

AN ANALYSIS OF FATAL EVENTS IN THE CONSTRUCTION INDUSTRY 2000

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This report is based upon OSHA-inspected fatal events in construction during calendar 2000. The data analyzed were provided by Dr. Joseph Dubois, Director, Office of Statistics, Occupational Safety and Health Administration. William R. Schriver, Ph.D., Director, Thomas E. Cressler II, M.S., Senior Associate Administrator and Gregory G. Zigulis, B.S.C.E., MBA, Associate Director, conducted the study and prepared this report; they alone are responsible for all interpretations, conclusions and any errors found in the report.

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I. Introduction

This paper reports on the causes of fatal events in the construction industry which occurred in calendar year 2000. Seven earlier studies¹ by the Construction Industry Research and Policy Center (CIRPC) analyzed the causes of fatal events in this industry in 1991-1992, 1993-1994, 1995, 1996, 1997, 1998 and 1999.

II. Data

The data analyzed in this report, provided by OSHA from Form 170's, consist of narrative descriptions of the 637 fatal events inspected by OSHA resulting from accidents which occurred in construction during calendar year 2000. The Occupational Safety and Health Act of 1970 provides States with the option of administering the Act themselves or accepting Federal administration of the Act. Twenty-nine States and the District of Columbia chose administration under the Federal System, and the remaining 21 States and two Territories chose self-administration under State Plans².

In this report as in earlier reports, analysis includes all OSHA-inspected fatal construction accidents regardless of Federal or State administration. However, Appendix B does include separate tables showing the frequency of accident causes separately for both groups.

Also, as in the earlier studies, non-accidental fatalities on construction sites or contractor yards (such as deaths from non-work related heart attacks, strokes, seizures, etc.) and fatalities of construction workers killed off-site in traffic accidents were excluded from the analysis; these

¹ An Analysis of Fatal Events in the Construction Industry, 1991-1992 (1993), An Analysis of Fatal Events in the Construction Industry, 1993-1994 (1995), An Analysis of Fatal Events in the Construction Industry, 1995 (1996), An Analysis of Fatal Events in the Construction Industry, 1996 (1997), An Analysis of Fatal Events in the Construction Industry, 1997 (1999), An Analysis of Fatal Events in the Construction Industry, 1998 (2000), and An Analysis of Fatal Events in Construction, 1999 (2001), Construction Industry Research and Policy Center , University of Tennessee, Knoxville.

² States in the Federal System are: AL, AR, CO, CT, DE, DC, FL, GA, ID, IL, KS, LA, ME, MA, MS, MO, MT, NE, NH, NJ, NY, ND, OH, OK, PA, RI, SD, TX, WV and WI. States and Territories under State Plans are: AK, AZ, CA, HI, IN, IA, KY, MD, MI, MN, NV, NM, NC, OR, PR, SC, TN, UT, VT, VI, VA, WA and WY.

fatalities accounted for about 3 percent of OSHA-inspected fatal construction events in 1991-1999 and 4.2 percent in 2000. Although the Occupational Safety and Health Act of 1970 requires employers to report fatalities to OSHA within eight hours of the occurrence of the event, all fatalities on construction sites are not inspected by OSHA; for example, OSHA does not inspect fatal construction events involving independent contractors with no employees. Therefore, the results reported upon here do not provide a year-to-year analysis of changes in the absolute number of fatal events or individuals killed on construction sites.

Each narrative record typically consists of a brief description of the event leading to the fatality, although this is not always the case. Where the narrative description was omitted, inconclusive or completely unclear the event cause was coded “unknown cause or other”; otherwise each narrative was analyzed and classified into one of 32 cause categories, although a great deal of collective judgment was often required to classify the cause of many of the accidents.

This report also includes the following classification of each fatal event according to coding by the OSHA compliance officer who investigated the accident: (1) type of construction (new or addition, alteration or rehabilitation, maintenance or repair, demolition, other); (2) estimate of total project value (seven dollar-value categories beginning with “under \$50,000” and ending with “\$20,000,000 and over”); (3) 17 end-use categories, such as “single-family housing,” “multi-family building,” “commercial building,” “street or highway,” etc.; and (4) the construction operation being performed that caused the fatal event (selected from a list of construction operations such as “backfilling and compacting,” “cutting concrete pavement,” “erecting structural steel,” “installing equipment (HVAC and other,” etc.). However, CIRPC’s review of over 1200 case files of fatal construction events occurring in 1997, 1998 and 1999

revealed that coded data for an event were sometimes internally inconsistent or did not comport with corresponding narrative descriptions. Consequently, the data analyzed in this report are restricted to the direct causes of the fatal events where the authors were able, in most cases, to classify the events with relative certainty according to 29 types of causes, essentially the same types as were used in CIRPC's previous fatality studies. However, coded data are included in Appendix D for the following: (1) end-use of structure; (2) type of construction; (3) construction operation associated with the fatality; (4) contract value of the construction project; and (5) occupation of the victim(s).

In classifying the events a rule of primacy was followed for multiple-cause fatalities (representing less than 1 percent of the fatality events in this study and the earlier studies cited): the first cause in the chain of causes was recorded as the cause of the fatal event. Definitions of the causes are shown in Appendix A.

III. Analysis

A. Distribution of Fatal Events by Cause

Table 1 shows the cause classification system, the number of times each cause represented a fatal event in 2000, the relative frequency of each cause and the number of victims killed.³ It can be seen that "fall from/through roof" led all other causes in number of fatal events (75 or 11.8 percent of total fatal events), followed by "fall from/through structure" (57 or 8.9 percent). The third leading cause was "electric shock by equipment contacting power source" (39 or 6.1 percent); the fourth leading cause was "crushed/run-over/trapped of operator by operating construction equipment" (37 or 5.8 percent); tying for the fourth "lifting operation" (37

³ Each event included at least one person killed and in several events additional workers were injured.

