PROJECT KICK-OFF TELE-CONFERENCE MINUTES

Meeting Date: March 4, 2008
In Attendance: Walt Korkosz, Ken Baur, David Dieter, Gino Kurama, Brian Smith, Bob Tener

1. Introductions

2. Overview of Research & Project Goals

- Overall project objective is validation of the hybrid precast concrete wall system as special RC shear walls based on ACI ITG T5.1. (Kurama)
- Project has four specific objectives: (Kurama)
  - Develop validated seismic design procedure;
  - Develop validated analytical model(s);
  - Develop experimental results demonstrating seismic performance;
  - Develop practical guidelines and accepted design procedure document.
- PT stands are preferred over PT bars – bars would need devices to splice them. (Baur)
- Anchorages of PT strands inside the foundation need to be discussed further. (Baur & Kurama)
- Is there any consideration given to diaphragm interaction? (Dieter)
  - Diaphragm typically dowelled into walls and we won’t be able to gain information on inter-story drift due to differential movement between walls and diaphragm. (Dieter)
  - We would use welded connections if possible, which are typical in practice. (Baur)
  - Diaphragms are outside the scope of the current project. However, because of similar gap-opening mechanism along horizontal wall panel joints, diaphragm-to-wall interaction would be similar to that in the wall specimens tested as part of the DSDM project at UCSD. (Kurama)
- Wall panel sizes are controlled by self weight. We can use panels up to 16-ft high (more typically 12-ft) and up to 20-ft long (these numbers reinforce conclusions from previous meeting with Korkosz on January 29, 2008). Panel joints at mid-story heights are not common. It is much easier to ship when panels are flat rather than at a 45-degree angle. (Baur & Dieter)
While not typical, the use of external steel angle/plate armors at the wall toes may be a cost-effective way to help prevent concrete crushing. (Baur & Dieter)

- The use of fiber-reinforced grout is not common in the precast concrete industry. Dry-pack grout would be more typical for the horizontal joints in a wall since the placement of dry-pack during construction would not require a "dam." It may be ideal to use dry-pack fiber-reinforced grout. (Baur, Dieter, & Korkosz).

- It may be better to add the fibers into the dry-pack mix before adding water. (Kurama)

- In addition to the energy dissipating mild steel bars, the wall panel reinforcement would include wire mesh reinforcement at the panel faces and horizontal reinforcing bars at the base of the panel to control vertical crack at the gap tip. (Kurama)

- Scaling of the reinforcing bars is important. (Dieter)
  - The area of the steel reinforcement would be scaled, and not necessarily the diameter of the bar. Therefore, the number of bars would be reduced more so than the diameter of the bar. (Kurama)

- The wall thickness will not be scaled at the same ratio as the overall test setup. The full-scale prototype wall thickness will be 12-inches. The thickness of the walls in the scaled tests will be 6-inches, which corresponds to a 0.5-scale instead of the 0.4-scale used elsewhere in the structure. The 6-inch wall thickness is needed for the detailing and production of the wall panels. (Kurama)

3. Industry Collaborators

- Roles of the industry collaborators were discussed. (Kurama)
- Cost-comparison of the hybrid system with conventional construction will be a key item for the feasibility of the project results being applied in actual practice. (Kurama)
- It would be better to minimize the use of bonded energy dissipating mild steel bars (and thus, the number of splice sleeve devices) and maximize the use of unbonded PT-strands to achieve the design base moment strength of the wall. (Baur)
- High Concrete would like to have Brian Smith present during specimen casting. This would help to ensure that the samples are cast to experimental testing standards/expectations. (Baur)
4. Project Deliverables and Schedule

- Schedule of the progress reports was discussed. (Kurama)
  - The design of the test specimens should be concluded by the end of the spring and the production of the shop drawings and the specimens should start during the summer. (Kurama)
  - We would like to have only the first two specimens produced first, followed by experimental testing. The final four specimens can be produced upon satisfactory performance of the first two specimens. (Baur & Kurama)

5. Codification and Utilization Procedure

- Due to codification cycles, when would this project be implemented within the codes? The project findings are more likely to become part of ACI 318-14 rather than ACI 318-11. (Dieter)
- The project results can be used in practice once the test program is completed successfully. (Baur)

6. Dissemination and Diffusion

- The dissemination and diffusion plans for the project were discussed. (Kurama)

7. Discussion of Resolutions from Previous Meetings

- To achieve the required energy dissipation ratio specified by ACI ITG T5.1, up to 50% of the total wall base moment strength may need to be provided by mild-steel reinforcement. Therefore, a significant amount of mild steel reinforcement will need to cross from the foundation into the base panel. We cannot terminate all of this mild steel within the base panel since this would make the joint above the base panel more critical than the joint below the base panel. Continuing some of the mild steel reinforcement into the second panel would reduce the gap opening at the first-to-second panel joint. The project will investigate if less than 50% mild steel ratio can satisfy the ACI ITG T5.1 energy dissipation requirement. This would reduce the amount of mild steel needed and may eliminate some or all of the reinforcement continuing into the second panel. (Kurama)
- It may be difficult to get contractors set the splice sleeves for the mild steel bars properly. (Dieter)
- It may be more preferable to “dowel-up” than “dowel-down” in California. (Dieter)
- It is easier to “dowel-down” in the Midwest because contractors can come back to grout when the weather is nicer. This would also keep the debonded regions of the mild steel bars outside the splices, which would be better. Thus, sticking with the current “dowel-down” details is recommended. (Baur)

- Rationale behind the experimental test matrix and the rebar placement in the test specimens was reviewed. (Kurama)
- The wall design moments and the determination of the mild steel and PT steel areas were discussed with respect to the seismic region. (Kurama)
- Rationale behind the gravity loading for the full-scale prototype designs was based on the following criteria (dictated by typical design practice scenarios as determined by Baur and Korkosz):
  - 90-psf dead loads (no live load included). Live load is not considered as part of gravity loads (more conservative for seismic design).
  - 60-ft tributary width acting on girder.
  - 30-ft to 45-ft length of girder.
  - Girders frame into wall from one side only, with one girder framing at each level. Reaction from girder onto wall at each level is 80 to 120-k.
- Wall shear design needs to be checked. (Korkosz)
- Possibly test one specimen with no superimposed gravity load. (Korkosz)
- It appears to be suitable to apply the superimposed gravity load using additional PT-strands inside the wall test specimen. (Korkosz & Kurama)
- The next steps for the project were discussed: (Kurama)
  - Decide which load/reinforcement case to use, as determined by Korkosz.
  - Determine the longitudinal mild steel reinforcement inside the second story panel using capacity design procedures.
    - Design the base joint.
    - Calculate the wall moment capacity at the base joint (using $f_{py}$ instead of $f_{pi}$ and $f_{su}$ instead of $f_{sy}$).
    - Calculate the bending moment at the second floor joint using a linear moment diagram for the test specimens (since a single lateral force will be applied near the top).
• Use linear-elastic section analysis to determine the extreme tension and compression stresses at the first-to-second panel joint.
  - Design the walls for shear.
  - Continue with the analytical modeling of the walls.