Item XVII-1

State of California
Seismic Safety Commission

Memo

To: Seismic Safety Commission

From: Fred Turner, Staff Structural Engineer
California Seismic Safety Commission
1755 Creekside Oaks Drive, Suite 100
Sacramento, CA 95833
Phone: (916) 263-0582 Fax: (916)263-0594 Email: Turner@StateSeismic.com

Date: November 1, 2011

Subject: **Proposed Contract Extension to an Existing Contract 2010-08 with UCSD Regarding Post-Earthquake Building Fire Performance**

On January 7, 2011, the Commission entered into an interagency agreement with UC San Diego to provide $300,000 for a project that will test a 5 story building on a shaking table. This project is underway and a progress report on three tasks is attached. Task 1 involves the design, assessment protocols, and simulation of an intensive care unit in a portion of the test building. Task 2 is the development of a base isolation design for the test building. Task 3 is the development of an educational video.

UC San Diego has requested that a representative of the Seismic Safety Commission comment in the educational video about the history of the Hospital Seismic Safety Act, portions of which were sponsored by the Commission, as well as the need for research to improve our understanding of how nonstructural systems and components perform in earthquakes. Staff recommends that the Commission appoint a representative to participate in the shooting of the video.

UCSD has requested an additional $50,032 from the Commission to assist in a limited set of live fire tests to assess the potential for smoke and fire spread in the earthquake-damaged building after the shaking tests are completed. In response to this request, staff asked Commissioner Timothy Strack, former Commissioner Don Parker and Dr. Charles Scawthorn to review and comment on the conceptual scope of work for the fire tests. All three supported the proposal in concept.

Professor Jose Restrepo from UCSD will make a short presentation at our November 10th, 2011 meeting regarding this proposal.

Staff Recommendation

Staff recommends that the Commission review the attached scope of work, budget and timeline, listen to Professor Restrepo's presentation, and be prepared to ask questions and consider authorizing staff to enter into negotiations with UCSD to fund this project.

STATE OF CALIFORNIA

STANDARD AGREEMENT AMENDMENT

STD. 213 A (Rev 6/03)

☐ **CHECK HERE IF ADDITIONAL PAGES ARE ATTACHED** _____ **Pages**

AGREEMENT NUMBER	AMENDMENT NUMBER
SSC 2010-08	**1**
REGISTRATION NUMBER	

1. This Agreement is entered into between the State Agency and Contractor named below:
   STATE AGENCY'S NAME
   Alfred E. Alquist Seismic Safety Commission
   CONTRACTOR'S NAME
   University of California San Deigo
2. The term of this Agreement is 1/1/2011 through 12/31/2012
3. The maximum amount of this Agreement after this amendment is: **$**50,032.00 350,032.00
4. The parties mutually agree to this amendment as follows. All actions noted below are by this reference made a part of the Agreement and incorporated herein:

   At the conclusion of the shake tests, a limited set of live fire tests will be conducted to assess the potential for smoke and fire spread in the earthquake-damaged building. These tests will involve two components: pressure testing of compartment integrity, and live fire testing to assess performance against fire and smoke spread.

   Earthquake shaking and fire testing will be conducted during the first quarter of 2012, with testing completed by March 31, 2012. Data analysis and post-test simulation will be conducted over the balance of 2012.

Thermocouples and cables		$20,000
Cameras		$4,700
Burner, controls, fuel		$7,000
Material costs		$2,000
Shipping costs		$1,000
Door fan equipment		$4,000
Site technician cost		$3,880
	Subtotal	$42,580
Indirect (17.5%)		$7,452
	TOTAL	$50,032

   This amendment also extends the time of the agreement to December 21, 2012.

   All other terms and conditions shall remain the same.

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

CONTRACTOR

CONTRACTOR'S NAME *(If other than an individual, state whether a corporation, partnership, etc.)*
University of California San Diego

BY *(Authorized Signature)* ✍ | DATE SIGNED *(Do not type)*

PRINTED NAME AND TITLE OF PERSON SIGNING
Clarice Lin Park, Contract & Grant Officer

ADDRESS
9500 Gillman Drive MC 0934 La Jolla CA 92093-0934

STATE OF CALIFORNIA

AGENCY NAME
Alfred E. Alquist Seismic Safety Commission

BY *(Authorized Signature)* ✍ | DATE SIGNED *(Do not type)*

PRINTED NAME AND TITLE OF PERSON SIGNING
Richard McCarthy, Executive Director

ADDRESS
1755 Creekside Oaks Drive Suit 100 Sacramento CA 95833

CALIFORNIA
Department of General Services
Use Only

☐ Exempt per:

STATE OF CALIFORNIA
STANDARD AGREEMENT
STD 213 (Rev 06/03)

AGREEMENT NUMBER
SSC 2010-08
REGISTRATION NUMBER

1. This Agreement is entered into between the State Agency and the Contractor named below:

STATE AGENCY'S NAME
Alfred E. Alquist Seismic Safety Commission

CONTRACTOR'S NAME
University of California San Diego

2. The term of this Agreement is: January 1, 2011 through December 31, 2011
One year

3. The maximum amount of this Agreement is: $ 300,000
Three hundred thousand dollars and zero cents

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement.

Exhibit A – Scope of Work — 5 page(s) CW 2/18/11

Exhibit B – Budget Detail and Payment Provisions — 3 page(s) CW, 2/18/11

Exhibit C* – General Terms and Conditions — GIA 610 RM

Check mark one item below as Exhibit D:

☐ Exhibit - D Special Terms and Conditions (Attached hereto as part of this agreement) — page(s)

☐ Exhibit - D* Special Terms and Conditions

Exhibit E – Additional Provisions — page(s)

Items shown with an Asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto. These documents can be viewed at www.ols.dgs.ca.gov/Standard+Language

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

CONTRACTOR

CONTRACTOR'S NAME *(if other than an individual, state whether a corporation, partnership, etc.)*
University of California San Diego

BY *(Authorized Signature)* — DATE SIGNED *(Do not type)* 1/5/11

PRINTED NAME AND TITLE OF PERSON SIGNING
Clarice Lin Park, Contract & Grant Officer

ADDRESS
9500 Gilman Dr. MC 0934
La Jolla, CA 92093-0934

STATE OF CALIFORNIA

AGENCY NAME
Alfred E. Alquist Seismic Safety Commission

BY *(Authorized Signature)* — DATE SIGNED *(Do not type)* 1/7/11

PRINTED NAME AND TITLE OF PERSON SIGNING
Mr. Richard McCarthy, Executive Director

ADDRESS
1755 Creekside Oaks Dr. #100, Sacramento, CA 95833

California Department of General Services Use Only

APPROVED
MAR - 4 2011
DEPT OF GENERAL SERVICES

Klyates

☐ Exempt per:

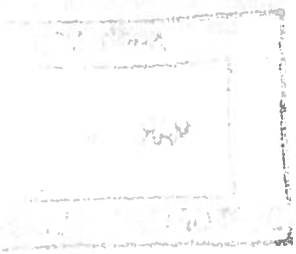

Exhibit A

Performance of Hospital Nonstructural Components and Systems to Earthquakes and Post-Earthquake Fire

Proposed Project to California Seismic Safety Commission

Background

Nonstructural components are the architectural finishes such as partitions, cladding and windows, as well as plumbing, mechanical and electrical systems typically found in buildings. In recent earthquakes, newer hospital structures have performed adequately, however the poor performance of nonstructural components has resulted in hospitals being evacuated and unavailable in critical post earthquake periods. This poor performance is a significant concern. Moreover, nonstructural component damage has led to substantial direct and indirect economic loss, which is in general greater than losses associated with the building structural system. Another significant concern is the performance of passive fire barrier systems after severe ground shaking. Post earthquake fires have been a major source of loss of life and damage in the past earthquakes. While building codes have greatly strengthened the requirements for nonstructural components in recent years, components designed and installed to these new requirements have not yet been tested in strong earthquakes.