Table 1. Construction Fatality Event Causes, 2000

Event Causes	Description	Number of Events and Victims		Percent of Events
		Events	Victims	
1.	asphyxiation/inhalation of toxic vapor	5	7	0.8
2.	caught in stationary equipment	7	7	1.1
3.	collapse of structure	26	30	4.1
4.	crushed/run-over of non-operator by operating construction equipment	33	34	5.2
5.	crushed/run-over/trapped of operator by operating construction equipment	37	37	5.8
6.	crushed/run-over by construction equipment during maintenance/modification	14	14	2.2
7.	crushed/run-over by highway vehicle	24	27	3.8
8.	drown, non-lethal fall	5	5	0.8
9.	electric shock by touching exposed wire	20	21	3.1
10.	electric shock by equipment contacting power source	39	43	6.1
		<u>Event</u>	<u>Percent</u>	
	a. ladder	8	1.3	
	b. scaffold	2	0.3	
	c. crane/lifting equipment/boom/dump truck	18	2.8	
	d. contact while handling materials such as gutters, iron rods, etc.	11	1.7	
11.	electric shock from equipment installation/tool use	35	35	5.5
12.	electric shock, other	0	0	0.0
13.	elevator (struck/crushed by elevator or counter weights)	2	2	0.3
14.	fall from/with ladder: includes collapse/fall of ladder	26	26	4.1
15.	fall from/through roof	75	75	11.8
16.	fall from highway vehicle/construction equipment	12	12	1.9
17.	fall from/with scaffold	30	30	4.7
18.	fall from/with bucket (aerial lift/basket)	13	13	2.0
19.	fall from/with structure (other than roof)	57	57	8.9
20.	fall from/with platform or catwalk	12	14	1.9
21.	fall through opening (other than roof)	18	18	2.8
22.	fall, other	0	0	0.0
23.	fire/explosion/scalding	14	15	2.2
24.	hyperthermia/hypothermia	4	4	0.6

25.	lifting operation	37	37	5.8
26.	struck by falling object/projectile (including tip-overs)	25	25	3.9
27.	trench collapse	36	43	5.7
28.	unloading-loading equipment/material (except by crane)	18	18	2.8
29.	other:	13	14	2.0

	<u>Event</u>	<u>Percent</u>
a. lightning	0	0.0
b. crushed	5	0.8
c. unknown cause or other	8	1.3

	<u>637</u>	<u>663</u>	<u>100.00</u>
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or 5.8 percent); the fifth leading cause was “trench collapse” (36 or 5.7 percent); and the sixth leading cause was “electric shock from equipment installation/tool use” (35 or 5.5 percent). The number and relative frequencies of the remaining causes of the 637 fatal events analyzed may be read directly from Table 1. (Comparative frequencies for earlier years are shown in Figures C1 through C4 in Appendix C.)

The number of victims killed by each cause is also shown in Table 1 where it can be seen that in most events only one worker was killed per event. There were 16 fatality causes where no event had multiple fatalities; only 10 fatality causes included events with multiple fatalities. “Asphyxiation/ inhalation of toxic vapors” was the fatality cause which had the most victims killed per event, i.e., 5 events and 7 victims or 1.4 victims per event.

Table 2 shows a comparison of the ranks of the causes in 2000 with the average rank of the causes of fatal events during the period 1991 - 1999. It can be seen that the overall rank pattern of the causes in 2000 is very similar to the rank pattern in 1991 – 1999. An overall statistical comparison of the correlation of the rank in 2000 with the average rank in 1991-1999 was calculated using a Spearman

Table 2. Comparison of Ranks of Causes of Fatal Events in 1991 - 1999 with 2000

<u>Event</u>	<u>1991 - 1999 Average</u>			<u>2000</u>		
	<u>Number</u>	<u>Percent</u>	<u>Rank</u>	<u>Number</u>	<u>Percent</u>	<u>Rank</u>
1.	6.3	1.1	22	5	0.8	24
2.	5.8	1.0	25	7	1.1	23
3.	26.3	4.4	8	26	4.1	10
4.	47.9	7.9	3	33	5.2	8
5.	32.1	5.3	6	37	5.8	4
6.	12.2	2.0	19	14	2.2	17
7.	24.7	4.1	11	24	3.8	13
8.	6.0	1.0	23	5	0.8	24
9.	25.7	4.3	9	20	3.1	14
10.	48.2	8.0	2	39	6.1	3
11.	25.0	4.1	10	35	5.5	7
12.	5.9	1.0	24	0	0.0	28
13.	24.0	0.4	29	2	0.3	27
14.	23.1	3.8	12	26	4.1	10
15.	67.2	11.2	1	75	11.8	1
16.	4.7	0.8	26	12	1.9	21
17.	19.2	3.2	14	30	4.7	9
18.	11.8	2.0	20	13	2.0	19
19.	46.0	7.6	4	57	8.9	2
20.	15.4	2.6	16	12	1.9	21
21.	15.1	2.5	17	18	2.8	15
22.	4.7	0.8	26	0	0.0	28
23.	14.3	2.4	18	14	2.2	17
24.	3.4	0.6	28	4	0.6	26
25.	32.7	5.4	5	37	5.8	4
26.	22.2	3.7	13	25	3.9	12
27.	27.9	4.6	7	36	5.7	6
28.	10.1	1.7	21	18	2.8	15
29.	16.3	2.7	15	13	2.0	19
TOTAL	<u>603</u>	<u>100.0</u>		<u>637</u>	<u>100.0</u>	

rank correlation procedure.⁴ The correlation obtained was + .94, $p < .0001$, indicating that the ranks of the causes in the two time periods are highly and positively correlated, i.e., did not change significantly between 1991 – 1999 and 2000. Since averaging the 1991 – 1999 ranks removed inter-year variance, a somewhat lower correlation would be expected between 1999 and 2000 ranks of causes, i.e., a measure of the short-term cycle as opposed to a longer-term trend. The Spearman rank-order correlation between 1999 and 2000 causes was calculated and found to be insignificantly lower, + .92, $p < .0001$, indicating that the 1991-1998 pattern changed very little between 1999 and 2000.

