Overview

- OSHA Directorate of Construction and OSHA Alliance Program
- OSHA Alliance Program Construction Roundtable
- Resources
- Structural Collapses during Construction and Prevention through Design (PtD)
- Q&A
Alliance Program

• OSHA and the participating organizations define, implement, and meet a set of short- and long-term goals that fall into three categories:
  – Training and education
  – Outreach and communication
  – Promoting the national dialogue on safety and health

• Sharing technical expertise, developing and disseminating compliance assistance products with participants

• Provides OSHA access to millions of employers and employees

Dr. David Michaels, Assistant Secretary, USDOL-OSHA, delivers remarks at the Alliance Program Construction Roundtable meeting at the Department of Labor on February 17, 2011
OSHA Alliance Program Construction Roundtable

- Purpose of Alliance Roundtable

- Success of Alliance Program Construction Roundtable:
  - Fall Protection Workgroup
  - Design for Safety (DfS) Workgroup
  - Presentations
OSHA Alliance Program Construction Roundtable: Members

- American Fire Sprinkler Association
- American Pipeline Contractor Association
- American Industrial Hygiene Association
- American Society of Safety Engineers
- Association of Equipment Manufacturers
- Concrete Sawing and Drilling Association
- Independent Electrical Contractors
- Roadway Work Zone Safety and Health Partners Alliance
- National Association of Home Builders
- National Institute for Occupational Safety and Health
- National Safety Council
- Sealant Waterproofing and Restoration Institute
- National Safety Council
- Washington Division of URS Corporation
Alliance Program Construction Roundtable Products

Design for Safety Workgroup

• Design for Construction Safety Website
• “Introduction to Designing for Construction Safety” presentation
• Design for Construction Safety 2 – 4 Hour Course
Construction Workplace Design Solutions.

Through the Alliance Program Construction Roundtable, participants developed a series of Construction Workplace Design Solution documents on fall hazards (2010, May):

- Falls From Roof Edge
- Falls From Floor Openings
- Falls From Non-Moving Vehicles
- Roof Hatch Access and Hole Protection [Specify Non-Fragile Skylights and/or Skylight Guards]
- Specify Sufficient Wall Height to Allow Parapets to Function as Fall Prevention
Design for Construction Safety Web Site

Announcements & Recent News:

We invite any suggestions you have for improving the site! We are also happy to post announcements and links to unpublished DfCS documents.

Here is a two-page overview of the DfCS/PtD concept.


For a powerpoint of the DfCS presentation made at the Construction Safety Conference in Chicago on February 12, 2008, click here. (Note: This file is over 5 Mb.)

For a powerpoint of the DfCS presentation made at the CIB W99 Conference in Orlando, FL on March 11, 2008, click here.

For a powerpoint file that provides a quick overview of DfCS and a summary of this website, click here or in the Powerpoint File tab on the left. This file was presented at the On-site Consultation Training Conference 2007 held in Newport, RI April 10-12, 2007. This file is similar to a presentation made on February 14, 2007 at the 17th Annual Construction Safety Conference in Rosemont, IL.

For a powerpoint file intended to be used in a 2-4 course on DfCS intended for design engineers, click here. (Note: This file is nearly 5 Mb.)
Reducing Fall Fatalities and Injuries

- **Design Professionals** – Design Professionals’ need to be cognizant to design with health and safety in mind. Design permanent building features so that fall protection is not needed. This eliminates the chance of an accident if fall protection is not provided, provided but not used, or not used properly.

- **Contractors** – It is the contractor’s responsibility to enforce compliance with safety practices with regard to ladders, scaffolds, and instances where fall protection is necessary.

- **Workers** – It is the worker’s responsibility to apply the safety practices with regard to ladders, scaffolds, and instances where fall protection is necessary.
Design Permanent Anchorage Points: Residential Fall Protection
Fall Prevention Resources

OSHA

• Alliance Program Construction Roundtable Web Page
  http://www.osha.gov/dcsp/alliances/roundtables/roundtablesconstruction.html

• Fall Protection Safety and Health Topics Page

• OSHA’s Construction Pocket Guide
  http://www.osha.gov/Publications/OSHA3252/3252.html

Other

• Design for Construction Safety Web Site
  http://www.designforconstructionsafety.org

• NIOSH Prevention Through Design Web Page
  http://www.cdc.gov/niosh/topics/PTD

• Safety in Design
  www.safetyindesign.org
Structural Collapses during Construction and PtD

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Source: BLS CFOI Data
Work Related Fatalities

Source: BLS CFOI Data
Fatality Rates
(Fatalities per 100,000 workers)

Source: BLS Injury/Illness Data
Although construction had the highest number of fatal injuries in 2007, agriculture, forestry, fishing, and hunting and mining had the highest fatality rates.