To date, research on the behavior of nonstructural components and systems (NCSs) has been primarily based on observations from past earthquakes, limited shake table testing, and pseudo dynamic cyclic testing. Typically, these tests are conducted at the component level. Tests have been conducted primarily at the State University of New York of Buffalo, UC Berkeley, and UC San Diego. Large-scale tests have also been conducted in Japan on the E-Defense shake table; however, because of differences in practice, the outcome of this testing has little application to California. Importantly, experimental research into the performance of hospital NCSs has been sparse at best. Yet recent earthquakes (e.g. 2010 Chile, Baja California) have alerted us to the still vulnerable nature of hospitals and their secondary support infrastructure.

In light of these issues, the statement of work described herein by the University of California, San Diego (UCSD) proposes to augment an existing larger project with the ingredients needed to experimentally assess the performance of hospital systems, namely via the integration of a building base isolation option to demonstrate seismic isolation effectiveness in assuring post-earthquake functionality and incorporation of an intensive care unit (ICU) on one floor of a test building. Moreover, the proposed project will provide the opportunity to increase public awareness of the importance of the earthquake and post-earthquake performance of hospital systems as observed in past events. The existing project focuses on evaluating the seismic and post earthquake fire performance of nonstructural components placed within a full-scale, 5 story building. This project is unique in that it will focus on the overall performance of components and systems and their interactions, both amongst other NCSs as well as with the structural system. The project will provide a visual, high-profile demonstration of how these systems perform when subjected to various levels of earthquake ground motions. When earthquake motion testing is complete, the test building will then be subjected to full fire effects to simulate post earthquake fire conditions.

Overall Project Description and Tasks Associated with other Support Mechanisms

This project involves a three year commitment with a number of project sponsors. In total, $4.9M in funds is being provided from the National Science Foundation (NSF) and industry (including $300k pending from NIST). The most significant resources for the project are provided by the NSF, Englekirk Partners/C4, and industry. The grant provided by the NSF provides resources to partially support

academic researchers at UCSD, Howard University, and San Diego State University (SDSU) and graduate students and associated tasks. UCSD is responsible for (i) overall oversight and management of the project, (ii) peer review of the non-base isolated building system design, construction and test execution, (iii) coordination, instrumentation, data reduction, and reporting of the building skeleton and bare NCS seismic testing and results and (iv) facilitating and implementing technology transfer. The NSF grant is provided through the NEES program, therefore with these funds, UCSD is also responsible for timely experimental data sharing and archiving via the NEESit system. Howard University, a historically black University, is responsible for implementation of protective systems to the NCSs (local NCS protective measures) and associated testing and simulation aspects of this effort. SDSU is responsible for (i) construction management and (ii) education and outreach efforts. The latter involves a K-12 initiative to partner with the Stanley E. Foster Construction Tech Academy (CTA) (a Gates Foundation School in the San Diego Unified school district with about a 90% non-white-male population, and students focused on construction, engineering, and architecture). CTA teachers and students will be engaged in the overall project during all phases (design, construction, and testing). Efforts with teachers will involve creating and testing curriculum modulus for secondary education, while students will be engaged in internships on-site to work with the research team. Costs for the overall test execution are sought from industry partners (cash contributions). The bare NCSs to be implemented in the building are provided by industry sponsors (in-kind/materials contributions). To-date these include an elevator, perimeter cladding, windows, ceilings, electrical/mechanical systems, a roof mounted chiller, passive and active fire protective systems, and anchorage. Englekirk Partners/C4 support (combination of cash and in-kind/materials) resources are providing the cost of the building skeleton; including design, shop drawings, construction, and demolition. Funding requested of NIST (pending) would provide support for the post-earthquake fire testing effort (design, instrumentation, post-earthquake burn tests, data reduction, and reporting).

Specific CSSC-Requested Support Activities

In this proposal we are seeking the support of the CSSC to provide $300,000 in funds for a project duration of 12 months, which would be used for tasks associated with evaluating and documenting the earthquake and post-earthquake fire performance of hospital systems. Three tasks are proposed under this request. Task 1, requiring $120,000 in resources, will focus on development and testing of an intensive care unit (ICU) within the building. Task 2, requiring $80,000 in resources, will focus on design and implementation of a base isolation system below the building. Task 3, requiring $100,000 in resources, will be used to produce an educational video documenting the seismic performance of hospitals during earthquakes and in the immediate aftermath.

Objectives of the Study

The overall goal of the project commitment with CSSC is to improve our understanding of hospital system performance under earthquake and post-earthquake fire conditions. The importance of documenting this understanding in a succinct fashion to the general public will support broad awareness of the issues faced by this critical infrastructure.

Scope of Work

The work tasks that are required for successful completion of this research study are outlined below. A timeline for completion of the tasks is presented in Table 1.

Exhibit A

Task 1. Design, Assessment Protocols, and Simulation of an Intensive Care Unit: The research project associated with this proposal is part of a much larger project that will investigate the response of a building system including typical nonstructural systems to several levels of earthquake motion expected in California at a site near a major active fault. The experimental testing will be conducted on the Large Outdoor High-Performance Shake Table (LHPOST) at the University of California at San Diego (UCSD). This unique testing will be performed on a landmark five story building built at full-scale and furnished with nonstructural elements, namely: an elevator, cladding and window systems, piping, sprinklers, fire barriers and heating, ventilating and air conditioning (HVAC) systems. In this task, the existing building plan will be augmented with a floor dedicated to support a fully operational intensive care unit. Electrical power distribution and equipment layout details will be developed in consultation with CHA, CSSC, OSHPD, and HBSB. Protocols will be developed for post-shaking evaluation of the ICU room and specific equipment response. Pre-test simulation considering the ICU-building system will be conducted to provide insight into the system interaction response of the ICU floor and its associated equipment.

