



2016 Safety Report



PAC2016-2

AVA Documents
Document Sharing Hub

Construction Industry Institute

Abbott
Ameren Corporation
American Transmission Company LLC
Anadarko Petroleum Corporation
Anheuser-Busch InBev
Aramco Services Company
ArcelorMittal
Architect of the Capitol
Ascend Performance Materials
AstraZeneca
BP America, Inc.
Cargill, Inc.
Chevron
ConocoPhillips
Consolidated Edison Company of New York
The Dow Chemical Company
DTE Energy
Eastman Chemical Company
Eli Lilly and Company
Enbridge Inc.
EnLink Midstream
ExxonMobil Corporation
General Electric Company
General Motors Company
GlaxoSmithKline
Global Infrastructure Partners
Greater Toronto Airports Authority
Honeywell International Inc.
Huntsman Corporation
Irving Oil Limited
Kaiser Permanente
Koch Industries, Inc.
LyondellBasell
Marathon Petroleum Corporation
National Aeronautics & Space Administration
NOVA Chemicals Corporation
Occidental Petroleum Corporation
ONEOK, Inc.
Ontario Power Generation
Petroleo Brasileiro S/A - Petrobras
Petronas
Phillips 66
Pioneer Natural Resources
Potash Corporation of Saskatchewan
The Procter & Gamble Company
Public Service Electric & Gas Company
Reliance Industries Limited (RIL)
SABIC - Saudi Basic Industries Corporation
Shell Global Solutions US Inc.
Smithsonian Institution
Southern Company
Tennessee Valley Authority
Tesoro Corporation
TransCanada Corporation
U.S. Army Corps of Engineers
U.S. Department of Commerce/NIST/EL
U.S. Department of Defense/
Tricare Management Activity
U.S. Department of Energy
U.S. Department of State
U.S. Department of Veterans Affairs
U.S. General Services Administration
The Williams Companies, Inc.

AECOM
Affiliated Construction Services Inc.
AMEC Foster Wheeler
Atlas RFID Solutions
Autodesk, Inc.
AZCO INC.
Baker Concrete Construction Inc.
Barton Malow Company
Bechtel Group, Inc.
Benham, A Haskell Company
Bentley Systems Inc.
Bilfinger Industrial Services Inc.
Black & Veatch
Burns & McDonnell
CB&I
CCC Group
CDI Corporation
CH2M
Construtora Norberto Odebrecht S.A.
Continuum Advisory Group
Coreworx Inc.
CRB Builders, LLC
CSA Central, Inc.
Day & Zimmermann
Eichleay, Inc.
Emerson
Ensto, Inc.
ePM
Faithful+Gould
Fluor Corporation
Hargrove Engineers + Constructors
Hilti Corporation
I.M.P.A.C.T.
IHI E&C International Corporation
IHS
Jacobs
JMJ Associates LLC
JV Driver Projects Inc.
KBR
Kiewit Corporation
Lauren Engineers & Constructors, Inc.
Matrix Service Company
McCarthy Building Companies, Inc.
McKinsey & Company, Inc.
Midwest Steel, Inc.
Parsons
Pathfinder, LLC
PCL Constructors, Inc.
PricewaterhouseCoopers Advisory Services LLC
PTAG, Inc.
Quality Execution, Inc.
Richard Industrial Group
S & B Engineers and Constructors, Ltd.
SBM Offshore
Sinopec Engineering (Group) Co., Ltd. - SEG
Skanska USA
SNC-Lavalin Constructors Inc.
Supreme Group
Technip
UniversalPegasus International
Vitalica
Wanzek Construction, Inc.
The Weitz Company, Inc.
Wilhelm Construction, Inc.
Wood Group
WorleyParsons
Zachry Group
Zurich



Documents

Document Sharing Hub

2016 Safety Report

Prepared by
Construction Industry Institute
Performance Assessment Committee

PAC2016-2

April 2017

© 2017 Construction Industry Institute™

The University of Texas at Austin

CII members may reproduce and distribute this work internally in any medium at no cost to internal recipients. CII members are permitted to revise and adapt this work for their internal use, provided an informational copy is furnished to CII.

Available to non-members by purchase; however, no copies may be made or distributed, and no modifications may be made, without prior written permission from CII. Contact CII at <http://construction-institute.org/catalog.htm> to purchase copies. Volume discounts may be available.

All CII members, current students, and faculty at a college or university are eligible to purchase CII products at member prices. Faculty and students at a college or university may reproduce and distribute this work without modification for educational use.

Printed in the United States of America.

