



Schedule for Data Roll-Out & Beta Users

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Outline

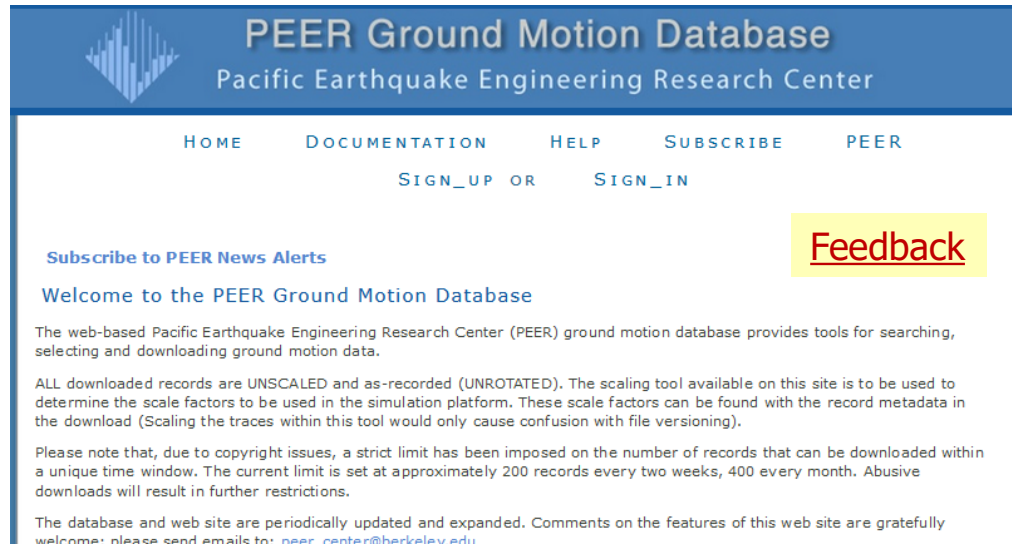
- Engaging the Earthquake Engineering Community
- Transition to Practice
- Beta Users
- Schedule for Data Roll-Out

Engaging the Earthquake Engineering Community (1/2)

- Value Proposition of PEER to develop the simulated GM database:
 - ✓ Earthquake Engineering Center “11 core institutions, 9 educational affiliates & many participants”
 - ✓ Culture of creating/maintaining enabling technology (e.g., PBEE, OpenSees & NGA databases)
 - ✓ Active connection to the Earthquake Engineering profession in California and elsewhere
- PEER will facilitate broader use and impact of the simulated GM database (e.g., research in transportation systems, links to OpenSees/OpenSRA & SimCenter tools).
- The simulated GM database is timely to engage the Earthquake Engineering community by leveraging DOE resources.
- *Simulated GMs are expected to facilitate regional scale evaluation of energy systems.*

Engaging the Earthquake Engineering Community (2/2)

- Database interface will include a feedback feature for users to provide suggestions to be considered in future updates.
- The Earthquake Engineering community input will facilitate future design standard guidance using simulated GMs and realizing their benefits.
- We plan to hold an annual SGMD Forum similar to this event “every April?”



The screenshot shows the PEER Ground Motion Database website. The header is blue with the PEER logo (a stylized waveform) on the left and the text "PEER Ground Motion Database" and "Pacific Earthquake Engineering Research Center" on the right. Below the header is a navigation menu with links for HOME, DOCUMENTATION, HELP, SUBSCRIBE, PEER, SIGN_UP OR, and SIGN_IN. A yellow box highlights the "Feedback" link. The main content area includes a "Subscribe to PEER News Alerts" link, a "Welcome to the PEER Ground Motion Database" heading, and three paragraphs of text. The first paragraph describes the database's search and download tools. The second paragraph explains the scaling tool and its limitations. The third paragraph notes copyright restrictions on record downloads. The footer of the main content area provides contact information for the database and website updates.

