

WOOD FRAME SOFT-STORY RETROFIT PROGRAM

CACP Presentation

March 21, 2018

Soft-Story Retrofit Unit

City of Los Angeles

Department of Building and Safety



How Did This Program Start?

California, Health and Safety Code, HSC § 19160, 19161

- 19160 Effective 1/1/2006, **Encourage** cities and counties to address the seismic safety of soft-story residential buildings.....
- 19161 Effective 1/1/2007, Each city or county, **may assess** the earthquake hazard in its jurisdiction and identify buildings subject to its jurisdiction as being potentially hazardous to life in the event of an earthquake. Potentially hazardous buildings include the following:
 - *Wood-frame, multiunit residential buildings **constructed before January 1, 1978**, where the ground floor portion of the structure contains parking or other similar open floor space that causes soft, weak, or open-front wall lines, equivalent standards.....*

Effective 5/21/1998:

Ordinance 172,018 added Division 93 to the Los Angeles Building Code:

Voluntary Earthquake Hazard
Reduction in Existing Wood Frame
Residential Buildings with Soft, Weak,
or Open Front Walls

- Mayor Eric Garcetti appointed renowned seismologist Dr. Lucy Jones as Science Advisor for Seismic Safety for the City of Los Angeles in 2014
- In 2016 'Resilience By Design' report published highlighting four critical areas of seismic vulnerability and attainable solutions:

1. Retrofit of Non-Ductile Concrete Buildings
2. Retrofit of Soft-Story Wood Frame Buildings
3. Water System Infrastructure Upgrades (including impact on firefighting capability)
4. Telecommunications Infrastructure Upgrades

What is a Soft-Story Building?

- Loosely speaking, a structure that has:

Weaker/Softer first floor

Inadequate to resist the lateral load of the stories above during an earthquake due to large openings on first floor, such as **garages, tuck-under parking, large windows, and/or large overhang / Cantilever**



Examples of Possible Soft-Story Buildings









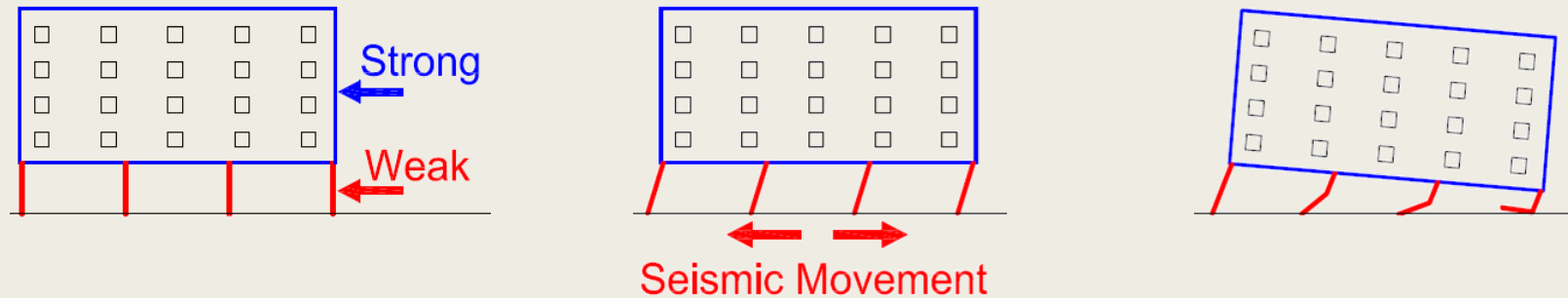






Why Retrofit?

Without proper strengthening, the soft-story floor becomes weak and may suffer structural damage or complete failure during and/or after an earthquake.



1994 Northridge Earthquake



1994 Northridge Earthquake



1994 Northridge Earthquake



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1994 Northridge Earthquake



Seismic Design Objective for Apartments, Offices, Retail...etc.

*The Building Code emphasizes on
Collapse prevention,
Life and Safety,*

The building sustains substantial damage in an earthquake, but remains stable and with significant reserve capacity. Occupants have an opportunity to egress the structure.

*but not necessarily for
Immediate Occupancy or Operational*

Northridge Earthquake Aftermath

Los Angeles Times

CIRCULATION:
1,228,353 DAILY / 1,521,197 SUNDAY

TUESDAY, JANUARY 18, 1994
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DAILY 35c
DESIGNATED AREAS HIGHER

33 Die, Many Hurt in 6.6 Quake

L.A. Area Freeways Buckle, Buildings Topple

Sylmar Jolted by Ghosts of Horror Past

■ **History:** The city that crumpled under a 6.5 quake in 1971 remembers well the terror that came when the earth gave way. On Monday, it seemed like it was cursed.

By CRAIG TURNER
and RICHARD E. MEYER
TIMES STAFF WRITERS

Beate Heuss had nearly conquered her fear when she felt it again.

That's why it was so terrifying. It was happening again. She and her husband, David, were in bed, like the last time. In a mobile home, just like the last time. It was, in fact, the same mobile home, at the same trailer park.

"This one felt much worse," she said afterward, calm but able to remember every tremor, then the shaking, then the violence. "It was much harder, a hard jolt. The '71 one swayed a little." But this one did not sway. It simply slammed David and Beate Heuss and their



The body of LAPD Officer Clarence W. Dean lies near his motorcycle, which he had thrown over the side of the freeway, as he was driving on the Golden State Freeway during Monday's earthquake.

■ **Disaster:** Epicenter is in Northridge, where three-story apartment complex pancakes. Ruptured gas lines erupt in fire in strongest tremor in city's modern history.

By TRACEY KAPLAN
and GREG KRIKORIAN
TIMES STAFF WRITERS

A deadly magnitude 6.6 earthquake—the strongest in modern Los Angeles history—ripped through the pre-dawn darkness Monday, awakening Southern California with a violent convulsion that flattened freeways, sandwiched buildings, ruptured pipelines and left emergency crews searching desperately for bodies trapped under the rubble.

