BSSC PUC IT9 - Diaphragm Issues
Meeting 5
February 14, 2017 - 9:30 AM to 11:00 AM PST

Agenda & Notes

NEHRP PUC IT9 web meeting
Tue, Feb 14, 2017 9:30 AM - 11:00 AM PST

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0.1 Attendance: Bonneville, Manley, Gill, McCormick, Eatherton, Lawson, Yuan, Cobeen, LaPlante, Line, Bodwell, Tremblay, Ghosh, Schafer, Schiff, Shuck, Sabol, Holmes.

1. RWFD Steel Research Update

   Ben Schafer provided an update on the steel deck diaphragm connection testing that has been conducted, resulting in hysteresis plots for the varied type of connection types included in the study. Different types of connections and east and west coast practices were discussed. Focus for the next six months will change from testing to analytical studies, built on the connection test data.

2. ATC-135 Status Report

   John Lawson reported on the activities of the ATC-135 project (set up to allow a focused group to drill down deeper into the steel deck diaphragm testing and analysis for the RWFD methodology). The ATC-135 Project Technical Committee (PTC) received an in-depth update on the steel RWFD research on January 18, 2017. Following this meeting the PTC has developed a memo communicating questions and concerns to the steel research team. John reported that they had looked in particular at 1) Test data relied on and how it should be considered, including reliance on monotonic versus cyclic data, 2) How to address proprietary connectors (screws, power actuated pins, etc.) and 3) How to capture deck behavior at diaphragm boundaries. John reported that coming up next in the research are significant analytical studies using incremental dynamic analyses (IDAs).

3. RWFD - Check in on topic groups

   a. Topic 2 Orthogonal Directions - SDII Group

   b. Topic 4 Plan Configurations - Lawson, Cobeen

      Kelly Cobeen presented a powerpoint showing a building with two diaphragm spans, one that (based on ratio of period of diaphragm to period of supporting walls) qualifies for use of the FEMA P-1026 method, and one that does not. This was identified as an often occurring building plan configuration, for which provisions based on P-1026 will need to give design direction. Cobeen communicated a discussion with Lawson that suggested that this be designed using the P-1026 methodology, with the longer span diaphragm eligible for reduced nailing in the diaphragm center, and the smaller diaphragm not eligible
and using heavier nailing through-out. The fundamental question raised is - will we be able to identify design rules that adequately address non-rectangular geometries, or is additional research required in order to address these geometries?

Lawson noted that while conducting analytical studies for P-1026, they did look at using the higher diaphragm design forces through the full diaphragm, without reduced nailing in the center, and got what he believed to be adequate performance.

McCormick asked about the implications for wall anchorage forces if the strength and stiffness of diaphragms was increased above current code levels.

Eatherton raised concerns about re-entrant corners and the behavior that could result with two adjacent diaphragms responding to different frequencies. Suggested that analytical study of these configurations would be appropriate.

Schafer indicated that he thought it would be important to see the type of detailing that would occur at the intersection of the two diaphragms to understand behavior and how two diaphragms with different frequencies might interact.

Tremblay noted buildings studies analytically with steel frames at the interface, and indicated that the combined building including the two diaphragm spans had its own unique frequency of response.

It was agreed that the committee needs to make a fundamental decision that they will either proceed to identify non-rectangular building configurations that they believe can be included in the methodology, or identify research needed. Cobeen will complete design of the two-span diaphragm system and circulate.

c. Topic 7 Rigid But Light Vertical Systems - Lawson, Koliou
d. Topic 9 Interaction of Inelasticity in Vertical System and Diaphragm - Schafer
e. Topic 10 Period Data From Tremblay’s Work - Eatherton
f. Topic 11 Diaphragm Deflections - Cobeen
g. Topic 12 Commentary on Diaphragm Zoning - Schafer
h. Topics 13 & 14 Transition to ASCE 7 - Holmes, LaPlante, Manley, Line
i. Topic 15 Nail Penetration Effects - Lawson, Koliou, Cobeen

4. Next web meeting

j. Second week of March

i. Meeting set for March 14, 2017 9:30-11:00 PST

ii. Agenda to include determination of IT9 big-picture direction on Topic 4 - will IT9 1) identify areas outside of perfectly rectangular plans where the RWFD methodology can be used 2) identify research required in order to understand application to non-rectangular plans, or 3) both?

iii. Agenda to include report from Lawson and Koliou on Topic 7.

5. Next in-person meeting
k. May 4, 2017 San Francisco
   i. Will be at Embassy Suites Burlingame
   ii. OK to make travel arrangements
   iii. Cobeen will circulate room information to those that indicated they need rooms
   iv. Meeting will be 9:00 to 5:00 to accommodate those traveling the day of the meeting. Please plan to be there for the full day, including a working lunch.