HCAI Department of Health Care Access and Information
2020 West El Camino Avenue, Suite 800
Sacramento, CA 95833
hcai.ca.gov

***** SPECIAL NOTICE *****

This meeting will be held in-person at the locations noted below, as well as by teleconference. Committee members and members of the public may fully participate from their own locations.

NOTICE OF PUBLIC MEETING

HOSPITAL BUILDING SAFETY BOARD

Structural and Non-Structural Regulations Committee

Date:
Tuesday, April 11, 2023
10:00 a.m. – 4:00 p.m.

Locations:
Department of Health Care Access and Information
2020 West El Camino Avenue, Suite 930
Sacramento, CA 95833

Department of Health Care Access and Information
355 South Grand Avenue, Suite 1901
Los Angeles, CA 90071

Teleconference Meeting Access:
HBSB Teams SNSR Committee

For more detailed instructions on attending or joining the meeting, see pages 3 – 4.

Committee Members:
Jim Malley, Chair; Farzad Naeim, Vice-Chair; Cody Bartley; Louise Belair; Bruce Clark; Mark Hershberg*; David Khorram; Marshall Lew; Jennifer Thornburg

HCAI Staff:
Mike Hooper; Joe LaBrie; Roy Lobo; David Neou; Carl Scheuerman; Jamie Schnick; Ali Sumer

*Consulting Member

1. **Call to Order and Welcome**

   Facilitator: Jim Malley, Committee Chair (or designee)

2. **Roll Call and Meeting Advisories/Expectations**
   Facilitator: Ken Yu, Executive Director (or designee)

3. **Review and approve the draft November 7, 2022 meeting report/minutes**

   Facilitator: Jim Malley, Committee Chair (or designee)

   - Discussion and public input

HCAi
Department of Health Care Access and Information

Structural and Nonstructural Regulations Committee

by
James O. Malley Acting Chair

COMMITTEE MEMBERS:
Bruce Clark
Mike Hooper
David Khorram
Marshall Lew
Farzad Naeim
Michael O'Connor
Jennifer Thornburg

CONSULTING MEMBER : Michelle Malone

HCAi STAFF:
Chris Tokas, Joe LaBrie, Roy Lobo, Davie Neou, Carl Scheuerman, Jamie Schnick, Ali Sumer, James Yi

MEETING REPORTS:

- Meeting Date: November 7, 2022

Meeting Date: November 7, 2022
OVERVIEW OF TOPICS

- Topic 1 – Discussion on HCAI PIN Assembly Bill (AB 1882), Hospitals: Seismic Safety (Ali Sumer, HCAI)
- Topic 2 – Proposed Amendments to the 2022 California Administrative Code, Title 24, Part 1, Chapter 6, Small and Rural Hospital Relief Program, (Carl Scheurman, HCAI)
- Topic 3 – Committee Goals for 2023 (Jim Malley, Committee Chair)

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 1 - Discussion on Draft HCAI PIN Assembly Bill (AB 1882), Hospitals: Seismic Safety (Ali Sumer, HCAI)

- AB 1882 requires that on 1/1/2024 and annually thereafter, that hospital owners submit an annual status update on the Structural Performance Category ratings of the buildings. Acute care hospitals that do not meet the seismic safety standard by July 2023, the hospital owner is required to put a public notice in the lobby or waiting area to notify the public.

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 1 - Discussion on Draft HCAI PIN Assembly Bill (AB 1882), Hospitals: Seismic Safety (Cont.)

- Mr. Sumer noted that the bill requires owners of acute care inpatient hospitals to annually report the following:
  - The county board of supervisors in whose jurisdiction the building was located
  - The city council
  - Any labor union representing workers who work in the building that does not comply with seismic safety regulation.
  - The board of directors of a district or joint power agency that provides fire and emergency medical services in the hospital building's jurisdiction
  - HCAI department
  - The board of directors of the hospital
  - The local office of emergency services or equivalent agency
  - The office of emergency services
  - The medical health operational area coordination

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 1 - Discussion on Draft HCAI PIN Assembly Bill (AB 1882), Hospitals: Seismic Safety (Cont.)

- Mr. Sumer also mentioned that the law requires SPC-2 and NPC-5 buildings in include the following identification:
  - On the title sheet of construction drawings and title sheet of specifications. The the following documents and/or forms were excluded: Amended Construction Documents (ACD), Request for Information (RFI), Calculations, and Testing, Inspection & Observation (TIO).
  - On the title sheet of seismic compliance reports.
- Discussion and input by the Committee followed. HCAI staff will consider the suggestions made by Committee Members.
- The PIN will be published by early December, 2022.
- Motion was made to approve the draft P related to AB 1882. Unanimous vote to approve the Motion

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 2 – Proposed Amendments to the 2022 California Administrative Code, Title 24, Part 1, Chapter 6, Small and Rural Hospital Relief Program, (Carl Scheurman, HCAI)

- Mr. Scheuerman stated that the Small and Rural Hospital Relief Program was a grant program administered by Office of Health Facility Loan Insurance (OHFLI) for qualified hospitals to seek funding for seismic safety compliance projects.
- He stated that eleven hospitals had initiated application for program admission. Three had revised compliance plans, which had been approved, and eight were pending compliance plan submission.

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 2 – Proposed Amendments to the 2022 California Administrative Code, Title 24, Part 1, Chapter 6, Small and Rural Hospital Relief Program, (Cont.)

- Mr. Schuerman noted Title 24 proposed Title 24 language to:
  - Define “Integrated Review” as applied to retrofit scheme development.
  - Bring revised compliance plan requirements into code, applicable to all facilities
  - Create provision in code for SRHRP and any subsequent funding program
- Mr. Scheuerman said PIN 71 added enabling language on State Grant Programs to state that the State of California may establish programs that provide grant funding for general acute care hospitals to advance seismic safety.

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 2 – Proposed Amendments to the 2022 California Administrative Code, Title 24, Part 1, Chapter 6, Small and Rural Hospital Relief Program, (Cont.)

- Mr. Schuerman stated that the Office of Health Facility Loan Insurance (OHFLI) determined that for a hospital to be eligible for the State Grant Program, the hospital had to be:
  - Small Hospital
  - Rural Hospital
  - Critical Access Hospital
  - Compliance imposes a financial burden on the applicant that may result in hospital closure
  - The hospital closure would impact health care accessibility in the communities surrounding the hospital.

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 2 – Proposed Amendments to the 2022 California Administrative Code, Title 24, Part 1, Chapter 6, Small and Rural Hospital Relief Program, (Cont.)

- Mr. Schuerman added that another enabling language was integrated reviews for seismic compliance. The purpose was to provide technical assistance to a hospital project team to develop a cost-efficient structural or non-structural seismic retrofit program.
- Discussion and input was provided by the Committee.
- Motion was made to endorse the action for the adoption of proposed regulation as it related to SP-395. Unanimous vote to approve the Motion

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 3 –SNSR Committee Goals for 2023 (Jim Malley, Committee Chair)

- Mr. Malley discussed progress on the 2022 Committee Goals
- Support HCAI with review of code changes (Ongoing)
- Support HCAI with review of new/revised PINs, CANs, and OPDs (Ongoing)
- Implementation of SPC-4D and NPC-4D (Goal was removed)
- Issues regarding repurposing hospital buildings (Ongoing)
- Develop pre-approved details (Moved to 2023 goal)
- Revisit NPC-5 requirements (Goal was removed)

Meeting Date: June 22, 2022
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Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 3 –SNSR Committee Goals for 2023 (Cont.)

- Mr. Malley Gave a List of Potential Committee Goals for 2023
  - Seismic compliance issues related to NPC-3, NPC-4D and NPC-5. Streamlining the process for compliance to meet the statutory and regulatory deadline.
  - Review of Code amendments that are now obsolete as those issues have been addressed in model code.
  - Develop and implement procedures and enforceable building standards to ensure safe and sustainable healthcare facilities.
  - New products, materials and methods that would benefit the public by early adoption rather than wait for their incorporation in the building code.
  - Increase IOR competency

Meeting Date: June 22, 2022
OVERVIEW OF TOPICS

Topic 3 –SNSR Committee Goals for 2023 (Cont.)

- List of Potential Committee Goals for 2023 (Cont.)
  - Implementation of small and rural hospital relief program, increase technical assistance and awareness.
  - Implementation of AB 1882 requirements. Reach out to stakeholders via seminars and webinars to raise awareness.
  - Training and outreach to industry on code changes and tips for working with HCAI. In-person training meetings was highly suggested.

Meeting Date: November 7, 2022
OVERVIEW OF MOTIONS

- The following Motions were made at this meeting:
  - Motion was made to approve the draft Pin related to AB 1882. Unanimous vote to approve the Motion.
  - Motion was made to endorse the action for the adoption of proposed regulation as it related to SP-395. Unanimous vote to approve the Motion .

4. **Updates to Policy Intent Notice (PIN) 62, OSHPD Preapproval of Manufacture's Certification (OPM)**

   Facilitators: Roy Lobo and Jeffery Kikumoto, HCAI (or designee)

   - Review of PIN updates
   - Discussion and public input

HCAi
Department of Health Care Access and Information

Office of Statewide Hospital Planning and Development

California's Building Department for Hospitals

Updates to PIN 62, OSHPD Preapproval of Manufacturer's Certification (OPM) program

By

Roy Lobo, Ph.D., S.E., Principal Structural Engineer

Jeffery Kikumoto, S.E., Senior Structural Engineer

Structural and Nonstructural Regulations Committee

April 11, 2023

OSHPD Preapproval of Manufacturer's Certification (OPM)

The OSHPD Preapproval of Manufacturer's Certification (OPM) is a voluntary program for review and preapproval of seismic design of supports and attachments for nonstructural components to be used in health facilities construction in California.

- PIN 62: OSHPD Preapproval of Manufacturer's Certification (OPM)
- OSHPD Preapproval of Manufacturer's Certification (OPM) Triage Check List
- FAQ's for Preapproval of Manufacturer's Certification (OPM)

If you have questions regarding the OPM program please send an email to OPM@hcai.ca.gov

List of OPM

Updates to PIN 62- (OPM Program)

- PIN 62, is being updated to reference CBC 2022. There is minimal change in the requirements between CBC 2019 and CBC 2022 as both adopt ASCE 7-16.

- Language has been updated to reflect changes to CAC 7-115 (d)

Requirements for Application of Preapprovals in CDs – CAC 7-115 (d)

7-115. Preparation of construction documents and reports.

(d) The specification and use of preapprovals does not preempt the plan approval and building permit process. Construction documents using preapprovals shall be submitted to the Office for review and approval and issuance of a building permit prior to the start of construction.

1. The registered design professional, in conjunction with the registered design professional in responsible charge, listed on the plan review application or the building permit application, shall review all qualities, features, and/or properties to ensure code compliance, appropriate integration with other building systems, and proper design for the project-specific conditions and installation. Stamping and signing of construction documents as required in subsection (a) and (b) shall be for this purpose only.
2. When preapprovals are used, they shall be incorporated into the construction documents. Incorporation by reference only is not permitted. Preapprovals must be incorporated without any modification. This subsection shall not apply if modifications are made to the preapproved details.

Submitting a New OPM

- Note: The 2025 CBC will adopt ASCE 7-22. The force equation for determining demands on nonstructural components in ASCE 7-22 has been updated to align with the latest research. Demands on nonstructural components now must consider the dynamic characteristics of the building, the component and their location within the building.
- Future submittals or revisions to existing OPMs should consider impacts of this change and are reminded to incorporate these provisions as alternatives within their OPM submittal.

Questions?

5. **Testing Criteria for Allowable Load Rating of Vibration Isolators**

   Facilitators: Roy Lobo and Timothy Piland, HCAI (or designee)

   - Alternative testing criteria for vibration isolators
   - Discussion and public input

HCAi
Department of Health Care Access and Information

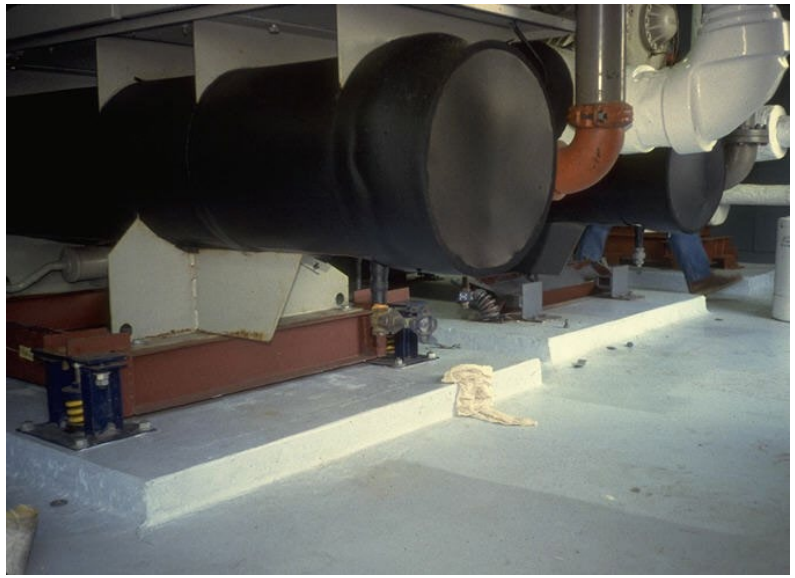
Office of Statewide Hospital Planning and Development
California's Building Department for Hospitals

Testing Criteria for Allowable Load Rating of Vibration Isolators

By
Roy Lobo, Ph.D., S.E., Principal Structural Engineer
Timothy Piland, S.E., Senior Structural Engineer

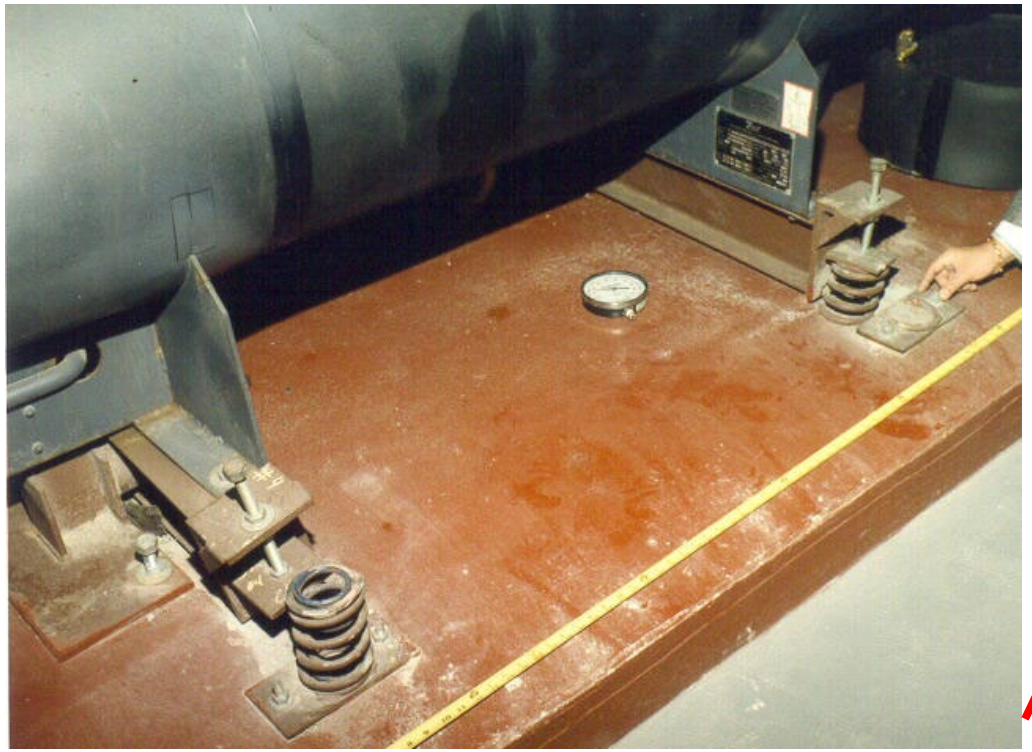
Structural and Nonstructural Regulations Committee
April 11, 2023

Equipment Supported on Vibration Isolators



Images provided by Todd Noce

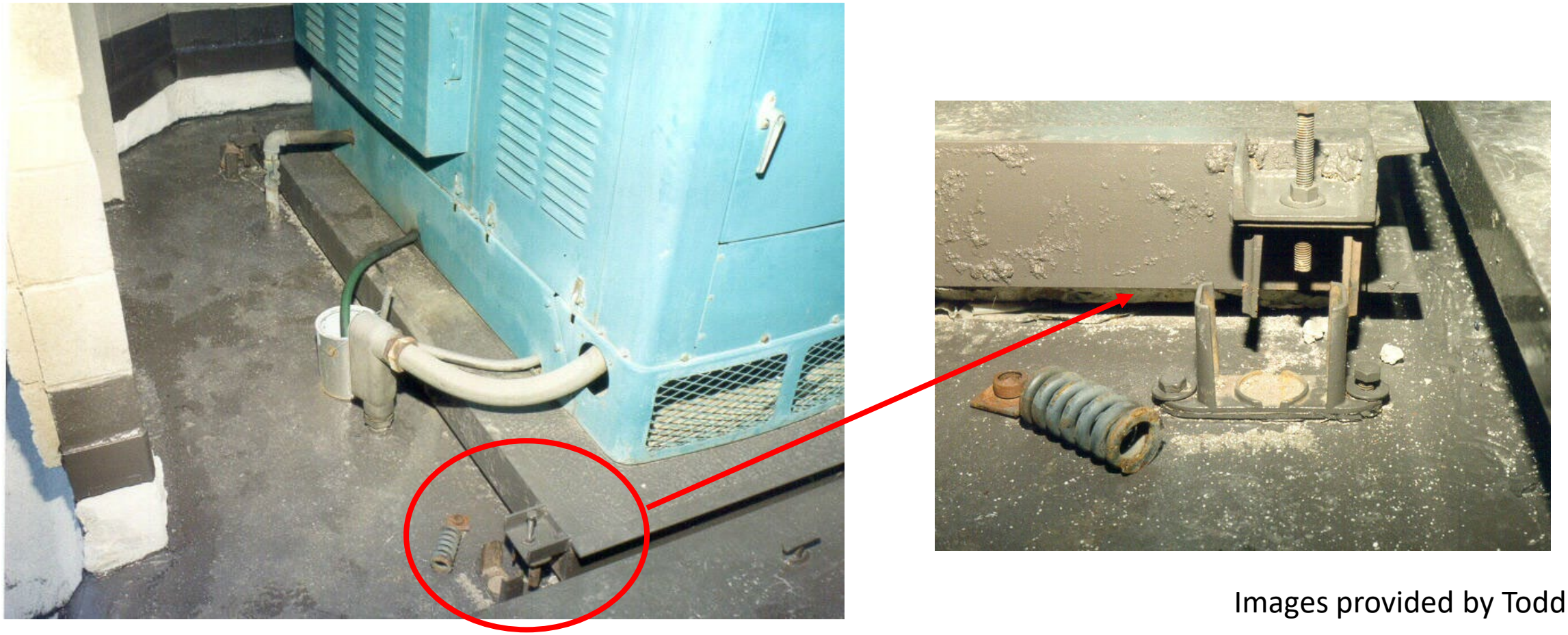
Failure of Springs Supporting a Chiller, ‘94 Earthquake



Pipe Separation from Outer Pipe Restraint

Images provided by Todd Noce

Mechanical Unit on Non-seismic Rated Spring Mounts



Images provided by Todd Noce

MECH UNIT AFTER THE '94 QUAKE. UNIT SUPPORTED ON CONCRETE INERTIA BASE AND NON-SEISMIC RATED (BRITTLE CAST IRON) SPRING MOUNTS.

Cooling Tower Damage after 1992 Yucca Valley Earthquake

Images provided by Todd Noce

THE CROSS BRACING CONNECTING THE MAIN BEAMS TOGETHER WERE NOT PROPERLY WELDED IN PLACE. ONCE THEY FAILED, THE MAIN BEAMS FOLDED OVER….

Cooling Tower Damage after 1992 Yucca Valley Earthquake

Images provided by Todd Noce

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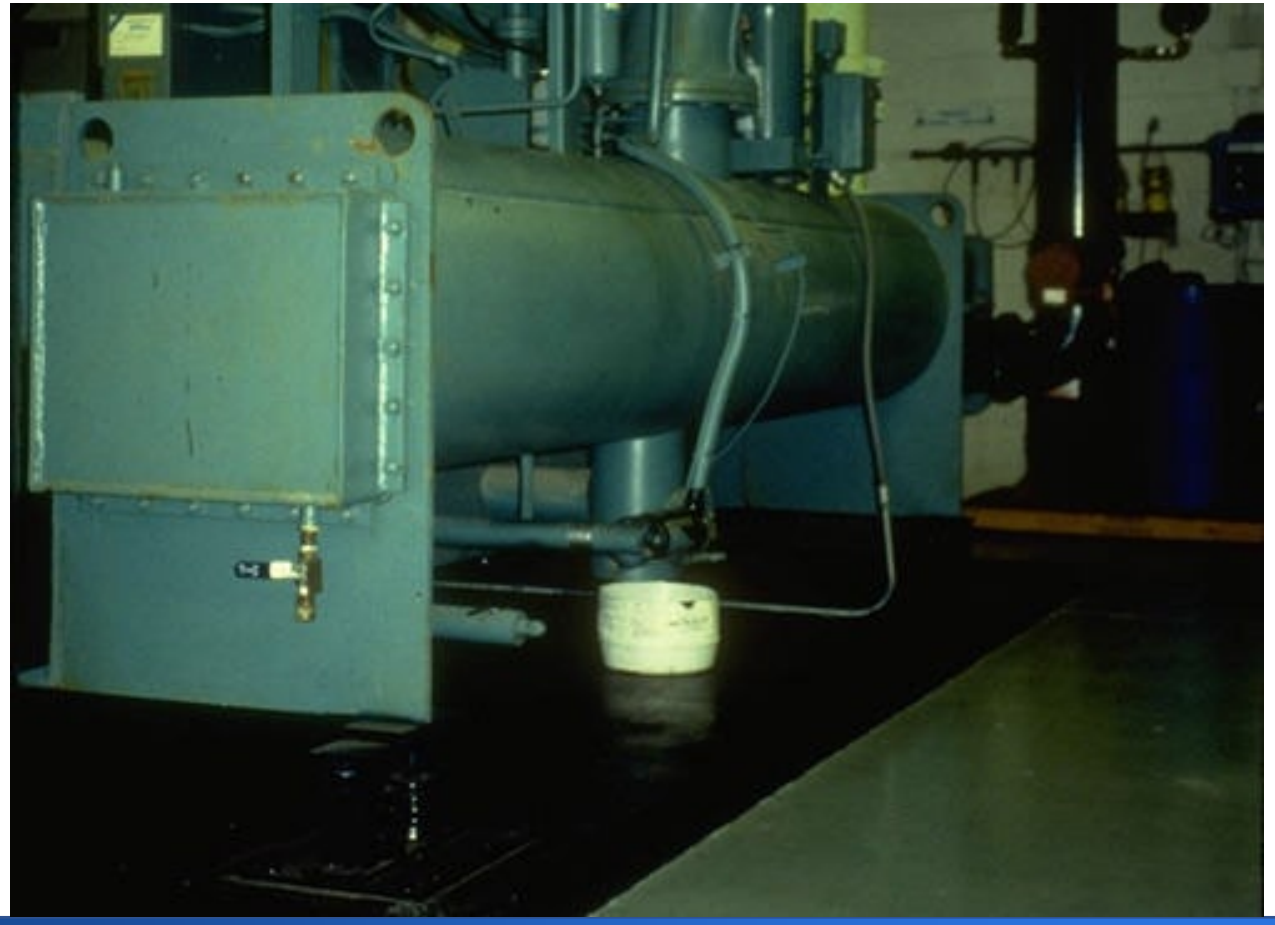
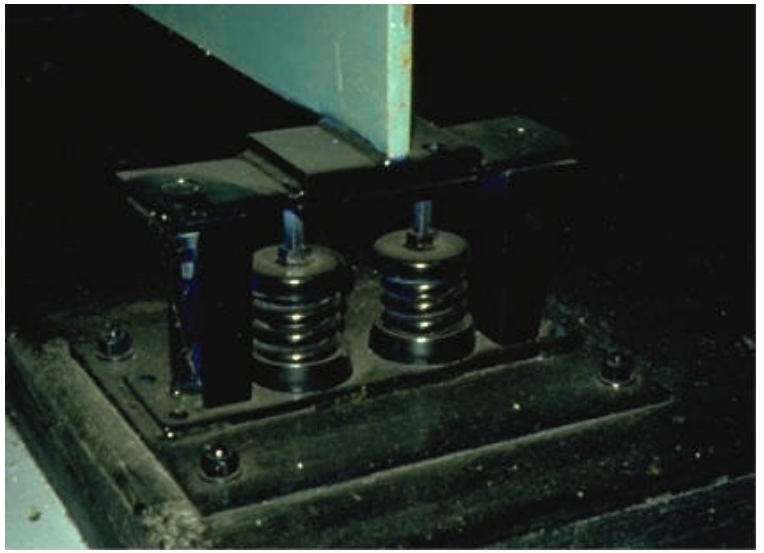
Chiller After ’94 Quake.





