

# **PALOMAR MEDICAL CENTER HAZUS UPDATE**

November 29, 2007

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CO Architects  
KPF Consulting Engineers

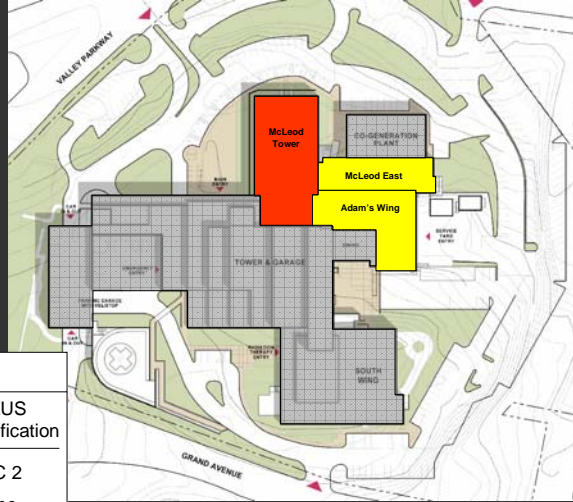
PALOMAR  
POMERADO  
HEALTH




## **Agenda**

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- **Bottom Line on HAZUS for Palomar Campus**
- **How HAZUS Works**
- **Evolution of HAZUS**
- **Progress to Date**
- **Findings**
- **Next Steps**

## SPC Evaluation and HAZUS Summary



Legend	
SB 1953 Evaluation	HAZUS Reclassification
	SPC 1
	SPC 1
	Not Evaluated
	SPC 2
	None

## How HAZUS Works

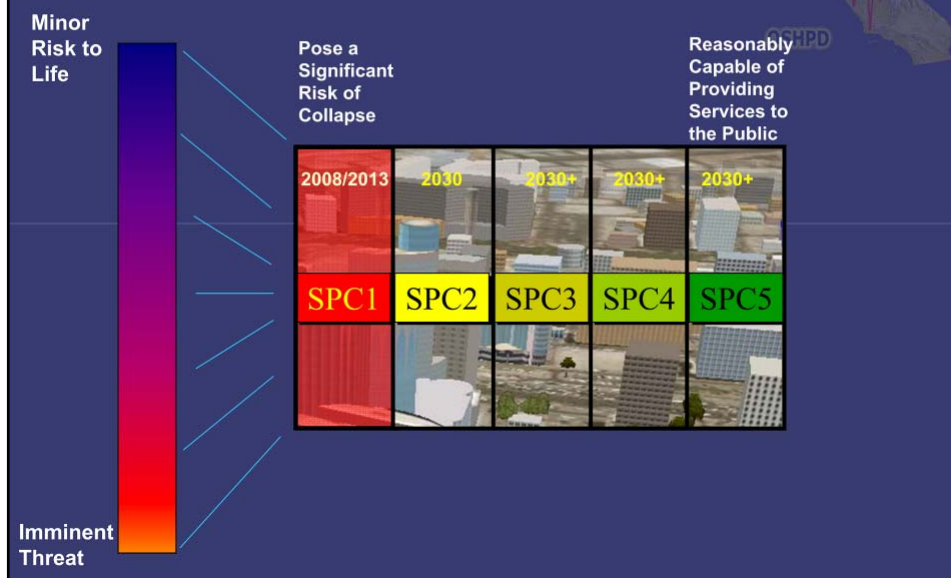
Excerpts from a presentation by John Gillengerten:



Re-Prioritization Screening of  
SPC-1 Hospital Buildings

California Building Standards Commission  
November 14, 2007

## 1995 – Structural Performance Categories



## Reprioritization of SPC-1 Buildings

- Provides an opportunity to focus on the worst hospital buildings first, as outlined in the Governor's Healthcare Reform plan
- Utilizes advances in the estimation of seismic hazards and seismic design
- Leverages the original seismic evaluations

## What is HAZUS ?



- HAZUS is a standardized publicly available and nationally applicable earthquake loss estimation methodology
- HAZUS includes the Advanced Engineering Building Module (AEBM), that allows input of building-specific properties

## HOW DOES HAZUS WORK?



- Combines 4 inputs
  - *Ground Motion*
  - *Construction Type (structural systems/materials)*
  - *Building Codes at time of construction*
  - *Structural Deficiencies*
- Yields Damage and Loss Probability
  - *5 Categories from "None" to "Complete"*
  - *Complete damage = total economic loss*
  - *A fraction of buildings suffering "complete" damage may collapse*

## Participation is Voluntary



- Hospitals with one or more SPC-1 buildings will be notified about the HAZUS program
- For a building to be considered for reclassification, the hospital owner shall submit the necessary data by July 1, 2009

