

Executive Order 12941  
*Seismic Safety of Existing Federally Owned or Leased Buildings*  
Its History, Content and Objectives

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**Abstract:** Work by the Interagency Committee on Seismic Safety in Construction (ICSSC) is expected to lead to the eventual development of a systematic program of seismic upgrading for Federally owned buildings. Steps that have been taken to date include 1) the development of seismic evaluation and rehabilitation standards, 2) the drafting of an Executive Order which adopts the technical standards and calls for a seismic inventory and cost estimate, and 3) the issuance of guidance on how to efficiently and consistently inventory Federally owned buildings and how to estimate the costs of mitigating unacceptable seismic risks. The inventory and cost estimates will be forwarded to the Federal Emergency Management Agency (FEMA) by December 1, 1998. FEMA will use the data to assess the costs and impacts of a wide variety of potential seismic risk mitigation programs. By December 1, 2000, FEMA will report to Congress on the most economically feasible program for achieving acceptable levels of seismic safety in its approximately half-million owned buildings. (See Appendix A for information on characteristics of the Federally-owned building population.)

**Background:** The National Earthquake Hazards Reduction Program (NEHRP), initiated in 1978, stated as one of its guiding principles, "The Federal government must set an example for others to emulate by its own actions, including the institution of more effective hazards mitigation measures in its own facilities." [Executive Office of the President, 1978]. Pursuant to this goal, Congress, in the 1990 NEHRP Reauthorization Act [Public Law 101-614], called upon the President to adopt, by December 1, 1994, "standards for assessing and enhancing the seismic safety of existing buildings constructed for or leased by the Federal Government which were designed and constructed without adequate seismic design and construction standards. Such standards shall be developed by the Interagency Committee on Seismic Safety in Construction."

**Technical Standards:** In February, 1994, the ICSSC issued the standard called for in the Public Law, *Standards of Seismic Safety for Existing Federally Owned or Leased Buildings* (RP4) [Todd, 1994]. The RP4 standard establishes "substantial life safety" as the minimum performance objective that should be achieved in any Federal seismic rehabilitation project. The RP4 standard notes that higher performance levels will be appropriate for many Federal buildings, such as those that must remain operational after an earthquake, or those which house critical or extremely valuable contents. The standard allows each individual agency to define its own agency-appropriate criteria for identifying buildings needing higher performance and for establishing technical procedures for achieving the desired level of performance.

The standard presents a list of "triggering" events: actions which require the seismic evaluation of a Federal building. The triggers include:

- change of function that increases the risk
- significant remodeling (more than 50% of building replacement value)
- repair of significant structural damage
- the agency identifies an "exceptionally high seismic risk"
- an existing building is newly acquired by the Federal government, through purchase, or donation

If a triggered building is evaluated and judged to be seismically unacceptable, a plan must be established for achieving adequate seismic safety. The triggering events are, for the most part, economically advantageous moments to undertake seismic rehabilitation. For example, in most substantial renovations, the building structural skeleton is exposed. The costs of removing and replacing the architectural finishes (wall surfaces, floors, ceilings, etc.) can be a significant part of a seismic rehabilitation project. When that work is being done anyway for other reasons, the cost of the seismic rehabilitation can be reduced.

The standard includes a list of buildings which may be deemed exempt from seismic evaluation. These are structures in which the seismic risk is believed to be extremely low. Exemptions include buildings with only incidental human occupancy, small single-story wood or light steel frame buildings, buildings designed and constructed using modern seismic codes (as defined using "benchmark years"), buildings which have been previously rehabilitated, and one- and two-family houses in regions of moderate and low seismicity. These exemptions do not apply to buildings which require performance above the life safety level.

For evaluation procedures to determine whether buildings meet the minimum substantial life safety performance objective, the RP4 standard references an existing private sector consensus-based seismic evaluation manual, the *NEHRP Handbook for the Seismic Evaluation of Existing Buildings* (FEMA 178) [FEMA, 1992], which was produced and balloted by the Building Seismic Safety Council. RP4 goes beyond FEMA 178 by identifying four distinct compliance categories:

- structural
- nonstructural
- geologic/site hazards
- adjacency

While all four of these concerns are addressed in FEMA 178, the bulk of the FEMA 178 document is devoted to structural concerns. RP4 calls special attention to the other three topics to emphasize the importance of assessing these potential risks. Enhancements to the FEMA 178 evaluation procedures are presented for these three topics.

The technical criteria which the RP4 standard has established for seismic upgrading to a substantial life safety level is that the rehabilitated building must meet the evaluation criteria. The ICSSC anticipates that the next edition of the RP4 standard, which is to be updated every five years, will reference the Seismic Rehabilitation Guidelines currently under development by FEMA for rehabilitation portion of the standard.

**Dealing with Leased Buildings:** The RP4 standard states that existing leases may be held until they expire without addressing seismic safety. However, lease renewals and new

leases may not be entered into for seismically unacceptable buildings. These requirements will gradually remove seismically unsafe buildings from the leased-building population at little or no programmatic cost to the Federal government.