Task 1 Product: Calculations, Design Drawings, Construction Specifications, and Assessment Protocols for the Intensive Care Unit. The UCSD shall own all rights to the calculations, design drawings, construction specifications, and assessment protocols for the Intensive Care Unit. CHP, 2/18/11 RJM

Task 2: Development of Base Isolation Design and Testing Plan: Isolation of hospital buildings is a modern strategy for minimizing damage and increasing the potential for immediate operability post-event. In this task, conceptual plans, pre-test simulation results, and protocols for testing of an isolation system to support the building structure will be developed. The design will be undertaken using nonlinear computer models and undergo peer review from structural engineering industry partners. The concept of seismic base isolation is intended to test the effectiveness of isolation on the performance of both the structure and nonstructural components. The project intends to demonstrate for ground motion levels and performance-based earthquake engineering practices consistent with the following national standards and guidelines ASCE 7-10, IBC 2009, ASCE 41-06, FEMA 450, FEMA 461, and ATC 58:

1. An Immediate Occupancy Performance Level for the hospital floor for those tests where the structure is not isolated.

2. An Operational Performance Level for the hospital floor for those tests where the structure is seismically isolated at its base.

The difference in performance goals between the two options may necessitate slightly different designs and installations for the nonstructural systems.

Task 2 Product: Calculations, Design Drawings, Construction Specifications, and Testing Plan for the Base Isolation Design. The UCSD shall own all rights to the calculations, design drawings, construction specifications, and testing plan for the Base Isolation Design. CHP, 2/18/11 RJM

Task 3: Development of an Educational Video: A high quality educational video will be developed documenting the earthquake performance of hospitals. Collection of video material and production of the educational video will target dissemination to the general public; however, importantly it will also more specifically target California hospital personnel. This professional quality video will also feature the planning of the upcoming test, including highlighting the outreach activities during planning and construction of the building. CHP, 2/18/11 RJM

Exhibit A

CVP 2/18/11

1. The Commission and UCSD shall jointly own and retain all copyright and reproduction rights to the video described in Task 3.

2. UCSD shall include an acknowledgement of the SSC's sponsorship in the video described in Task.

RSM

Exhibit A

1. The project representatives during the term of this agreement will be:

Alfred E. Alquist Seismic Safety Commission	UC San Diego[1]
Fred Turner	Profs. José Restrepo and Tara Hutchinson
916-263-5506	858-822-3392 & 858-534-7436
Fax: 916-263-0594	Fax: 858-864-8184 & 858-822-2260
Email: turner@stateseismic.com	Email:

Direct all inquiries to:

Alfred E. Alquist Seismic Safety Commission	UC San Diego[1]
Fred Turner	Profs. José Restrepo and Tara Hutchinson
1755 Creekside Oaks Drive Suite 100	9500 Gilman Drive, MC 0085
Sacramento CA 95833-3637	La Jolla, CA 92093-0085
916-263-5506	858-822-3392 & 858-534-7436
Fax: 916-263-0594	Fax: 858-864-8184 & 858-822-2260

Note 1): Robert Bachman, a recognized leader in the development of seismic design criteria for nonstructural components, will serve as the industry and government regulatory liaison for this research project.

Exhibit A

Table 1: Project Performance Timeline

Months after Project Award →	1	2	3	4	5	6	7	8	9	10	11	12
Task ↓												
1. Design, protocols, and Simulation of an ICU	←								→			
2. Base Isolation Design, Drawings, and Testing Plan	←					→						
3. Educational video production						←						→

EXHIBIT B

BUDGET DETAIL

Performance of Hospital Nonstructural Components and Systems to Earthquakes and Post-Earthquake Fire

Jose I. Restrepo PI
Tara Hutchinson Co-PI
Joel P. Conte Co-PI
Bob Bachman Consultant

Task 1: Design, Assessment Protocols, and Simulation of an Intensive Care Unit

Item	Budget ($k)	Private Sector Participants ($k)
Design development & shop drawings	15.0	
ICU Construction	32.0	
ICU System Modeling (Conte)	9.0	
Post-doctoral researcher	20.0	
Technical Oversight (Hutchinson)	8.0	
Consulting/Liaison with Hospitals (Bachman)	18.0	18.0
sum	102.0	
IDC (17.5%)	17.9	
Task total	**120.0**	

Task 2: Base Isolation Design & Testing Plan

Item	Budget ($k)	Private Sector Participants ($k)
Design development & shop drawings	5.0	
Base isolation restraint mechanism design & construction	45.0	25.0
Technical Oversight (Restrepo)	6.5	
Post-doctoral researcher	10.0	
Consulting (Bachman)	2.0	2.0
Sum	68.5	
IDC (17.5%)	12.0	
Task total	**80.0**	

Task 3: Video Part I

Item	Budget ($k)
UCSD-TV Production costs	35.0
UCSD-TV (Wargo) Travel	10.0
Technical Oversight (Restrepo & Hutchinson)	20.0
Travel	10.0
Post-doctoral researcher	10.0
Sum	85.0
IDC (17.5%)	14.9
Task total	**100.0**
Total	**300.0**

45.0
15.0% % Private Sector

1. Travel within the State, from SoCA to NoCA (San Francisco and Sacramento) to conduct interviews required for the video production:

4 Trips for 3 people (Reporter, Video Assistant and Project Manager or PI). At least one trip will be combined with a CSSC meeting in Northern California and the PI will report to the Commission.

Round Trip Airfare & Taxes:	$370.00
Hotel (1 night) & Taxes:	$140.00
Per Diem:	$60.00
Total per person per trip:	**$570.00**

In addition each trip the party will pay:

Cargo fee (Cameras, tripods and other video equipment):	$80.00
Land transport (car rental and/or Taxi):	$125.00
Total:	**$205.00**

Hence, the cost per trip for a party of three is:

3*$570 + $205.00 = **$1,915.00**

The cost of four trips is:

4 x $1,915 = **$7,660.00**

2. Travel within State from San Diego to Imperial, Los Angeles or San Luis Obispo Counties for three people (Reporter, Video assistant and PI or PM). Average mileage for a return trip is 358 miles. One night stay in each county. At least one trip will be combined with a CSSC meeting in Southern California and the PI will report to the Commission.

Car rental:	$180.00
Gas:	$60.00
Total:	**$240.00**

Hotel:	$120.00
Per diem:	$60.00
Total:	**$180.00**

Trip total: 3 x $180 + $240 = **$780.00**

3 trips total: 3 x $780 = **$2,340.00**

TOTAL TRAVEL: $7,660 + $2,340 = **$10,000.00**

1. **Invoicing**

   A. For services satisfactorily rendered and upon receipt and approval of the invoices, the Alfred E. Alquist Seismic Safety Commission agrees to compensate the Regents of the University of California, San Diego for actual expenditures incurred in accordance with the rates specified herein or attached hereto withholding 10 percent to be recompensed when deliverables are received.

   B. Itemized invoices shall be accompanied by a progress report.

   C. Invoices shall include the Agreement Number and shall be submitted in triplicate quarterly in arrears to:

   Sue Celli
   Alfred E. Alquist Seismic Safety Commission
   1755 Creekside Oaks Dr. #100
   Sacramento, CA 95833

2. **Budget Contingency Clause**

   A. It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the program, this Agreement shall be of no further force and effect. In this event, the State shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.

