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HOSPITAL BUILDING SAFETY BOARD Instrumentation Committee

**Thursday, October 26, 2023
10:00 a.m. – 4:00 p.m.**

Teleconference Meeting Access:
[HBSB Teams Instrumentation Committee](#)
Access Code: 271-646-402

Committee Members Present

Marshall Lew, Chair
Jim Malley
Farzad Naeim
Jennifer Thornburg

Consulting Members Present

Hamid Haddadi
Tony Shakal

HCAI Staff Present

Chris Tokas
Hussain Bhatia
Erol Kalkan
Roy Lobo
Ali Sumer
John Grey

HBSB Staff Present

Veronica Yuke, Acting Executive Director
Marcus Palmer
Evet Torres

1. Welcome and introductions

Marshall Lew, Committee Chair, called the meeting to order on October 26, 2023, at 10:00 a.m., and Acting HBSB Executive Director, Veronica called roll.

2. Roll Call and Meeting Advisories/Expectations

Five members of the Committee present constitute a quorum. There being six present at the time of roll, a quorum was established.

1 Ms. Yuke read the meeting rules and procedures.

2
3 **3. Review of the Fiscal Year 2022-23 HCAI/CSMIP Hospital Instrumentation**
4 **Annual Report by the California Strong Motion Instrumentation Program**
5 **(CSMIP)**

6 **Presenter:** Hamid Haddadi, Consulting Member

7 Mr. Haddadi outlined the milestones for instrumenting hospitals, which included a kickoff
8 meeting with HCAI, California Geological Survey (CGS), and a structural engineer for
9 sensory layout; obtaining approval from HCAI for the layout along with preparation of a
10 Technical Specification Letter (TSL); then a site visit for sensory marking; and ultimately
11 completing the project instrumentation.

12
13 Mr. Haddadi stated that there were three types of instrumentation projects:

- 14 • Type 1 - HCAI-Funded regular instrumentation of hospitals
- 15 • Types 2 - Owner-funded instrumentation of new hospitals with CSMIP guidance
16 and assistance.
- 17 • Types 3 - Owner-funded instrumentation of retrofitted existing hospitals with
18 CSMIP guidance and assistance.

19
20 Mr. Haddadi reported that for the fiscal year 2022/2023, there were 19 earthquakes with
21 a magnitude of 3 or larger that were reported at instrumented hospitals.

22 He stated that the last contract was initiated on March 20, 2020, and due to the
23 pandemic challenges faced, \$260,000 from the budget was reverted, and so \$160,000
24 was amended to the contract and was used for the project completion.

25 Mr. Haddadi reviewed the statewide strong motion instrumentation update, stating that:

- 26 • Out of 805 outpatients, 67 were either a hospital or ground stations associated
27 with hospitals.
- 28 • Seventy-three hospital buildings needed re-instrumentation, and out of those four
29 are under OSHPD review.
- 30 • Hospital buildings with Strong-Motion Seismic Accelerograph recorders (SSA)
31 totaled 190, 38 being OSHPD hospitals, needed an upgrade.

32
33 Dr. Lew proposed discussing the possibility of using lower-cost MEMS to expand the
34 instrumentation of more buildings, in the next committee meeting.

35 Mr. Haddadi reported that the system for ground station monitoring was complete, with
36 approximately 250 stations integrated into the real-time system.

1 Mr. Kalkan asked about the latency of getting data directly from the system instead of
2 digitizing it at the hospital. Mr. Haddadi answered that the latency would be minimal,
3 less than a second, as the system supports an early warning, preventing significant
4 delays.

5
6 **Discussion and Input**

- 7 • None

8
9 **Informational and Action item**

- 10 • None

11
12 **4. Annual update to the Committee regarding CSMIP**

13 **Presenter:** Erol Kalkan, HCAI

14 **Discussion and Input**

15 Mr. Kalkan highlighted that the California Building Code (CBC) required instrumentation
16 for new hospital buildings that are owner-funded, and these buildings were approved
17 through Alternate Means of Compliance for the Lateral Force Resisting System, seismic
18 isolation, and Damping systems.

19 Mr. Kalkan stated the criteria for HBSB Building Instrumentation Selection:

- 20 • Proximity to fault capable of generating earthquake magnitudes larger than 6.5
21 and sites with high probability of seismic events.
- 22 • Non-standard structural systems.
- 23 • Adjacent to other buildings with pounding probability.
- 24 • Buildings with irregularities to put seismic sensors.
- 25 • Tall inter-story heights to monitor the amount of drift during strong earthquakes.
- 26 • Seismically retrofitted buildings, SPC-4D.
- 27 • Soil type.
- 28 • Lack of instrumented buildings in the geographic area.

29 Mr. Kalkan reported on the parameters used by Lateral Seismic Resisting Systems in
30 Hospitals, which are instrumentation required by owner:

- 31 • Structures with Passive Energy Dissipation Systems
- 32 • Structures with Seismic Isolation Systems

- 1 • Other structures of conventional Lateral Force Resisting Systems with alternate
- 2 methods of compliance.
- 3 • Structures with lateral system not listed in ASCE 7 Table 12.2-1.

4 Mr. Kalkan stated that 85 hospitals were instrumented with help from CSMIP.

5 He also talked about the HCAI-funded instrumentation projects that were completed:

- 6 • Miller Children's Hospital, Long Beach.
- 7 • Presbyterian Intercommunity Hospital, Whittier.
- 8 • Santa Clara Valley Hospital, San Jose.