The correlation result is not surprising given that the general composition of construction output, and therefore the mix of construction operations required to produce the output, was probably very similar during the time periods examined. This interpretation implies that the rank of a cause is a function of the magnitude of exposure to the cause and/or the inherent danger associated with the cause.

While the number of OSHA-inspected fatal construction events caused by accidents have had an upward trend since 1991, employment in construction establishments has also increased.⁵ The trend of these fatal events per 100,000 construction establishment employees is as follows: 1991 – 1992: 13.1; 1993 – 1994: 11.8; 1995: 11.4; 1996: 10.5; 1997: 10.6, 1998: 10.4; 1999: 11.0; and 2000: 9.5.

⁴ Sydney Siegel, Nonparametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 956), p. 219.

⁵ Bureau of Labor Statistics, National Employment, Hours, and Earnings.

APPENDIX A

Definitions of Fatality Causes

1. asphyxiation/inhalation of toxic vapor: lack of oxygen and/or inhalation of toxic gas, (excluding asphyxiation resulting from fire/explosion).
2. caught in stationary equipment: body or clothing caught pulling worker into equipment.
3. collapse of structure: building or other structure falling on worker, not including falling ladder, scaffold, aerial lift/ basket, platform, with a structure, trench collapse, or wall (earthen) collapse.
4. crushed/run-over of non-operator by operating construction equipment: non-operator run-over or crushed between equipment and ground or another object by an operator controlled piece of construction equipment.
5. crushed/run-over/trapped of operator by operating construction equipment: includes rollover and catching of body in equipment or between equipment and ground or other object while operating the equipment.*
6. crushed/run-over by construction equipment during maintenance/ modification: includes equipment/parts falling on worker while assembling or disassembling equipment.
7. crushed/run-over by highway vehicle: any run-over by non-construction equipment, including trains.
8. drown, non-lethal fall: non-lethal falls into water and flooding of container, trenches, etc.
9. electrocution by touching exposed wire/source: body part contacting the wire/source except when installing equipment or using a tool.
10. electrocution by equipment contacting wire
 - a. ladder
 - b. scaffold
 - c. crane/lifting equipment/boom/dump truck:
 - d. other: contact while handling materials, e g. gutters, iron rods, painting equipment, etc.

*Includes fatalities resulting from asphyxiation/fire/explosion/drowning of trapped operators.

11. electrocution from equipment installation/tool use: includes failure to de-energize equipment, inappropriate energizing, contacting energized part with tool or body, and inadequately grounded tools or exposed tool wires.
12. electric shock, other and unknown cause
13. elevator (struck/crushed by elevator or counter-weights):
14. fall from/with ladder: includes collapse/fall of ladder.
15. fall from roof; fall through roof: skylight or other opening.
16. fall from vehicle (vehicle/construction equipment): falls from vehicle or equipment while in motion or at rest.
17. fall from/with scaffold: includes collapse/fall of scaffold.
18. fall from/with bucket (aerial lift/basket): includes collapse/fall of bucket.
19. fall from/with structure (other than roof): fall through opening in the side or through the floor (not opening in the floor) and with the structure in a collapse.
20. fall from/with platform or catwalk (attached to structure: includes collapse/fall of platform.
21. fall through opening (other than roof): falls through stairwells, equipment openings, or other openings in a floor.
22. fall, other
23. fire/explosion/scalding, excluding electrical burns/explosions
24. heat/hypothermia
25. lifting operations: failure of equipment, inappropriate lifting, and all loading and unloading by crane operations except electrocution.
26. struck by falling object/projectile (including tip-overs): does not include collapse of structure, trench, earthen wall, or lifting operations.
27. trench collapse: includes earthen wall
28. unloading-loading equipment/material (except by crane): includes slipping and tipping over of construction equipment/material while loading and unloading.

29. other:
- a. lightning
 - b. crushed
 - c. unknown cause or other

APPENDIX B

Table B1. State Plan Construction Fatality Event Causes, 2000

Event Causes	Description	Number of Events and Victims		Percent of Events
		Events	Victims	
1.	asphyxiation/inhalation of toxic vapor	3	5	1.5
2.	caught in stationary equipment	2	2	1.0
3.	collapse of structure	5	6	2.5
4.	crushed/run-over of non-operator by operating construction equipment	12	12	6.0
5.	crushed/run-over/trapped of operator by operating construction equipment	17	17	8.5
6.	crushed/run-over by construction equipment during maintenance/modification	0	0	0.0
7.	crushed/run-over by highway vehicle	2	2	1.0
8.	drown, non-lethal fall	0	0	0.0
9.	electric shock by touching exposed wire	8	9	4.0
10.	electric shock by equipment contacting power source	19	21	9.5
		<u>Event</u>	<u>Percent</u>	
	a. ladder	3	1.5	
	b. scaffold	1	0.5	
	c. crane/lifting equipment/boom/dump truck	8	4.0	
	d. contact while handling materials such as gutters, iron rods, etc.	7	3.5	
11.	electric shock from equipment installation/tool use	12	12	6.0
12.	electric shock, other	0	0	0.0
13.	elevator (struck/crushed by elevator or counter weights)	0	0	0.0
14.	fall from/with ladder: includes collapse/fall of ladder	9	9	4.5
15.	fall from/through roof	26	26	13.1
16.	fall from highway vehicle/construction equipment	4	4	2.0
17.	fall from/with scaffold	12	12	6.0
18.	fall from/with bucket (aerial lift/basket)	2	2	1.0
19.	fall from/with structure (other than roof)	14	14	7.0
20.	fall from/with platform or catwalk	2	2	1.0
21.	fall through opening (other than roof)	5	5	2.5
22.	fall, other	0	0	0.0
23.	fire/explosion/scalding	5	6	2.5
24.	hyperthermia/hypothermia	0	0	0.0
25.	lifting operation	11	11	5.5