   B. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, the State shall have the option to either cancel this Agreement with no liability occurring to the State, or offer an agreement amendment to Contractor to reflect the reduced amount.

3. **Payment**

   A. Costs for this Agreement shall be computed in accordance with State Administrative Manual Section 8752 and 8752.1.

   B. Nothing herein contained shall preclude advance payments pursuant to Article 1, Chapter 3, Part 1, Division 3, Title 23 of the Government Code of the State of California.

DGS MEMORANDUM

Date: February 1, 2011

To: Sue Celli
Seismic Safety Commission

Kathleen Yates

From: Kathleen Yates, Staff Counsel IV
Department of General Services
Office of Legal Services
707 Third Street, 7th Floor
West Sacramento, CA 95605

Subject: CONTRACTOR: UC San Diego
CONTRACT # SSC 2010-08
TRACKING # 232233

There is information missing from this contract and contract package. There is no "mission critical" statement for this contract. The Std 215 does not include information as to why you believe the price to be paid for these three tasks is reasonable (#16) and there is no detailed information as to why GC 19120(b) is the correct authority for contracting out (#17). Exhibit C, for General Terms and Conditions is not identified as either the GTC 610 or the GIA 610. Exhibit B, Page 3, Item 4 is titled "Invoicing" yet that is also the title of Item 1. Item 4 actually deals with matters other than invoicing. There is no mention as to ownership of the Base Isolation Design being developed in Task 2. There is no final report being provided at the end of the project; there are only progress reports being provided along with the quarterly invoices. There is also an educational video being produced, and there is mention of a follow up video being "proposed" at a later date however it appears that this follow up video is not included in the $100K for Task 3. Please provide the "mission critical" statement, provide the information on the Std 215 #16 and #17 and identify which GTC's comprise Exhibit C. Have the parties initial the changes to the Std 213.

If you have any questions, please do not hesitate to contact me at (916) 376-5115.

The final quarterly report will conclude "the product."

Progress Report - Executive Summary & Contacts

Task 1	Design, Assessment Protocols, and Simulation of an ICU	Progress: 80%

Principal Investigator	Tara Hutchinson, Ph.D, P.E.	858.534.7436 (o) tahutchinson@ucsd.edu
Graduate Student Researchers	Xiang Wang Steve Mintz Elias Espino	
Subject Matter Expert	Bob Bachman, S.E.	949.495.4726 (m) rebachmanse@aol.com

Task 2	Development of Base Isolation Design and Testing Plan	Progress: 100%

Principal Investigator	Jose Restrepo, Ph.D	858.822.3392 (o) jrestrepo@ucsd.edu
Graduate Student Researchers	Michelle Chen Elide Pantoli Xiang Wang Hamed Ebrahimian	

Task 3	Development of an Education Video	Direction: 100% Production: 20%

Principal Investigator	Jose Restrepo, Ph.D	858.822.3392 (o) jrestrepo@ucsd.edu
Graduate Student Researcher	Steve Mintz, P.E.	415.937.1436 (m) sjmintz@ucsd.edu
Science Producer, UCSD-TV	Richard Wargo	760.840.7218 (m) rwargo@ucsd.edu

Task 1 – Design, Assessment Protocols, and Simulations of an ICU

Task Progress

Procurement of hospital equipment is nearly complete. Construction of partition walls on the 4th and 5th floor has begun. The majority of hospital equipment is donated by typical vendors, and will also be installed by these same vendors. Many vendors are opting to install to OSHPD Pre-Approved details (OPA). Some vendors are also trying new designs.

The team is currently coordinating necessary in-wall and above ceiling details to support equipment. These details are targeted to follow current standards of practice. Mechanical, electrical, and plumbing services are also being coordinated where necessary. The team has selected contractors to perform electrical and mechanical/plumbing installation. Discussions to finalize scope of work are nearing completion.

Approximately 80% of equipment has been guaranteed, and requests to vendors for an additional 10% of total equipment are close to finalization. Where 'Number' not indicated, one is provided.

Pledged Equipment

Number	Item	Vendor
3	Headwall Unit	Modular Services Company
	Medical Gas Column	
2	Medical Gas Boom	
	Workstations on Wheels	Humanscale
	Wall Mounted Workstation	
2	Nurse Call Bed Station	Responder Systems Corporation and Rauland Inc.
	Nurse Call Corridor Light	
	Nurse Call Wall Mounting Cabinet	
	Public Address System	BiAmp and Rauland Inc.
	Medical Freezer	Helmer
	Patient Lift	Hill-rom
2	Wall Mounted Cabinet	Stanley Healthcare
2	Mobile Metal Cabinet	
2	Wire Shelving Unit	
	Overhead Equipment Support	Hilti
	Equipment Boom	Berchtold
	Surgical Light	Maquet
	Monitoring Equipment Boom	
3	Ultra Sound Imager*	UCSD Surplus Sales
	Catheterization Imager*	

* Indicates non-functional equipment. All other equipment is intended to be operational.

Equipment Nearing Finalization

Number	Item	Vendor
	Emergency Generator	Cummins
	IV Pump	CareFusion
2	Patient Care Bed	Stryker
2	Patient Handling Stretcher	
2	ICU Sliding Breakout Door	Besam
2	ICU Swinging Breakout Door	

Other Equipment

Number	Item	Vendor
4	Health Care Mannequin	Mythbusters
	Hemodialysis Unit	Gambro
	Mechanical Ventilator	Phillips/Respironics

Upcoming Activities

- Procure remaining equipment
- Construct electrical and mechanical subsystems for operating equipment
- Develop protocols for post-shake evaluation of hospital floors and specific equipment response.

Attachments

- Medical Equipment floor layouts (2 pages)

