APA Northern Section Newsletter
american planning association
california chapter

JULY MEETING

WINE AND CHEESE SEMINAR

Topic: Linking Housing and Office Development in San Francisco: A Way to Solve the City's Housing Problem?

(The San Francisco City Planning Department has been requiring developers of new office space to construct housing to meet the demand generated by their projects. This seminar discusses the rationale behind the city's requirements, the manner in which they are implemented, and the developer's perspective regarding the policy).

Date: Wednesday, July 14, 1982

Time: 7:00-9:00pm

Location: EDAW
1725 Montgomery, 2nd Floor
San Francisco
(Between Francisco and Chestnut)

Panelists: Lu Blazej, Senior Planner, City of San Francisco
(Formulated the housing requirements for new office space)

Nat Taylor, Program Manager, Grosvenor Properties Ltd.
(Sponsor of the first project accepting the requirement)

William Witte, Deputy Director, S.F. Mayors Office of Community Development
(Implements the housing requirements)

Price: $5.00 per person. Pay at door.

RSVP: Mr. Chi-Hsin Shao
San Francisco Department of City Planning
415/558-5423
By Tuesday, July 13th

The following Northern Section members have passed the 1982 AICP exam:

R. Anderson
Alec Bash
Gary Binger
Christopher Buckley
Elaine Costello
Edward Davidson
Kevin Garrett
Dan Iacophano
Rodney Jeung
Bill Kritikos
Chandler Lee
Tom MaCrostie
David O'Brian
Gail Odom
Brian O'Halloran
Gary Pivo
Anu Raud
Richard Rogers
Cynthia Rossom
James Sisk
Barry Sitman
Bill Utic

UNDERSTANDING POTENTIAL EARTHQUAKE HAZARDS

By Marc W. Seeley, President, Merrill and Seeley, Inc.

Public concern with earthquakes and their effects has risen notably during the past several years. This increasing interest has occurred for three reasons; 1) The theory of Plate Techtonics, which explains the global mechanism for earthquakes has been greatly refined; 2) The popular press has given much attention to Plate Tectonics and to research on earthquake prediction; and 3) The recent increase in strong earthquake activity. This last reason has perhaps had the greatest impact on public concern.

In the past two years alone California residents have been affected by several significant earthquakes. The following four recent earthquakes have caused the most damage:

Date	*Location*	*Magnitude*	*Damage in Million $*
Oct. 1979	Imperial Co.	6.8	30.0
Jan. 1980	Livermore	5.8	4.0
May 1980	Mono Co.	6.0	1.5
Nov. 1980	Eureka	7.0	2.0

It seems to be part of human nature to forget events like these shortly after they occur. However, when earthquakes of this size occur "close to home" with a recurrence interval of four to five months, our concern does not diminish. To understand fully the significance of potential earthquake hazards it must be recognized that much larger earthquakes than those listed above will probably occur. They can occur in more intensely developed parts of the state where the cost of damage may be many times higher, and where the cost in lives may also be high.

Legislative acts in California such as those that regulate development in fault zones (Alquist-Priolo Special Studies Zones), public school siting, seismic safety of hospitals, safety of dams, and others have all helped to mitigate future earthquake hazards. As significant as laws are in reducing earthquake hazards, they cannot be fully effective unless those in the business of planning, siting, designing and building new structures have a clear understanding of the nature and magnitude of potential earthquake hazards. It is the intent of this article to clarify some important and often misunderstood information about earthquakes.

There are four distinct but interrelated earthquake phenomena that constitute potential hazards in populated areas. In order of generally decreasing potential for loss of life and damage to property, they are: 1) ground shaking, 2) ground failure, 3) surface displacement across fault traces, and 4) flooding from earthquake generated waves or dam failures. The order of hazard potential may differ depending on specific site conditions. The first three are the most widespread and are described below.

GROUND SHAKING

Ground shaking is the sudden physical and cyclic movement of the earth. That movement results from the propagation of several kinds of waves that originate at the focus of an earthquake. The transfer of the wave energy to man-made and natural objects can cause collapse, lateral displacement, and overturning. The ground shaking hazard is the greatest earthquake hazard because the effects are widespread, and even "moderate magnitude" (5.3-6.5) earthquakes like the Livermore, January 1980 event can cause considerable damage. The complex factors that cause areal variation in ground shaking are numerous and include: 1) magnitude and other physical earthquake characteristics such as duration of shaking, accelerations, etc. collectively called "focal mechanism," 2) distance to focus (the underground point of origin of seismic energy), 3) distance to epicenter (the surface location directly above the focus) and 4) local geological conditions (i.e. type and thickness of soil).

For a given site the potential ground shaking hazard is directly related to the magnitude and focal mechanism characteristics. Each whole number increase in Richter magnitude represents a 31.5 fold increase in energy. Thus a magnitude 7 earthquake will release 992.95 times (31.5 x 31.5) more energy than a magnitude 5 earthquake. Because of attenuation of earthquake waves as they travel through the earth, shaking energy is generally inversely related to the distance from the focus and the epicenter. Recent studies by Robert Nason of the U.S. Geological Survey indicate that for "great" earthquakes (magnitude 7.7) the site geologic conditions are not directly related to ground shaking potential. However, for earthquakes below a certain energy threshold, site geologic, topographic and soils conditions do affect the ground shaking hazard potential.

