Stilts Injuries in Construction

A study of workers' compensation claims in Washington State, 1996 to 2002

By Carolyn Whitaker

THE CONSTRUCTION INDUSTRY is at high risk for sustaining work-related injuries and illnesses (Bonauto, et al 3; Leigh, et al 201; Okun, et al 302; NIOSH 240). Workers face many hazards such as a dynamic, temporary and changing worksite; working at heights; using power tools; and lifting heavy and awkward materials. While various trades often share the same evolving space, all must take responsibility for ensuring a safe workplace.

Construction work is often performed on elevated surfaces such as scaffolds, ladders, lifts and stilts. Stilts are a form of scaffolding; however, a person wearing stilts typically lacks secondary fall protection devices such as safety rails or harnesses that are required with scaffolds. If a worker wearing stilts were to trip, s/he will likely fall. In Washington State, stilts are used primarily in wallboard installation, wallboard finishing and insulation installation trades. In these trades, stilts permit the user to quickly access areas high overhead, in corners, on ceilings and in narrow spaces such as hallways.

Stilts extend the lower part of a person's leg and raise a person above the walking surface. This shifts a person's center of gravity upward, requiring the wearer to adjust his/her sense of balance. Otherwise nonhazardous aspects of the working environment—such as doorways, overhead fixtures and benches—can become hazardous as a stilts user tries to navigate around them. Most stilts are made of aluminum and the worker's foot is typically secured with straps to a fixed, spring-loaded sole plate while the footpad that contacts the ground articulates. Stilts may have fixed legs that range from 14 to 24 in. or telescoping legs that extend from 14 to 40 in.

Most published studies that describe falls among wallboard installers, residential carpenters and insulators do not discern falls from stilts as compared to falls from scaffolds and ladders [Lipscomb, et al(a) 797; (b) 483; Chiou, et al 1105; Dement and Lipscomb, 102]. This is largely because, unlike ladders and scaffolds, stilts do not have a designated injury code such as an Occupational Injury and Illness Classification Structure (OIICS) code (see Event or Exposure Classification Codes 110 through 119) or an ANSI Z16.2 code for categorizing these types of injuries (BLS; ANSI). The author found no published studies that document injuries from stilts in the construction industry. The description of stilts injuries is based on information contained in descriptive text fields within Washington State's State Fund industrial insurance data.

The impetus for this study was a request for information about stilts injuries from a union representative of the ceiling and wallboard industry. Some companies and communities are questioning the costs, benefits and safety of stilts as compared to scaffolds. In two surveys conducted among drywall installers and finishers, tasks performed using stilts were perceived as having greater fall potential than tasks performed with stepladders and scaffolds [Pan, et al(a) 35]. Scaffolds and ladders may reduce the fall potential compared to stilts and can serve as an alternative to stilts. However, the challenges of working with scaffolds in lieu of stilts include the need to reset and move scaffolds as work progresses; this is a time-consuming task during which other injuries could occur [Pan, et al(b) 630].

The purpose of this study is to describe the magnitude and costs of stilts-related claims using workers' compensation data (text fields). In addition, underlying causes for stilts claims and subsequent strategies for prevention are identified. This study does not attempt to address whether stilts should be banned. Communities that are considering a switch from stilts to scaffolds and ladders can use the injury information presented to better understand the safety and economic implications of such a decision.