Images provided by Todd Noce

SUPPORTED ON SEISMIC RATED ALL DIRECTIONAL SPRING MOUNTS

Seismic Rating of Nonstructural Elements (NSE)

Seismic Rating of Nonstructural Components (CBC 1705A.14.2)

- **1705*A*.14.2 Nonstructural components.** For structures assigned to Seismic Design Category D, E or F, where the requirements of Section 13.2.1 of ASCE 7 for nonstructural components, supports or attachments are met by *manufacturer's certification* as specified in Item 2 therein, the registered design professional shall specify on the approved construction documents the requirements for seismic *certification* by analysis *or* testing. Certificates of compliance for the *manufacturer's certification* shall be submitted to the building official as specified in Section 1704*A*.5.
- *Seismic sway bracing components satisfying requirements of FM 1950 or using an alternative testing protocol approved by the building official shall be deemed to satisfy the requirements of this section*

Seismic Demand on Vibration Isolators

- **ASCE 7-22 -** New Force Equation for demands

$$F_p = 0.4 S_{DS} I_p W_p \left[\frac{H_f}{R_\mu}\right] \left[\frac{C_{AR}}{R_{po}}\right] \qquad (13.3\text{-}1)$$

H_f = Factor for force amplification as a function of height in the structure as determined in Section 13.3.1.1;

R_μ = Structure ductility reduction factor as determined in Section 13.3.1.2;

C_{AR} = Component resonance ductility factor that converts the peak floor or ground acceleration into the peak component acceleration, as determined in Section 13.3.1.3; and

R_{po} = Component strength factor as determined in Section 13.3.1.4.

$$H_f = 1 + a_1 \left(\frac{z}{h}\right) + a_2 \left(\frac{z}{h}\right)^{10} \qquad (13.3\text{-}4)$$

$$H_f = 1 + 2.5 \left(\frac{z}{h}\right) \qquad (13.3\text{-}5)$$

Parameters Influencing Nonstructural Response

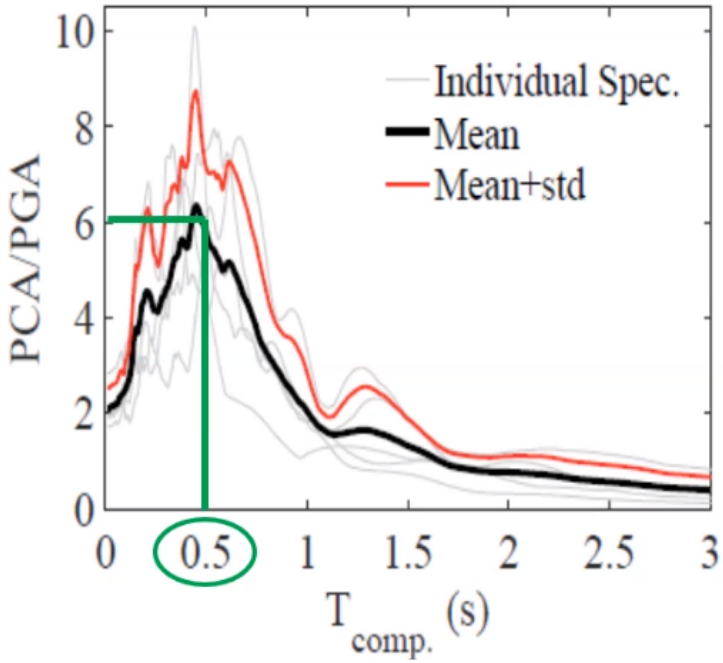
- Ground shaking intensity, PGA
- Building
  - Seismic force-resisting system
  - Building modal period, $T_{n,bldg}$
  - Building ductility, μ_{bldg}
  - Building damping, β_{bldg}
  - Building configuration (such as plan and vertical irregularities)
  - Floor diaphragm rigidity
- Height of component within the building, z/h
- Component
  - Component period, T_{comp}
  - Component and/or anchorage ductility, μ_{comp}
  - Component damping, β_{comp}
  - Component reserve strength margin, $R_{po,comp}$

Slide by Bret Lizundia

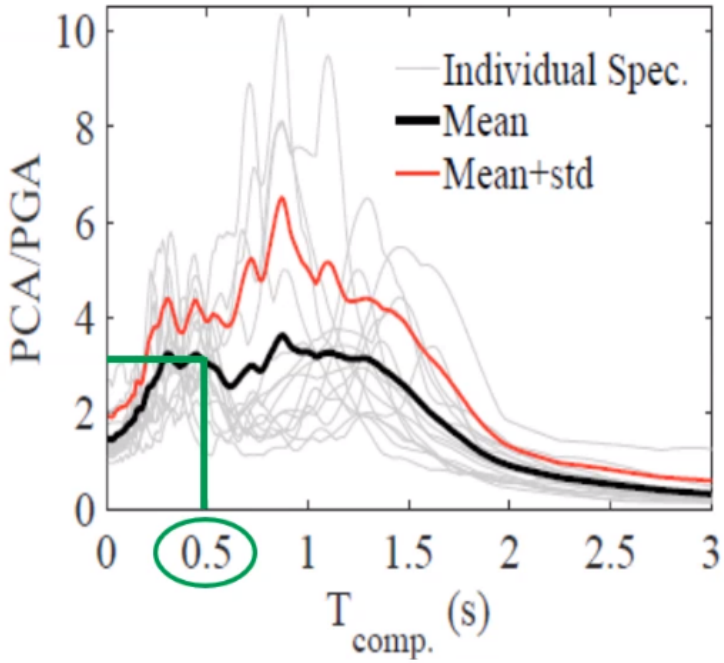
Seismic Force-Resisting System

T_{comp} = 0.5 sec

Reinforced Concrete SW



Steel SMRF



Effect of building stiffness on PCA/PGA for instrumental recordings
(from NIST GCR 18-917-43, 2018 and Lizundia paper in 2019 SEAOC Convention Proceedings)

Key Takeaway

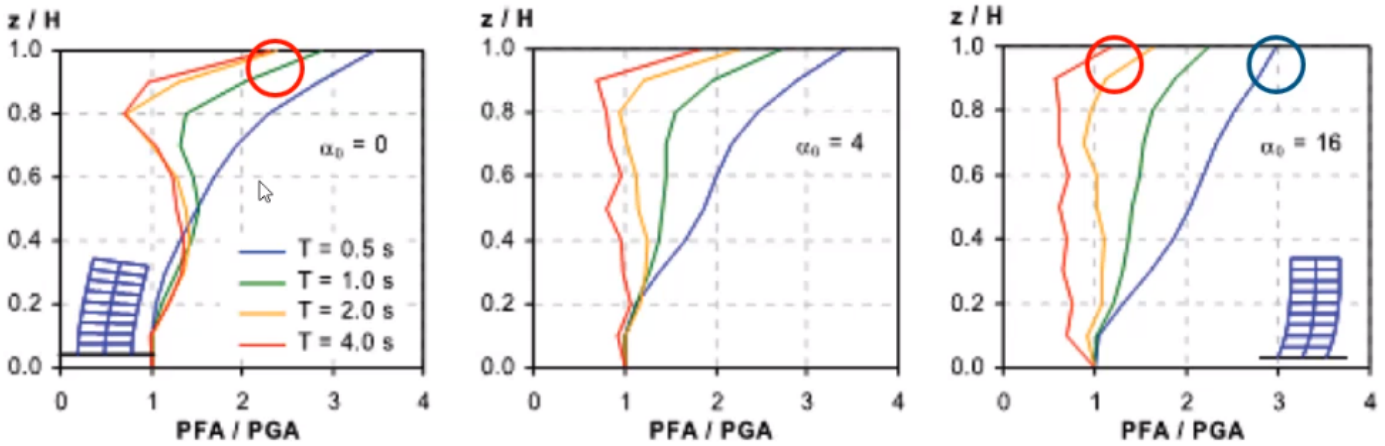
- Same component responds very differently in different seismic force-resisting systems

Figure Assumptions

- Elastic component assumed with β_{comp}=5%
- Dataset includes 19 recordings with PGA>0.15g

Slide by Bret Lizundia

Building Modal Periods, $T_{n,bldg}$



Effect of period of vibration and lateral system stiffness on PFA/PGA

Key Takeaway

- Longer period means less amplification
- Cantilever systems have more "whipping" action

α_0= Lateral stiffness ratio, defined as $\alpha_0 = H/(GA/EI)^{0.5}$

H = height,

GA = shear rigidity of a shear beam

EI = the flexural stiffness

α_0 = 0 represents a pure flexural model

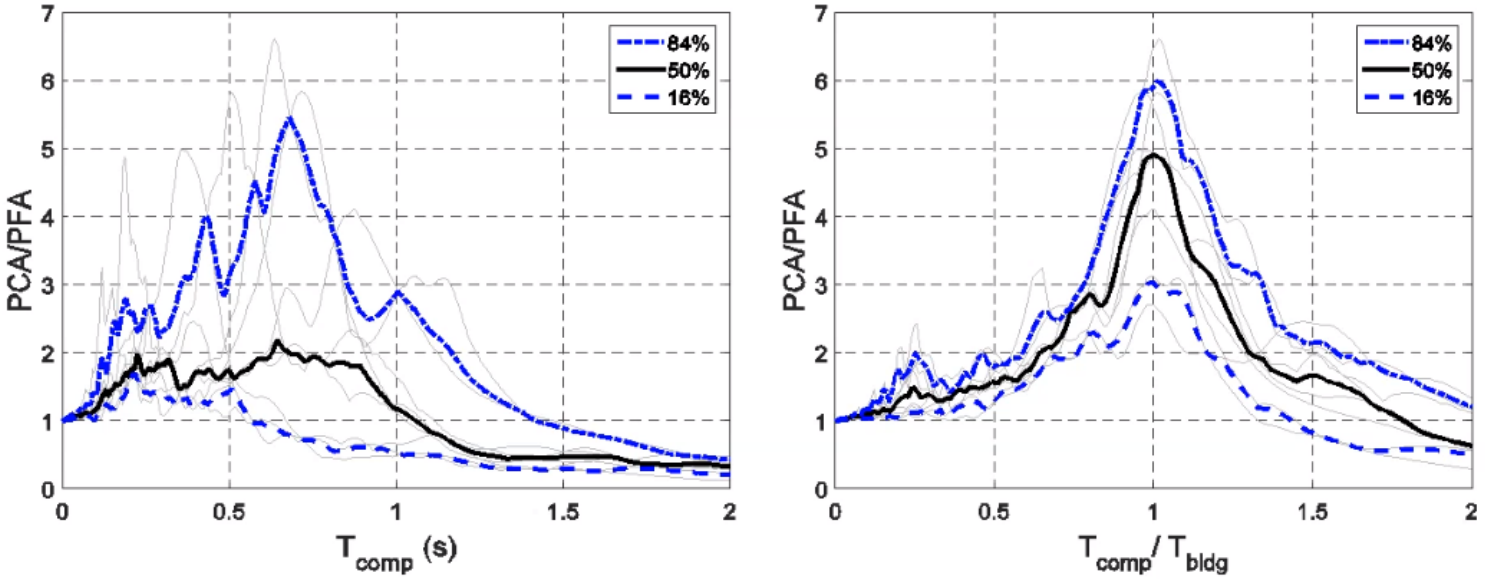
α_0 approaching infinity represents a pure shear beam

(from Miranda and Taghavi, 2009)

Note: Full reference citations are in NIST GCR 18-917-43

Slide by Bret Lizundia

Component Period, T_{comp}, and Building Period Resonance



Relationship between PCA/PFA comparing spectra without normalization (left) and with normalization (right) by T_{bldg} *(from Miranda et al., 2019)*

Key Takeaway

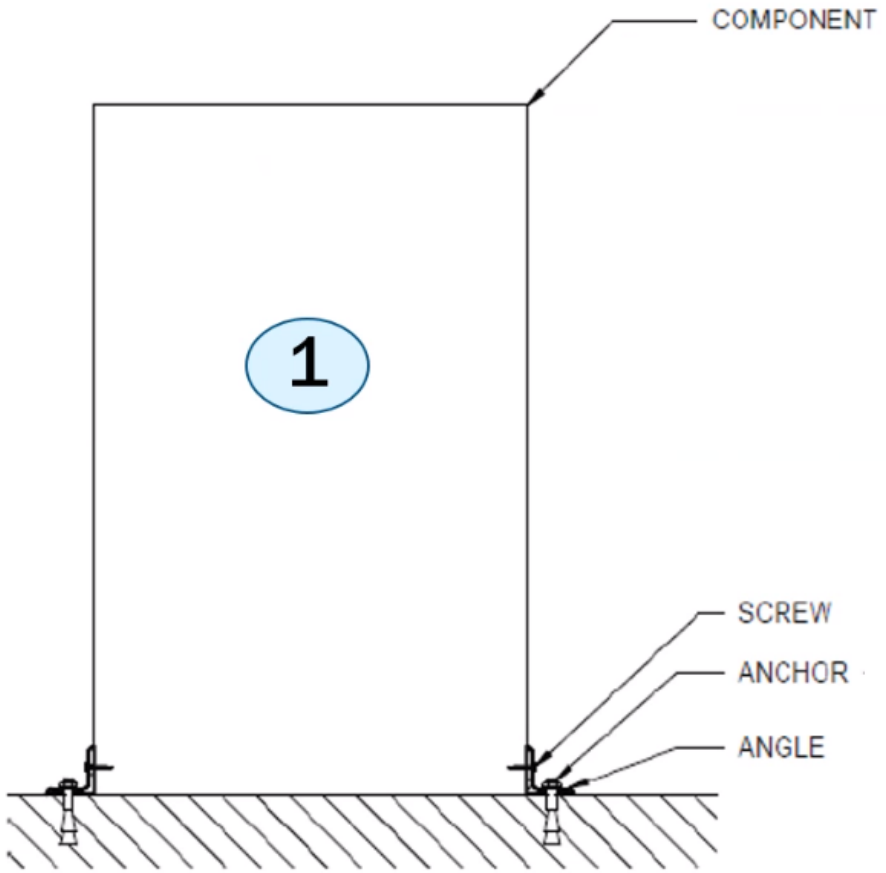
- Normalized x-axis is helpful to understand influence of building in component response

Figure Assumptions

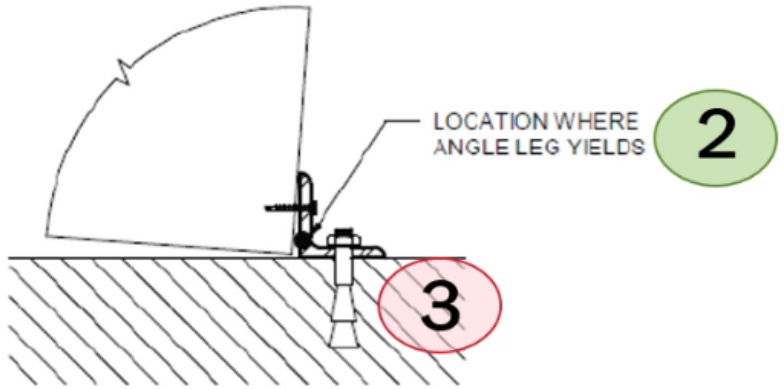
- Elastic component with β_{comp}=5%
- Dataset includes eight recordings with PCA>0.9g

Slide by Bret Lizundia

Sources of Component and/or Anchorage Ductility

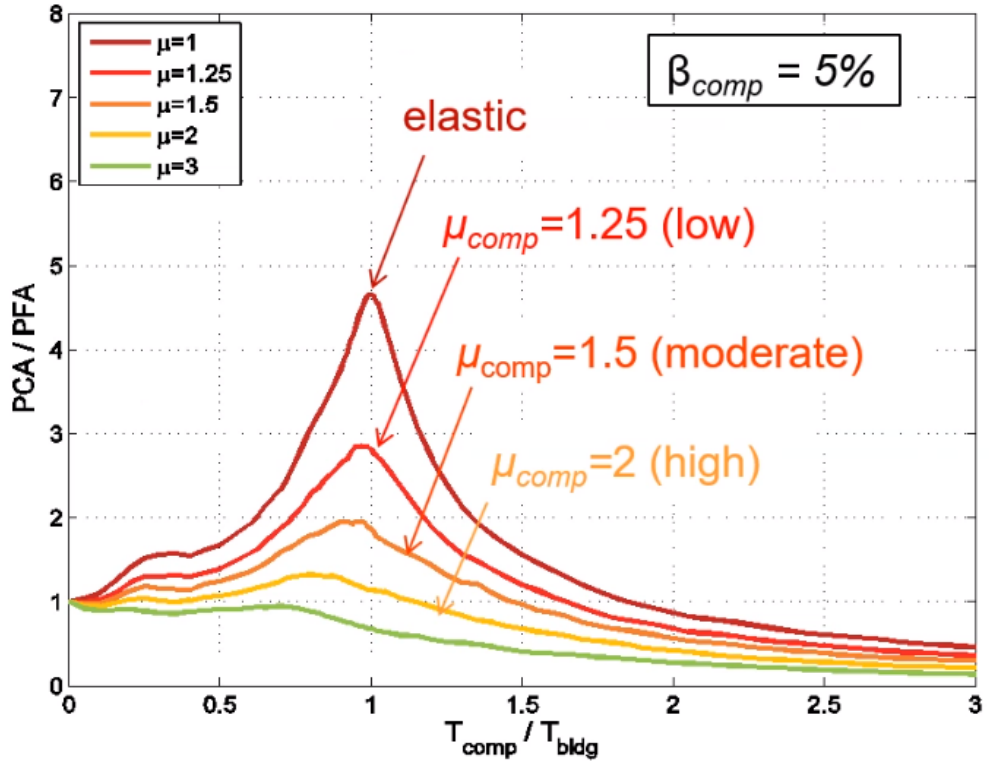


1. Component
2. Connection of component to anchor
3. Anchor



Slide by Bret Lizundia

Component/Anchorage Ductility, μ_{comp}



Mean response of PCA/PFA versus T_{comp}/T_{bldg} for different levels of component ductility *(from NIST, 2018 and Lizundia, 2019)*

Key Takeaway

- Ductility substantially reduces component response, particularly at resonance

Figure Assumptions

- Elastic component assumed with β_{comp}=5%
- Dataset includes 86 recordings with PCA>0.9g

Slide by Bret Lizundia

Evolution of Seismic Design Force Equation

ASCE 7-16

$$\frac{F_p}{W_p} = (0.4S_{DS}) \times \left[1 + 2\left(\frac{z}{h}\right)\right] \times \left[\frac{a_p}{R_p}\right] \times I_p$$

NIST GCR 18-917-43 (ATC-120)

$$\frac{F_p}{W_p} = \mathrm{PGA} \times \frac{\left[\left(\frac{\mathrm{PFA}}{\mathrm{PGA}}\right)\right]}{\left[R_{\mu bldg}\right]} \times \frac{\left[\left(\frac{\mathrm{PCA}}{\mathrm{PFA}}\right)\right]}{\left[R_{po,bldg}\right]} \times I_p$$

2020 *NEHRP Provisions* and ASCE 7-22

$$\frac{F_p}{W_p} = (0.4S_{DS}) \times \frac{\left[H_f\right]}{\left[R_\mu\right]} \times \frac{\left[C_{AR}\right]}{\left[R_{po}\right]} \times I_p$$

- Ground response
- PFA/PGA
- Resonance and component ductility
- Component strength reserve margin
- Building ductility

Slide by Bret Lizundia

Component Resonance Ductility Factor, C_{AR}

- Mechanical and electrical equipment shall be assigned a factor per ASCE/SEI 7-22 Table 13.6-1.

$$\frac{F_p}{W_p} = (0.4S_{DS}) \times \left[\frac{H_f}{R_\mu}\right] \times \left[\frac{C_{AR}}{R_{po}}\right] \times I_p$$

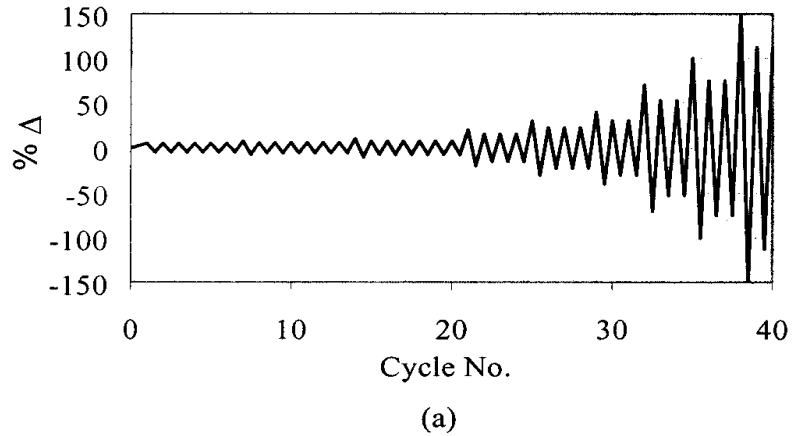
Table 13.6-1. Seismic Coefficients for Mechanical and Electrical Components.

MECHANICAL AND ELECTRICAL COMPONENTS	C_{AR}: Supported at or below grade plane	C_{AR}: Supported above grade plane by a structure	R_{po}	Ω_{op}[b]
VIBRATION-ISOLATED COMPONENTS AND SYSTEMS[a]				
Components and systems isolated using neoprene elements and neoprene isolated floors with built-in or separate elastomeric snubbing devices or resilient perimeter stops	1.8	2.2	1.3	1.75
Spring-isolated components and systems and vibration-isolated floors closely restrained using built-in or separate elastomeric snubbing devices or resilient perimeter stops	1.8	2.2	1.3	1.75
Internally isolated components and systems	1.8	2.2	1.3	1.75
Suspended vibration-isolated equipment, including in-line duct devices and suspended internally isolated components	1.8	2.2	1.3	1.75

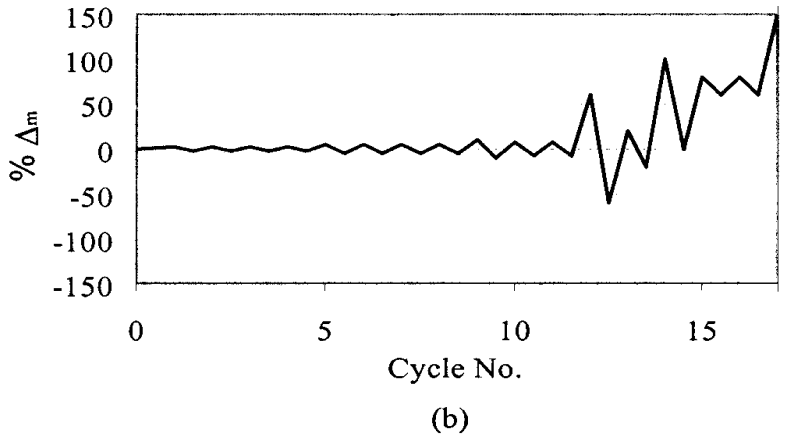
What Criteria to use for Rating of Vibration Isolators?

- *CBC* permits alternative testing protocols approved by the building official for establishing rating capacities of nonstructural components.

What is a Loading Protocol..?



(a)



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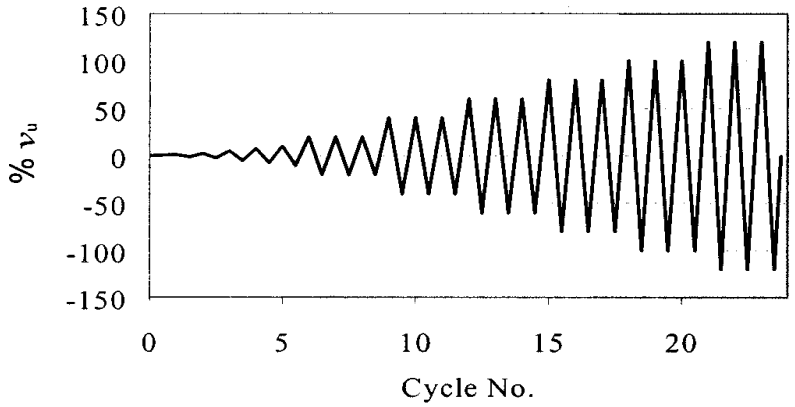
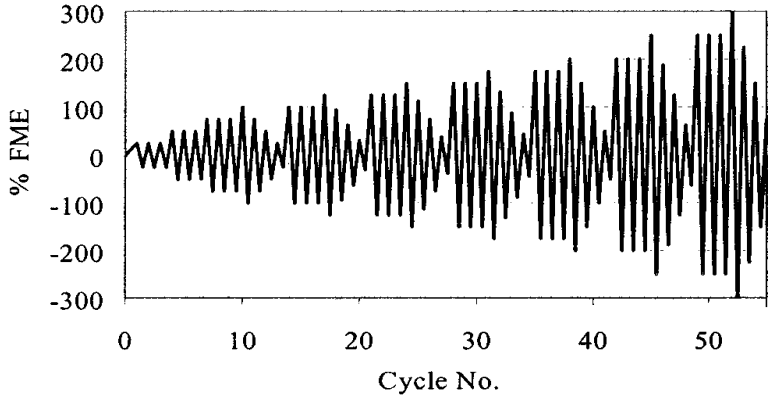


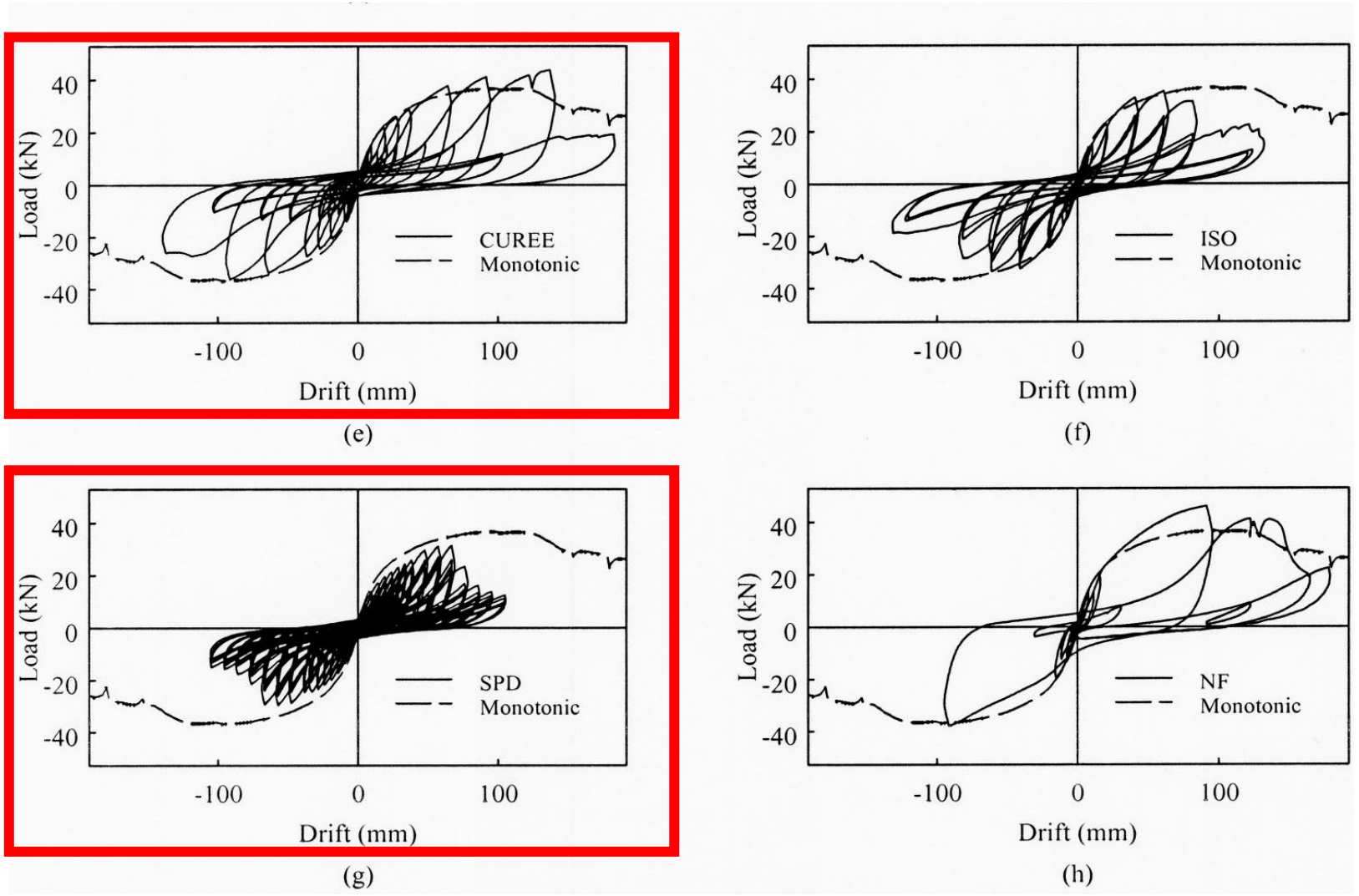
(c)



(d)

Bruce Maison

Effect of Loading Protocol



Bruce Maison

Trends

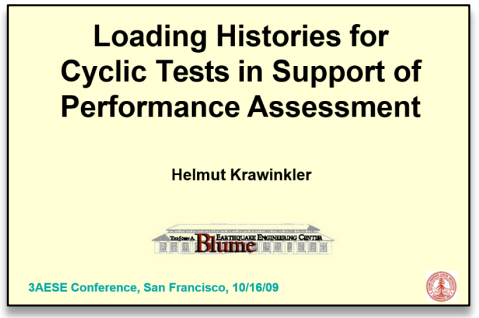
- One-sided response at “large” drifts
- Few “large” excursions
  - Mostly < 3 “large” drift excursions
- More like “monotonic” as opposed to “numerous fully-reversed cycles”

Bruce Maison

Why Bother with Loading Protocols

Objectives of Testing

- Evaluation of behavior
- Study of damage and failure modes
- Development of design/detailing criteria
- Analytical modeling



Dilemmas:

- Single test should represent many different conditions existing in a structure
- The demands imposed by ground motions on the structure depend strongly on structural characteristics
- The imposed demands are a function of ground motion characteristics, which depend strongly on soil type, source-to site distance, and many other geophysical parameters
- Various performance levels of interest, from immediate occupancy to collapse
- Loading history never is “right”

Helmut Krawinkler

3AESE Conference, San Francisco, 10/16/09

Impact of Damping (β_{comp}) on Seismic Demand on NSE

PCA = Peak Component Acceleration
PFA = Peak Floor Acceleration
T_{comp} = Period of the component
T_{IDbldg} = Building Period
β_{comp} = Component damping

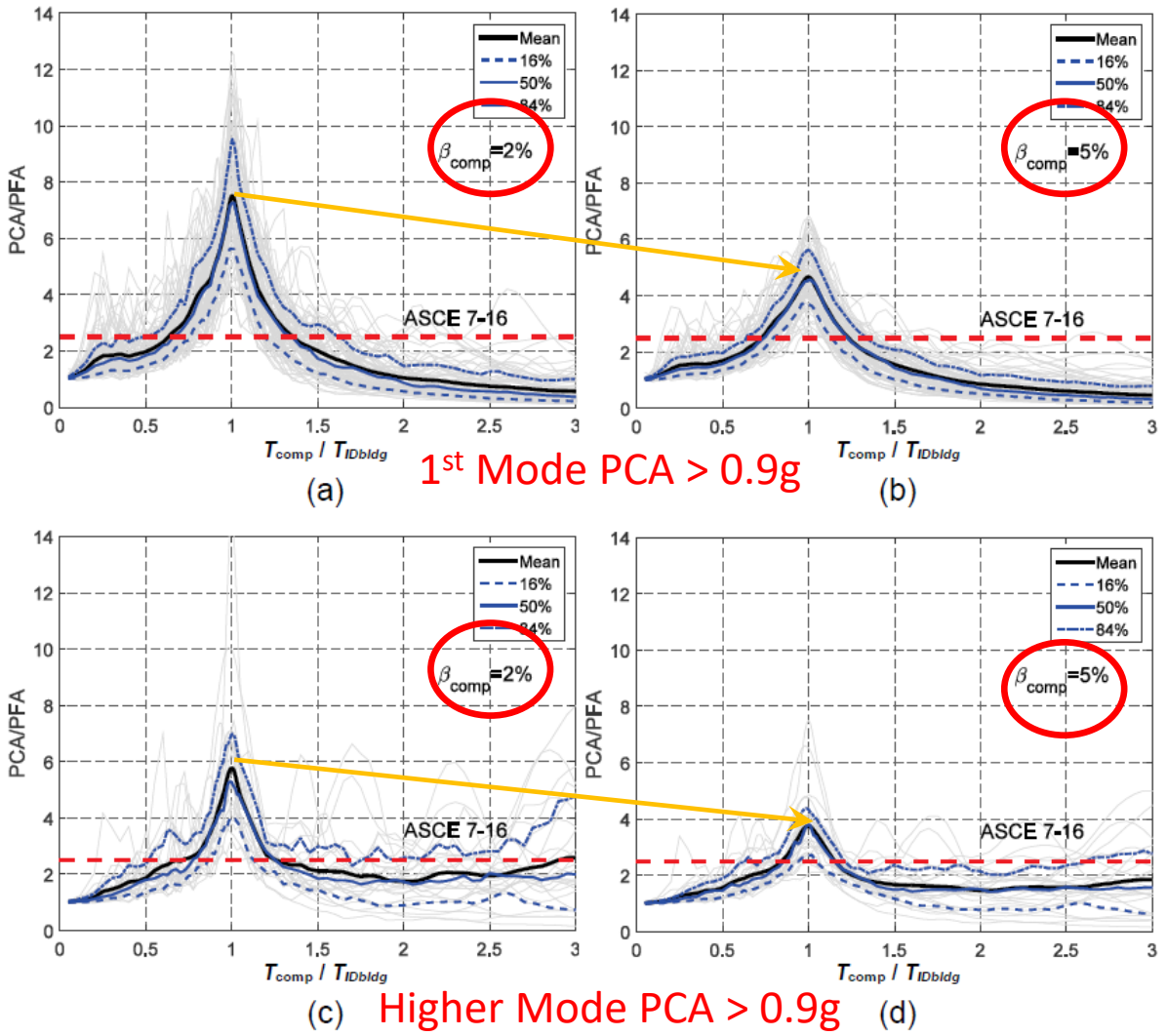


Figure 4-21 PCA/PFA versus T_{comp} / T_{IDbldg} for T_{comp} = 2% in (a) and (c) and T_{comp} = 5% in (b) and (d). An elastic component is assumed. Figures (a) and (b) are for 86 recordings with first mode PCA response > 0.9g. Figures (c) and (d) are for 27 recordings with higher mode PCA response > 0.9g. From Kazantzi et al. (2018).