26.	struck by falling object/projectile (including tip-overs)	6	6	3.0
27.	trench collapse	15	16	7.5
28.	unloading-loading equipment/material (except by crane)	6	6	3.0
29.	other:	2	2	1.0

	<u>Event</u>	<u>Percent</u>
a.	lightning	0
b.	crushed	2
c.	unknown cause or other	0

	<u>199</u>	<u>207</u>	<u>100.00</u>
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Table B2. Federal State Construction Fatality Event Causes, 2000

Event Causes	Description	Number of Events and Victims		Percent of Events
		Events	Victims	
1.	asphyxiation/inhalation of toxic vapor	2	2	0.5
2.	caught in stationary equipment	5	5	1.1
3.	collapse of structure	21	24	4.8
4.	crushed/run-over of non-operator by operating construction equipment	21	22	4.8
5.	crushed/run-over/trapped of operator by operating construction equipment	20	20	4.6
6.	crushed/run-over by construction equipment during maintenance/modification	14	14	3.2
7.	crushed/run-over by highway vehicle	22	25	5.0
8.	drown, non-lethal fall	5	5	1.1
9.	electric shock by touching exposed wire	12	12	2.7
10.	electric shock by equipment contacting power source	20	22	4.6
		<u>Event</u>	<u>Percent</u>	
	a. ladder	5	1.1	
	b. scaffold	1	0.2	
	c. crane/lifting equipment/boom/dump truck	10	2.3	
	d. contact while handling materials such as gutters, iron rods, etc.	4	0.9	
11.	electric shock from equipment installation/tool use	23	23	5.3
12.	electric shock, other	0	0	0.0
13.	elevator (struck/crushed by elevator or counter weights)	2	2	0.5
14.	fall from/with ladder: includes collapse/fall of ladder	17	17	3.9
15.	fall from/through roof	49	49	11.2
16.	fall from highway vehicle/construction equipment	8	8	1.8
17.	fall from/with scaffold	18	18	4.1
18.	fall from/with bucket (aerial lift/basket)	11	11	2.5
19.	fall from/with structure (other than roof)	43	43	9.8
20.	fall from/with platform or catwalk	10	12	2.3
21.	fall through opening (other than roof)	13	13	3.0
22.	fall, other	0	0	0.0
23.	fire/explosion/scalding	9	9	2.1
24.	hyperthermia/hypothermia	4	4	0.9
25.	lifting operation	26	26	5.9

26.	struck by falling object/projectile (including tip-overs)	19	19	4.3
27.	trench collapse	21	27	4.8
28.	unloading-loading equipment/material (except by crane)	12	12	2.7
29.	other:	11	12	2.5

	<u>Event</u>	<u>Percent</u>
a.	lightning	0
b.	crushed	3
c.	unknown cause or other	8

	<u>438</u>	<u>456</u>	<u>100.00</u>
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APPENDIX C

Figure C1. Comparison of Construction Fatality Events (1991-99 and 2000)

