

**Minutes**  
**Meeting of the FDOT Communications Team**  
**of the PCA Product Standards and Technology Committee Standards Subcommittee**  
**March 5, 2014**

A meeting of the PCA FDOT Communications Team was held with representatives of the Florida Department of Transportation Materials Office in Gainesville, FL.

**Call to Order**

Steve Wilcox convened the meeting at approximately 1:05 P.M. EST.

**Attendance**

Steve Wilcox - Argos

Nick Popoff - Suwannee

Mike Bergin - FDOT

Toby Dillow - FDOT

Dale DeFord - FDOT

Ghulam Mujtaba - FDOT

Jorge Tercero - Titan

Muhammad Khan - Titan

Chris Britt - Cemex

Gary Knight - Lehigh

Richard De Lorenzo - FDOT

**Summary Actions:**

- S. Wilcox will forward the Georgia excel data that was used in the PLC presentation.
- S. Wilcox will forward the Georgia Tech study that is studying the effect of various aggregates (including limestone) on PLC cements over the next 3 years.
- S. Wilcox will forward the MSU research project draft report that was referenced in the meeting.
- Gary Knight stated that he would look into FDOT participation in the surface resistivity portion of the MSU research project and get back to Mike (cc group)
- Mike Bergin will forward Table 1 in Sec 346 Guidelines to the group once revised
- Mike Bergin will forward the Concrete International article on TNO DIANA (co-authored by Mike Bergin) to the group.
- Request for FDOT Testing PLC cements:
  - G. Knight has volunteered an existing PLC cement from the Lehigh Leeds Plant
  - Jorge Tercero will investigate producing a cement for testing
- The group agreed that the chemical and physical tables in C595 IL for a MH cement won't change to meet 70 cal/g and requested that FDOT keep their existing 80/88 cal/g specifications for IL cements.
- Dale DeFord to send the market cements Heat of Hydration presentation C1702 at 7 Days and C186 at 7 Days to the group.

## AASHTO M240/ASTM C595 Type IL Cements

S. Wilcox presented the history of Portland Limestone Cements and the current status of performance and DOT acceptance in the US. The technical and environmental benefits were also presented. Gary Knight presented the data from the Georgia DOT Trials comparing several different baseline cements and their Portland limestone counterparts.

There were a number of questions related to the presentation and to the concept of introducing PLC in Florida.

Mike Bergin-

- Why is Virginia blank in the map?
- Is the draft for Mississippi for BOTH paving and structural concrete (see attached)?
- Can FDOT also participate in the surface resistivity portion of the MSU research project by getting a few cylinders from each mix to measure the resistivity?
  - \* Gary Knight stated that he would look into that and get back to Mike (cc group)
- FDOT would like the opportunity to look at a few cement parings for comparison to evaluate the performance in various durability tests that they conduct...predominantly diffusivity and surface resistivity (corrosion related), strength and calorimetry.

Toby Dillow

-Will the new proposal be to have C595 IL (MH) cement have to meet 70 cal/g?

- \* The group agreed that the chemical and physical tables won't change and requested that FDOT keep their existing 80/88 cal/g specifications for IL cements.

Ghulam Mujtaba

-Are there any concerns with IL cements and using Florida limestone aggregates in concrete performance

- \* The group wasn't aware of any and that limestone aggregates were used in other studies/comparisons elsewhere.
  - o S. Wilcox will forward the Georgia Tech study that is studying the effect of various aggregates (including limestone) on PLC cements over the next 3 years.

Group Discussion on Section 346 and the definition of "slightly aggressive", "moderately aggressive" and "severely aggressive".

-They are defined in Chapter 10-Sec 2 in the Structures Design Guidelines and are defined according to exposure to low pH, chlorides and sulfates. Another guiding principle is the distance to tidal waters.

-Essentially, all concrete in coastal regions are severely aggressive unless distanced by 12' to tidal water.

-Heat of Hydration is the predominant concern in defining cements permitted in these exposures...sulfate resistance isn't a concern...corrosion and resistance to thermal cracking are of greatest concern.

- \* -Mike Bergin stated that the FDOT would need to revise Table 1 in Sec 346. It doesn't appear to be consistent with their practices and with Sec 921. More than likely they need only 2 criteria, Non-Aggressive and Severely Aggressive. It will take some time to sort this out and he didn't know where the PLC Type IL would fit...possibly replacing Type I and Type II (MH).

- o Mike would be able to forward the revised Table 1 in Sec 346 Guidelines to the group

### Heat of Hydration Discussion-

Nick Popoff presented information from the ASTM C01.26 Task Group to study the concept of replacing C186 with C1702. The precision from C1702, either internal or external mixing is consistently better than C186. C1702, 3 day or 7 day are good options for replacing the 7 day, C186 requirements. The industry is leaning towards supporting a 3 day C1702 limit or report.

FDOT is using predictive modeling using TNO DIANA, a very expensive software, using mix design, element design and C1702 data to predict heat rise and they would welcome this change.

Some discussion on the recent Concrete International article co-authored by Mike Bergin ensued.

- [Mike Bergin would be able to forward Concrete International article on TNO DIANA \(co-authored by Mike Bergin\) to the group.](#)

Some discussion followed where the concept of making mandatory reporting of Heat of Hydration for cements (either M85 or M240)

- Questions of reporting frequency were raised...because in M85 information is currently only provided semi-annually, and in M240, information is required monthly.
- FDOT doesn't even use the C186 7 day value of 70 cal/g (Table limits in AASHTO and ASTM). None of the market cements can meet this requirement.
- FDOT doesn't use the 28 day heat of hydration value in AASHTO or ASTM
- FDOT uses an 80 cal/g for mass concrete and 88 cal/g for Type II (MH) criteria

Dale DeFord presented some data from market cements showing the comparison between C1702 at 7 Days and C186 at 7 Days. The  $R^2$  numbers at 0.88 were quite a bit lower than the industry TG generated data which showed  $R^2$  numbers of 0.98 and 0.99 for C1702 at 3 Days and 7 Days, respectively.

- The FDOT work showed comparable numbers at 7 days and the question was raised on whether a 3 day result is appropriate for cementitious material combinations using SCMs.
- The FDOT work also showed that the Heat Index didn't provide them with much valuable information and Mean particle size correlates well with Blaine.

### Old/New Business

- The TG members will consult with manufacturers to see which sources of cement would be available to provide to the FDOT for testing. Paired samples of baseline and proposed limestone content cements would be required in quantities of one 50 gallon drum each, for each source submitted.
  - [G. Knight has volunteered an existing PLC cement from the Lehigh Leeds Plant](#)
  - [Jorge Tercero - Titan America will investigate into producing a cement for testing](#)
- S Wilcox thanked the FDOT for meeting with the PCA task group and will change the PCA map for Florida to planning to accept IL cement as a replacement for T-I once the heat of hydration questions are better understood and FDOT testing of PLC is complete.

### Date of Next Meeting or Conference Call

Not yet planned

### Lab Tour and Adjournment

The group took a tour of the FDOT materials laboratories and the meeting adjourned at 4:45 P.M. EST.

Minutes: Nick Popoff and Steve Wilcox

Attachments: FDOT PCA, PLC and Heat of Hydration PPT, Georgia Study data, FDOT Heat PPT, MSU PLC Draft Report