## Submittal Requirements



- Hospitals that choose to participate must, for each eligible building:
  - *Submit a complete structural evaluation*
  - *Submit a supplemental evaluation report identifying Significant Structural Deficiencies*
  - *Identify Building Type (Structural System)*
  - *Provide height above and below the seismic base*

## Basis of Reclassification

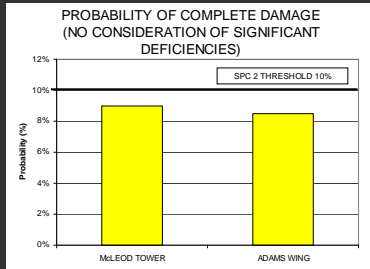


- Criteria was benchmarked to the performance of SPC-2 buildings
- Building with more than 0.75% Probability of Collapse will be placed in SPC 1
- Buildings with less than or equal to 0.75% probability of collapse will be classified as SPC 2

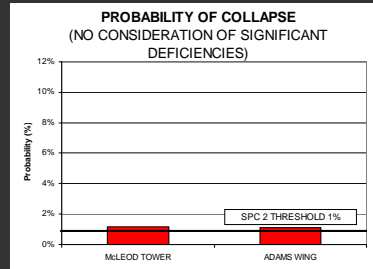
## Evolution of HAZUS

- The details of how SPC reclassification would be accomplished with HAZUS have been evolving.
- Original Criteria
  - 10% probability of complete damage
  - Considered only building type, age and height
  - No consideration of significant structural deficiencies, but discussion that it was an issue.
- Subsequent Revisions
  - Changed from 10% probability of complete damage to 1% probability of collapse
  - Added consideration of significant structural deficiencies
- Final Criteria
  - Changed to 0.75% probability of collapse
  - Refined significant structural deficiencies

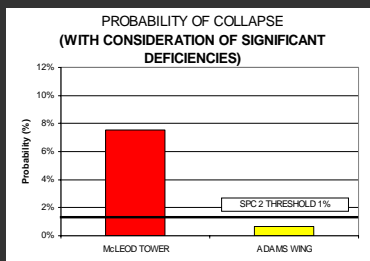
## Evolution of HAZUS



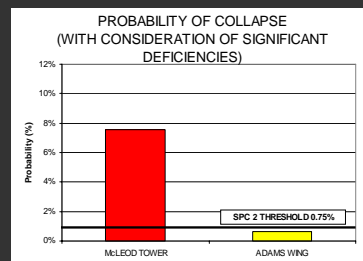
MARCH 2007



MID 2007



AUG 2007



NOVEMBER 2007

## Progress to Date

- SPC Structural Evaluations
  - McLeod Tower and Adams Wing complete
  - McLeod East approximately 90% complete
  - Requested existing Geotechnical Engineering report for Palomar campus from URS
- HAZUS Preliminary Assessments
  - McLeod Tower, Adams Wing and McLeod East complete
- HAZUS Supplemental Evaluation Reports and SPC 2 Reclassification
  - Adams Wing and McLeod East in progress
  - Will include all supplemental information required for HAZUS evaluation (i.e. building type and height)
  - Need confirmation of soil parameters from Geotechnical Engineer

## Summary of Significant Structural Deficiencies for HAZUS

Structural Deficiency	CAC Section	McLEOD TOWER	ADAMS WING	McLEOD EAST
Age (Pre-1933 buildings)	-	T	T	T
Material Tests (none)	-	F	F	F
Redundancy	3.2	T	T	T
Weak Story Irregularity	3.3.1	T	T	T
Soft Story Irregularity	3.3.2	T	T	T
Mass Irregularity	3.3.4	MF	T	T
Vertical Discontinuity	3.3.5	F	MF	MF
Torsional Irregularity	3.3.6	F	MF	MF
Deflection Incompat.	3.5	F	T	T
Short Column	3.6	T	T	T
Wood Deterioration	3.7	NA	NA	NA
Steel Deterioration	3.7	NA	NA	NA
Concrete Deterioration	3.7	T	T	T
Weak Column-Steel	4.2.8	NA	NA	NA
Weak Column-Conc.	4.3.6	NA	NA	MF
Cripple Walls	5.6.4	NA	NA	NA
Topping Slab (Missing)	7.3 & 7.4	NA	NA	NA
Wall Anchorage	8.2	NA	T	T

