

PRESENTATIONS

TITLE: Construction Specifications: The Other Contract Document

PRESENTER: Jordan Terry, SE, CDT

SYNOPSIS: As structural engineers, we receive very little if any formal training on project delivery, contract documents, and especially construction specifications. With this limited training, many structural engineers lack a basic understanding of construction specifications, why they matter, and how to write them.

During this presentation, we will discuss project delivery, the role of specifications, the relationship between drawings and specs, CSI formats, and spec writing best practices to avoid being burned by them during construction.

TITLE: Things I have Learned about Seismic Engineering

PRESENTER: Brent Maxfield, SE

SYNOPSIS: When I graduated in 1984, I thought I knew about seismic engineering. Since that time, I have spent my career trying to learn and understand key principles of seismic engineering. In this presentation I will distill and share some of the important things I have learned during my 40 years of experience such as ductility and intentional yielding, rationale for overstrength factors and R factors, and how ground motions are determined.

TITLE: Exploring How Open Web Floor Trusses Optimize Construction

PRESENTER: Chris Horowitz, PE

SYNOPSIS: Floor trusses are the ideal structural system for single family, multi-family, and other commercial builds due to their inherent design flexibilities, optimized construction advantages, and exceptional strength. Each floor truss is designed and engineered for the unique and specific project. Open-web floor trusses create downstream value through faster and safer on-site installation, efficient MEP installations, and additional opportunities for reduced material costs. This course will demonstrate project benefits when utilizing open web floor trusses.

TITLE: Advances in FRP

PRESENTER: Alex Daddow, PE, CDT

SYNOPSIS: Focusing on the evaluation and retrofit design practices for concrete diaphragms and concrete shear walls in the U.S., using FRP as a seismic strengthening solution. Although there are extensive component modeling load-deformation characteristics and acceptance criteria prescribed for various concrete components in U.S. standards like ASCE/SEI 41, such provisions for concrete diaphragms generally point to walls and other similar component idealizations. Consequently, practicing engineers must resort to alternative design methods for assessing retrofit design decisions wherein real building diaphragms rarely resemble the idealized wall counterpart. After evaluation shows that retrofit is required, similar extrapolations are required for FRP strengthening schemes, using the beam-analogy and debonding strains prescribed in ACI 440.2-R and other documents. This presentation will highlight large-scale testing for diaphragm shear, chords and collectors, and shear-deficient concrete walls while providing design recommendations resulting from these test programs and will provide guidance to consulting engineers on effective ways to specify FRP for seismic applications to meet design intent.

TITLE: HSS Yield-Line Analysis in Practice

PRESENTER: Beth Suminski, PE, SE

SYNOPSIS: One distinction that sets HSS connections apart from open section connections is weak-axis bending of the HSS connecting face, leading us to the often-intimidating yield-line analysis. Yield-line analysis has been widely used in the analysis of plates to determine flexural capacity and is a key methodology to design HSS connections under out-of-plane loading. This session aims to demystify yield-line analysis and clarify the underlying principles behind plastification limit state equations, providing valuable insights for your next HSS connection design.

TITLE: Engineering Yourself First

PRESENTER: Jake Kennington, SE

SYNOPSIS: In structural engineering, the "strong column, weak beam" principle is a critical design strategy that ensures a structure's stability during extreme events by prioritizing the integrity of columns over beams. This principle can also serve as a metaphor for personal and professional growth. By strengthening the "columns" of personal development—such as cultivating self-discipline, enhancing self-awareness, and fostering creativity—we create a foundation that supports sustained professional success and overall well-being. This presentation explores practical strategies, including mastering morning routines, reflective writing, and engaging in creative pursuits outside of work, to build a resilient personal foundation that leads to long-term productivity and fulfillment.

TITLE: Insulated Concrete Form Construction: Design and Detailing - Benefits and Pitfalls

PRESENTER: Chris Reeves, PE

SYNOPSIS: This seminar will cover issues related to insulated concrete forms including seismic design, diaphragm to wall detailing, and possible issues with their construction and code-compliance.

TITLE: Replaceable Fuse Moment Connections: Experimental Testing and Strategies for Design

PRESENTER: Justin Marshall, PhD

SYNOPSIS: Replaceable fuse moment connections have the advantage of achieving code required performance, being repairable following damaging earthquakes, and being economical for new design and retrofit projects. Best practices for moment frame design are covered including case studies highlighting the economic and functional recovery benefits of using repairable connections. Recent small-scale and full-scale experimental testing of replaceable fuse connections for new construction and retrofit of existing structures is presented demonstrating new concepts for absorbing earthquake energy only in components that can be easily replaced.

