



THE CENTER FOR CONSTRUCTION
RESEARCH AND TRAINING

Green Jobs: Safety & Health Outlook for Workers

A View from under the Hard Hat

Don Ellenberger, Environmental Hazard Training Director

April 1, 2010

Frances Perkins Building Auditorium

U.S. Department of Labor

Washington, D.C.

- Insulators & Asbestos Workers
- Boilermakers
- Bricklayers
- Carpenters
- Plasterers & Cement Masons
- Electrical Workers
- Ironworkers
- Painters & Allied Trades
- Plumbers & Pipe Fitters
- Roofers
- Sheet Metal Workers
- Elevator Constructors
- Laborers
- Teamsters
- Operating Engineers



Number and percentage of construction establishments and employees,
by establishment size, 2007
(Payroll establishments)

Establishment size (number of employees)	Number of establishments	% of all establishments	Total number of employees	% of all employees
1 to 9	660,454	81.4%	1,711,260	23.5%
10 to 19	78,957	9.7%	1,057,733	14.6%
20 to 99	63,309	7.8%	2,457,313	33.8%
100 to 499	8,176	1.0%	1,481,955	20.4%
500 or more	556	0.1%	559,622	7.7%
Total	811,452	100.00%	7,267,833	100.00%

What is Green (in construction?)

- Building upgrades for older homes / apartments
 - Windows / doors / insulation



What is Green (in construction?)

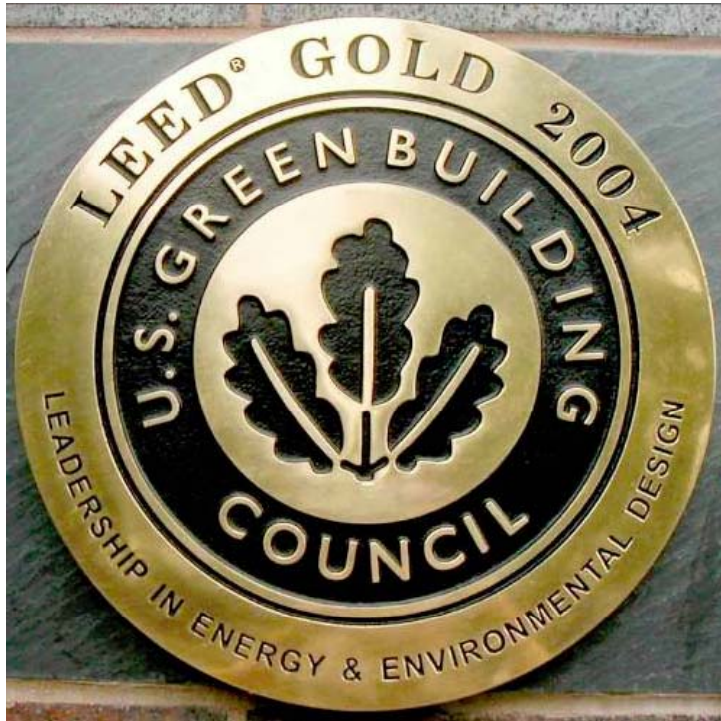
- Wind turbine erection



Are Green Jobs Safer?

- No statistical difference between green and non-green projects in terms of construction worker safety and health.

Source: Rajendran / *Journal of Construction Engineering and Management*, October 2009



