



## The City of Berkeley

### Estimating Pre-1980 Concrete Buildings

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January 28, 2009

## Berkeley Statistics



Population	100,000 people
City Area	10 sq mi
Year of incorporation	1878
Population Density	10,000 people/sq mi
Known Faults within City Limits	Hayward Fault

- ♦ Interesting facts:
  - UC Berkeley Campus
  - Active Building Dept
  - Highly educated population



## Useful Step: History of City

Source: "Berkeley, A City in History"  
by Charles Wollenberg © 2002

- ♦ Building and Population Boom years:
  - Post 1906
    - ♦ Population quadrupled within a decade
  - Post 1923 Great Fire
    - ♦ Housing, commercial, manufacturing construction booms
  - Post WWII
    - ♦ apartment construction for huge influx of UCB students
- ♦ Historical Earthquake Damage:
  - 1868 – not much of a city to be damaged
  - 1906 – minor damage
  - 1989 – minor damage

## Useful Step: Get GOOD Contacts

- ♦ City of Berkeley—Building & Safety Division
  - Current and retired building officials
  - Seismic Safety Coordinator
  - Plan Checkers
  - Building Inspectors
- ♦ Alameda County—Assessment Services Div.
- ♦ Engineers / Architects
- ♦ Professors (Architecture & Engineering)
- ♦ City Safety Advocates (leaders of programs)
- ♦ Realtors & Developers

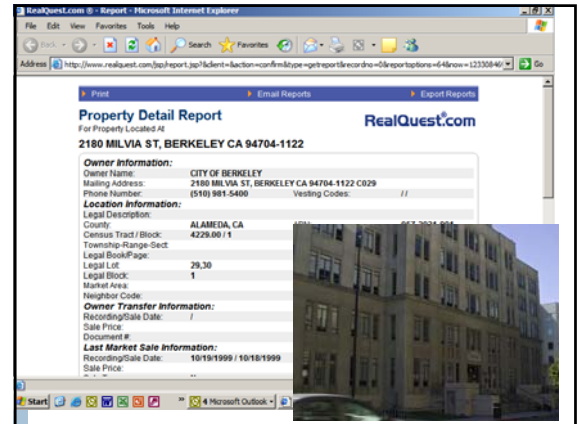
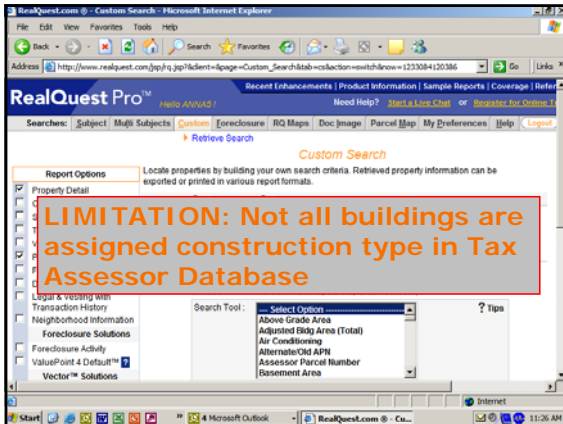
**Make Contacts at the BUILDING DEPT!!!**

## Useful Step: Mitigation Programs

- ♦ City of Berkeley Building Seismic Mitigation Programs:
  - Public School & Fire Station & City Hall Retrofit Program
    - ♦ COMPLETED!
  - URM Inventory and Mandatory Retrofit Ordinance
    - ♦ ~ 90% Complete
  - Tilt-up Inventory
  - Soft Story Engineer's Analysis Required (but NO Mandatory Retrofit Ordinance...yet)
- ♦ UC Berkeley Seismic Mitigation Program

## PROCESS: Data Mining

- ♦ REALQUEST
  - Software extracts data from Tax Assessor's Data
  - Many city planning departments subscribe to this service!
- ♦ Berkeley Approach:
  - RealQuest search with filters:
    - ♦ for Building Type = "Concrete" & "Masonry"
    - ♦ For Year Building from 1860 – 1979
    - ♦ For City of Berkeley
  - Yields list of addresses meeting the filter criteria
  - Subtract known tilt-up and URM buildings



### PROCESS: Street Survey

- Survey commercial corridors where concrete buildings are likely

Method Used:  
CAR Driving Survey

- GOALS:
  - Look for missing concrete buildings
  - Identify buildings on current list that should be removed

### PROCESS: Getting the Number

805 Take REALQUEST Number

- 78 = 727 Remove Condo Duplicates

Remove Existing Bldg Inventories:

- 242 = 476 URM List
- 33 = 452 Conc Tilt-up list

x 0.4 = 180 Adjust for Accuracy based on Street Survey:  
only 40% of surveyed bldgs from list are actually concrete

### PROCESS: Final Number

- Final personal check:
  - Only small percentage of city buildings are concrete as seen during driving survey
  - We've seen at least 5 times as many URM
  - Based on known quantity of URM: Concrete is about 20% of URM  $0.2 \times 730 = 150$
  - Familiarity with the city (live and work in Berkeley)

**FINAL ESTIMATE = 150 – 250 Buildings**

### PROCESS: Further Refinement

- Additional street surveys of commercial & industrial & student residential corridors
- Contact local experts and get their "endorsement" of the process and final number
  - Engineers
  - Architects
  - Realtors & Developers
  - Building Inspectors

## Final Thoughts

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- ♦ Don't get frustrated with inaccuracy
- ♦ Sidewalk surveys give good reality check
- ♦ Good contacts –work with your local government
- ♦ Knowing the history of the city is useful
- ♦ Expert panel should provide worthwhile feedback

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