TITLE: The MSG Sphere: Solving Design, Fabrication and Construction Challenges with Cast Steel Connections

PRESENTER: Brian Miller & Cawsie Jijina

SYNOPSIS: Behind the visual phenomenon of the massive MSG Sphere, exists a structural steel grid-shell structure complete with cast steel nodes. Discover the reasons why project stakeholders chose to use steel castings, and the effective means that steel castings were integrated into the design, simplified fabrication, and streamlined construction activities on site.

TITLE: Stiffness Analysis of Steel Connections – Are you sure that's a pin connection?

PRESENTER: Jason McNeil, PE

SYNOPSIS: Serviceability and material stiffness often present themselves as a design challenge. Large drifts or deflections, failing members, and thermal expansion/contraction, can all be concerns that relate back to stiffness. This presentation explores the pivotal role of stiffness analysis in steel structures and particularly hones in on the stiffness of steel connections. It will emphasize both traditional methods and modern software solutions. The traditional hand calculation process will be discussed, along with revealing common challenges that often arise. Key reasons for conducting stiffness analysis will be covered, including ensuring analysis assumptions, enhancing serviceability, optimizing structural performance, and meeting stringent design codes. Several illustrative case

studies will demonstrate the practical implications of stiffness analysis, showcasing how informed design decisions lead to safer and more efficient structures. With advances in structural engineering software, structural engineers can take advantage of improved tools for stiffness analysis of steel connections. These innovative tools simplify the analysis process by automating calculations and providing comprehensive visualizations, significantly improving accuracy and reducing design time. A cyclical workflow can even be created to take connection stiffness information and input it back to the global analysis model, resulting in a more accurate understanding of the structural behavior. Attendees will gain insights into how software solutions not only alleviate the burdens of manual analysis but also empower engineers to explore complex design scenarios with confidence.

TITLE: Soil-Structure Interaction at the Salt Lake Temple

PRESENTER: Taylor Nordquist

SYNOPSIS: The bearing capacity of a footing is often governed by allowable settlement, rather than strength of the bearing soil. Actual settlements are a function not only of load and soil stiffness, but of how the stresses and stiffnesses of the structure and the soil interact, until equilibrium is achieved. Additionally, inherent variabilities and uncertainties in soil makeup and behavior are ever-present, having a significant effect on soil-structure interaction (SSI). Hence, simplifying assumptions are frequently made when a geotechnical engineer provides soil capacities for a building. The Salt Lake Temple retrofit is a worthy case-study for SSI. The Salt Lake Temple has been undergoing retrofit for the last 5 years, including transferring 124 million pounds of mostly unreinforced masonry structure onto a seismic base-isolation system. The interaction of the historic foundations, new foundations, and shoring systems, with the slightly-cemented gravelly soils at the site provides valuable insight into SSI. This presentation will compare anticipated movements developed using finite element modelling with movements measured at the temple and explore the factors and uncertainties that often govern allowable bearing capacity.

TITLE: Advancements and New Anchoring Technologies for Externally Bonded Fiber Reinforced Polymer Systems

PRESENTERS: Tim Sapienza, PE & Victor Reyes, PE

SYNOPSIS: Fiber reinforced polymer (FRP) anchors are commonly used in achieving performance goals of FRP systems. However, FRP anchors have limited field QAQC, and are time consuming to install. A new advancement in anchoring FRP system is the Duktil FRP Anchor Plates System, a steel/FRP laminate plate that bonds directly to FRP materials and uses traditional post-installed mechanical anchors. The Duktil FRP Anchor Plate System increases the performance of anchored FRP systems, provides easier field installation, and utilizes field QAQC with current industry standards for post-installed anchors. This presentation will discuss the technical merits and application uses of Duktil.

TITLE: Flush Frame Connections – Setting a Standard for Steel Joists to Wide-Flange Girders

PRESENTER: Dennis Montgomery, SE, PE

SYNOPSIS: Flush frame connections allow for the top chord of an open web steel joist to be flush with the top flange of the supporting wide-flange girder. The presentation will explore the benefits, design considerations, and share standardized details for joist flush frame connections.