PEER Ground Motion Database
Pacific Earthquake Engineering Research Center

HOME DOCUMENTATION HELP SUBSCRIBE PEER
SIGN_UP OR SIGN_IN

[Subscribe to PEER News Alerts](#) **Feedback**

Welcome to the PEER Ground Motion Database

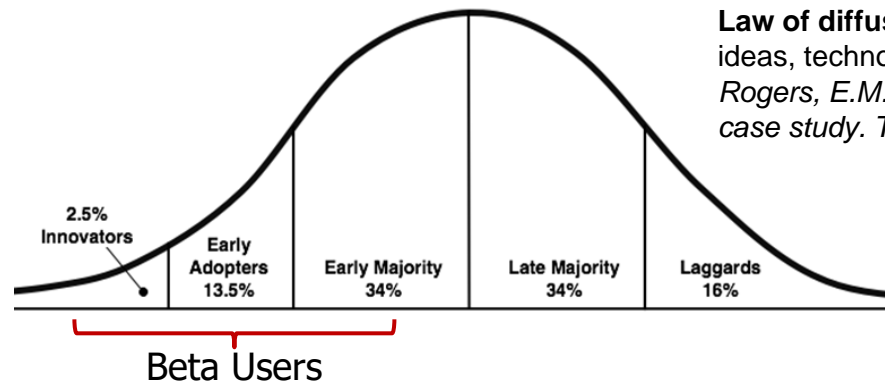
The web-based Pacific Earthquake Engineering Research Center (PEER) ground motion database provides tools for searching, selecting and downloading ground motion data.

ALL downloaded records are UNSCALED and as-recorded (UNROTATED). The scaling tool available on this site is to be used to determine the scale factors to be used in the simulation platform. These scale factors can be found with the record metadata in the download (Scaling the traces within this tool would only cause confusion with file versioning).

Please note that, due to copyright issues, a strict limit has been imposed on the number of records that can be downloaded within a unique time window. The current limit is set at approximately 200 records every two weeks, 400 every month. Abusive downloads will result in further restrictions.

The database and web site are periodically updated and expanded. Comments on the features of this web site are gratefully welcome; please send emails to: peer_center@berkeley.edu

Beta Users



Law of diffusion of innovation (Rogers, 1962): How new ideas, technologies, or products spread through a population. *Rogers, E.M. (1962). How research can improve practice: A case study. Theory into Practice, 89-93.*

Potential Beta Users:

1. PEER research (promote use of simulated GMs through “**PEER Requests for Proposals (RFP)**”)
2. Users of SimCenter tools
3. Energy providers (PG&E, Southern California Edison, etc.)
4. Government agencies related to infrastructure networks (water, gas, transportation, etc.)
5. Structural engineering firms (using nonlinear dynamic analyses for building design & assessment)
6. Simulated GM researchers in various regions in US & worldwide

Request For Proposals

TRANSPORTATION SYSTEMS

- Sponsors
- Events
- Ground Motion Studies for Transportation Systems
- Projects (2023 - 2015)
- Publications & Data
- Related News
- Request For Proposals**

Pacific Earthquake Engineering Research Center (PEER) has continuing funding from the State of California related to the seismic performance of transportation systems. To optimally use these funds, PEER Research Committee solicits proposals through the RFP process, usually issued in fall.

PEER TSRP - Request for Proposals: Solicitation PEER-TSRP 22-01 and 22-02, December 2022 - Now Open

The deadline to submit technical proposals is 11:59pm (PT) February 28, 2023. Submit questions to peer_center@berkeley.edu by January 11, 2023.

- Download the blank proposal form (Word file, 45 KB)
- Main RFP on 6 Topics - Download the Solicitation Form (PDF file, 66 KB)
- Tested RFP - Download the Solicitation Form (PDF file, 53 KB)
- Submit Proposal here
- TSRP Questions and Answers - To be posted in the next few days

PEER TSRP - Request for Proposals: Solicitation PEER-TSRP 21-01 and 21-02, September 2021 - Now Closed

The deadline to submit technical proposals is 11:59pm (PT) November 1, 2021. Submit questions to peer_center@berkeley.edu by October 15, 2021.

