



The Earthquake Retrofit Law Explained



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TABLE OF CONTENTS

Introduction	3
Overview	4
Earthquake Retrofit Ordinance	7

ABOUT THE AUTHOR

This package was prepared by Iconic Investments with assistance and information provided by Jay Kumar, Technical Director & Project Manager at Partner Engineering and Science, Inc., a leading engineering, environmental, and sciences consulting firm with offices in 30 regions serving all 50 states. Mr. Kumar has over 10 years of experience with a variety of structural engineering, seismic design and seismic due-diligence engagements.

Most recently Mr. Kumar has been engaged with the analysis and structural design of seismic strengthening for collapse vulnerable buildings in the greater Los Angeles area. His area of expertise centers on the strengthening and retrofit of “soft-story” multi-family buildings.

Mr. Kumar has assisted lending institutions in their development of seismic risk policies used to determine which types of properties are prone to elevated levels of earthquake damage and or collapse.

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INTRODUCTION

In October 2015 the Los Angeles City Council unanimously approved one of the nation's toughest retrofitting ordinances, mandating seismic upgrades aimed at improving earthquake safety in over 14,000 buildings throughout the city. This ordinance directly affects owners and tenants of apartment buildings built prior to 1978 with soft, open, or weak wall lines. This typically corresponds to building sections supported by slender columns with larger tuck-under parking at the ground level. These properties have been deemed to be most at risk in an earthquake event.

In this guide, we'll help you to understand if and how this ordinance may affect you and your tenants, and how to navigate the complex process of compliance. We believe every owner should be informed.



OVERVIEW

WHY THE PROPOSED LAW?

Moderate to severe earthquakes are common in Los Angeles and throughout California. The 1994 Northridge earthquake killed 57 people, many resulting from collapses of soft-story apartment buildings, and caused approximately \$20 billion in damage. At the time it was considered to be one of the deadliest and most expensive natural disasters in US history.

The likelihood of another major earthquake occurring in Los Angeles is high, and city officials want to minimize both the potential for loss of life and economic impact. City officials acknowledge it is not a question of if, but when.

WHO WILL IT AFFECT?

The Los Angeles City Council and Mayor Garcetti's office recently approved a mandatory seismic strengthening ordinance that affects two groups of buildings known to be vulnerable to earthquake damage. These are:

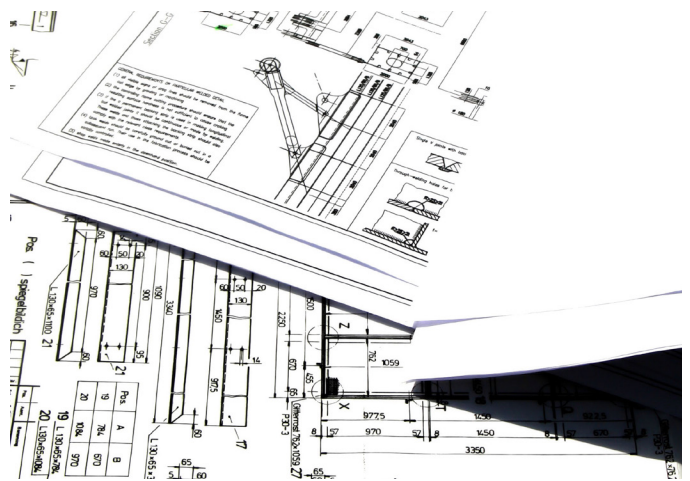
- Wood framed multi-family buildings with areas of tuck-under parking - with soft line or weak line configurations - that were constructed under permits filed before January 1, 1978.
- Non-Ductile Concrete Buildings constructed prior to January 13, 1977

The "soft story" or soft line/weak line building configuration is common to apartment buildings in Los Angeles, and is known to be especially vulnerable to earthquake damage and potential collapse. The proposed ordinance will require landlords to reinforce and strengthen these properties. The Los Angeles Department of Building and Safety has so far pre-identified approximately 13,000 buildings within the city limits that have a condition.