TITLE: ASCE7-22: General and Wind Updates

PRESENTER: Emily Guglielmo, SE, PE, F.SEI

SYNOPSIS: This session will begin with a brief overview of each hazard, including the high-level updates in ASCE 7-22. Then it will include a deep dive into the Wind Load provisions, including updates to the wind maps, the inclusion of a new tornado chapter, updates to the directionality factor (K_d), removal of simplified methods.

TITLE: ASCE7-22: Seismic Updates

PRESENTER: Emily Guglielmo, SE, PE, F.SEI

SYNOPSIS: This session will include a deep dive into the updated seismic provisions. Specific topics that will be discussed include an introduction to the multi-period response spectrum procedure, two-stage analysis updates, inclusion of flexible wall-rigid diaphragm provisions, and a new force equation for non-structural components.

TITLE: ASCE 7-22 Snow Loads: Understanding the Shift to Reliability-Targeted Snow Loads

PRESENTERS: Dr. Brennan Bean & Jeannette Torrents

SYNOPSIS: Ground snow loads in ASCE 7-22 have been revised to incorporate additional years of data, greatly reduce case study areas, and have shifted to a reliability-targeted basis. Updates also include a new winter windiness factor, revised extent of windward drifts, and updated thermal factors. This presentation will review the reasons for these changes, explain how to use them in practice, as well as look to the future of how to address snow loads in a changing climate.

TITLE: Design of Steel Stairs in High Seismic Regions

PRESENTER: Jami Havens, PE

SYNOPSIS: Meeting seismic drift requirements in stair design often poses challenges, especially when trying to satisfy the aesthetic preferences of architects and owners. How can these requirements be effectively addressed across various stair layouts? This presentation will demonstrate that the provisions of ASCE 7-16 can be met while working with architects and owners to help meet their needs.

TITLE: Ethics in Construction and Risk Management

PRESENTER: Tim Conde

SYNOPSIS: In the construction industry, integrity serves as a building block of success. When we conduct ourselves with integrity, ethical behavior follows. Ethical behavior is the practice of making decisions regarding project risks while adhering to principles of honesty, fairness, transparency, and accountability, ensuring the safety and well-being of all stakeholders involved, and avoiding practices like bribery, deception, or prioritizing personal gain over the project's overall integrity. In short, ethics in construction means managing risks responsibly and ethically, prioritizing safety and compliance over potentially risky shortcuts to meet project deadlines or budgets.

TITLE: Use of semi-rigid cavity ties as an out-of-plane strengthening technique for URM veneer and cavity walls.

PRESENTER: Robert Hudson

SYNOPSIS: Unreinforced masonry (URM) veneer and cavity walls, a hallmark of historic construction, face particular seismic challenges due to their slender aspect ratio and often inadequate connectivity between masonry wythes. These challenges are accentuated by flexible veneer and cavity ties, never intended to be part of a lateral seismic resisting system.

An experimental program was undertaken to validate the use of post-installed semi-rigid ties for the purpose of compositely integrating both wythes of veneer or cavity walls in the out-of-plane direction, reducing the slenderness of these wall sections and subsequently increase their out-of-plane resistance to seismic loading. This presentation will cover the full-scale semi-cyclic and dynamic experimental testing performed to validate this technique, design procedures, construction details, and case study examples where this technique has been effectively utilized.

TITLE: The AI Journey: Adoption and Innovation in Structural Engineering

PRESENTER: Andrew Sundal, AIA, PE(MN)

SYNOPSIS: Artificial Intelligence (AI) has promised to change our world with the release of large language models (LLM) such as ChatGPT, Claude, Gemini, etc. But how does this technology impact your firm now? How does this technology change the strategy of your practice? The NCSEA Foundation's 2024-2025 Innovation in Structural Engineering Grant selected AI as the topic of research. This initiative seeks to uncover and support transformative advancements in AI that can shape the future of structural engineering. As a member of the grant team, Andrew Sundal will present the team's 2024 findings, exploring how AI is influencing the field. He will delve into the practical applications of AI in current engineering practices, highlighting both the exciting opportunities and the limitations of integrating AI into real-world projects.

TITLE: Transitioning from Cowboy Project Management to Formal Certification

PRESENTER: Marcor Platt, SE, PE

SYNOPSIS: Does a degree in structural engineering equate to project management excellence? Our industry for the most part has answered yes, as evidenced by an almost complete lack of project management certification among structural engineers. In the structural engineering industry, we are pursuing operational excellence which combines effectiveness, delivering precisely what the client needs and efficiency, delivering it with minimal byproduct. Marcor will take you from cowboy project management through formal PM certification, with the goal of arriving at Active Quality Management which is where operational excellence happens.