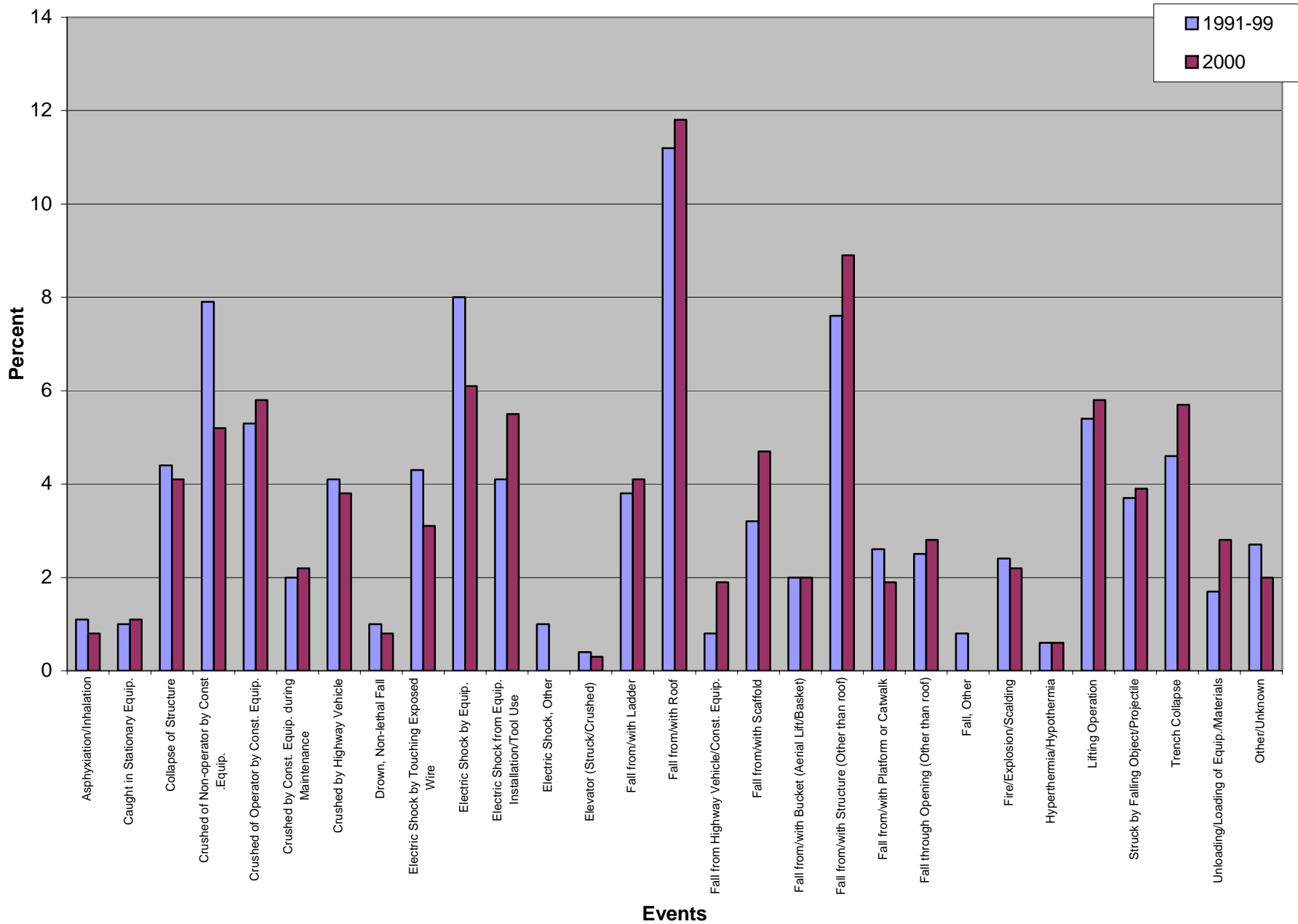


Figure C2. Comparison of Construction Fatality Events (2000)

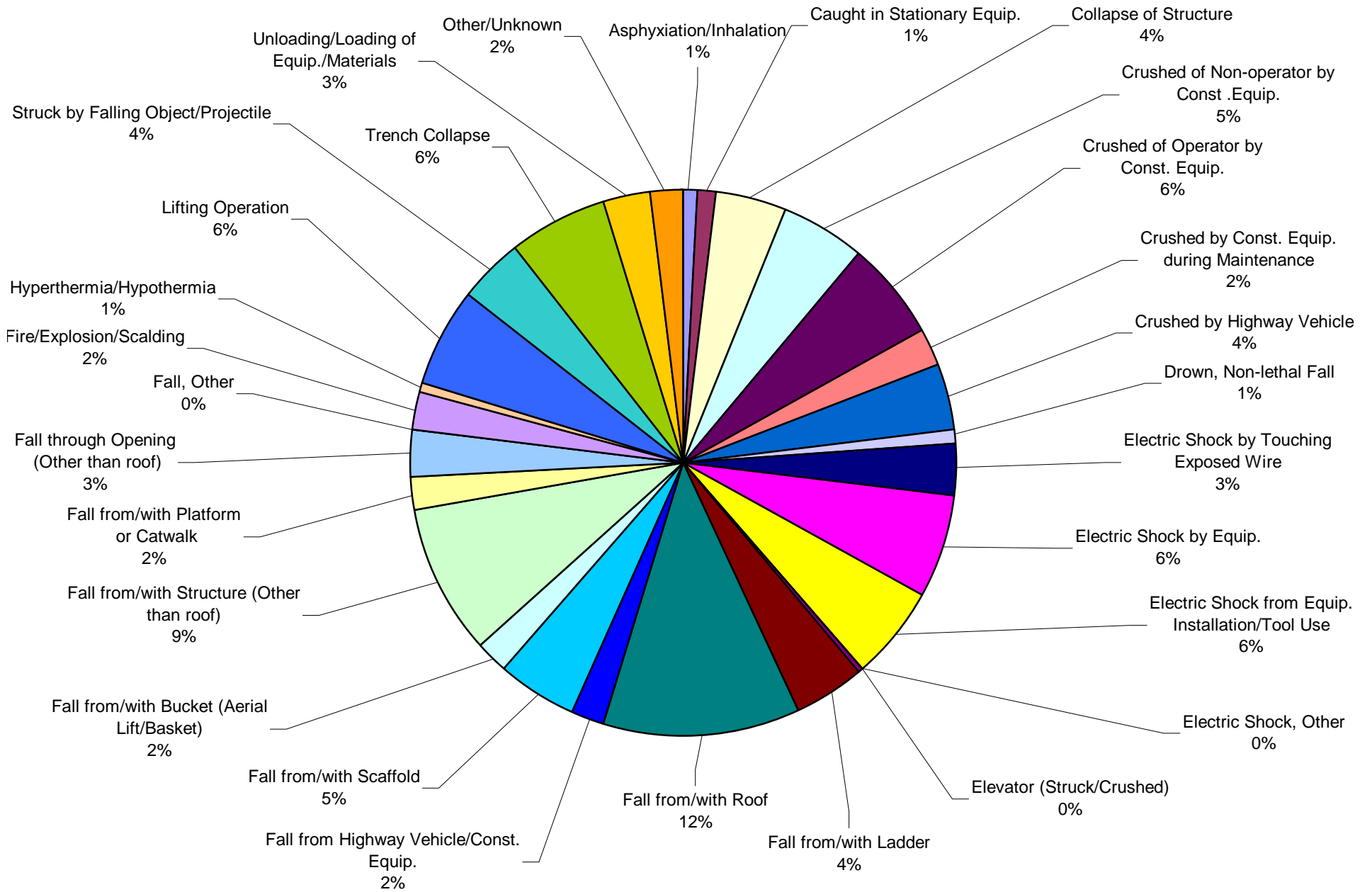


Figure C3. Comparison of Construction Fatality Events (1991-99)