- Download the blank proposal form (Word file, 41 KB)
- Single Topic - Download the Solicitation Form (PDF file, 121 KB)
- Workshop - Download the Solicitation Form (PDF file, 139 KB)
- TSRP Questions and Answers (Updated 10/19/2021)

PEER TSRP - Request for Proposals: Solicitation PEER-TSRP 20-02, September 2020 - Now Closed

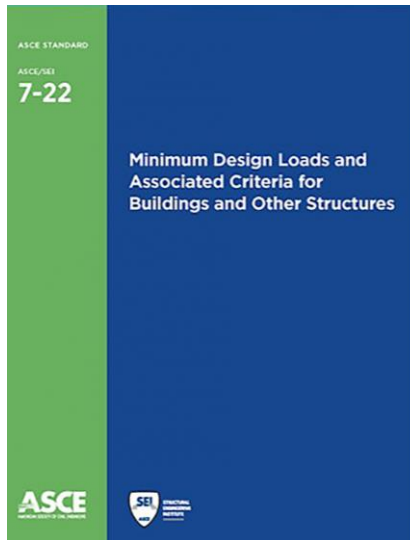
The deadline to submit technical proposals is 11:59pm (PST) November 2, 2020. The deadline to submit questions to peer_center@berkeley.edu is 5pm (PDT) September 30, 2020.

- Download the blank proposal form (Word file, 100 KB)
- Download the Solicitation Form (PDF file, 143 KB)
- TSRP Questions and Answers - Posted 10/02/2020

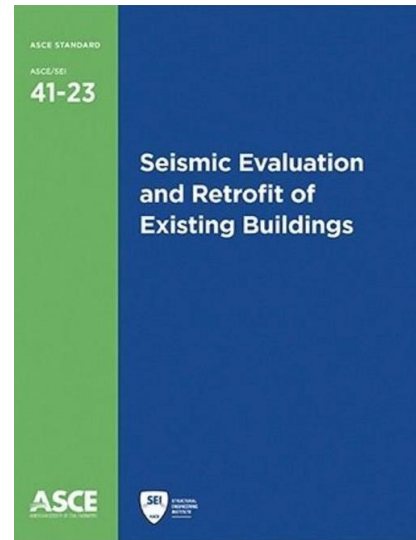
PEER TSRP - Request for Proposals: Solicitation PEER-TSRP 19-01, September 2019 - Now Closed

The deadline to submit technical proposals is 11:59pm (PST), November 3, 2019 (posted October 30, 2019, supercedes date in Solicitation). The deadline to submit questions to peer_center@berkeley.edu is 5pm (PDT), October 15, 2019.

