Media Guide
to Structural Engineering
in Southern California

Prepared by the
Structural Engineers Association of Southern California

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About this Media Guide

This media guide is designed to assist and support journalists working in and covering Southern California as it relates to covering structural issues, with a particular emphasis on buildings and hazard events like earthquakes. This is meant to be a simple guide to provide basic information and be a resource to gain more information on these topics. The Guide is divided into four parts:

Further, this guide is intended to be updated regularly to provide current contact information. For the most recent version, visit https://seaosc.org/Media-Relations or contact SEAOSC at (562) 908-6131 or seaosc@seaosc.org.

About SEAOSC

Founded in 1929, the Structural Engineers Association of Southern California (SEAOSC) is one of the oldest structural engineering associations in the world and is one of four regional structural engineering associations (known as Member Organizations) of the Structural Engineers Association of California (SEAOC).

The purpose of SEAOSC is “to advance the science of structural engineering; to assist the public in obtaining dependable structural engineering services; to encourage engineering education; to maintain the honor and dignity of the profession; and to enlighten the public with regard to the province of the structural engineer.”

SEAOSC members are civil, structural, and geotechnical engineers regularly engaged in the practice of structural engineering. SEAOSC also draws membership from related fields involved in design and construction, including academia (professors and students), contractors, and representatives from industry and government.

Part 1: The Basics about Structural Engineers and Structural Engineering

1. *What is structural engineering?*

Structural Engineering is a specialty within Civil Engineering which deals with the design, construction and maintenance of our surrounding infrastructure, such as buildings, bridges and tunnels. Though often conflated, a structural engineer is not an architect. Rather, a structural engineer takes the vision of the architect, building owner, or project leader and creates a physical system, or structure necessary to support the intended loads. The work of the structural engineer is analogous to the skeleton holding the weight of a body. The end goal of the structural design is to resist loads from forces such as gravity, seismic, and wind loads.

2. *What does a structural engineer do?*

A Structural Engineer designs the physical elements that allow a building to stand, provide shelter, and safely resist forces. These elements (beams, columns, walls, foundations, etc.) are designed to meet the requirements of the governing building codes. The day-to-day tasks of a structural engineer entail creating construction documents, performing calculations and evaluations, as well as coordinating with a general contractor before and during the construction phase.

3. *Why does someone hire a structural engineer?*

A structural engineer possesses the specialized education and experience needed to design and evaluate a structure, whether new or existing, that is safe for its intended use. The design or assessment of every structure is particular to the environment it is in, and a properly licensed engineer is equipped to analyze structures founded in different soil conditions, as well as subject to various gravity, seismic, and wind loads. A structural engineer is also a technical resource who can discuss various options for retrofitting a building and the advantages and disadvantages of each. An engineer’s stamp and signature is required on contract documents, permitted by the authority having jurisdiction, for New Building Construction, Existing Building Renovation, & Existing Building Seismic Retrofit.

4. *What is a licensed civil and structural engineer?*

Within structural engineering, there are two levels of licensing issued and governed by the Board for Professional Engineers, Land Surveyors, and Geologists (BPELSG) in the state of California. The first level of licensing is the Civil Engineer license, which requires 6 years of qualifying work experience or education and the passing of an examination. The second level of licensing is the Structural Engineer license which is obtained after the Civil Engineer license. This requires having a Civil Engineer’s license and an additional 3 years of qualifying work experience under the supervision of a licensed Structural Engineer and the passing of an additional

examination. Most structures may be designed under the supervision of a Civil Engineer, however, special structures such as hospitals, schools, and essential facilities require the additional qualification of a Structural Engineer.

5. ***What is the relationship between the USGS (geologists generally) and Structural Engineers?***
   Geologists are experts in ground movements and earthquake motions, and structural engineers are experts in how buildings respond and react to those earthquake motions. Geologists and Structural Engineers work together to help mitigate damages from earthquakes.

6. ***How does someone find a licensed engineer?***
   SEAOSC has provided a webpage to help facilitate that search.
   Visit http://www.seaosc.org/find-an-engineer

Part 2: Structural Engineering FAQs for Journalists

1. ***When should I contact a Structural Engineer?***
   A structural engineer should be contacted whenever covering a story having to do with the built environment and structures, including buildings, bridges, walls, towers; and how the structure is intended to or has performed especially following a disaster such as an earthquake, fire, collapse, or explosion. This can be applied globally, so other disasters that can cause structural failure could include hurricanes, snowstorms, tornados, and other extreme weather events.

2. ***How do I know if the structural engineer I'm talking to is qualified to give comment or enhance my story?***
   SEAOSC has a vetted and trained list of experts that represent the association in Southern California as well as have professional expertise in the various topic areas. If you find another engineer not suggested through SEAOSC make sure they are licensed in the state (https://search.dca.ca.gov/) and have a current portfolio of work related to the topic at hand. You can also contact SEAOSC to make sure they are in good standing with the Association for further validation.

3. ***What is building performance?***
   As with any engineered object such as a car, airplane, computer, or mobile phone, certain performance expectations are established by the designer on behalf of the client or user. Then, the object is designed to meet or exceed those expectations — and buildings and structures are no different. A building's "performance" is merely the measure of whether the structure has met the defined criteria or expectations. For structural engineers, the main defining guide in establishing the criteria or performance expectation is the Building Code as governed by the local jurisdiction. Additionally, the client may require enhanced criteria, such as floor vibration sensitivity for medical research labs.