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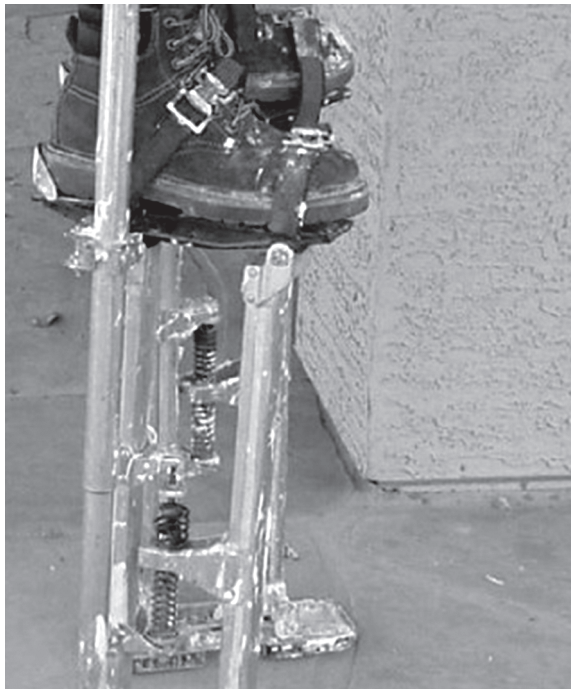

Abstract: *Stilts are used in the construction trades to elevate a worker above the walking surface to complete work on walls and ceilings. This article examines data from Washington State's workers' compensation system and describes the magnitude, underlying causes and costs of claims incurred by stilts users. A total of $3.4 million was paid on 277 claims from 1996 to 2002. The median cost of compensable claims was $7,223 and these claims cost a median of 73 lost workdays. Prevention strategies are provided based on the injury causes found in this claims analysis.*

Relavant Safety & Health Regulations

There are no documented surveys of stilts use in the U.S. However, vendors who sell these devices to the construction trades can be found in at least 30 states, indicating that stilts are used nationwide. California currently bans the use of stilts in construction [California Code of Regulations 8:1637(j)]; this ban dates back to approximately 1965 when language prohibiting stilts is found in the California Construction Safety Orders. In the late 1990s, the Victorian WorkCover Authority of Australia announced a no-tolerance policy regarding stilts use in construction work, citing the inherent dangers of stilts and the unacceptable risks of injury to the wearer (WorkSafe Victoria 1). As in most of the U.S., stilts are permitted in construction work in Washington State. The safety and health laws that regulate their use are found in the Washington Administrative Code (WAC) [WAC 296-155-505(7) and 296-874-20042].

Washington State's Industrial Insurance System

With the exception of the federal government, those self-employed, and those who qualify to self-insure, Washington State employers must obtain workers' compensation insurance through the Washington State Department of Labor and Industries (L&I) industrial insurance system. The department administers the State Fund, an industrial insurance program that provides coverage for approximately 1.9 million (about two-thirds) of the workers in the state.

Injury Claim Coding & Case Identification

A worker, the employer and the worker's physician complete a Report of Industrial Injury or Occupational Disease form to initiate an injury claim. On the form, the worker, employer and physician provide descriptive information regarding the injury, including a potential description of tools involved. Text from the injury form is transcribed verbatim into text fields and is stored within L&I databases. The selection criteria used in this study was a computerized text search for the word "stilt" on the injury form with an injury date between January 1996 and December 2002. Additional text searching for potential misspellings of the word stilt were undertaken (e.g., tilt, still, stit, spilt). Following all text extractions, claim text was manually reviewed and claims that were not stilts-related were excluded. Text extraction was used because the ANSI Z16.2 coding system—the injury classification used by L&I workers' compensation system—does not have "stilts" as a designated injury source (ANSI).

Job Classes & Task Descriptions

L&I classifies all occupations and industries into more than 300 risk classes or job classes by similar risk of injury for insurance purposes [WAC 296-17-310(2)]. This classification, termed the Washington Industrial Classification (WIC) System, is unique to the Washington State industrial insurance system. The job class system is useful for analysis because it identifies workers engaged in similar processes across various industries. During the study period, workers in 15 construction-related job classes filed workers' compensation claims for stilts-related injuries. Four job class categories are described in this article: 1) wallboard taping and texturing; 2) insulation installation; 3) wallboard installation; and 4) other (includes 12 different job classes that had 12 or fewer claims per class). Job classes in the "other" category include carpentry, exterior painting, interior plastering and sprinkler installation.