The 10-second temblor, which was not the long-dreaded Big One but erupted so fiercely that it initially seemed every bit as intense, was blamed for at least 33 deaths—nearly half of which occurred when a three-floor apartment complex near the epicenter in Northridge collapsed into two stories.

Triggered by a fault that squeezed the northern San Fernando Valley between two mountain ranges like a vise, the 4:31 a.m. earthquake swamped hospitals with hundreds of injured victims and left thousands more homeless as fires, floods and landslides dotted a landscape that has been visited by destruction with dis-

How Can the City be Resilient?

Passed Ordinance 183,893 on **October 9, 2015** to mandate retrofit for these type of buildings which became effective November 22, 2015

ORDINANCE NO. 183893

An ordinance amending Divisions 93 and 95 of Article I of Chapter IX of the Los Angeles Municipal Code to establish mandatory standards for earthquake hazard reduction in existing wood-frame buildings with soft, weak, or open-front walls and existing non-ductile concrete buildings, and amending Sections 152.02, 152.04, 152.05 and 152.08 of Article 2 of Chapter XV of the Los Angeles Municipal Code to grant authority to the Rental Adjustment Commission to modify Tenant Habitability Program requirements for purposes of implementing seismic retrofit mandates.

Replaced LABC Chapter 93 (originally as voluntary work)

What is the Purpose?

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.

*Los Angeles Building Code
Chapter 93, Titled as:*

Mandatory Earthquake Hazard
Reduction In Existing Wood-
Frame Buildings with Soft,
Weak or Open Front Walls

What is the Focus for Engineers and Architects?

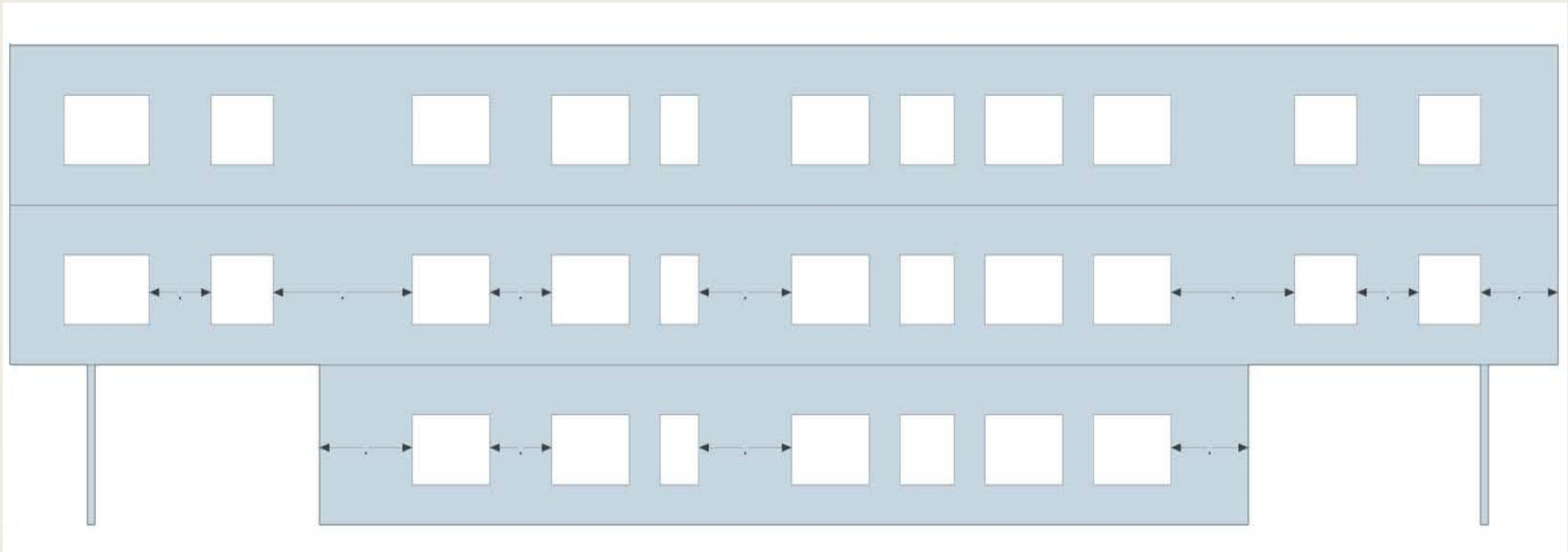
The ordinance is a prescriptive design focusing on the following wall lines, not the entire story as in San Francisco

- Open-Front Wall Line
 - *Wall line without a vertical elements of the lateral force resisting system. Cantilever $\leq 6'$ is OK*
- Soft Wall Line
 - *Stiffness $< 70\%$ of wall line above, P / Δ*
- Weak Wall Line
 - *Strength $< 80\%$ of wall line above*

Open Front Wall Line



Weak Wall Line



- For a quick check to determine weak wall line
 - Total length of wall piers* on 1st story < 80% of total length of wall piers* on 2nd story
 - *Wall piers must have H/W ratio ≤ 2
- For example: width of wall piers $\geq 4'$ for wall height of 8'

Other Los Angeles City Mandatory Seismic Retrofitting Programs

■ Chapter 88:

- *Earthquake Hazard Reduction in Existing Buildings - Unreinforced Masonry Buildings (URM)*

■ Chapter 91:

- *Earthquake Hazard Reduction in Existing Tilt-Up Concrete Wall Buildings*

■ Chapter 95:

- *Earthquake Hazard Reduction in Existing Non-Ductile Concrete Buildings*

Other Los Angeles City Voluntary Seismic Retrofitting Programs

■ Chapter 92:

- *Earthquake Hazard Reduction in Existing Wood Frame Residential Buildings with Weak Cripple Walls and Unbolted Sill Plates*

■ Chapter 94:

- *Earthquake Hazard Reduction in Existing Hillside Buildings (on Slopes Greater Than 33%)*

■ Chapter 96:

- *Earthquake Hazard Reduction in Existing Reinforced Concrete and Reinforced Masonry Wall Buildings with Flexible Diaphragms*

Other Jurisdictions with Mandatory Soft-Story Retrofit Programs

- City of San Francisco
- City of West Hollywood
- City of Santa Monica
- Other Smaller Northern California Cities
 - *Fremont*
 - *Alameda*
 - *Berkeley*

Which Buildings are Affected?

