Construction Industry Safety History

CSTM 102
Projects of the past

1883 Brooklyn Bridge
1914 Panama Canal
1931 Empire State Building
1936 Hoover Dam
1936 San Francisco-Oakland Bay Bridge
1937 Golden Gate Bridge
1883 Brooklyn Bridge

- Construction started .................................. January 3, 1870
- Opened to traffic ........................................ May 24, 1883
- Total length of bridge and approaches ............. 6,016 feet
- Width of bridge ........................................... 85 feet
1883 Brooklyn Bridge

- 27 people died during construction
The French Began Construction in 1878
United States bought the rights and took over construction in 1904
Over 80,000 men worked on this project
They excavated 262 million cubic yards
Canal is 51 miles long
1914 Panama Canal

- Around 20,000 workers died during the first twenty years of construction
- After the United States took over 5,609 additional workers died
1914 Panama Canal
SPORT ON THE CHAGRES

One of the diversions very popular among the sporting members of the canal staff was alligator hunting. The upper waters of the Chagres could usually be relied upon to produce excellent sport, though these great reptiles are found in all the principal streams on the Isthmus.
1931 Empire State Building
Hawks Nest Tunnel Disaster

There are no definitive statistics as to the death toll from the Hawks Nest disaster. According to a historical marker on site, there were 109 admitted deaths. A Congressional hearing placed the death toll at 476. Other sources range from 700 to over 1,000 deaths amongst the 3,000 workers. Many of the workers at the site were African-Americans from the southern United States who returned home or left the region after becoming sick, making it difficult to calculate an accurate total.
Largest Mining Accident

- Tunnel Completion Timetable
- Mar. 31, 1930 – ground was broken for tunnel
- Mid-June 1930 – significant tunnel excavation began
- Sept. 19, 1931 – tunnel “holed-through” in 17.5 months (10 weeks ahead of schedule), most workers were paid off and sent home
- Dec. 1, 1931 – Tunnel “trimming” was finished and remaining laborers were dismissed.
- 1934 Hawk’s Nest tunnel and dam were finished
Cherniack determined that there were 135 excess deaths among white males in Fayette County 1931-1937 compared to neighboring counties and WV. He attributed all those deaths to work in the tunnel. He calculated that 63% of the local white men, who worked more than 2 months in the Tunnel, died within 6 years of acute silicosis. Applying that percentage to all who worked more than 2 months in the Tunnel, he estimated that at least 764 men died of acute silicosis as a result of having worked in the Hawk’s Nest Tunnel!
1931 Empire State Building
1931 Empire State Building
1931 Empire State Building

Empire State Building
Vital Statistics:

- **Location**: New York, New York, USA
- **Completion Date**: 1931
- **Cost**: $41 million
- **Height**: 1,454 feet
- **Stories**: 102
- **Schedule**: Complete in 1 year and 45 days
- **Labor Force**: 3,000 + workers

6 men died during the construction
1936 Hoover Dam

Interesting Facts:

• 726 feet tall x 660 feet thick
• Largest reservoir in the United States
• Job was built between 1931 and 1936
1936 Hoover Dam
1936 Hoover Dam

FATAL INJURIES

1931-1936

HEAT PROSTRATION – 16
DROWNING – 7
BLASTING – 12
FALLING ROCKS – 24
AUTO ACCIDENTS – 10
STRUCK BY – 30
FALLS – 26
ELECTROCUTION – 5
OTHER – 83

TOTAL – 213
1936 San Francisco-Oakland Bay Bridge
1936 San Francisco – Oakland Bay Bridge

Begin Construction: May 1933
Complete Construction: October 1936

Bridge Type: Suspension – Tunnel – Cantilever/Truss

Cost: $78 Million ($3.46 Billion Today)
Total Manhours: 54,850,000

Construction Fatalities: 24
Golden Gate Bridge 1937

Length: 1.7 Miles

Width: 90 ft

Tower Height Above Water: 746 ft

Construction Begin: Jan 1933

Construction End: May 1937

Cost: $27,000,000 ($1.2 Billion Today)

Construction Fatalities: 11
Golden Gate Bridge 1937

- Pete Williamson, one of the bridge workers, recalled what it was like...