Table of Contents

<i>Chapter</i>	<i>Page</i>
List of Figures	v
List of Tables	vii
1. Introduction	1
1.1 Background	1
1.2 Survey Instrument	2
1.3 Reading Reported Rates	3
1.4 Key Findings	3
1.5 Limitations	4
2. Summary of Aggregated Data	5
3. Industrial Sector Analyses	11
4. Project Location Analysis	19
5. Duration of DA and RT Cases	27
6. Near Misses and First Aid Cases	33
7. Fatalities	37
8. Corporate Safety Benchmarks	41
9. Conclusions	47
References	49
Appendix A: Definitions	51
Appendix B: Industry Division of CII Safety Survey	53

List of Figures

Figure 1. Inputs for the CII Annual Safety Survey Instrument	2
Figure 2. TRIR (RIR) Rate, Aggregated Data, 1989–2015	8
Figure 3. DART (LWCIR) Rate, Aggregated Data, 1989–2015	9
Figure 4. Control Charts of Safety Rates from 2005–2015	10
Figure 5. TRIR Rate by Industry Group	12
Figure 6. DART Rate by Industry Group	13
Figure 7. Owner TRIR Three-year Moving Average, 2001–2015	15
Figure 8. Contractor TRIR Three-year Moving Average, 2001–2015	15
Figure 9. Owner DART Rate Three-year Moving Average, 2001–2015	16
Figure 10. Contractor DART Rate Three-year Moving Average, 2001–2015	16
Figure 11. TRIR Rates for U.S.-based and International Projects	20
Figure 12. DART Rates for U.S.-based and International Projects	21
Figure 13. U.S. TRIR Rate by Industry Group	22
Figure 14. U.S. DART Rate by Industry Group	23
Figure 15. International TRIR Rate by Industry Group	24
Figure 16. International DART Rate by Industry Group	25
Figure 17. Average Duration of DA Cases	28
Figure 18. Average Duration of RT Cases	29
Figure 19. Average Duration of DA Cases by Industry Group	30
Figure 20. Average Duration of RT Cases by Industry Group	31
Figure 21. Near Miss Tracking	34
Figure 22. First Aid Tracking	34
Figure 23. TRIR Rate and First Aid Tracking	35
Figure 24. DART Rate and First Aid Tracking	35

Figure 25. Fatality Rate by Respondent Type since 1999	38
Figure 26. Three-year Fatality Rate Moving Average by Respondent Type	38
Figure 27. Fatal Occupational Injuries among CII Members That Reported in 2015 (2014 Calendar Year Data) by Cause, 2012–2015	39
Figure 28. 2015 Corporate Safety Statistics – TRIR Rate of U.S. Projects	44
Figure 29. 2015 Corporate Safety Statistics – DART Rate of U.S. Projects	45
Figure 30. 2015 Corporate Safety Statistics – DA Rate of U.S. Projects	46

List of Tables

Table 1. 2015 Aggregated Safety Data	5
Table 2. Incident Rates and Changes from 2013 to 2015	6
Table 3. Safety Performance by Employee Type and Industry Group	17
Table 4. 2015 Corporate Safety Benchmarks of All Projects	42
Table 5. 2015 Corporate Safety Benchmarks of U.S. Projects	43

Introduction

This report summarizes the responses of CII members to the Construction Industry Institute (CII) Annual Safety Survey. The survey was administered to all CII members between April and July in 2016. From among CII's membership of more than 130 organizations, 75 (i.e., 33 owners and 42 contractors) submitted their corporate safety statistics for the 2015 calendar year. These data represent a combined total of 3.22 billion work hours. This report presents the latest safety trends among CII members, and provides corporate safety performance benchmarks that members can use for self-analysis.

The primary purpose of this report is to document the descriptive statistics obtained from the CII Annual Safety Survey. For the past few years, CII has chosen to limit the amount of commentary regarding potential causes for specific safety statistics or trends. The reasons behind many of the observations are left both for the reader to ponder and for CII to consider for further potential research.

1.1 Background

CII and its members have a long history of valuing safety and being committed to the goal of zero accidents. Reflecting this commitment, CII has funded many safety studies since its founding in 1983. These studies have generated many of the safety practices that CII members and the architectural/engineering/construction (AEC) industry widely use today to deliver capital projects safely. As a part of CII's safety research effort, the CII Performance Assessment Program has collected annual corporate safety performance information from its member organizations since 1990 (for calendar year 1989 data).

