# Bridge Contractors / Caltrans Liaison Committee Meeting Minutes

**Date:** Friday, March 18, 2016
**TIME:** 10 a.m. to 2:00 p.m.
**LOCATION:** Caltrans – Translab Auditorium
5900 Folsom Blvd, Sacramento CA

**COMMITTEE PURPOSE:** *To establish a liaison between Caltrans and the California bridge contracting community focused on structure related items of mutual interest. To maintain an on-going dialogue on pertinent issues and pursue action items in a collaborative effort to improve bridge construction in California.*

**COMMITTEE MEMBERS:** Industry Members identified by the AGC, SCCA and UCON

**MEETING CALLED BY:** Steve Altman **TYPE OF MEETING:** Committee Meeting

**FACILITATORS:** Ken Bocchicchio, John Weldon **NOTE TAKER:** John Babcock

**ATTENDEES:** See attached list

**HANDOUTS PROVIDED:** Standard Specification Section 51-6, Mass Concrete
Summary of specification revisions for the addition of fibers and shrinkage reducing admixture
Revised specification sheet

**MINUTES POSTED AT:** http://www.dot.ca.gov/hq/esc/construction/br_contractor_outreach/

**Welcome and Self Introductions**
Ken Bocchicchio, John Weldon

**Opening Remarks and purpose for meeting**
Steve Altman Deputy Division Chief - Structure Construction

**Updates on Previous Topics**

- **Falsework Certification/Bridge Demolition Engineer of Record** discussion moved to Bridge Contractors Falsework Meeting. – (Babcock) Ongoing topic, will look at it intensely over the summer and come to a resolution. The goal is quality and safety of the falsework and during the demolition. If you want to be a part of the Caltrans Industry Falsework Advisory Team, you can contact John at john.babcock@dot.ca.gov.
- **Clear cure Specification pilot**. – (Bocchicchio) Use of clear cure on a project by Contract Change and with those results it is anticipated that a specification will be developed for the use of clear cure compounds.
- **Traffic windows for falsework, demolition, and girder erection** – (Wilder) Data is being collected along with the development of a portfolio of successful uses of "super windows." The Department recognizes the need for these super windows during construction to increase safety and reduce or minimize congestion. The goal is to identify projects early

during the Project Initiation Document (PID) stage, early identification allows the department to focus resources on development of the needed detours. Include the availability of super windows in the contract and initiate their use with the VECP process. JWeldon - 55 hours closure on Rte 91 Design Build contract came out of local input. During a public forum the consensus was to close the freeway for a short period of time rather than smaller closures over a longer period. The work completed during this closure included falsework erection, bridge demolition, traffic transitions, bridge deck rehabilitation, etc. There was heavy use of changeable message signs (CMS) in adjacent districts/counties. DKennedy, earlier attempts to implement on past projects were killed due to the time element needed for approval.

To date where the super windows have been used they have been successful. There may be a need to tell the public what was accomplished and how many closures it saved, the benefits.

The implementing agency for the Rte 91 project issued a news bulletin describing the work and included a link to a YouTube time lapse video of the various work that took place. https://www.youtube.com/embed/DISbP5SWr1s

- **ABC (Accelerated Bridge Construction)** – Used when there is a need for quick repairs, but as the infrastructure ages there is an increased need for this technique to minimize traffic disruptions. Pilot projects are in place that incorporate precast elements, girders, columns, footings, decks etc. Historically California highway bridges have been constructed using Cast in Place concrete and based upon successful research you may see the use of more precast structures. The Director sees the use of ABC as a significant cost savings. The use of ABC also shortens the planning period and possibly interference in streams etc.

**New Topics**

**Mass Concrete /Thermal Control**

The following files related to this topic are posted on the website:

| | |
|---|---|
| Specification | A MASS CONCRETE SPEC.pdf |
| Presentation | B MASS CONCRETE knapp.ppt |
| Presentation | C MASS CONCRETE Weldon.pptx |

**Theory/Specifications presentation by Craig Knapp**:

a. High heat of hydration causes Delayed Ettringite Formation (DEF)
   i. High sulfate concentration in the pore liquid
   ii. Sulfate has expansive reaction with calcium aluminate
b. Self-desiccation (self-drying) resulting in:
   i. Impeded hydration
   ii. Voids
   iii. Increased shrinkage
   iv. Lower ultimate strengths
c. Thermal cracking caused by excessive temperature differential increases permeability
d. Mass concrete is identified in:
   i. Standard Specifications for cast-in-place piles 8 ft diameter or greater
   ii. Special Provisions for elements with the smallest dimension exceeding 7 ft
e. Other risk factors include:
   i. High ambient temperature
   ii. Higher cement content
   iii. Lightweight concrete
   iv. Long haul times
   v. Etc.
f. Passive controls include:
   i. Use of Supplementary Cementitious Materials such as fly ash or GGBS/GGBFS (Ground Granulated Blast Furnace Slag)
   ii. Low coefficient of thermal expansion (CTE) Aggregate
   iii. Lowering initial concrete temperature
g. Active controls include:
   i. Cooling the surface
   ii. Insulating the surface
   iii. Cooling pipes

h. Thermal Control Plan:
    i. Calculations showing hottest point in the mass and maximum allowable temperature differential
    ii. Mix design
    iii. Curing method and duration
    iv. Peak and differential temperature controls
i. Temperature monitoring and recording
j. Summary:
    i. 160 F maximum is the Department's determination acceptable risk
    ii. Multitude of factors that impact concrete temperature during hydration
    iii. Many ways to mitigate