"I had to walk along those girders with nothing to hold onto, balancing myself on 8-inch I-beams with only net and water underneath. The thought of walking the flanges scared the hell out of me. But I did it. I learned quickly that when the wind was blowing, which was all the time out there, you had to carry lumber on the side away from it. If you didn't, it could get hold of you and blow you into the drink."
## 10 Most Dangerous U.S. Jobs 2002

**Construction**

“A dangerous place”

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Fatalities per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber Cutter</td>
<td>117.8</td>
</tr>
<tr>
<td>Fisher</td>
<td>71.1</td>
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<tr>
<td>Pilot/Navigator</td>
<td>69.8</td>
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<tr>
<td>Structural metal worker</td>
<td>58.2</td>
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<tr>
<td>Driver/sales worker</td>
<td>37.9</td>
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<tr>
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<td>37.0</td>
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<tr>
<td>Electrical power installer</td>
<td>32.5</td>
</tr>
<tr>
<td>Farm worker</td>
<td>28.0</td>
</tr>
<tr>
<td>Construction laborer</td>
<td>27.7</td>
</tr>
<tr>
<td>Truck driver</td>
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Bureau of Labor Statistics
From another perspective

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<th>Occupation</th>
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<tr>
<td>Construction w/o truck driver</td>
<td>155.4</td>
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<td>Timber Cutter</td>
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Bureau of Labor Statistics
It is the most dangerous job on the planet!

- Mine clearing and bear taming actually are the only professions that have it beat.
- Falls the leading cause of fatal injuries in the industry—442 deaths in 2007 nationwide for falls.
U.S. Construction Fatalities

- Average of all U.S. industries is 5 deaths per 100,000 employees
- Construction averages 15.3 deaths per 100,000 employees
  Over three times the amount of fatalities than all industries.
- Approximately 1,000 construction workers killed each year
- 3,859 construction workers fell to their death between 1980-1993
- Deaths on construction cites have increased 25% over the past seven years
- Construction related deaths rose 6% in 1998
Bureau of Labor Statistics

- In 2005 more than 1000 fatal and 400,00 non-fatal incidents in the construction industry.
- Non-fatal reduced to 401,000 from 529,300 in 1994.
- Fatal incidents increased from 1028 to 1234 in 2004.
- Assuming 220 working days in a year, on average, there were
  - 5.65 fatal incidents every day in 2005
  - 1885 non-fatal incidents in 2005
Construction Safety & Health

OSHA- Occupational Safety & Health Administration-

- December 29, 1970 President Nixon OSHA Act
- Federal Authority providing standards and rules for healthy and safe work environments. They also conduct investigations and issue citations to make sure standards are being followed.
- Requires statistical reporting of construction accidents.
Fatality Comparison

Manhours Worked Per Fatality

- **Kiewit** (1988-Pres) - 15,758,610
- **Gldn. Gt. Br.** (1933-1937) - 4,181,818
- **SFOBB** (1933-1936) - 2,285,417
- **Hvr. Dam** (1931-1936) - 170,761
- **Emp. St. Bldg** (1930-1931) - 1,300,000
- **Pan Canal (US)** (1904-1914) - 112,462
- **Pan Canal (FR)** (1881-1904) - 20,452
- **Brkln Br.** (1870-1883) - 1,032,785

Manhours/Fatality
OSHA INCIDENCE COMPARISON
1991-2001

OSHA Recordable Incidents Per 100 Workers Per Year (or Per 200,000 MHRS)

Kiewit is about 10 years ahead of the Industry.
Focus Four from OSHA

- Falls
- Electrical
- Struck By
- Caught Between
- 85% of citations and 90% of fines
Recordable Injury Rate

- An incidence rate of injuries and illnesses may be computed from the following formula:

$$\frac{(\text{Number of injuries and illnesses} \times 200,000)}{\text{Employee hours worked}} = \text{Incidence rate}$$
Lost Time Injury

The number of lost days away from work

- The Lost Time Injury and Illness rate (the number of injuries and illnesses that result in one or more lost work days per 100,000 hours worked).

- Illnesses include infections, allergy, mental health and respiratory.
Construction Industry Lost Time Injuries

Construction Workers suffered:

- 332,000 lost time injuries in 1999
- 70,000 serious back injuries, 32,000 fractures and 2300 amputations
- 23 percent of all cases resulted in 31 or more days away from work.
General Industrial Accidents

Lack of proper **Personal Protective Equipment** Account for:

- 84% of head injuries
- 60% of eye injuries
- 77% of foot injuries
- 99% of face injuries

**Personal Protective Equipment Includes:**

- Hardhats
- Safety boots
- Hearing Protection
- Safety Eye Wear
- Harnesses
- Gloves

**USE YOUR PPE!**
Safety and the Industry?

- To have each and every person go home to their families each night without injury or a fatality.
- To enhance your ability to manage safety as an integral part of the project, achieving safe production.
- Safety reporting and recordkeeping.
- What is the cost of safety?
- Priority or value?
The Safety Pyramid

1
Fatality

10
Lost Time Accident

100
Minor Injury Accident

500
Near Miss

?
Unsafe Behavior, Acts, Conditions
Construction Industry Safety History

Basic Tools of Improvement

- Proper PPE
- Hazard communication
- Making conditions safe
- Safe acts
- Training
- TEAMWORK