The wallboard installation job class includes the installation of wallboard (also known as drywall, gypsum board and sheetrock) in all types of residential and commercial buildings. The process typically includes cutting the wallboard to size with hand or power tools, then using nails or screws to fasten it to wall studs or onto the ceiling. Wallboard taping and finishing workers are engaged in taping wallboard after it is installed. The process involves taping the seams, spreading joint compound over the seams and sanding the joint compound until smooth. Finishing also includes wallboard texturing and wallboard priming. Insulation installation includes workers who use stilts to install suspended or acoustical grid ceilings in commercial buildings, as well as workers who handle insulation material for residential and commercial buildings.

Data Analysis

Data for claims analysis were extracted from the L&I database on Aug. 10, 2004, including information on claimant demographics, claim cost and time lost. Claims were analyzed by job class and injury type. Injury rates were calculated using the number of claims as the numerator and the number of full-time equivalent workers (FTEs) as the denominator.

Claims Costs

Claims are divided into three cost categories: no cost, medical-only and compensable claims. Medical-only claims have costs attributed to the clinical care and diagnoses of the injured worker, whereas compensable claims have the same medical costs plus wage replacement benefits (paid after more than 3 days of time lost), and/or disability and pension. This article describes the economic burden of stilts claims with regard to the median cost of medical-only claims and on the number of lost workdays (time lost days), and the total dollar amount paid for compensable claims by job class and injury type. Claim costs for

closed claims reflect actual paid costs. For claims that were not closed, costs reflect paid costs plus the total future costs as estimated by a case reserve specialist.

Results

This study analyzed all 280 workers' compensation claims filed from 1996 to 2002. Of the 280 claims, 275 were accepted and 276 were closed at the time of analysis. A total of 117 claims (42%) were compensable or incurred costs in addition to medical care such as lost work time payments (3 or more days lost), disability and pension. No stilts-related claims were fatal. No worker filed two or more claims for a stilts-related injury. All claims filed were within the construction industry as defined by the North American Industry Classification System (NAICS) codes of 2361, 2362, 2381, 2382, 2383 and 2389 (OMB).

Table 1

Claims, FTEs & Injury Rate by Job Class

Job class	No. of Claims (%)	No. of FTEs	Claim rate/10,000 FTEs
Wallboard taping and texturing	137 (48.9)	8,958	153.0
Insulation installation	84 (30.0)	7,554	111.2
Wallboard installation	23 (8.2)	8,634	26.6
Other[a]	36 (12.9)	202,002	1.8

[a]Other includes 12 job classes with fewer than 12 claims in each class.

Table 2

Underlying Causes of Stilts Injuries

	No. of claims (%)				
Injury Type	Wallboard taping/texturing	Insulation installation	Wallboard installation	Other	Total
Fall	90 (65.7)	54 (64.3)	14 (60.9)	24 (66.7)	182 (65.0)
Overexertion	16 (11.7)	8 (9.5)	4 (17.4)	3 (8.3)	31 (11.1)
Bodily reaction	16 (11.7)	5 (6.0)	3 (13.0)	3 (8.3)	27 (9.6)
Struck against	6 (4.4)	10 (11.9)	1 (4.4)	2 (5.6)	19 (6.8)
Other	9 (6.6)	7 (8.3)	1 (4.4)	4 (11.1)	21 (7.5)
Total	137 (100)	84 (100)	23 (100)	36 (100)	280 (100)

Table 1 shows that the wallboard taping and texturing job class had the greatest stilts claim rate followed by insulation installation (111 claims/10,000 FTEs) and wallboard installation (27 claims/10,000 FTEs). For these top three job classes, an average of 10 claims were filed (range 1 to 30 claims per year) involving an average of approximately 1,200 FTEs (range 923 to 1,362 FTEs) per year. Twelve job classes were combined into a single "other" category, which had a total of 36 claims and 202,002 FTEs during the 7-year study period. Within the "other" category, building repair and carpentry had 11 claims (31%).

