

Seismic Retrofit Requirements and Their Triggers

Editorial & Advice for Tenants, Guest Articles

When a tenant or building owner contemplates making changes or renovations to an existing building, invariably the topic of code-required seismic upgrades comes up (or more specifically, alterations to strengthen the lateral resistance capacity of the building). Most people want to know in advance of doing any design work, what the seismic requirements will be and what parts of the renovation project will trigger any seismic work. Be aware that the type of project you may be considering and the scope of the anticipated alterations can trigger upgrades to the structural system, and your building permit application will need to include the seismic work as part of the scope of work covered by the permit.

The Building Code

The building code in California (as well as the local jurisdictions in California) is based on a model code document called the International Building Code (IBC) which was prepared through a consensus process by the International Code Council (ICC). The California Building Standards Commission (CBSC) then reviews and prepares a series of amendments to the model code and publishes the **California Building Code or CBC (technically referred to as Title 24, Part 2). This is The Building Code throughout California.** The model code and the amendments are updated typically on a 3-year revision cycle. Local jurisdictions can (and will) write amendments to the provisions in the CBC. Some cities will choose to use the CBC "straight" or without amendments, while others will make extensive revisions to conform to local regulations. San Francisco has numerous local amendments (made through the local city ordinance process) including the provision for seismic strengthening of existing buildings.

Building codes typically follow the "grandfather" approach, e.g. the building code in effect at the time of construction applies, and although later versions of the code may have been enacted since the time of construction there are few, if any, provisions for applying the code retroactively to existing buildings. This is true, when no additions, remodeling or alterations are made to the building. Hence, it is possible to have a 50 year building that is code compliant (e.g. it met the all the code requirements when it was constructed and no additions, remodeling or alterations have been done over the years.) However, there are numerous triggers for upgrades when additions, remodeling or alterations are contemplated, and this includes upgrades to the lateral or seismic structural system. And to make it even more confusing, different cities may have amended the triggering regulations of the CBC!

The cost of this type of work can be significant, depending on a number of factors such as the age of the building and **how inherently strong it is resisting earthquake forces.** The costs can be a "dealbreaker" in many leasing situations.

So how can a tenant get a clear answer on whether his or her Tenant Improvement project will trigger an upgrade? Unfortunately the simple answer is, "It depends." The real answer needs more thorough analysis and you are advised to seek the help of a registered architect and/or structural engineer to ascertain the code requirements for your project. However, a discussion of the general concepts for the triggers and the requirements can be useful in reviewing potential lease spaces and their renovation requirements prior to selecting a potential building.

Building Code Requirements

The building code (which covers all new building construction, additions and renovations) is where the applicable seismic provisions are typically enforced. **In addition to structural design requirements, the building code also covers fire resistance, disabled access and other life safety requirements.**

Identify the jurisdiction

So to begin to answer the million-dollar seismic upgrade question, first we start with the project location and whether the building is under the jurisdiction of the local municipality. Certain building types are exempt from local building department review (and subsequently local amendments). For instance, federally owned buildings are exempt from local review and the California Building Code (CBC). Hospitals and other types of medical facilities are generally not under the jurisdiction of the city or county where they are located, but rather they are reviewed by the Office of Statewide Health Planning and Development (OSHPD). Schools and other types of K-12 facilities are generally not under the jurisdiction of the local municipality, but rather they are reviewed by State Fire Marshall's Office (SFM). State Office buildings are reviewed by the Office of the State Architect (OSA). Prisons and other correctional facilities are reviewed by the California Board of Corrections, and so on.