- Buildings that meet the following criteria:
 - *Consist of 2 or more stories wood frame construction*
 - *Built under the building code standards enacted before January 1, 1978*
 - *Large opening(s) on the first floor or overhang*



What Buildings are Exempted?

Residential Buildings
with 3 units or less



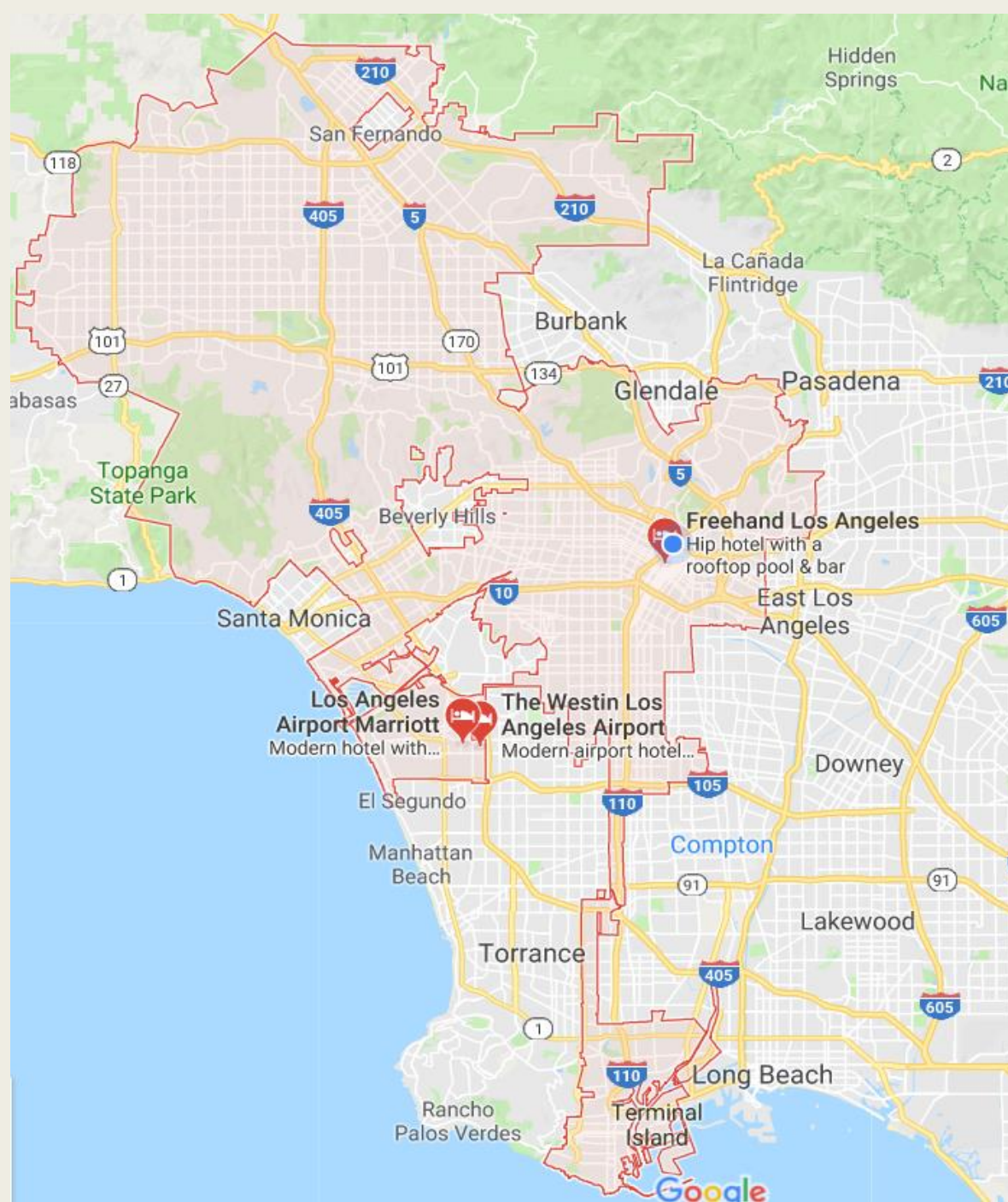
Buildings Designed with
Steel/Concrete Moment Frames,
Concrete Shear Walls or Masonry

Concrete at 1st level
(Concrete Podium)