The ordinance, which is now law, requires owners of vulnerable buildings to *complete seismic upgrades within 7 years* once they are notified that their buildings must be strengthened. *Within 2-years after service of the order the Building Owner must submit to the Building Department a structural analysis and/or plans that demonstrate compliance* or include the proposed structural alteration to meet the requirements of Division 93. *Within 3½-years after service of the order, property owners must obtain all necessary permits for rehabilitation or demolition.*

WHEN WILL OWNERS BE NOTIFIED?

The ordinance, in it's current form, has designated priorities to help in the implementation and enforcement. These priorities



OVERVIEW



focus on buildings presenting greatest risk to loss of life first. The priorities are as follows:

- Priority I: Buildings with 16 or more units;
- Priority II: Buildings with 3 or more stories, and 16 or less units;
- Priority III: Buildings not falling under the definitions of Priority I or II.

It is important to note that, once an owner is given notification of retrofit requirements on their property, a notice of work required is recorded on title.

WHAT'S INVOLVED?

A SWOF (Soft, Weak or Open Front) retrofit will typically include the addition of steel moment frames along the open parking areas and are designed to not obstruct the existing parking. Walls surrounding the parking areas may require strengthening with plywood structural panels before new finishes or stucco is re-applied.

HOW MUCH WILL IT COST?

The cost of such retrofits vary widely and will likely range between \$30,000 to \$250,000 for wood-frame buildings, and likely over \$1 million for concrete structures.

Costs are totally dependent on the specific building configuration and scope of work. Construction durations for soft-line strengthening are often 60-days (+/-) and must be carefully planned to avoid tenant relocation or habitability disruptions.

The design, acquisition of building permits, tenant notifications, and construction coordination can be compressed into 6-months but often take longer due to variables.

WHAT ARE THE CURRENT CODES?

The building codes currently in force 2014 LABC and 2013 CBC do not provide perfect guidance to Engineers on how to address SWOF conditions. Additionally, there are a variety of methodologies in existence to improve building strength and stability. This has been a source of confusion among practicing structural engineers and building officials.

The ordinance draws from model codes but is expected to only target localized SWOF deficiencies and not the entire building (except in rare cases) - thereby limiting the scope and the costs. The performance outcome is to create a more

OVERVIEW

earthquake resilient Los Angeles.

ARE THERE ANY FINANCING OPTIONS?

New funding and financing options are developing such as:

A proposal is currently before the City Council that would allow owners of rent controlled properties subject to the ordinance to pass a portion of the costs to tenants through a rental increase. The exact dollar amount and time-frames have not yet been finalized, but the Council is debating a rate of between \$38 and \$50 per month for five or seven years. At best, this option will allow owners to recapture some of the actual costs associated with retrofit.

Property owners may also elect to pursue creative financing solutions - essentially secondary loans - available through lending programs that include the AllianceNRG PACE.

Governor Brown recently vetoed AB428, a bill which would have provided owners with a 30% tax break on the costs of retrofit. New legislation may arise to fill this gap.



RETROFIT ORDINANCE

AMENDMENT TO DIVISIONS 93 & 95 OF ARTICLE I CHAPTER IX LAMC

This section of the amended ordinance applies to wood-frame properties with soft-story parking. The section pertaining to concrete buildings has been omitted, but is available upon request.

Section 1. Division 93 of Article 1 of Chapter IX of the Los Angeles Municipal Code is amended in its entirety to read as follows:

ARTICLE 1, DIVISION 93

MANDATORY EARTHQUAKE HAZARD REDUCTION IN EXISTING WOOD-FRAME BUILDINGS WITH SOFT, WEAK OR OPEN-FRONT WALLS

SEC. 91.9301. PURPOSE.

