WELCOME TO THE
ASCE 142ND ANNUAL CIVIL ENGINEERING CONFERENCE

The Global Growth of Prevention through Design (PtD): Overview of the PtD Concept

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What is Prevention through Design (PtD)?

“What addressing occupational safety and health needs in the design process to prevent or minimize the work-related hazards and risks associated with the construction, manufacture, use, maintenance, and disposal of facilities, materials, and equipment.”

(http://www.cdc.gov/niosh/topics/ptd/)
PtD in Construction is...

- Explicitly considering construction safety in the design of a project.
- Making design decisions based in part on a project's inherent safety risk to construction workers.
- Addressing worker safety in the constructability review process.

“Safety Constructability”

(Source: www.designforconstructionsafety.org)
Why PtD in Construction?

- **22%** of 226 injuries that occurred from 2000-2002 in Oregon, WA, and CA\(^1\)
- **42%** of 224 fatalities in US between 1990-2003\(^1\)
- **60%** of fatal accidents resulted in part from decisions made before site work began\(^2\)
- **63%** of all fatalities and injuries could be attributed to design decisions or lack of planning\(^3\)

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\(^2\) European Foundation for the Improvement of Living and Working Conditions

\(^3\) NSW WorkCover, CHAIR Safety in Design Tool, 2001
Additional Motivations

• Moral and ethical standards

  “Engineers shall recognize that the lives, safety, health and welfare of the general public are dependent upon engineering decisions ....” (ASCE Code of Ethics)

• ASCE Policy Statement 350

• Sustainability
Additional Motivations

Hierarchy of Controls

- **Elimination**
  - Eliminate the hazard during design

- **Substitution**
  - Substitute a less-hazardous material or form during design

- **Engineering Controls**
  - “Design-in” engineering controls,
  - Incorporate warning systems

- **Administrative Controls**
  - Well-designed work methods & organization

- **PPE**
  - Available, effective, easy to use

PtD
“Swiss Cheese” Model of Accident Trajectory

PtD Example

The Erector Friendly Column

- Include holes in columns at 21” and 42” for guardrail cables and at higher locations for fall protection tie-offs
- Locate column splices and connections at reasonable heights above floor
- Provide seats for beam connections

(Source: National Institute of Steel Detailing and Steel Erectors Association of America)
Benefits of PtD Implementation

• Eliminate/reduce site hazards
  • Fewer worker injuries and fatalities
• Increased productivity; increased quality
• Fewer delays due to accidents
• Encourages designer-constructor collaboration
• Improved operations/maint. safety
• Reduced workers’ comp. premiums
Barriers to PtD Implementation

• **Barriers:**
  • No/minimal site safety in designer education and training
  • Competing priorities (e.g., safety vs. cost/schedule)
  • Lack of knowledge of how to design for safety
  • Unclear authority and responsibility for PtD
Barriers to PtD Implementation (continued)

• Barriers:
  • Difficult for designers to assess risks if lack of field experience
  • Contractual separation of design and construction
  • Cost and time requirements for implementation of PtD
  • Fear of liability
Enablers of PtD Implementation

- **Enablers:**
  - A committed owner/client
  - Positive safety culture
  - Design engineer experience and training
    - Both construction and safety
  - Integrated project delivery methods
  - Design/construction visualization tools
PtD as a National and International Initiative

- NIOSH PtD National Initiative
  - NORA Construction Sector Council CHPtD Workgroup
- OSHA Construction Alliance Roundtable
- ANSI/ASSE PtD Standard Z590.3-2011

- U.K. - Construction (Design and Mgmt.) Regulations
- Other EU countries, Australia, South Africa, and more
Which is safer to build? How much safer?

Steel-framed building

Concrete-framed building