How to Identify Possible Soft-Story Buildings

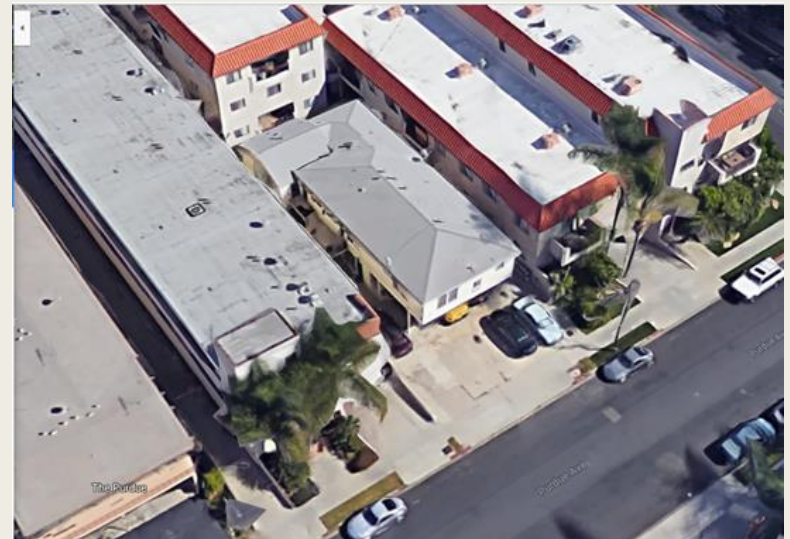
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- **Apartments** – Approximately 36,000 Rent Stabilization Ordinance (RSO) buildings from Los Angeles City Housing Department inventory
 - *Buildings were constructed on or before October 1, 1978*
- **Condominiums** – Approximately 3,500 buildings (30,000 units) from LA County Tax Assessor inventory
 - *Buildings were constructed on or before October 1, 1978*
- **Commercial** – Found by Inspection staff during field investigations

How Did we Filter the Raw Data of Addresses

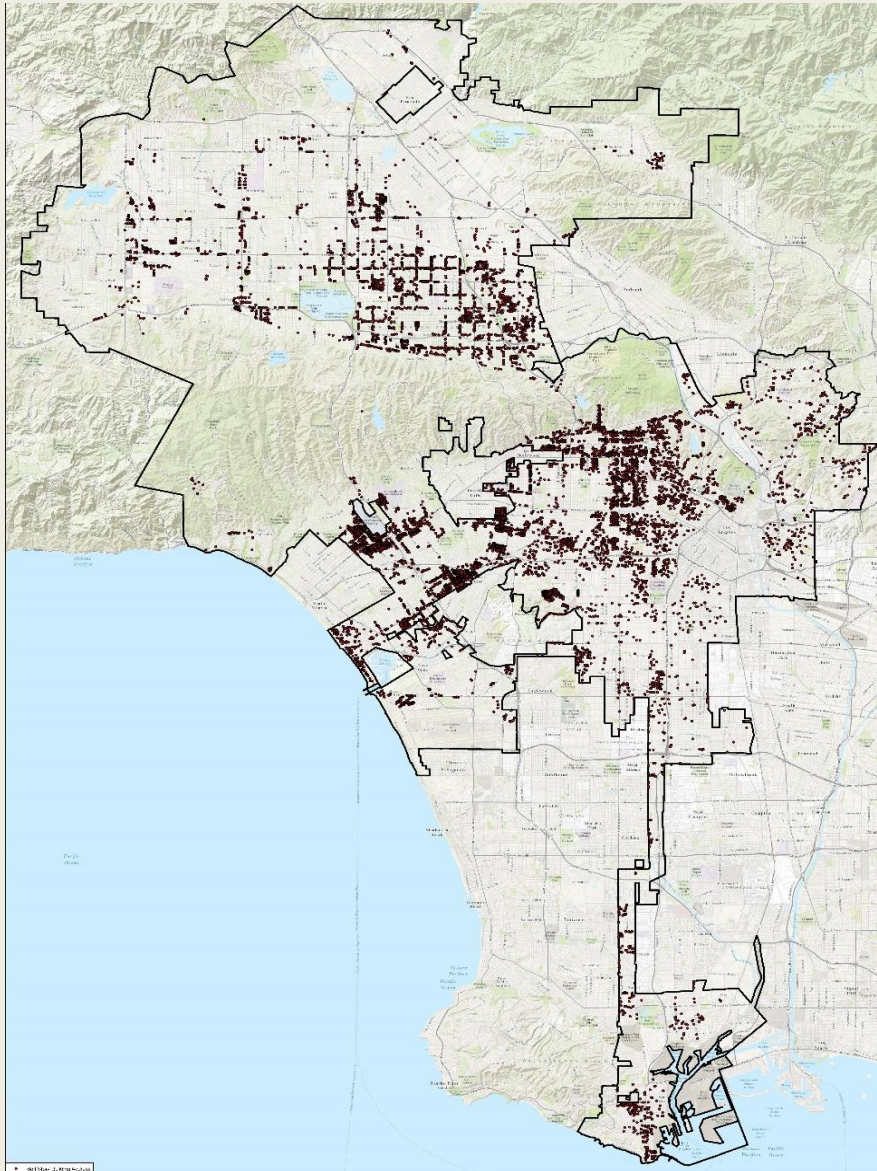
- Applied aerial map applications (Google Earth, Pictometry) for street view and oblique view



How Did we Filter the Raw Data of Addresses

- Researched Building Permits – Verified plan check submittal date, type of construction and use (apartment, condo, commercial)
- After raw data filtered to approximately 25,000 buildings
 - *Inspector visited each building to verify soft-story condition*
 - *Included written report and photos of each building elevation (all four sides of building)*

How Many are There in LA City?



LADBS has identified
~ **14,900** buildings

- 22% \geq 3 stories
- 13,550 apartments
- 1,350 condos and commercial
- **Over 170,000 affected families**

Los Angeles City Action Plan

- Sent out **Courtesy Notification** letters in early 2016 to all affected building owners
- Sent out **Order to Comply (OTC)** letters to all affected building owners
 - *From May 2016 thru Dec 2017*
 - *Approximately 23,000+ OTCs already sent out*
- **Certificate of Substandard Property lien** will be recorded against the property– this may have an adverse impact for owners to sale or refinance, if no action is taken!

