

Advisory Committee on Earthquake Hazards Reduction

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Needs for Existing Building Risk Evaluation and Mitigation

Observed Technical Needs-Practitioner Perspective

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Topic areas that need improvement for the evaluation and retrofit of existing buildings include the following:

Develop global-based evaluation/retrofit methodology (as opposed to ASCE 41 component based) particularly for Collapse Prevention. This implies an improved ability to predict collapse risk, which will facilitate identification of truly high risk buildings.

Determine effect of vertical ground motions on brittle structural elements. Determination of loading on various structural elements from vertical ground motions is complex due to uncertainty of transfer of motion at the soil-foundation interface and the multiple vertical frequencies in framing systems. Such effects have largely been ignored in the past due to inherent strength of most structural elements due to gravity design and the high rate of loading generated by the high frequency of significant vertical accelerations. However, brittle structural components or connections that may be present in older existing buildings may be susceptible to such loading. If this risk proves significant, simplified evaluation methods should be developed.

Resolve the concern over in-situ testing requirements in ASCE 41. This includes further consideration of the effect of varying material properties in evaluation and retrofit, improvement of methods of nondestructive material testing, and on a broader scale, development of methods to create documentation of as-built conditions when no drawings are available.

Improve methods to detect structural deterioration or damage. Post earthquake evaluations, either preliminary or detailed, generally are limited to consideration of damage that is visible without destructive testing. After most damaging events, there are concerns about "hidden damage," but little has been done about it.

Develop repair guidelines for repair of structural damage. A significant event in the U.S. will result in a large number of damaged structures. Currently, acceptable methods of repair for many types of damage are not identified, which will result in inconsistent, and possibly unacceptable, repairs, delays in evaluation and restoration of buildings, and delays in recovery. The FEMA 306 series and the SAC project both contain information about repairs but are narrowly focused and will be inadequate for the large number of building types needing repair.

Develop guidelines for evaluation and retrofit of buildings on liquefiable sites.