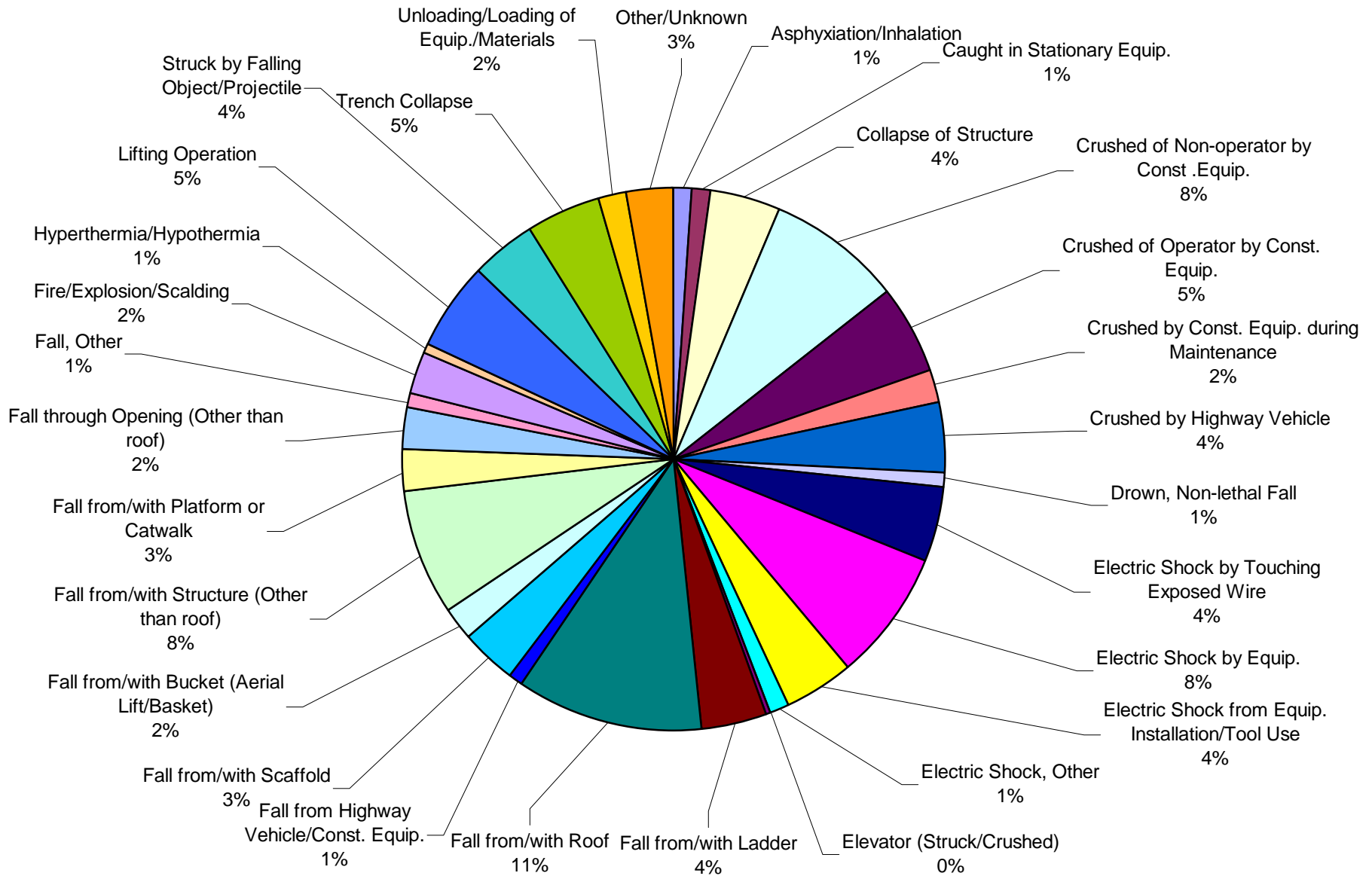
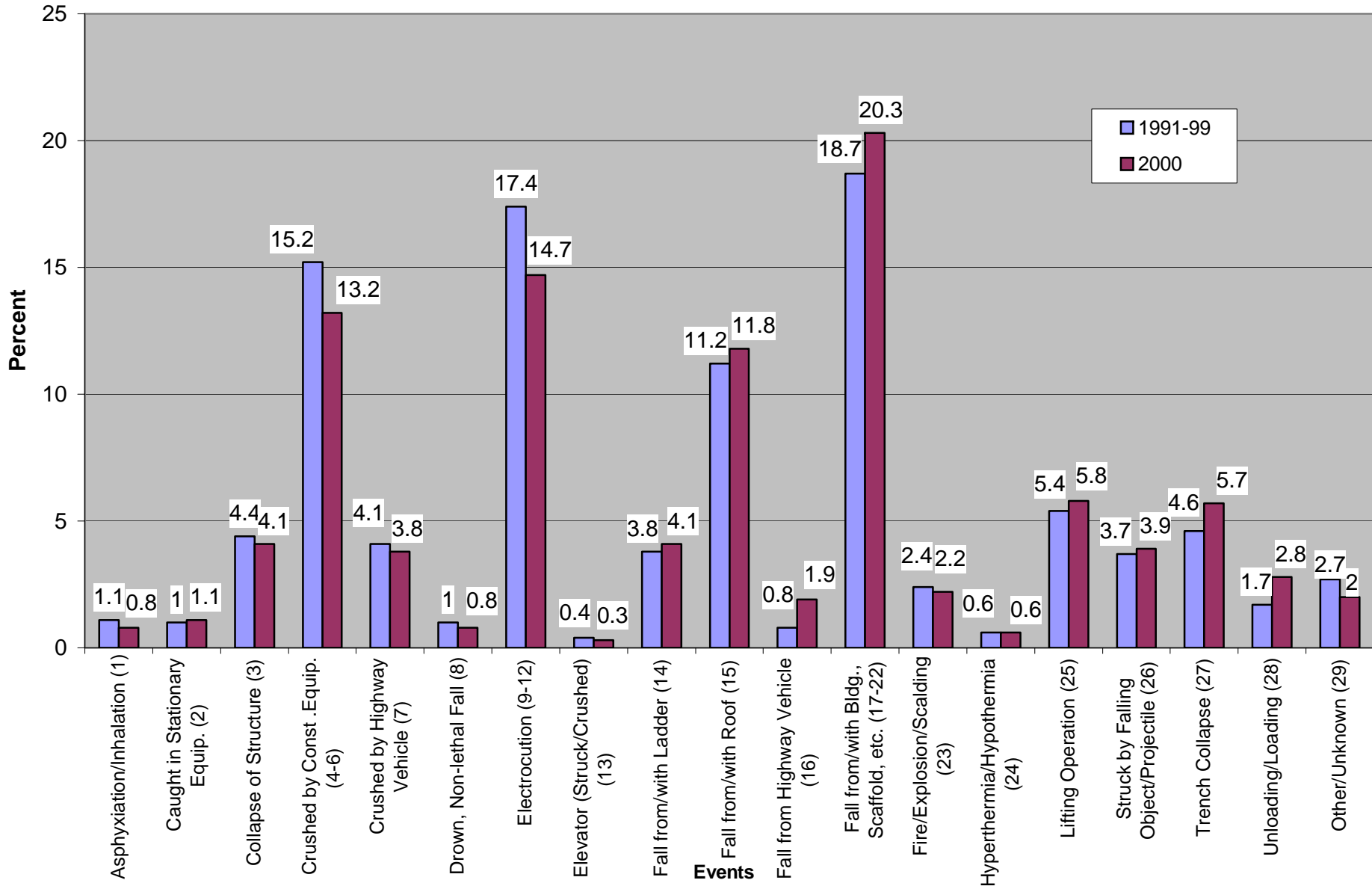


