CITY HALL
SEISMIC EVALUATION

Christine F. Andersen
Director of Public Works
February 21, 2006

Condition Assessment of City-Owned Buildings

As part of the planning and assessment of needs for City building facilities, structures have been inventoried for current condition and identification of deficiencies.

Characteristics of City Hall Structure

City Hall Assessment

In evaluating City Hall certain features of the structure indicated the need for a seismic assessment:

Built in 1974 under 1970 UBC

High rise structure with SMRF

Consultant Team

- **3DI**
  Pat Lappin
  Danny Kaye

- **TMAD Taylor & Gaines**
  Paul Yeh, S.E.
  Balram Gupta, Ph.D., S.E.

- **Earth Mechanics**
  Arul K. Arulmoli, GE 2090

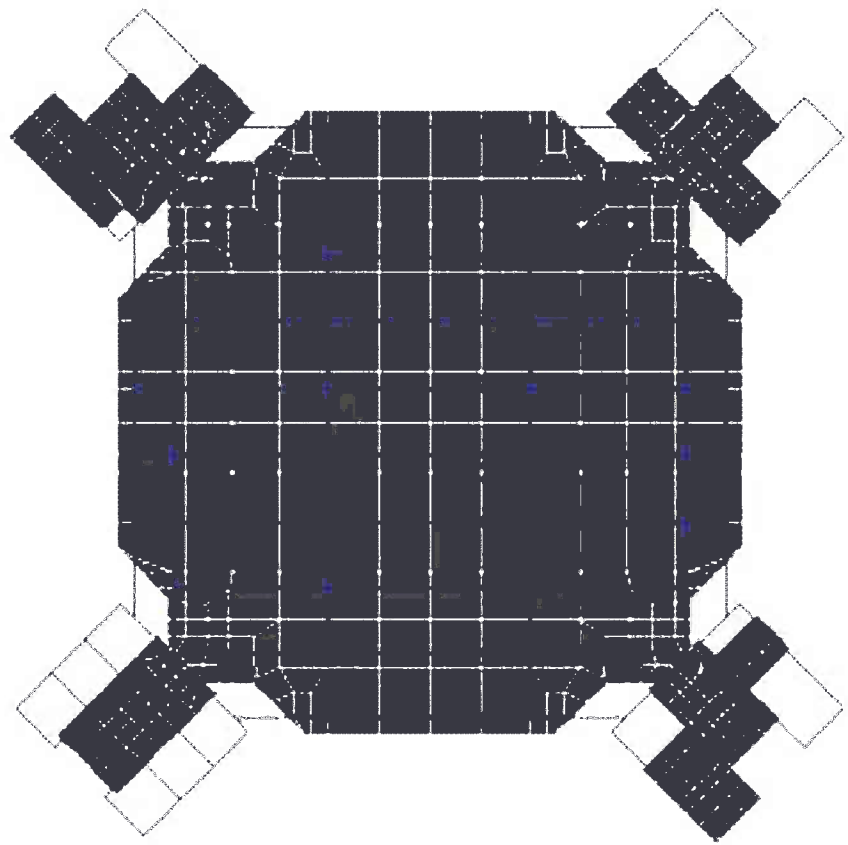
FEMA 310 Life-Safety review process selected for use

The FEMA 310 process is approved for the evaluation of the performance of existing buildings under seismic events.

The process involves a tiered approach to identify areas of potential concern and then to develop more detailed evaluation of building design and performance expectations.