OFFICIAL BUSINESS
Document entitled to free recording per Government
Code Sections 6103 and 27383

Recording Requested by and When Recorded Return to:

LOS ANGELES DEPARTMENT OF BUILDING
AND SAFETY
SOFT-STORY RETROFIT UNIT
201 N. Figueroa Street, Suite 890
Los Angeles, CA 90012

SPACE ABOVE THIS LINE FOR RECORDER'S USE

CERTIFICATE OF SUBSTANDARD PROPERTY
(Mandatory Seismic Retrofit Ordinance)

Pursuant to Los Angeles Municipal Code (LAMC) § 91.9305.2, the Superintendent of Building of the City of Los Angeles hereby gives notice that the building located on the property described herein is within the scope of Division 93, Article I, Chapter IX of the LAMC (Mandatory Earthquake Hazard Reduction in Existing Wood-Frame Buildings with Soft, Weak or Open-Front Walls). The current owner of record has been ordered to structurally analyze the building and to comply with the minimum design standards of Division 93 by, either structurally altering or, at the owner's option, demolishing the building.

The affected property is legally described as follows: _____ as recorded in _____
of the Records of the Office of the County Recorder of the County of Los Angeles, which property is
located at and known as _____, currently in the name(s) of _____

Reference is made to Initial Determination Order No. _____ on file in the office of the Superintendent of Building.

This Certificate of Substandard Property shall continue in force until the Superintendent of Building records a Certificate of Compliance. For further information concerning this Certificate, contact the Department of Building and Safety, Soft-Story Retrofit Unit, City of Los Angeles.

DATED: This 16th day of March, in the year 2017.

Department of Building and Safety
City of Los Angeles
Superintendent of Building

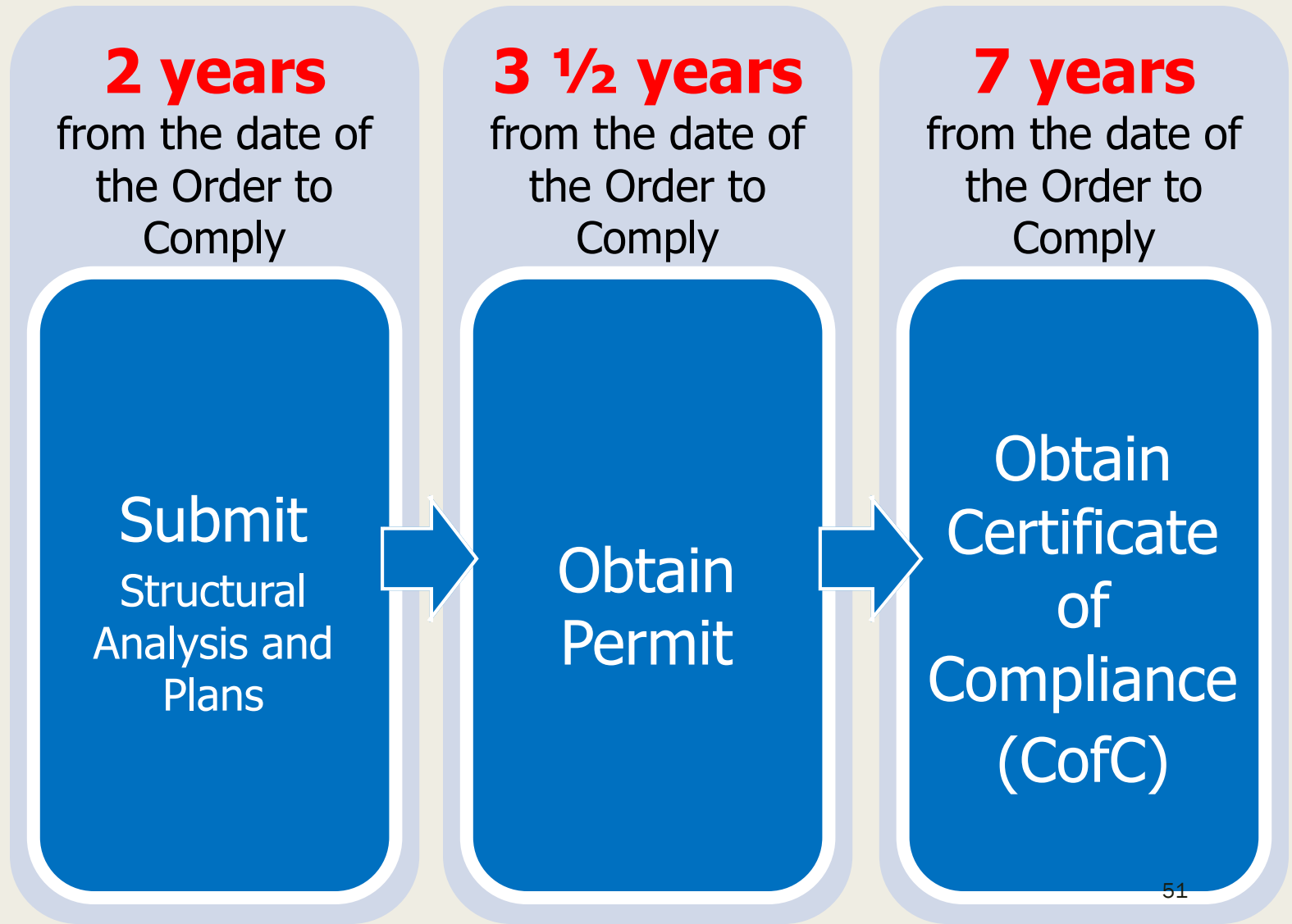
By: _____

Chief of Soft-Story Retrofit Unit
Building Civil Engineer

When Did We Send Out the OTCs?

