

CODES CORNER

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Adoption of the 2007 Codes of New York State

Update to the Uniform Fire Prevention and Building Code and State
Energy Conservation Construction Code.

Transition period for Uniform Code is
October 3, 2007 to December 31, 2007.

Uniform Code will become effective on **January 1, 2008.**
Energy Code has **no transition period**, effective **January
1, 2008.**

To order code books from ICC ask for the **2007
Codes of New York State.**

www.iccsafe.org Phone: (800)-786-4452

Specific Titles:

Existing Building Code of New York State – 2007 Edition (This is
a NEW code for NYS)

Building Code of New York State – 2007 Edition

Residential Code of New York State – 2007 Edition

Fire Code of New York State – 2007 Edition

Property Maintenance Code of New York State – 2007 Edition

Plumbing Code of New York State – 2007 Edition

Mechanical Code of New York State – 2007 Edition

Fuel Gas Code of New York State – 2007 Edition

Energy Conservation Construction Code of New York State –
2007 Edition

PROPOSED IEBC MODIFICATIONS

Items #1, 27, 41 and HP 28 - Seismic Requirements in Existing Buildings

Note: new text Underlined, deleted text Strikeout

**Sections: 101.2, 407.1.1, 407.3.2.1.1, 507.2.2, 607.4.2, 707.5, 707.8, 807.3.1,
812.6,**

903.3, 1001.2, 1102.4 (see attached document for text)

Needs and Benefits:

Until now, the goal regarding work on existing buildings has been for the building code to allow repairs without the entire building being brought up to code. New seismic requirements in the present Appendix K and the proposed IEBC are too broad and have and will significantly discourage renovation and reuse of existing buildings.

Geologic conditions within New York State may not justify the expense of either present requirements for existing buildings contained in the Appendix K of the New York State Uniform Fire Prevention and Building Code or those contained within the proposed International Code Council International Existing Building Code (IEBC).

New York State Codes and Seismic History

New York State's "old" 1984 statewide code nor the local codes that preceded it did not include specific seismic load requirements. In essence, it appears that most, if not all of the existing buildings within New York State were not built with any seismic considerations until 2003. This prior way of building is causing current hardship and costly upgrades when structural seismic provisions of the International Existing Code are applied to existing buildings where no prior seismic considerations were incorporated. Establishing geologic patterns over human time scales is difficult at best. Hundreds of millions of years ago, the East coast was this continent's active plate tectonic boundary, as the West coast is today. In many areas of the East where earthquakes have occurred historically, specific faults causing the quakes have not been mapped or even identified. Another problem in evaluating earthquake risk is that earthquake records exist for only the last couple of hundred years. New York State counties with the most seismic activity are St. Lawrence, Franklin, and Essex in the northern part of the state. New York's largest recorded earthquake (a magnitude 5.8) occurred in 1944, creating its greatest damage in Massena and Cornwall in St Lawrence County. Building features affected most were chimneys, and several structures were declared unsafe for human occupancy until repaired. Cracks formed in the ground in Hogansburg, Franklin County, with brick-masonry and concrete structures were damaged there. No buildings collapsed and no one was killed or injured.

Western United States

In California 3,371 people have died in 23 earthquakes since 1900. Other states with earthquake deaths include Alaska, Washington, Oregon, Hawaii, Idaho, Wyoming, and Montana. The following discussion, written by the Association of Bay Area governments, California Division of Mines and Geology City of San Francisco describes the background and current approach that California is

taking regarding decisions regarding seismic requirements: "Faced with the disastrous losses from the Loma Prieta shock, the California Legislature realized that stronger measures were needed to combat earthquake hazards. In 1990, the Legislature passed the California Seismic Hazards Mapping Act to assist cities and counties in protecting public health and safety against such hazards. This law requires the State Geologist to make maps of seismic hazard zones, identifying areas prone to violent shaking and ground failure. It also requires that evaluation of these potential hazards precede approval of construction projects within defined hazard zones and that buyers of real estate be notified when the property lies within such a zone. This act builds on the success of both the 1972 law and the early maps of predicted ground shaking.

1. The California Seismic hazards Mapping Act declares:

a) The effects of strong ground shaking, liquefaction, landslides, or other ground failure account for approximately 95 percent of economic losses caused by an earthquake.

b) Areas subject to these processes during an earthquake have not been identified or mapped statewide...

c) It is necessary to identify and map seismic hazard zones...to reduce and mitigate those hazards to protect public health and safety. It is the intent of the Legislature to provide for a statewide seismic hazard mapping...program to assist cities and counties in...protecting the public...from...hazards caused by earthquakes.