Table 2 shows that falls were consistently the most common injury type and accounted for 65% of all claims. Overexertion (musculoskeletal) claims accounted for 11% of all claims, followed by bodily reaction which comprised 10% and struck against which totaled 7%. The types of injury were similar for all four job class categories.

A primary goal of this analysis was to determine the underlying causes of stilts injuries so that prevention strategies could be identified. Table 3 shows that trips were the leading cause of stilts claims in each job class and accounted for 38% of all injuries. Slips ranked second and were the underlying cause in 15% of the claims. Overexertion includes musculoskeletal disorders and ranked third (9%), followed by poorly maintained stilts (8%) and falls incurred while putting on or removing stilts (5%). In some cases, a worker hit his/her head on fire sprinklers or doorjambs (4%), lost his/her balance (4%) or fell while bending over (2%). Claims with causes coded as "other" include getting things in the eye, ambient lighting failure, contact with live electrical wire, infection from stilt strap, falls down stairs and pushing material with legs while wearing stilts.

Economic Impact of Stilts Claims

During the study period, a total of $3.4 million was paid on 277 claims (three claims with no costs incurred were rejected). The 12 costliest claims (top 5%) accounted for $2 million (60%) of all total claim costs (range $72,645 to $378,656). These claims occurred primarily in wallboard taping and texturing workers (n = 8, 67%) and were primarily caused by falls (n = 10, 83%). The underlying causes of the 12 costliest claims included trips (n = 6, 50%) from contact with an extension cord, a stack of wood, wallboard scrap, a box and a scaffold wheel. Circumstances such as slips and poorly maintained stilts accounted for two claims (17%) each and were also underlying factors among the 12 costliest claims.

A total of 177 workers (63%) had no lost workdays as a result of their injuries; funds paid for these medical-only claims totaled $226,209 (median $350). A total of 103 workers (37%) claimed 4 or more lost

Table 3

Underlying Causes of Stilts Claims

	No. of claims (%)				
Underlying cause	**Wallboard taping/texturing**	**Insulation installation**	**Wallboard installation**	**Other**	**Total**
Tripping	56 (41)	27 (32)	10 (44)	12 (33)	105 (38)
Slipping	21 (15)	13 (16)	2 (9)	7 (19)	43 (15)
Overexertion	13 (10)	8 (10)	3 (13)	1 (3)	25 (9)
Poorly maintained stilts	13 (10)	6 (7)	1 (4)	3 (8)	23 (8)
Putting on or removing stilts	2 (2)	5 (6)	3 (13)	3 (8)	13 (5)
Hitting head on fixture	5 (4)	6 (7)	0 (0)	1 (3)	12 (4)
Loss of balance	4 (3)	3 (4)	2 (9)	1 (3)	10 (4)
Bending	4 (3)	0 (0)	0 (0)	1 (3)	5 (2)
Other	8 (6)	7 (8)	2 (9)	4 (11)	21 (8)
Insufficient information	11 (8)	9 (11)	0 (0)	3 (8)	23 (8)
Total	137 (100)	84 (100)	23 (100)	36 (100)	280 (100)

workdays (median 73, range 1 to 2,465) due to a stilts-related injury (Table 4). By job class category, workers in the "other" category reported at least twice the median number of lost workdays compared with wallboard taping and texturing workers; they also had the highest median total dollar amount paid for a claim. The total dollar amount paid for compensable claims predominantly includes wage replacement benefits (cost of lost workdays) as well as medical costs and disability or pension awards. That "other" workers have the lowest number of compensable stilts claims overall but the highest costs indicates that the injuries sustained by "other" workers are possibly more severe compared to workers in the wallboard taping and texturing, wallboard installation and insulation installation job classes.