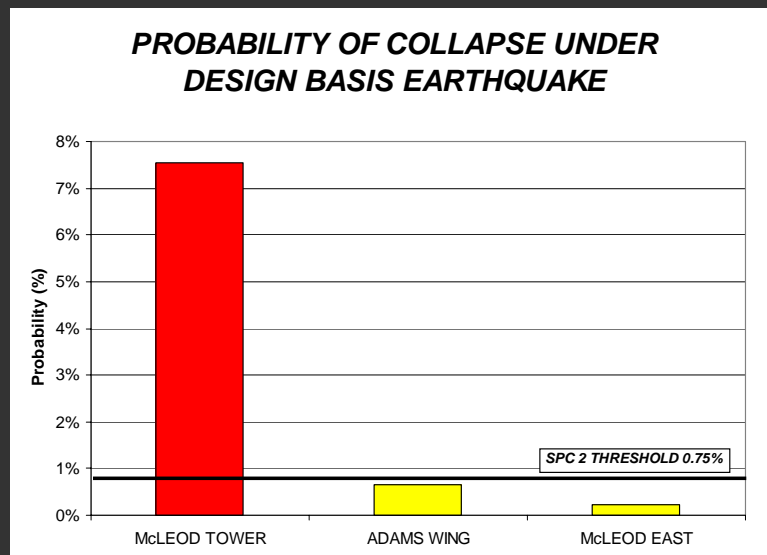
**Legend:**

T = True

F = False

MF = Mitigated False

## Summary of HAZUS Results



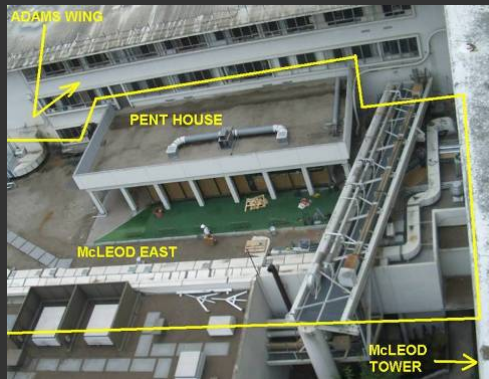


## Material Testing Program

- Material testing will generally improve the probability of collapse determined by HAZUS.
- A material testing program was originally proposed as part of the evaluation effort.
- The HAZUS results are not affected by the presence or absence of material testing for any of the three buildings.
- KPFF recommends that no material testing program is required based on the HAZUS assessments.

## McLeod East Penthouse

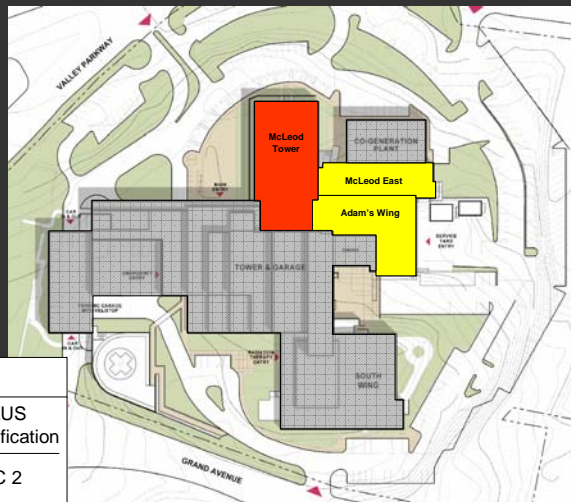
- The SPC Evaluation for McLeod East revealed that the building's penthouse may pose a local hazard due to a "weak column" deficiency.
- Does not pose a global collapse hazard, so we do not believe that it will affect the reclassification using HAZUS.
  - Need to confirm this assumption with OSHPD.
- KPFF recommends that the penthouse be removed or retrofitted to mitigate this hazard.



## Next Steps

- Submit formal SPC Evaluation reports for Adams Wing and McLeod East
  - A Geotechnical Engineering report is required. KPFF has requested an existing report from URS to be used for this purpose.
- Complete and submit supplemental reports for SPC 2 reclassification based on HAZUS
  - Submit to OSHPD concurrently with SPC Evaluation reports.
  - A letter from URS is required to substantiate the soil parameters based on the existing Geotechnical Engineering report.
- No material testing programs are required
- Assess local hazard of McLeod East penthouse and develop conceptual retrofit scheme
  - May be presented to OSHPD as a voluntary seismic retrofit.

## Questions?



Legend		SB 1953 Evaluation	HAZUS Reclassification
<span style="display:inline-block; width:15px; height:15px; background-color:yellow; border:1px solid black;"></span>	SPC 1	SPC 1	SPC 2
<span style="display:inline-block; width:15px; height:15px; background-color:red; border:1px solid black;"></span>	SPC 1	SPC 1	None
<span style="display:inline-block; width:15px; height:15px; background-color:grey; border:1px solid black;"></span>	Not Evaluated		