

Safety and the Engineer: Addressing Construction Site Safety During Project Planning, Design, and Construction

Purpose and Background

Safety is part of every engineer's role. Whether focusing on protecting the end-users of a facility or those who construct and maintain the facility, safety is at the core of civil engineering. Integrating safety into design and construction practices is paramount. We all work together to be good stewards of our workforce and the public.

This course provides guidance to engineers regarding how to enhance construction site safety throughout the planning, design, and construction of projects. The course covers safety concepts and industry practices used to evaluate and improve construction worker safety through the design of the project features, construction operations, and site safety program elements. The objectives of this course are to:

- Educate participants about the theories and practices developed to understand and improve safety on construction projects
- Enable participants to design comprehensive safety programs to address and enhance safety on construction projects. The approach taken to the topic is from the viewpoint of a civil/construction engineer tasked with developing a safety program which spans from project planning and design through the end of construction.

The course begins with examination of construction site injuries and fatalities and the typical causes of accidents. This is followed by study of the impacts of construction accidents, how to assess safety risk, and how to measure and predict safety performance. The majority of the course covers methods of controlling, eliminating, and reducing safety hazards through the design of the project, the construction process, and the site safety program elements. The hierarchy of controls is utilized both for the structure of the course and as the foundation for addressing safety on projects and designing an effective safety program.

Incorporating safety considerations throughout the entire project life-cycle will lead to improved safety performance and fewer injuries and fatalities. This outcome is the ultimate goal. In order to achieve this goal, we need to know how best to address safety based on recognized safety concepts and industry constraints. Knowing how to incorporate safety will enable all project team members to participate in the effort to improve safety in the industry. This safety knowledge is especially important as integrated project delivery methods become more prevalent in the industry.

Seminar Instructor

JOHN GAMBATESE, PH.D, P.E., M.ASCE. is a Professor in the School of Civil and Construction Engineering at Oregon State University. Dr. Gambatese's educational background includes Bachelor and Master of Science degrees in Civil Engineering from the University of California at Berkeley, and a PhD in Civil Engineering from the University of Washington. He has worked in industry for a structural engineer in San Francisco and as a project engineer for a construction management firm in Seattle. He started his current position at Oregon State University in 2000 following three years on the faculty at the University of Nevada, Las Vegas. Dr. Gambatese's expertise is in the road areas of construction engineering and management, and structural engineering.

He has taught many courses over his career on a variety of subjects including: construction safety, contracts and specifications, planning and scheduling, structural analysis and design, temporary construction structures, construction site systems engineering, and engineering economics. He has performed research and published numerous articles on construction worker safety, work zone design and safety, prevention through design, risk management, sustainability, constructability, innovation, and construction contracting. He is a member of the American Society of Civil Engineers (ASCE) and American Society of Safety Professionals (ASSP). He is a licensed Professional Civil Engineer in California.

- For group training, contact John Wyrick (JWyrick@asce.org) or Stephanie Tomlinson (STomlinson@asce.org)

Summary Outline

DAY 1

- Introduction to the course
- Nature of Safety in Construction
 - * A description of injury/fatality statistics within the construction industry including case studies to focus on specific safety issues
- Accident Theories and Causes - presentation of the different theories of why accidents occur
- Hazard Recognition and Risk Assessment
 - * Instruction on how to quantitatively assess safety risk associated with a project
- Safety Performance and Monitoring
 - * Impacts of Injuries/Fatalities and Working Safely
 - * Description of how injuries/fatalities affect project performance (cost, schedule, quality, etc.), and how working safely also affects project performance
- Measuring Safety Performance
 - * Means in which safety performance can be measured using leading and lagging indicators

DAY 2

- Designing a Safety Program for a Project
 - * Introduction of a plan/process that can be used for designing a safety program for a project based on the knowledge gained from
- Prevention through Design (PtD) - introduction to PtD: implementation, barriers, enablers, and benefits
- Administrative Controls
 - * Description of different types of administrative controls beneficial to improving safety
- Worker Involvement and Behavior
 - * How to engage all project personnel (including both design and construction) in the safety effort
- Course summary and feedback

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Seminar Benefits

- Become knowledgeable about basic safety theories/concepts applicable to both design and construction
- Learn new ways to address safety across multiple project phases
- Develop your safety knowledge and skills so that you can contribute to safety on projects
- Understand how to quantify safety risk related to both project designs and construction operations
- Expand your knowledge of how to address safety in a project design
- Learn how to develop a comprehensive safety program that extends across all project phases

Learning Outcomes

Upon completion of this course, participants will be able to:

- Describe theories of accident causation in the construction industry and apply the theories to evaluate causation of accidents
- Calculate the risk associated with construction site safety hazards
- Describe the hierarchy of controls and apply it to improve construction site safety
- Describe the concept of designing for safety as it is applied to construction site safety and apply it to a project's design
- Describe common elements of safety programs on construction projects
- Design a comprehensive safety program from planning and design through the end of construction
- Become familiar with ways to overcome barriers to improving safety on projects

Who Should Attend?

The course content will extend from basic safety concepts to detailed descriptions and application of techniques to address safety during the project life-cycle. General knowledge of the architecture/ engineering/construction industry is needed, as well as the typical project development process. The course is intended for all engineers who participate in the planning, design, and/or construction of projects, including those who work for owner/developer organizations, design firms, construction firms, and any combination thereof.

ASCE seminars are available for On-Site Training. For details regarding On-Site Training and/or needs-based training opportunities, please contact:

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