Priority	Categories	Start Date
I. ≥ 16 units	≥ 3 -story	May 2, 2016
	2-story	July 22, 2016
II. ≥ 3 -story	≤ 16 units	October 17, 2016
III. Not in I or II	9 – 15 units	July 24, 2017
	7 - 8 units	August 21, 2017
	4 – 6 units	October 2, 2017
	Condos /Commercial	November 6, 2017

How Soon Do Owners Have to Comply?



First Compliance Date is Approaching in May 2018!

- First Orders to Comply sent out almost 2 years ago (May 2, 2016)
- City currently sending out Final Notification Warning Letters
- If still in non-compliance and no action taken by owner by compliance date
 - *a Non-Compliance Letter will be sent to owner*
 - *Includes an invoice of \$660.00*

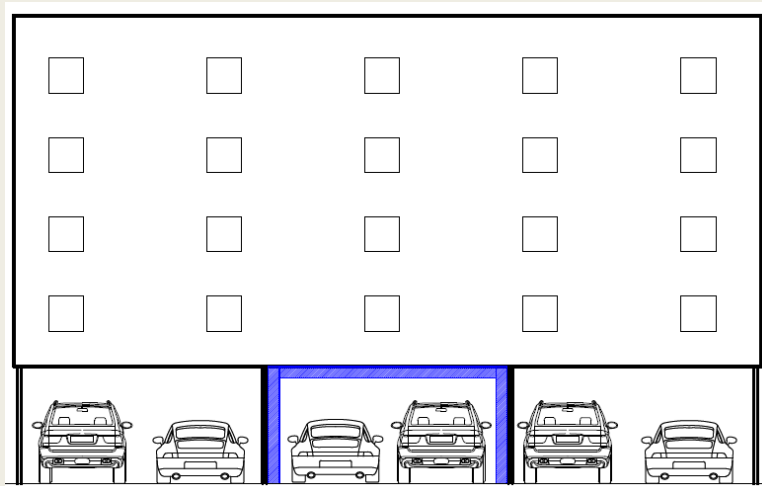
Consequences for Non-Compliance

- Will subject owner to non-compliance fee of \$660
- Additional penalties may be incurred if non-compliance fee not paid and still no action taken by owner
 - *Additional fees of \$2,330 or more plus interest*
 - *Possible jail time*

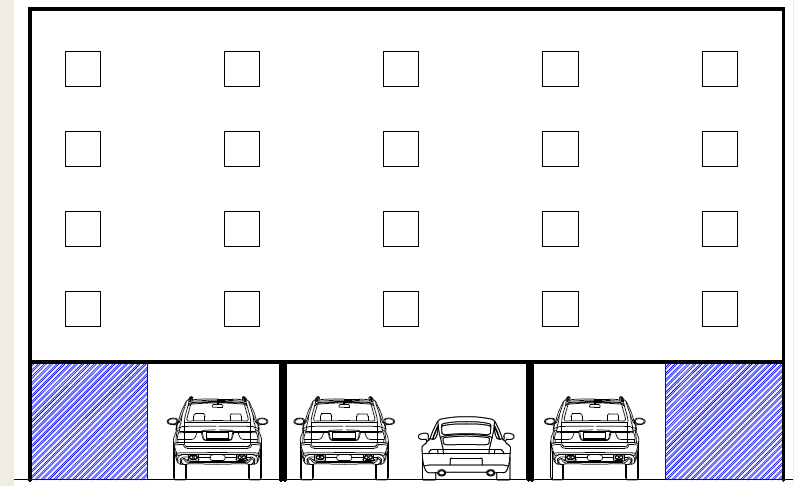
Current Status of Soft-Story Program as of March 5, 2018

- 30% of approximately 14,900 buildings have submitted plans for plan check review
- 12% of approximately 14,900 buildings have pulled permits for construction
- 5% of approximately 14,900 buildings have completed retrofit work and have been issued a Certificate of Compliance (CofC)

What are the Typical Strengthening Systems?



MOMENT FRAME *



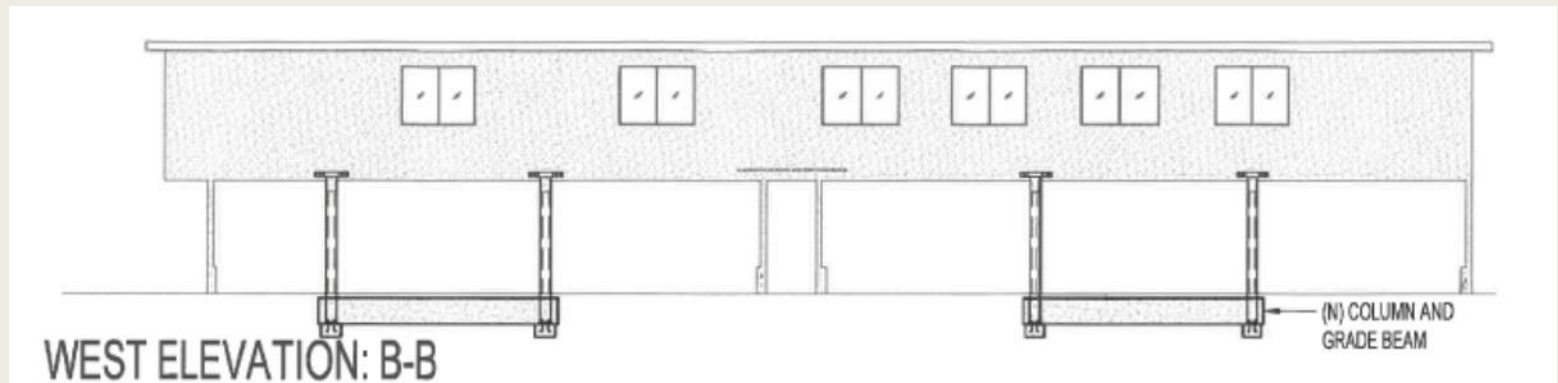
SHEAR WALLS**

* Custom design or use proprietary products

** Concrete or masonry walls are prohibited.

** May affect Tenant Habitability

What are the Typical Strengthening Systems?



