

- I. Welcome and call to order: Chris Zweifel, Committee Chairman
  - A. Passed around the roll / sign in sheet
  - B. Introduced visitors, and new faces, including Dr. Takashi Hara, and recognized his input into the current document revision. (Dr. has been on the committee for many years but living in Japan has not been able to attend the meetings for many years). We acknowledged the great distance that he traveled to be with us.
- II. Discussion of comments on the latest balloted "Guide For Concrete Shell Structures".
  - A. Discussed Rick Crandall comments
    1. Regarding 2.2.4.3.2: Is "1/15 of the span" correct?
      - a) After discussing and agreeing that it is correct, Ryan Poole made a motion finding Mr. Crandall's argument non-persuasive. Larry Byrne seconded. Vote was unanimous in the affirmative.
    2. Regarding 2.5: "Why not use the term "snap through buckling" instead of "inelastic failure". Chris explained that "inelastic failure" applies to all shells, for which this guide is written, while "snap through buckling" is more specific for domes.
      - a) Charles H. made a motion to find Mr. Crandall's argument non-persuasive. Ryan Poole seconded. Vote was unanimous in the affirmative.
    3. Regarding 3.1.1: Why not spell out the acronym "LRFD".
      - a) This was discussed to be "editorial", and it was agreed to spell it out the first time it appears in the document.
    4. Regarding 3.1.3: Is 3000 psi minimum 28-day concrete strength correct?
      - a) After discussion, Mike Hunter made a motion to change the minimum to 4,000 psi. Ryan Poole seconded, and the vote was unanimous in the affirmative.
    5. Regarding 2.2.4.12: Correct spelling of "through" (not "~~though~~")
      - a) Agreed to make this editorial change
  - B. Discussed Charles Hanskat's comments
    1. Regarding 3.1.2: Redundant and unclear

- a) After discussion, Charles made a motion to clarify the reference as ACI 318 revision 1999. Ryan seconded; vote was unanimous in the affirmative.
- C. Discussion of Ted Smulski's comments
1. Regarding 3.3.10.1: Ambiguous
    - a) After discussion, Charles made a motion to strike the words, "not required for stresses.", Ryan seconded; vote was unanimous in the affirmative.
  2. Regarding the final reference, at the end of the Guide: Ted said he looked up the referenced document, and pointed out the correct spelling in the title is "Parabaloidical" instead of "Paraboloical".
    - a) It was agreed to make this editorial change.
- D. Discussed Dr.. Arnold Wilson's comments
1. Regarding 2.2.4.1.2:
    - a) After discussing, Ryan Poole made the motion to find Dr.. Wilson's argument nonpersuasive, Larry Byrne seconded; the vote was unanimous in the affirmative.
    - b) After further discussion it was agreed as an editorial change to delete the word, "very".
  2. Regarding 3.1.2: Dr.. Wilson suggested additional sentence to require factoring of the loads when using the LRFD approach.
    - a) After discussion it was found that Dr.. Wilson's rationale is persuasive, however the committee chose to address differently than Dr. Wilson's suggested new sentence. Instead of having a factor to reduce the stress, we would reference the ASD procedure in ACI 318-99.
    - b) Chris Zweifel made the motion to delete the first sentence entirely, and the "However" in the next sentence; rewording as follows, "Because of their slender cross section, shells can be very susceptible to creep deformation and buckling, especially when stresses are elevated. It is therefore advisable to keep stress levels

in concrete and reinforcement at or below ASD levels as required in ACI 318 R99." Mike Hunter seconded; vote was unanimous in the affirmative.

3. Dr. Wilson suggested to add a paragraph 3.3.16: "Careful attention must be paid to crack control when leakage or corrosion control are important design requirements. Much lower steel stresses will generally be required"
  - a) After discussion the committee found Dr. Wilson's argument persuasive, however Charles Hanskat suggested alternate wording, "When prevention of leakage and/or corrosion resistance are important design considerations for a shell, lower reinforcing steel stresses are recommended."
  - b) Ryan Poole made a motion to use Charles' wording, Larry Byrne seconded; vote was unanimous to accept.

E. Since all of the comments were resolved it was decided that Chris would review the document for conformance with ACI Style Manual and submit to TAC.

III. Chris Zweifel announced that committee 318 will include a Chapter for Shells in 318.14. It will be Chapter 26 (replacing chapter 19 in current 318 document).

IV. Discussion of upcoming Session for Tampa meeting:

- A. Chris Zweifel suggested reducing the number of presentations from being 6 down to probably 4. The Committee agreed with this suggestion
- B. Charles Hanskat is qualified to be a moderator (having previously taught the moderation training), Charles was nominated and approved to be the moderator for the Shell's Session.
- C. Ted Smulski agreed to prepare and present on the history of shells.
  1. Committee members are encouraged to provide him information and resources.
- D. Other presentations discussed included:
  1. Design of shells – Chris Zweifel volunteered to present on this topic "green" design

2. Architectural applications of shells – Dr Hara volunteered to present on this topic
  3. Industrial applications of shells: Mike Hunter volunteered to present on this topic.
  4. It was decided that Charles Hanskat would wrap up the session with a short presentation on the sustainability of shell structures.
- E. It was agreed to compare and coordinate presentation outlines in order to avoid being redundant, and/or "stepping on each other's toes".
- V. Mike Hunter made a motion to adjourn, Larry Byrne seconded. Meeting was adjourned.