The purpose of this division is to promote public welfare and safety by reducing the risk of death or injury that may result from the effects of earthquakes on existing wood-frame multi-story buildings with soft, weak or open front walls. In the Northridge Earthquake, many multi-story wood-frame buildings with tuck-under parking performed poorly and collapsed, causing the loss of human life, personal injury and property damage. It has been determined that the structural vulnerability of this building type is typically due to soft, weak or open front walls. This division creates minimum standards to mitigate hazards from these deficiencies. Adherence to these minimum standards will improve the performance of these buildings during earthquakes and reduce, but not necessarily prevent, the loss of life, injury or earthquake-related damage.

SEC. 91.9302. SCOPE.

The provisions of this division shall apply to all existing buildings of wood-frame construction, or wood-frame portions thereof, where:

1. A permit for construction of a new building was applied for before January 1, 1978, or, if no permit can be located, the structure is determined by the Department to have been built under building code standards enacted before January 1, 1978; and 2. The ground floor portion of the structure contains parking or other similar open floor space that causes soft, weak or open-front wall lines, and there exists one or more stories above.

EXCEPTIONS: This division shall not apply to any building containing three dwelling units or less if the building is used solely for residential purposes. Moreover, notwithstanding any provision of this Code, compliance with this division shall not require existing electrical, plumbing, mechanical or fire-safety systems to be altered to comply with existing code unless they constitute a hazard to life or property.

SEC. 91.9303. DEFINITIONS.

The following words and phrases, whenever used in this division, shall be construed as defined in this section. Words and phrases not defined here shall be construed as defined in Division 2 of this Code.

CRIPPLE WALL is a wood-framed stud wall extending from the top of the foundation wall to the underside of the lowest floor framing of the building.

DWELLING UNIT shall include any individual residential unit within either an R-1 or R-2 occupancy building, including a mixed-occupancy building when part of it is either an R-1 or R-2 occupancy. A dwelling unit shall include the area of a building that is occupied as a dwelling unit, whether the building is approved or unapproved for residential use.

GROUND FLOOR is any floor within the wood-frame portion of a

building whose elevation is immediately accessible from an adjacent grade by vehicles or pedestrians. The ground floor portion of the structure does not include any floor that is completely below adjacent grades.

OPEN-FRONT WALL LINE is an exterior wall line, without vertical elements of the lateral force-resisting system, which requires tributary seismic forces to be resisted by diaphragm rotation or excessive cantilever beyond parallel lines of shear walls. Diaphragms that cantilever more than 25 percent of the distance between lines of lateral force resisting elements from which the diaphragm cantilevers shall be considered excessive. Exterior exit balconies of six feet or less in width shall not be considered excessive cantilevers.

QUALIFIED HISTORICAL BUILDING is any building designated or currently in the process of being designated as a "qualified historical building" as defined in Part 8, Title 24 of the California Code of Regulations.

RETROFIT is an improvement of the lateral force-resisting system by alteration of existing structural elements or addition of new structural elements.

SOFT WALL LINE is a wall line, the lateral stiffness of which is less than what is required by story drift limitations or deformation compatibility requirements of this division. In lieu of the engineering analysis required by this division to determine whether a wall line's lateral stiffness is less than the aforementioned story drift limitations or deformation compatibility requirements, a soft wall line may be defined as a wall line in a story where the wall stiffness is less than 70 percent of the stiffness of the exterior wall above for the direction under consideration.

STORY is as defined in this Code, but includes any basement or underfloor space of a building with cripple walls exceeding four feet in height.

STORY STRENGTH is the total strength of all seismic-resisting elements sharing the same story shear in the direction under consideration.

WALL LINE is any length of a wall along a principal axis of the building used to provide resistance to lateral loads.

WEAK WALL LINE is a wall line at the ground floor where the wall strength is less than 80 percent of the strength of the wall above in the direction under consideration.

SEC. 91.9304. PRIORITY DESIGNATIONS.

