CALTRANS APPROVAL PROCESS FOR WARM-MIX ASPHALT TECHNOLOGIES

1. INTRODUCTION

Warm Mix Asphalt (WMA) encompasses a range of technologies that allows a reduction in traditional hot mix asphalt production, placement and compaction temperatures. The California Department of Transportation (Caltrans) is interested in the evaluation of WMA technologies for extending the paving season, potential increased pavement service life, environmental benefits, and worker safety. Consequently, Caltrans has been evaluating warm mix technologies under a variety of applications, including field test sections throughout the state, accelerated pavement testing, and associated laboratory testing. Federal and other state funded research has been, and continues to be followed closely.

A wide range of different warm-mix technologies is available. However, due to their relatively recent introduction, only limited longer-term performance data, especially on high traffic volume highways, has been collected. Consequently, Caltrans has instituted an approval process for all WMA technologies in the state to ensure that the way in which each works, and the potential benefits and risks of using them are fully understood, and that any performance related problems are correctly analyzed and explained. Information gained from assessing these approvals together with results from ongoing research will guide implementation of warm-mix asphalt in California in terms of where best to use it, and in making changes where required to specifications, mix design procedures, test methods, quality control procedures, material plant quality programs, and the use of recycled asphalt pavement.

2. APPROVAL PROCESS

The Caltrans WMA approval process requires that the WMA technology provider and/or approval requester submit a request for approval and brief report summarizing the results of laboratory and field testing undertaken on the technology to date and providing evidence that equal or better performance is achieved when compared to conventional hot-mix asphalt controls. The testing can be undertaken in any state. Caltrans will review this submittal and determine whether, based on the testing performed, the WMA technology should be approved or provisionally approved for use on Caltrans projects.

2.1 Summary Report Prepared by WMA Technology Provider

The summary report must be prepared by the WMA technology provider or a consultant appointed by the technology provider and should summarize the laboratory and field testing undertaken on the technology. The results must clearly indicate that the WMA performs equal or better to the level of the HMA (control) performance. Any laboratory testing cited should have been undertaken by an AASHTO accredited laboratory not directly affiliated with the WMA technology provider. The report should include the following:

- <u>Chapter 1: Contact Details</u>
  - WMA technology name.
  - WMA technology provider (company name, representative name, and contact information).
  - The name of the organization and lead investigator(s) undertaking laboratory and field testing (including AMRL certification number).
- <u>Chapter 2: Technology Details</u>
  - A brief overview of how the technology works
  - Details on required plant modifications to accommodate the technology
  - Details on how Caltrans Material Plant Quality Program (MPQP) requirements will be met
  - A copy of the Material Safety Data Sheet (MSDS)

- Chapter 3: Laboratory Test Results
  - Mix design (can be Hveem or SuperPave)
  - A summary of laboratory testing results, including tabulated mix properties, mix production details, and tabulated laboratory test results comparing the HMA and WMA supported by plots where appropriate. The results must provide evidence that the WMA mix performs equal to or better than the HMA control mix. Tests can be undertaken on specimens removed from a road or prepared in a laboratory. Testing should include the following:
    - Rutting performance
      (AASHTO T-320 [Repeated Simple Shear Test], AASHTO TP 63-03 [Asphalt Pavement Analyzer] or AASHTO TP 79 [Dynamic Modulus/Flow Number])
    - Cracking performance
      (AASHTO T-321 [Fatigue Beam] or Texas Overlay Tester)
    - Moisture sensitivity performance
      (AASHTO T-324 [Hamburg Wheel Track] and AASHTO T283 [Tensile Strength Retained] (or CT371 if tested in California))
    - Open-graded friction course durability
      (ASTM D-7064 [Part x2][Cantabro])
    - Binder testing (to determine effect on PG grading. AASHTO M-320)
- Chapter 4: Field Test Results
  A minimum of three experiments is required, one of which may include an accelerated loading test. Each test must include an HMA control. On field tests, the HMA control and WMA sections must be placed end-to-end in the same lane (not in adjacent lanes). Sections should have an AADT of at least 10,000 with at least 10% trucks. Each section should have been monitored after construction (as a baseline) and again after 12 months or longer (i.e., at least one year of traffic).
  Each project summary should include:
  - Experiment locations, experiment details (including traffic), and the monitoring program.
  - Mix design information (can be Hveem or SuperPave)
  - Mix production and construction data (include production and placement temperatures, summary of QC measurements, and any other documented observations).
  - Tabulated summary of observations from each visit. The reasons for any differences between the HMA and WMA sections should be explained.
  - Photographs at each monitoring visit showing all distresses. Photographs must show equal or better performance to HMA control.
- Chapter 5: Reference list of reports cited in the text and other reports prepared on the WMA technology.
- Chapter 6: List of State DOT contacts and associated documentation (e.g. project special provisions) applicable to the construction of the test sections.

2.2 Approval

Caltrans will review the report and if satisfied with the information provided, the technology will be placed on the Caltrans "*Approved List of Warm-Mix Asphalt Technologies*". If insufficient field testing has been undertaken, the technology may be placed on the Caltrans "*Provisional Approved List of Warm-Mix Asphalt Technologies*", which allows experimental use on projects with a Traffic Index less than 11, until a revised summary report with the required field testing has been submitted and approved.

A copy of the approval checklist is attached.

Caltrans Warm Mix Asphalt Technology Approval

Company		Technology				
Contact		Date Reviewed				
Documents Submitted	Summary Report	Yes	No			
	Supporting Reports	Yes	No			
	Other	Yes	No			
MPQP adherence information		Yes	No	MSDS		
Name of organization doing testing						
Experiment designs		Yes	No			
Mix designs		Yes	No	Method		
Specimen preparation		Yes	No	LMLC	FMLC	FMFC
Rutting performance		Yes	No	Method		
Fatigue performance		Yes	No	Method		
Hamburg Wheel Track		Yes	No	Method		
Tensile Strength Retained		Yes	No	Method		
OGFC durability		Yes	No	Method		
Other		Yes	No	Method		
Other		Yes	No	Method		
Performance better or equal to HMA		Yes	No			
Number of states with tests			Number of tests in report			
Field test in California		Yes	No	Test with TI>11	Yes	No
Satisfactory evaluation		Yes	No			
Performance better or equal to HMA		Yes	No			
DoT contact names		Yes	No	Reference list	Yes	No
Recommendation		Approved		Provisional	Reject	
Reasons/comments						
Review Panel Chairperson						