Impact of Damping on Seismic Demand on NSE

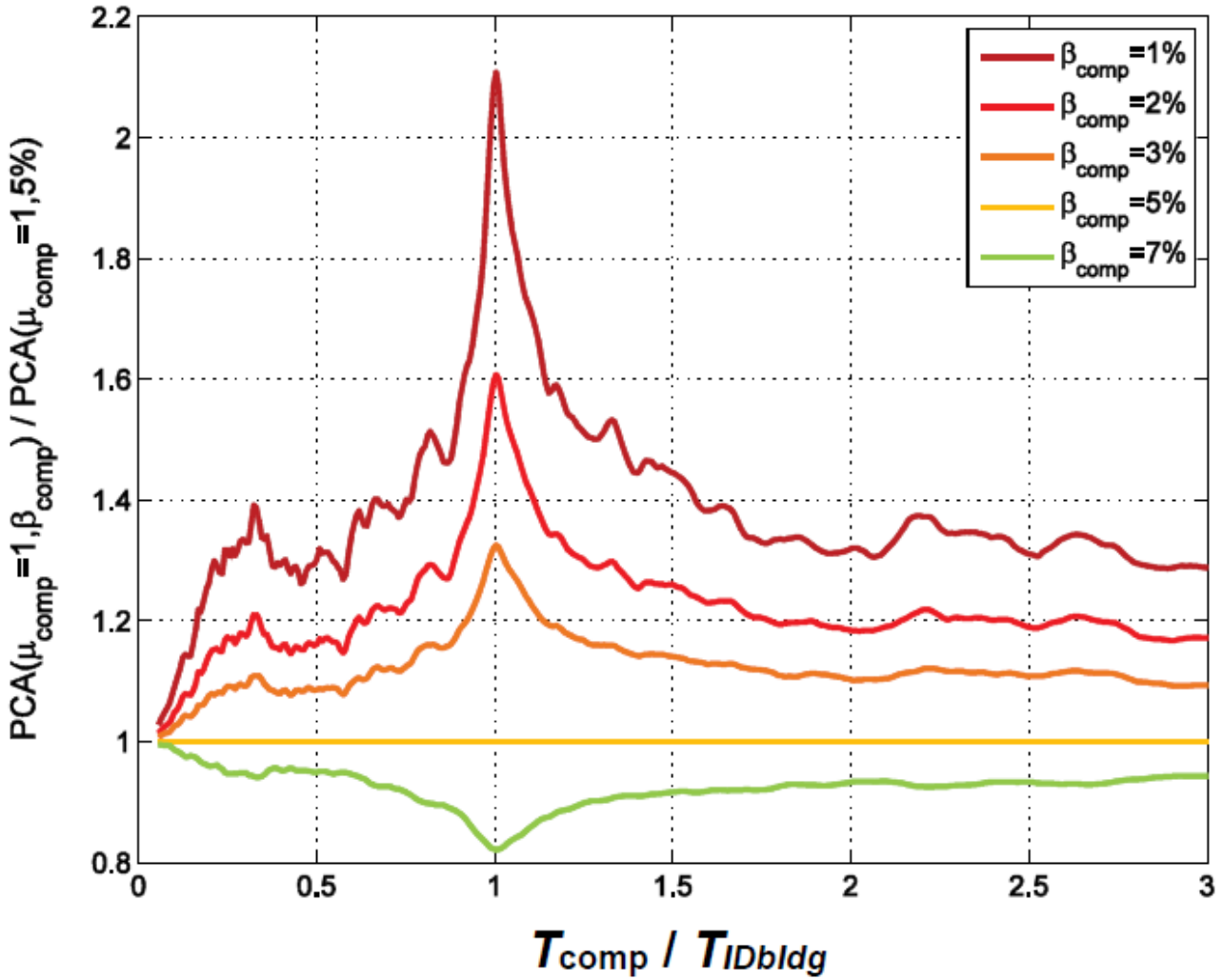


Figure 4-20 Mean elastic PCA ratios between inherent component damping, T_{comp}, of 5% and other damping levels. The dataset includes 86 recordings with PCA > 0.9g.

Impact of Ductility (μ_{comp}) on Seismic Demand on NSE

PCA = Peak Component Acceleration
PFA = Peak Floor Acceleration
T_{comp} = Period of the component
T_{IDbldg} = Building Period
μ_{comp} = Component ductility
β_{comp} = Component damping

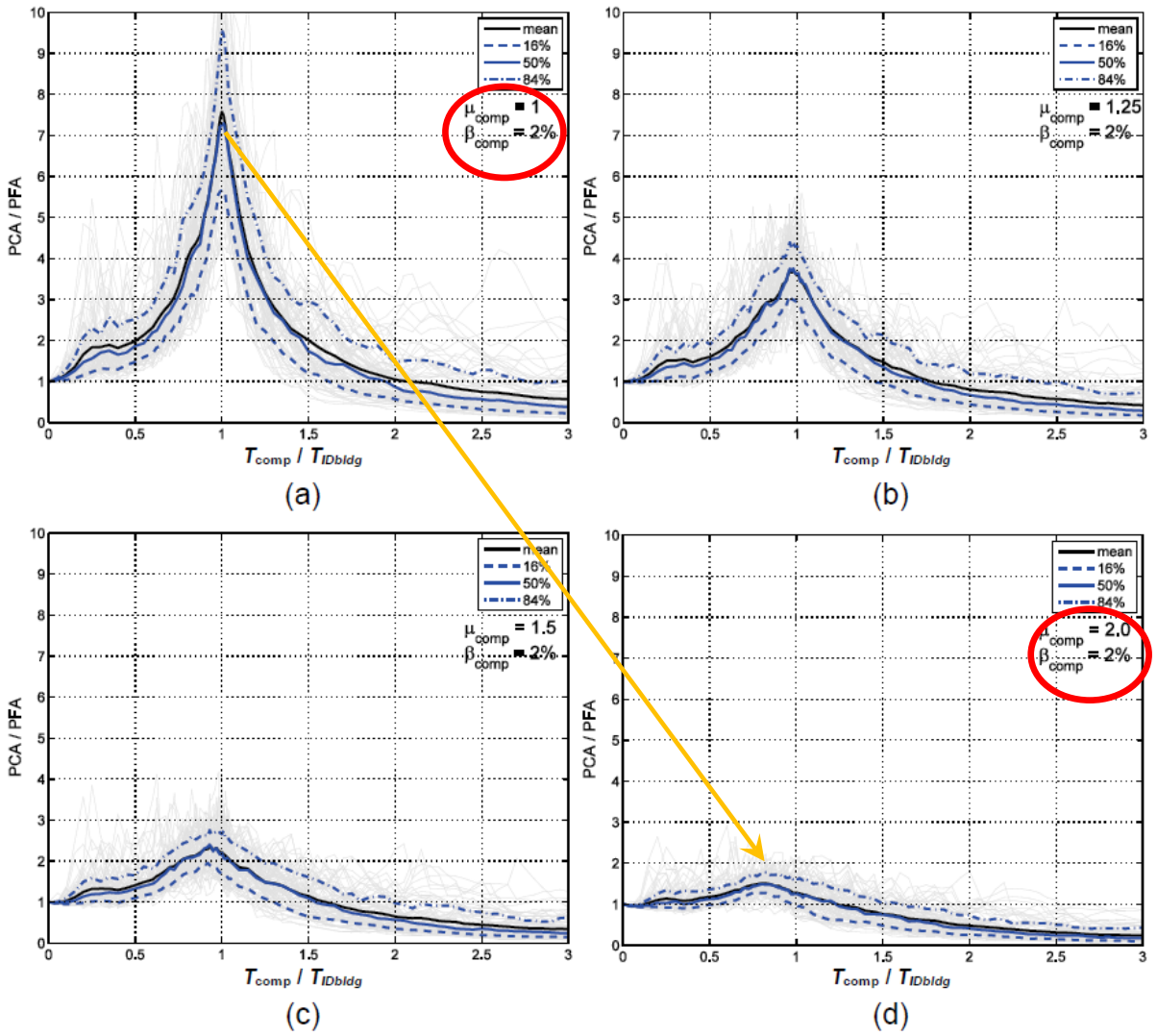
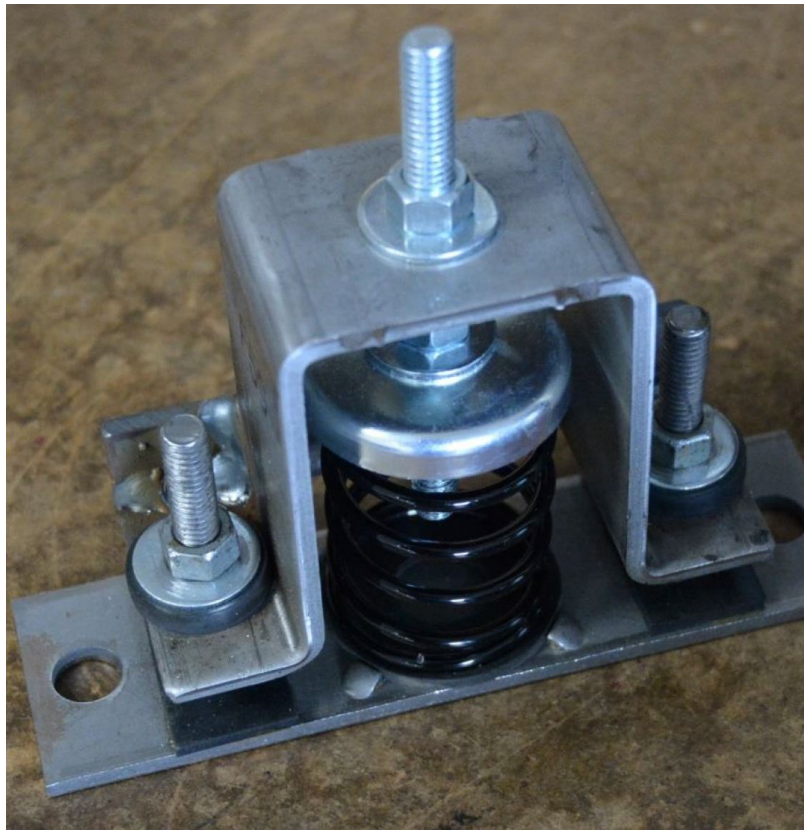
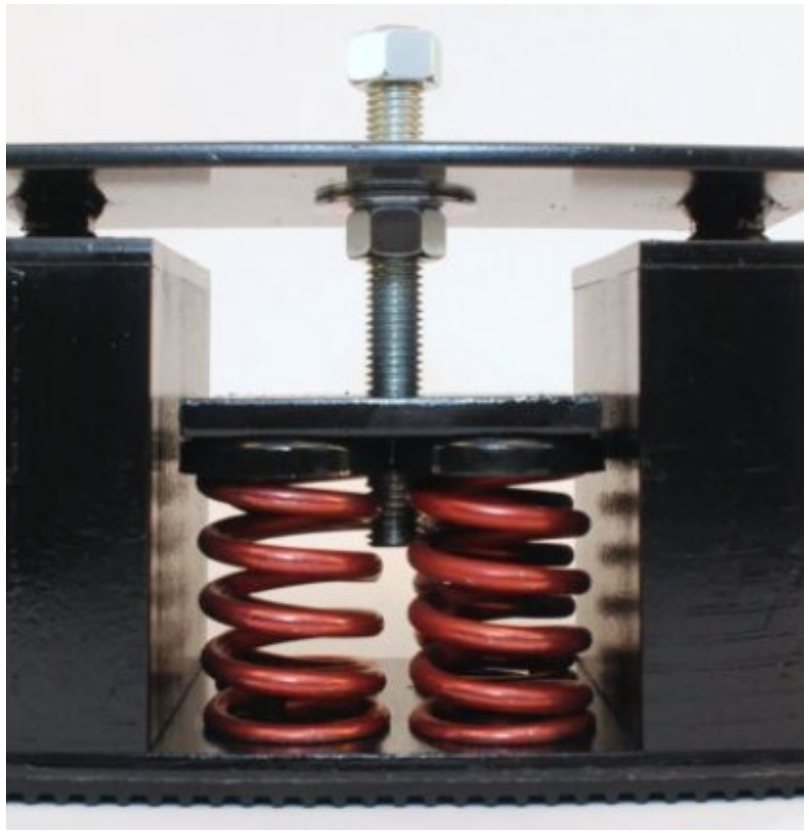


Figure 4-22 Comparison of PCA/PFA versus T_{comp}/T_{IDbldg} for different levels of component ductility. Figure (a) is an elastic component with μ_{comp} = 1; (b) is for μ_{comp} = 1.25; (c) is for μ_{comp} = 1.5; and (d) is for μ_{comp} = 2. β_{comp} = 2% inherent component damping is assumed. The dataset includes 86 recordings with PCA > 0.9g.


What Loading Protocol to use for Vibration Isolators?

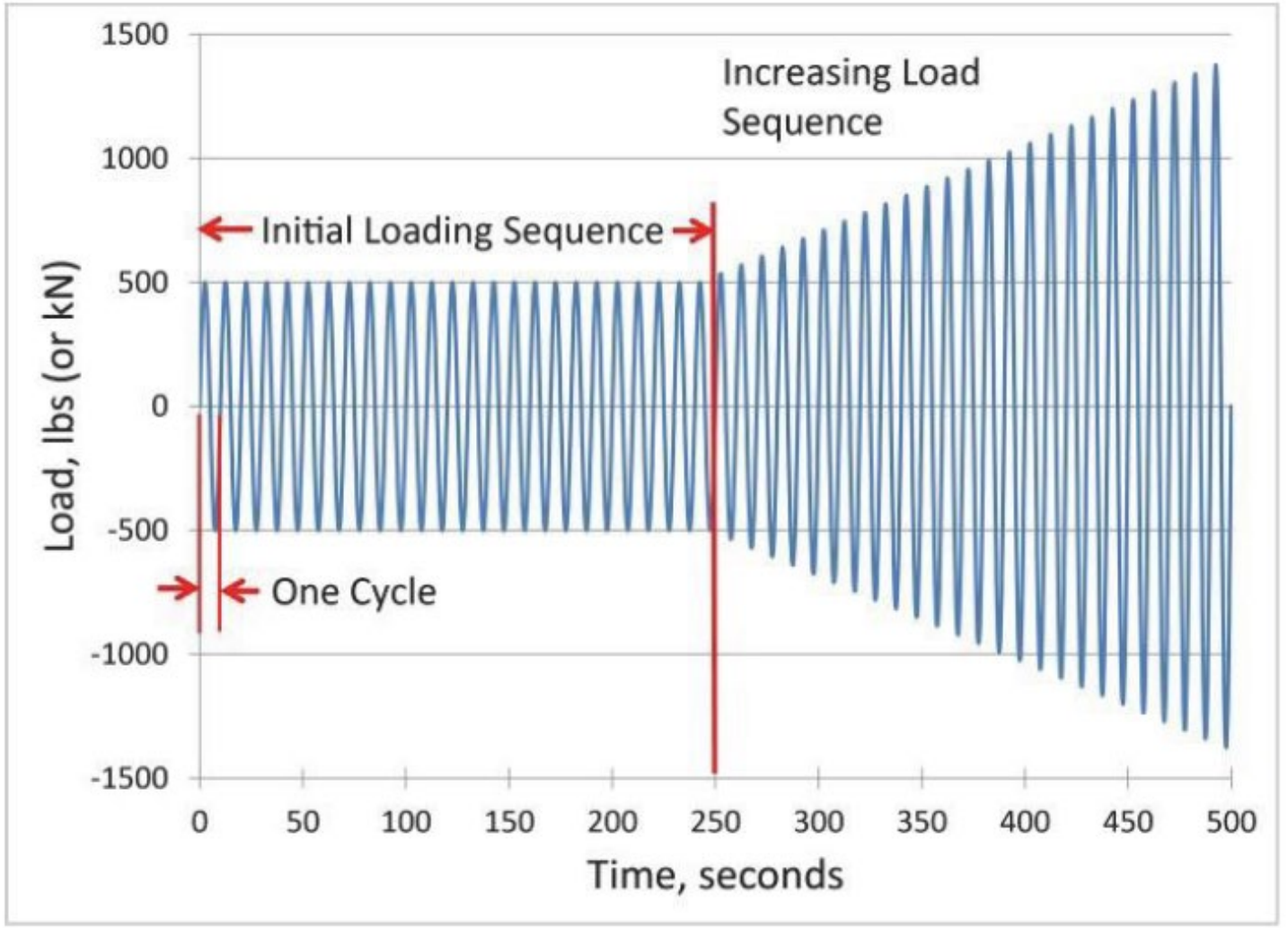
What Loading Protocol to use for Vibration Isolators?

- ASHRAE 171?
- FM 1950?
- FEMA 461?
- Other?

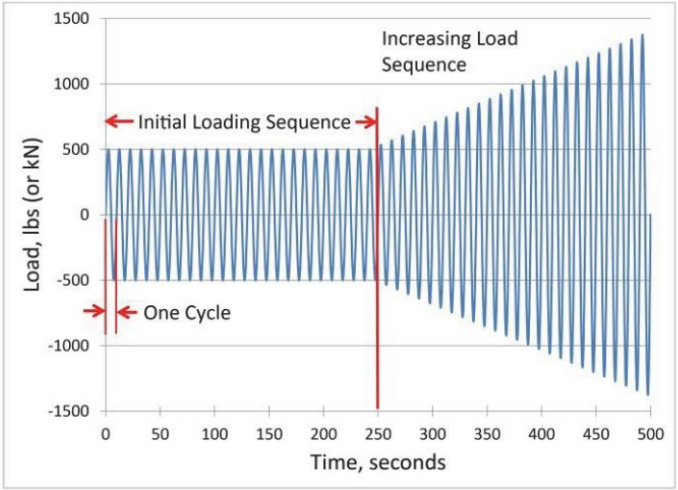
Loading Protocol Component Test – ASHRAE 171

Steps

- 1) Estimate Ultimate Maximum Capacity (UMC)
- 2) Perform initial sequence of tests at 50% of UMC
- 3) Increase load after initial sequence at 3.5% of UMC



Seismic Rating – ASHRAE 171



- All the capacities noted above shall be reduced by the appropriate resistance factor, Φ (LRFD), or safety factor, Ω (ASD) obtained from the material standard(s) for the material. The rated capacity equals Φ(capacity) or (capacity)/Ω. For steel, the appropriate Φ or Ω factors based on the observed behavior from testing are noted below.
- Tensile yielding, Compression, Flexure or Shear; Φ=0.9 Ω=1.67
- Tensile rupture or fracture; Φ=0.75 Ω=2.0

Loading Protocol Component Test – FM 1950

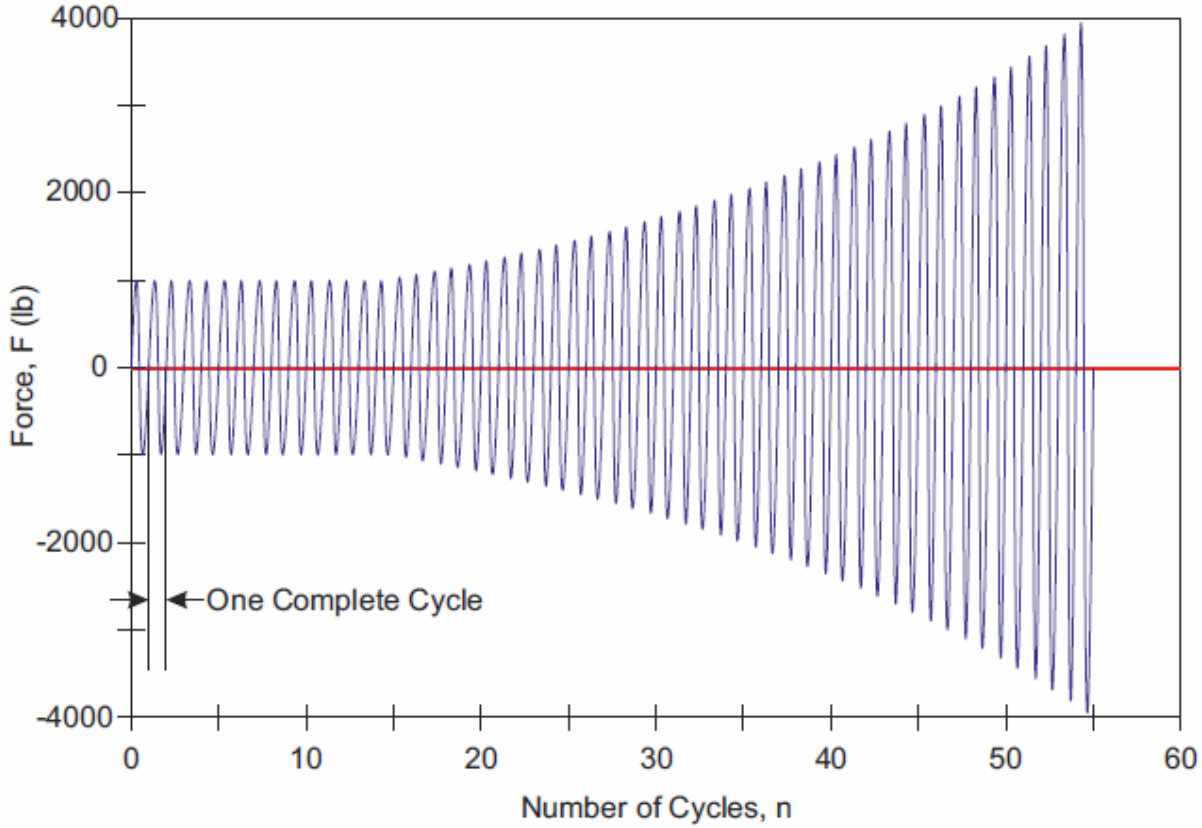


Figure 4.2 Force History Plot (Component Testing)

Loading Protocol Component Test – FM 1950

- Pipe bracing components with expected ratings > 1000 lbs, initial loading = 1000 lbs.
- Expected ratings less than 1000 lbs, initial loading = 250 lbs.
- First 15 cycles at initial loading.

$$Force = X \; for \; N \leq 15 \; cycles$$

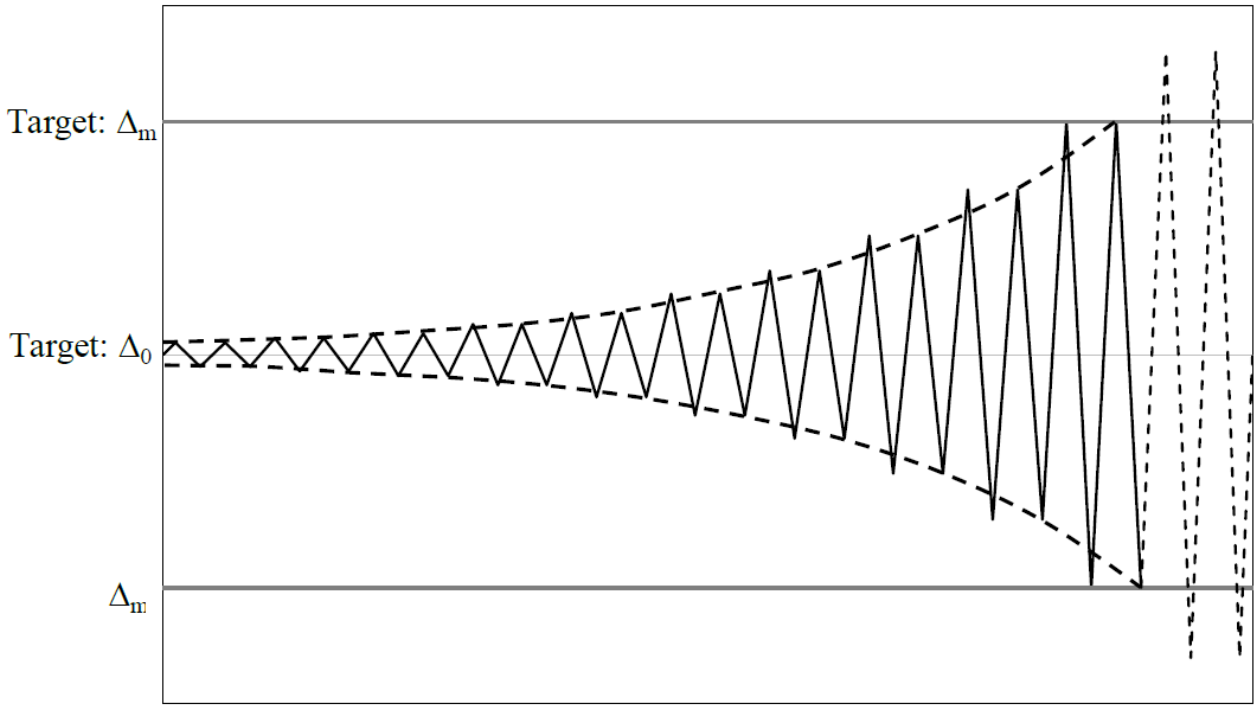
$$Force = X \times \left(\frac{15}{14}\right)^{\frac{(n-15)}{2}} \; lb \quad for \quad n > 15$$

X = 1000 for Subassemblies with ratings expected to be greater than 1000 pounds (454 kg)
X = 250 for Subassemblies with ratings expected to be less than 1000 pounds (454 kg)

Acceptance Criteria – FM 1950

- Three tests to be performed.
- Failure occurs when there is a break or deformation limits are exceeded.
- Load rating from lowest magnitude of force reading from three samples.
- Previous complete cycle gives load rating for LRFD.
- ASD values are derived by dividing the load rating, by a safety factor (Ω) of 2.0 or of LRFD multiplying by a resistance factor (ϕ) of 0.7 (2016).

