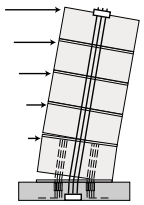
HYBRID PRECAST WALL SYSTEMS
FOR SEISMIC REGIONS



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September 24, 2009

Industry Meeting Resolutions

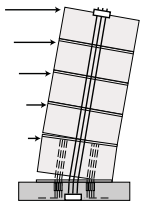
Meeting Date: September 12 and 14, 2009
Meeting Venue: PCI Convention, San Antonio, TX
In Attendance: N. Hawkins, W. Korkosz, K. Baur, S.K. Ghosh, Y. Kurama, B. Smith

The following resolutions were made based on the meeting:

Specimen Detailing and Construction

- The industry advisory panel agreed that small changes to the confinement steel detailing at the wall base combined with an increased unconfined concrete strength will improve the performance of the system to satisfy the required validation drift. On full-scale wall panels, the first confinement hoop is typically placed about 2-inches above the bottom of the wall. For the test specimens, this dimension will be scaled. Therefore, the first hoop will be placed about 3/4-inches above the bottom of the wall. No steel armor or additional reinforcement at the toes of the wall will be used. By constructing the wall panels with no additional armor or reinforcement, the design will be more economical and the shear friction coefficient at the panel-to-foundation joint will not be reduced.
- The hoop reinforcing cages for the confined concrete inside the base panel will be fabricated at the University of Notre Dame to ensure appropriate placement and spacing of the confinement hoops.
- Distributed Grade 60 reinforcing bars in the horizontal and vertical directions will be used instead of welded-wire fabric at each face of the wall panels. In the base panel, these reinforcing bars will be tied to and terminated inside the confinement hoop cages.
- If steel armor is used at the toes of future test specimens, the same detail will be used at both ends of the base panel. This will help ensure symmetrical behavior of the system.
- Prior to casting the next specimens, trial concrete batches will be mixed to ensure that sufficient compressive strength can be achieved. Cylinders will be broken at 1, 7, 28 and 56-days to ensure that the compressive strength will achieve at least 6,000-psi but no more than 8,500-psi on test day.

This project is funded by the Charles Pankow Foundation and the Precast/Prestressed Concrete Institute. Any opinions, findings, conclusions, and/or recommendations expressed in this material are those of the researchers and do not necessarily represent the views of the sponsors.



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Future Test Specimens

- Specimen 1 tested the approximate upper-bound for the amount of ED steel and lower-bound for the amount of PT steel that can be used in a hybrid wall system while satisfying the validation requirements. Since the advisory panel agreed that, in general, the industry would like to decrease the amount of PT steel used in the wall, the originally-planned variations of the moment ratio (which is the contribution of the mild steel to the overall base moment strength of the wall) will be eliminated from the test matrix. The moment ratio used for Specimen 1 will also be used in the future hybrid wall specimens.
- The advisory panel agreed that the study should focus on wall systems with multiple wall panels. Therefore, the tests involving shorter length walls (consisting of a single wall panel) will be eliminated from the test matrix.
- Instead of studying "intermediate" confinement detailing, the advisory panel agreed that it would be more beneficial to study "ordinary" detailing. Since the amount of confinement steel would be substantially reduced in an ordinary wall panel, the lateral displacement capacity will also be reduced. Therefore, the target drift requirements will be reduced by using drift requirements proportional to those in ACI ITG 4.3 instead of the drift requirements in ACI ITG 5.1.
- The advisory panel agreed that it would be beneficial to study two emulative walls: one where both the flexural and longitudinal web reinforcement is continuous across the base joint and one where only the flexural reinforcement at the wall ends is continuous.
- The second phase of testing will consist of two specimens. Specimen 2 will be a repeat of the first specimen, with the incorporation of the modifications to the specimen construction, reinforcement detailing and concrete strength as described on page 1. Specimen 3 will be an emulative wall. This test plan ensures that if future changes are required to the hybrid wall design, detailing, or construction, there will be up to three more specimens available to execute these changes.
- Ordinary confinement detailing, wall panels with openings, and the second emulative wall will be incorporated in the third phase of testing (which consists of Specimens 4, 5 and 6).

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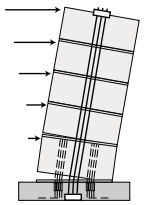

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Shear Slip Design and Requirements

- Based on the measured behavior of Specimen 1, there is a reasonable possibility that future test specimens could exceed the 0.06-inch shear slip limit given by ACI ITG 5.1. The advisory panel agreed that the tests should measure the actual slip that occurs across the horizontal joints rather than try to restrain the slip to ensure that the 0.06-inch requirement is satisfied. From these tests a realistic horizontal shear-slip value can then be obtained, with the possibility of modifying the shear-slip requirement within future editions of ACI ITG 5.1. Further, the advisory panel agreed that the lower-than-designed unconfined concrete strength and the premature degradation of the confined concrete at the wall toes may have resulted in increased shear-slip at the panel-to-foundation joint of Specimen 1.

Data Acquisition

- Data acquisition will occur on both faces of the wall. The back face of the wall will be used for conventional instrumentation. The digital imaging correlation will be moved to the front face of the base panel. This will prevent data loss in the digital imaging measurements due to obstructions from the placement of the conventional instrumentation. Since a portion of the front face of the base panel (about one quarter of the panel at the base) will be used for digital imaging, cracks will be manually marked only on the remaining part of the panel.

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