Mark	Item	Vendor	Level	Height	Width	Depth
110	Ultrasound Imager	UCSD Surplus	Level 4	4'-10"	1'-10"	3'-0"
111	Ultrasound Imager	UCSD Surplus	Level 4	5'-9"	1'-9"	3'-0"
112	Ultrasound Imager	UCSD Surplus	Level 4	4'-10"	1'-10"	3'-0"
120	Catheterization Imager	UCSD Surplus	Level 1	5'-0"	6'-8"	1'-10"
130	Mechanical Ventilator		Level 5	3'-0"	1'-6"	1'-6"
142	Headwall (Flush Mounted)	Modular Services	Level 4	7'-2"	1'-1 7/8"	4 1/2"
143	Medical Gas Column	Modular Services	Level 4	9'-4"	9"	9"
144	Headwall (Surface Mounted)	Modular Services	Level 4	7'-2"	1'-1 7/8"	4 1/2"
145	Headwall (Surface Mounted)	Modular Services	Level 4	7'-2"	1'-1 7/8"	4 1/2"
148	Medical Gas Boom	Modular Services	Level 5	5'-6"	1'-9"	5'-10"
149	Medical Gas Boom	Modular Services	Level 5	5'-6"	1'-9"	5'-10"
150	Heart Lung Bypass		Level 5	3'-0"	2'-0"	2'-0"
170	Suction Pump		Level 5	9 3/8"	7 1/2"	1'-4 3/4"
180	Surgical Light	Maquet	Level 5	1'-0"	1'-0"	4'-0"
190	Hemophiltration Unit		Level 5	4'-5"	2'-10"	1'-8"
200	Monitoring Equipment Boom	Maquet	Level 5	4'-0"	1'-6"	5'-0"
201	Equipment Boom	Berchtold	Level 5	4'-0"	1'-6"	5'-0"
202	Overhead Equipment Support	Hilti	Level 5	1'-0"	10'-0"	10'-0"
203	Overhead Equipment Support	Hilti	Level 5	1'-0"	4'-0"	4'-0"
210	Workstation on Wheels	HumanScale	Level 4	4'-10"	1'-4 1/2"	1'-8 1/2"
219	Wall Mounted Workstation	HumanScale	Level 4	5'-0"	2'-0"	3'-5"
220	IV Pumps	CareFusion	Level 4	4'-0"	2'-0"	2'-0"
231	Wall Mounted Storage Cabinet	Stanley InnerSpace	Level 5	7'-0"	2'-0"	2'-10"
232	Wall Mounted Storage Cabinet	Stanley InnerSpace	Level 5	7'-0"	2'-0"	2'-10"
233	Mobile Metal Cart	Stanley InnerSpace	Level 5	6'-8"	2'-0"	3'-0"
234	Mobile Metal Cart	Stanley InnerSpace	Level 1	6'-8"	2'-0"	3'-0"
235	Wire Shelving Unit	Stanley InnerSpace	Level 5	6'-2"	2'-0"	3'-0"
236	Wire Shelving Unit	Stanley InnerSpace	Level 1	6'-2"	2'-0"	3'-0"
240	Nurse Call Bed Station	Responder Systems	Level 4	4"	6"	1"
241	Nurse Call Bed Station	Responder Systems	Level 4	4"	6"	1"
242	Nurse Call Corridor Light	Responder Systems	Level 4	4"	6"	5"
243	Nurse Call Wall Mounting...	Responder Systems	Level 4	2'-4"	1'-2 3/8"	4 3/4"
260	Health Care Mannequin		Level 4	1'-2"	1'-10"	5'-6"
261	Health Care Mannequin		Level 4	1'-2"	1'-10"	5'-6"
262	Health Care Mannequin		Level 4	5'-6"	1'-10"	1'-2"
263	Health Care Mannequin		Level 5	1'-2"	1'-10"	5'-6"
270	Hospital Freezer Unit	Helmer	Level 5	6'-8"	2'-5 1/2"	2'-11 1/2"
280	Med Gas Compressor		Level 5	8 1/2"	8 1/8"	4 3/8"
290	Med Gas Tank and Enclosure		Level 5	4'-0"	3'-0"	1'-6"
300	Patient Care Bed	Stryker	Level 4	2'-6"	3'-5 1/2"	7'-9"
301	Patient Care Bed	Stryker	Level 4	2'-6"	3'-5 1/2"	7'-9"
302	Patient Care Stretcher	Stryker	Level 5	2'-6"	3'-5 1/2"	7'-9"
303	Patient Care Stretcher	Stryker	Level 5	2'-6"	3'-5 1/2"	7'-9"
310	Patient Lift	Hill-rom	Level 4	9'-4"	10'-0"	11'-9 3/4"
320	Annunciator	BiAmp	Level 4	1"	1'-0"	1'-0"
321	Annunciator	BiAmp	Level 5	1"	1'-0"	1'-0"
330	Sliding Breakout Door		Level 4	7'-0"	7'-0 1/2"	4"
331	Sliding Breakout Door		Level 4	7'-0"	7'-0 1/2"	4"

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EQUIPMENT LEGEND

Figure AF0

MEDICAL EQUIPMENT LAYOUT

Project Name
BNCS

Date
10/23/2011

110	Ultrasound Imager
111	Ultrasound Imager
112	Ultrasound Imager
142	Headwall (Flush Mounted)
143	Medical Gas Column
144	Headwall (Surface Mounted)
145	Headwall (Surface Mounted)
210	Workstation on Wheels
219	Wall Mounted Workstation
220	IV Pumps
240	Nurse Call Bed Station
241	Nurse Call Bed Station
242	Nurse Call Corridor Light
243	Nurse Call Wall Mounting...
260	Health Care Mannequin
261	Health Care Mannequin
262	Health Care Mannequin

300	Patient Care Bed
301	Patient Care Bed
310	Patient Lift
320	Annunciator
330	Sliding Breakout Door
331	Sliding Breakout Door

LEGEND

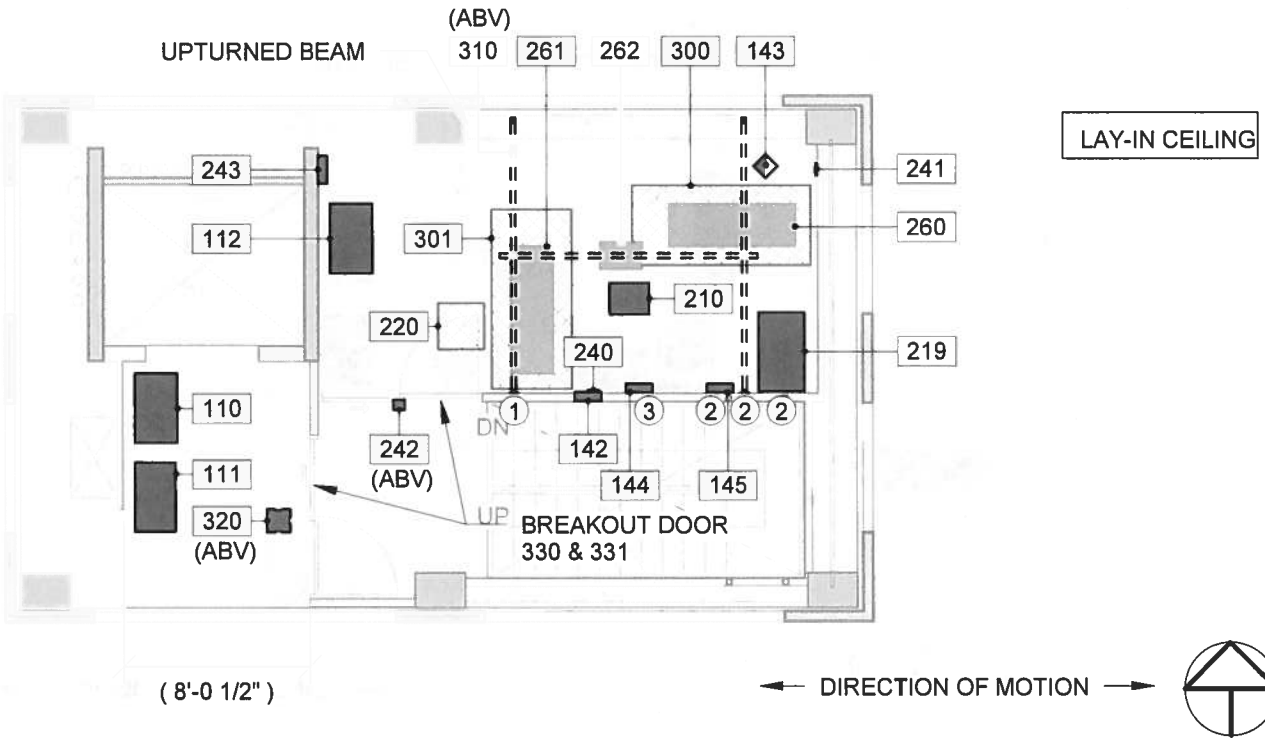
PLEDGED
Indicates equipment vendor has agreed to include item in test and/or submitted paperwork to guarantee item.