Transition to Practice



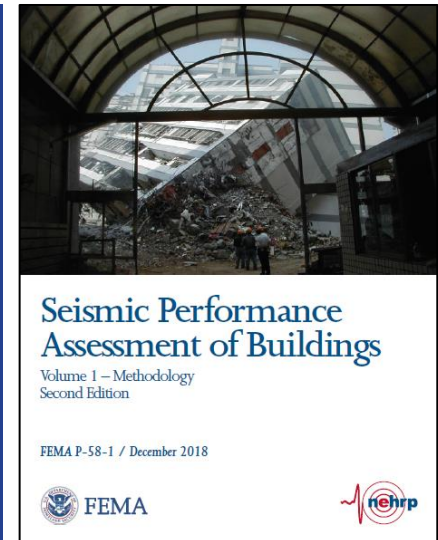
ASCE 7-22



ASCE 41-23



Tall Buildings Initiative

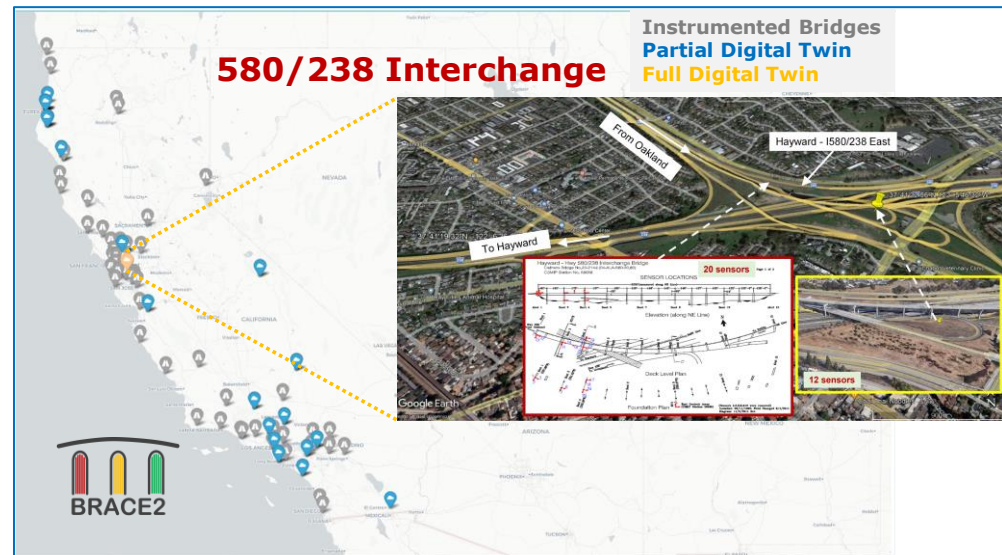
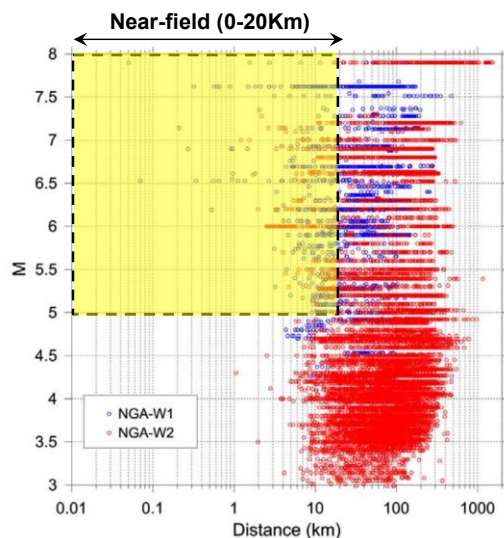


FEMA P-58

- ASCE 7-22 requires a minimum of 11 GM time histories for each target spectrum.
- ASCE 7-22 Section 16.2.3: “*Where the required number of recorded ground motions is not available, it shall be permitted to supplement the available records with simulated GMs.*”
- In PBEE, even more GMs are preferred to:
 - ✓ Quantify the uncertainty in structural/foundation response
 - ✓ Estimate probability of collapse

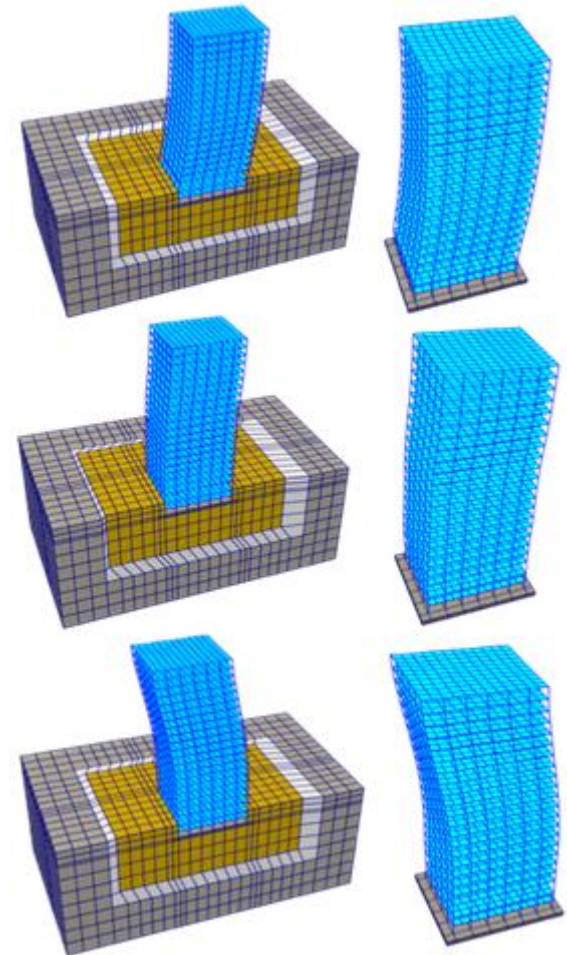
Advantages of the Simulated GM Database in Practice