The Department shall prioritize its enforcement of this division as follows:

Priority I: Buildings containing 16 or more dwelling units.

Priority II: Buildings with three stories or more, containing fewer than 16 dwelling units.

Priority III: Buildings not falling within the definition of Priority I or II.

SEC. 91.9305. COMPLIANCE REQUIREMENTS.

91.9305.1. General. The owner of each building within the scope of this division shall cause a structural analysis to be made of the building by a civil or structural engineer or architect licensed by the state of California, and if the building does not meet the minimum earthquake standards specified in this division, the owner shall cause the building to be structurally altered to conform to such standards or, at the owner's option, cause it to be demolished with-

RETROFIT ORDINANCE

AMENDMENT TO DIVISIONS 93 & 95 OF ARTICLE I CHAPTER IX LAMC

in the time limits stated in Section 91.9305.2.

91.9305.2. Time Limits for Compliance. The owner of a building within the scope of this division shall comply with its requirements within the following time limits:

1. Within one (1) year after service of the order described in Section 91.9306, submit to the Department for review and approval: a. A structural analysis and plans which shall demonstrate the building, as is, meets or exceeds the requirements set forth in Section 91.9309; or b. A structural analysis and plans which shall demonstrate that the proposed structural alteration of the building meets or exceeds the requirements set forth in Section 91.9309; or c. Plans for the demolition of the building.

2. Within two (2) years after service of the order, obtain all necessary permits for rehabilitation or demolition.

3. Within seven (7) years after service of the order, complete construction or demolition work under all necessary permits.

Time limits for compliance shall be based on the service date of the original order from the Department. Transfer of title shall not change compliance dates.

SEC. 91.9306. ADMINISTRATION.

91.9306.1. Issuance of Order. When the Department determines that a building is within the scope of this division, the Department shall issue an order as described in Section 91.9306.4 to the owner of the building.

91.9306.2. Service of Order. The Department shall serve the order in writing, either personally or by certified or registered mail, upon the owner as shown on the last equalized assessment roll. Service by mail shall be deemed complete at the time of deposit in the post office. Proof of giving notice may be made by an affidavit of an employee of the City that shows service in conformity with this division.

91.9306.3. Failure to Receive Order. Failure of the owner to receive an order shall not relieve the owner of any obligation to comply with this division.

91.9306.4. Contents of Order. The order shall specify that the building has been determined by the Department to be within the scope of this division and, therefore, is required to meet the minimum seismic standards described in Section 91.9309. The order shall specify the priority designation of the building and shall be accompanied by a copy of Section 91.9305, which sets forth the owner's alternatives and time limits for compliance.

91.9306.5. Appeal from Order. The owner of any building subject to this division may appeal the Department's initial determination that the building is within the scope of this division to the Board of Building and Safety Commissioners. Such appeal shall be filed with the Board within 60 days from the service date of the order. Any such appeal shall be decided by the Board no later than 60 days after the date that the appeal is filed. Such appeal shall be made in writing upon appropriate forms provided by the Department, and the grounds of the appeal shall be stated clearly and concisely. Each appeal shall be accompanied by a filing fee as set forth in Table No. 4-A of Division 4 of Article 8 of Chapter IX of the Los Angeles Municipal Code.

Requests for slight modifications from any other determinations, orders or actions by the Department pursuant to this division shall be made in accordance with the procedures established in Section

98.0403.2 of the Los Angeles Municipal Code.

91.9306.6. Recordation. At the time that the Department serves the order described in this section, the Department shall file with the Office of the County Recorder a certificate stating that the subject building has been determined to be within the scope of this division, and that it has been ordered to be structurally analyzed and structurally altered or demolished (if the owner so decides), pursuant to Section 91.9305.2, if the Department determines that it does not conform to the minimum design standards of this division.