1. **ORDINARY & SPECIAL CANTILEVER COLUMN SYSTEMS WITH GRADE BEAM OR**
2. **DEEP POLE FOUNDATION***

* Deep Pole Foundations require a Soils Report Investigation and may need CAL/OSHA approval, also may affect workability

Retrofit Under Construction



Retrofit Under Construction



Retrofit Under Construction



Completed Retrofit



Completed Retrofit



Completed Retrofit



Completed Retrofit



Completed Retrofit



What Does the Owner Need to Do First?

- Hire a State of California licensed Engineer or Architect who shall provide the following:
 - *Structural Analysis*
 - *Architectural and Structural Plans*
- To find an Engineer visit *Structural Engineers Association of Southern California (SEAOSC)*:
 - www.seaosc.org/find-an-engineer

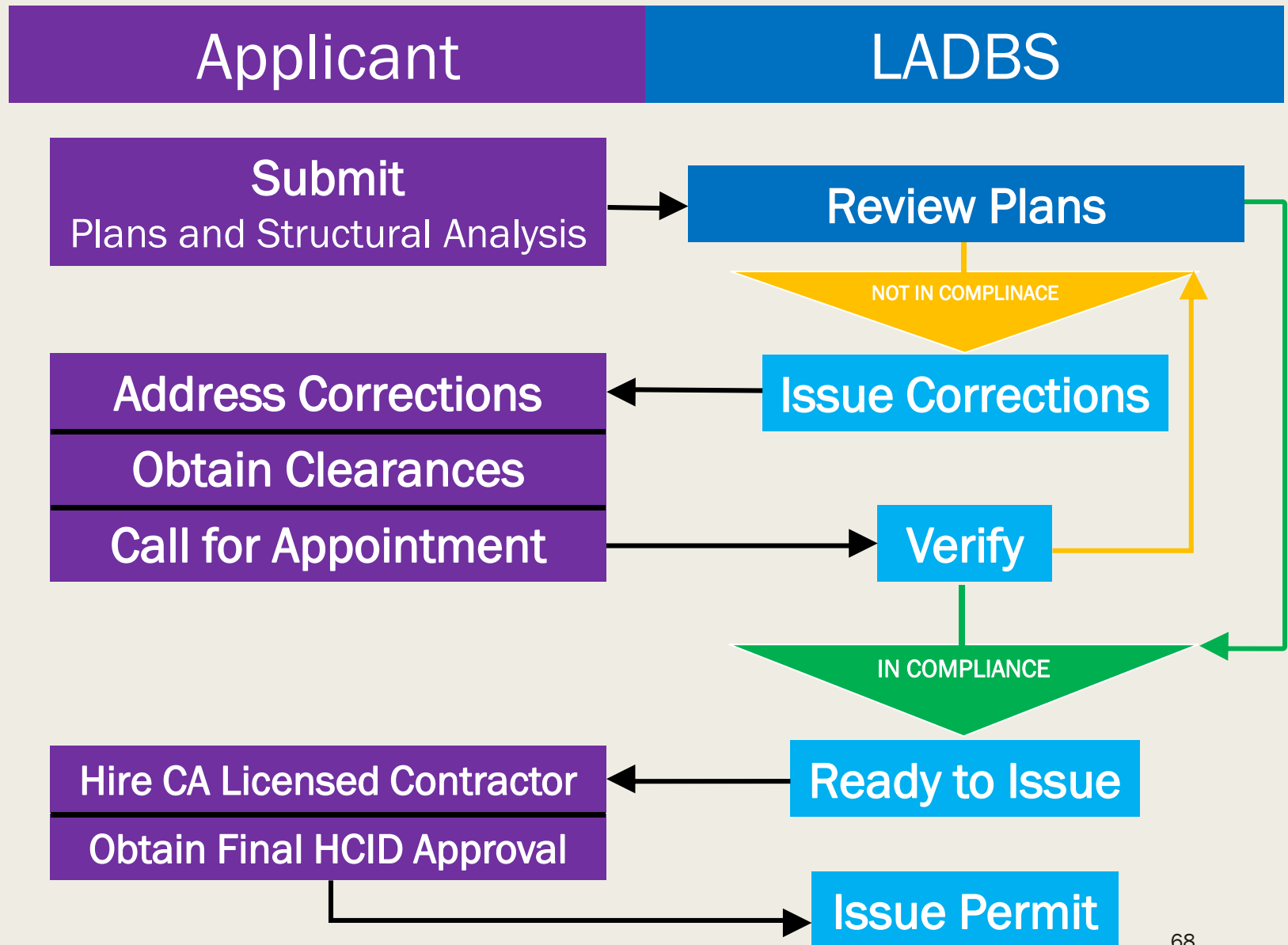
What Does the Owner Need to Do Next?

- Based on the structural analysis, determine the course of action in compliance to the ordinance:
 - *Retrofit*
 - *Maintain as-is (existing) or as previously retrofitted*
 - *Demolish*
- Submit the structural analysis and plans to Building and Safety for plan check review

