RAP/RAS Subtask Group Working List
May 30, 2013

March 14, 2013 (TransLab)
April 4, 2013 (Fontana)
May 2, 2013 (Granite Sacramento)
May 30, 2013 (Fontana)

Issue 1. RAP/RAS Specification Progress

Given Caltrans goal of having a RAP/RAS binder replacement specification on the server effective July 2014, and after additional discussion, Industry proposes that the "binder replacement" terminology be integrated in the spec as soon as possible. This would eliminate confusion between weight of aggregate replacement and binder replacement terminology and minimize duplication of effort; ie, revisiting the RAP specifications to accommodate the binder replacement language required for the RAP/RAS specifications. Incorporating Caltrans 3 to 5% RAS specifications (September 2012) into the current discussion will allow for a smoother transition to our ultimate goal of having a RAP/RAS binder replacement specification by July of 2014.

(4/4/2013) RAS incorporation now in process

Issue 2. RAP Fractionation

(3/14/2013) RAP fractionation on ¼" sieve for mixes with ≥15% RAP (dwa)

- **Screen size?**
  - **Industry proposal = ½ or ⅝-inch**
  - **CT compromise - ⅜-inch?**

Industry proposed a contractor option for fractionation. As a compromise to Caltrans requirement to fractionate, industry proposed fractionation at the ½-inch or ⅝-inch screen.

(5/2/2013) Industry is concerned that fractionation on the ¼-inch screen may create the following problems and add additional cost without realizing any real benefit:

- ***excessive fines may limit the amount of RAP (may not allow for 25% RAP) (dwa)***
- ***require additional stockpile space***
- ***require an additional plant bin***
- ***require additional belt scale capable of measuring a small quantity of RAP; eg, less than 10% RAP (dwa)***
- ***additional testing (LP-9/daily testing)***

(5/2/2013) Industry proposes a ⅜-inch nominal maximum fractionated product

(5/2/2013) Meeting – Caltrans not comfortable with the nominal maximum criteria – want to avoid arguments over small percentage points – want to stick with 100% passing 3/8" screen (or less) with tolerance of between 1 to 3% - TBD by next meeting.

(5/2/13) Industry accepts ⅜-inch for fractionation; tolerance of up to 2% retained on stockpile...after 10 minutes of Gilson "shaking"; alternatively stated, 98% passing the ⅜-inch sieve.
FRACTIONATION ISSUE RESOLVED! (waiting for Industry conformation)

(5/30/2013) Industry concurs with 5/2/13 resolution
Caltrans proposed RSS includes 97% - 100% passing 3/8 sieve
Caltrans proposed RSS includes 10 minutes +/- 15 seconds of Gilson "shaking".

Issue 3. Industry wants to revisit the language regarding the PG binder grading required on a "bump down"

(4/4/2013) Industry has solicited input from Caltrans-approved binder suppliers as to availability of PG binders. Data will be forthcoming.

(4/4/2013) Caltrans wants a single bump down – if the single bump down grade is not available, that option disappears – there may be an exception when considering PG 64-10 and PG 64-16 grades, Joe will get back with us at the next meeting. Caltrans will consider work done by PCCAS, Rita and Bob will bring back information from 4/16/13 meeting. Additional information from other states, NAPA, AI, etc will be gathered by industry and shared with the group.

As we move to RAS and binder replacement criteria we will need to look at a "true grade" of the final binder – lots of work, lots of discussion necessary.

(5/2/2013)

- ***Tier 1 – allow binder replacement up to 15% (total including both RAP & RAS)***
- ***Tier 2 – allow binder replacement between 15% and 25% (total including both RAP & RAS)***
- ***Tier 3 – allow binder replacement between 25% and 40% (total including both RAP & RAS)***
- ***Hamid will look into the pooled fund study that was done by 6 states (Caltrans participated) and see what data were gathered and what the results were by next meeting.***
- ***Joe will put out a questionnaire to the AASHTO group server on RAS use, performance, procedures, specifications, etc. Joe will draft the questions and circulate to the STG for comment prior to posting by June meeting.***

- ***Industry will also research other resources (states, NAPA, NCAT, etc) and bring back to the group (work in progress).***

Options to consider Bump Down? If you want 40% binder replacement, Caltrans requires a one-grade "bump down.) The only binder that may be problematic is the PG 58-34 (from a PG 64-28). Blending Chart? Rejuvenator?

% recycle by weight of aggregate	Current Section 39	
≤ 15%	RAP and RAS (combined 15% by weight; RAS ≤ 5%) on ANY lift	max 15% binder replacement when RAS is used (to be addressed by RSS)
> 15 % ≤ 25%	Upper 0.2ft – RAP only; max 25% binder replacement Lower lifts – RAP only; max 40% binder replacement; bump down No RAS!!!	

Goal – Binder Replacement
Joe Peterson to provide first draft prior to 30May13 ***

Binder Replacement	Criterion/Criteria
≤ 25% w/ max 5% RAS (by dwa)	***
25% to 40% w/ max 5% RAS (by dwa)	***
Under consideration? ▪ Bump down ▪ Binder recovery ▪ Rejuvenator ▪ Several cycles of PAV ▪ UCPRC evaluating RAP mastic; may obviate the need to extract and recover binder ▪ Combined virgin & recycled binders – evaluate PG (How close is the combined binder to the original specified???)	