The Department shall file with the Office of the County Recorder a certificate terminating the above recorded status of the subject building if the building is thereafter demolished by owner pursuant to Section 91.9305.2, found not to be within the scope of this division, or is determined to be structurally capable of resisting minimum seismic forces as a result of structural alterations or analysis required by this division.

SEC. 91.9307. OCCUPANT AND TENANT ADVISORY.

91.9307.1. Notification to Tenants and Occupants. When the Department determines that a building falls within the scope of this division, the owner shall advise all current and prospective residential and non-residential tenants, subtenants, lessees sublessees, or any other person(s) entitled to the use and/or occupancy of the building of such determination. With respect to current and prospective residential tenants, subtenants, lessees, sublessees, or other person(s) entitled to the use and/or occupancy of the building, the property owner shall advise such persons of the Department's determination in a method and written format approved and promulgated by the Los Angeles Housing and Community Investment Department. With respect to current and prospective non-residential tenants, subtenants, lessees, sublessees, or other person(s) entitled to the use and/or occupancy of the building, the owner shall advise such persons of the Department's determination in a method and written format approved and promulgated by the Department.

91.9307.2. Tenant Habitability Plan. If required by the Rent Stabilization Ordinance, the property owner shall be required to submit to the Los Angeles Housing and Community Investment Department a Tenant Habitability Plan pursuant to Article 2, Chapter XV of the Los Angeles Municipal Code (L.A.M.C. Section 152.03B). If, upon review of the Tenant Habitability Plan, it is determined by the Los Angeles Housing and Community Investment Department that work required under this division affects the tenantability of any building or residential unit as defined in California Civil Code Section 1941.1, the owner shall be required to pay relocation benefits pursuant to Article 1, Chapter XV of the Los Angeles Municipal Code (L.A.M.C. Section 151.09G) to any tenant, subtenant, lessee, sublessee, or other person(s) entitled to the use and/or occupancy of the building that is affected by the untenable conditions or displaced from the residential unit. However, the mere undertaking and completion of work performed by the owner pursuant to this division shall not, in and of itself, result in any building or residential unit being deemed untenable or uninhabitable as defined in California Civil Code Section 1941.1.

SEC. 91.9308. HISTORICAL BUILDINGS.

Qualified historical buildings shall comply with requirements of the California Historical Building Code established under Part 8, Title 24 of the California Code of Regulations.

RETROFIT ORDINANCE

AMENDMENT TO DIVISIONS 93 & 95 OF ARTICLE I CHAPTER IX LAMC

SEC. 91.9309. ENGINEERING ANALYSIS.

91.9309.1. Scope of Analysis. This division requires the alteration, repair, replacement or addition of structural elements and their connections to meet the strength and stiffness in conformance with this Code except as modified herein. The lateral-load-path analysis shall include the resisting elements and connections from the wood diaphragm immediately above any soft, weak or open wall lines to the foundation. Stories above the weak wall line shall be considered in the analysis but need not be modified.

91.9309.2. Design Base Shear and Design Parameters. The design force in a given direction shall be 75% of the design base shear specified in the seismic provision of ASCE 7.

91.9309.3. Lateral Vertical Systems. Strengthening systems with concrete walls or masonry walls, or steel braced frames shall be not be permitted.

91.9309.4. Horizontal Structural Irregularities in Buildings with Three or More Stories. Structures with three or more stories having horizontal structural irregularities of either type 2, 3, 4, or 5 listed in ASCE 7, "Horizontal Structural Irregularities" Table, shall be altered to meet the additional requirements of those sections referenced in the table for the entire story with weak or open wall lines.

91.9309.5. Alternate Analysis, Base Shear and Design Parameters. Pursuant to Section 91.104.2.6, the Department may approve alternate design methodologies that improve the whole first story seismic performance that are at least equivalent to those prescribed by this division and that achieve the life safety objectives established by this division.