Figure C4. Comparison of Construction Fatality Events (1991-99 and 2000)



APPENDIX D

Table D1. Construction Fatal Events by End-Use Type, 2000

Event Causes	Description	Number of Frequency	Percent	Cumulative Percent
1	Single Family or Duplex Dwelling	109	17.14	17.14
2	Multi-Family Dwelling	42	6.60	23.74
3	Commerical Building	130	20.44	44.18
4	Other Building	150	23.58	67.77
5	Highway, Street, Bridge, and Other Paving	105	16.51	84.28
6	Other Non-Building Construction	100	15.72	100.00
		<u>636</u>	<u>100.00</u>	

The coding for these data could not be verified.

Table D2. Construction Fatal Events by Type of Project, 2000

Event Causes	Description	Number of Frequency	Percent	Cumulative Frequency
1	New, Addition and Alteration Construction	465	73.46	73.46
2	Maintenance and Repair	99	15.64	89.10
3	Other	69	10.90	100.00
		<u>633</u>	<u>100.00</u>	

The coding for these data could not be verified.

Table D3. Construction Fatal Events by Four-Digit SIC, 2000

Event Causes	Description	SIC	Number of Frequency	Percent	Cumulative Percent
1	General Contractors - Single Family Houses	1521	21	3.30	3.30
2	General Contractors - Residential Buildings Other than Single Family	1522	7	1.10	4.40
3	Operative Builders - Single Family Housing, Multi-family Housing, Manufacturing, Light Industrial, Commercial, and Institutional Buildings	1531	2	0.31	4.71
4	General Contractors - Industrial Building and Warehouses	1541	15	2.35	7.06
5	General Contractors - Non-residential Buildings, other than Industrial and Warehouse	1542	37	5.81	12.87
6	Highway and Street Construction, Except Elevated Highways	1611	39	6.12	19.00
7	Bridge, Tunnel, and Elevated Highway Construction	1622	22	3.45	22.45
8	Water, Sewer, Pipeline, and Communications and Power Line Construction	1623	58	9.11	31.55
9	Heavy Construction, Not Elsewhere Classified	1629	33	5.18	36.73
10	Plumbing, Heating and Air-Conditioning	1711	33	5.18	41.92
11	Painting and Paper Hanging	1721	21	3.30	45.21
12	Electrical Work	1731	51	8.01	53.22
13	Masonry, Stone Setting, and Other Stone Work	1741	22	3.45	56.67
14	Plastering, Drywall, Acoustical, and Insulation Work	1742	16	2.51	59.18
15	Terrazzo, Tile, Marble, and Mosaic Work	1743	2	0.31	59.50
16	Carpentry Work	1751	31	4.87	64.36
17	Flooring and Other Floor Work Not Elsewhere Classified	1752	3	0.47	64.84
18	Roofing, Siding, and Sheet Metal Work	1761	66	10.36	75.20
19	Concrete Work	1771	17	2.67	77.86
20	Water Well Drilling	1781	2	0.31	78.18
21	Structural Steel Erection	1791	35	5.49	83.67
22	Glass and Glazing Work	1793	5	0.78	84.46
23	Excavation Work	1794	29	4.55	89.01
24	Wrecking and Demolition Work	1795	15	2.35	91.37
25	Installation or Erection of Building Equipment, Not Elsewhere Classified	1796	11	1.73	93.09
26	Special Trade Contractors, Not Elsewhere Classified	1799	40	6.28	99.37
27	Non-Construction Coded		4	0.63	100.00
			<u>637</u>	<u>100.00</u>	

The coding for these data could not be verified.