1.2 Survey Instrument

The content, formatting, and deployment of the CII Annual Safety Survey have evolved over time to reflect changes in U.S. Occupational Safety and Health Administration (OSHA) reporting standards and to improve data integrity. CII has kept most of the survey questions consistent over time in order to establish safety trends. The latest survey was administered through an online survey instrument, which gathers the data by industry sector, location, and employee type. (See Figure 1.) The main data entry fields collected in the 2016 CII Safety Survey were the following:

- Total Work Hours
- Total Recordable Incident Cases
- Days Away and Restricted or Transferred (DART) Cases
- Days Away (DA) Cases
- Total Number of Days Associated with Days Away (DA) Cases
- Total Number of Days Associated with Job Restriction or Transfer (RT) Cases
- Number of Fatalities

Work Type	Workhours	Total Number of Recordable Cases	Total Number of Cases with Days Away from Work	Total Accumulated Number of Days Away from Work	Total Number of Cases with Job Transfer or Restriction	Total Accumulated Number of Days of Job Transfer or Restriction	Total Number of Fatalities
Home Office							
Field							
Home Office							
Field							

Figure 1. Inputs for the CII Annual Safety Survey Instrument

The CII Annual Safety Survey focuses on safety data associated with capital projects, excluding operations and maintenance. In addition, the survey includes questions regarding near misses, first aid cases, and fatalities. CII aligns all safety terms used in the survey with OSHA definitions, in order to compare the survey results with the yearly safety statistics that OSHA provides on the overall U.S. construction industry. Appendix A provides definitions of the key terms used throughout this report.

1.3 Reading Reported Rates

The reader should note that, throughout this report, smaller values of safety rates are considered better than higher values. If a rate increased since the previous report, the safety rate is said to have worsened. Otherwise, if a rate decreased since the previous report, it is said to have improved. These qualifications of rates as higher/worse or better/lower are used interchangeably throughout this report. Similarly, a given group (e.g., heavy industrial projects) is said to have outperformed other groups when its rates are lower than the rates of the other groups.

1.4 Key Findings

This year, the survey generated eight key findings:

1. As a group, CII members continued to outperform the U.S. national construction industry by a substantial margin.
2. Owners and contractors in the heavy industrial sector reported the best rates across all sectors. (See Figures 5 and 6.)
3. Owner-reported data showed that the infrastructure sector experienced the highest (three-year average) rates, while contractor-reported data showed that the building sector presented the highest rates. (See Figures 7 through 10.)
4. Overall, U.S. safety rates are still higher than international rates. (See Figures 11 and 12.)
5. The heavy industrial sector data presented the best rates for U.S. projects, for both owners and contractors. (See Figures 13 and 14.)
6. Owner-reported data from U.S. projects indicated higher average Restricted and Transfer duration, compared to the duration observed in the international data. (See Figure 18.) The opposite is true for contractor-reported data, but by a small margin.
7. Among CII members, fatality cases increased substantially from 31 fatalities in 2014 to 42 in 2015, and the fatality rate worsened from 1.8 to 2.6. “Falls” and “Contact with objects

and equipment” were among the major causes of fatalities. (See Figure 27.) OSHA fatality cases in the construction industry increased from 899 to 937 fatalities, and the fatality rate increased from 9.8 to 10.1 cases per 100,000 full-time workers in 2015.

8. Data still indicate that the goal of zero accidents can be achieved. In fact, three CII members reported zero safety incidents across their organizations during 2015.

1.5. Limitations

As with previous annual safety surveys, CII owner and contractor members were asked to provide safety data for both their direct-hire employees and their contractors’ employees. However, because contractors were not uniquely identified in the owner responses, some double reporting of contractor data is likely. This overlap often presents itself in two ways:

- owners reporting on their contractors’ employees
- contractors reporting on their direct-hire employees

In addition, the results for the building and infrastructure sectors may not be fully representative, due to small sample sizes. Consequently, readers should use caution when comparing results across sectors. With more and more CII members participating in the survey, and with CII continually expanding into the building and infrastructure sectors, these issues will likely become less prevalent in the future.

2

Summary of Aggregated Data

This chapter presents the results of the aggregated data analyses for the CII Annual Safety Survey. Table 1 summarizes the aggregated 2015 safety data obtained through the survey. The total cumulative work hours increased 10 percent from 2014 to 2015, and included 75 participating members (compared to 78 in the previous report). Table 1 also presents the aggregated data by respondent type (i.e., owner and contractor). Unlike in previous years, contractors reported less than half of the total work hours, with an increase from 51 percent of the total work hours in 2014 to 61 percent in 2015.

Table 1. 2015 Aggregated Safety Data

	Owners	Contractors	Total
Total Number of Recordable Cases	1,954	4,282	6,236
Total Work Hours	1,259,139,163	1,959,286,893	3,218,426,056
Total Number of DART Cases	1,089	1,548	2,637
Total Work Hours	1,194,645,630	1,890,760,489	3,085,406,119
Total Number of DA Cases	343	987	1,330
Total Work Hours	1,256,327,244	1,890,760,489	3,147,087,733
Total Number of Fatalities	11	31	42
Total Work Hours	1,256,683,018	1,959,286,893	3,215,969,911

The reader should note that some responding members could not provide all of the requested data or give details by category. (CII staff members prepare the final data set for this report each year, after considerable effort to validate the data.) For this reason, the total overall work hours reported differ for many of the metrics presented in Table 1 (e.g., work hours for contractors' DART and recordable cases). In particular, some owners had difficulty reporting information related

to job restriction or transfer (RT) cases due to the short durations of the work tasks involved. As a result, data shown in Table 1 have been adjusted to reflect the most conservative basis (where necessary), due to missing data uncovered during validation.

