ACI COMMITTEE 336
FOOTING, MATS AND DRILLED PIERS
Fall 2008 CONVENTION – St. Louis, MO
Sunday, November 2, 2008
1:00 – 5:00 P.M.
Renaissance Grand – R-Shaw

1. Introductions
   1.1. Sign-in sheet
   1.2. Request that guests sign in

2. Administrative Items
   2.1. Additions or changes to agenda?

3. Approval of Minutes
   3.1. Fall 2006, Denver, CO
       3.1.1. Ballot did not meet ½ rule (see below)
       3.1.2. Vote
   3.2. Spring 2007, Atlanta, GA
       3.2.1. Resolve negative: “B. Oliver named chair”
       3.2.2. Ballot did not meet ½ rule
       3.2.3. Vote
   3.3. Fall 2007, Fajardo, PR
       3.3.1. Ballot did not meet ½ rule
       3.3.2. Vote
   3.4. Spring 2008, Los Angeles, CA
       3.4.1. Minutes posted to website 04/08/2008
       3.4.2. Review minutes onscreen
       3.4.3. Vote
   3.5. Voting summary


**Ballot Items:**

<table>
<thead>
<tr>
<th>Item #</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Denver 2006</td>
</tr>
<tr>
<td></td>
<td>The previous ballot received a negative vote. The attached version has been revised accordingly.</td>
</tr>
<tr>
<td></td>
<td>Attached File: ACI 336 Minutes - Denver 2006 r1_ballot</td>
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<tr>
<td>2</td>
<td>Atlanta 2007</td>
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<tr>
<td></td>
<td>Attached File: ACI 336 Minutes - Atlanta 2007_ballot</td>
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<tr>
<td>3</td>
<td>Puerto Rico 2007</td>
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<td>Attached File: ACI 336 Minutes - Puerto Rico 2007_ballot</td>
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</tbody>
</table>
**Preliminary Voting Summary:**

There are 22 committee members eligible to vote.

Passage of an item requires resolution of any negative votes. Passage of an item also requires that the number of affirmative votes be at least that given by the 1/2 and 2/3 rules. Please refer to the ACI Technical Committee Manual for additional information on balloting procedures.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Affirmative</th>
<th>Affirmative with Comments</th>
<th>Negative</th>
<th>Abstain</th>
<th>Not Returned</th>
<th>The 1/2 Rule</th>
<th>The 2/3 Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
<td>4</td>
<td>12</td>
<td>Item Does Not Meet</td>
<td>Item Meets</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td>Item Does Not Meet</td>
<td>Item Meets</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td></td>
<td></td>
<td>3</td>
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<td>Item Does Not Meet</td>
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</tr>
</tbody>
</table>

4. **Membership Roster Update**
   4.1. Current roster
      4.1.1. Updates/corrections available online
      4.1.2. Changes to current membership categories
   4.2. Membership questionnaire
      4.2.1. Results
      4.2.2. Next steps
   4.3. Prospective new members

5. **Status of Current Documents**
   5.1. 336.1R – Specification for Drilled Piers
      5.1.1. Committee agreed to postpone revision until revision of 336.3R is approved.
   5.2. 336.2R – Suggested Analysis and Design Procedures for Combined Footings and Mats
      5.2.1. TAC requested formal committee response: revise or remove from MCP?
      5.2.1.1. Voting summary:
      02/01/2008 ballot
      There are 22 committee members eligible to vote.
      Passage of an item requires resolution of any negative votes. Passage of an item also requires that the number of affirmative votes be at least that given by the 1/2 and 2/3 rules.

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   5.2.2. B. Brant volunteered to work on revision. Progress?

   5.3. 336.3R – Design and Construction of Drilled Piers
      5.3.1. New draft uploaded 03/30/2008
      5.3.2. Numerous editorial & minor changes (B. Oliver, R. Frizzi)
      5.3.3. Discussion session is Agenda item 8.
5.3.4. Balloting strategy suggestions?

5.4. 336.4R – Alternative Method for the Analysis and Design of Footings using Load and Resistance Factors
   5.4.1. Significant interest in industry, on committee
   5.4.2. Need to focus resources on 336.2R first, then same subcommittee should pick up .4R

6. TAC Updates

<table>
<thead>
<tr>
<th>Activity</th>
<th>TAC Spring Meeting</th>
<th>TAC Summer Meeting</th>
</tr>
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<tbody>
<tr>
<td>Final 30-day letter ballot issued</td>
<td>November 7, 2008</td>
<td>March 11, 2009</td>
</tr>
<tr>
<td>Committee-approved document</td>
<td>December 12, 2008</td>
<td>April 15, 2009</td>
</tr>
<tr>
<td>submitted to staff for editorial review*</td>
<td>February 6, 2009</td>
<td>June 10, 2009</td>
</tr>
<tr>
<td>Document submitted to TAC and external reviewers</td>
<td>March 3-5, 2009</td>
<td>July 8-10, 2009</td>
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</table>

7. Future joint technical session with 543 or ASCE?

8. Discussion Session: 336.3R

The numbering used below corresponds to the section numbers in the draft of 336.3R-xx.

Synopsis
The drilled pier design procedure includes: (1) determination of overall pier size using service loads and allowable resistances, and (2) design using factored load combinations. Emphasis is on the former, which involves interaction between the earth and pier.

Do we need to re-visit this in light of current ground-to-pier design procedures using LRFD?

Recommendation: Include both methods in the document, simultaneously. Volunteers?

1.2 Notations
K₂ = constant, dimension to be selected in each individual case so that the dimension of kₐ becomes L⁻³

Recommendation: Remove any variables which are not used in the document or figures.