Table D4. Construction Fatal Events by Project Value, 2000

Event Causes	Description	Number of Frequency	Percent	Cumulative Percent
1	Under 50,000	177	28.01	28.01
2	50,000-250,000	131	20.73	48.73
3	250,000-500,000	68	10.76	59.49
4	500,000-1,000,000	81	12.82	72.31
5	1,000,000-5,000,000	85	13.45	85.76
6	5,000,000-20,000,000	44	6.96	92.72
7	20,000,000 and over	46	7.28	100.00
		632	100.00	

The coding for these data could not be verified.

Table D5. Construction Fatal Events by Construction Operation, 2000

Code	Description	Frequency	Percent of Events
01	Backfilling and compacting	20	3.14%
02	Bituminous concrete placement	2	0.31%
03	Construction of playing fields, tennis courts	0	0.00%
04	Cutting concrete pavement	4	0.63%
05	Demolition	24	3.77%
06	Dredging	2	0.31%
07	Elevator, escalator installation	3	0.47%
08	Emplacing reinforcing steel	4	0.63%
09	Erecting structural steel	30	4.71%
10	Erection of coffer dams, caissons	2	0.31%
11	Excavation	35	5.49%
12	Exterior masonry	19	2.98%
13	Exterior cladding	2	0.31%
14	Exterior carpentry	26	4.08%
15	Exterior painting	15	2.35%
16	Fencing, installing lights, signs, etc.	14	2.20%
17	Fireproofing	2	0.31%
18	Forming	7	1.10%
19	Forming for piers or pylons	2	0.31%
20	Installing interior walls, ceilings, doors	13	2.04%
21	Installing metal siding	2	0.31%
22	Installing windows and doors, glazing	2	0.31%
23	Installing culverts and incidental drainage	4	0.63%
24	Installing equipment (HVAC and other)	41	6.44%
25	Installing plumbing, lighting fixtures	13	2.04%
26	Installing underground plumbing conduit	8	1.26%
27	Interior tile work (ceramic, vinyl, acoustic)	1	0.16%
28	Interior masonry	2	0.31%
29	Interior plumbing, ducting, electrical work	10	1.57%
30	Interior carpentry	17	2.67%
31	Interior painting and decorating	7	1.10%
32	Landscaping	9	1.41%
33	Loading dock forming and pouring	1	0.16%
34	Paving	20	3.14%
35	Pile driving	1	0.16%
36	Placing bridge deck	1	0.16%
37	Placing bridge girders and beams	7	1.10%
38	Plastering	1	0.16%
39	Pouring or installing floor decks	2	0.31%
40	Pouring concrete floor at grade	0	0.00%
41	Pouring concrete for piers, and pylons	1	0.16%
42	Pouring concrete foundations and walls	1	0.16%
43	Roofing	61	9.58%
44	Seawall construction, riprap placement	0	0.00%

45	Site clearing and grubbing	11	1.73%
46	Site grading and rock removal	16	2.51%
47	Stripping and curing concrete	4	0.63%
48	Surveying	1	0.16%
49	Swimming pool construction	0	0.00%
50	Temporary work (buildings, facilities)	18	2.83%
51	Traffic protection	4	0.63%
52	Trenching, installing pipe	24	3.77%
53	Waterproofing	3	0.47%
54	Steel Erection Of Solid Web-Connecting	5	0.78%
55	Steel Erection Of Solid Web-Bolting-Up/Detail Work	2	0.31%
56	Steel Erection Of Solid Web-Welding/Burning/Grinding	0	0.00%
57	Steel Erection Of Solid Web-Plumbing-Up	0	0.00%
58	Steel Erection Of Solid Web-Moving Point To Point	1	0.16%
59	Steel Erection Of Solid Web-Landing Materials (Hoisting)	4	0.63%
60	Steel Erection Of Open Web Steel Joists-Connecting	1	0.16%
61	Steel Erection Of Open Web Steel Joists-Bolting-Up/Detail Work	1	0.16%
62	Steel Erection Of Open Web Steel Joists-Welding/Burning/Grinding	1	0.16%
63	Steel Erection Of Open Web Steel Joists-Plumbing-Up	0	0.00%
64	Steel Erection Of Open Web Steel Joists-Moving Point To Point	0	0.00%
65	Steel Erection Of Open Web Steel Joists-Landing Materials (Hoisting)	1	0.16%
66	Installation Of Decking-Initial Laying Deck (Incl Layout & Safety)	10	1.57%
67	Installation Of Decking-Final Attachment Deck (Welding/Shear Studs/Etc)	1	0.16%
68	Installation Of Decking-Flashing Of Decking	1	0.16%
69	Installation Of Decking-Hoisting Bundles	2	0.31%
70	Other Activities-Installing Ornamental And Architectural Steel	12	1.88%
71	Other Activities-Post Decking Detail Work	10	1.57%
00	Unknown	66	10.36%
		<u>637</u>	<u>100.00%</u>

The coding for these data could not be verified.