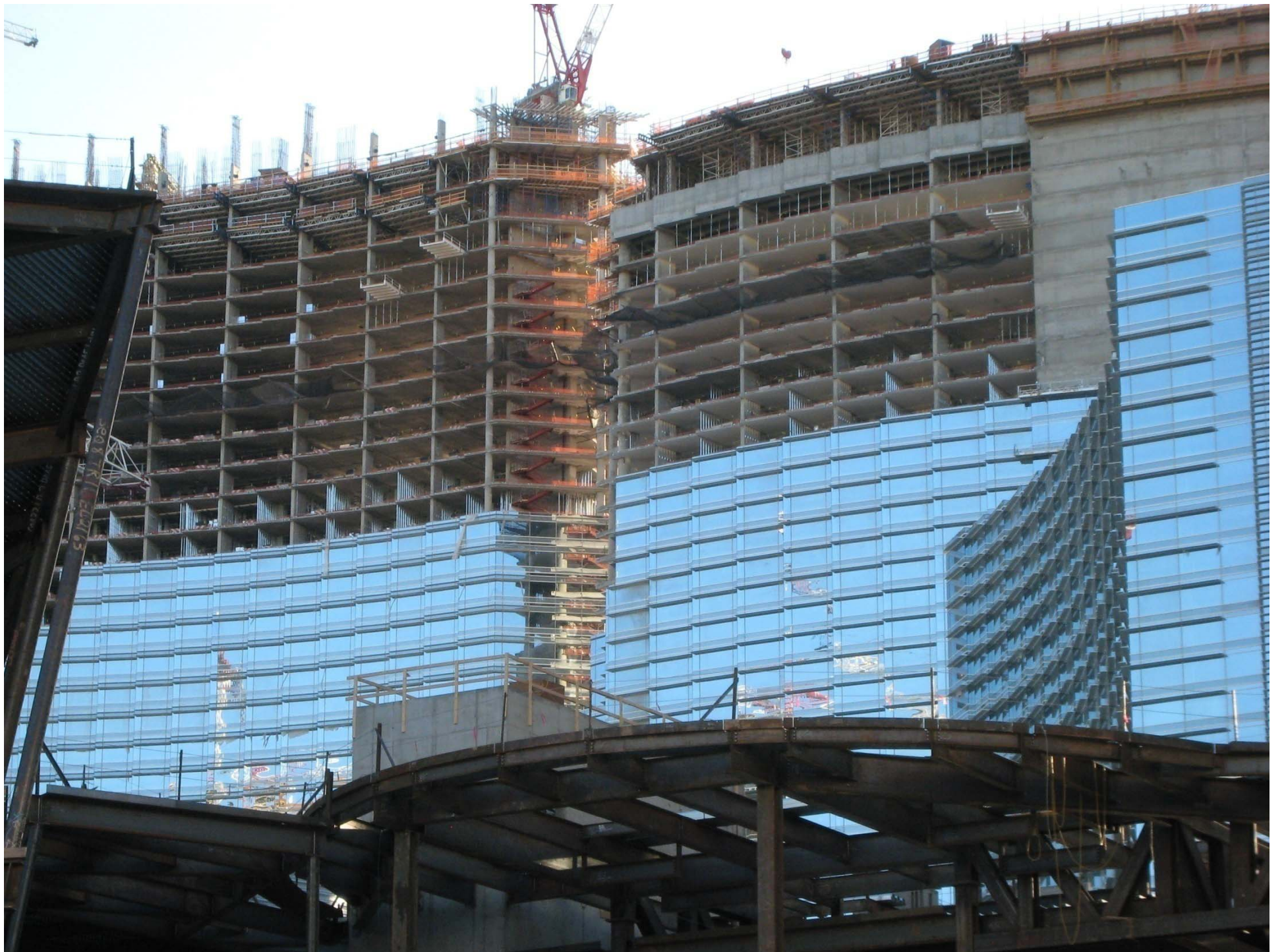
USGBC says
occupants are
healthier and more
productive in LEED
buildings

But what about
the builders . . . ?