GROUND FAILURE

The second greatest potential earthquake hazard is that of ground failure. Ground failure includes settlements, slumping, liquefaction and similar failures in unconsolidated deposits. This earthquake hazard is also widespread and can affect areas many miles from the causative fault. For example, areas along the margin of San Francisco Bay underlain by compressible, water-saturated soils have a high potential for ground failure. Even moderate earthquakes can cause significant damage; especially if the duration of shaking is long. The damage is caused by 1) loss of shear strength due to increased pore-water pressure (liquefaction), 2) vertical settlement of unconsolidated soils, or 3) the lateral movement towards a free or unsupported face of an unconsolidated deposit or fill (lurching or slumping).

Ground failures can cause differential settlement, overturning of structures and failure of improperly designed and constructed fills. The potential for occurrence of this kind of earthquake hazard is related to the characteristics of the ground shaking and to site geologic conditions. Important ground shaking characteristics include: 1) energy; 2) amplitude/frequency, 3)duration, and 4) accelerations. Areas where ground failure potential is high have one or more of the following characteristics: relatively uniform grain size soils, low compressive strength soils, and high water tables.

FAULT LINE DISPLACEMENT

In terms of potential for damage the third most significant earthquake hazard in California is that

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A NOTE FROM THE EDITOR

There's nothing like controversy to bring one out of a summer stupor, and this month's wine and cheese seminar is presenting quite a controversial topic: the requirement that office developers also build housing. The concept is innovative, seems relatively painless (i.e. profit is presumably made from the housing), and appears a logical response to a perceived supply/demand imbalance in the regional housing market.

Still, I am not positive this linkage of responsibility for nonresidential and residential development is a particularly sound policy. It implies the private sector, through its usual methods, cannot provide housing in sufficient quantity to meet demand. While perhaps true, I see this as a short-run problem deriving primarily from current capital market constraints. Given time, the private sector should be able to respond to demand signals and create an adequate supply of housing if sites are available (this latter point is important, but the office/residential regulation apparently would not affect it unless homes had to be designed into the office project).

I am also hard-pressed to justify the policy from a public welfare perspective as, according to economic theory, housing demand is neither a 'social cost' (i.e. negative externality) nor a 'public good' (which only government can adequately provide). Anyway, these are my initial thoughts on the topic, and I am sure there are cogent counter-arguments. Come to the seminar this Wednesday and find out!

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Earthquakes Continued

of displacement across fault lines. Tectonic earthquakes result from the sudden movement of blocks of the earth's crust along surfaces of weakness which define the block boundaries. The surface expressions of these inter-block boundaries are called fault traces. Most earthquakes of magnitude 5.5 or larger result in the propagation of movement between the crustal blocks to the ground surface. Displacement along surface faults can be horizontal, vertical or a combination of the two; depending on the kind of fault. Most major active faults in the San Andreas system have horizontal (right-lateral) displacement.

Unlike the previously discussed hazards, surface fault hazards are confined to a relatively narrow zone along active faults. In addition to the obvious line of fault displacement there is a zone on either side of the fault where permanent ground distortion occurs. Structures sited astride active fault traces can be severly damaged; they are subject to displacement or distortion caused by faulting as well as to ground shaking and possibly ground dailure.

The width of the zone of displacement and distortion is related to the type of fault and the magnitude of the earthquake. For lateral displacement faults the maximum half-width zone from the fault centerline to the outer edge of the deformation zone is generally estimated to be 300 feet. For vertical displacement faults the zone may be ten times wider.

The amount of displacement and distortion across the fault zone is also related to the magnitude of the earthquake and to the type of fault. Evaluations of historical data show the maximum displacement for lateral-slip faults is up to 30 feet for magnitude 8 earthquakes, 20 feet for magnitude 7 earthquakes, and 6 feet for magnitude 6 earthquakes.

CONCLUSION

Of the three types of earthquake hazards discussed, only that of surface fault displacement is confined to a small zone near the causative fault. Yet this is the only hazard addressed by the Alquist-Priolo Special Studies Zone Act. Ground shaking and ground failure hazards affect much greater areas and therefore have the potential to cause the most extensive damage. It is very important that planners, designers, and builders of our new structures have a realistic understanding of the nature and reality of earthquake hazards.

The Three Laws of Planning Law

1. Facts Win Cases. You either prove your case or lose the race, and what the facts don't show you surely will blow.
2. The Three Martini Lunch. An amazingly effective tool of persuasion.
3. Know Your City Attorney. ~~Corrolaries:~~ Corollaries: (a) lawyers have their own biases, and (b) you can never have too many friends in high places.

Actually, the future does not exist except as a concept, a cosmic wisp of possibility. How people view it can make big differences. What befalls society around the bend in the river will not come hurtling out of space (weather excepted) but will have arisen out of today. "The present," as Philosopher Gottfried Wilhelm Leibniz puts it, " is pregnant with the future." The highest prudence consists of not looking ahead but of giving the best care to the burgeoning and, for better or worse, fruitful moment at hand.

Frank Trippett
TIME
April 26, 1982

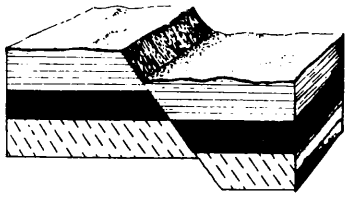

Diagram to illustrate the arrangement of rock strata in a Fault

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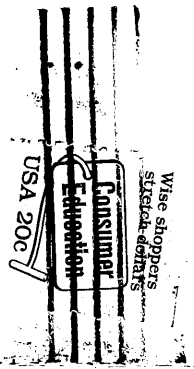

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