Questions:

a. What happens if the temperature exceeds the 160 maximum, say it is 165, what happens? There is no authorization to pay for concrete that does not meet the specification.
b. What can take place to leave it in place? Very few options that are acceptable due to the unknown nature of the damage caused by the excess heat. One potential remedy would be sealing and keeping the water out.
c. Is there a record of percentages or occurrences of this occurring? No record, but ASR and expansion due to delayed ettringite formation (DEF) look similar. The environment is not static as cement is being ground finer and elements are larger.
d. What about the temperature differential? CT does not specify a value for this parameter. Many factors play into what the differential can be.
e. Why are delivery temperatures dropping, job on central coast is down as low as 75°F. Does not know specifics of that project. But generally the lower temperature at delivery lowers the peak temperature.

**Industry Challenges presentation by John Weldon:**

a. Limited resources and costs for an Engineered Plan. There is one person at CTL Group that prepares these
b. Equipment is custom built, available from limited rental sources and cost
c. Requires computer program and monitoring equipment use, maintenance and costs
d. Effort required to implement includes:
    i. Installation of cooling tubes, transducers, home run
    ii. Chiller set-up and power supply
    iii. Daily monitoring, data gathering, and reporting (Sensitive equipment and reams of paper)
    iv. Pressure grouting of abandoned system
    v. Presence of Engineer and reporting
e. Costs include:
    i. Engineering, manpower and equipment – Direct
    ii. Field engineer to collect data, prepare reports – Indirect
    iii. $30 -$40 per CY or more plus Field Engineer support
f. Proposed solutions:
    i. Caltrans perform a benefit/cost analysis
    ii. Review collected data to evaluate effort
    iii. Added construction joints
    iv. Revise Mix / Additives
    v. Include a bid item (final pay) so that it is not missed especially with limited time to bid.
    vi. Reduce scope of monitoring

**Butch Parker** – Current specification is tough, going over the maximum temperature makes it a science project. Can the remedy be an administrative deduction? Can Caltrans better identify the risk/benefit? Another solution would be to include a schematic showing elements that will be mass concrete. Craig Knapp stated that the department lists a table with elements that will be mass concrete. Past projects have identified dimensions but not specific elements.

**Paul Navarro** – Specify the elements or quantity. Craig responded that tables are now being included.

There is a table in SSP 51-1.01A that identifies the portion(s) of the bridge that must be constructed of mass concrete.

**4. Use for structural elements other than piles having (1) a least dimension of more than 7 feet or (2) a concrete volume with dimensions large enough to require measures to cope with the heat of hydration. Consult with METS for clarification. Use for CIDH or CISS piling with diameters greater than 14 feet.**

The portions of the bridges shown in the following table must be constructed of mass concrete under section 51-6:

| Bridge name and number | Portion of bridge |
|---|---|
| | |
| | |
| | |
| | |
| | |

**5. Use if proprietary earth retaining systems are allowed as alternatives to the**

Questions:

a. Will mix modification be a solution, and would you know at bid time? Some tweaking of mixes will do it.
b. Can elements be designed to not be mass concrete?

Comments:

a. Identify those elements that will be mass concrete on the contract plans either on the Concrete Strength and Type Limits detail or something similar.
b. Design mitigation. Column steel needs to be evaluated.
c. Columns act as their equivalent square, e.g. 9' acts as 7.5' (8') square.
d. CT should be collecting the data and have a central repository of it.

After the meeting Brian Mapel reported that he called John Gajda over at CTL after the meeting last week and asked him his opinions on how to deal with temperatures that exceed the specified maximum.

He had some interesting ideas based on what he's seen across the country:

1. John sits on the ACI committee that writes the policies concerning mass concrete. He indicated that sometime within the next few years for concretes with at least 20% Class F fly ash or 25% class C fly ash content, the committee would be considering the ACI max temp at either 170 or 175. That is ACI, not Caltrans, but it seems that research is showing that the pozzolan replacement has a large effect and they now have test data to prove it.
2. Going over 160 happens but shouldn't be encouraged simply because the limit does exist and is there for a reason.
3. Going over 160 isn't the end of the world.
4. He started breaking it down into ranges:
    a. Up to maybe 10 degrees over, they can do some paper analysis with the chemical composition of the aggregate and justify that they overage is either O.K. or not.
    b. Between 10 and 25 degrees over, do the paper analysis, but maybe also take some physical samples and test for potential to DEF. He says he's done that in the past and it can be done in a relative short time frame.
    c. Over 25 degrees maybe you just set a definitive "will be removed". He wasn't sure 25 degrees was that point but somewhere around there would most likely be appropriate.
5. No matter what, if the thermal plan is violated, there needs to be a change made. You can't just keep doing it even though the numbers say it's O.K. As we said in the meeting, the limit is there for a reason, we need to enforce it.
6. We also talked about adding a fine for going over a second time.
    a. Up to 10 degrees over, maybe $2.00 a C.Y.
    b. Between 10 and 25, maybe $10.00 a C.Y.