The LEED Building

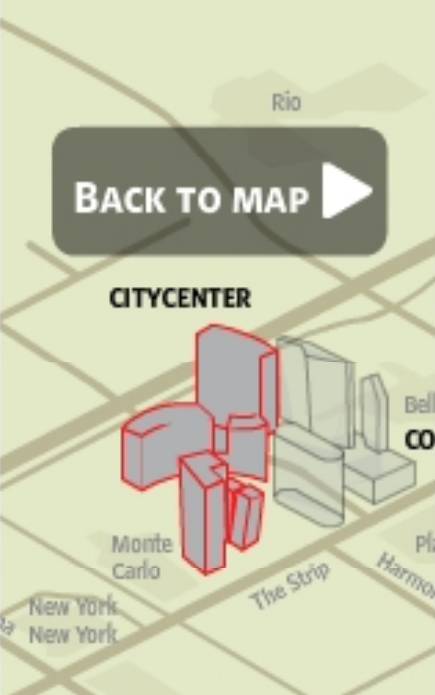
- Designed to:
 - Reduce energy consumption
 - Reduce water consumption
 - Reduce CO2 output
 - Improve indoor air quality
 - Improve resources stewardship



Harold Billingsley, Ironworker

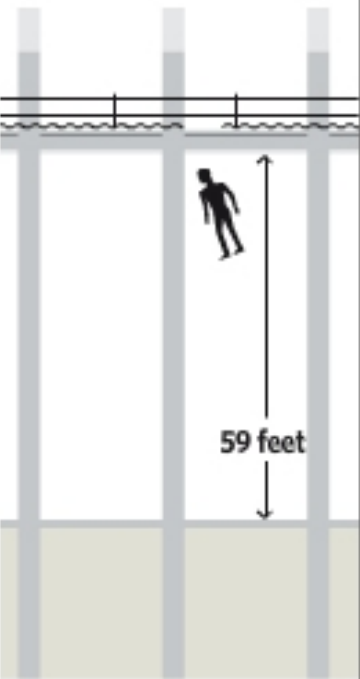
FATAL CONSTRUCTION ACCIDENTS ON THE STRIP

[BACK TO MAP](#)



CITYCENTER

Worker fell through a 3-foot by 11-foot opening in temporary corrugated metal decking on the second floor, falling 59 feet to his death. The worker did not have his safety harness attached.




OSHA INVESTIGATION

Safety lanyards on the worker's body harness did not have hooks on the ends. This safety system allows the worker to "clip" themselves to other railings or fixed material. There should not have been a hole in the decking. There was no netting, guardrail or personal fall arrest system in place to protect the employee from falls. OSHA found three violations and fined SME Steel \$13,500.

FOLLOW-UP

At an informal conference between OSHA administrators and SME, an OSHA administrator withdrew all citations for total fines of \$0.00.

Harold Billingsley, Ironworker, died Oct. 5, 2007 at CityCenter Casino [view Harold Billingsley's Bio](#)



[view Bio](#)

WORKERS KILLED IN RECENT CONSTRUCTION ACCIDENTS *By ZACH WISE, CHRIS MORRIS, ALEXANDRA BERZON*

[slideshow](#) [video](#) [interactive](#)

CONSTRUCTION DEATHS **COST OF EXPANSION** **ACCIDENTS ON THE STRIP**

“How many construction site deaths should there be to make a building ~~‘not green’~~ regardless of the environmental benefits?”

How can safety be designed into Green Jobs?

- There currently is a blind spot in sustainable design practice when it comes to worker safety and health.
- Tremendous focus is placed on materials, energy and the environment, but designers typically give little, if any, consideration to the safety and health of the people who install the green features or build the projects.

