

1 **PROPOSAL 3-4 (2009)**  
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5 **SCOPE: Sec. 11.8**  
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9 **PROPOSAL FOR CHANGE:**

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11 **Revise Provisions Section 11.8 as follows:**

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13 **11.8 Geologic Hazards and Geotechnical Investigation**

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16 **11.8.1 Geotechnical Investigation Report for Seismic Design Categories C through F.** A  
17 geotechnical investigation report shall be provided for a structure assigned to Seismic Design Category C,  
18 D, E or F in accordance with this section. An investigation shall be conducted and a report shall be  
19 submitted that shall include an evaluation of the following potential geologic hazards:

- 20  
21 a. slope instability;  
22 b. liquefaction;  
23 c. settlement;  
24 d. and surface displacement due to faulting or lateral spreading.  
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26 The report shall assess the potential consequences of geologic hazards, including but not limited to total  
27 and differential settlement, lateral movement, and lateral loads on foundations. The report shall contain  
28 recommendations for appropriate foundation designs, ground stabilization, or other measures to mitigate  
29 the effects of the hazards. Where deemed appropriate by the authority having jurisdiction, a site-specific  
30 geotechnical report is not required where prior evaluations of adjacent sites with similar soil conditions  
31 provide sufficient direction relative to the proposed construction.  
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33 **11.8.1.1 Earthquake Ground Motions for Geologic Hazards Investigations.** Geologic hazards shall  
34 be evaluated for site ground motions, seismic sources, and earthquake magnitudes consistent with Design  
35 Earthquake ground motions. Effects of geologic hazards on structural performance shall also be checked  
36 for Maximum Considered Earthquake (MCE) ground motions (without two-thirds factor). Ground  
37 motions shall be determined based on Section 11.4 or based on a site-specific study following the  
38 procedures in Chapter 21.  
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40 **11.8.2 Additional Geotechnical Investigation Report Requirements for Seismic Design Categories**  
41 **D through F.** The geotechnical investigation report for a structure assigned to Seismic Design  
42 Category D, E or F shall include the determination of lateral pressures on basement and retaining walls  
43 due to earthquake motions.  
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45 **REASON FOR PROPOSAL:**

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47 *This proposal modifies the requirements for geologic hazards evaluations as follows:*

**Proposal 3-4 (2009) Continued**

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1 *Current Section 11.8.1 is deleted so as not to absolutely prohibit the siting of a structure*  
2 *in Seismic Design Categories E and F on an active fault. The current requirement is*  
3 *based on the assumption that the structure cannot be designed for fault displacement,*  
4 *which may generally be the case but not always. Current Section 11.8.2 (proposed*  
5 *renumbered Section 11.8.1) requires that a fault rupture hazard including consequences*  
6 *of the displacement be evaluated and mitigated if needed. Mitigation would include not*  
7 *siting the structure on the fault if other means of mitigation were not feasible.*

8 *Proposed Section 11.8.1.1 defines earthquake ground motions for geologic hazards*  
9 *evaluations. A proposed requirement is that geologic hazards not only be evaluated for*  
10 *Design Earthquake ground motions, but also that effects of such hazards be checked for*  
11 *Maximum Considered Earthquake (MCE) ground motions (without two-thirds factor).*  
12 *Geologic hazards potentially can result in much larger ground deformations at the MCE*  
13 *level than at the design level. The effects of such larger deformations should be*  
14 *considered in structural and foundation design with respect to structure performance*  
15 *criteria. By limiting the geologic hazard evaluation to only the design earthquake, as*  
16 *currently done, the level of risk for geologic hazards could be higher than that for*  
17 *structural design for ground motions.*

18 *Proposed Section 11.8.1 refers to two parts of the Provisions for seismic ground motion*  
19 *quantification. One of these parts -- Section 11.4 -- will be modified in another proposal*  
20 *to be generated by E.V. Leyendecker that will add nationwide quantification of peak*  
21 *ground accelerations (needed for many types of geologic hazards evaluations) to the*  
22 *existing quantifications of spectral response accelerations. The other part is Chapter 21,*  
23 *which contains the requirements for site-specific ground motion quantification.*

24 *In current Section 11.8.3 (proposed Section 11.8.2), the text relating to geologic hazards*  
25 *evaluations for Seismic Design Categories (SDC) D-F is deleted because the*  
26 *requirements for SDC D-F are the same as requirements for SDC C-F stated in proposed*  
27 *Section 11.8.1 and 11.8.1.1. The text that remains in proposed Section 11.8.2 is the*  
28 *requirement for SDC D-F to determine seismic lateral pressures on basement and*  
29 *retaining walls.*

30 **TS 3 VOTE:**

31 *Yes = 7            Yes with Reservations = 1            No = 2            Not Voting = 3*  
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33 **Proposal 3-4 – Comments from TS-3 members who voted No or YR.**

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35 **M. Yegian – YR**

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37 I generally agree with Proposal 3-4. The text under Section 11.8.1.1 is not very clear. Does one run  
38 liquefaction analysis for both DE and MCE? Should the effect of liquefaction based on MCE be  
39 included in the structural design when it is based on the DE?  
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41 I vote Yes, with a suggestion to further clarify the text of Section 11.8.1.  
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43 **J. Stewart – No**

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45 I support the change with respect to surface rupture. If this is a stand-alone proposal, put me down for a  
46 'yes' vote.  
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**Proposal 3-4 (2009) Continued**

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1 I do not support the proposal for ground motion levels to be considered for ground failure analysis. The  
2 reason is that the wording is too vague and it implies a different standard for ground failure analysis  
3 than for building analysis. With regard to the vagueness of wording, the statement in section 11.8.1.1  
4 that the effects of geologic hazards should be “checked” for the MCE event in addition to the hazards  
5 being “evaluated” for the DBE is the source of my concern. I can see remarks like this being in a  
6 commentary (although even the terminology should be better defined), but I just don’t see how this can  
7 be in the provisions. If this is a stand along proposal, my vote is no. If the surface rupture and ground  
8 motion issues are part of the same proposal, then my vote on the joint proposal would be no.  
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10 **T. Hale – No**

11  
12 I vote No on Proposal 3-4. My reasons are as follows:  
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14 The prohibition of siting a structure in Seismic Design Categories E and F on an active fault should  
15 remain. There are no established methods of structural design or construction types to mitigate fault  
16 displacements without at least a partial collapse. Current section 11.8.2 only mentions the effect on  
17 foundation design, whereas the superstructure will also be effected due to flexible foundation systems.  
18 Analytical methods and code provisions have not been established to determine appropriate fault  
19 rupture displacements for design of structures located directly over the faults.  
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21 In addition, in California, removal of the original provision to prohibit construction of SDC E or F  
22 buildings where there is a known potential for surface faulting under an active fault will result in  
23 violations of the Alquist-Priolo Earthquake Fault Zoning Act.  
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