- Availability of subsurface motions where recorded GMs are generally at the surface with limited number of geotechnical arrays (**typically hard to maintain**)
- Suitable for scenario-based regional-scale simulations
- Recorded motions not available for significantly large earthquakes (NGA West2 database only has records for moment magnitudes $M_w \leq 7.9$ & mostly distances ≥ 5 km)
- Realistic GM input to long span structures having insufficient number of recorded GMs for multi-support excitation input



Potential Uses for Engineering Research & Practice: **Structural**

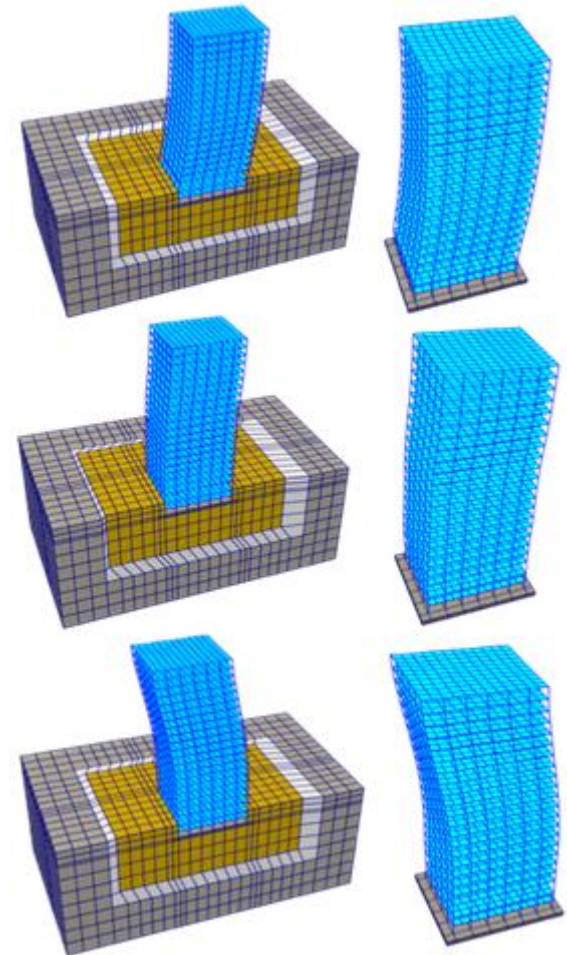
- **Probabilistic Performance-based design optimization:** Minimize lifecycle costs; Achieve resilience objectives
- **Floor Motions:** Response of nonstructural components
- **Comparisons:** Structural response with recorded & simulated motions for validation & acceptance
- **Instrumented Buildings:** More confidence in use of simulated GMs



Courtesy of D. McCallen

Potential Uses for Engineering Research & Practice: **Geotechnical**

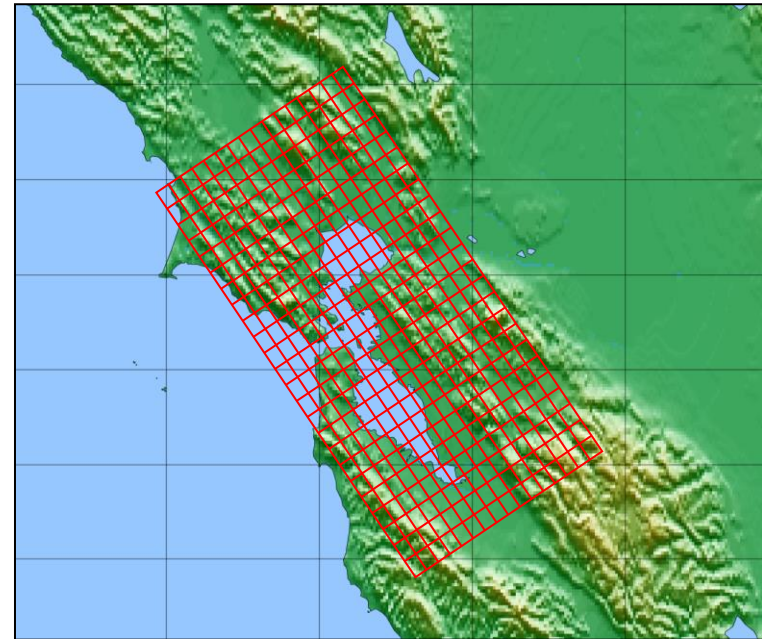
- **Free Field vs. Motions at the Base of the Structure:** Identify needs for Soil-Foundation-Structure Interaction (SFSI) modeling
- **Bedrock Motions:** Use in complete SFSI modeling
- **Geotechnical Arrays:** Validation of subsurface motions; Characterizing soil layers
- **Simulated Motions:** Coupling with liquefaction (e.g., NGL), landslide analysis, etc.