NIOSH's Top Compelling Activities

- #3 – Include OSH into green and sustainable standards as they are being updated
- #4 – Include OSH in procurement and construction
- #6 – Integrate safety and health into green elements of contractor specifications
- #9 – Develop, validate and disseminate a LEED-like OSHA rating system

We can quantify

LEED rates jobs on:

- Sustainable sites
- Water efficiency
- Energy and atmosphere
- Materials and resources
- Indoor environmental air quality
- Innovation and design

So let US rate jobs on:

- Owner commitment to safety
- Safety and health professionals / contracts
- Safety and health planning
- Training and education
- Employee involvement

There is a tool in development to do this

LEED-like OSH rating system

Sustainable Construction Safety and Health Rating System

Building Towards Sustainable Construction Worker Safety and Health

By
Sathyanarayanan Rajendran, PhD
Safety Supervisor
Hoffman Construction Company of Oregon

Sustainable Construction Safety and Health (SCSH) Checklist (R = Required, E = Elective)

Project Team Selection		6.6 Possible Credits
R	Element 1.1 Constructor Selection	2.3
R	Element 1.2 Subcontractor Selection	2.3
E	Element 1.3 Designer Selection	2.0
Safety and Health in Contracts		5.5 Possible Credits
R	Element 2.1 Safety and Health Requirements in Contracts	2.2
E	Element 2.2 Safety and Health Hazard Identification in Drawings	1.6
E	Element 2.3 Specification of Less Hazardous Materials	1.7
Safety and Health Professionals		8.1 Possible Credits
R	Element 3.1 Competent Personnel for All High Hazard Tasks	2.4
E	Element 3.2 Owner Safety Representative	1.8
E	Element 3.3 Constructor Safety Representative	2.0
E	Element 3.4 Subcontractor Safety Representative	1.9
Safety and Health Commitment		4.3 Possible Credits
R	Element 4.1 Management Commitment to Safety and Health	2.3
R	Element 4.2 Owner/Representative Commitment to Safety and Health	2.0
Safety and Health Planning		27.8 Possible Credits
R	Element 5.1 Safety and Health During Conceptual Planning Phase	2.3
R	Element 5.2 Constructability Review	2.3
R	Element 5.3 Designing for Worker Safety and Health	2.2
R	Element 5.4 Life Cycle Safety Design Review (LCS)	2.0
R	Element 5.5 Safety Checklist for Designers	2.1
R	Element 5.6 Constructor Site Specific Safety Plan	2.0
R	Element 5.7 Subcontractor Site Specific Safety Plan	2.1
R	Element 5.8 Job Hazard Analysis	2.3
R	Element 5.9 Pre-task Planning	2.3
R	Element 5.10 Look Ahead Schedule	2.1
R	Element 5.11 On and Off site Traffic Plan	2.1
R	Element 5.12 Good housekeeping Plan	2.2
E	Element 5.13 Personnel Protection Equipment (PPE) Plan	1.8
Training and Education		15.3 Possible Credits
R	Element 6.1 Safety Training for Designers	2.0
R	Element 6.2 Safety Orientation for All Workers	2.0
E	Element 6.3 Safety Training for All Field Supervisors	2.0
E	Element 6.4 OSHA 10-hour Training for All Workers	1.8
E	Element 6.5 Equipment Operators Skills and Training Assessment	1.8
E	Element 6.6 Toolbox Meetings	1.8
E	Element 6.7 Regular Safety Training for All Project Personnel	2.0
E	Element 6.8 Constructor Mentors Subs to Improve Safety Performance	1.9

Project Team Selection

- Owner uses past safety performance when selecting a contractor
- General uses past safety performance when selecting subs
- Owner chooses designer with experience / knowledge of worker safety & health

S & H in Contracts

- Safety & Health requirements in contracts
- Hazards identified in drawings
- Specify less hazardous materials

S & H Professionals

- Competent personnel for all high hazard tasks
- Owner safety representative
- General contractor safety representative
- Sub-contractor safety representative

S & H Planning

- Included during conceptual stage of project
- Constructability review
- Designing for worker safety and health
- Life cycle safety design review
- Safety checklist for designers
- General and Subs site specific safety plan

S & H Planning (cont.)

