

## Minutes

ACI Sub-Committee 440F  
FRP Strengthening/Repair

**ACI Fall Convention –Pittsburgh, Pennsylvania**  
**October 25, 2010**  
**12:00 PM to 2:30 PM**  
**Allegheny 3 – Westin Hotel**

### **440-F Members (33):**

Lee, Michael (Chair)	Busel, John	Orton, Sarah
Shield, Carol (Vice-Chair)	Ekenel, Mahmut	Porter, Max
Gold, Will (Vice-Chair)	Galati, Nestore	Rasheed, Hayder
Witt, Sarah (Co-Chair)	Green, Mark	Rodriguez-Nikl, Tonatiuh
Alkhrdaji, Tarek	Gremel, Doug	Seracino, Rudi
Arockiasamy, M.	Harries, Kent	Silva, Pedro
Bakis, Charles	Horeczko, Nick	Soudki, Khaled
Barnes, Joavim	Kanitkar, Ravi	Toutanji, Houssam
Bouadi, Hakim	Lopez, Maria	Tumialan, Gustavo
Brown, Gordon	McClaskey, Charlie	Vatovec, Milan
Brown, Vicki	Myers, John	White, Dave

### **440-Main Members\* and Visitors (19):**

Berges, Mario	El-Domiaty, Khaled	Kirby, Joe
Bischoff, Peter	El-Fattah, Ahmed Ebd	Kohlman, Randy
Bond, Greg	El-Salakawy, Ehab	Lequesne, Remy
Bryant, Michelle	Gibson, Robert	Stratman, Brian
Byrum, Amy	Henricks, Ed	Wan, Baolin
Carloni, Christian	Jaipurjar, Anurag	
Deschamps, Dominique	Kasan, Jarret	

### **Administrative**

1. Chair Michael Lee called the meeting to order at 12:05. Attendees made self-introductions.
2. Agenda: John Busel moved to approve the agenda. John Myers seconded the motion. The motion passed by voice vote.
3. Minutes: John Busel moved to approve the Minutes from the Spring 2010 Meeting in Chicago. Milan Vatovec seconded the motion. The motion passed by voice vote.
4. Meeting Announcements:

Carol Shield announced that FRPRCS 10 is being held at the next convention in Tampa. 145 papers were submitted. They have 72 papers in hand. There are 12 sessions, starting Saturday. There is a separate registration fee for FRPRCS-10 that includes dinner, proceedings and some other items. Information will be more formally presented at the main committee meeting. 440 meeting times are worked around the paper sessions and will go late on Tuesday. Not sub-committees will meet due to scheduling considerations.

Mark Green announced ACMBS Conference – Kingston in 2012. Abstracts due May 15, 2011.

Maria Lopez that ACI 440 and 446 will co sponsor a session at the ACI Spring 2012 Convention titled “A fracture approach for FRP-concrete structures.” December 1, 2010 is the deadline for abstract submission.

4<sup>th</sup> International Conference on Durability and Sustainability of FRP Composites for Construction and Rehabilitation, July 20-22, 2011, Quebec City, Canada. Papers are due February 1, 2011. Authors have been notified.

Michael Lee announced that Sarah Witt is now co-chair of the 440F sub committee and thanked Mark Green for his many years of service.

## **Old Business**

### **5. Task Group Reports**

- a) Glass Transition Temperature: Sarah Witt announced that the task group met on Sunday and had a presentation given by Anurag Jaipuria of Penn State University. He presented data that has been collected regarding Tg. The Tg TG has decided to use DMA as the method to determine Tg. More testing is planned to answer more questions about the test method.
- b) ACI 562 Repair Code: Tarek Alkhrdaji announced that 8 chapters are completed. The entire document will be going to TAC for review. Plan is still to publish repair code by 2012. The FRP strengthening sections mention ACI 440.2, 440.4 and 440.7.
- c) Blast Upgrade Guidelines: Khaled El-Domiaty and Carol Shield presented together. There was a vote to decide that 370 will be home to the document. ACI has a process where two committees can share a document. However, the document must be assigned a home committee and a supporting committee. Erik decided that 370 is the better home since the document covers more than FRP. The final document has to be approved by both committees. At this point there is an updated draft from the task group in 440F. The design methodology is finalized. It will focus on concrete and masonry flexural upgrades. Document will be submitted to both committees for comments by the end of the year. Updated draft will be submitted by the Tampa meeting. Alkhrdaji asked how the final vote will be handled. Carol’s understanding is that 370 will have to resolve negatives that are brought up in 440 but there will be only one vote in 440. This

is a newer process for ACI so the process is still being defined. The updated draft will be posted on the 440 website. Lee suggested that December 31, 2010 as the latest date for collecting comments. The document was reviewed on the screen. Max Porter asked a question about the listing of committee members on the document. The final document will only have 370 members listed.