By injury type, compensable claims resulting from being struck against an object were the most expensive; half of the four struck against claims were paid at least $11,170 per claim and had more than 118 (median) lost workdays. These four "struck against" claims all involved a fall in which the knees or head struck the floor, wall or doorjamb. Falls accounted for 65% of all claims and ranked second by cost at a median of $8,430 per claim with a median of 82 lost workdays. Bodily reaction and overexertion claims ranked third and fourth (median $6,953 and $4,492, respectively) in the total dollar amount paid per claim.

Discussion

An analysis of workers' compensation claims data identified that stilts-related claims occurred among the wallboard taping and texturing, wallboard installation, insulation installation and "other" construction job classes from 1996 to 2002. Workers who sustained the most stilts-related claims were engaged in wallboard taping and texturing and insulation installation. Compensable claims sustained by carpenters and other construction workers had a higher median number of lost workdays and much greater monetary cost, as compared to the wallboard and insulation installation trades. Trades in the "other" category, such as carpentry, perform highly diverse tasks and are not using stilts frequently tradewide. They may not have widespread cultural knowledge on the inherent hazards associated with stilts and they may be less likely to have frequent training and routine stilt maintenance.

Injuries have economic, social and emotional implications for the injured worker and his/her family. Approximately 37% of all stilts-related claims were compensable, with a median of 73 lost workdays. This is greater than all Washington State Fund workers' compensation claims combined, where 24% of all claims are compensable and the median number of lost workdays is 24 (Silverstein, et al 38). In addition to lost workdays, injured workers may suffer an additional loss of earning power if they have difficulty reentering the workforce post-injury because of low job demand and/or high labor competition.

The common underlying causes of falls were in keeping with the environment found at construction sites. Items such as extension and power tool cords, loose wires, carpet edge, tool carts, boxes, scaffold wheels, sheet plastic (meant to protect floors) and wallboard scrap were responsible for most trips. Falls from slips were predominantly caused by stepping in wet drywall mud, water and oil. Slips were also caused by stepping on small objects such as screws, nuts or metal debris. Several claims were caused by poor stilt maintenance including broken straps, loose straps and loose wing nuts. Because stilts elevate a person's height, contact with overhead fixtures such as doorjambs, sprinkler heads and exit lights can

Table 4

Lost Workdays & Total Dollar Amount Paid for Compensable Claims by Job Class & Injury Type

	Total no. of lost workdays			Total amount paid for claim		
Job class	**No. of claims**	**Median (days)**	**Range (days)**	**No. of claims**	**Median**	**Range**
Wallboard taping and texturing	58	76	1 to 2,465	68	$7,303	$101 to $378,656
Insulation installation	25	49	1 to 436	25	$4,492	$467 to $58,282
Wallboard installation	6	110	31 to 1,009	7	$3,638	$715 to $77,783
Other[a]	14	153	6 to 1,664	17	$27,710	$272 to $227,785
Injury type						
Struck against	4	118	15 to 436	4	$11,170	$1,569 to $58,282
Fall	68	82	1 to 2,465	77	$8,430	$147 to $361,544
Bodily reaction	11	82	3 to 584	13	$6,953	$426 to $86,531
Overexertion	15	37	1 to 1,615	17	$4,492	$101 to $378,656
Other	5	62	25 to 168	6	$2,524	$1,170 to $32,109
Total	103	73	1 to 2,465	117	$7,223	$101 to $378,656

[a]*Other includes 12 job classes with fewer than 12 claims in each class.*

result in head injuries or falls. In one study, drywall finishers perceived that putting on and getting up on stilts posed the greatest fall potential compared to other work-related tasks such as applying joint compound or smoothing tape [Pan, et al 626(b)]. In the present analysis, the act of putting on and taking off stilts contributed to just 5% of the claims. Inherent loss of balance, with no other contributing factors mentioned, accounted for 4% of the claims.