Distribution of fatalities by selected occupations in the private construction industry, 2006–07

- Construction laborers: 26% (2007), 27% (2006)
- Carpenters: 8% (2007), 9% (2006)
- First-line managers/supervisors of construction trades and extraction workers: 8% (2007), 7% (2006)
- Construction managers: 5% (2007), 6% (2006)
- Truck drivers, heavy and tractor-trailer: 4% (2007), 4% (2006)
- Painters, construction and maintenance: 3% (2007), 4% (2006)

Total fatalities in 2007 = 1,204
Total fatalities in 2006 = 1,239

Fatal work injuries involving construction laborers accounted for more than one out of every four private construction fatalities in both 2006 and 2007.

• Construction is one of the most hazardous occupations.

• Construction industry accounts for 7% of the U.S. workforce, but 21% of fatalities

• More than 1,000 deaths annually
Main Stages in Design and Construction

• Conceptual Design.
• Preliminary Design
• Detailed Design
• Fabrication
• Construction
• In the design review process as it is currently practiced:

  – In the design process architects/ engineers prepare permanent structure drawings.

  – Construction/worker safety is being overlooked.

• OSHA addresses safety of construction workers during construction of a facility
Rehabilitation Project
• Theatre structure was built in 1908 with additions in 1912 and 1927. Theatre front portion 50 ft. x 120 ft. and backstage 70 ft. x 65 ft.

• Existing exterior walls were to remain.
  – Height of existing brick wall 32 ft. above grade.
  – The existing basement 8’-5” below the street level.
  – New basement 6 ft. below existing basement.

• At time of Collapse:
  – Demolition was complete
  – New roof was in place
  – Project was in the reconstruction stage.
EXISTING MULTI-WYTHE BRICK WALL (TO REMAIN)

SLAB ON GRADE
(SEE PLAN)

#4 @ 16" E.W.F.

EL. -8.42'

EXIST BSMT SLAB

EL. -7.33'

12" CONCRETE WALL

DOWELS TO MATCH VERT. REINF. - LAP PER GENERAL NOTES

NOTE: CONTRACTOR TO PROVIDE TEMPORARY SHEETING AS REQ'D TO PREVENT UNDERPINNING DUE TO PRESENCE OF RUNNING SANDS (V.I.F.)

EL. -12.0'

Section 1

03.2
• Canopy Bridge 575' Long, width 11' to 18'.

• Canopy steel bridge under construction collapsed, killing a worker and injuring 18.

• At time of Collapse:
  – The entire bridge structural frame was supported over 15 temporary shoring towers approximately 30 ft. on centers
  – Concrete was being poured
• Permanent structure were made of high strength steel. Shoring designer assumed higher steel strength for temporary structure too, but were not specified in the shoring sketch.

• Contractor didn’t specify steel strength while procuring shoring towers

• Design drawings required shoring towers to be spaced not more than 30 feet. Towers were relocated by contractor to protect trees.

• Some of the helical anchors had insufficient embedment depth.
Erection
• One story Building. Columns were 24’ high

• Bid Drawings and Fabrication drawings had shown bracings for columns.

• Adequate stability was not provided during erection.

• Structure collapsed crushing a truck and damaged two scissor lifts.
Demolition
• Deck Removal Procedure
  – Transverse saw cut (6’ apart) entire span.
  – Longitudinal saw cut above the existing Girders.
  – 8 ft. x 6 ft. deck sections were pried off of the girders using a slab picker attached to excavator.

• At time of Collapse:
  – One section of the bridge was removed and reconstructed.
  – Contractor was removing the deck on the other section.
  – One span collapsed
Summary

• Based on our experience, the majority of the structural failures were caused by construction errors (75%). Many of these could have been avoided with better construction drawings and better coordination between Design Engineer and Contractor.

• At Design Stage Engineer must:
  – Address possible construction issues and must plan for future maintenance.