- d) Confined Column Modulus/Stability: Mark Green announced that this is a carry-over item from a 440.2R vote from a few years ago. There was a suggestion by Prof. Tepfers for some design review to make sure that what is in the document is appropriate. It is important to keep it as a task group as this has to be done. Green suggests that we have a volunteer to do this. In the past Nanni suggested Galati as a good person. Chair Michael Lee will follow up. Green has a copy of comments from Prof. Tepfers for whoever follows up on this.
- e) Mechanical Fastened FRP – No one was available to give an update. A paper has been submitted to FRPRCS 10. The idea was this would be a small section in 440.2R depending on the progress made into this area.
- f) Deflection: Hayder Rashid announced that the task group is compiling a database. If this is done before the next meeting, the chair will disseminate the information.

## **New Business**

### 6. Seismic Vote

#### Seismic Vote (Silva)

The ballot passed – there are 45 voting members, 19 voted affirmative, 9 affirmative with comment, 5 negative, 5 abstain, and 7 not returned. Passes both  $\frac{1}{2}$  rule and  $\frac{2}{3}$  rule. Lee suggested that we take time to come to a consensus on the negatives. The editorial comments were not reviewed during the meeting due to time constraints.

Pedro Silva gave a general overview of the vote and discussed the more significant technical items raised in the ballots.

Toni Nanni has made a motion to remove the minimum gap on columns, Kent Harries second. One negative from Tarek Alkrhdaji. Motion carries by voice vote

Harries Negative: Ballot 1 Page 7 – design shear equation with k factor to reduce concrete & steel contribution. This reduction is in line with ASCE 41. The k factor is based on the ductility of the section. This was on the ballot with ACI 360 who thinks that  $V_c$  should be 0. Kent suggested that this is new business for shear friction and the current equation is conservative.

Motion from Nanni – find Harries negative non persuasive and make it new business. Second Milan Vatovec. Motion carries by voice vote.

Harries Negative: Anchorage – add a note that says that there are anchorage possibilities that achieve the load path. The wording needs work and there might be some drawings

that are very generic in nature. Put in 3 – 4 conceptual sketches with wording that these are just some examples. Examples from Sarah Orton, Tarek Alkrhdaji, Gustavo Tumialan and Michael Lee.

Item 1 Page 11 – Gold Negative – needs further work on anchorage for shear walls. Are there limits on when this needs to be done (wall size, etc.)

Overall negative from Prota: The document is misinterpreting its role for FRP strengthening in seismic applications. However, the document does not specify demand. Lee suggested that we specifically state that this document does not address the demand and does not meet code. Ravi Kanitkar said that sometimes it does meet code so there should be no statement that it doesn't. Silva to call Prota to discuss this topic.

Negative on Appendix E – it is book knowledge and does not need to be in the document. Max Porter motion to find this non persuasive. Rashim seconds. Two negatives (John Busel and Nick Horeczko). Motion passes.

Horeczko has a general comment: This document needs to be looked at by others such as ACI 318H, California Seismic Engineers, SEAoC Seismology Group and NCSEA. Silva said that this has already been looked at by a task group from ACI 318H. Silva said he would contact ACI 369 (seismic retrofit of buildings). Lee asked Shield if there is a need for this type of review. She said that TAC would do the same thing in getting outside review. Lee will contact Horeczko to get some contact information.

Lee thanked Chris Pantelides, Tarek Alkhhdaji, Ravi Kantikar, and Carlos Espina for all the work.

Moving Forward with 440.2 – Chair Michael Lee announced that the document will not be re-issued until seismic chapter has been approved. Silva, Lee and Witt will work together to resolve rest of negatives from the seismic vote. Errata was issued in July 2010 for the existing document.

## **Adjournment**

7. A motion to adjourn was made by Milan Vatovec and seconded by Carol Shield. Motion Passes.

**End of Minutes**