4. ***What are the minimum expectations of the Building Code?***
   Within the typical Building Code based design, the performance expectation is defined by the idea of Life Safety. Life Safety Performance is intended to save the occupants but not necessarily the building. The expectation is that a building will maintain its structural integrity to the limit of the design standard. As a minimum code standard, this Life Safety criteria does not limit damage to the structure and it is recognized that a structure having achieved Life-Safe performance may require significant repairs, including to the extent that it may not be economically feasible to restore the Structural to its pre-event condition.

5. ***Aren't tall buildings built on rollers?***

A commonly held idea is that many buildings have been "built on rollers". Usually this comment refers to the belief that a building has been designed with enhanced capability to resist earthquakes. While a limited few buildings in the State of California have been constructed with isolation systems, none use actual "rollers." The more common base isolation systems use a combination of rubber and steel plates to "isolate" the base of the building from earthquake forces. These systems absorb the energy of the earthquake ground motion before it is transmitted into the upper portion of the structure.

6. ***Aren't new Buildings earthquake-proof? What types of buildings are vulnerable to collapse during earthquake shaking?***
   No building is earthquake-proof, and there are some older buildings that are particularly vulnerable to damage or collapse in an earthquake. Primarily, the following are understood to be the most dangerous, if not retrofitted: unreinforced masonry (URM), or brick, buildings, non-ductile concrete buildings, soft-story buildings (often with tuck-under parking such as the collapsed Northridge Meadows apartment building that killed many in 1994), tilt-up buildings, and steel moment-frame buildings (often multi story office buildings). A full description and explanation of each of these vulnerable buildings can be found in the early pages of the SEAOSC Safer Cities Survey.

7. ***What is performance-based engineering?***
   Performance-based engineering uses known properties of building materials (including steel, concrete, wood, etc.) to predict the overall behavior of the building. This approach uses the knowledge of how the building will perform to design the most cost-effective, life-safe building (in compliance with the code standard).

8. ***What is resilience-based engineering?***
   Resilience-based engineering is similar to performance-based engineering, however it has a different purpose and outcome. This approach uses performance-based design concepts to design buildings that have performance that goes beyond life safety. Resilience-based engineering is used to go beyond the code minimum to achieve a functional or operational building after an extreme event.

Design Level	***Design Goal***
Code Design	Life Safety is assumed
Performance-Based Design	Life Safety is quantifiable and known
Resilience-Based Design	Greater than Life Safety is achieved

9. What are some types of earthquake damage that can be found in buildings?

a. Cracks in finishes
b. Windows cracked and doors out of alignment
c. Walls pulled away from floors and roofs
d. Severe cracking of concrete or masonry walls and columns
e. Settlement of foundations
f. Buildings leaning or tilted
g. Collapse of the building or a portion of it

10. What are the laws/policies that govern building performance?

Local and state laws, as well as national standards, govern how buildings and other structures must be built. Fundamentally, the rules begin at the international level with the International Building Code that is developed in a 3-year process. The State adopts or modifies that code and all local jurisdictions in turn adopt it or make it more stringent, setting the local standard for structures. Locally, cities can (and some have) adopt local retrofit ordinances that address vulnerable buildings and require or encourage owners to fix known structural weaknesses. The latest, comprehensive list of local jurisdictions with such ordinances can be found in the Safer Cities Survey. Hospitals, public schools, and other critical buildings have different standards.

Part 3: Questions for Journalists to Ask about Structures

When asking an expert about a building or structure, here are a few questions you should ask to get a full understanding of the causes and circumstances of a building's stability.

1. *What type of building construction and design was used?*
2. *What caused the collapse/damage?*
3. *What other parts of the building are damaged? And why?*
4. *What can we do to avoid this type of damage in the future?*
5. *Are there potential hazards from neighboring structures?*
6. *What kind of nonstructural damage are buildings vulnerable to?*

Part 4: Key Contacts and Resources

Email requests and inquiries to: mediarelations@seaosc.org

Primary contacts for the Association are listed below. The individuals listed make up the Executive Committee of SEAOSC's Board of Directors and are available to answer questions regarding various types of issues or can ensure that you are put in contact with a key resource for specific questions.

Mr. Kenneth O'Dell, SE:	*Office phone at (562) 985-3200* *Text or Mobile at (562) 964-7966* *Mr. O'Dell is the 2020-2021 SEAOSC Past-President*
Mr. Matthew Barnard, SE:	*Office phone at (213) 596-5010* *Mr. Barnard is the 2020-2021 SEAOSC President*
Ms. Kelsey Parolini, SE:	*Office phone at (805) 391-7958* *Text or Mobile at (805)441-5590* *Ms. Parolini is the 2020-2021 SEAOSC President-elect*

Topics for discussion may include:

Earthquakes / Seismic Safety, Wind, Fire, Tsunami, Building issues (damage, delay, failure, quality, etc.), Quality assurance (plan check, inspections, etc.), Testing and Research (local and/or national), Community resilience, Local ordinances related to the above, Professional practice, Other partner organization's work, reports, etc. (NIBS, NCSEA, EERI), Critical structures (bridges, highways, lifelines, etc.), and Hazard reduction research.