Experience in many states reveals that seismic hazard maps serve diverse audiences. Users of these maps include buyers and owners of real estate, geotechnical consultants and engineers, financial institutions, utility and transportation companies, emergency managers, and government planners. Mapping seismic hazards is especially important in urban areas of earthquake-prone regions of the United States. Such areas have large populations and huge investments in structures and lifelines that are at risk from earthquakes. Potential losses from future urban earthquakes are staggering. For example, a repeat of the 1886 Charleston, South Carolina, earthquake today would cause an estimated 2,000 fatalities and \$5 billion of damage. In the central Mississippi Valley region, projected losses from a repeat of an 1811 earthquake are 6,000 lives and \$50 billion of damage.

Crucial to reducing these potential losses is sound geologic knowledge leading to effective seismic safety policies and legislation."

This thoughtful and scientific approach should be the manner in which New York should be doing similar research to justify any regulations for seismic construction in New York State, instead of accepting the IEBC requirements. The IEBC requirements are painted with too broad a brush for New York State.

Other states experiences with seismic requirements

Tennessee is holding off adopting the ICC codes because of the seismic issue. There is a earthquake prone region in a portion of that state and people in that area are concerned that business will go elsewhere as a result of the seismic

provisions. They have established a task force and are finding that various experts are disagreeing on technical aspects of seismic design. For example, some structural experts are claiming that the Mississippi delta soil conditions would cause buildings to fail in an earthquake while others think the soil conditions would act to dampen seismic movement. North Carolina and Kentucky have also amended or rescinded their ICC based codes after adopting them because of seismic issues.

What seismic rehabilitation requires and philosophy behind it.

Seismic upgrading techniques usually include the addition and/or strengthening of existing walls, frames and foundations. Adopting these recommendations often leads to heavy demolition, lengthy construction time, reconstruction and occupant relocation with all the associated direct and indirect costs. In the last few decades, the approach regarding repairs to existing structures has permitted repairs to damage, with the repair itself required to comply with current code, but without requiring that either the element being repaired or the structure as a whole be re-designed to resist the vertical and lateral forces proscribed in the current code. In years prior to its incorporation into the NYSUFP&BC in 2003, this philosophy represented a greatly debated but much-needed evolutionary leap with respect to prior code requirements that contained specific cost-of-repair based triggers for upgrading. Simply, though cost-of-repair-based triggers for upgrading were intended to result in long-term improvement to the building inventory, in many communities such triggers actually discouraged repair and maintenance work via the creation of significant financial disincentives to repair. Under the influence of these triggers, many communities' building stock endured long-term deterioration. With the introduction of the 2003 International Existing Building Code (IEBC), however, this time-tested and proven philosophy has been discarded in that the 2003 IEBC sets forth specific loss-of-capacity-based "triggers" for partial and full upgrades of existing damaged or deteriorated structures. For older buildings whose structural drawings are no longer available, an analysis will first require an in-depth field investigation simply to repair inconsequential damage. An owner might spend tens of thousands of dollars to get a permit for a five hundred dollar repair. Building tenants may even be required to relocate. Such provisions could either cause repairs to be performed without proper engineering design, without permits, and without reputable contractors or alternatively to cause needed repairs to not be made and to allow small problems to ultimately degenerate into larger ones. Many of the Main Street buildings most in need of re-use are older industrial and commercial buildings built long before current, lateral building standards were enacted. A "lateral load" is a sideways force on a building such as wind or an earthquake. Seismic retrofits to current code can be very expensive, and this cost can be the most important factor inhibiting conversion of some existing buildings to live/work use. This fact conflicts with the stated desire of cities to see underutilized (often vacant) buildings converted to a use for which there is often a pressing need and market demand.

Specific New York State requirements

Appendix K requirements for seismic loads for existing buildings occurs:

- for renovations
- where a change of occupancy occurs
- additions are made.

In the 2003 IEBC, the provisions of retrofitting existing buildings for seismic loads occurs:

- when repairs to structural elements occur
- where a change of occupancy occurs,
- additions are made
- when level 2 or level 3 alterations are made
- for historic buildings in high seismic zones
- in certain occupancies when a building is moved.

Generally speaking, seismic requirements in the 2003 IEBC are required when lesswork is being done on a building than Appendix K.

Department of State Code Administration and Enforcement Division regional staff were polled regarding the impact of Appendix K seismic requirements and consistently responded that these requirements were not being universally complied with because in many cases the cost of the seismic requirements would put an end to many projects. It is proposed to delete the requirements for seismic retrofit of existing buildings (those constructed prior to January 1, 2003) except for "essential facilities" that would be needed in case of an earthquake emergency (i.e. —hospitals and health care with surgery; fire/police facilities; power plants; emergency shelters, etc). These facilities would only require parapet bracing. Any other work can of course be done voluntarily.