Overexertion was the second leading injury type. Overexertion can result from both the strains that stilts place on the body as well as from the task required to complete the work. Stilts put high stress on the knees, legs, hips and back. Stilts put strain on the body because they change the mechanics of walking and alter a person's standing posture. Solid stilt foot plates prevent normal flexing and extending of the foot when walking forward, creating a more flat-footed gait. When stepping to the side in stilts, the foot and ankle cannot flex side-to-side; this can cause strain on the knee when it tries to compensate. The risk factors for overexertion disorders include heavy and awkward lifting, working with the hands over the head, repetitive motion and high hand force [Pan, et al(b) 629; L&I 4].

Limitations

The data presented in this article are likely an underestimation of the true burden of stilts-related claims. Claims not included in this analysis are those by self-insured employers, self-employed workers, nonregistered workers and injury incidents for which a claim was not filed. Because the claim selection criteria was based on a text word search rather than ANSI codes, stilts-related claims with no text information or text that did not include the word "stilt" were not counted.

Prevention Strategies

The challenge of preventing stilts injuries lies in the fact that virtually all common workplace objects can cause a fall from stilts. Items resulting in falls were as large as tool carts and as small as metal nuts. Given the great difficulty of eliminating these hazards, the use of scaffolds in place of stilts should be considered. California and Victoria, Australia, are examples of communities that have substituted scaffolds in place of stilts.

- Unlike stilts, scaffolds provide some fall protection. While scaffold use will not completely eliminate fall hazards, it may reduce the risk of fall injury.
- On a high ceiling job that requires full extension of stilts, a scaffold can provide a more comfortable and stable base for the high hand-pressure tasks of boxing and sanding.

Good housekeeping is critical to preventing stilts-related injuries. The majority of the claims discussed in this study resulted from a fall caused by a trip or slip. The underlying cause of most trips and slips is related to housekeeping. At the beginning of every shift, or when work progresses into a new area, the worker should:

- identify and remove (where possible) objects that may result in a fall;
- clear the floor of plastic or other large debris;
- sweep the floor;

The challenge of preventing stilts injuries lies in the fact that virtually all common workplace objects can cause a fall from stilts.

•carry brooms onto the site along with equipment and tools.

In general:

•Share information on stilts hazards with other trades at the worksite. This is essential to successful housekeeping efforts.

•Train stilts users to recognize that most items within their workspace are a potential fall hazard; time should be dedicated throughout the day to ensure that the work area is free of all such possible hazards.

•Motivation to keep a clear, uncluttered workplace can be found in the recognition that stilts injuries can be severe, can result in lengthy time away from work, and can be an economic and social drain on the worker.

Overexertion disorders can be prevented by limiting exposure to the risk factors that cause them.

•Use only high-quality, well-maintained stilts to reduce the stress that stilts can inherently place on the body. This study revealed that negligence in stilt care and maintenance can result in injury.

•Rotate tasks so that part of the day is spent off stilts; this will help to reduce the risk of overexertion disorders.

•All persons who wear stilts should be instructed on how to inspect, maintain and properly don stilts.

•All persons who wear stilts should exercise care when putting on and taking off stilts as injuries have been documented to occur during this task.

Conclusion

This report describes the underlying causes and economic costs of occupational stilts injuries, an injury type that is not well characterized in the published literature. Injuries predominantly occurred in the construction job classes of wallboard taping and texturing, wallboard installation, and insulation installation. Falls were the most common injury type, accounting for 65% of all claims. Falls from stilts were predominantly caused by trips and slips over a wide variety of workplace obstacles and debris; the primary prevention strategy for stilts injuries is therefore good housekeeping practices. The median number of lost workdays associated with compensable stilts injuries was high at 73 days, indicating that stilts injuries are severe. Stilts injuries have economic, social and an emotional impact on the injured worker and their family. ■

References

ANSI. Method of Recording Basic Facts Relating to the Nature and Occurrence of Work Injuries. ANSI Z16.2-1941, Rev. 1969. New York: ANSI, 1969.