9 Mr. Kalkan reported on the completed owner-funded instrumentation projects:

- 10 • Kaiser Hospital Tower expansion, Downey.
- 11 • Marin General Hospital, Greenbrae.
- 12 • St. Bernardine Hospital, San Bernardino.

13 Mr. Kalkan specified owner-funded instrumentation projects, underway:

- 14 • University Medical Center, Loma Linda.
- 15 • Hollywood Presbyterian, Los Angeles.
- 16 • Marina Del Rey Cedars-Sinai Medical Center.
- 17 • Scripps Tower II, La Jolla.
- 18 • Sharp Metropolitan MC, San Diego.
- 19 • UC Irvine Medical Center New Hospital, Irvine.
- 20 • UC Davis Health New Hospital, Sacramento.
- 21 • Scripps Mercy Tower, San Diego.
- 22 • UCLA Medical Center Replacement Project (Inpatient Tower)
- 23 • UCSF Parnassus (Acute care hospital), San Francisco.
- 24 • Cedars Sinai (Patient Tower), Los Angeles.

25 Mr. Kalkan stated that there was a real-time collection of data from the Santa Rosa
26 hospital, primarily focusing on the backend processes using developed algorithms for
27 post-processing seismic events, particularly earthquakes.

28 He noted that the post-earthquake seismic data assessment report contains:

- 29 • Waveform plots.
- 30 • Response spectra plots.
- 31 • Spectrograms and hodograms.

- 1 • Fast Fourier Transform (FFT) and Power Spectral Density (PSD) plots.
- 2 • Horizontal-to-vertical spectral ratio plots and statistical graphs that can track
- 3 changes in the predominant site frequency following seismic events.

4 Mr. Kalkan highlighted that there were efforts to create a basic summary report on the
5 data assessment for non-technical users, such as building management in hospitals.

6 He stated that there were only two seismic instrumented wood-frame hospital buildings,
7 which are John F. Kennedy Memorial Hospital and Tenet Health Central Coast Twin
8 Cities Community Hospital.

9 Mr. Kalkan gave the criteria for the wood-frame instrumentation projects:

- 10 • Year build- new versus old buildings.
- 11 • Small versus large facilities.
- 12 • Facilities that are in a high seismic region.
- 13 • Facilities structural system SPC-2, or SPC-4D, or SPC-5.
- 14 • Location – buildings in Central, Northern and Southern California.
- 15 • Whether to instrument more building with less sensors or less buildings with
- 16 more dense sensor arrays.

17 Dr. Lew suggested the possibility of co-locating high-resolution equipment with lower-
18 cost CSN-type instrumentation within the same building to gather more comprehensive
19 information by instrumenting more buildings, achieve a wider geometric spread, and
20 expedite the process of acquiring data.

21 Mr. Kalkan stated that Network Timing Protocol (NTP) was used to synchronize digital
22 sensors across various locations in wood frame structures.

23 Mr. Tokas mentioned that there would be a compiled list detailing buildings and their
24 distinct features and suggested geographic placements to prioritize earthquake-prone
25 areas to be presented and deliberated in the next meeting.

26 Mr. Haddadi asked whether the initial step of obtaining earthquake details followed
27 waveform extraction or continuous waveform monitoring. Mr. Kalkan answered that
28 when an earthquake occurs, the process entailed manually acquiring data from the
29 CSMD website and integrating it with metadata to gain a comprehensive understanding
30 of the earthquake event.

31 Mr. Malley asked how many new wood-frame hospital buildings were being built.

32 Mr. Sumer answered that there were a good amount of new wood-frame buildings that
33 were coming up.

34 Dr. Lew asked how the wood-framed buildings were doing on the NPC ratings.

35 Mr. Sumer answered that the NPC requirements were the same across the board.

1 Mr. Kalkan asked about the feasibility of easy comparison between low-cost and high-
2 resolution sensors by conducting tests on a shake table at different frequencies.
3 Mr. Haddadi answered that there was a pilot project underway that aimed to test both
4 high and low-resolution sensors.

5
6 **MOTION: [Malley/Thornburg]**

7 The committee unanimously voted to approve the San Jose Kaiser for HCAI-OSHPD
8 instrumentation.

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10 **Informational and Action item**

- 11 • None

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14 **5. Finalization of the white paper on “The Benefits of Strong-Motion**
15 **Instrumentation in Hospital Facilities”**

16 **Presenter:** Marshall Lew, Committee Chair, and Farzad Naeim

17 **Discussion and input**

18 Mr. Tokas stated that the white paper was ready for publication.

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22 **MOTION: [Malley/Haddadi]**

23 The committee unanimously voted to approve the final white paper on November 7th,
24 2022, on “The Benefits of Strong Motion Instrumentation in Hospital Facilities.”

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26 **Informational and Action item**

- 27 • None.

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29 **6. Comments from the public/committee members on issues not on this agenda**

30 **Presenter:** Marshall Lew, Committee Chair

31
32 **Discussion and input**

33 Dr. Lew stated that there would be an instrumentation committee meeting planned for
34 the first quarter of next year to discuss the issues regarding the instrumentation of
35 wood-framed hospital buildings.

1 **Informational and Action item**

- 2 • None.

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4 **7. Adjournment**

5 Mr. Lew adjourned the meeting on October 26, 2023, at approximately 12:28 p.m.