91.9309.6. Additional Anchorage Requirements for Buildings on Hillside. Where any portion of a building within the scope of this division is constructed on or into a slope steeper than one unit vertical in three units horizontal (33-percent slope), the lateral-force-resisting system, at and below the base level diaphragm, shall also be analyzed for the effects of concentrated lateral loads caused at the building base from the hillside conditions and comply with the provisions of Chapter 94 of the Los Angeles Building Code.

91.9309.7. Story Drift Limitations. The calculated story drift for each retrofitted story shall not exceed the allowable deformation compatible with all vertical load-resisting elements and 0.025 times the story height. The calculated story drift shall not be reduced by the effects of horizontal diaphragm stiffness, but shall be increased when these effects produce rotation. Drift calculations shall be in accordance with ASCE 7 requirements.

91.9309.8. Pole Structures. The effects of rotation and soil stiffness shall be included in the calculated story drift where lateral loads are resisted by vertical elements whose required depth of embedment is determined by pole formulas. The coefficient of subgrade reaction used in deflection calculations shall be based on an approved geotechnical investigation conducted in accordance with approved geotechnical engineering reports.

91.9309.9. P-Delta Effect. The requirements of the Los Angeles Building Code shall apply, except as modified herein. All structural framing elements and their connections not required by the design to be part of the lateral force resisting system shall be designed and detailed to be adequate to maintain support of design dead plus live loads when subject to the expected deformations caused by seismic forces. The stress analysis of cantilever columns shall

use an effective length factor of 2.1 for the direction normal to the axis of the beam.

91.9309.10. Ties, Continuity and Collectors. All parts of the structure included in the scope of analysis shall be interconnected and the connection shall be capable of resisting the seismic force created by the parts being connected as required per the Los Angeles Building Code.

SEC. 91.9310. INFORMATION REQUIRED ON PLANS.

91.9310.1. General. For existing and new construction, the plans and specifications shall be of sufficient clarity to indicate the nature, design methodology, and extent of the proposed work and to show in detail that it will conform to the provisions of this division and the Los Angeles Building Code.

91.9310.2. Engineer's or Architect's Statement. The responsible engineer or architect shall provide the following statements on the approved plans: "I am responsible for designing this building's seismic strengthening in compliance with the minimum standards of the Mandatory Earthquake Hazard Reduction In Existing Wood-Frame Buildings with Soft, Weak or Open-Front Walls"

SEC. 91.9311. VIOLATION/PENALTY.

Notwithstanding any other provision of this Code to the contrary, it shall be unlawful for any person, firm or corporation to maintain, use or occupy any building within the scope of this division that fails to meet the minimum earthquake standards specified in this division after receiving an order described in Section 91.9306.

Any person who violates or causes or permits another person to violate this division is guilty of a misdemeanor, and shall be subject to prosecution and/or administrative enforcement under the Los Angeles Municipal Code. For purposes of this paragraph, "any person" includes an owner, lessor, sublessor, manager or person in control of a building subject to this division. This term shall not include any person who is merely a tenant or other individual occupying any dwelling unit, efficiency dwelling unit, guest room or suite in a building. The legal owner of a building is that person, firm, corporation, partnership or other entity whose name or title appears on the record with the Office of the County Recorder, as well as all successors or assignees of these persons.

EXCEPTION: This section shall not apply to any building on which work is proceeding in compliance with the time limits set forth in this division, or in compliance with any extensions of time granted by the Department or the Board; or any action, order or determination made by the Department or the Board in the implementation of this division.

SEC. 91.9312. SEVERABILITY.

If any subsection, sentence, clause or phrase of this article is for any reason held to be invalid or unconstitutional by a court of competent jurisdiction or by reason of any preemptive legislation, such decision or legislation shall not affect the validity of the remaining portions of this ordinance. The City Council hereby declares that it would have adopted this section, and each and every subsection, sentence, clause and phrase thereof not declared invalid or unconstitutional, without regard to whether any portion of the ordinance would be subsequently declared invalid or unconstitutional.