TITLE: Advanced Timber Shear Wall Analysis

PRESENTER: Sam Christensen

SYNOPSIS: Sam will provide an in-depth look at the various analysis methods for timber shear wall design along with their assumptions, results, and real-world applicability. The presentation will quickly cover the basics of structures and shear walls for background and will move to the two industry standard analysis methods, their usage, results and assumptions. Then we will explore the "Engineering Judgement" or "Rational Analysis" design area for timber shear walls. A method for designing shear walls without hold downs will be presented. The design space for shear walls under various loadings will be explored and discussed. Some special cases will also be presented and discussed. Several examples will be included as well.

TITLE: Structural Brick Curtainwalls and Other Unique Structural Clay Masonry Systems.

PRESENTER: Steven Judd, SE (CA, UT) CBS

SYNOPSIS: Learn the history, concept, design, application, construction, and properties of curtain walls built with structural brick. Gain knowledge about moisture and thermal analysis concepts of different structural brick curtain walls and their impact on the energy requirements of the building. You will see examples of buildings utilizing structural clay masonry curtainwalls that achieved low life cycle, energy, and maintenance costs by using this long-lasting, flexible, and environmentally friendly wall system.

TITLE: Structural Considerations for Façade Systems

PRESENTER: Tait Ketcham, SE and Steven Judd, SE

SYNOPSIS: As architectural demands evolve, the design of building skins has become increasingly complex, necessitating a thorough understanding of both aesthetic and structural considerations. This presentation delves into the critical aspects of building skin design for the engineer of record as well as the specialty design engineer. You will gain insights into common challenges that can arise during both the design and construction phases, as well as innovative detailing approaches that enhance structural performance and aesthetic. Brick veneer systems, interstory drift considerations, common pitfalls in building skin design, delegated design and looking ahead to TMS 402/602-22 building codes and their potential impacts on future building skin projects will be touched on.

TITLE: Inside the NEW AISC *Seismic Provisions* and the 4th Edition *Seismic Design Manual*

PRESENTER: Mike Gannon SE, PE

SYNOPSIS: The latest editions of the AISC *Seismic Provisions* and *Seismic Design Manual* are now available. Learn more about the new seismic provisions for ordinary truss moment frames, coupled composite plate shear walls (SpeedCore), the new appendix on nonlinear response history analysis, and more. Find how new reference tables and examples can further assist in the design of seismic force-resisting systems.

TITLE: Concrete Shear Walls using ASCE 41 & ACI 369

PRESENTERS: Bryant Nielson & Jacob Linford

SYNOPSIS: This presentation will provide a general understanding of how ACI 369 is implemented in ASCE 41-23. We will specifically address the concrete shear wall provisions and how they are to be used in the seismic retrofit of existing buildings.

TITLE: Improve Retention in a Deadline-Driven Tech Industry – Panel Discussion

MODERATOR: Cambria Flowers

SYNOPSIS: This panel discussion will focus on what firms, large and small, can do to provide a more engaging and supportive work environment in the deadline driven field of structural engineering. Retention and recruitment suffer when employee mental health and job satisfaction is poor. This panel discussion will draw from local and national resource data to delve deeper into these topics.

TITLE: What's Old is New Again

PRESENTER: Tyler Weinbrecht & Aron Roper

SYNOPSIS: An exploration into different approaches to preserve and re-invigorate existing buildings. Including IEBC, ASCE 41 and ASCE 7 impacts.

TITLE: Career Growth: Paths, Scenarios & Taboo Topics

PRESENTER: Josh Ogle

SYNOPSIS: Career growth in structural engineering requires strategy and deliberate execution. This session outlines key milestones, actionable steps, and shines the light on “taboo” topics often left unspoken—like salary negotiations, expanding roles, and switching firms. By confronting these challenges head-on, engineers can be empowered to make informed decisions that shape their long-term success.

TITLE: Structural Steel – Innovation, Efficiency, and Sustainable Design

PRESENTER: Ian Lummis

SYNOPSIS: The structural steel industry is in a constant state of innovation, with steel mills developing stronger, and more sustainable steels to push the construction industry forward. This presentation will explore the role the steel industry plays in the world of green design by investigating

manufacturing related embodied carbon and the development of higher-strength, more efficient materials. We will provide insight on how engineers can harness the latest developments and innovations in the steel industry, through collaboration with material suppliers, to make their structures stronger, lighter, and greener.