IDENTIFIED
Indicates a vendor has been selected and discussions are closed to being finalized.

UNLIKELY
Indicates equipment is desired, but conversations with potential vendors have not been fruitful. It may not be possible to include equipment in test.

WALL ANCHORAGE KEYNOTES

1 Indicates equipment frames directly into typical stud.
2 Indicates equipment frames into SureBoard product.
3 Indicates equipment frames into traditional strap backing.



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ICU (LEVEL 4)

Figure
AF4

MEDICAL EQUIPMENT LAYOUT

Project Name
BNCS

Date
10/23/2011

130	Mechanical Ventilator
148	Medical Gas Boom
149	Medical Gas Boom
150	Heart Lung Bypass
170	Suction Pump
180	Surgical Light
190	Hemophiltration Unit
200	Monitoring Equipment Boom
201	Equipment Boom
202	Overhead Equipment Support
203	Overhead Equipment Support
231	Wall Mounted Storage Cabinet
232	Wall Mounted Storage Cabinet
233	Mobile Metal Cart
235	Wire Shelving Unit
263	Health Care Mannequin
270	Hospital Freezer Unit

280	Med Gas Compressor
290	Med Gas Tank and Enclosure
302	Patient Care Stretcher
303	Patient Care Stretcher
321	Annunciator

LEGEND

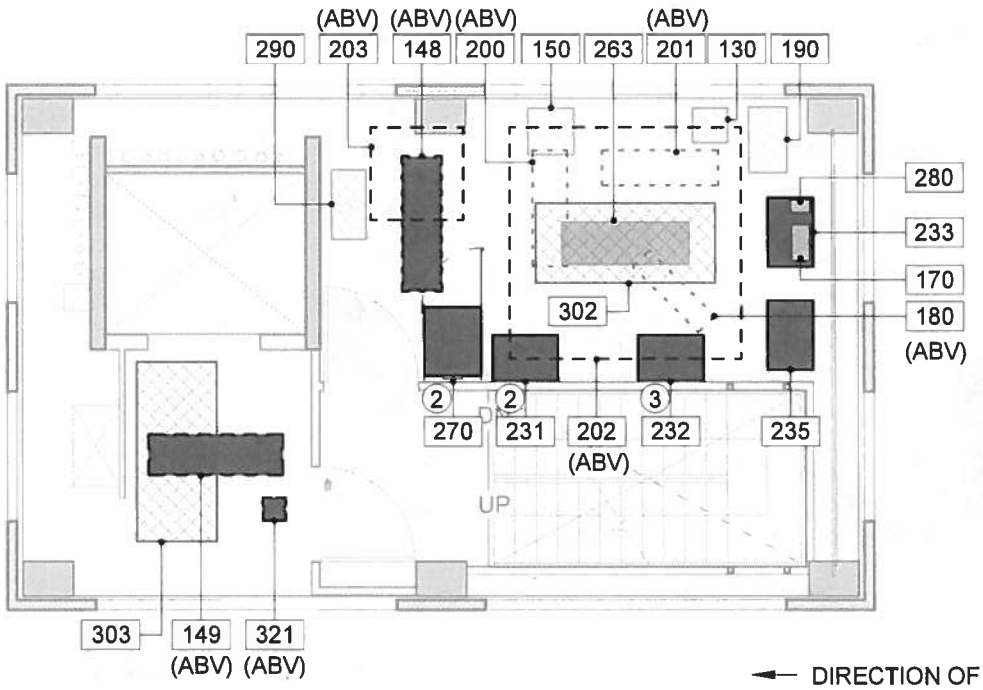
PLEDGED
Indicates equipment vendor has agreed to include item in test and/or submitted paperwork to guarantee item.

IDENTIFIED
Indicates a vendor has been selected and discussions are closed to being finalized.

UNLIKELY
Indicates equipment is desired, but conversations with potential vendors have not been fruitful. It may not be possible to include equipment in test.

WALL ANCHORAGE KEYNOTES

1. Indicates equipment frames directly into typical stud.
2. Indicates equipment frames into SureBoard product.
3. Indicates equipment frames into traditional strap backing.



← DIRECTION OF MOTION →

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SURGERY STE (LEVEL 5)

Figure AF5

MEDICAL EQUIPMENT LAYOUT

Project Name
BNCS

Date
10/23/2011

Task 2 – Development of Base Isolation Design and Testing Plan

Task Progress

Straight rods were installed and post-tensioned by ESEC crew during the week of September 26th. The draped tendons were post-tensioned and grouted by DSI on September 28th. The foundation has been instrumented to record creep deformations. The team has also begun formulating a test protocol for the entire project, listed below.

Summary of Proposed Test Motions:

Seismic testing is tentatively scheduled for late January and February of 2012. Selection of proposed motions is currently under review by core team and industry advisors.

Motion	Base Earthquake Record	Seismic Performance Target
Base Isolated Test Phase:		
1	ICA, Peru 2002	43 year event
	Walk-through	
2	Northridge 1994, Canoga Park	43 year event
	Walk-through	
3	San Pedro, Chile 2010	Isolator displacement of 12" or 0.5% interstory drift
	Walk-through	
Moment Frame Test Phase:		
4	ICA, Peru 2002	43 year event
	Walk-through	
5	Northridge 1994, Canoga Park	43 year event
	Walk-through	
6	Northridge 1994, LA City Terrace	43 year event
	Walk-through	
7	Denali (2002)	MCE (Maximum Credible Event)
	Walk-through subject to safety inspection	
	Possible additional scalings	Beyond Maximum Credible Event

Upcoming Activities

- Subsequent phase: (i) receive and install isolators, (ii) finalize testing protocols, (iii) execute seismic testing while building is in a base isolated configuration, and (iv) post-process test data.

Task 3 – Development of an Educational Video

Task Progress

Rich Wargo finalized and received approval by CSSC of production objectives and a script outline. A copy of the approved production objectives is included below for reference. The approved script outline is included as an attachment.

Abstract

A 25 to 30 minute documentary on the performance of hospitals in past earthquakes, efforts of the CSSC and others to improve hospital safety, and upcoming research at the UCSD Large High-Performance Outdoor Shake Table to further these efforts. Production will include commentary from subject matter experts, eyewitnesses where possible, original video imagery, interpretive graphics, and acquired archive imagery.