1.4 Definitions
Construction manager: The person, firm, or corporation with whom the owner enters into an agreement to act in the owner’s behalf during construction.

Recommendation: Remove any words which are not used in the document or figures.

Recommendation: remove definitions for words only used once; define them in context as required.
**Recommendation:** replace “soil”, “soil and rock”, “(soil and rock)” with “earth”; add definition of earth to section 1.4:

_Earth:_ Geotechnical subgrade material; includes soil, rock, and intermediate geotechnical materials such as weathered rock and cemented soils.

**General**

**Recommendation:** be consistent in the use of an introductory sentence following a subchapter (0.0) prior to any subheadings (0.0.0). (Example: 3.4-Vertical load capacity, followed immediately by 3.4.1.)

2.5.7 Axial load tests

Is there an issue with describing O-cell or Statnamic testing in generic terms? Is there a reason to use the trade names?

**Recommendation:**

…For large projects or in cases of uncertainty, load tests are desirable. Reaction can be provided by belled or socketed piers designed for tension and positioned around the drilled pier to be compression tested. The reaction piers transfer load through a reaction frame and jacks positioned above the test pier.

Heavily loaded drilled piers are often testing using other methods. One such method, developed by J. Osterberg, consists of installing an embedded instrumented loading jack capable of applying a load in excess of the pier’s maximum design load within a full-scale test pier. Both end bearing and side resistance are tested. The maximum test load is defined by failure in either side resistance or end bearing. If the maximum side resistance is exceeded, the test can be extended further conventionally with a surface reaction frame and dead weights or anchor piers to permit applying higher end bearing load. Another common test method accelerates an independent reaction mass upward using pressure contained in a chamber; the resulting reaction is applied to the pier. Load tests may also be performed on small diameter, instrumented, drilled piers; however, care must be exercised in extrapolating the results to larger diameter piers.

2.3.3 **Construction engineering and quality control**

2.3.3 Construction engineering and quality control—Construction engineering should be performed to confirm the validity of simplifying assumptions made in the design. The scope and method of observation, obtainable tolerances, and quality control influence the refinement to which the design can reasonably be carried. Conversely, allowable tolerances may determine construction methods, scope of geotechnical construction engineering, observation, and quality control.

Ambiguous?

**Recommendation:** Accept as-is.

3.1.1 Axial loads

\[DL = \text{dead loads from the supported structure and weight of the pier, less weight of material displaced by the pier (net weight of the pier)}\]

\[Dg = \text{dead loads from the supported structure and weight of the pier (gross weight of the pier).}\]

& etc.

There are ten variable definitions given here. Should we define variables in the text, or only in the notation section of Chapter 2 at the beginning of the document?
**Recommendation:** Accept as-is.

### 3.6 Piers socketed in rock

Should this section cover IGM?

**Recommendation:** IGM deserves special attention for sampling techniques, etc., but does it need particular mention here? If so, please provide suggested text.

### 4.4.5 Concreting methods

We need to clarify and agree on:
- Minimum tube diameters
- Use of ‘rat holes’

**Recommendation:**

Minimum tremie and pump tube ID diameters should be:
- Tremie: 10 inches
- Pump Tube: 5 inches

All tremies should be maintained clean and smooth on the interior. The exterior should be as smooth as practical and free from materials that might contaminate the slurry. The latter can be accomplished by rinsing the tremie before lowering it into the slurry, or by storing the tremie in a hole filled with slurry.

### 5.5 Concrete placement

This section appears to have been taken largely from a document about piles.
- Is it generally applicable to piers?
- Does the committee feel it presents needed information?
- Is a grout “precharge” common practice for drilled piers >30 inches in diameter?

### 5.8 Criteria for acceptance

Should this section be expanded to include additional discussion of NDT and load testing (including Osterberg cells)?

**Recommendation:** Include a few sentences, but direct the reader to the appropriate document(s):

#### 5.8.1 Location and plumbness

ACI 117-06 Section 3 and its commentary give several tolerances; the requirements of 336.1 are shown in brackets []:
- 3.1-Deviation from plumb
- 3.1.3 Category C–For reinforced concrete piers—+/-2.0% of shaft length.[1.5% and/or 1/24 of specified shaft diameter]<note: per the commentary, this is the excavated hole>>
- 3.2.3 Top of drilled piers
  - Horizontal deviation of the as-cast center shall be the lesser of 4.2% of the shaft diameter or +/-3in. (76mm). [1.5% and/or 1/24 of specified shaft diameter]
- 3.3.2 Top surface of drilled piers
Vertical deviation….+1 in. (25mm)
……………………..-3 in. (76mm) [not specified, but +/-0.5 inch for anchorage
components]
3.4.1 Base of bell pier
The lesser of 10% of the bell diameter or +/-3 in. (76 mm).[1/12]

**Recommendation:** Accept 117’s recommendations; refer to 117 in our documents (both 336.1 and
336.3R). Otherwise, specify better values for all of the same tolerances in 336.1 and refer to it in
336.3R.

**Editorial Changes (to be made prior to next ballot)**

- Update section numbering to comply with Style Manual:
  - **Chapter 1—Introduction and Scope**
    - 1.1—Introduction
    - 1.2—Scope
  - **Chapter 2—Notation and Definitions**
    - 2.1—Notation
    - 2.2—Definitions
    - 2.3—Acronyms (if applicable)

  …remaining chapters will be renumbered accordingly.

- Verify or correct all Figure, Table, Section, and Equation references.

- **Figure list in cover letter**
  When retrieving artwork from a previous version of the document or from another committee document,
  indicate in the submittal cover letter where each figure exists. Also indicate both the original number and new
  number.

9. **Future Agenda Items**

10. **Adjourn**