FEMA 461 Cyclic Loading Protocol



The amplitude a_{i+1} of the step i+1 (not of each cycle, since each step has two cycles) is given by the following equation:

$$a_{i+1} = 1.4 a_i \qquad (2\text{-}1)$$

Sample Test Results using different loading protocols

Loading Protocol Component Test – ASHRAE - 171

Figure 39: "X" Orientation test setup for the FHSL-1-120 01-35_001-03 samples

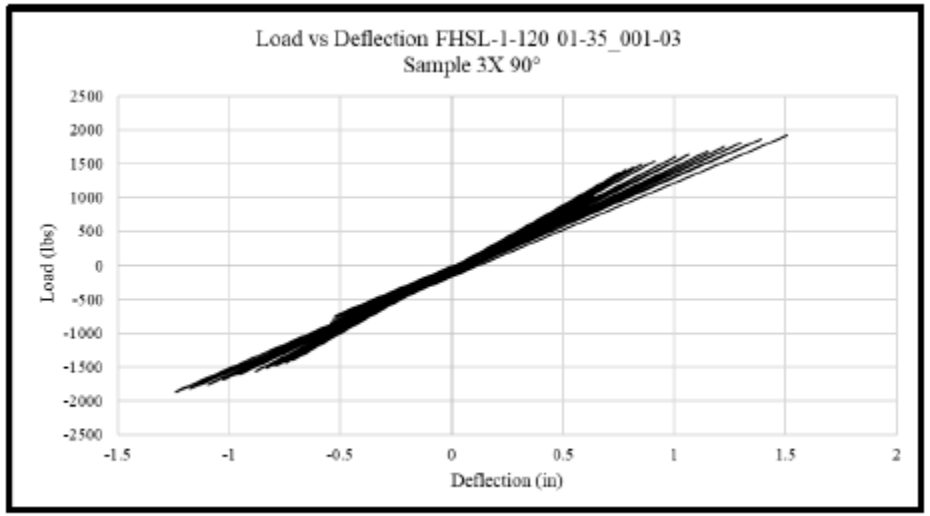


Figure 27: Load vs Deflection for FHSL-1-120 01-35_001-03 Sample 3X

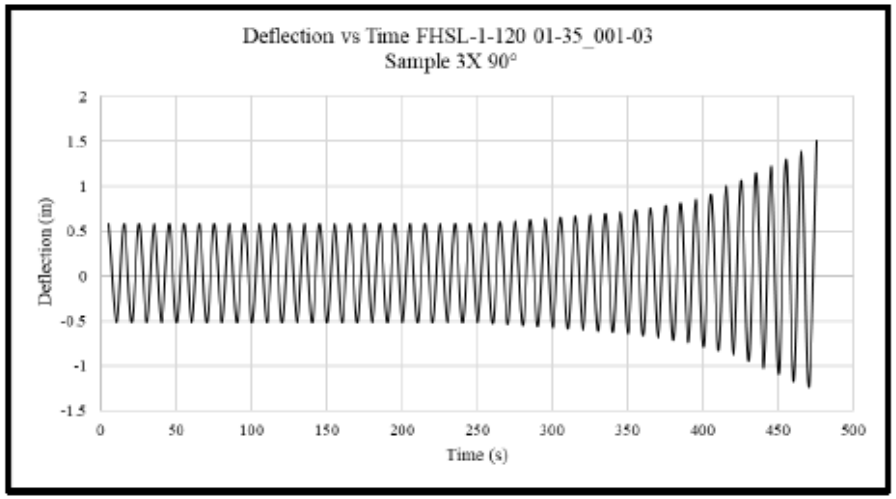


Figure 26: Deflection vs Time for FHSL-1-120 01-35_001-03 Sample 3X

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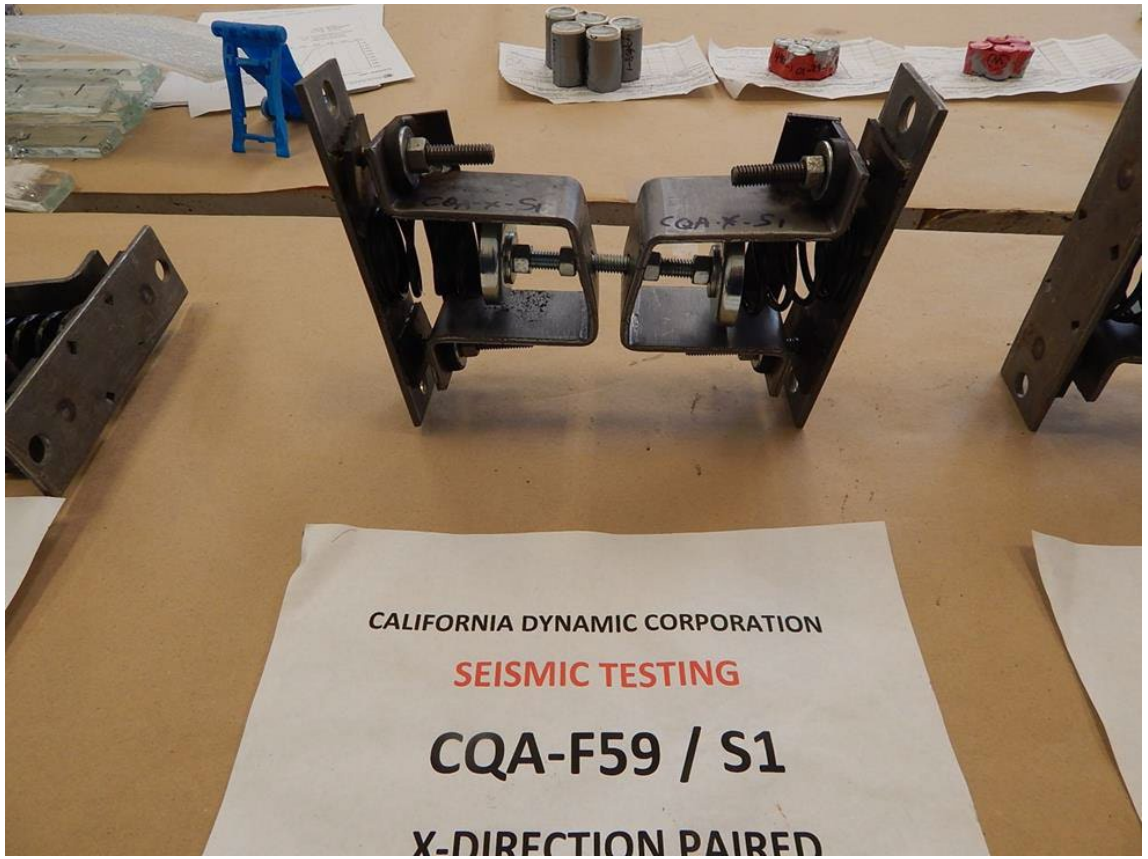
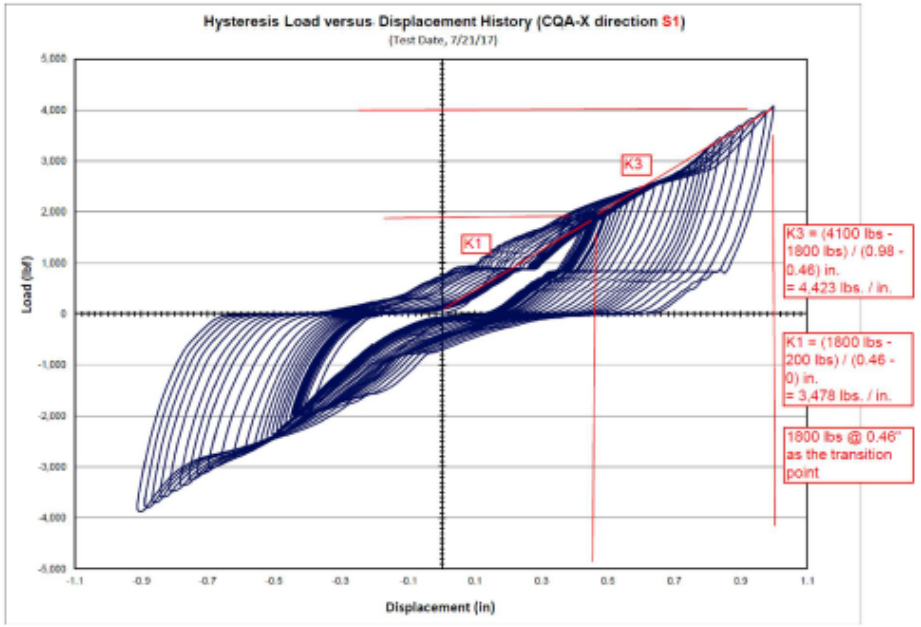
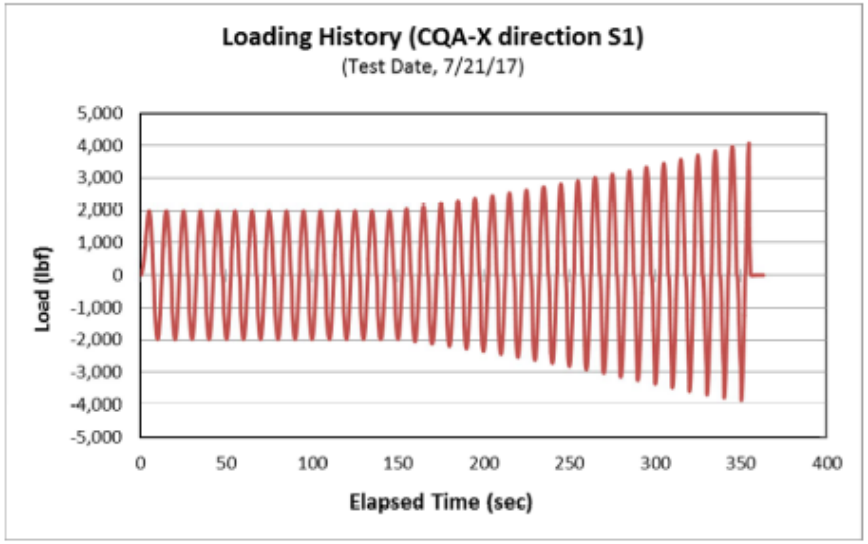
ASHRAE - 171

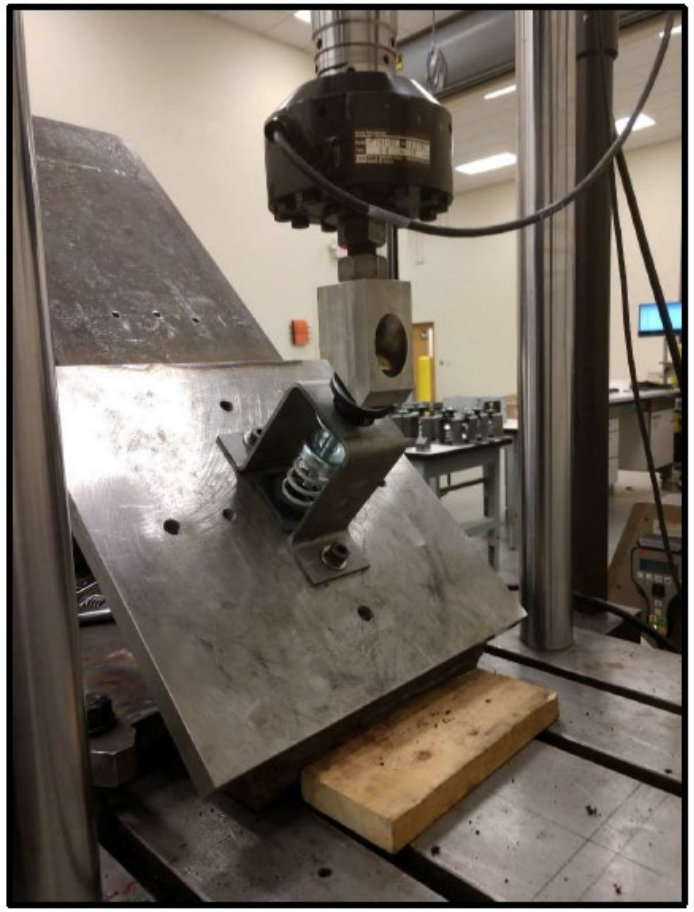


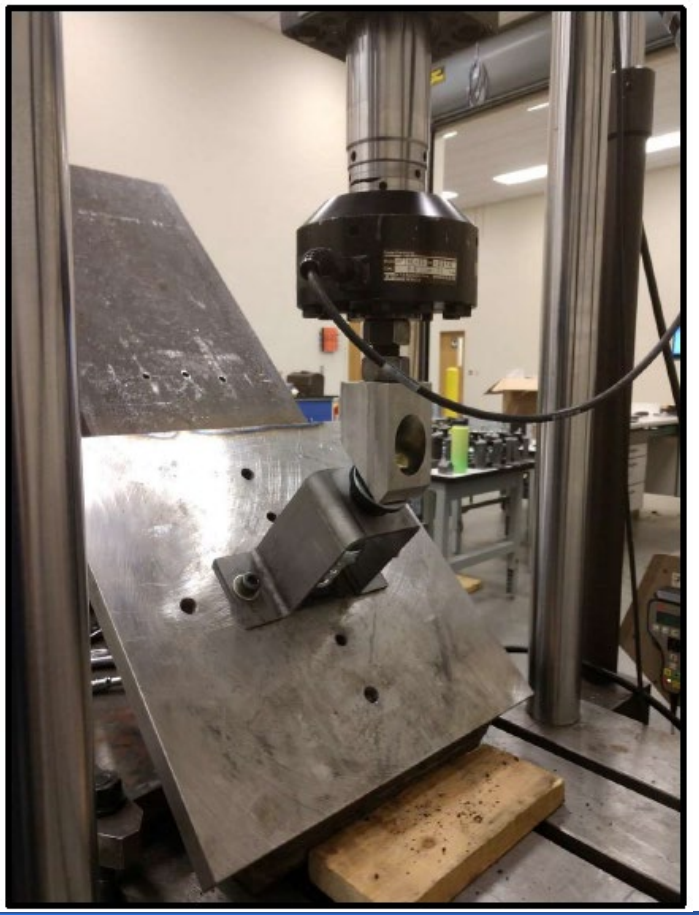
CAQ-X direction-S1:





Isolator testing including axial variation





Isolator Testing Including Axial Variation

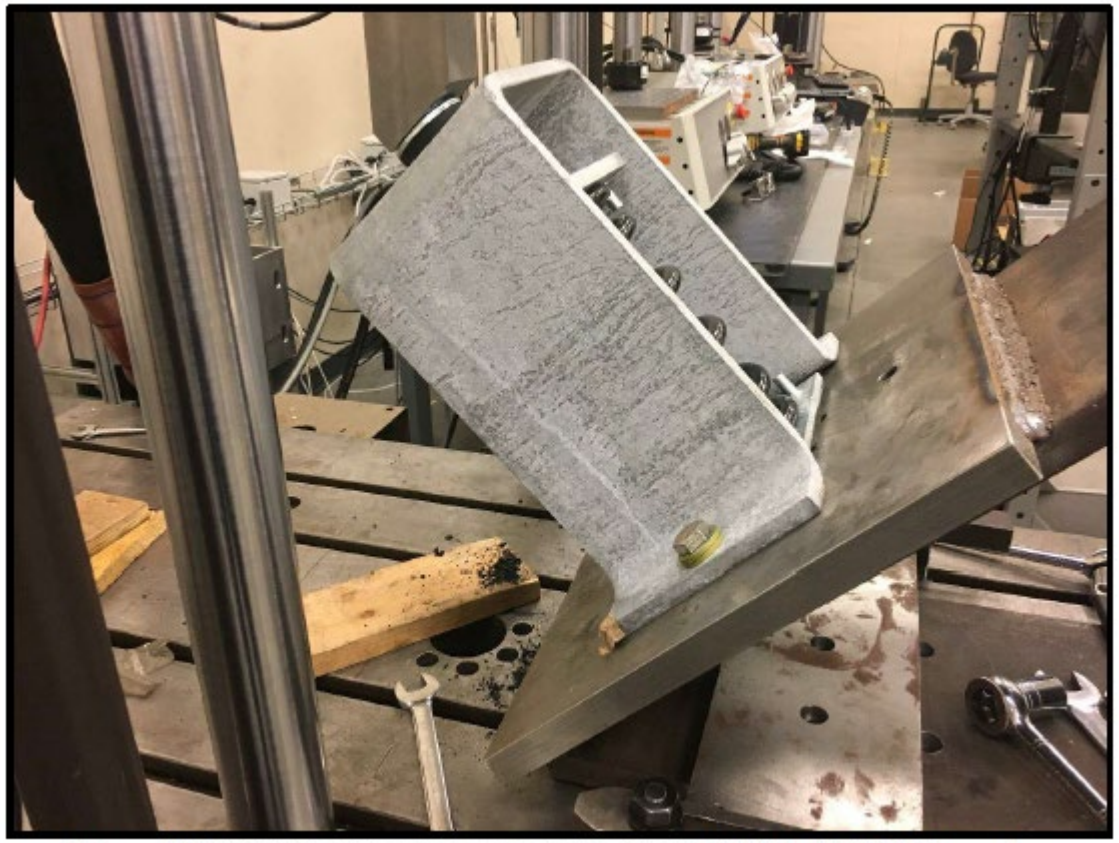
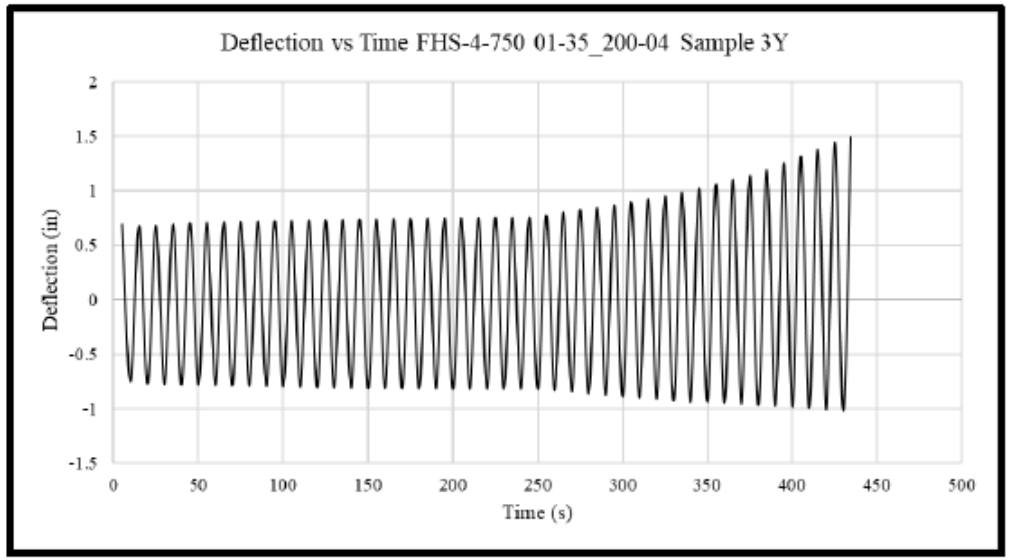
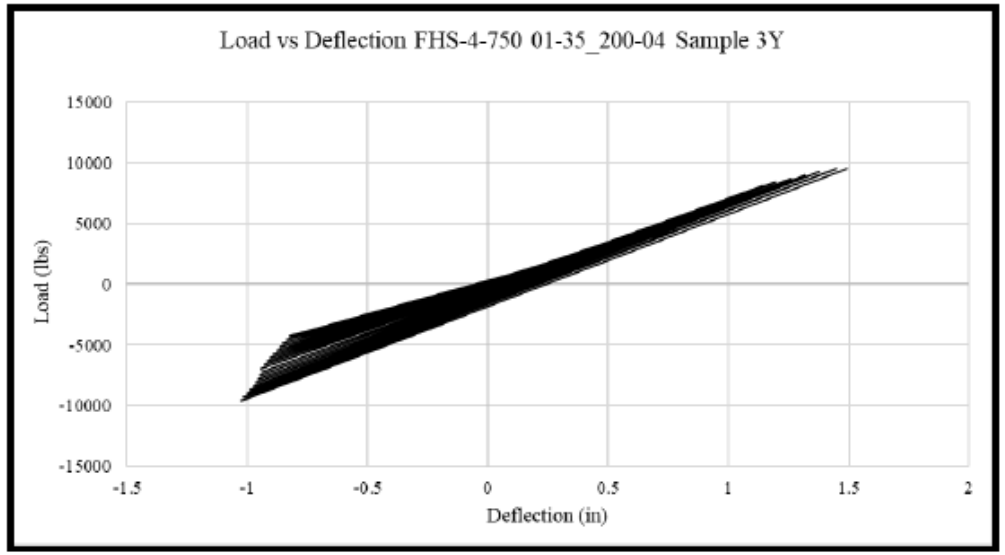
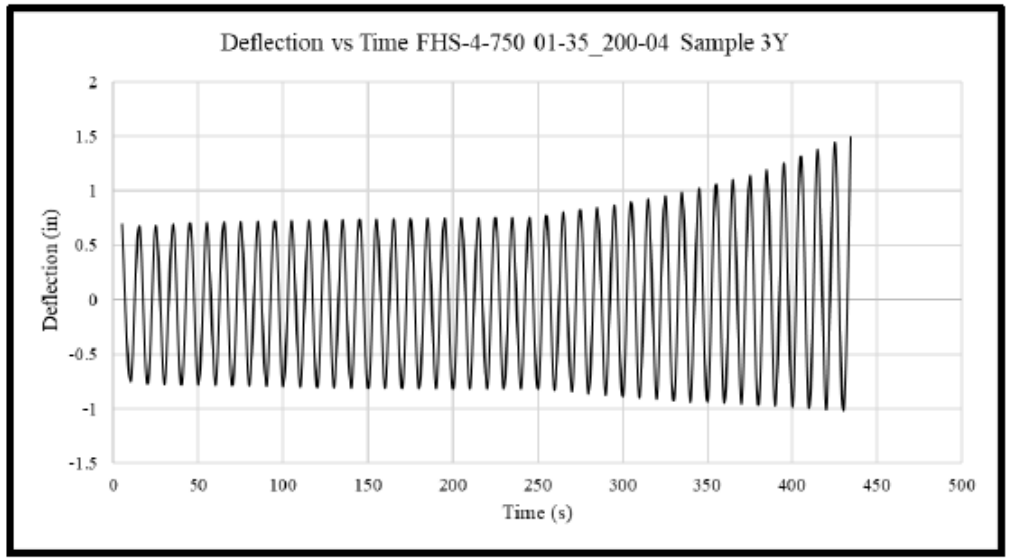


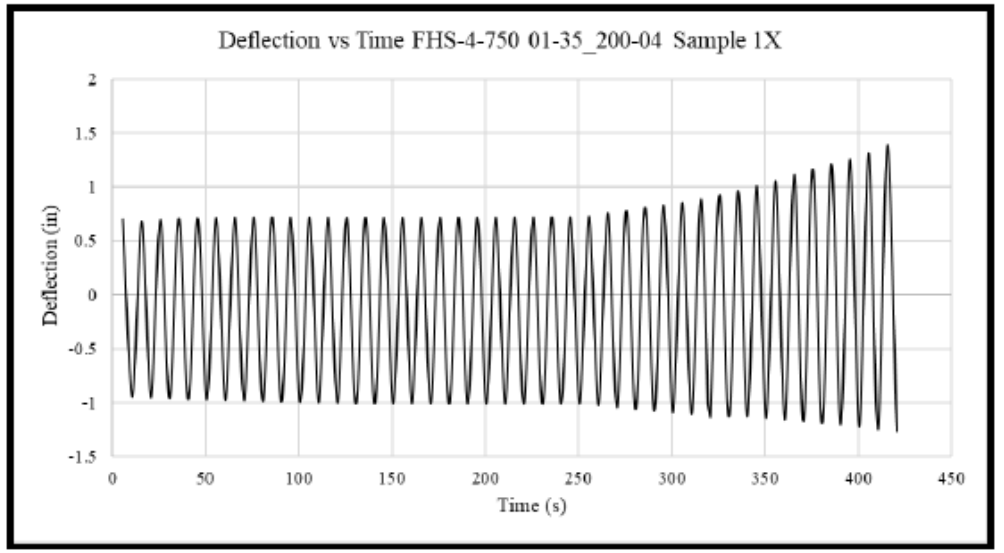
Figure 38: "Y" Orientation test setup for the FHS-4-750 01-35_200-04 samples

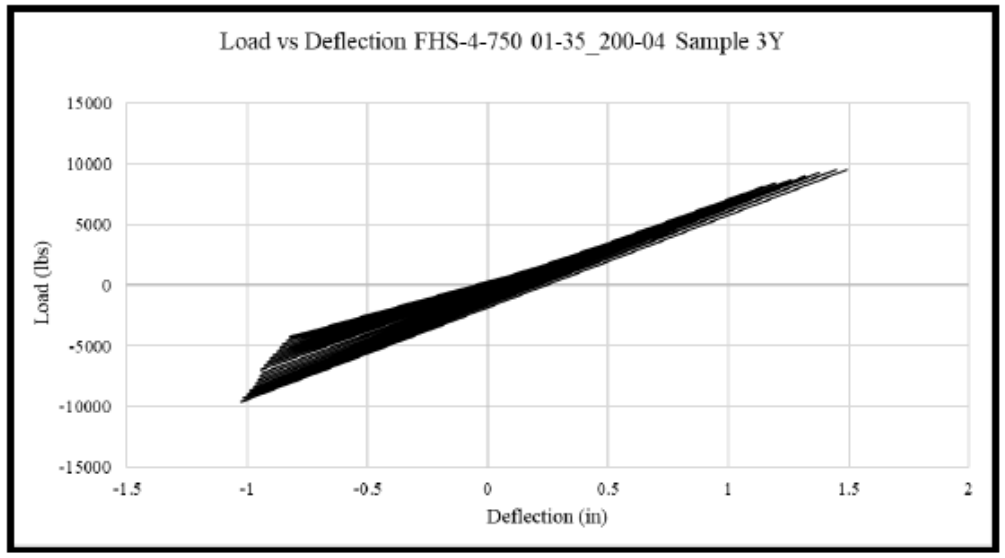


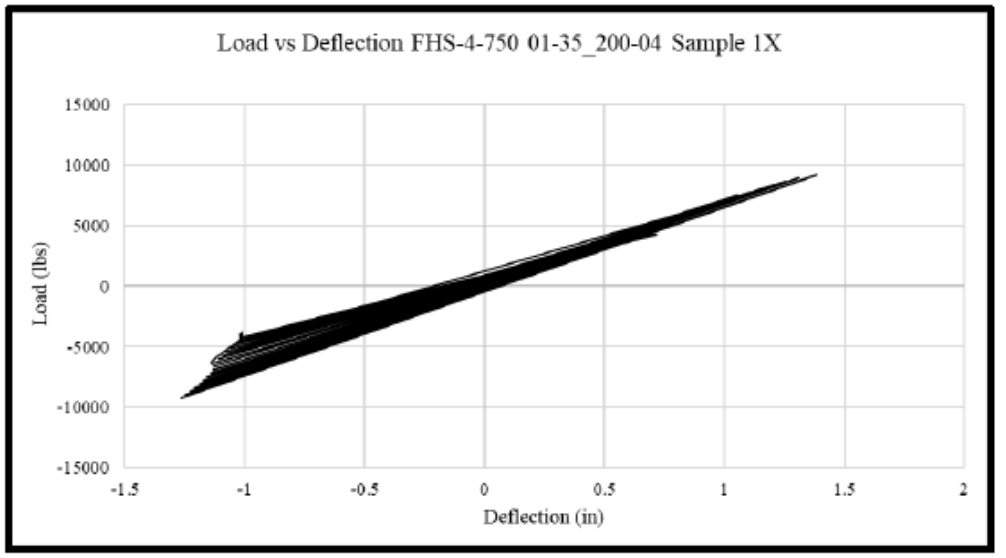


Isolator Testing Including Axial Variation









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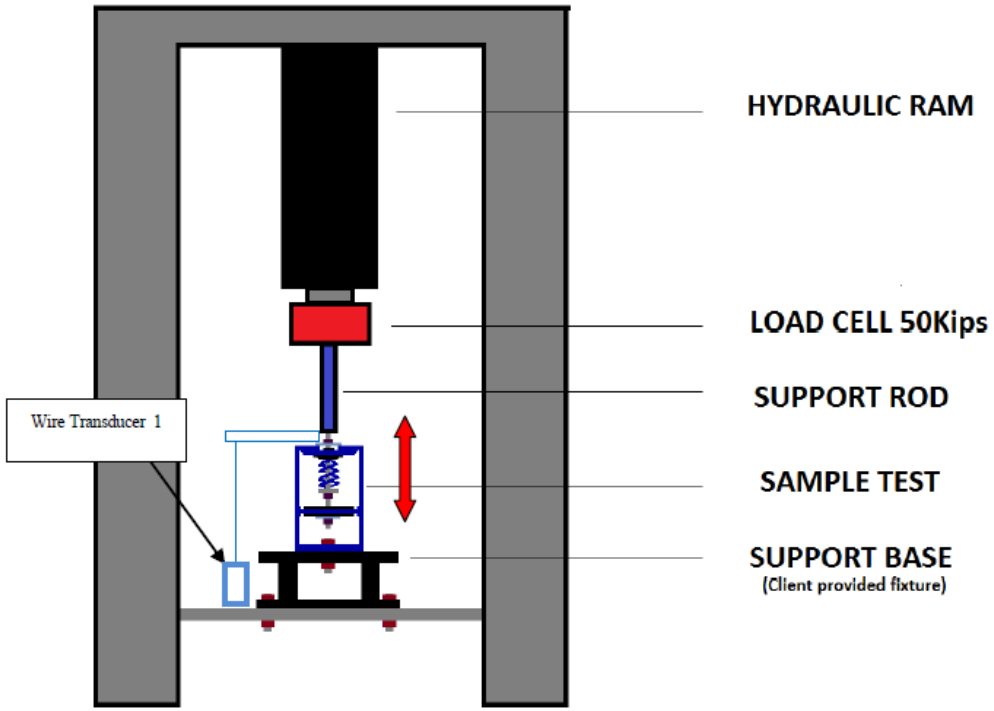
Isolator Testing Including Axial Variation

Table II – Results from individual horizontal tests for FHS-4-750 01-35_200-04 samples

Orientation	Sample	Date Tested	Anticipated Max Capacity Load (lbs)	Initial Load (lbs)	Max Load (lbs)	Cycles Completed	Notes
X	1	9/16/19	8,500	4,250	9,176	41	Sample exceeded deformation limit
X	2	9/16/19	8,500	4,250	9,615	43	Sample exceeded deformation limit
X	3	9/16/19	8,500	4,250	9,498	42	Connecting bolt sheard in half
Y	1	9/16/19	8,500	4,250	8,772	40	Bolt housing sheard in half
Y	2	9/16/19	8,500	4,250	9,259	41	Sample exceeded deformation limit
Y	3	9/16/19	8,500	4,250	9,519	43	Connecting bolt sheard in half