The video will specifically target California hospital personnel and policy makers, and will also contain educational material for the general public and the media.

Prioritized Objectives and Intended Audience:

1. **California hospital management and medical staff**
   - Instill sense of urgency for investigation into fire and seismic performance and why the high probabilities of strong intensity earthquakes throughout California make this necessary.
   - Justify / minimize monetary expense to modernize hospitals
   - Show dedication of hospital personnel

2. **Policy makers**
   - Describe rationale for current Hospital Seismic Safety Act
   - Justify / minimize expense of modernizing hospitals

3. **Adult general public**
   - Articulate the variety of impacts earthquakes have on hospitals
   - Explain secondary benefits of hospital modernization
   - Explain rationale and need for earthquake and post-earthquake fire testing
   - Stimulate interest in the test and a subsequent program about the test program and its key results
   - Attract additional stakeholders in the test and a subsequent program about the test and its results

4. **Media**
   - Correct some common media misinterpretations (e.g. Intensity v. Magnitude)
   - Explain how we reached current seismic policy

Production Progress

UCSD-TV crews have captured B-roll of the final roof slab pour on 9/21, core team meeting on 10/6, white-noise test on 10/12, and video imagery of the finished structural system with some nonstructural partitions installed.

Rich Wargo has also developed a list of interviewees and subject matter experts. Interviews are currently being conducted

Upcoming Activities

- Continue interviews with subject matter experts
- Compile rough cuts of expert commentary and other interviews
- Compile first complete draft

Attachments

- Topical Outline: CSSC Hospital Seismic Performance Video (3 pages)
- Media Elements Outline (5 pages)
- Proposed Commentators and SMEs (2 pages)

Topical Outline: CSSC Hospital Seismic Performance Video

1) INTRODUCTION

a) Capture viewer interest and engagement by partially revealing preparations for the seismic test conducted on the UCSD Large High-Performance Outdoor Shake Table of a full-scale, fully equipped acute care facility.
   i) Introduction only partially reveals the nature of the structure and preparations to leave the audience with the questions:
      (1) what is going on here
      (2) and why

b) The brief introduction emphasizes three main concepts
   i) This is a specially designed structure with a unique purpose
   ii) It is being built at a very special and unique facility
   iii) It is being built by a collaboration of the best seismic design experts and other contributors from around the world.

2) HISTORY OF EARTHQUAKE EFFECTS ON HOSPITALS

a) Present a prime motivation for the test, in part answering the question "why?"
   i) Main intent of this chapter is to make it obvious to the audience that these effects must be minimized or prevented and to pose the question – how can this achieved?

b) Describe the effects of past earthquakes that had significant effects on hospitals as events that provided motivation to institute changes in seismic safety requirements for these facilities.
   i) 1971 San Fernando
      (1) Collapse of Olive View Hospital
      (2) Collapse of Veteran's Administration Hospital
   ii) 1994 Northridge
      (1) Evacuation of re-built Olive View Hospital due to nonstructural damage
      (2) Evacuation of other regional Hospitals
   iii) 2010 El Centro Community Hospital
      (1) Evacuation due to smoke propagation event

c) Main concepts communicated in this chapter will be:
   i) In past seismic events hospital functions were crippled, or worse, that hospitals became burdens to safety and emergency services.
   ii) Evacuation puts patients at risk and interferes with a hospital's primary purpose - to provide life safety and emergency care to the effected community.

Reiterate the level of seismic activity in California, and the inevitability of strong-motion events throughout the state.

3) **HOW CALIFORNIA RESPONDED**
   a) Describe how California has responded to needs revealed by these events with two main pieces of legislation, the Alquist Act and SB1953.
      i) Communicate what the legislation is
      ii) Explain their respective intent and results at improving seismic safety and performance of hospital facilities.
   b) Focus on the current state of progress at achieving the goals of SB1953
      i) present status of which goals are being achieved
      ii) the strategies that can and are being employed to achieve those goals
      iii) what remains to be accomplished
   c) Chapter conclusion
      i) Emphasize that while life-safety performance of California hospitals is very good, completing the task of ensuring operational performance during and through a severe shaking event is a complicated task
      ii) Concludes posing the question "why is this complicated?"

4) **THE SPECIAL NATURE AND COMPLEXITY OF HOSPITALS**
   a) Describe the special purpose and nature of hospitals
      i) how they are critical elements of civic emergency services infrastructure
      ii) describe the physical elements that distinguish them from other facilities and make hospital operations possible
         (1) Focus on the elements of the physical plant of a hospital and all the systems that allow it to function
         (2) How the structural system and the many non-structural elements of a hospital are an integrated whole.
   b) Explain the complexity of interactions when this integrated system is subject to the dynamics of seismic forces
      i) what challenges this complexity poses for achieving the goals of SB1953 in terms of:
         (1) physical implementation
         (2) cost
         (3) appropriate regulatory measures.
   c) Chapter conclusion
      i) Explain that substantiating information is needed to gain a better understanding of, and thus respond more effectively to these challenges.
      ii) Concludes posing the question – "how can we gain this information?"

5) **THE TEST**
   a) Explain why this additional research is needed.
      i) Explain the elements essential to maintaining operations throughout a seismic disaster
      ii) What isn't understood about the dynamics of the interactions of those essential elements in an earthquake

iii) Explain the lack of knowledge about fire propagation after an earthquake
iv) Explain how the features of the test specimen will address these issues.

b) Explain the process and sequence of the test
   i) the nature and purpose of the various seismic records
   ii) the reason for conducting base-isolated and fixed foundation testing.

c) Chapter conclusion
   i) Asking who is involved and why the test is important to the variety of stakeholders and participants in the test.

6) **STAKEHOLDER PERSPECTIVES / CONCLUSION**

a) Various stakeholders will communicate from their perspectives why the test is important:
   i) fundamental researchers
   ii) design engineers
   iii) regulatory and code specialists
   iv) medical equipment manufacturers
   v) hospital operators, managers, and staff.

b) They will explain what is of particular interest to them and what they hope to learn.

c) This chapter will show the broad-based value of the results in answering many questions and helping to achieve a consensus on approaches to realizing the goals of SB1953

7) **CONCLUSION**

a) Reprise some of the key concerns expressed by the stakeholders

b) Ask what will be the results, and what will we learn?

c) Closing Narrative:
   i) *"The answer? By Spring 2012 this one-of-a-kind building will have undergone a first-of-its-kind and unique test. It will have done its job to help us find answers - and the CSSC hopes to share this historic event with you."*

Media Elements

expert indicates recommendation/ suggestion for appropriate subject matter expert(s) is requested