So you must first identify who actually owns the building and if the local building department has jurisdiction. If the building is located in San Francisco and is subject to the jurisdiction of San Francisco Department of Building Inspection, the local building code amendments do include a more detailed set of seismic upgrade requirements and specific triggers depending on the scope of work and occupancy of the building. [See San Francisco Requirements below]

Occupancy and Buildings covered by the CBC

The occupancy group classification of the building (or more simply, how it is used) determines which provisions of the building code apply. It is therefore important that the existing and intended uses are clearly ascertained. The CBC divides the regulations into two broad categories: (1) occupancy or use of the building, and (2) construction type or what the building is made of. [This makes good sense; the life-safety qualities of any building are a function of how intensely the building is used (e.g., a warehouse with few people and no combustible items have fewer limitations than say a movie theater with lots of people and some highly combustible materials) along with how strong and fire resistant the main building materials are. For example, a highly combustible wood framed building has more restrictions than a virtually non-combustible concrete framed building.]

Common Commercial Occupancies Defined

(For simplicity we will focus on the most common type of commercial building use, e.g. privately owned office building with lease space to multiple tenants on multiple floors, which typically is classified as **Group B — Business**. Other occupancy categories can be found in Chapter 3 of the CBC.)

Group B—Business occupancies include: "...among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts. Business occupancies shall include, but not be limited to, the following:

- Airport traffic control towers
- Ambulatory health care facilities serving five or fewer patients
- Animal hospitals, kennels and pounds
- Banks Barber and beauty shops
- Car wash
- Civic administration

- Clinic-outpatient (not classified as Group I -2.1)
- Dry cleaning and laundries: pick-up and delivery stations and self-service
- Educational occupancies for students above the 12th grade
- Electronic data processing Laboratories: testing, research and [SFM] instruction
- Motor vehicle showrooms
- Post offices
- Print shops
- Professional services (architects, attorneys, dentists, physicians, engineers, etc.)
- Radio and television stations
- Telephone exchanges
- Training and skill development not within a school or academic program

The seismic upgrade triggers included in the CBC are all tied to changes in occupancy or use [Title 24, Section 3408.4]. Therefore, if your building is covered by the CBC without local amendments you will need to determine the approved use of the building (e.g., how it was classified when it was permitted) and confirm that the intended use after the renovation are in the same group.

The CBC states that an existing building will have to “conform to the seismic requirements for a new structure” when a change of use is contemplated that intensifies the use (e.g., increase the number of occupants and/or the amount of combustible materials stored in the building). This means that the building, as renovated, will have to meet all current strength requirements, and depending on the age of the existing building, this can be costly. This is due in part to the code-required strength levels that have systematically increased over several decades as engineers have concluded that the expected demands on buildings from earthquakes in our area are greater than previously anticipated.

Therefore, assuming your building was classified as Group B and the intended use falls clearly into one of the listed Group B uses, and the building is subject to the CBC without local amendments, no seismic strengthening will likely be triggered by the renovation work.

San Francisco Seismic Triggers

In San Francisco, the building code has been amended to require building owners to upgrade their building(s) as they are renovated. The type and scope of the renovation will determine the amount of structural work required. However, when seismic work is triggered, it typically does not have to meet the full strength levels as defined by the CBC, which can significantly reduce the cost of the seismic work. [See San Francisco Structural Design Requirements vs. CBC Requirements below.]

There are many different triggers in San Francisco. Mainly they break down into three categories:

- Increase in building size or occupant load
- Structural modifications or repairs
- Extent of renovation

Increase in building size or occupant load:

Assuming there is no change of use or occupant load and the building size is increased through

a **vertical addition** (e.g. added story), the new addition will likely have to meet the CBC requirements and the vertical load path from the addition to the foundation will have to be adequate to carry the new loads. Projects that include vertical additions should be reviewed early on in the design process by a structural engineer to confirm the existing structural elements are adequate to handle the loads and will meet current demand/capacity regulations as defined in Sections 1609 and 1613 of the CBC.

Assuming there is no change of use or occupant load, and the building size is increased through a **horizontal addition**, and the area of the horizontal addition is less than 30% of the original building area (as defined by SFBC 3403.4.1.1), only the new addition will likely have to meet the SFBC upgrade requirements with no upgrades required for the remainder of the building. Larger horizontal additions that are not isolated structurally from the original building structure will likely have to be built to CBC standards and the original building will likely have to meet SFBC upgrade requirements. If the structure of the new horizontal addition can be isolated, then only the new structure will likely have to meet CBC standards with no upgrade required for the original building. If the anticipated project changes the use, which in turn increases the occupant load by 10% and the occupant load for the building is more than 100, the entire building will likely have to meet the SFBC upgrade requirements.