**Implementing the Technical Standards:** In order to ensure that the standards were put into action, the ICSSC drafted a proposed Executive Order for consideration by the President. After review by the Executive Branch, the President signed the order on December 1, 1994 [Executive Order 12941]. Section 1 adopts the RP4 standard as the minimum technical criteria that all Executive Branch agencies and departments must meet in future seismic evaluation and mitigation projects. By adopting the RP4 standard, the "triggers" become mandatory, thus initiating a modest program of seismic evaluation and rehabilitation in all Federal agencies. It is not the intent of the Executive Order that agencies with active seismic evaluation and rehabilitation programs reduce the level of their efforts to the bare minimum "life-safety in triggered buildings" established in the RP4 standard. Rather, agencies with active programs are to continue their efforts, using agency-appropriate evaluation and rehabilitation procedures that meet or exceed the RP4 levels. Section 1 of the Executive Order is intended to prod into action those agencies that have been heretofore inactive.

**Collecting Information to Develop a More Active Program:** Section 2 of the order requires that all agencies and departments owning or leasing buildings develop a seismic inventory and estimate the costs of mitigating unacceptable seismic risks. This information was deemed necessary because, based on the limited amount of available data, the estimates of the cost of achieving adequate seismic safety in the approximately half-million Federally-owned buildings resulted in a spread that was too great to allow for reliable budget planning.

The order directs the ICSSC to issue guidance on performing the inventory and cost estimating. The ICSSC guidance, *ICSSC Guidance on Implementing Executive Order 12941 on Seismic Safety of Existing Federally Owned or Leased Buildings (RP5)* [Todd 1995], calls for the inventory to screen buildings into exempt and non-exempt buildings, using RP4 criteria, to eliminate extremely low risk buildings from further consideration. For non-exempt buildings, information on location (seismicity), use, age, model building type, size, and number of stories is to be collected. In addition, agencies are asked to indicate whether each non-exempt building is historic and whether it is considered "essential."

The ICSSC guidance recommends that agencies evaluate the seismic safety of all buildings they identify as posing an exceptionally high risk. "Exceptionally high risk" is to be defined on an agency-specific basis, considering:

- the expected frequency and intensity of earthquake occurrence, and
- the expected consequences of the event, considering
  - number of occupants,
  - criticality of building function,
  - vulnerability of the structural system, and
  - agency-specific needs.

Agencies are asked to evaluate the safety of a representative sample of the remaining non-exempt buildings.

For buildings found to be seismically deficient, an estimate of the cost of achieving acceptable seismic safety is to be reported. This information is to be forwarded to FEMA by December 1, 1998. FEMA will use the data to examine the costs and benefits of a wide variety of potential programs to upgrade the seismic safety of existing Federal buildings. By December 1, 2000, FEMA will submit to Congress the results of their findings. It is hoped that this effort will lead to the adoption of a pro-active program of systematic upgrading of the seismic safety of Federal buildings.

### References

- Executive Office of the President, "The National Earthquake Hazards Reduction Program," June 22, 1978, Washington, DC.
- Executive Order 12941, *Seismic Safety of Existing Federally Owned or Leased Buildings*, Federal Register Vol. 59, No. 232, Washington, DC, December 5, 1994.
- FEMA (Federal Emergency Management Agency), *NEHRP Handbook for the Seismic Evaluation of Existing Buildings*, FEMA 178, June 1992, Washington, DC.
- Public Law 101-614, "National Earthquake Hazards Reduction Program Reauthorization Act," November 16, 1990, Washington, DC.
- Todd, Diana, editor, *Standards of Seismic Safety for Existing Federally Owned or Leased Buildings*, ICSSC RP4, NISTIR 5382, National Institute of Standards and Technology, February 1994, Gaithersburg, MD.
- Todd, Diana and Ann Bieniawski, editors, *ICSSC Guidance on Implementing EO 12941 on Seismic Safety of Existing Federal Buildings*, ICSSC RP5, NISTIR 5734, National Institute of Standards and Technology, October 1995, Gaithersburg, MD.

### Appendix A

The General Services Administration (GSA) maintains an inventory of real-property owned by the Federal government. This inventory does not contain enough information to establish the expected seismic risk in a building (such as structural system, year built, number of stories). However, it does give information that can be used to establish certain characteristics of the Federally-owned building population.

Of the approximately half-million Federally-owned buildings, about 55 percent are in regions where the seismicity is considered to be low, 25 percent are in regions of moderate seismicity, and 20 percent are in areas of high seismicity. The Departments of Defense (Army, Navy, Air Force) collectively own close to 80 percent of all Federal buildings. Practically every possible type of building (relative to use) is owned by the Federal government: office buildings, hospitals, prisons, schools, apartment buildings, barracks, single-family houses, industrial facilities, warehouses, laboratories, air traffic control towers, parking garages, museums, picnic shelters, lighthouses, barns, cabins, outhouses. Federally-owned buildings come in all sizes and all ages. It is believed that all structural types are likely represented, with the possible exception of the true high-rise skyscraper.