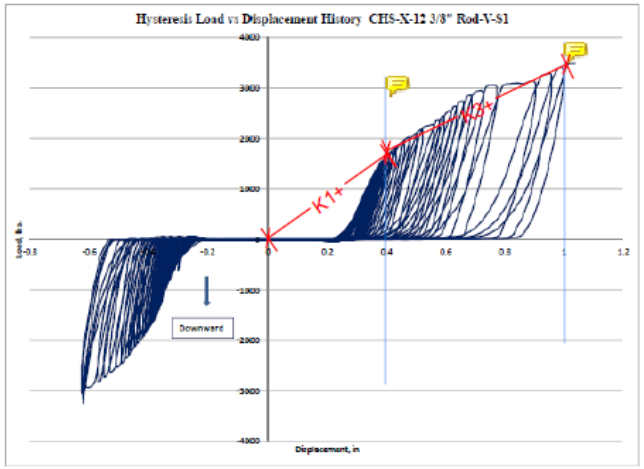
Loading Protocol Component Test – FM - 1950

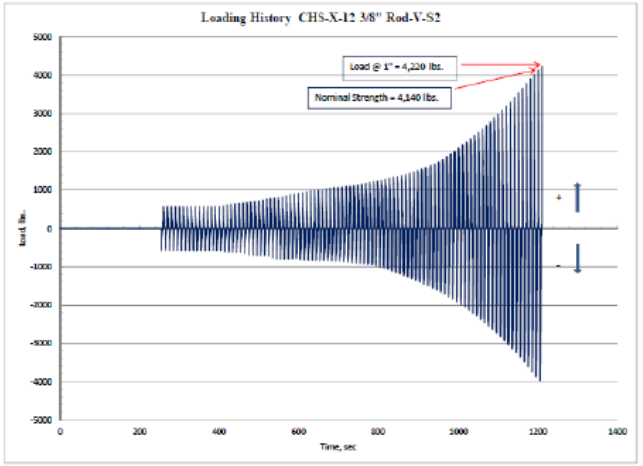


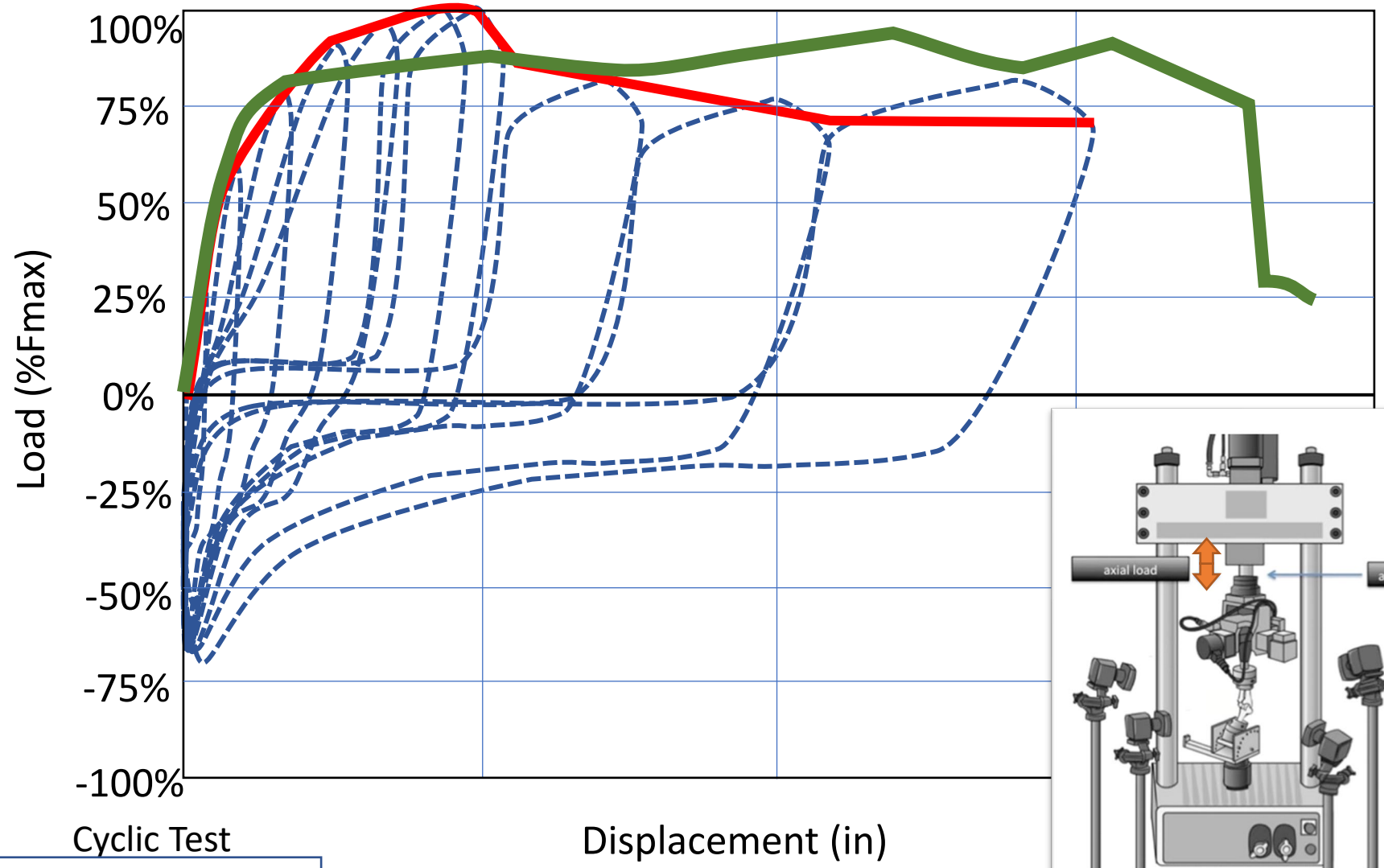
Typical Test Setup for CHS-X-12 3/8”Rod Ø: Vertical Configuration

Loading Protocol Component Test – FM - 1950

Typical Test Setup for CHS-X-12 3/8”Rod Ø: Vertical Configuration







FEMA 461 Cyclic Loading Protocol

Seismic Rating Capacity of NSE

Proposed Criteria for Seismic Rating of NSE

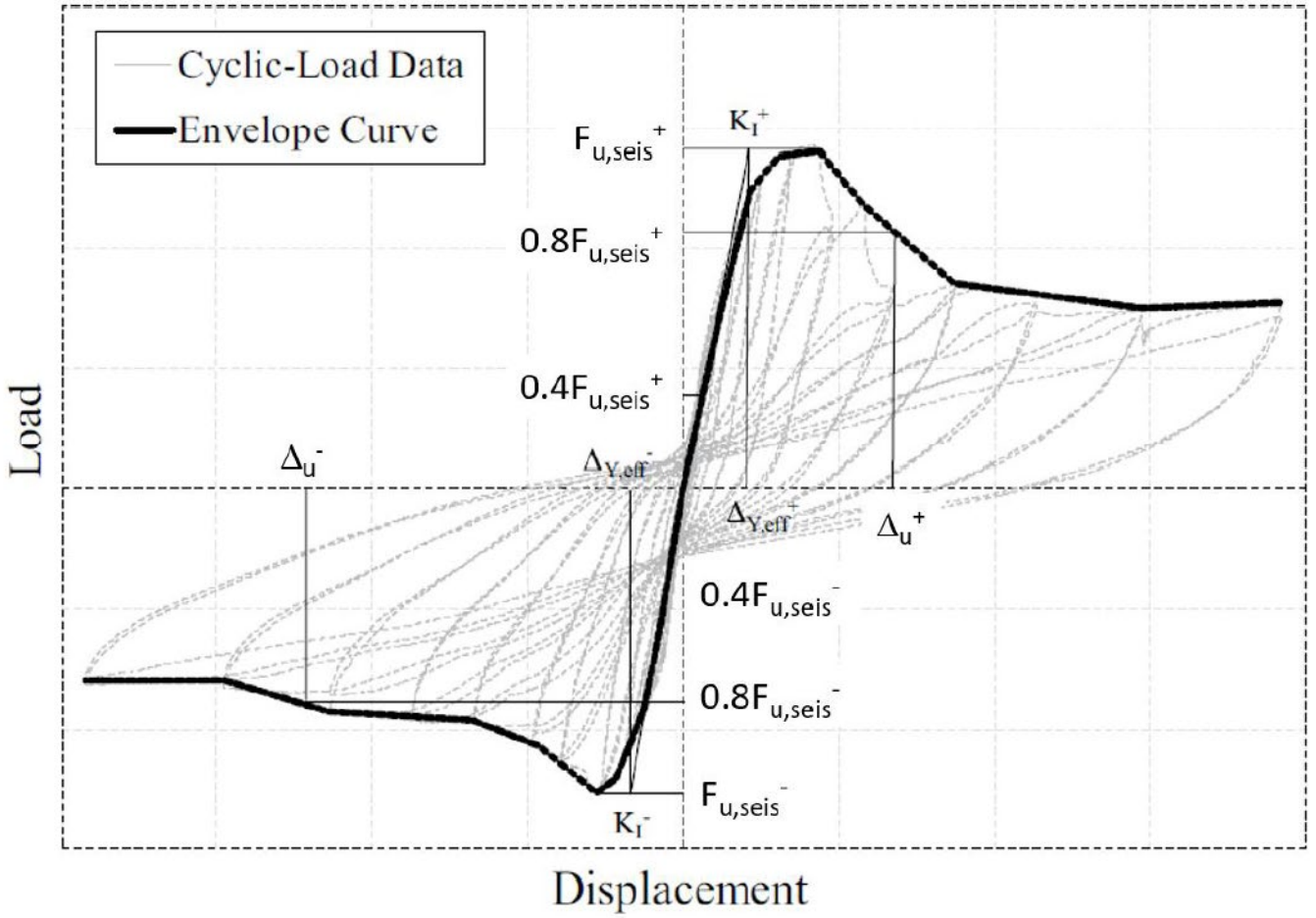
$F_{u,seis}$ = Ultimate load in the cyclic test.

K_I= Initial stiffness based on force and deformation at 0.4 $F_{u,seis.}$

$\Delta_{Y,eff}$ = Effective Yield displacement defined as $F_{u,seis}$ / $K_{I.}$

Δ_U = Ultimate deformation corresponding at 0.8 $F_{u,seis}$ in the post peak range.

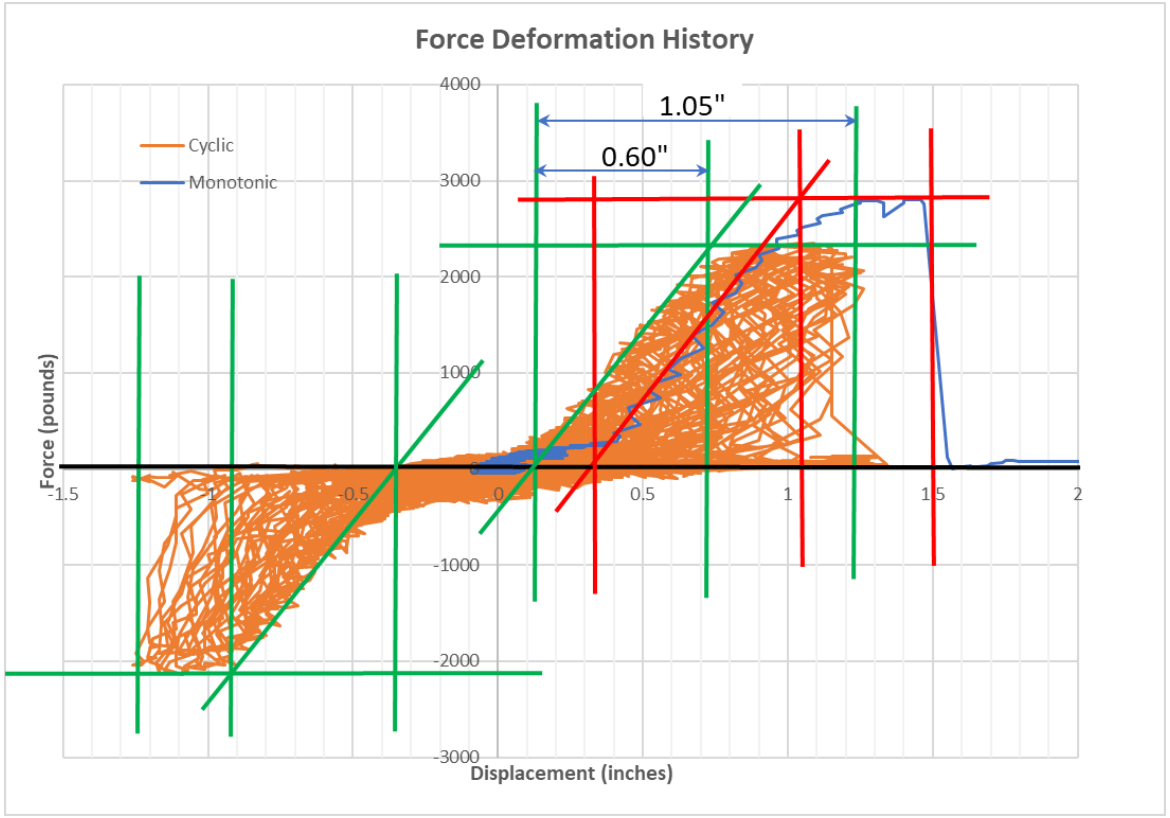
μ_{eff} = Effective ductility capacity defined as Δ_U / $\Delta_{Y,eff}$



Determination of Minimum Ductility

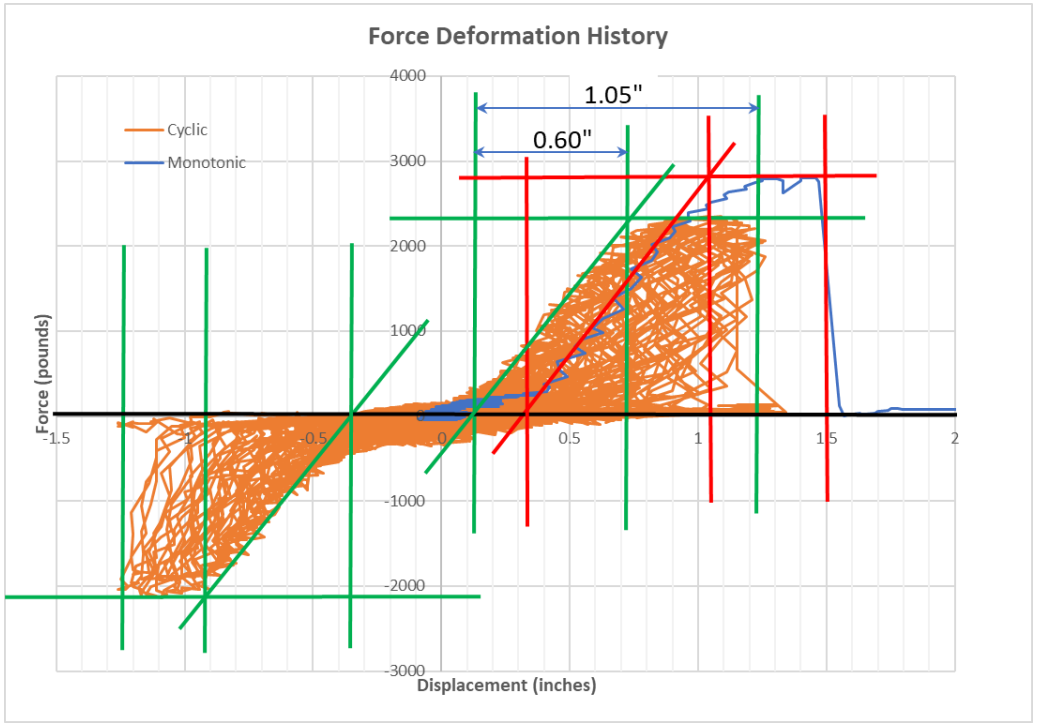
- $\mu_{Cyclic+} = \frac{1.05}{0.60} = 1.75$
- $\mu_{Cyclic-} = \frac{0.90}{0.55} = 1.63$
- $\mu_{Monotonic} = \frac{1.17}{0.73} = 1.60$
- $\mu_{average} > 1.60$

No further reduction in capacity

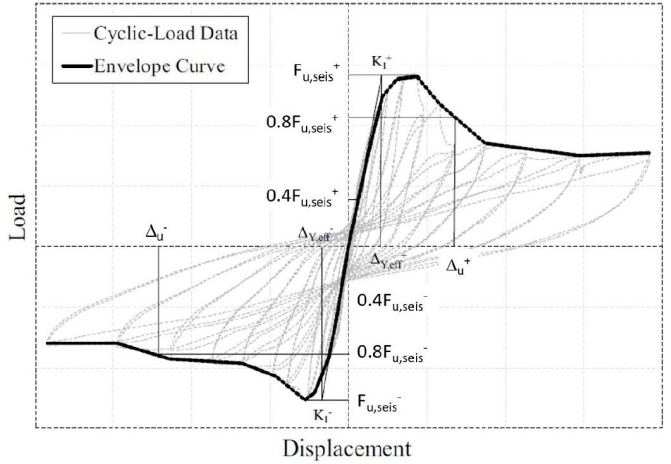


Isolator Rated Capacity

- $Capacity\ FM\ 1950 = 0.7\left(\frac{2300+2100}{2}\right) = 1540lbs$
- $Capacity\ ASHRAE\ 171 = 0.9\left(\frac{2300+2100}{2}\right) = 1980\ lbs$
- $Capacity\ FEMA\ 461_{cyclic} = 0.8\left(\frac{2300+2100}{2}\right) = 1760\ lbs$
- $Capacity\ FEMA\ 461_{monotonic} = 0.8(0.8(2800)) = 1792\ lbs$



Proposed Rating Criteria



- Rated load expressed in terms of Load Resistance Factor Design (LRFD), where the nominal strength (R_n) is multiplied by a resistance factor (ϕ) less than one, or in terms of Allowable Stress Design (ASD), where the nominal strength is divided by a safety factor (Ω) larger than one.
- Minimum of three tests for each NSE. The nominal strength for the NSE is found by identifying the smallest ultimate seismic strength from the test samples.
- NSE shall satisfy a minimum ductility capacity of 1.6, otherwise lateral load capacity shall be further reduced by the factor of μ_{eff} /1.6.
- NSEs with effective ductility capacity greater than 1.6, load rating, resistance factor is recommended to be taken as ϕ =0.9. Also, the recommended safety factor is Ω =1.67. Where μ_{eff} > 1.8, ϕ shall be permitted to be taken as, ϕ = 1.0 and Ω =1.5, as the additional ductility gives more reliable performance and hence a higher rated capacity.

Questions?

6. **Findings and Lessons Learned from the Turkey Earthquake**

   Facilitator: Ali Sumer, HCAI (or designee)

   - Observations on the performance of hospital buildings and other structures
   - Discussion and public input

2023 Turkey Earthquakes - Preliminary Findings for Hospitals

Ali Sumer and Maryann Phipps from EERI Learning from Earthquakes Hospital Team of
Gordon Wray, Bret Lizundia, Ricardo Henoch, Ali Roufegarinejad, Onder Akinci [Turkey: Volkan Kara, Yuksel Tonguc]

For Hospital Building Safety Board Meeting April 11, 2023

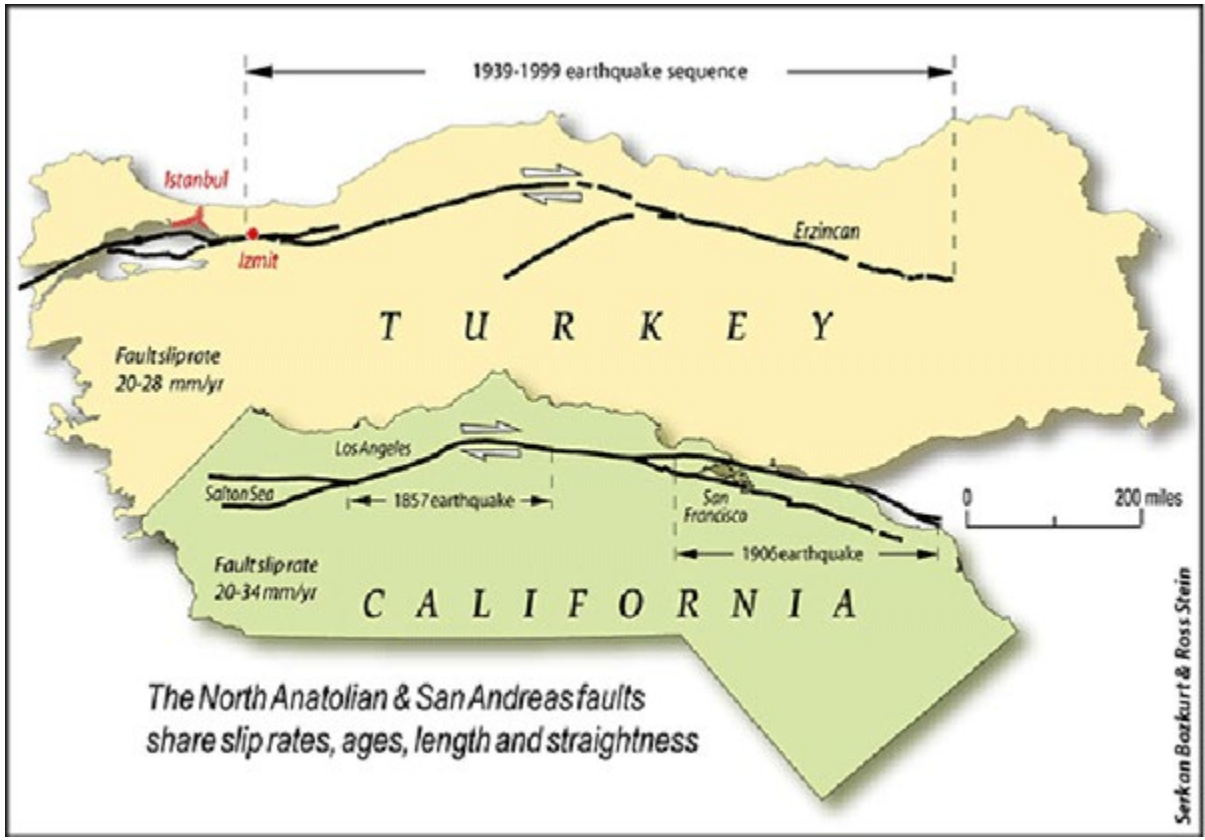
Presentation Overview

- Earthquake summary
- Purpose of the reconnaissance effort
- Hospital reconnaissance team
- What did we do?
- Types of construction
- Structural performance
- Nonstructural performance
- Performance of other building types
- Post-earthquake safety assessment
- Takeaways
- Resilience strategies

Osmaniye Government Hospita

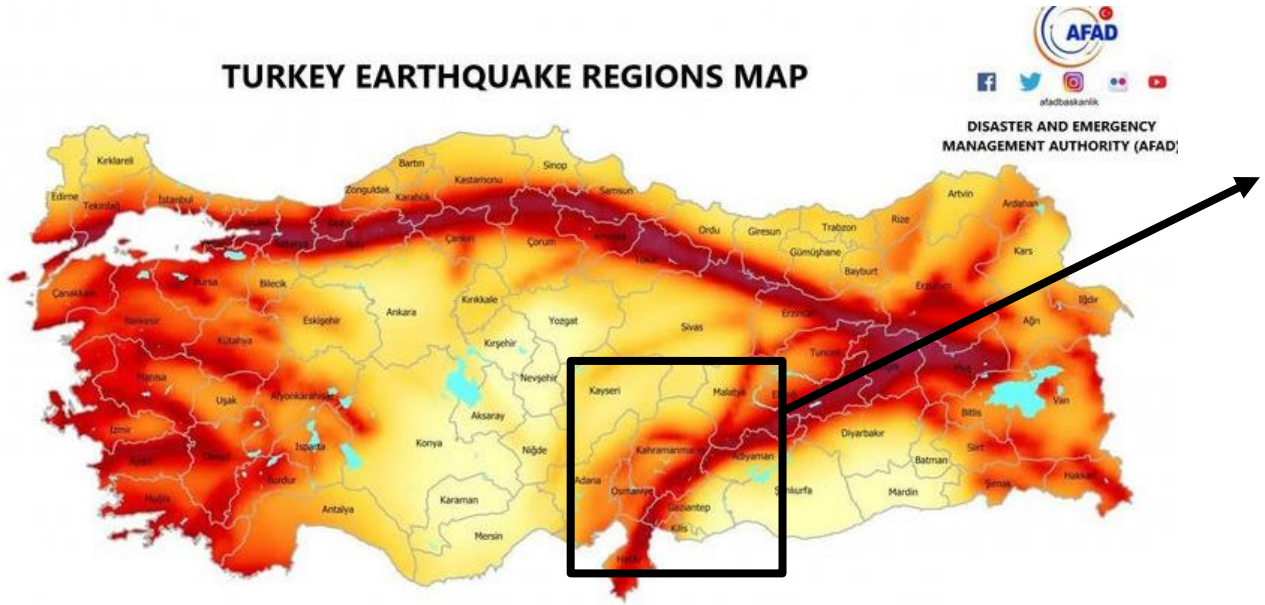

Hatay Egitim Ve Arastirma Hospital


TURKEY
Istanbul
Sioux Falls
Ankara
Chicago
Izmir
Denver
Adana
Washington, D.C.
North Atlantic Ocean
North Pacific Ocean
0 500 Km
0 500 Mi


1939-1999 earthquake sequence
Istanbul
Izmit
Erzincan
T U R K E Y
Fault slip rate
20-28 mm/yr
Los Angeles
Salton Sea
1857 earthquake
San Francisco
1906 earthquake
0 200 miles
Fault slip rate
20-34 mm/yr
C A L I F O R N I A
The North Anatolian & San Andreas faults
share slip rates, ages, length and straightness
Serkan Bozkurt & Ross Stein

EQ Summary

- 50,000+ deaths (BBC, 23 Feb 2023)
- Max. PGA: 1.23g first EQ; 0.65g second EQ (METU)
- East Anatolian Fault Zone