    Basically, some financial dis-incentive that keeps contractors focused on not exceeding the limit.

Anyway, these were just some of the ideas that he came up with.
He did mention that there were few if any actual recorded instances of DEF in California. I've never actually seen it myself

but he seemed to indicate it was a very rare occurrence out here.

**2015 Standard Specifications** – Presentation by Chuck Suszko –

The following files related to this topic are posted on the website:

Presentation D 2015 Construction Standards Suszko.pptx

a. The 2015 version of the Standard Specifications may be the last printed version
b. All projects ready to list after June 30, 2016 must use the 2015 Standards, some exceptions.
c. Divisions I, II ad XI apply to all other sections.
d. An upcoming webinar with more detail is anticipated to be delivered in May.
e. 4-part format for technical sections 15 – 99
    - XX-X.01 General
        - XX-X.01A Summary
        - XX-X.01B Definitions
        - XX-X.01C Submittals
        - XX-X.01D Quality Assurance (replaces quality control and assurance)
    - XX-X.02 Materials
    - XX-X.03 Construction
    - XX-X.04 Payment
f. Some changes to the Divisions:
    i. Division III Earthwork and Landscape (formerly Grading)
    ii. Division IX Traffic Control Devices (formerly Traffic Control Facilities)
    iii. Division X Electrical Work (New Division)
    iv. Division XI Materials (moved from X to XI)
    v. Division XII Building Construction (moved from XI to XII)
g. Some changes to the Sections:
    i. Section 56 is now Overhead Sign Structures, Standards, and Poles
    ii. Section 59 is now Structural Steel Coatings
    iii. New Section 60 Existing Structures
    iv. New Section 87 Electrical Systems - emporary signals will be located at the end of the electrical section.
h. There is now a General Section for each Division
i. New terms for the 2015 Standard Specifications
    i. Revision Clauses (were called introductions), the *Replace*, *Add*, or *Delete* statements in the RSS and SSP's
    ii. Quality Assurance (was quality control and assurance)
    iii. Quality Characteristics (was sometimes material property)
j. New format for Quality Assurance
    - XX-X.01A(4) Quality Assurance
    - XX-X.01A(4)(a) General
    - XX-X.01A(4)(b) Quality Control
    - XX-X.01A(4)(c) Department Acceptance

**Concrete Deck Specifications - Polymer Fibers/Shrinkage limitations/curing** – Presentation by Sonny Fereira

The following files related to this topic are posted on the website:

Presentation E CONCRETE DECK SPEC fereira.pptx
Specification F CONCRETE DECK SPEC.pdf
Spec summary G CONCRETE DECK SPEC summary.pdf

Presentation:

a. Cost and impacts of deck cracking
b. Causes include drying shrinkage, plastic shrinkage, thermal gradients, and autogenous and chemical shrinkage
c. Caltrans spends about $50 Million annually to repair cracked bridge decks on structures that are less than 4 years of age
d. Formula for CRACK-Less Bridge Deck include adding the following to the concrete mix:
    i. Shrinkage reducing admixture
    ii. Water Reducing admixture

iii. Fibers

e. Drying shrinkage values established
f. Plastic shrinkage control includes fogging, preventing evaporation of water from the plastic concrete
g. Cost for CRACK-Less Bridge Decks is estimated at $0.89/SF or about $2,000,000 annually
h. High performance cure has been used on some structures and includes the application of curing compound, water cure for three days, and a reapplication of the curing compound

Questions:

a. High performance deck cure, even if it is covered for ten days, will you still have to spray it with cure? Depends on which version of the specification applies to your project. Problem was the cure affected the skid test performance.
b. But if it is out of cure, why does it have to be sprayed with cure? Craig Knapp responded that components in the curing compound aids in the resistance of the deck.

Comment:

a. The dosage of Shrinkage Reducing Admixture recommended by the supplier appears to affect the temperature. It seems that half of the dosage is satisfactory. In the test batches, check the temperature.

**Recap**

- Minutes will be posted and emailed to attendees.
- Next meeting in Southern California, September 16, 2016.
- Action items and questions that arose during the meeting.
- Clear cure – interest in status of pilot project.
- Mass concrete has questions related to its use and the deposition of the data that is being collected.

**Future Agenda Concepts**

- Electronic Bidding??? NO interest.
- Design Build??? There is interest in this topic.
- GPR scanning, identifies voids. Normally we drag chains and cue on the auditory response to identify areas needing repair. A better audience may be SM&I. Craig will take back to the Concrete and Bridge preservation committees. Penhall is proposing a demonstration out in District 8.
- **Plastic ducts**, how many bridges have used. No knowledge of the use of plastic, but we use plastic trumpets. Plastic ducts are being used on the DB projects.
- **Electronic drawings**. Is it possible to get them immediately after award?

**Adjourn**