- Job hazard analysis
- Pre-task planning
- Look-ahead schedule
- Traffic plans
- Good housekeeping plan
- PPE plan

Training and Education

- Safety training for designers
- Safety orientation for all workers
- OSHA 10 for all workers
- Safety training for field supervisors*

A Foreman's Choice

- Commercial building HVAC / energy upgrades







RESEARCH REPORT



CONSTRUCTION
SAFETY
ASSOCIATION OF
ONTARIO

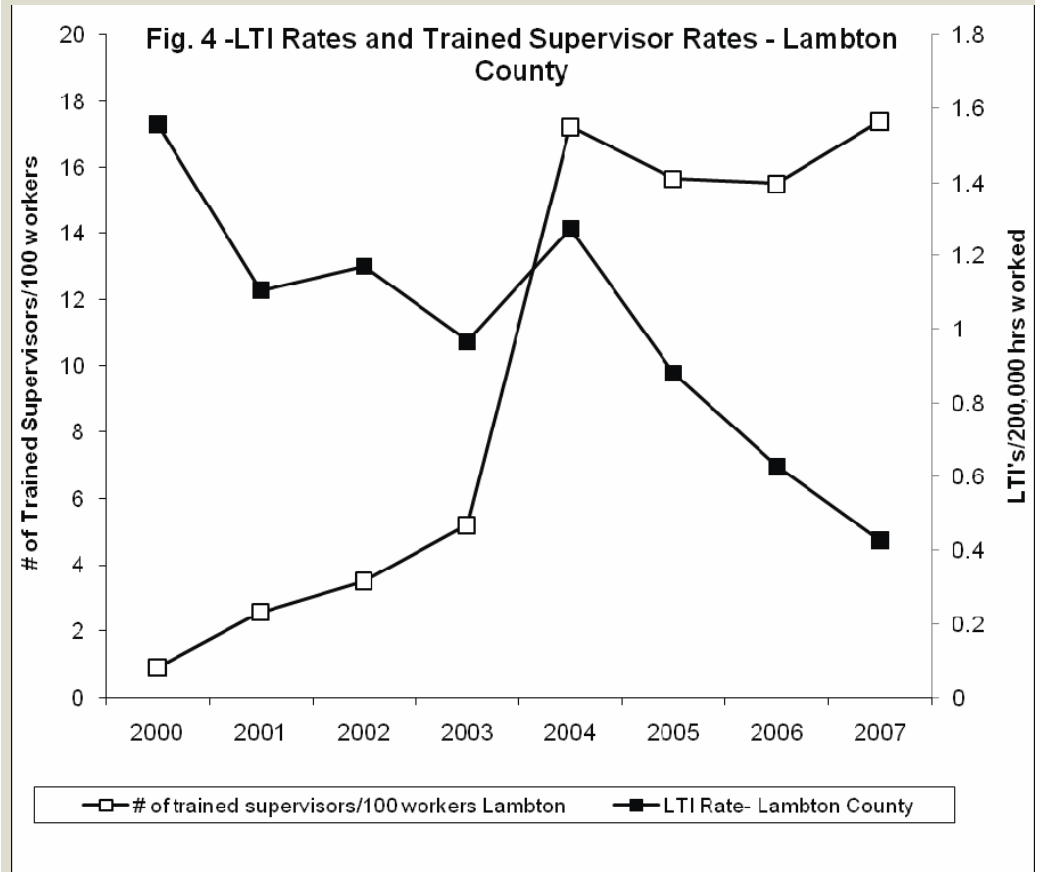
The effect of supervisory training on lost-time injury rates in construction

D. J. McVittie, DOHS

P. Vi, M.Eng

February 2009

Construction Safety Association of Ontario - Study



My recommendation for small employers with construction workers:

- Plan for safety
- Train your foremen
- Train workers, especially new and inexperienced workers
- Score yourself on how well you design your project from inception

Our recommendations to DOL / BLS & OSHA

As DOL/BLS proceeds in establishing a definition of “green jobs,” it is essential that conserving our **human resources** receive the same consideration as conserving our **natural resources**.

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