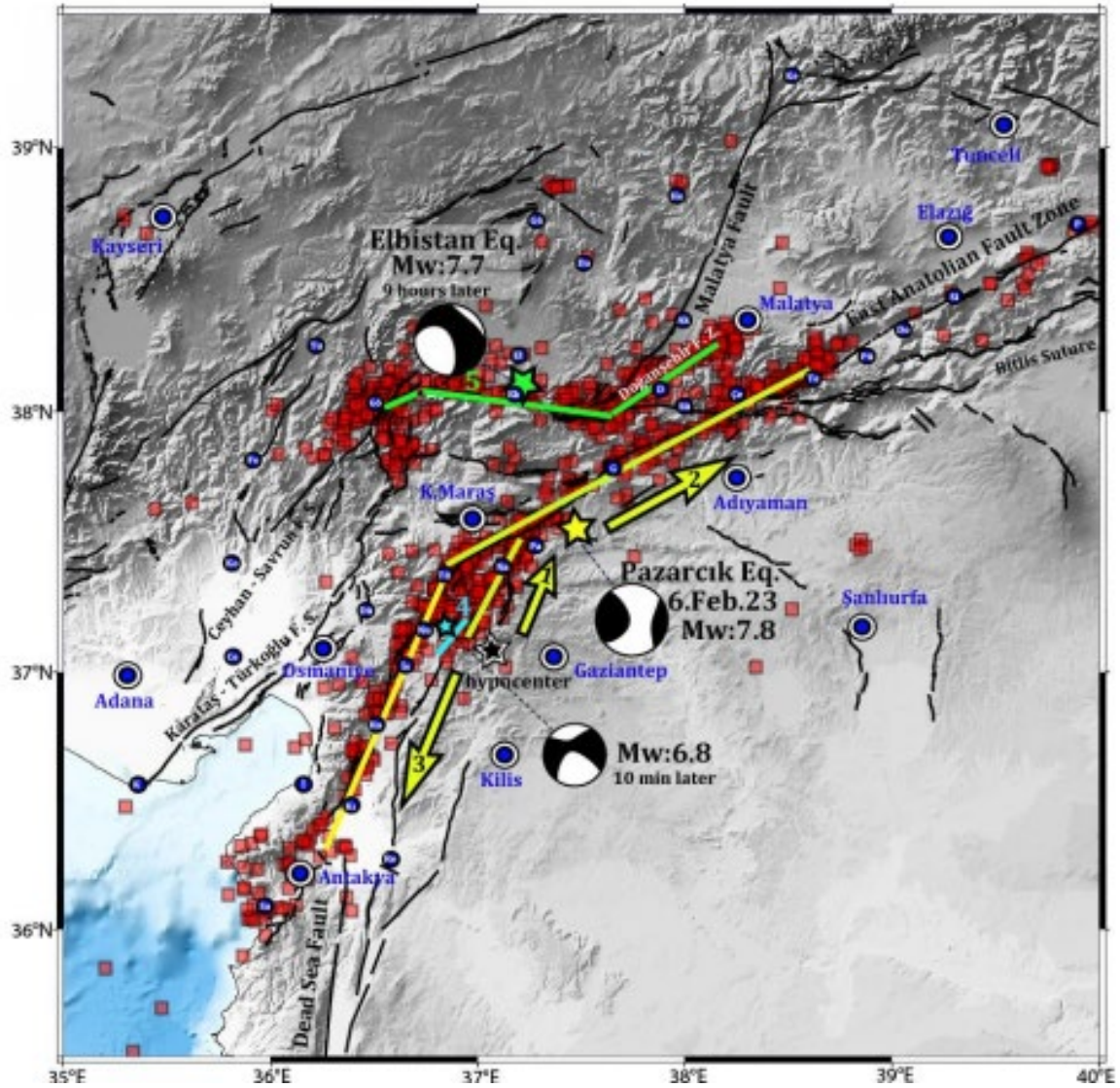
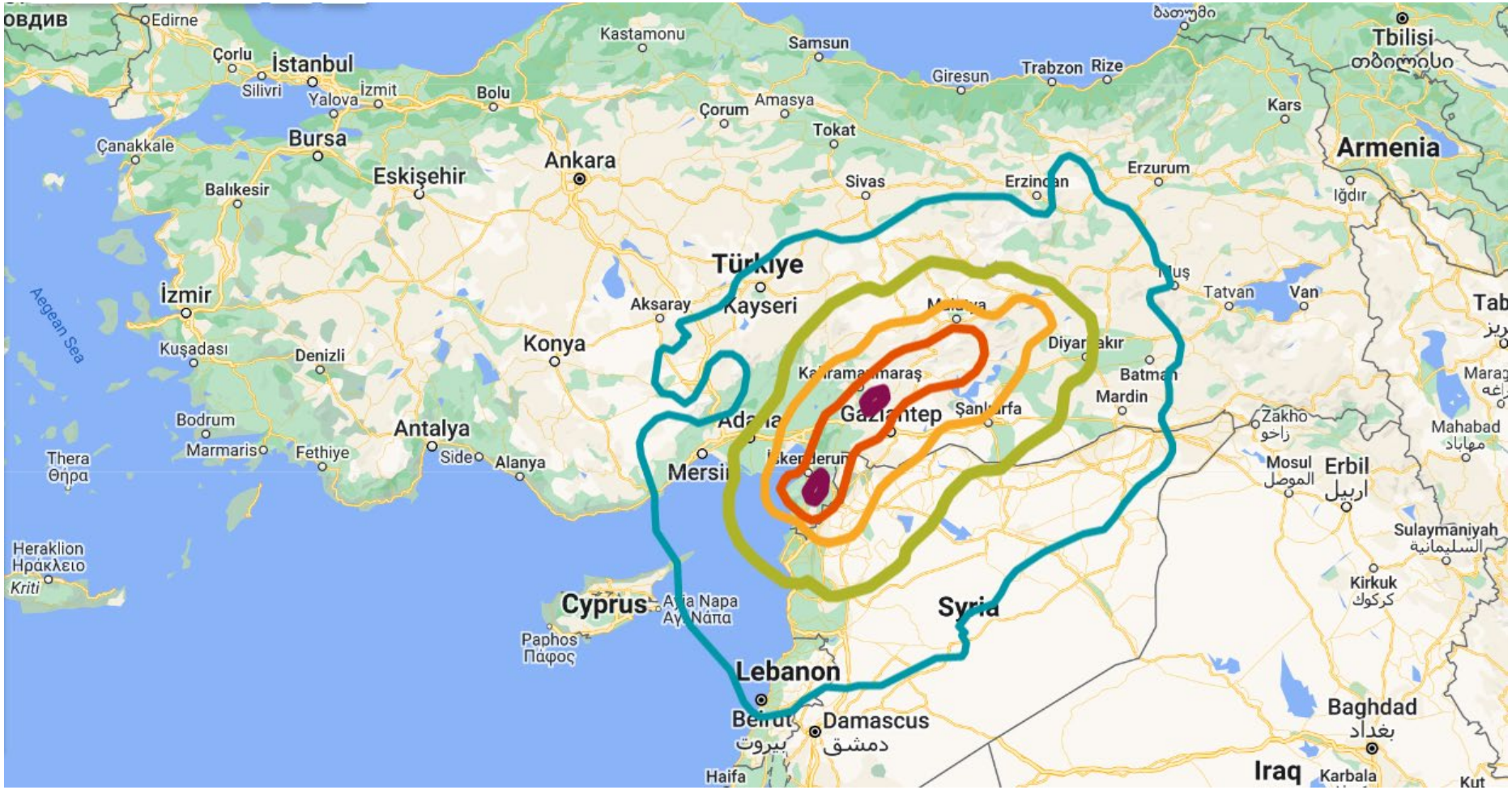
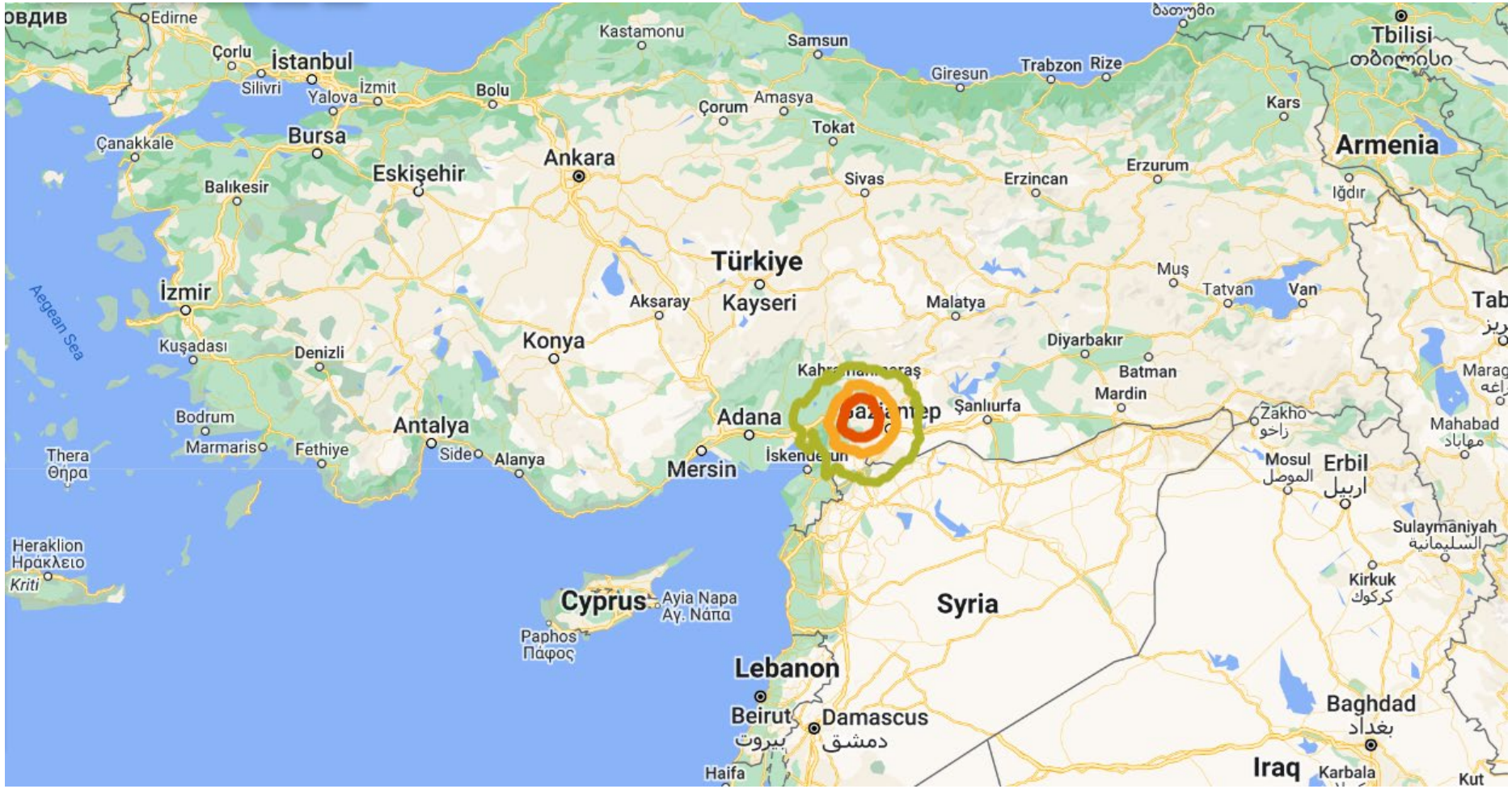


Image from 20 Feb 2023 Middle East Technical University Preliminary Reconnaissance Report

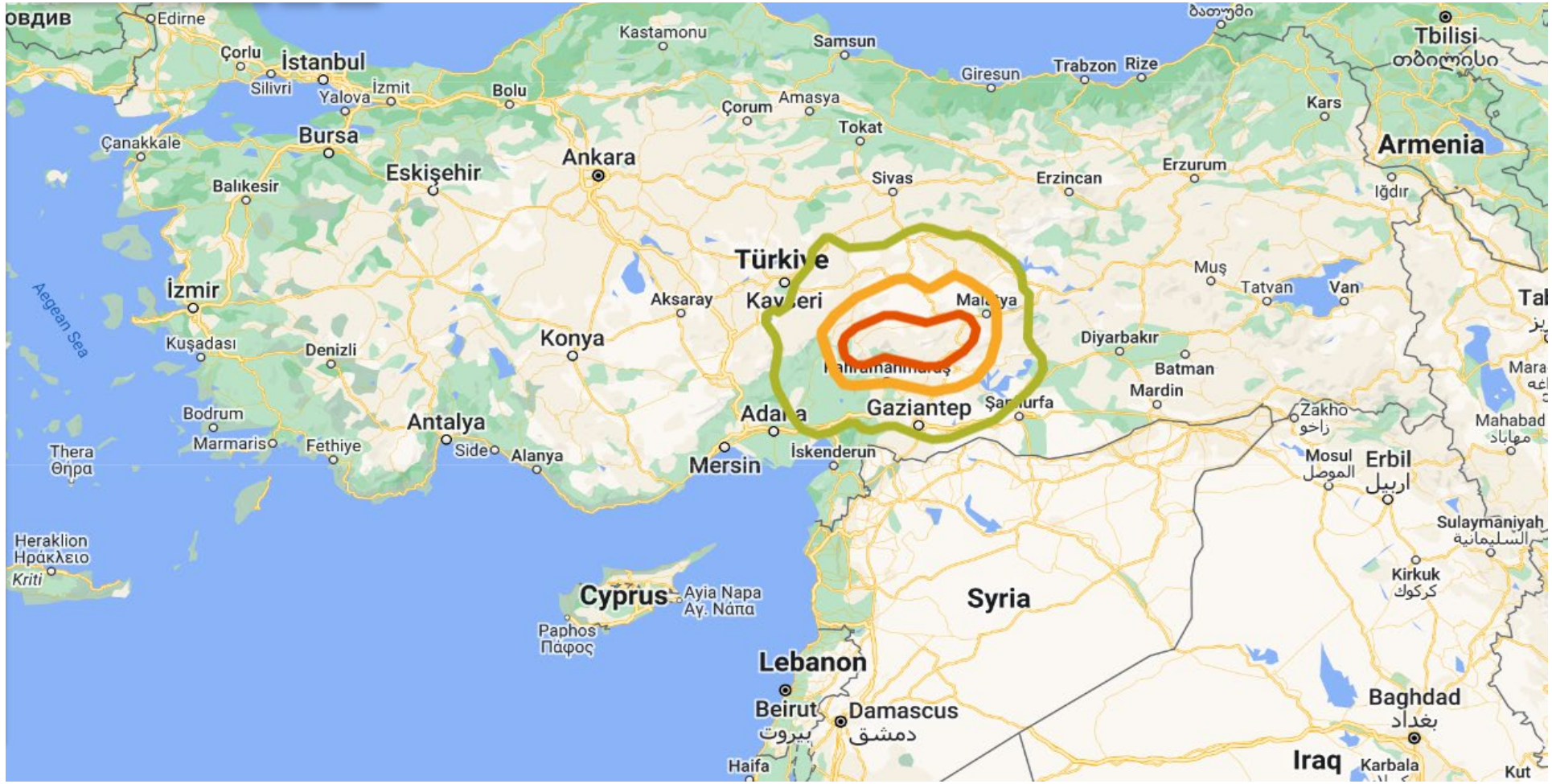
7.8 Magnitude Event - 4:17am Feb 6, 2023



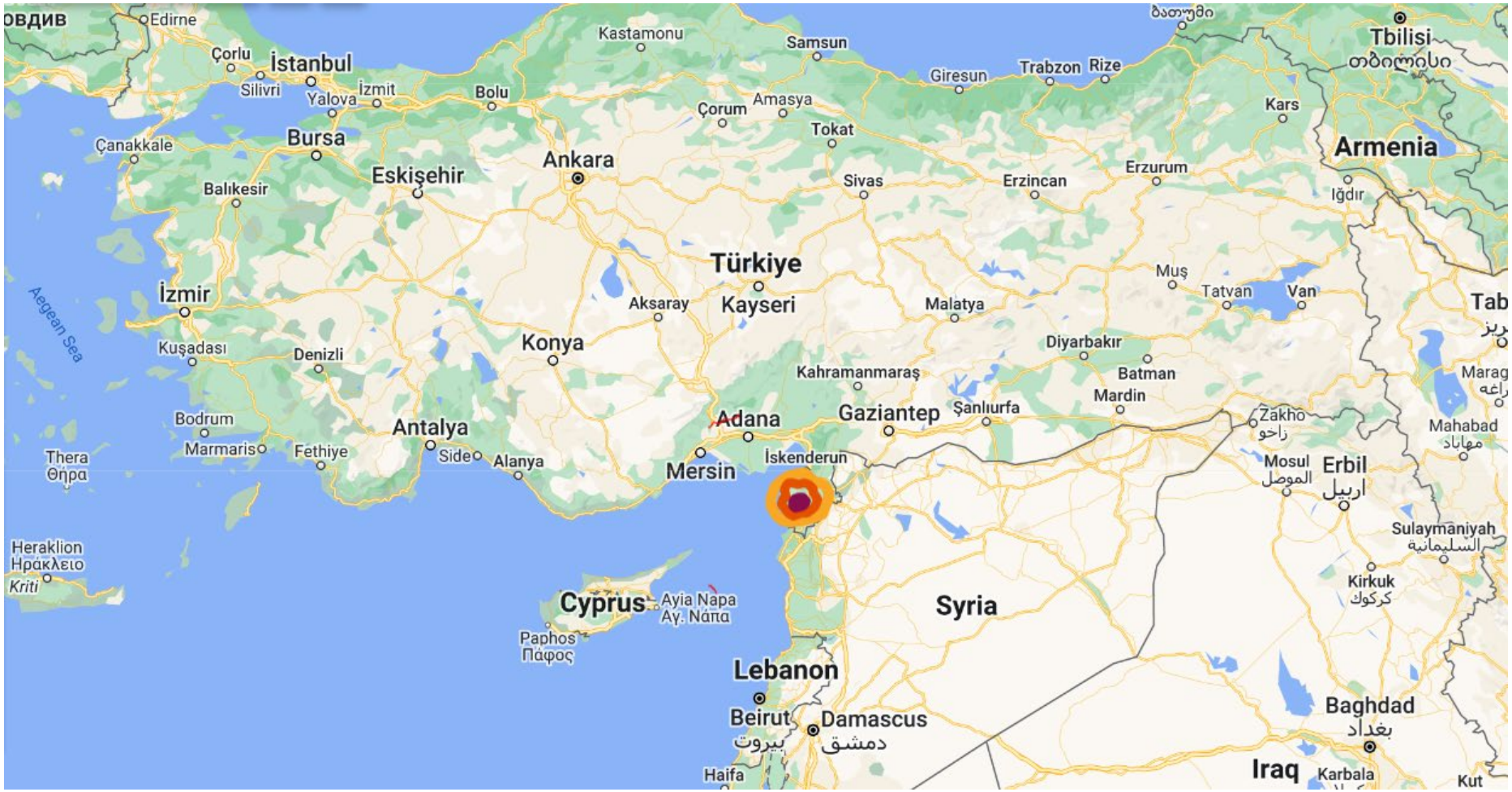
11 minutes later - 6.7 event, aftershock



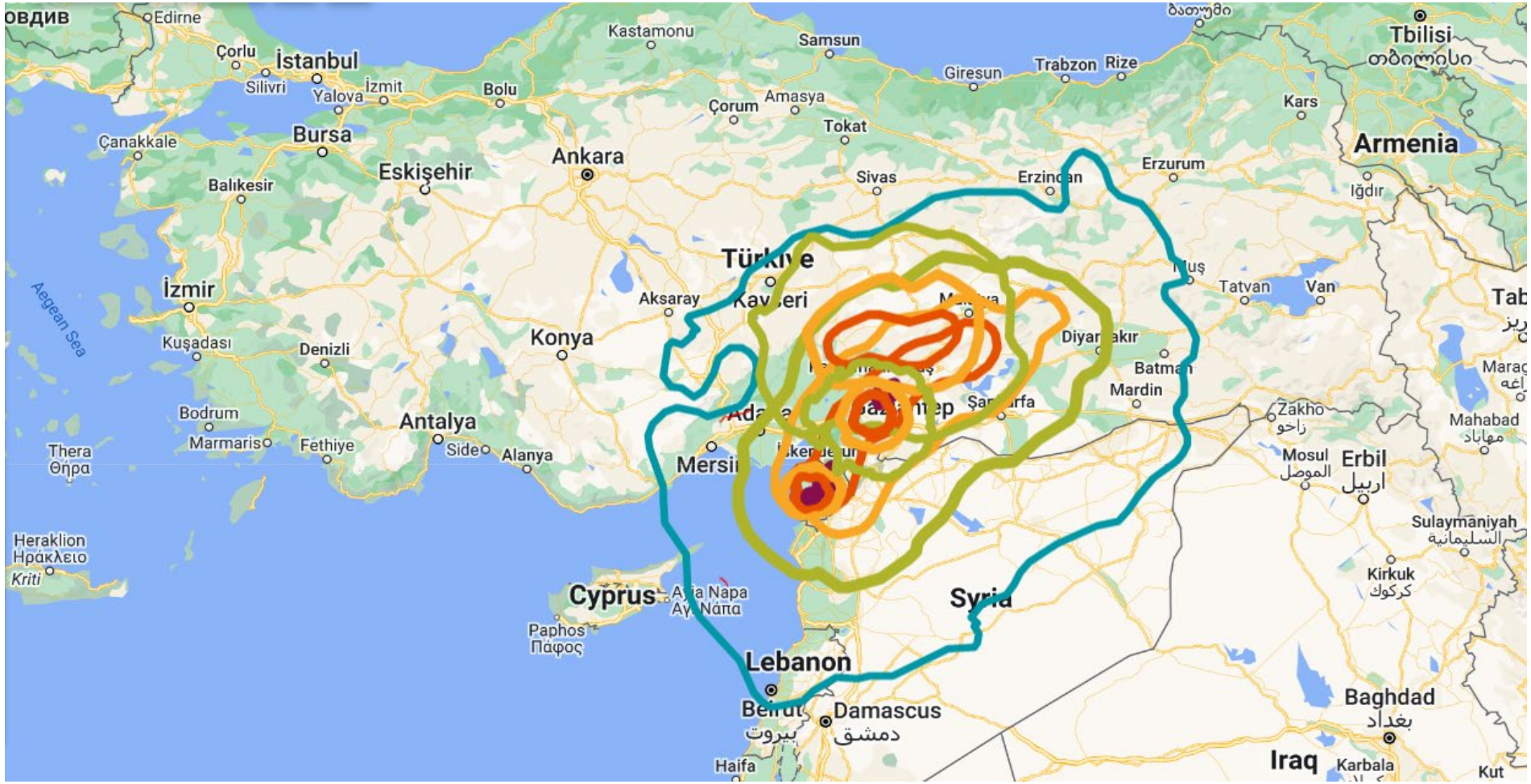
9 hours later – 7.5 magnitude event (the 2nd EQ)



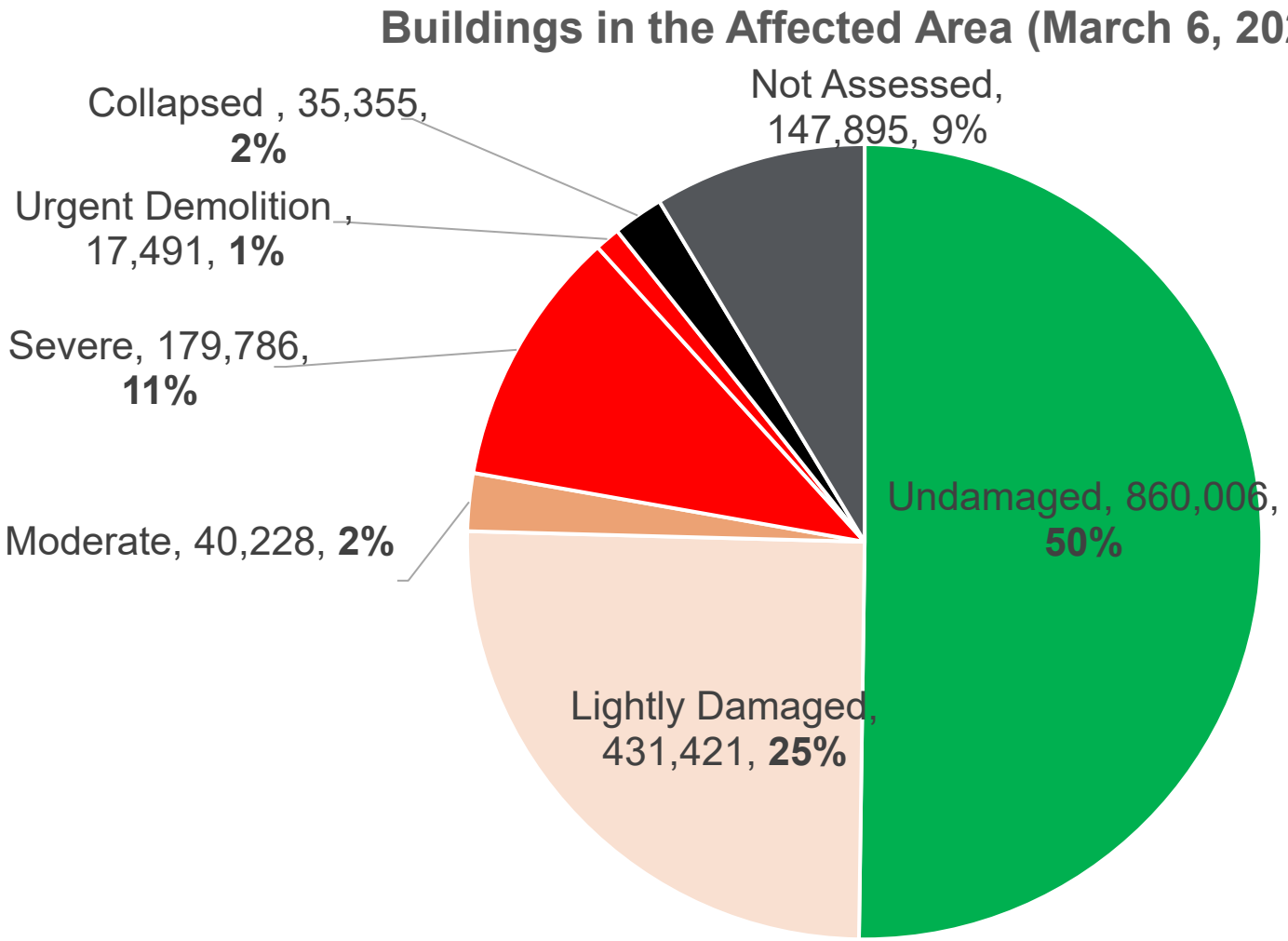
2 weeks later – 6.3 magnitude event



All 4 events combined



Building Damage Status (as of March 6, 2023)



Each building has multiple "housing units, houses"

Estimated 2.3 million people are in the moderate/severe/collapsed building categories.

$55 billion loss, and expected to be much higher.

- *Data source: Türkiye Earthquakes Recovery And Reconstruction Assessment Report Strategy and Budget Office (SBO) of the Presidency of the Republic of Türkiye*

Hospital Data

Province	Population*	# of Hospitals	Hospital Bed Capacity**	# of Beds per 10,000
Hatay	1,686,043	12	2,847	17
Kahramanmaraş	1,177,436	10	1,934	16
Adıyaman	635,169	10	1,184	19
Osmaniye	559,405	5	735	13
Malatya	812,580	12	1,733	21
Gaziantep	2,154,051	12	3,060	14
Adana	2,274,106	14	4,345	19
Diyarbakır	1,804,880	18	2,703	15
Elazığ	591,497	8	1,690	29
Kilis	147,919	2	635	43
Şanlıurfa	2,170,110	13	2,987	14
Region Total	14,013,196	116	23,853	17

*Source: Address Based Population Registration System, 2022

- Source: Türkiye Earthquakes Recovery And Reconstruction Assessment Report Strategy and Budget Office (SBO) of the Presidency of the Republic of Türkiye
- Source: Ministry of Health, *Includes Ministry of Health, University and Private Hospital data.