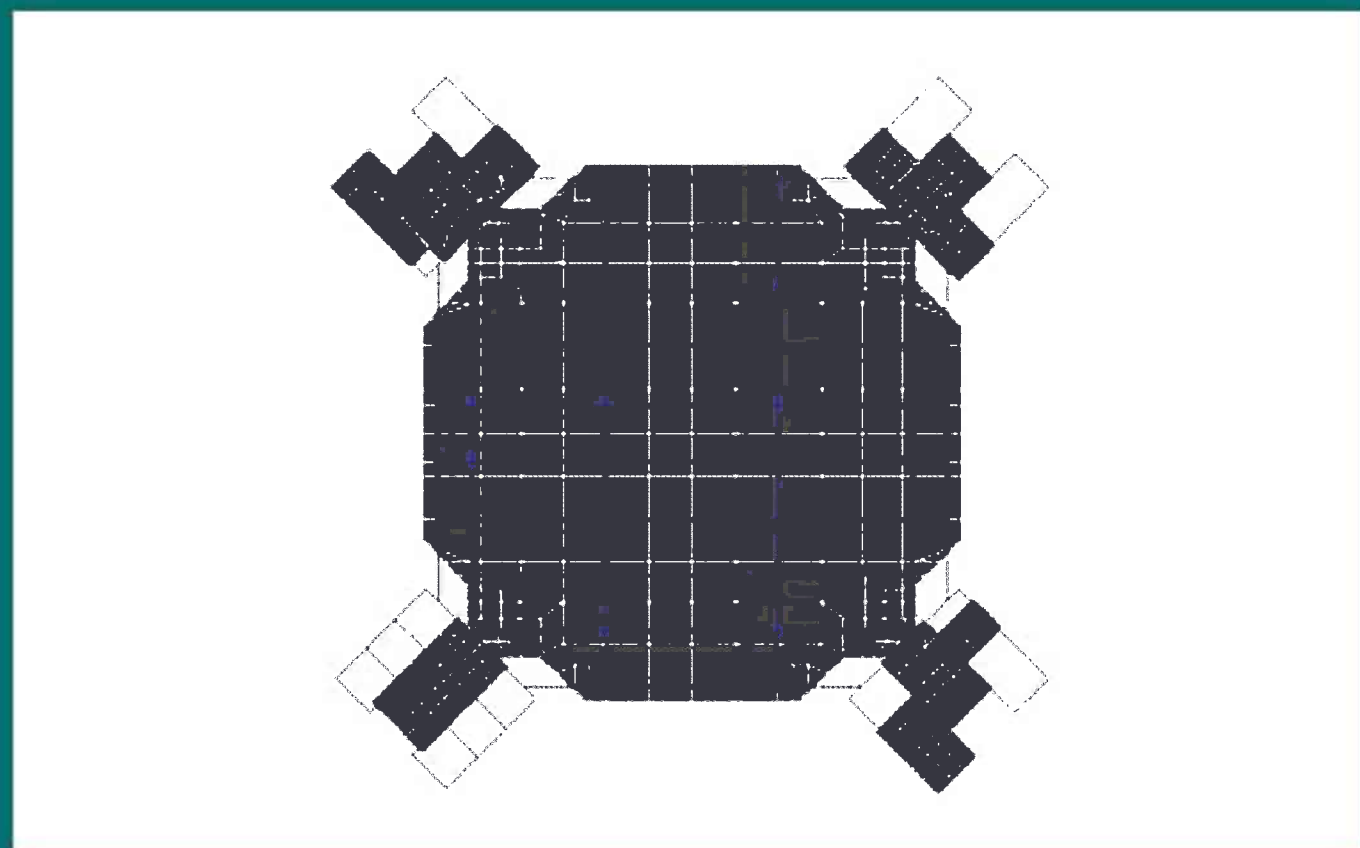
Characteristics of City Hall Structure

Welded Steel Moment Frame System



Transfer Truss at 2nd Floor

Wing Elements



Computer Assessment of Building Dynamics under Seismic Loads

Based on FEMA 310 event with 2% probability of occurrence in 50 years (more conservative than required by current code)