Bonauto, D., et al. "Prioritizing Industries for Occupational Injury and Illness Prevention, Washington State Workers' Compensation Claims Data, 1998-2002." Technical Report No. 64-1-2005. Olympia, WA: Washington State Department of Labor and Industries, Safety and Health Assessment and Research for Prevention (SHARP) Program, 2005.

Bureau of Labor Statistics (BLS). *Occupational Injury and Illness Classification Manual.* Washington, DC: U.S. Department of Labor, BLS, 1992. <http://www.bls.gov/iif/oshoiics.htm>.

California Code of Regulations. Title 8, Section 1637(j). Prohibited Types of Scaffolds. Register 2005, No. 21, 2005.

Chiou, S.S., et al. "Traumatic Injury among Drywall Installers, 1992 to 1995." *Journal of Occupational Environmental Medicine.* 42(2000): 1101-1108.

Dement, J.M. and H. Lipscomb. "Workers' Compensation Experience of North Carolina Residential Construction Workers, 1986 to 1994." *Appl Occupational Environmental Hygiene.* 14(1999): 97-106.

Leigh, J.P., et al. "Costs of Occupational Injury and Illness Across Industries." *Scand J Work Environmental Health.* 30(2004): 199-205.

Lipscomb, H.J., et al(a). "Work-Related Injuries in Drywall Installation." *Appl Occupational Environmental Hygiene.* 15(2000): 794-802.

Lipscomb, H.J., et al(b). "Work-Related Injuries in Residential and Drywall Carpentry." *Appl Occupational Environmental Hygiene.* 18(2003): 479-488.

NIOSH. *Worker Health Chartbook.* DHHS (NIOSH) Publication No. 2004-146. Cincinnati, OH: Department of Health & Human Services, Centers for Disease Control & Prevention, NIOSH, 2004.

Offices of Management and Budget (OMB). North American Industry Classification System (NAICS). Lanham, MD: Department of Commerce, National Technical Information Service, 2002.

Okun, A., et al. "Identifying High-Risk Small Business Industries for Occupational Safety and Health Interventions." *American Journal of Industrial Medicine.* 39(2001): 301-311.

Pan, C.S., et al(a). "Assessment of Perceived Traumatic Injury Hazards During Drywall Hanging." *International Journal of Industrial Ergonomics.* 25(1999): 29-37.

Pan, C.S., et al(b). "Assessment of Perceived Traumatic Injury Hazards During Drywall Taping and Sanding." *International Journal of Industrial Ergonomics.* 25(2000): 621-631.

Silverstein, B., et al. Work-Related Musculoskeletal Disorders of the Neck, Back and Upper Extremity in Washington State, 1994–2002. Technical Report No. 40-8a-2004. Olympia, WA: Washington State Department of Labor and Industries, SHARP Program, 2004.

Washington Administrative Code(a). Title 296, Chapter 296-155-505(7): Safety Standards for Construction Work, Floor Openings, Wall Openings and Stairways. Olympia, WA: Washington State Department of Labor and Industries.

Washington Administrative Code(b). Title 296, Chapter 296-874-20042: Scaffolds, General Requirements. Olympia, WA: Washington State Department of Labor and Industries.

Washington Administrative Code(c). Title 296, Chapter 296-17-310(2): Manual of Rules, Classifications, Rates and Rating System for Washington Workers' Compensation Insurance. Olympia, WA: Washington State Department of Labor and Industries.

Washington State Department of Labor and Industries. "Ergonomics Demonstration Project." Wallboard Industry. Olympia, WA: Washington State Department of Labor and Industries, 2002. <http://www.lni.wa.gov/Safety/Topics/Ergonomics/Success/Demo/default.asp>.

WorkSafe Victoria. "Why WorkSafe Will Not Tolerate the Use of Stilts for Construction Work." Victoria, Australia: Victorian WorkCover Authority, July 2002. <http://www.workcover.vic.gov.au/dir090/vwa/home.nsf/pages/so_construction_attach2/$File/Stilts.pdf>.

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