SEISMIC RISK REDUCTION THROUGH BUILDING CODE ENFORCEMENT

SEAOSC
Earthquake Loss Reduction Summit

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Overview

- What Does LADBS Do?
- Seismic Risk Reduction through Building Code Adoptions, Implementations, and Enforcement
- Seismic Retrofit Programs in Los Angeles

What Does LADBS DO?

MISSION

- To protect the lives and safety of the residents and visitors of the City
- To enhance the quality of life, housing, and economic prosperity
- These are accomplished by:
  - Advising, guiding and assisting customers to achieve compliance with the City Codes, City Regulations, and State Laws
  - Providing a timely process to facilitate construction and maintenance of commercial, industrial, and residential buildings

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What Does LADBS DO?

SCOPE OF RESPONSIBILITES

- Approval of Construction Projects
  - All New Buildings, Additions & Alterations Require Plan Review, Permit and Inspection
    - Residential Projects
      - Single Family Dwellings
      - Multi-Family Dwellings (Apartments & Condominiums)
    - Commercial Buildings
      - New Buildings
      - Tenant Improvements
    - Private Schools
      - Public Schools are handled by a State Agency

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Seismic Risk Reduction Through Building Code Enforcement

- The following adoptions, implementations and enforcements are essential contributors in the Department's proactive role in resolving building safety issues and mitigating earthquake hazards in buildings
  - LA City Codes for Design and Construction
  - Approval Process for Construction
  - Lessons from Past Earthquakes
- Seismic Retrofit Programs in Los Angeles

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LA City Codes for Design and Construction

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LA CITY CODES:

- LA Building Code was established in 1889
- LA Seismic code was initiated as a result of a 6.25 magnitude earthquake in 1933 (Long Beach)
- LA codes have been amended and revised regularly, mostly every three years, to keep pace with the:
  - Ever-changing technology of the construction industry
  - New proven concepts of structural design

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LA CITY CODES (cont.):

- Model Building Code
  - Every three years, the International Building Code (IBC) is published by the International Code Council (ICC)
- State of California adopts the California Building Code (CBC) after making necessary amendments to the IBC
- State mandates all local jurisdictions to adopt the CBC after six months from its publication with any necessary local amendments

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LA CITY CODES (cont.):

- Local amendments made to the CBC can only be:
  - Due to geologic, topographic or climatic findings
  - More restrictive
- LA City adopts Los Angeles Building Code (LABC) after making necessary amendments to the CBC
  - Requires Public Hearing Process and Approval by:
    - Board of Building & Safety Commissioners
    - Planning and Land Use Management Committee
    - LA City Council

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LA CITY CODES (cont.):

- Current 2011 LABC is based on the 2010 CBC with the LA amendments
  - Seismic Design requirements are based on ASCE7-05 published by the American Society of Civil Engineers

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Approval Process for Construction

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APPROVAL PROCESS:

- Plan Check & Permit Issuance by LADBS
  - Types of Permits
    - Building
    - Grading
    - Plumbing
    - Mechanical
    - Electrical
    - Elevator, etc.

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APPROVAL PROCESS (cont.):

- Construction Inspection by LADBS Inspectors
  - Ensures compliance with the approved plans
  - Provides quality control and quality assurance for the approved construction
  - Holds the contractor accountable to correct all construction deficiencies
  - Requires approval by LADBS inspectors before proceeding to each new construction phase
  - Issuance of Final Certificate of Occupancy by LADBS

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APPROVAL PROCESS (cont.):

- Alternate Materials/Products Approval by LADBS Research/Testing Laboratories
  - LADBS reviews and approves technical reports of alternate materials/products that are at least equivalent to the code prescribed quality, strength, effectiveness, durability and safety.
  - LADBS Information Bulletin, "Policy on Accepting Alternate Building Materials or Products."

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Lessons From Past Earthquakes

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Lessons Learned

Long Beach Earthquake, 5:55 P.M., March 10, 1933 (6.25 Magnitude)

- Reported Problems:
  - Unreinforced masonry bearing wall buildings, including over 100 school buildings failed catastrophically
  - If the earthquake had struck when school was in session, the loss of lives would have been horrifying

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Lessons Learned

Northridge Earthquake, 4:30 A.M. January 17, 1994 (6.7 Magnitude)

- Reported Problems:
  - Masonry and tilt-up concrete wall buildings with wood flexible roof diaphragms needed to be better connected to hold the buildings together
  - Steel moment frame welded joints were found to have fractures through the welds and beam-column panel zones
  - Numerous fires were caused by broken gas pipes due to building shifting off foundation or unsecured water heaters falling
  - Narrow wood shear panel, stucco and drywall construction did not perform as expected

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Lessons Learned

Northridge Earthquake, 4:30 A.M., January 17, 1994 (6.7 Magnitude)

- Reported Problems (cont.):
  - Multi-story wood frame buildings with tuck-under parking performed poorly and collapsed
  - Numerous houses on steep slopes had severe damage, with some collapsing which caused a few deaths
- Resulted in the development and implementation of emergency code changes, retrofit standards and code amendments

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Lessons Learned

Building Code Amendments

- LADBS was proactive in proposing code amendments for new construction and mandatory and voluntary retrofit ordinances for existing buildings.
- The Northridge Earthquake pointed out the importance of proper detailing and assurance that the load path be maintained.
- This led to requiring periodic observations of the engineer or architect of record to assure that major structural elements and connections were properly installed.
- Also, resulted in requirements for new hillside buildings to be horizontally anchored to their foundations.

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Seismic Retrofit Programs in Los Angeles

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Mandatory Seismic Retrofit Programs

Type of Building / Program	Starting Date
Earthquake Hazard Reduction in Existing Unreinforced Masonry Buildings (*designed Prior to October 1933)* (LABC Chapter 88) **8,080 Buildings Affected** **8,079 Buildings Complied**	1981
Earthquake Hazard Reduction in Existing Tilt-Up Concrete Wall Buildings (*designed Prior to* January 1976) (LABC Chapter 91) **2,638 Buildings Affected** **2,638 Buildings Complied**	1994
Special Provisions for Repair of Welded Steel Moment Frame Buildings in High Earthquake Damaged Areas (Ordinance No. 170406, effective 3/7/95) **520 Buildings Affected** **519 Buildings Complied**	1995
Seismic Gas Shutoff Valves (Ordinance No. 170406, effective 3/7/95) **30,000 Complied per year**	1995

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Voluntary Seismic Retrofit Programs

Type of Building / Program	Starting Date
Earthquake Hazard Reduction in Existing Wood Frame Residential Buildings with Weak Cripple Walls and Unbolted Sill Plates - Anchor LA Program. *Los Angeles City's developed standards, which are being used outside of the City by other agencies* (LABC Chapter 92)	1996
Earthquake Hazard Reduction in Existing Wood Frame Residential Buildings with Soft, Weak or Open Front Walls (LABC Chapter 93)	1998
Earthquake Hazard Reduction in Existing Hillside Buildings (LABC Chapter 94)	1996
Earthquake Hazard Reduction in Existing Reinforced Concrete Buildings and Concrete Frame Buildings with Masonry Infills - *designed Prior to January 1976* (LABC Chapter 95)	1996
Earthquake Hazard Reduction in Existing Reinforced Concrete and Reinforced Masonry Wall Buildings with Flexible Diaphragms - *designed prior to January 1995* (LABC Chapter 96)	1996

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All these core functions, along with the LADBS' constant efforts to improve quality control and quality assurance in building construction, collectively, are integral parts of building a safer Los Angeles.

Los Angeles Department of Building and Safety

For more information, visit our website

www.ladbs.org

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Thank You