Considers local geological factors

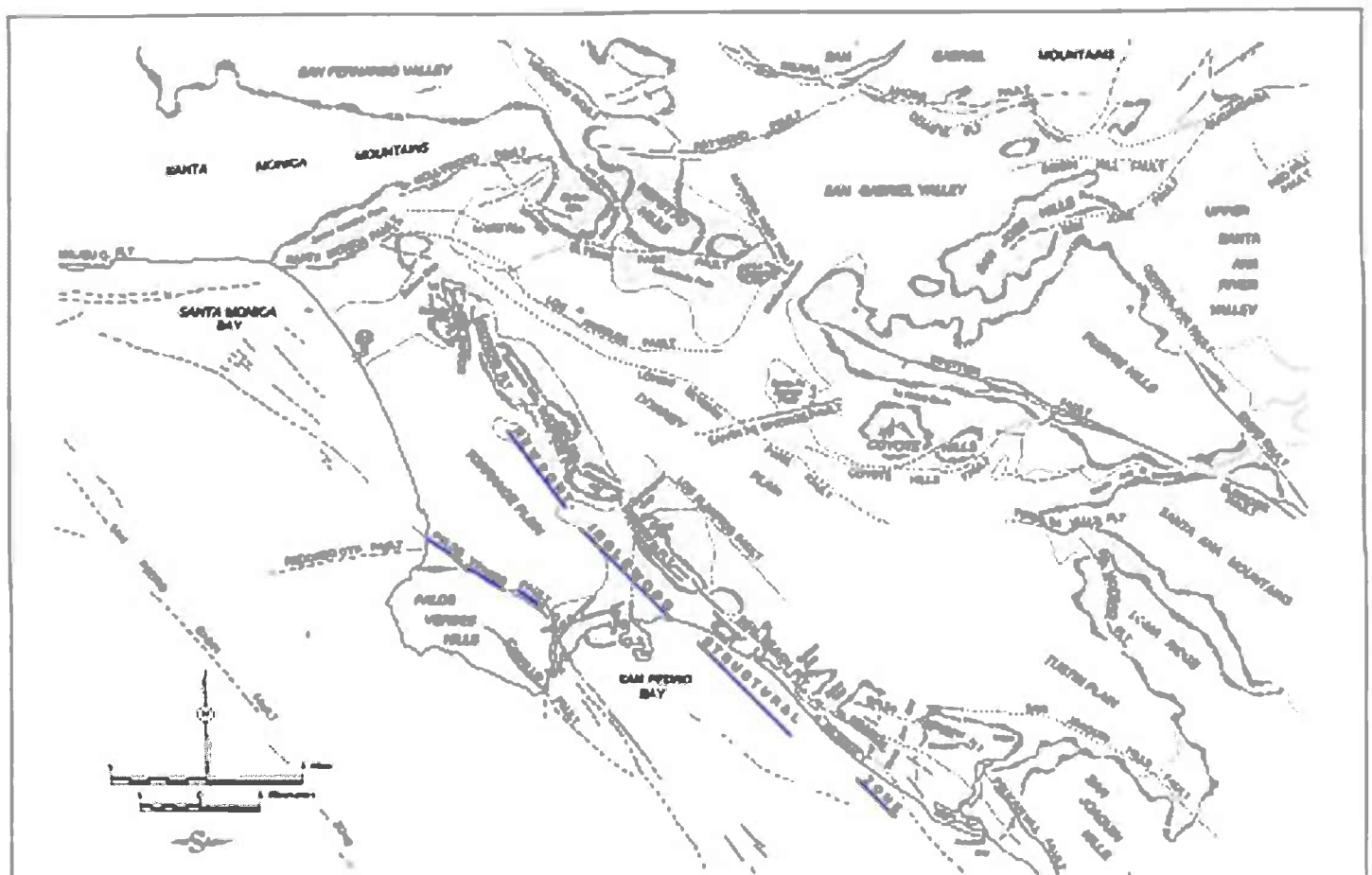
Historical Earthquake Experience

Long Beach City Hall is included in the California Department of Conservation—Division of Mines and Geology Seismic Monitoring Sites

