

LATERAL FORCE DESIGN CRITERIA

Approved: 

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Rev.: 16 By FTA

The following lateral force design criteria shall be used for the design of all conventional and laboratory facilities at the Lawrence Berkeley National Laboratory, Berkeley, California.

All structures and non-structural elements of buildings shall be designed and constructed to withstand all lateral forces in accordance with American Society of Civil Engineers (ASCE) Standard 7-05 as modified by the latest edition of the California Building Code (CBC) adopted by the Building Standards Commission and the following:

1. The seismic base shear for building and non building structures anywhere on the LBNL site may be calculated for latitude $37^{\circ} 52' 33''$ and longitude $122^{\circ} 14' 51''$. The height of a structure (h_n) is to be measured from bottom of the lowest level which is exposed to the weather on at least one side to the top of the roof. Seismic analyses will utilize the static lateral force procedures of the CBC unless a dynamic analysis is necessary. When a dynamic analysis is required, the design basis earthquake is as specified in *Ground Motion Time Histories for the UC Berkeley Campus* (LBL-62614) scaled to the target intensities in *Updated Probabilistic Seismic Hazard Evaluation and Development of Seismic Design Ground Motions for the University of California, Berkeley and Lawrence Berkeley National Laboratory* (LBNL-1975E).
2. The drift and deformation of building structures anywhere on the LBNL Berkeley campus shall comply with Section 12.12 of ASCE 7 with the following exception: in Table 12.12-1 the allowable drift of "Structures, other than masonry shear wall..." (the first row of the Table) for Category I or II shall not exceed $0.020h_{sx}$ and footnote "c" of the Table is deleted. The drift and deformation of non building structures shall comply with Section 15.4 of ASCE 7.
3. The bracing and anchorage of all building related or conventional non-structural elements, such as mechanical equipment, plumbing and electrical equipment, machines, partitions, ductwork, etc., anywhere on the LBNL Berkeley campus shall be comply with Chapter 13 of ASCE 7 except the weight specified in Section 13.1.4.4b shall be changed to 100 pounds. When dynamic analysis is required in accordance with paragraph 2 above, the use of roof and/or floor spectra may also be required for the design of the anchorage of non-structural elements.

The ASCE 7 importance factor (I_p) shall be 1.5 for the design of seismic bracing for fume hoods, laminar flow hoods, bio-safety cabinets, chemical storage cabinets and clean rooms containing biological or chemical hazards, including the ductwork, filters and blowers associated with these elements. Section 1613.6.8 of the 2010 CBC is not applicable anywhere on the LBNL Berkeley campus.

Fire protection piping supports and bracing shall be designed to NFPA 13-02 as adopted by the State of California.

4. The seismic design criteria for programmatic equipment, shielding and hazardous or toxic material handling systems including piping, ductwork, equipment, etc. shall be in accordance with LBNL Health and Safety Manual, Publication 3000, Chapter 23, Seismic Safety.
5. The allowable deflection of buildings, structures and their elements or components when subjected to the required wind pressures shall not exceed $L/240$, where "L" is the appropriate length or height of the element under consideration.
6. Building and non building structures anywhere on the LBNL site shall be designed for wind exposure category C.
7. All foundations, earth retaining structures and other earthworks shall be designed in accordance with the recommendations of a registered Geotechnical Engineer. The design of foundation walls retaining six feet or more of earth shall include earth pressures from seismic forces.