The requirement for parapet bracing for essential facilities in certain seismic zones addresses the problem that has occurred when earthquakes have occurred in New York: damage to chimneys and other brickwork that may cause damage or injury below. The New York State Department of Health (DOH) regulates hospitals throughout the state and does not have seismic requirements for what are considered essential facilities. DOH is aware of California legislation which requires San Francisco to seismically upgrade its essential facilities over a period of twenty years, but is not pushing similar measures in New York State. If DOH does not consider it necessary to seismically strengthen its buildings, this requirement should not be imposed on it by the Department of State because of the tremendous expense involved.

Risk/Cost

Statistics indicate construction designed to withstand all possible scenarios is more costly than the derived benefit. Earthquakes, meteors, riots etc. may cause a fire. If it is a mild earthquake, small meteor, or ineffective riot, and then a fire ensues, the probability is that the system will survive and perform. Larger

catastrophes will turn all preparations into an effort in futility. States with the likelihood of severe earthquakes and the real danger of earthquake-related deaths, have determined the derived benefit outweighs the cost. Therefore not only construction, but infrastructure, has been designed to withstand earthquakes to the degree of protection and possibility, and cost, have established. Some states do not consider earthquake protection to be this cost effective. New York has not done the work necessary to make this determination. Also, to be consistent, if existing and new buildings in New York State must meet seismic requirements, then other public services such as dams, transportation, communication and water systems also should be examined. The *San Francisco Chronicle* (February 8, 2005) notes that rebuilding the San Francisco-owned regional water system on which 2.4 million Bay Area residents rely is now projected to cost \$4.3 billion. Before such sweeping requirements are imposed on New York's existing buildings, both the public and private sectors should commit to making seismic safety a priority in allocating financial and other resources. Seismic requirements presently disproportionately targets small building owners and those who are interested in Quality Communities issues and again these stakeholders have not been brought into this discussion.

Costs:

Rehabilitation costs: FEMA 156-157, 1994 titled *Typical Costs for Seismic Rehabilitation of Existing Buildings, Volume I and II* include a "typical" cost of all buildings in the database that can be used for general cost estimation purposes is \$16.50/ s.f. According to Gary Searer, a structural engineer in California, that figure should be doubled by 2005, which brings the typical figure for seismic rehabilitation to \$31/square foot—a figure does not include the cost of replacing architectural finishes. Some seismic upgrades in California have cost \$300/ s.f. Vertical addition costs. Based on two New York variance petitions, the cost of adding additional floors to an existing building went from \$120 to \$165 (a 35% increase) for one project and from \$175 to \$262 (a 50% increase) for another. Both variance requests were granted. Conversion costs. A Syracuse developer has done cost estimates of conversions of several existing buildings. The first involved inserting a second floor of a former boiler plant to convert the building to an office building. The cost to create a 1,500 s.f. second floor within a 35' high space is \$10.88/ s.f. without seismic requirements and \$22.62/s.f. with seismic requirements. Before seismic requirements were required in New York, the second floor would have been integrated into the existing structure, which has plenty of structural capacity to carry the load. Under the seismic requirements, the most economical solution is to create an independent structure constructed independent of the boiler plant structure. There would also need to be excavation and the pouring of ten footings and more structural steel to independently carry the addition. The ICC code requires the construction of an independent structure free of the old boiler plant, but does not require the existing boiler plant meet seismic standards.

The second involves a two story factory building with a clerestory rising 20 feet above the second floor. The proposed plan converts this double height volume into loft bedrooms above the living room and kitchen. Without the addition of this loft space the economics of this project will not work. Before the seismic regulations went into effect, the new floor would have been supported from the existing structure, which has plenty of capacity to handle residential loads since the building was designed for heavier industrial uses. This approach would cost \$13.88/ s.f. The costs of constructing the new floor compliant with seismic requirements would require an independent structure through the building to support the loft floor. New structural columns would need to be extended through the building to support the new third floor. Twenty-six new footers to support 26 new columns that would rise 24-feet high to bear the weight of the new floor. It was estimated that this approach would cost \$25.72/ s.f.

Alternatives:

Two alternatives were considered. One was retaining the 2003 IEBC requirements. The other was to use Appendix K requirements as written. The 2003 IEBC seismic requirements are more extensive than those of Appendix K. The subcommittee determined the 2003 requirements were thus more appropriate to be required of buildings built after January 1, 2003 (originally compliant with seismic requirements).