Historical Earthquake Experience

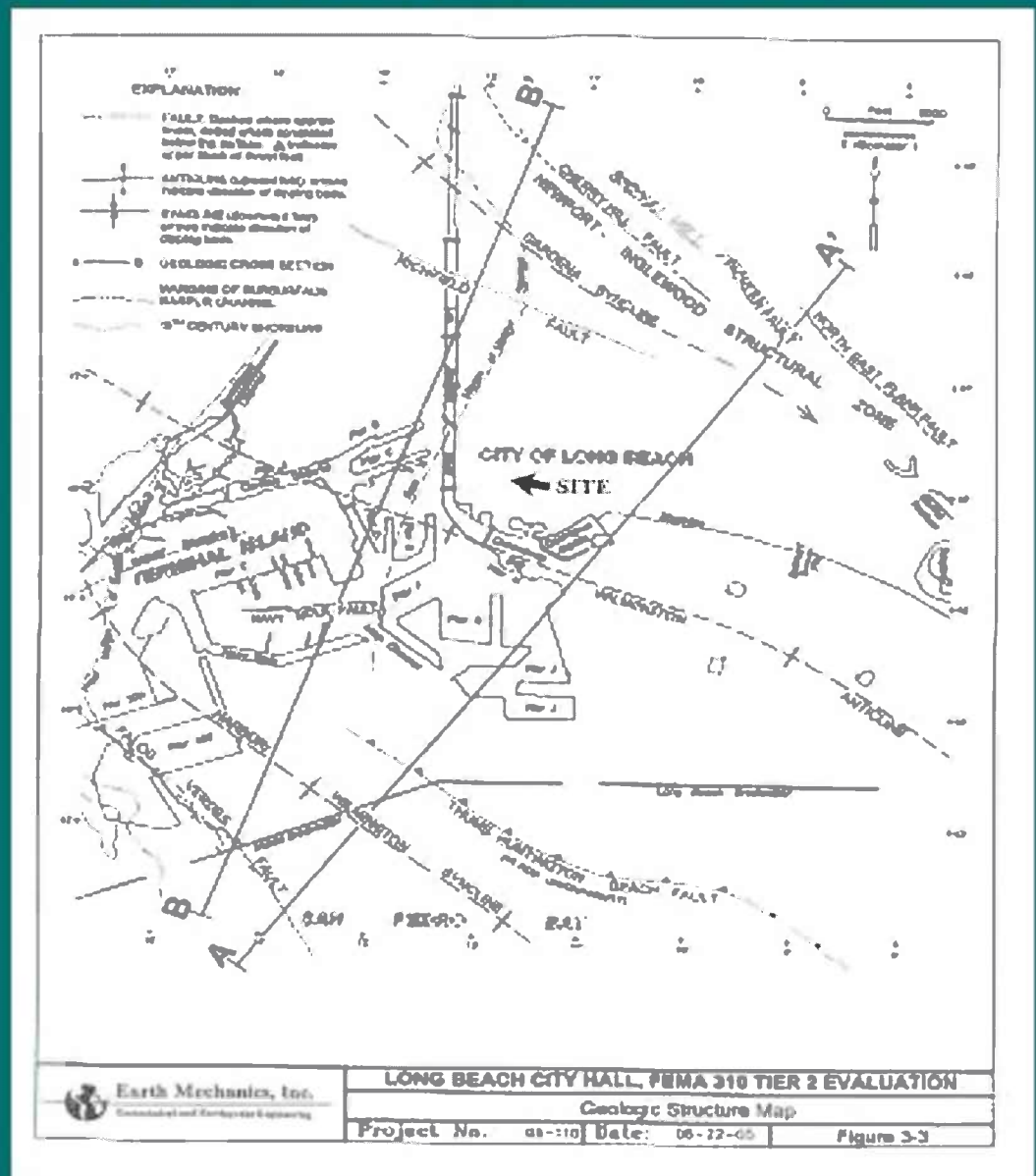
Earthquake	Mag.	Dist. (Mi)	Horiz Apk (g)	
			Ground	Struct.
Northridge, Jan 17, 1994	6.7	36 mi	.04	.06
Big Bear, June 28, 1992	6.5	84 mi	.02	.03
Sierra Madre, June 28 1991	5.8	36 mi	.02	.03
Whittier, October 1, 1987	6.1	21 mi	.06	.07

Long Beach Area Faults



Earth Mechanics, Inc.	LONG BEACH CITY HALL, FEMA 310 TIER 2 EVALUATION	Regional Physiographic and Fault Map
	Project No. 05-110 Date: 08-22-05	Figure 3-1

