PUC IT -01
Seismic Design Categories

MEETING DATE: April 3, 2017
LOCATION: SF San Andreas & Phone

ATTENDEES:
Ibbi Almufti  Jon Heintz  Bob Pekelnicky  Jiqiu Yuan
David Bonneville  Sandy Hohener  Maryann Phipps
David Bonowitz  John Hooper  John Silva
John Gillengerten  Nico Luco  Rob Smith
Ron Hamburger  Steven McCabe  Greg Soules

NOTES BY: Laura Weyl

The notes presented herein attempt to best categorize the discussions that arose from the various topics presented during the meeting. All presentations are included with the distribution of the minutes and are officially part of the minutes. Refer to the presentation to understand the content of the various issues discussed. When an individual’s comments are recorded, they are the opinion of that individual alone and do not in any way reflect committee consensus.

1.0 Introduction

The purpose of this meeting was to discuss various topics under the purview of IT-01 prior to the PUC meeting. First was a discussion on nonstructural performance based on what is being discussed in the ATC 120 project Second, was a discussion on the number of seismic design categories and what they should be used for in response to a charge from the PUC in their November meeting. Wrapping up with meeting was a discussion of other topics and next steps.

Bob Pekelnicky summarized the overarching goal of IT-01, which is to provide direction on the performance objectives for the provisions. He indicated that the group should be focused not just on what the prescriptive provisions of the NEHRP Provisions provide, but more fundamentally what the performance objectives for buildings and other structures should be as a basis for people to do alternate, performance-based designs and to lay the foundation for future updates to the provisions.

2.0 Nonstructural Seismic Performance
Maryann Phipps provided a summary of what Working Group 2 of the ATC 120 project has been discussing regarding performance objectives for nonstructural components. The group has drafted the matrix below related to safety, function, and property loss for nonstructural components. It separates components into two classes, I = 1.0 which is intended to be typical components and I = 1.5 which is intended to be components critical for function of a building or other structure, typically is a Risk Category IV structure.

![Framework of Performance Objectives for Nonstructural Components](image)

The group also proposing to assign components to either an I = 1.0 or 1.5 based as shown in the example matrix below.

![Mock-up of Concept](image)

The members in attendance expressed general approval with this direction. There was some discussion of the specifics of which component would be assigned to with class performance class. A point was raised about whether we are getting sufficient safety with our current provisions, which the group appeared to be in agreement we did. There was not agreement about whether we are getting adequate performance of egress and even if we should be providing higher performance for it. Maryann took the groups general approval as affirmation of the work the ATC 120 project is doing and will report back to IT-01 at the next meeting of further developments from ATC 120.
3.0 Seismic Design Categories

Bob Pekelnicky reported that at the last PUC meeting IT-01 was shared with looking at how many Seismic Design Categories there are and what requirements are triggered by them while the Project 17 working group the way in which the lines between SDC’s are drawn. Because of the importance of this issue, the PUC has asked for IT-01 to provide them a recommendation on whether to keep the current structure or change the number and requirements for the Seismic Design Categories by its August meeting.

The current SDC requirements are:
A has none
B consider forces with no restrictions on irregular systems, and almost no nonstructural requirements except parapets for URM and architectural components for Ip=1.5.
C is same as B for structural except for bad systems and some height limits. Nonstructural requirements are for architectural components across the board and MEP for an Ip=1.5.
D has height limits, system limits, and all architectural and MEP systems for nonstructural.
E has some additional system limitation and nonstructural limits.
F is even a little more strict

Right now the SDC’s are defined by Risk Category and SD1 and SDs. This table about how SDC’s are designed in the first place was based on MMI at MCE.

The group discussed whether the current number of SDCs is too many. Nobody felt there were too few. Last cycle, a PUC Issue Team proposed 3 SDCs. There was discussion on using MMI as a way to identify where seismic design would not be required because the MCE shaking intensity would be such that there would be no structural and only very light nonstructural damage. There was some general consensus on moving in the direction of 3 SDC, but not a definitive direction. A small working group was assembled consisting of Ron Hamburger (leader), John Gillengerten, Steve McCabe, Greg Soules, and John Silva to look into this matter and make a recommendation to IT-01 before the next PUC meeting in August.

4.0 Function Performance Objectives Working Group

At the last meeting a working group was proposed to look at whether there should be a separate function performance objective for Risk Category IV (and possibly III) structures. Chapter 1 of ASCE 7-16 will contain a section stating the Risk Category IV structures should have a high reliability of maintaining function in the design hazard. This group will discuss how that charge relates to the earthquake hazard. It will discuss if 2/3*MCER is the correct design hazard or if
there should be a separate function level earthquake and discussion on whether there needs to be changes to the Provisions to achieve the function performance objective. The working group is led by Ibbi Almufti and consists of David Bonneville, Greg Soules, David Bonowitz, Nico Luco, and Bob Pekelnicky.

5.0 ATC 58-2 Report

The ATC 58-2 project is looking to benchmark the performance of buildings designed to the Provisions. Ron Hamburger and David Bonneville provided the issue team with some updates on the project. The performance of code designed buildings varies depending on the structural system and the amount of over-design. An initial aggregating of the work done is shown in the table below. It should be noted that this is preliminary.

Performance Expectations – Risk Category II

<table>
<thead>
<tr>
<th></th>
<th>67% MCE</th>
<th>100% MCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Repair Cost</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Median Repair time</td>
<td>30 days</td>
<td>60 days</td>
</tr>
<tr>
<td>Unsafe Placard Probability</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>Reparability Probability *</td>
<td>90%</td>
<td>75%</td>
</tr>
<tr>
<td>Collapse Probability</td>
<td>1%</td>
<td>3%</td>
</tr>
</tbody>
</table>

* Reparability Probability is a function of the combined probabilities of the non-occurrence of collapse or residual drift and the median repair cost not exceeding 50%.

6.0 Next Steps

There will be another IT-01 meeting in July, in advance of the August PUC meeting. Workings groups will meet to discuss their topics. There is another working group that will be looking in to a white paper on providing resilient or better than code design, which did not have a report at this meeting.