California had **18.7** General Acute Care beds per 10,000 people in 2021
https://www.kff.org/other/state-indicator/beds-by-ownership/

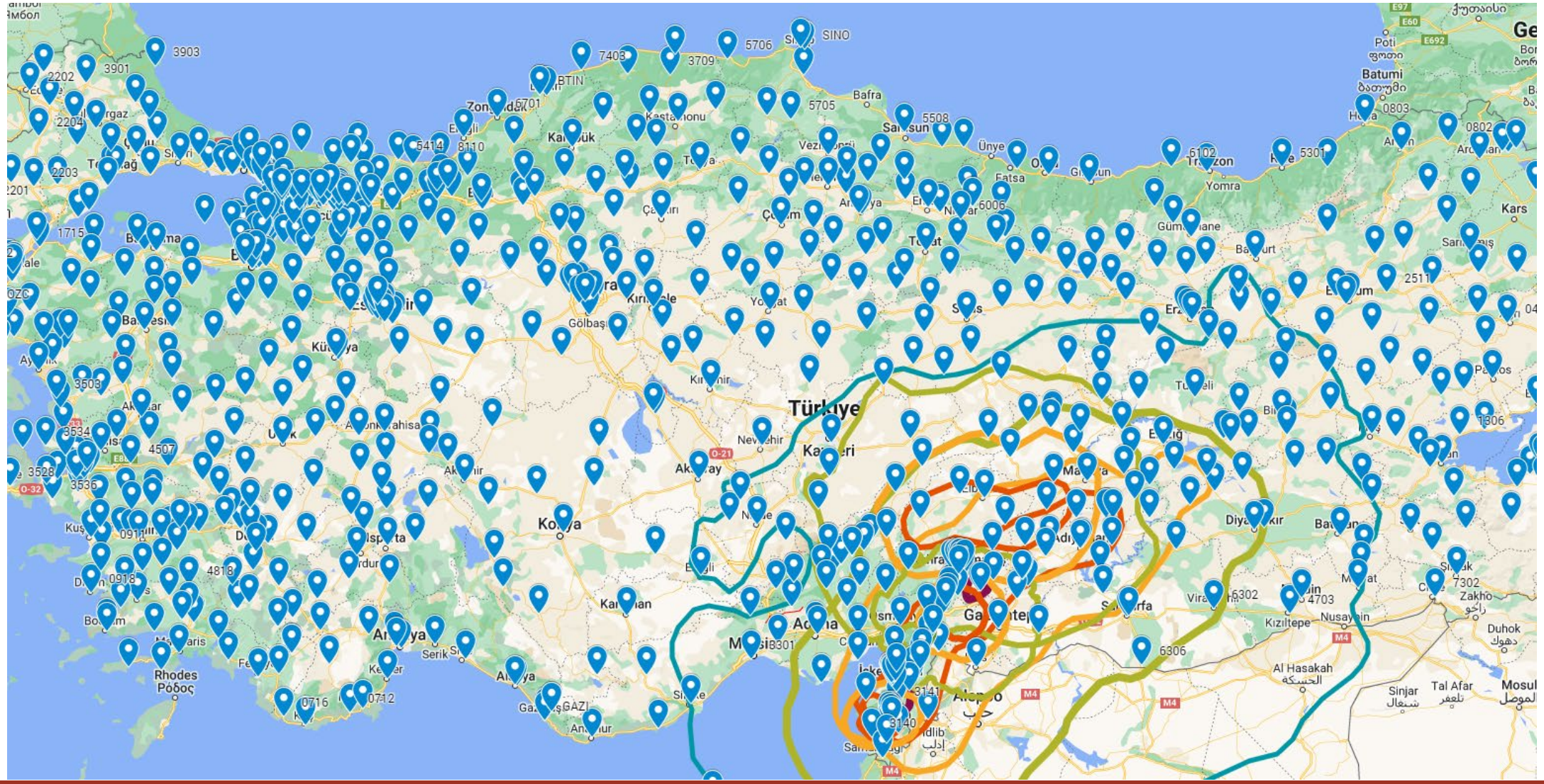
Official damage report

- Out of 116 hospitals in the region:

  - **Moderate/Severe damage**: 42 hospital buildings (27 Ministry of Health, 6 by universities and 9 by the private sector) *Source: Türkiye Earthquakes Recovery And Reconstruction Assessment Report Strategy and Budget Office (SBO) of the Presidency of the Republic of Türkiye*

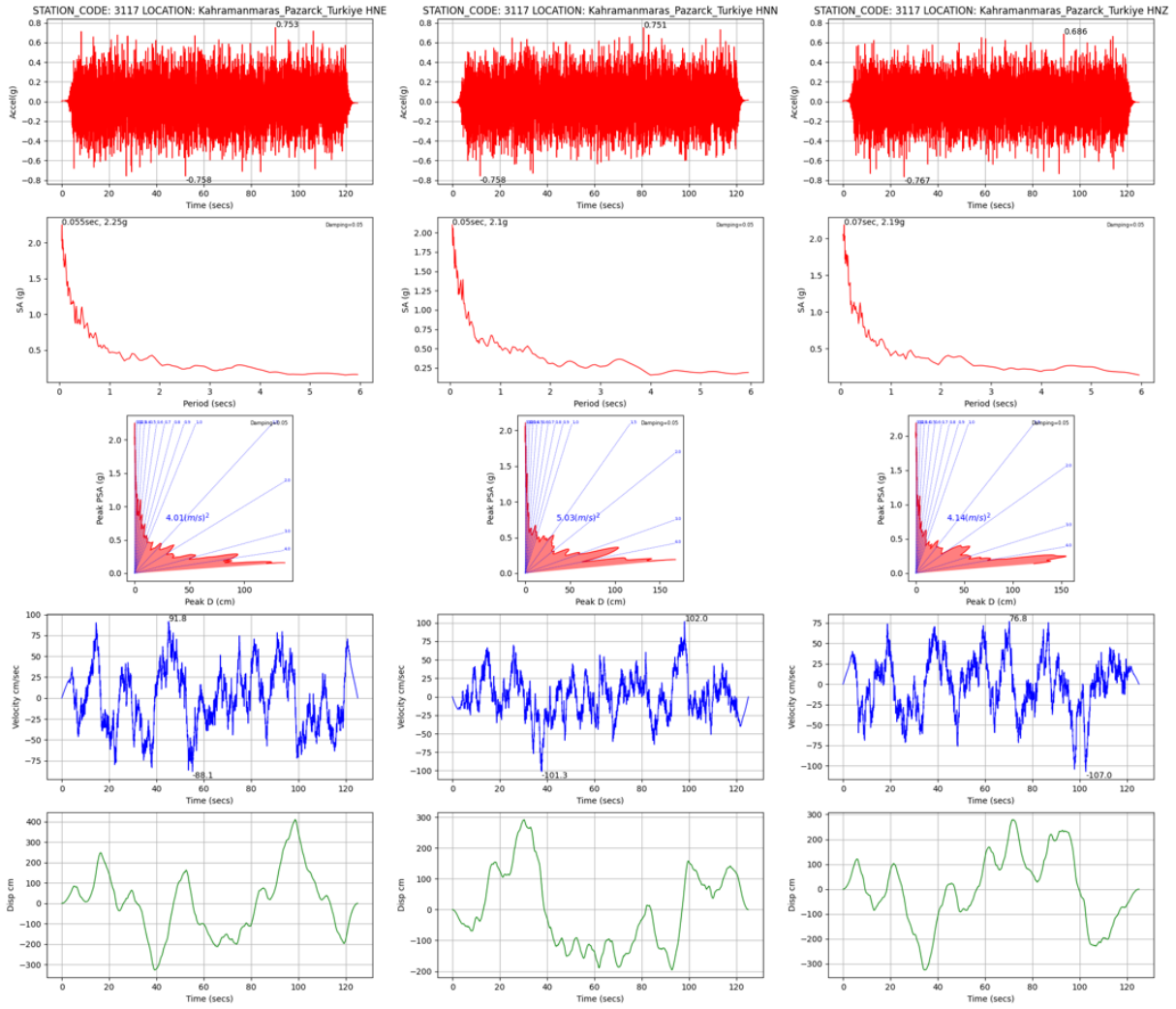
- *Please note: it is not clear if these numbers are counting campuses or individual seismic separate buildings.*

AFAD Seismic Stations



Ground Motion Analysis

- More to follow…



Purpose for the Reconnaissance Trip

From the Hospital Team Mission Statement:

- The 2023 Turkey Earthquakes provide an unprecedented learning opportunity due to the strong earthquake shaking affecting **modern engineered buildings** and the availability of a **large set of strong motion records**.
- The Hospital Reconnaissance Team will focus on both **structural and nonstructural performance of affected hospitals**. The team will collect data to identify what conditions allowed hospitals to continue to serve the community and which prevented the continuity of care. Of particular interest will be **learning the impediments to functional recovery**.
- The overarching goal of the reconnaissance is to **translate the observations and data into improved design and construction practices**. Many of the findings are expected to result in recommendations for changes to building codes, seismic design guidelines, and construction and inspection practices.

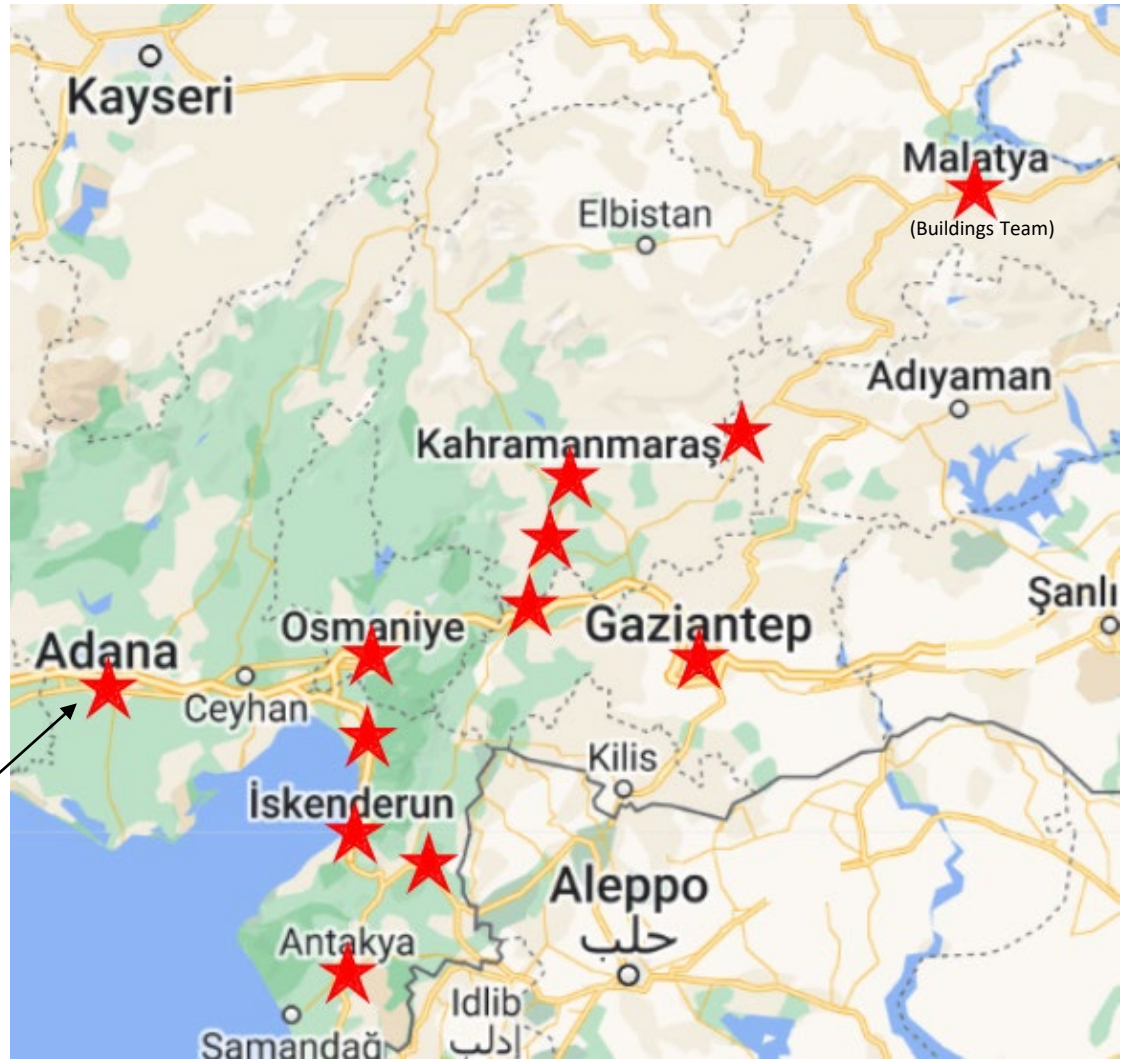
Hospital Team

- US
  - Ali Sumer, HCAI, Group Leader
  - Onder Akinci, SGH
  - Ricardo Henoch, SOM
  - Bret Lizundia, Rutherford + Chekene
  - Maryann Phipps, Estructure
  - Ali Roufegarinejad, Forell/Elsesser
  - Gordy Wray, Degenkolb
- Turkey
  - Volkan Kara, MD, Cerrahpaşa Medical School - İstanbul
  - Yuksel Tonguc, Promer Engineering, Ankara
- Lebanon
  - Mahmood Hachem

What Did We Do?

- Where did we go?

Our home base



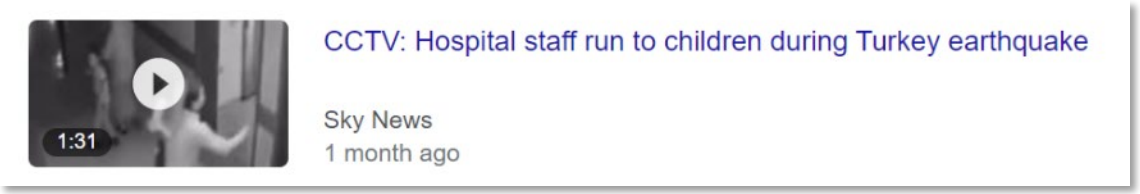
What Did We Do?

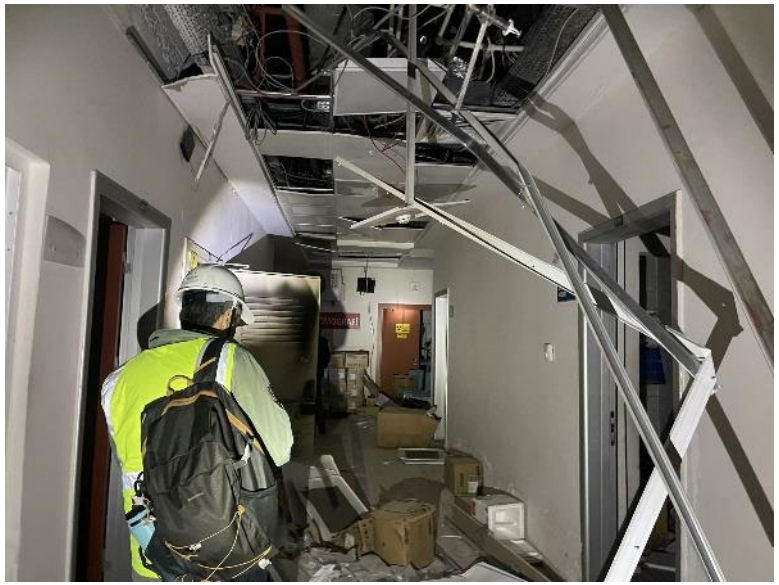
- Collected info from 33 hospitals in the earthquake region
- Various hospital sizes small, medium, large
- Private, government, university hospitals
- Fixed base, base isolated
- Various construction year
- Visited ground motion record station, correlating record vs surrounding damage.

- The Hospital team is currently working on analyzing the data.

What Did We Do?

- What did we do?
  - Internet searches
  - Drive by
  - Walk by
  - Inside visit
  - Interviews





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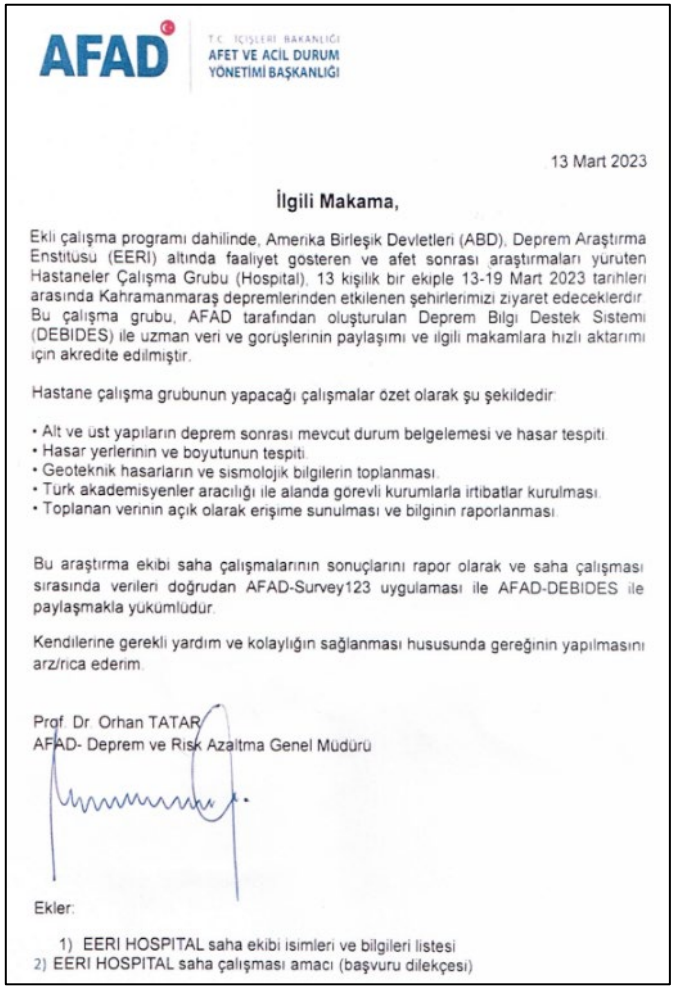


AFAD

T.C. İÇİŞLERİ BAKANLIĞI
AFET VE ACİL DURUM
YÖNETİMİ BAŞKANLIĞI

13 Mart 2023

İlgili Makama,

Ekli çalışma programı dahilinde, Amerika Birleşik Devletleri (ABD), Deprem Araştırma Enstitüsü (EERI) altında faaliyet gosteren ve afet sonrası araştırmaları yuruten Hastaneler Çalışma Grubu (Hospital), 13 kişilik bir ekiple 13-19 Mart 2023 tarihleri arasında Kahramanmaraş depremlerinden etkilenen şehirlerimizi ziyaret edeceklerdir. Bu çalışma grubu, AFAD tarafından oluşturulan Deprem Bilgi Destek Sistemi (DEBIDES) ile uzman veri ve goruşlerinin paylaşımı ve ilgili makamlara hızlı aktarımı için akredite edilmiştir.

Hastane çalışma grubunun yapacağı çalışmalar özet olarak şu şekildedir:

- Alt ve üst yapıların deprem sonrası mevcut durum belgelemesi ve hasar tespiti.
- Hasar yerlerinin ve boyutunun tespiti.
- Geoteknik hasarların ve sismolojik bilgilerin toplanması.
- Türk akademisyenler aracılığı ile alanda görevli kurumlarla irtibatlar kurulması.
- Toplanan verinin açık olarak erişime sunulması ve bilginin raporlanması.

Bu araştırma ekibi saha çalışmalarının sonuçlarını rapor olarak ve saha çalışması sırasında verileri doğrudan AFAD-Survey123 uygulaması ile AFAD-DEBIDES ile paylaşmakla yükümlüdür.

Kendilerine gerekli yardım ve kolaylığın sağlanması hususunda gereğinin yapılmasını arz/rica ederim.

Prof. Dr. Orhan TATAR
AFAD- Deprem ve Risk Azaltma Genel Müdürü

Ekler:

1) EERI HOSPITAL saha ekibi isimleri ve bilgileri listesi
2) EERI HOSPITAL saha çalışması amacı (başvuru dilekçesi)

Structural Systems

- Fixed base and seismically isolated
- Lateral force-resisting systems: RCSW and RCMF with stiff, heavy infill partitions
- Gravity load-carrying systems: Flat plate, waffle, one-way joists with HCT (Hallow Clay Tile) left-in-place forms
- Foundations: Mats, spread footings, deep foundations in some cases
- Seismic joints: Common between wings

- Majority of hospital buildings that we visited are built in the last ~ 20 years.

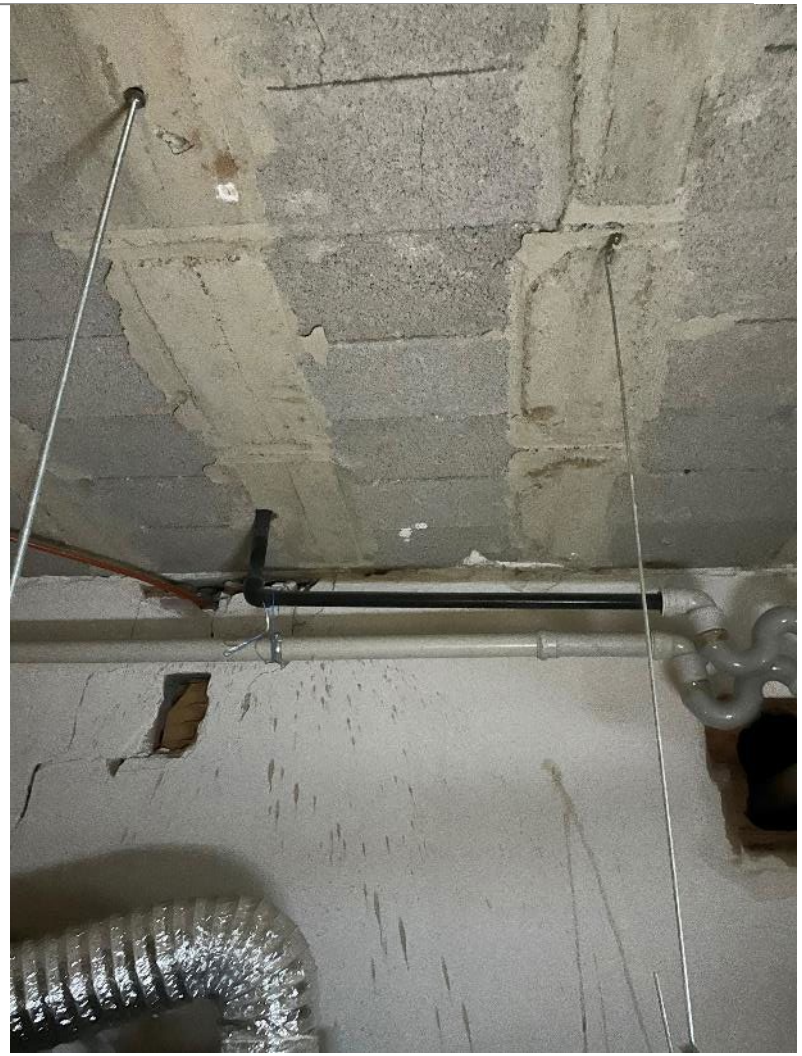
Structural Systems – Fixed Base

Belen Government Hospital
RC shear wall
PGA: 0.46 g
PGV: 55cm/s

Pazarcik Government Hospital
RC shear wall on 550 piles
Separated by seismic joints into 5 structures
PGA: 2.38 g (under review)
PGV: 94 cm/s

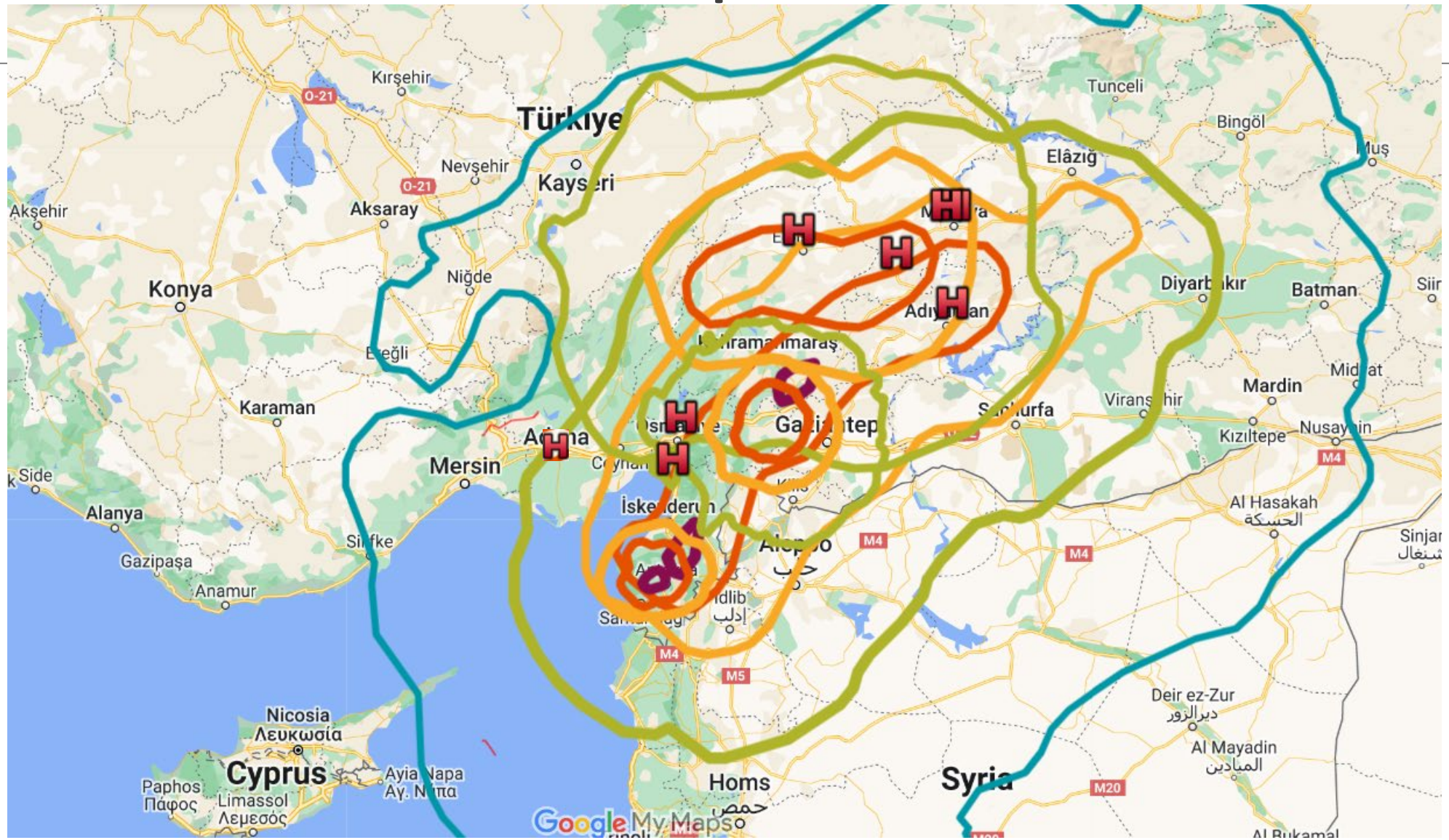
Structural Systems – Superstructure

Iskenderum Gelisim Hospital



Palmiye Hospital
Iskenderun
Ribbed Floor Slab

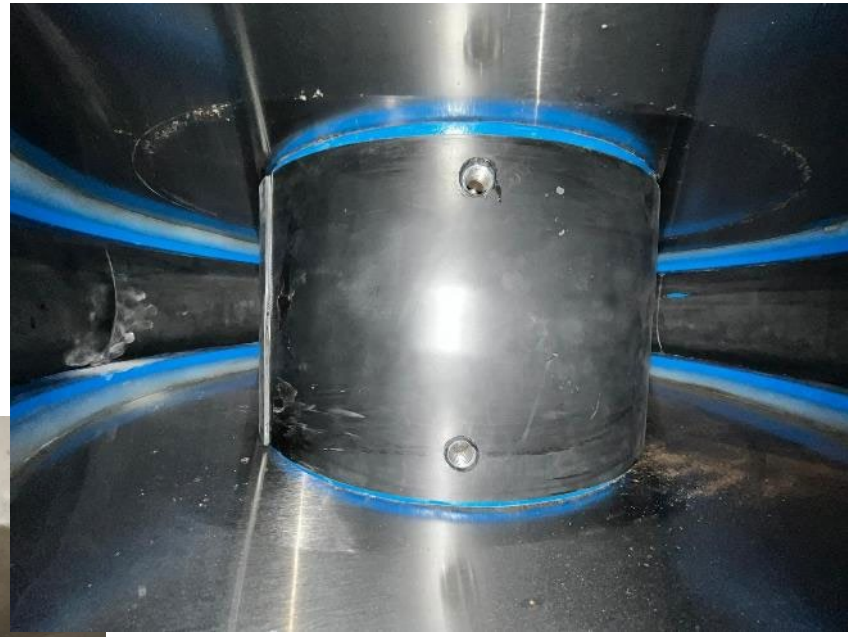
Base Isolated Hospitals - in the area



Structural Systems - Seismically Isolated

Kahramanmaras Necip Fazil Hospital
Under Construction

Dortyol Government Hospital

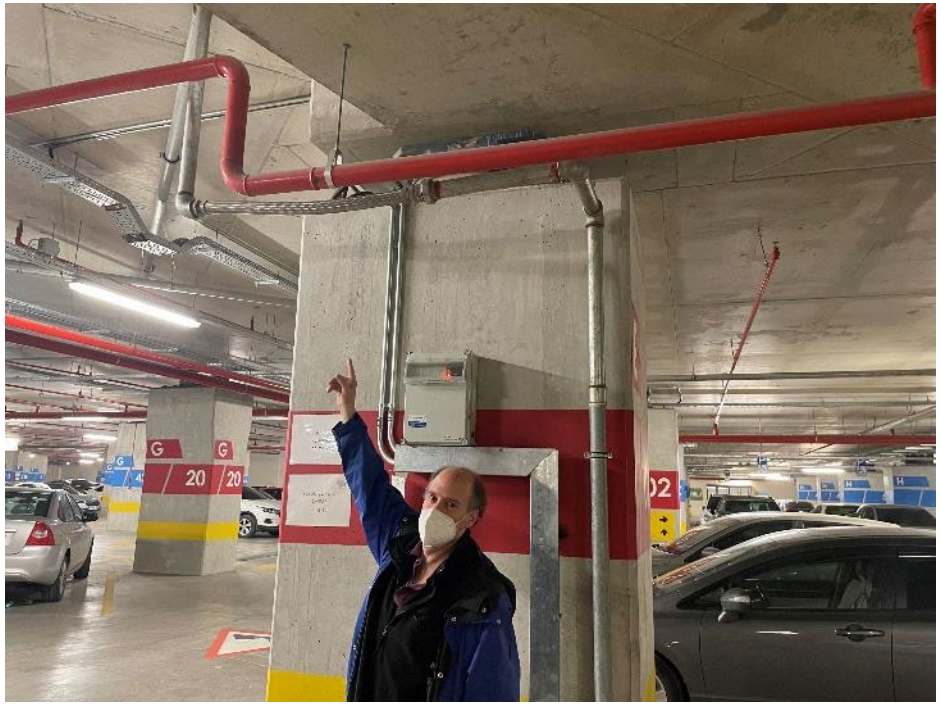


Adana City Hospital
Triple friction pendulum articulated slider (puck) quality assurance testing path appears visible.
EQ movement was inside slider.

Structural Systems - Seismically Isolated

Osmaniye Government Hospital
Moat gap filled with gravel

Adana City Hospital
Sidewalk crosses the moat cover



Adana City Hospital
Flex connection provided for piping but does not have axial extension capability for isolator movement

Structural Performance – General

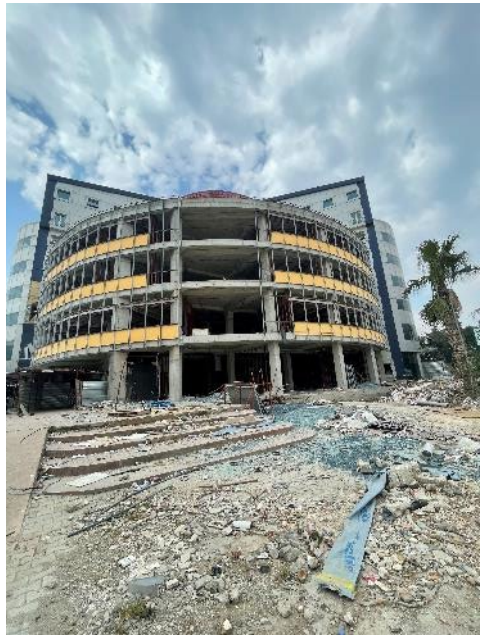
- General: Structural damage to hospitals was typically fairly limited, particularly in newer hospitals.
- Shear walls: Diagonal tension cracking and horizontal cracks at construction joints.
- Infill: Heavy, stiff infill at exterior and interior participated in resisting load and had light to severe cracking and spalling, with out-of-plane failure.
- Columns and beams: Limited damaged observed.
- Concrete stairs: Slip joints not observed, and stairs resisted load and failed in some cases.
- Foundations: Some rocking on shallow foundations and settlement around perimeter of pile supported buildings.