Courtesy of D. McCallen

Potential Uses for Engineering Research & Practice: **Regional Sim.**

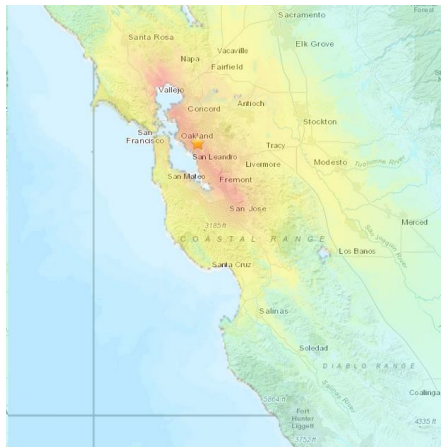
- **Coupling Simulated Motions with Fragilities and Consequence Functions:** Scenario-based loss assessments
- **Identification of Weakest Links of a System:** Prioritization of structures to be retrofitted or need for further detailed analysis
- **Machine Learning Models Using Results for Training from Many Simulations:** Potential updating of ShakeAlert's location & magnitude estimations for Earthquake Early Warning (EEW)



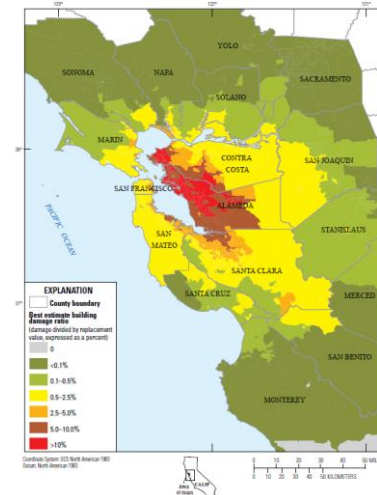
Courtesy of D. McCallen

Regional PBEE Simulations Using Simulated GMs

- With advances of computational technologies & availability of efficient methods to extract information, application of PBEE for regional scale simulations is possible.
- Simulated GMs are essential for accurate regional quantification of shaking in hazard analysis, to develop GMs for structural analysis, and for better city planning.



ShakeMap of a M 7.3 scenario earthquake on the Hayward fault



Example building damage maps from the HayWired study (2018)

- Regions with high seismicity in US (e.g., Cascadia Subduction Zone, Humboldt Region, San Francisco Bay Area, Greater Los Angeles Area & New Madrid Zone) and worldwide with available simulated GM studies (e.g., Chile, Colombia, Italy, Japan & Türkiye) can be added later to the database.

Schedule for Data Roll-Out

Task	Jan.–March	April–May	June–July.	Aug.–Sep.
Complete Server Configuration (Setup & Test)				
Complete User Interface				
Include All Data & Metadata for SFBA Simulations				
Beta Version Roll-out				
Feedback from Beta Users				
Full Version Roll-out				

Concluding Remarks

- PEER hosting & maintaining the database adds a value to the broader use and impact of the simulated motions, which are expected to facilitate the regional scale evaluation of energy and other infrastructure networks.
- The motions in the database have many potential uses in structural, geotechnical, and regional scale applications including transition to practice.
- Feedback from potential users is essential to develop the full version of the database.
- There are current and future physics-based GM simulation studies in the US and around the world from which new data can be added to the database in the future.
- The database development and the full version roll-out will be regularly communicated to the PEER community (**Website + Social Media + News Digest + Annual SGMD PEER-LBNL-DOE Forum**).



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<https://peer.berkeley.edu/>

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2024 PEER - LBNL Workshop
Simulated Ground Motions for the San Francisco Bay Area
January 18-19, 2024