CHAPTER/Topic	Approx Time (minutes)	Notes / Commentary / Possible Interview Outcomes
1) INTRODUCTION Narration over extensive visuals of test specimen preparations: - imagery of ESEC facilities - imagery of personnel - imagery of structure	1:00	A special structure is being built at a unique facility in Southern California ▪ Brief description of unique facility-largest shake table in North America ▪ Brief description of variety of collaborators -best seismic design knowledge and experience from across the country ▪ Brief, incomplete description of structure-special five story building designed for one special purpose
2) HISTORY OF EARTHQUAKE EFFECTS ON HOSPITALS 1971 San Fernando Earthquake - Focus on collapse of VA and Olive View. - Possible eyewitness accounts. - Archival stills and video 1994 Northridge Earthquake - Narration and imagery focuses on disruptions and closures of hospital functions. - Possibly eyewitness accounts if available. - Archival stills and video 2010 El Centro Fire/Smoke Event - Expert and imagery. - Eyewitness accounts if possible. Endemic Nature of Quake Risk in California - Narration describing quake risk. - Graphics and imagery describe statewide seismic activity	5:00	

CHAPTER/Topic	Approx Time (minutes)	Notes / Commentary / Possible Interview Outcomes
3) HOW CALIFORNIA RESPONDED - Brief narration introduces experts who will provide commentary - ***Expert*** comments on Alquist Act: intent and results - Visuals: San Fernando damages - Same expert comments on SB 1953: history, intent, requirements. - Visuals: Northridge - ***Expert*** commentary - interpretive graphic of compliance rates	< 3:00	Visuals integrated where appropriate to interpret or articulate commentary
- ***Expert*** on screen commentary - visuals of strategies	3:00	The strategies that can and are being employed to achieve those goals: retrofit, phase-out of service, new construction strategies that have been adopted or are available
- ***Expert*** on screen - appropriate visuals of hospital operations	0:30	Expert explains what remains to be accomplished - reiterates intent of SB 1953 – to maintain function during and through a seismic disaster – emphasizes that life-safety performance of California hospitals is very good, but that ensuring operational performance during and through a severe shaking event is a complicated task - why is this complicated?

CHAPTER/Topic	Approx Time (minutes)	Notes / Commentary / Possible Interview Outcomes
4) INTRODUCE SPECIAL NATURE AND COMPLEXITY OF HOSPITALS - ***Expert*** commentary - visuals describe the physical plant / elements of a hospital: MEP, HVAC, elevators, stairs, various acute care delivery (ER, trauma, surg, ICU, Peds, diagnostic, labs) - interpretive graphics/imagery - ***expert*** explanation of key structural and nonstructural elements of a hospital building - ***expert*** commentary - interpretive graphics and visuals explain interaction of structural and non-structural elements under seismic displacements and accelerations - ***Expert(s)*** comment on challenges in achieving compliance	1:00 1:00 1:00 0:30	Narration and visuals, show variety of functions and hospital operations.
- ***Expert*** on screen commentary	0:20	Chapter conclusion: Explain that substantiating information is needed to gain a better understanding of, and thus respond more effectively to these challenges - how can we gain this information?

CHAPTER/Topic	Approx Time (minutes)	Notes / Commentary / Possible Interview Outcomes
5) THE TEST - Visuals of hospital operations - ***expert*** commentary show critical elements necessary to maintaining operations through a seismic crisis	>1:00	• Explain why this additional research is needed. • Explain/review the critical elements essential to maintaining operations throughout a seismic disaster
- ***Expert*** and visuals describe key elements about which more information is needed	1:00	• Explain what isn't understood about the dynamics of the interactions of those essential elements in an earthquake
- Fire ***expert*** at test specimen. Potential use of El Centro Community Hospital eyewitnesses	>3:00	• Fire expert explains the lack of knowledge about fire propagation after an earthquake and relationship of seismic damages to fire risk, what is not known, and how that will be tested with this structure.
- ***Expert(s)*** and visuals provide tour of the test specimen. - Visuals of structure both before mechanical and architectural finish and after complete installation	3:00	• Explain how the features of the test specimen will address these issues
- ***Expert*** and visuals of ESEC explain test process	1:00	• the nature and purpose of the various seismic records • the reason for conducting base-isolated and fixed foundation testing
- ***Expert*** and visuals of test specimen and base isolators. - Potential imagery of Arrowhead, Mills Peninsula and/or Christchurch Women's	1:00	
- Narration and visuals. Visuals communicate scale, magnitude and complexity of test	> 0:30	Chapter conclusion: Explains the array of interests that are involved and asks why the test is important to the variety of stakeholders and participants in the test.

CHAPTER/Topic	Approx Time (minutes)	Notes / Commentary / Possible Interview Outcomes
6) STAKEHOLDER PERSPECTIVES / CONCLUSION - Various stakeholders (on-site at test specimen when possible) - fundamental researchers - design engineers - regulatory and code specialists - medical equipment manufacturers - hospital operators, managers, and staff.	2:00	• Various stakeholders will communicate from their perspectives why the test is important. • They will explain what is of particular interest to them and what they hope to learn. • This chapter will show the broad-based value of the results in answering many questions and helping to achieve a consensus on approaches to realizing the goals of SB1953
7) CONCLUSION - Short clips of choice / key comments from stakeholders about their hopes for the results - Narration and visuals of test preparations create anticipation and excitement about the test and subsequent results	1:00	
	29:50	

Source • Topics	**Potential Commentator(s) / comments**
CSSC or OSHPD personnel:	
- commentator on history and intent of Alquist Act and SB 1953	Dick McCarthy or other CSSC?
- commentator to describe challenges to achieving BNCS compliance to SB1953 requirements	if CSSC personnel, record 11/9,10 in SD
- describe need for substantiating information and research	
OSHPD personnel:	
- commentator on goals of SB 1953	Chris Tokas?
- commentator on structural and non-structural compliance rate	
CSSC and/or UCSD:	
- expert on strategies for structural compliance (engineer(s), or designer(s))	Jose, Tara, ??
o retrofit strategies	
o new design strategies	
o phase out strategies	Chris Tokas on phase out?
Hospital physical plant operations expert:	
- describe physical plant and functions of essential components of hospital: MEP, HVAC, elevators, stairs, acute care delivery suites	CHA personnel (Roger Richter?)
- describe critical components that must function during and throughout seismic event	
UCSD Seismic / Structural Experts (Tara, Jose, and ??):	
- define and describe key structural and non-structural components of a hospital	Tara, Jose, Englekirk operations
- describe seismic motions on a structure and resulting interactions of structural and BNCS under seismic loads	
- describe what is not known about critical components under seismic loads	
- tour of test specimen, describe how specimen is designed to provide needed information	

- describe test process - describe base isolation and purpose of base isolation and fixed testing **Brian Meacham** - comment on lack of knowledge about post-quake fire propagation - describe how test specimen will gather information about post-quake fire **Eyewitnesses:** - 1971 Olive View (Smith, Hazard) - Northridge - smoke evacuation event in El Centro **Stakeholders**: describe their need / interest in the test and results - fundamental researchers - design engineers - regulatory and code specialists - medical equipment manufacturers - hospital operators, managers, and staff	Brian Meacham Cynthia Smith, Jim Hazard (confirmed)

End of Report

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