(5/30/13)

Revised Implementation Schedule

	% recycle by weight of aggregate	Target	
Step 1[a, d]	≤ 15%	RAP and RAS (combined 15% by weight; RAS ≤ 5%) on ANY lift	max 15% binder replacement when RAS is used (Currently an NSSP)[b]
Step 2[c]	> 15 % ≤ 25%	Upper 0.2ft – RAP only; max 25% binder replacement Lower lifts – RAP only; max 40% binder replacement; bump down Goal to have this completed prior to July 1st, 2013 (specification moratorium) No RAS!!!	
Step 3[e]	0% to 40% by binder replacement	RAS is limited to a max of 5% by dwa	

Notes:

a. Contractors can request the use of the NSSP on a project by project basis subject to approval by the RE. Caltrans would expect an economic analysis as per the Standard Specifications.
b. Caltrans will consider the use of a CPD to expedite and streamline the process. (Joe will discuss with Construction and report back to the STG Co-Chairs by the next meeting – ASAP!).
c. Tony will send the proposed changes to the specifications (Step 2) to industry and respond to Joe by Wednesday, June 5th.
d. Caltrans needs to modify the hidden language in the NSSP to make it 0% - 5% at the contractors option. Caltrans will send to the Co-Chairs no later than June 13th.
e. Under consideration - -
    a. Bump down
    b. Binder recovery
    c. Use of rejuvenator's
    d. Several cycles of PAV
    e. UCPRC evaluating RAP mastic; may obviate the need to extract and recover binder
    f. Combined virgin & recycled binders – evaluate PG (How close is the combined binder to the original specified???).
    g. As we move to RAS and binder replacement criteria we will need to look at a "true grade" of the final binder – lots of work, lots of discussion necessary.

Issue 4. Industry recommends reducing the frequency/amount of testing required for mixes containing ≤ 15% RAP *(dwa)*

Industry proposes that testing be conducted once every 3 days or once per 5000 tons of mix, whichever is lesser.

(4/4/2013) Caltrans will take this back for consideration and report back at the next meeting.

(5/2/2013) Caltrans does not plan to revise current (Section 39) testing requirements.

Issue 5. Industry recommends consideration of a wider tolerance on JMF RAP content during production.

(3/14/2013)
Current draft requires *(dwa)*:

- **mixes with ≤15% RAP, tolerance is JMF ±5%**
- **mixes with ≤25% RAP, tolerance is JMF ±3%**
- **(4/4/2013) compromise from Caltrans for new JMF "trigger"**
  >15-25% ±4%...but not to exceed 25% binder replacement
  >25% ±3% (in the future)
  ~~Regardless of RAP content, binder replacement cannot exceed 25%.~~

Industry is requesting clarification on these tolerances. Industry believes these tolerances apply to HMA production. For example, in the current Section 39 specifications allows for a mix design containing 10% RAP (dwa). In this instance, during production the contractor can produce a mix targeting 5-15% RAP (dwa). The only tolerance on the targeted RAP percentage is related to the MPQP requirements.

(4/4/2013) As a condition of fractionating RAP, for mixes containing 15 to 25 % RAP (dwa), industry request the specification allow up to 29% RAP (dwa) as long as the mix does not exceed 25% binder replacement.

(4/4/2013) Caltrans will be considering a similar approach as taken by other states – relate maximum RAP content to traffic volumes.

(5/2/2013) Since Industry has agreed to current Section 39 RAP language, this discussion is no longer be warranted. Industry will respond to Caltrans suggestion at next meeting; ie, 30May13. Tony Limas to solicit Industry for comment; ie, is there an Industry consensus.

***(5/2/2013)* May be considered as part of the transition to binder replacement in the future.**

(5/30/2013) Industry concurs with replacement language

Issue 6. For mixes with higher RAP content, consider the addition of natural sand?

(4/4/2013) Future discussion for mixes with RAP ≥ 25% *(dwa)*.

(4/4/2013) Caltrans and Industry need to monitor gyratory compactor, RAP replacement and field compatibility effect on natural fines demand.

(4/4/2013) On the back burner, will monitor test data

***(5/2/13)* Pending accumulation of gyratory data.**

***(5/30/13)* Still pending accumulation of gyratory data.**

Issue 7. (New 5/2/13) Addition of materials to minimize stockpile clumping of RAS and facilitate feeder flow.
(5/30/13) Caltrans is inclined to leave the anti-clumping issue to the contractor. Caltrans will write proposed language for the "clumping" issue and treatment and QC requirements. Contractor will need to address this issue in their QC plan.

- **Zeolite?**
- **Natural fines?**
- **RAP / RAS blend?**

Issue 8 - (5/2/13) %RAP – need to clearly distinguish between percent by dry weight of aggregate (dwa) or percent by binder replacement (abr)!!! (See table above).

5/30/13 Meeting Action Items

1. **Issue 3 - Caltrans will consider the use of a CPD to expedite and streamline the process. (Joe will discuss with Construction and report back to the STG Co-Chairs by the next meeting – ASAP!).**
2. **Issue 3 - Tony will send the proposed changes to the specifications (Step 2) to industry and respond to Joe by Wednesday, June 5th.**
3. **Issue 3 - Caltrans needs to modify the hidden language in the NSSP to make it 0% - 5% at the contractors option. Caltrans will send to the Co-Chairs no later than June 13th.**
4. **Issue 3 – Bob will bring copies of blending charts / nomographs to next meeting for discussion.**
5. **Hamid will update the PPPMMR and circulate to STG Co-Chairs for review and approval.**
6. **Next meeting – Monday, June 24th @ 10:00 @ Granite Construction Summit Conference Room (Bradshaw office)**