Structural Repairs and Modifications:

Structural modifications are those which typically change columns, beams and shear walls or braces. If the structural work you would like to do is repair or replace more than 30% of the floor or roof areas and/or their structural supports (cumulative, beginning on May 21, 1973), – the entire building will likely have to meet the SFBC upgrade requirements.

It should be noted that seismic upgrades to the structural system, which are not triggered by a renovation or addition, can be done on a voluntary basis and typically will not trigger other seismic requirements. The upgrades may trigger accessibility upgrades (or other life-safety requirements) and you should consult with a registered architect prior to proceeding on the design work.

Extent of Renovation:

Depending on how much of the building is to be remodeled by non-structural Tenant Improvements (TI), the TI work may also trigger seismic upgrades. What is somewhat unique in this requirement is that the renovation work over the last two years is taken into account along with the renovation project in question. Be aware that it is possible that a small Tenant Improvement project on one floor of a multistory building could, where other projects have been completed over the last two years, trigger a full upgrade to the building. The trigger is defined as where two-thirds or more of the floors (excluding basements) in the building are "Substantially Altered" (e.g., partitions or ceilings are renovated or have been changed in the last two years, per SFBC 3404.7). In this event, the entire building will likely have to meet the SFBC upgrade requirements.

So assuming there is no change of use or occupancy, and the project is limited to one floor or less in a multistory building that has not seen any renovation activity for at least two years it is unlikely that it will trigger any seismic upgrading.

San Francisco Structural Design Requirements vs. CBC Requirements

In the event your project must meet SFBC seismic requirements when triggered by a renovation or addition, the force levels and other detailed standards contained in the current CBC have been relaxed somewhat. The main item is that the seismic force level is only 75% of the requirement in the CBC. Also, what is referred to as the near-field effect factor as required in the CBC to account for the proximity of active faults and the subsequent increase in force levels is held a 1.0 (or no required increase for nearby faults.) However, for most buildings (less than five or six stories) in most parts of San Francisco (closer to downtown), there are no near field effects, due to

the distance to the nearest active fault. There are a number of other exceptions to the CBC that your engineer can take advantage of when designing seismic upgrade projects in San Francisco.

There are also a number of other minor exceptions and you may find that even your structural engineer may not have a clear picture on how the specific regulations apply to a particular project. In this event, building permit applicants are encouraged to request that their architects or engineers apply for a Pre-Plan Review meeting to discuss the project in detail with the building department officials. That way, the seismic triggering issues and the subsequent design requirements can be clarified and documented in writing before proceeding with the construction documents and permit application. This will speed up the department plan review and avoid costly surprises and delays in the permit application process.

Also, it should be pointed out that the building code is a minimum standard, and therefore not only can you exceed the requirements contained therein, but you are encouraged to do so whenever feasible.

With the help of your architect or structural engineer the seismic upgrade issues can be identified and quantified early on in the design process, so that all the parties to a lease will know their respective responsibilities and minimize their exposure to surprises in the tenant improvement process. And the earlier the question of whether a seismic upgrade will be triggered can be determined, the more time will be available to design cost-effective solutions to meet the requirements.

About the Author

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Ned is also Chair of the Code Advisory Committee to the San Francisco Building Inspection Commission. The Code Advisory Committee (CAC) consists of 17 members who are qualified by training and experience to deliberate and make recommendations on matters pertaining to the development and improvement of the content of the San Francisco Building Code, Mechanical Code, Electrical Code, Plumbing Code, Green Building Code and Housing Code as well as related rules and regulations or proposed ordinances that the Director of the Building Inspection Department determines may have an impact on construction permits. Specific recommendations of this Committee are directed to the Building Inspection Commission for their further action. Additional information.

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