Long Beach Area Faults



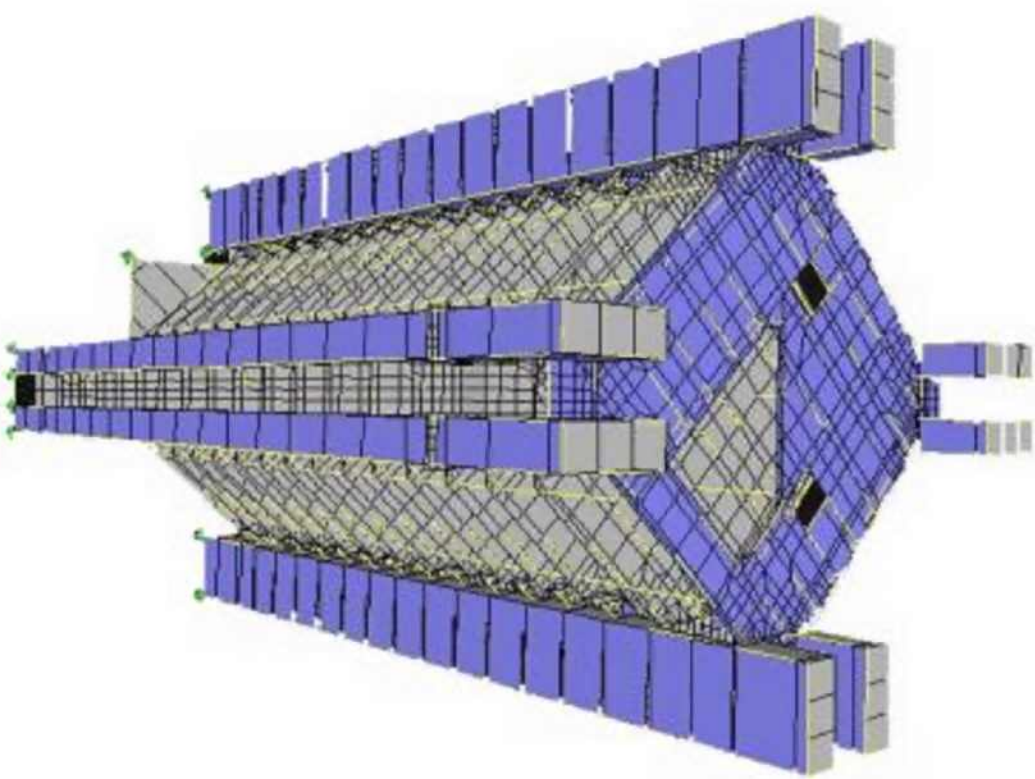
City Hall Dynamic Response to Seismic Loading—Areas of Concern

Wings—Pre-cast concrete panels

Weak connections

Torsion effects

Over stressed truss at 2nd floor



Field Investigation of As-Built Conditions—Steel Frame and Welds

Non-destructive testing of random areas of the building were conducted to visually inspect Steel Framing and Welds.

Ultrasonic testing of Welds was conducted.

Steel Frame and Welds

Observations revealed that Steel Framing and Welds were in conformance with design documents and accepted standards for construction.

Pre-cast Concrete Panels

Exterior pre-cast panel connections were found to be substantially deficient in construction method.

While this is of concern, it is not the driver in problems presented by the Wing configuration and structural concerns.

Summary of Seismic Assessment

As part of the permitting for City Hall in 1974 it was learned that additional strength analysis was required that exceeded the 1970 UBC in effect at that time.

Recent inspection of the building confirms that the construction of the structural system was in conformance with plans and accepted construction methods.