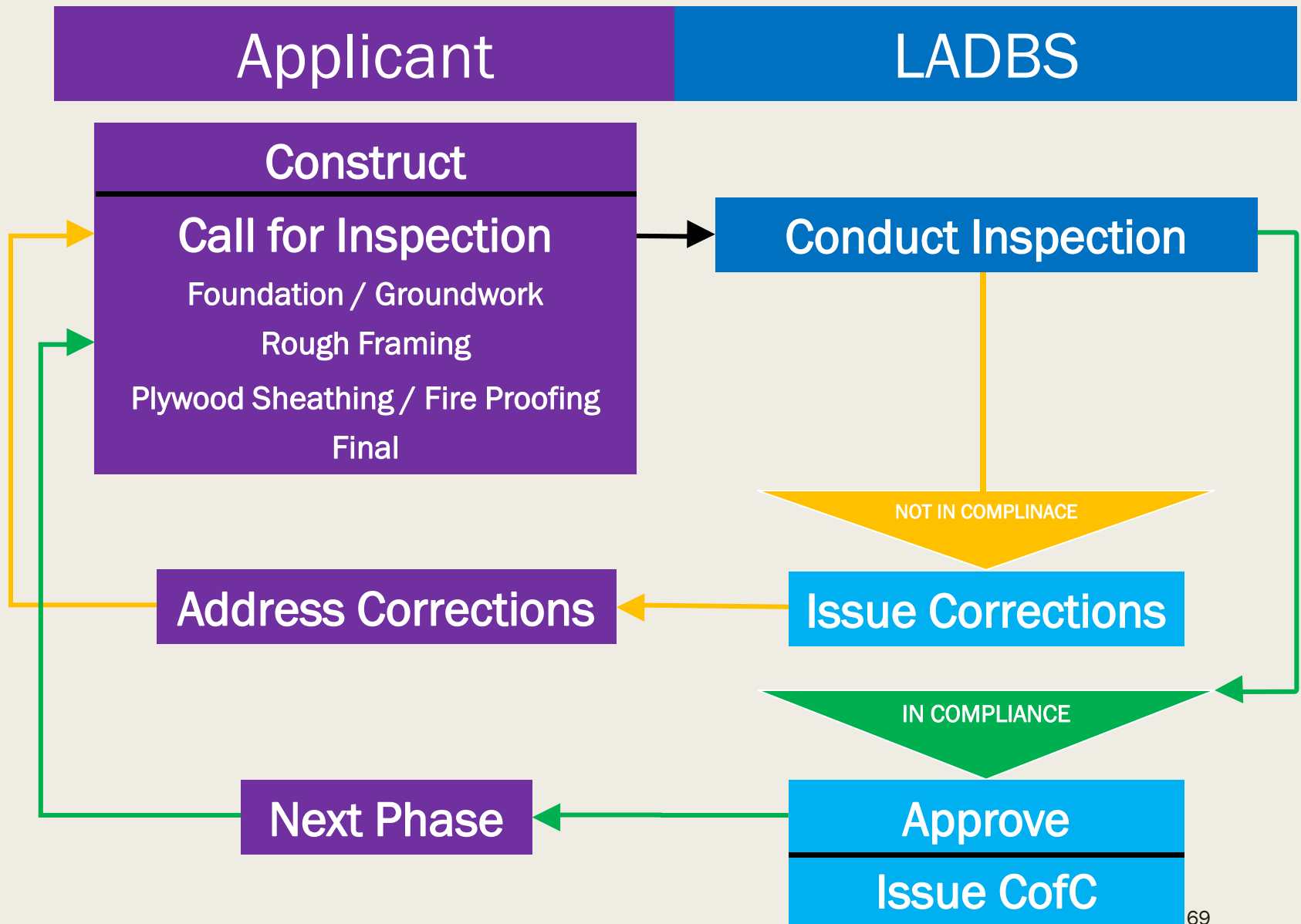
What Does the Owner Need to Do Next?

- Notify tenants in writing per HCID-LA regulations regarding:
 - *Tenant Habitability Plan*
 - *Cost Recovery*
 - Full Cost of Retrofit is shared 50/50 between building owners and tenants
 - Retrofit Recovery Fees collected through a monthly surcharge as determined by HCID-LA
- Visit HCID-LA website for more information:
 - <http://hcidla.lacity.org>

How to Obtain a Permit?



How to Obtain a CofC?



What Are the Costs, Fees and Timelines?

- Average construction cost
 - \$30,000 - \$60,000
- Average building plan check and permit fees
 - \$1,100
- Average plan check turn around time
 - *1½ months*
- Average construction time:
 - *2 to 3 months*
- Average Engineer and Architect fee?
- ❖ The costs, fees and timelines shown above are for reference only. Actual values depend on individual site and building.

Common Retrofit Design Issues and Plan Check Solutions

■ Parking Stall Dimensions After Retrofit

- *Standard stall width can be reduced to 7'-6"*
- *Standard stall depth can be reduced to 15'-0"*
 - Accomplished without need for Planning Approval

■ Disabled Access Compliance/Upgrades

- *Only required for commercial and mixed-use buildings*

What Should Owners Do If They Think Their Building IS Exempt From Retrofit?

■ Appeal Process

- *Within **60 Days** of the Service of the Order, submit a written request to the Board of Building and Safety Commission with supporting documents, such as:*

- Structural Analysis
- Permits of Original Construction
- Set of Original Plans

How Do I Get the List of Soft-Story Building Addresses?

- From Building and Safety Custodian of Record Office
- 213-482-6770
- LADBS.custodianofrecords@lacity.org

How Can I Check the Status of Submitted Building Plans?

- Visit www.LADBS.org

- Under “Services”:

- *Property Activity Report*
- *On-line Building Record*

Upcoming Los Angeles City Retrofit Fair

- 3rd Annual Event
- Includes Engineers, Architects, Contractors, HCID-LA staff and LADBS staff
- Date, Time, and Location are to be determined
- Visit LA Mayor's website for updated information and registration requirements in the near future:
 - <https://www.lamayor.org/>

Let's make our City
Resilient,
Safe,
and be Prepared
for the next BIG one!

SOFT-STORY RETROFIT UNIT

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LOS ANGELES, CA 90012

(213) 482-SOFT (7638)

(213) 202-9924

SOFT-STORYRETROFIT@LACITY.ORG

LADBS.ORG/SOFT-STORY