Structural Performance – Fixed Base

Megapark Hospital in Kahramanmaras
Infill damage and poor concrete frame quality, but no significant frame damage visible

Pazarcik Government Hospital
Soil settlement around perimeter of pile-supported hospital

Structural Performance – Fixed Base



Ozel (Private) Defne Hospital
Antakya

Structural Performance – Fixed Base

New School (finished construction a day before the earthquake)

Buildings across the street from one another in Antakya

Auxiliary Building

Hatay Egitim Ve Arastirma Hospital Main Building
(After rescue and demo)

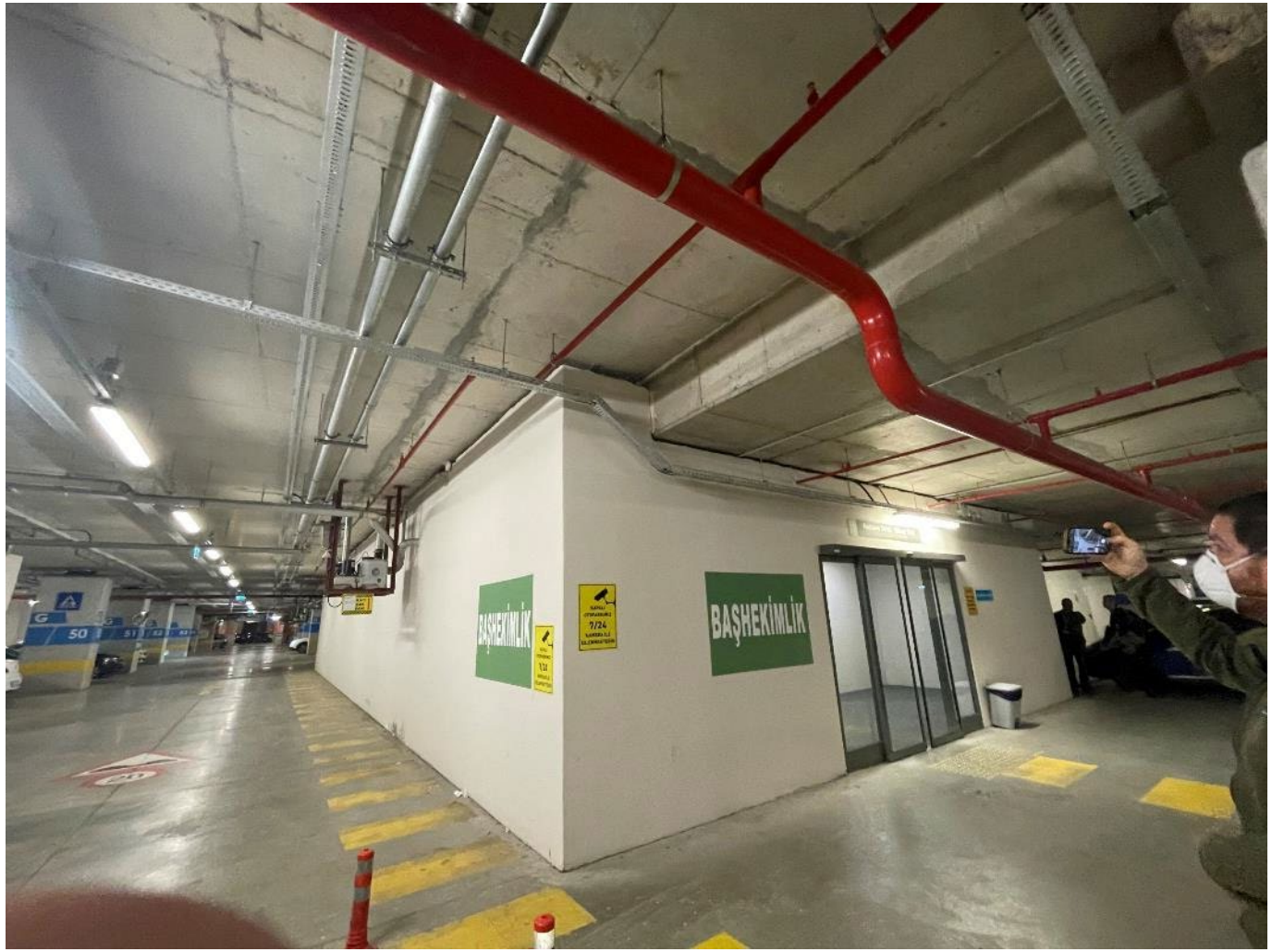
Structural Performance – Isolated

- Seismically isolated buildings
  - Generally good performance with some partition cracking, but buildings remained functional
  - EPS triple friction pendulum and TIS double friction pendulum observed
  - Slip occurred, but it can be difficult to ascertain in lower levels of shaking. Scratch plates help, but have limitations on distinguishing main shock vs. aftershock vs. construction scratches.
  - Many examples of no fly zone and moat gap being compromised.

Osmaniye Government Hospital
Scratch Plate

Structural Performance – Isolated

- Main entrance from parking garage to lower story of hospital.
- Partitions are supported by mat.
- Isolators are on top of columns, so plane of isolation is just under slab.
- Partition short circuits at left side. It was damaged and repaired without correcting the issue.
- Similarly, pipes connected to slab go through the partition with no ability to move freely. Partition was damaged and repaired without correcting the issue.



Adana City Hospital

Isolation Example – Adana City Hospital

- Partition cracking, but no loss of function
- Slip in first EQ, but not second EQ, likely
- Superstructure amplification at roof vs just above isolator: about 3 (fixed & iso)
- Even though EQ1 had 5 times PGA, isolation kept roof PFA only 1.4 times larger than EQ2

http://www.imr.com.tr/en/adana-city-hospital/#!

Adana City Hospital Strong Motion Records					
Level	Dir.	Q1 M =7.8		2 M_w=7.5	
		PFA	A/A	A	PFA/PGA
Roof	North	0.123	1.0	0.090	7
	East	0.149	1.3	0.110	4
	Vertical	0.034	1.4	0.024	1
Just abov isolats	North	0.034	0.3	0.022	2
	East	0.031	0.3	0.023	9
	Vertical	0.027	1.0	0.022	0
Just bel isolats at M (PG	North	0.122	--	0.019	
	East	0.115	--	0.025	
	Vertical	0.025	--	0.022	

Lifelines / Utilities:

- Electricity

  Power outage in Hatay, Kahramanmaras, Adiyaman, Gaziantep
  Electricity was partially restored after 1 – 7 days
  Electricity was restored in parts of Kahramanmaras within 1 day.
  (Source: METU Preliminary Reconnaissance Report)

- Water:

  Water outage (Hatay, Kahramanmaras), partially restored after few days – few weeks

- Gas:

  Gas was not resupplied due to safety concerns (as of 1 month)

- Communication

  Mobile partially functional, restored quickly

Nonstructural Performance

- Cladding
- Partitions
- Ceilings
- Egress
- Equipment
- Distributions Systems
- Medical Equipment
- Furnishings and Contents

Nonstructural Performance

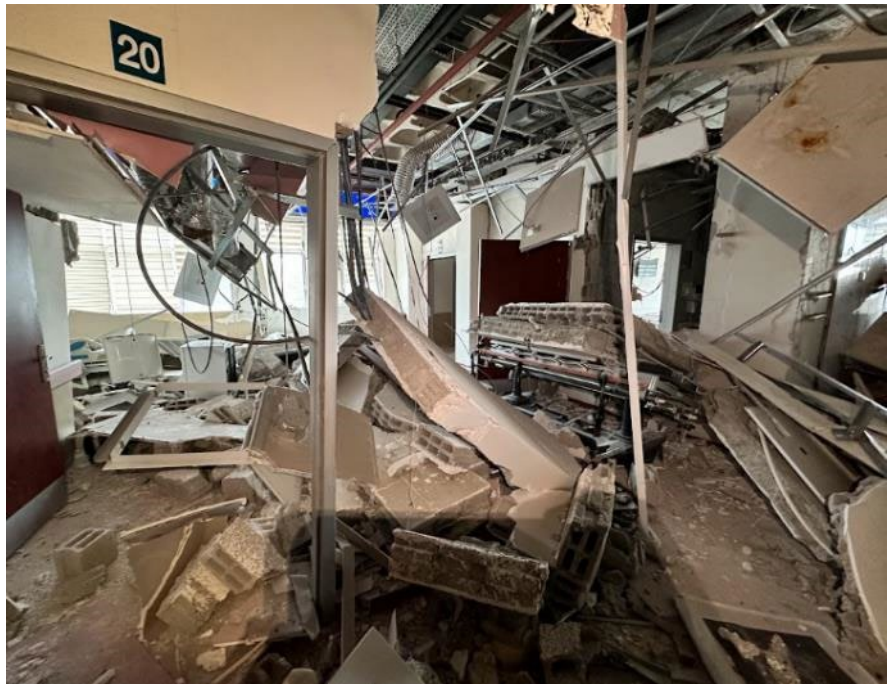
- Cladding

Nonstructural Performance

- Cladding

Nonstructural Performance

- Partitions



Nonstructural Performance

- Ceilings

Nonstructural Performance

- Egress

Nonstructural Performance

- Egress

Nonstructural Performance

- Equipment

Nonstructural Performance

- Equipment

Nonstructural Performance

- Equipment



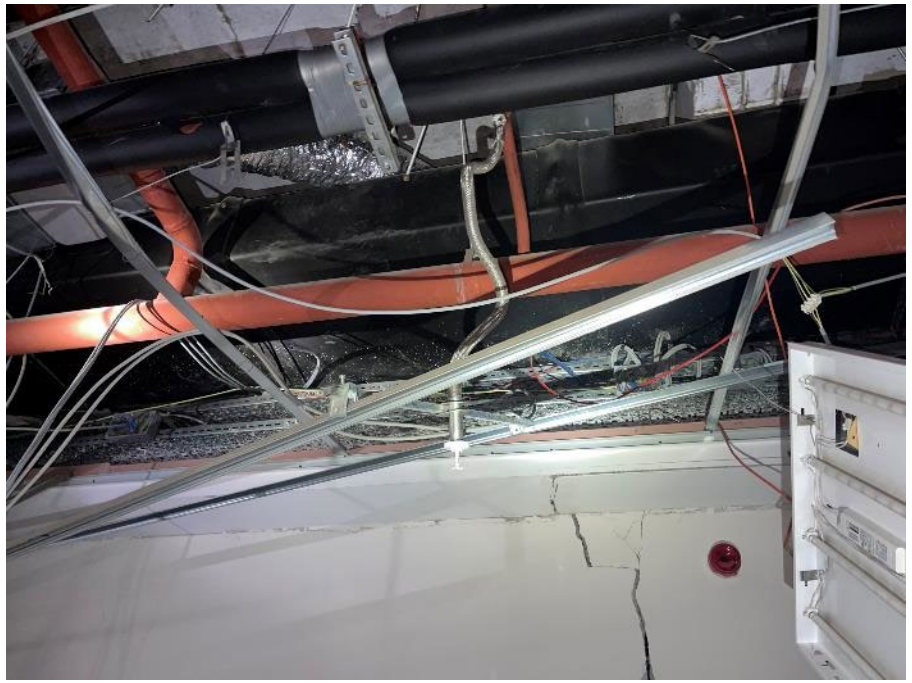



Nonstructural Performance

- Equipment

Nonstructural Performance

- Distribution Systems



Nonstructural Performance

- Medical Equipment

Nonstructural Performance

- Medical Equipment

Nonstructural Performance

- Medical Equipment

Nonstructural Performance

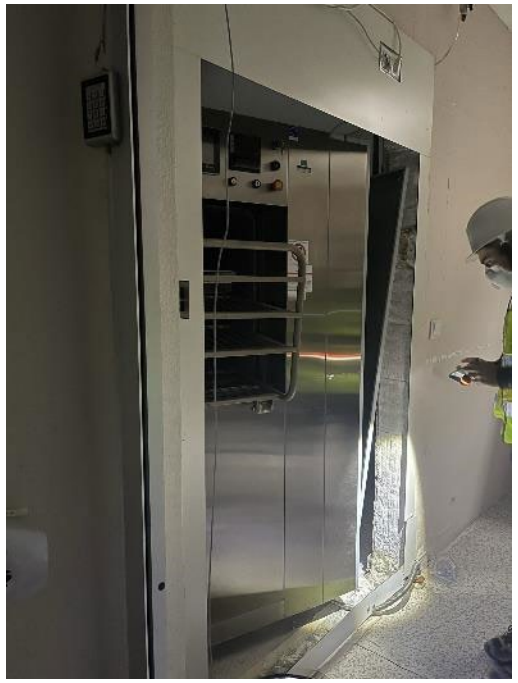
- Medical Equipment

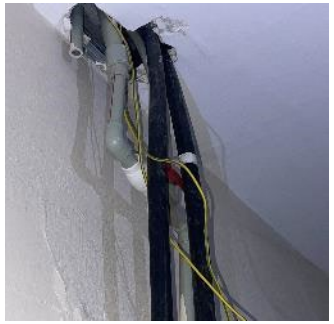
Nonstructural Performance

- Medical Equipment

Nonstructural Performance

- Medical Equipment





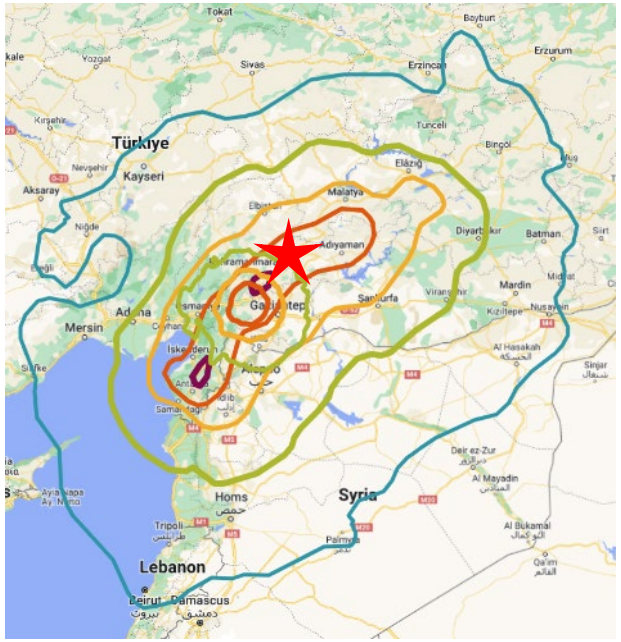
Nonstructural Performance

- Medical Equipment

Nonstructural Performance

- Furnishings and contents

Nonstructural Performance Example



Pazarcik Government Hospital
- Built 2020
- 125 Beds
- Fixed Base

PGA =

PGV =

Nonstructural Performance Example

Pazarcik Government Hospital
- 1 out of 3 generators worked
- Bulk oxygen was damaged and repaired
- Internal data services went down

Nonstructural Performance Example

Pazarcik Government Hospital
Ceilings and partitions were heavily damaged
Cabinets and furnishings were toppled
Medical equipment was generally okay

- Hospital was evacuated except for emergency dept.
- Hospital tents set up for triage and treatment.
- After 10 days clinics were opened on ground floor.
- Upper floors under repair Week 6.

Not quite NPC2 performance

Post-earthquake Safety Assessment

- Evaluation by volunteers, government engineers, university students
- Typically, there are no placards on the building. Status is listed on a public website.
- Hospitals were handled by special government evaluators, working with the Ministry of Health.

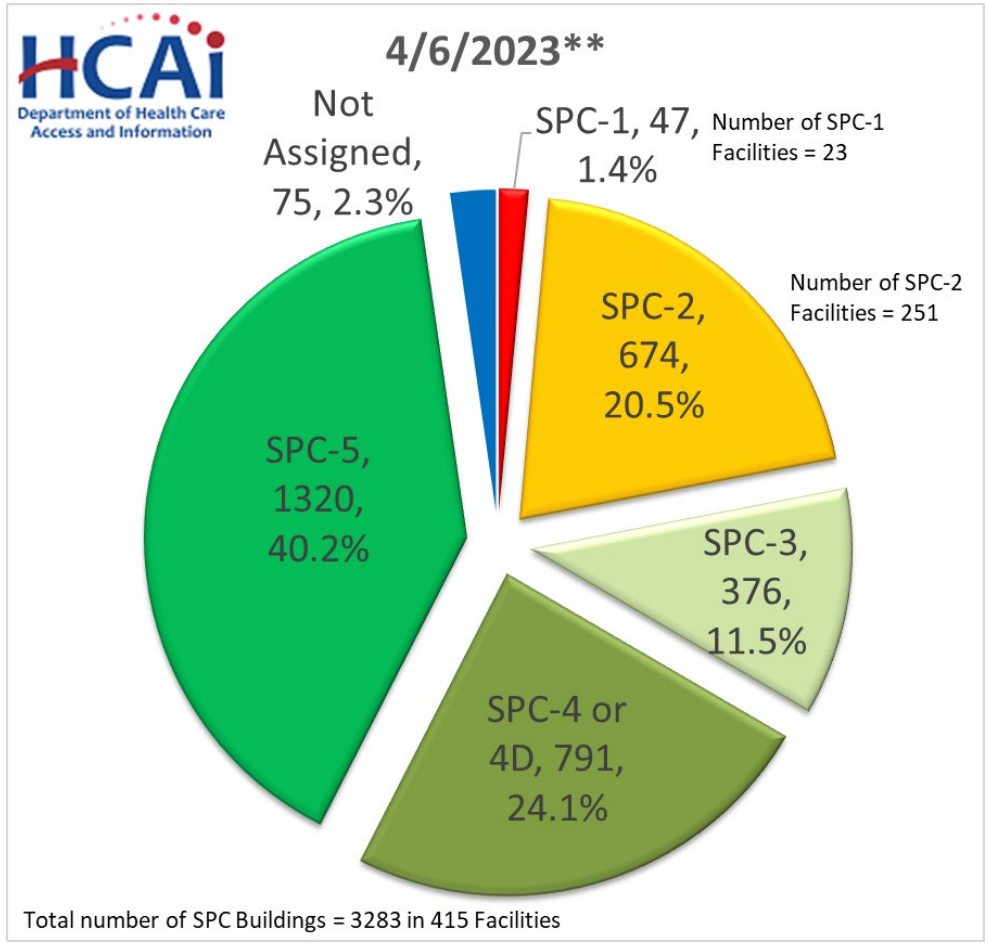
Apartment in Iskenderun

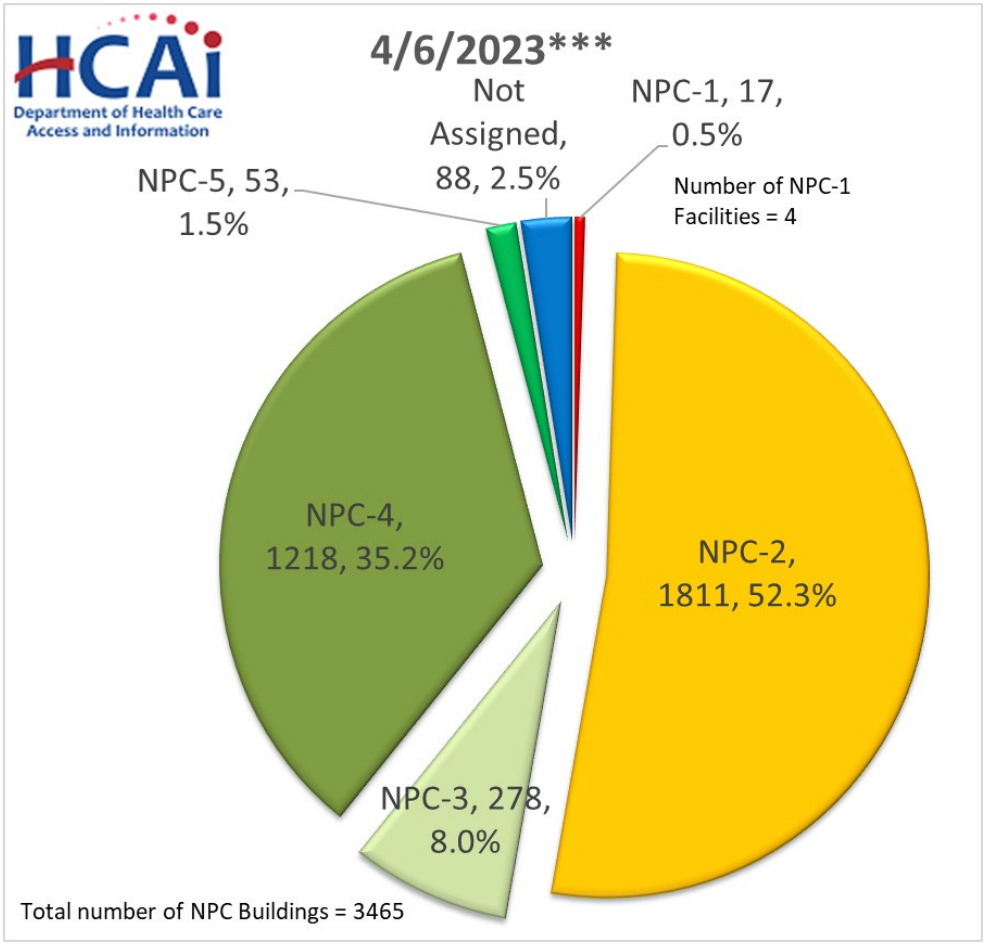
Shear Wall Damage

City Safety Evaluators and Tablet with GIS

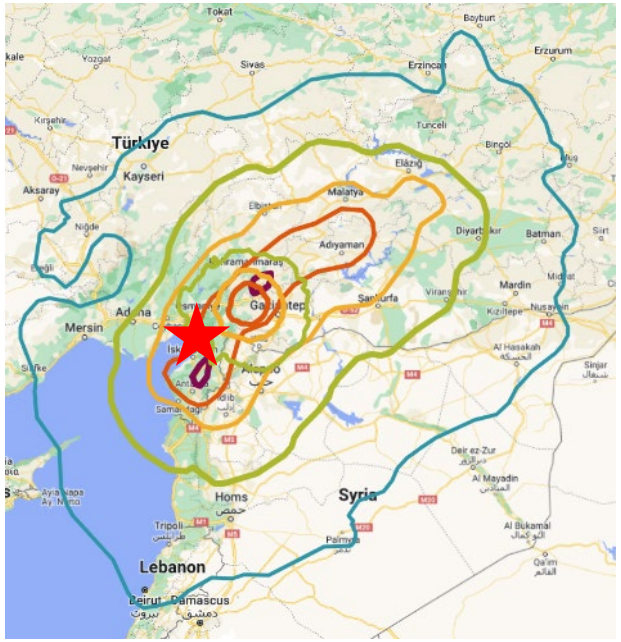
Reflections

- What does it mean for California?





Structural Performance Example



Iskenderun Government Hospital

PGA =

PGV =

1968 Concrete Building

2005 Concrete Building

2020 Steel Building

Structural Performance Example

2005 Building

1968 Building

2020 Building

1968 Concrete Building
COLLAPSED

2005 Concrete Building
EVACUATED

2020 Steel Building
Shelter/Limited function

Structural Performance Example

2005 Building
125 Beds

1968 Building

2020 Building

SPC1
1968 Concrete Building
COLLAPSED

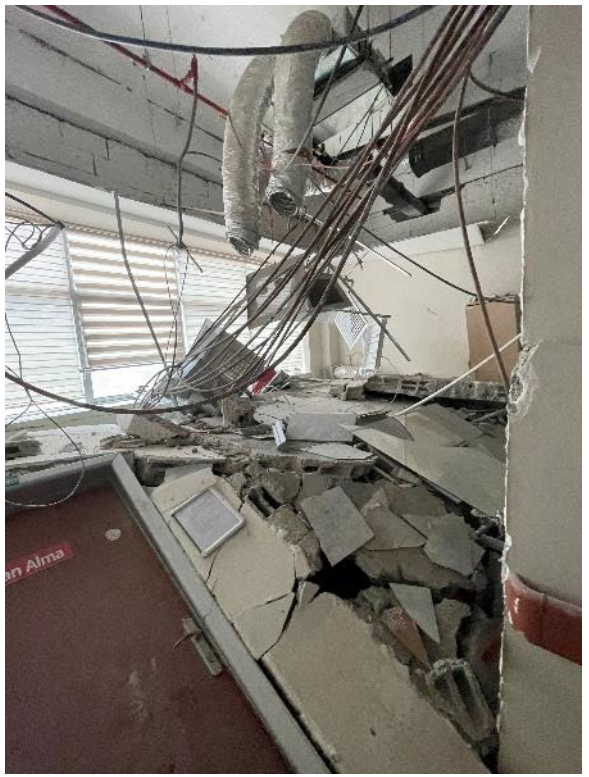
SPC2
2005 Concrete Building
EVACUATED

SPC3
2020 Steel Building
Shelter/Limited Function

Takeaways

- What happened to hospitals is closely guarded and politically sensitive.
- It is all about nonstructural – until it is not.
- There was surprisingly good performance of many pieces of unanchored equipment.
- Unbraced MEP distribution systems also appeared to remain in place. Functionality was not confirmed.
- Unbraced ceilings partially or completely collapsed
- There was very poor performance of heavy partitions and adhered masonry.

Markasi Hospital
Kahranmanmaras
Unanchored roof fan slides on pad



Kemal Beyazit Hospital
Turkoglu
Partition failure

Takeaways

- Resilience for a hospital is quite complicated and fragile.
  - Fear: Cracks in partitions make patients and staff afraid to stay or to return.
  - Redundancy: One lost incubator shuts down the IVF ward.
  - Capacity: Running out of thread shuts down surgery.
- Staff priorities: Exit quickly or try to help patients who are not mobile?
- Timely, appropriate (not too conservative) safety assessments matter greatly.

Markasi Hospital
Kahranmanmaras
Babies transferred from nursery
due loss of power

Resilience Strategies

- **Before the Earthquake**
  - Pre-plan for structural evaluation of post-EQ building condition.
  - Exercise emergency generator and provide redundancy where possible.
  - Construct on-site wells where possible or provide large storage tanks.
  - Limit use of brittle finishes.

Osmaniye Government Hospital
Emergency generator farm

Resilience Strategies

- **Before the Earthquake**
  - Prepare for elevator shut down (contract for post-earthquake service in advance; explore alternatives for in-house restart)
  - Prevent extensive nonstructural damage by providing anchorage and bracing of nonstructural components; be prepared to quickly prepare wall cracking to reduce anxiety about reentry.
  - Have trained medical teams, with equipment and trucks to set up field hospitals near damaged hospitals.

Nurdagi Government Hospital
Field hospital in parking lot of closed hospital

Resilience Strategies

- **After the Earthquake**
  - Have on-call experienced structural engineers available on post-earthquake safety assessments.
  - Scared staff understandably tend to evacuate. If evacuation decision is made by the hospital, shutting down a hospital cannot be easily undone.
  - Repair nonstructural wall cracks quickly, to assuage staff and patient concerns

Closing Thoughts

Hatay Training and Research Hospital
(Hatay Eğitim ve Araştırma Hastanesi)
Built 2001

Kirikhan Government Hospital
(Kirikhan Devlet Hastanesi)
Built 2019

Closing Thoughts

Hatay Antakya State Hospital (after rescue and demo)
(Hatay Eğitim ve Araştırma Hastanesi Ek Hizmet Binası)

Questions?

Nurdagi Government Hospital
Structural and nonstructural damage

Pazarcik Government Hospital
Rebuilding Central Utility Plant with same infill approach

7. Committee Goals for 2023

Facilitators: Jim Malley, Committee Chair (or designee)

- Discuss goals for Committee and begin to outline approach to accomplish the goals
- Discussion and public input

LIST OF SNSR COMMITTEE GOALS FOR 2022

- Support HCAI with review of code changes (ongoing)
- Support HCAI with review of new/revised PINs, CANs, and OPDs (ongoing)
- Implementation of SPC-4D and NPC-4D (Removed)
- Issues regarding repurposing hospital buildings (Ongoing but most projects completed)
- Develop pre-approved details (Add to 2023 Goals)
- Revisit NPC-5 requirements (Removed)

LIST OF SNSR COMMITTEE GOALS FOR 2023

- Seismic compliance issues related to NPC-3, NPC-4D and NPC-5. Streamlining the process for compliance to meet the statutory and regulatory deadline.
- Review of Code amendments that are now obsolete as those issues have been addressed in model code.
- Develop and implement procedures and enforceable building standards to ensure safe and sustainable healthcare facilities.
- New products, materials and methods that would benefit the public by early adoption rather than wait for their incorporation in the building code.

LIST OF SNSR COMMITTEE GOALS FOR 2023 (Cont.)

- Increase IOR competency. Is adequate testing and inspection happening in the field? Roles and responsibilities of the Design Professional and HCAI.
- Implementation of small and rural hospital relief program, increase technical assistance and awareness.
- Implementation of AB 1882 requirements. Reach out to stakeholders via seminars and webinars to raise awareness.
- Training and outreach to industry on code changes and tips for working with HCAI. Could be either via webinars or in-person training meetings.
- Other issues brought to the committee by HCAI or the public.

8. **Comments from the Public/Committee Members on issues not on this agenda**

   Facilitator: Jim Malley, Committee Chair (or designee)
   The Committee will receive comments from the Public/Committee Members. Matters raised at this time may be taken under consideration for placement on a subsequent agenda.