay thickness that satisfies the requirements of 1 and 2 above.

4. Use either Table 1 or Table 2 to determine the ARHM-GG equivalent sections, with and/or without SAMIs. Use Table 1 if structural needs control and Table 2 if reflection crack retardation controls.

5. If the ride score of the pavement to be rehabilitated is greater than the allowable maximum and there is no structural need per 1 above, select one of the following:

   a) Place two 0.10' thick lifts of ARHM-GG or

   b) Cold plane to a depth of 0.10', then place ARHM-GG as determined per Steps 1 thru 4 above.
### Table 1
**Structural Equivalencies**

<table>
<thead>
<tr>
<th>Thickness (ft.)</th>
<th>DGAC</th>
<th>ARHM-GG</th>
<th>ARHM-GG on a SAMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
<td>0.10</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>0.20</td>
<td>0.10</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>0.25</td>
<td>0.15</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>0.30</td>
<td>0.15</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>0.35</td>
<td>0.20</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>0.40</td>
<td>0.20</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>0.45</td>
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<td>0.20</td>
<td></td>
</tr>
<tr>
<td>0.50</td>
<td>0.15</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>0.55</td>
<td>0.20</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>0.60</td>
<td>0.20</td>
<td>0.15</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. The maximum allowable non-experimental equivalency for ARHM-GG is 2:1.
2. The minimum allowable ARHM-GG lift thickness is 0.10 ft.
3. Place 0.15 ' of new DGAC first.
4. Place 0.20 ' of new DGAC first.
5. ARHM-GG may not prevent cold weather induced transverse cracks.

### Table 2
**Reflection Crack Retardation Equivalencies**

<table>
<thead>
<tr>
<th>Thickness (ft.)</th>
<th>DGAC</th>
<th>ARHM-GG</th>
<th>ARHM-GG on a SAMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15</td>
<td>0.10</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>0.20</td>
<td>0.10</td>
<td>-</td>
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<tr>
<td>0.25</td>
<td>0.15</td>
<td>-</td>
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<tr>
<td>0.30</td>
<td>0.15</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>0.35</td>
<td>0.15</td>
<td>0.20</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. The minimum allowable ARHM-GG lift thickness is 0.10 ft.
2. A DGAC thickness of 0.35" is the maximum thickness recommended by Caltrans for reflection crack retardation.
3. Use 0.15 if the crack width is <1/8" and 0.20 if the crack width is ≥1/8".
4. Use if the crack width is ≥1/8". If <1/8", use another strategy.
5. ARHM-GG may not prevent cold weather induced transverse cracks.