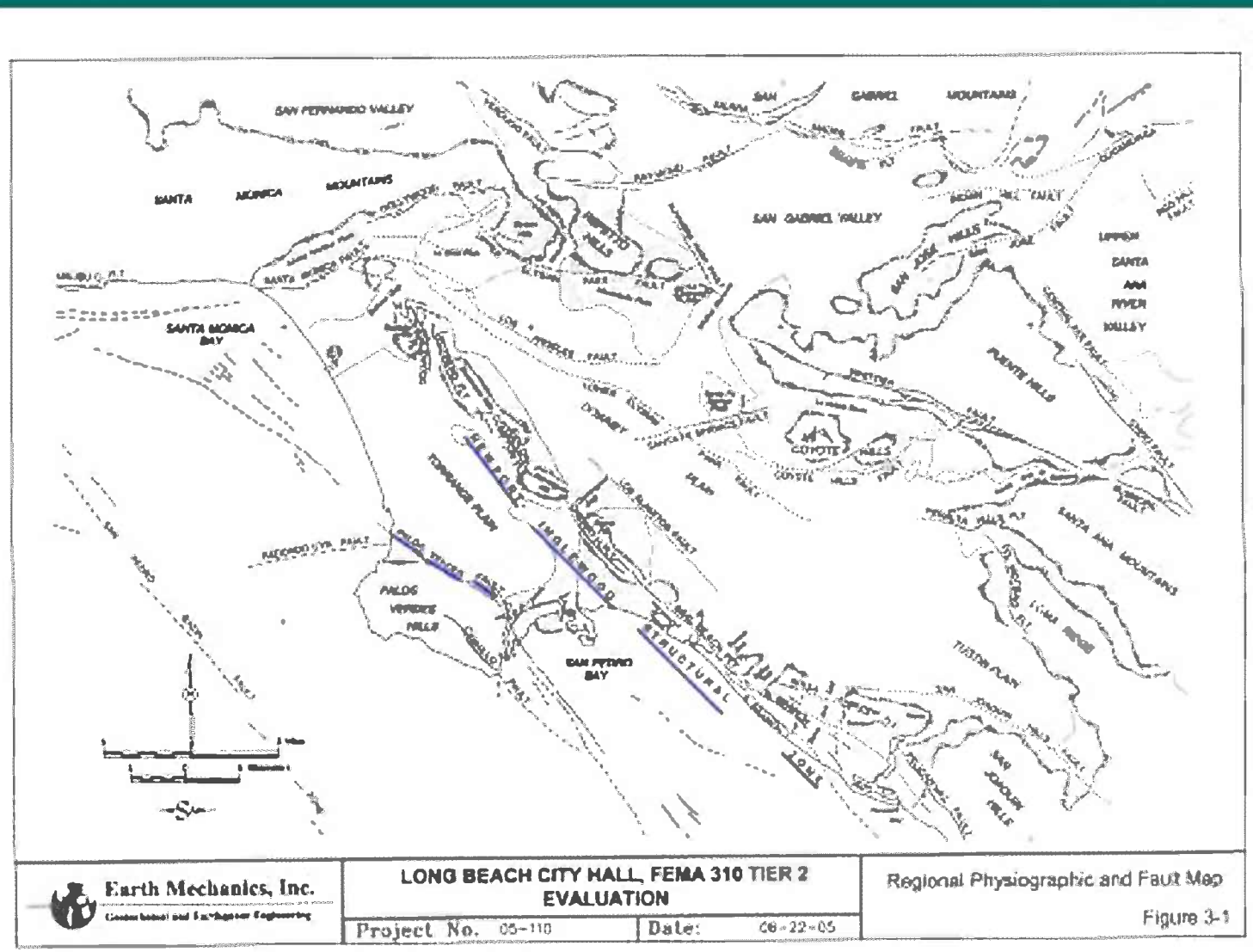
The condition of the building does not present any deterioration of the structure over the past 30 years.

Areas of Concern—Next Steps

Immediate concern is the evaluation of emergency response plans for occupants of the building to ensure personal safety.

Development of Mitigation Strategies to address problems with the Wings and 2nd Floor Truss.

Relative Probability of Significant Seismic Event



Critical Messages

-Seismic Evaluation of City Hall is based on concern for Life-Safety and good Stewardship of City Structures.

-FEMA 310 process provided validation of design integrity and condition of City Hall structure.

-While probability of a sufficiently significant seismic event is still very low—it is prudent to take next steps to evaluate retrofit strategies.

Next Steps

Manage Rumor Control—ensure that good information is available to the public.

Ensure that Emergency Response plans are in place and understood.

Develop next level of design work to provide higher level of mitigation plan and implementation strategy.

Requested Action for February 21, 2006 Council Meeting

Authorize City Manager to develop mitigation plans to address City Hall seismic deficiencies.

Include evaluation of alternative locations for short term and long term implementation.

Develop cost estimates and financing strategies for options.