Table 2 compares the safety rates from the past two years. As a group, CII members' TRIR improved by 7.6 percent from 2014 to 2015. When segmented by respondent, the data show that CII owner members experienced a 33.5-percent decrease in their TRIR, while the rate increased by 16.5 percent for contractors. The overall DART worsened by 12.7 percent from 2014 to 2015. The overall fatality rate worsened substantially (i.e., by 49.2 percent). When examining the fatality rate by respondent, CII found that contractors had a 54.1-percent increase in their collective fatality rate, while owners' fatality rates increased by 22.7 percent.

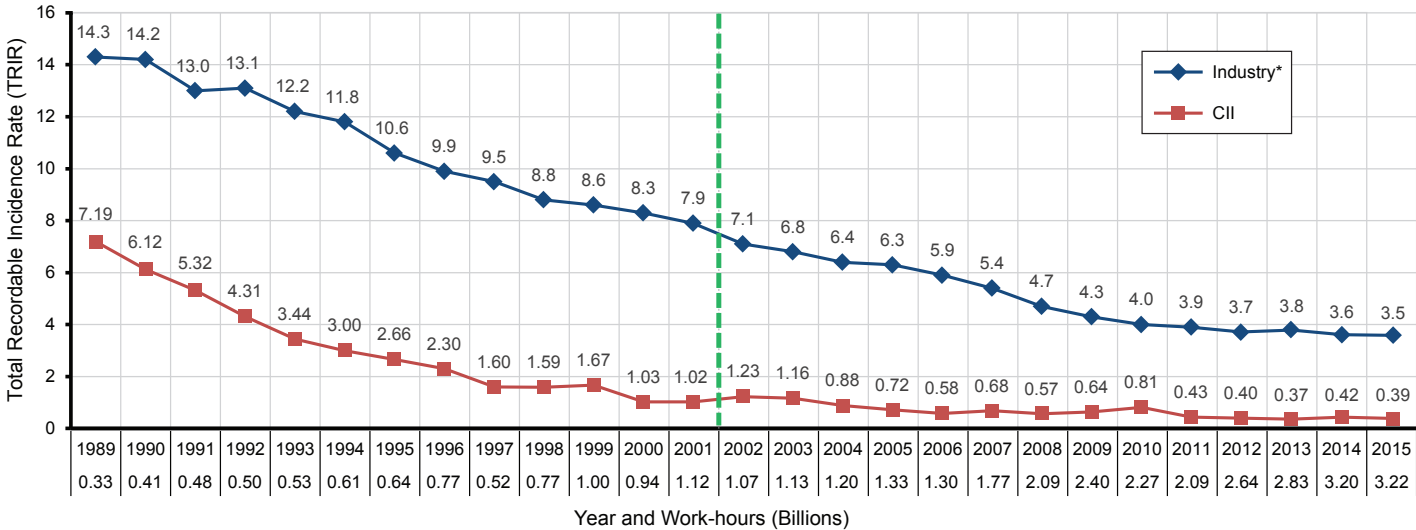
Table 2. Incident Rates and Changes from 2014 to 2015

Respondents	Metric	2014	2015	Change
All	TRIR	0.42	0.39	-7.6%
	DART Rate	0.15	0.17	12.7%
	DA Rate	0.06	0.08	36.7%
	Fatalities	1.75	2.61	49.2%
Owners	TRIR	0.47	0.31	-33.5%
	DART Rate	0.16	0.18	16.7%
	DA Rate	0.09	0.05	-36.0%
	Fatalities	1.43	1.75	22.7%
Contractors	TRIR	0.38	0.44	16.5%
	DART Rate	0.15	0.16	10.7%
	DA Rate	0.05	0.10	99.9%
	Fatalities	2.05	3.16	54.1%

To obtain the results presented in this report, CII calculated the DART, TRIR, and fatality rates consistent with OSHA definitions. This means that the data shown for DART and TRIR note the number of cases or recordable injuries (respectively) for 100 workers working 40 hours a week for 50 weeks each year (i.e., 2,000 hours per worker per year). The calculations are different for the fatality rate, which is determined by the number of fatalities occurring among 100,000 workers working for a full year.

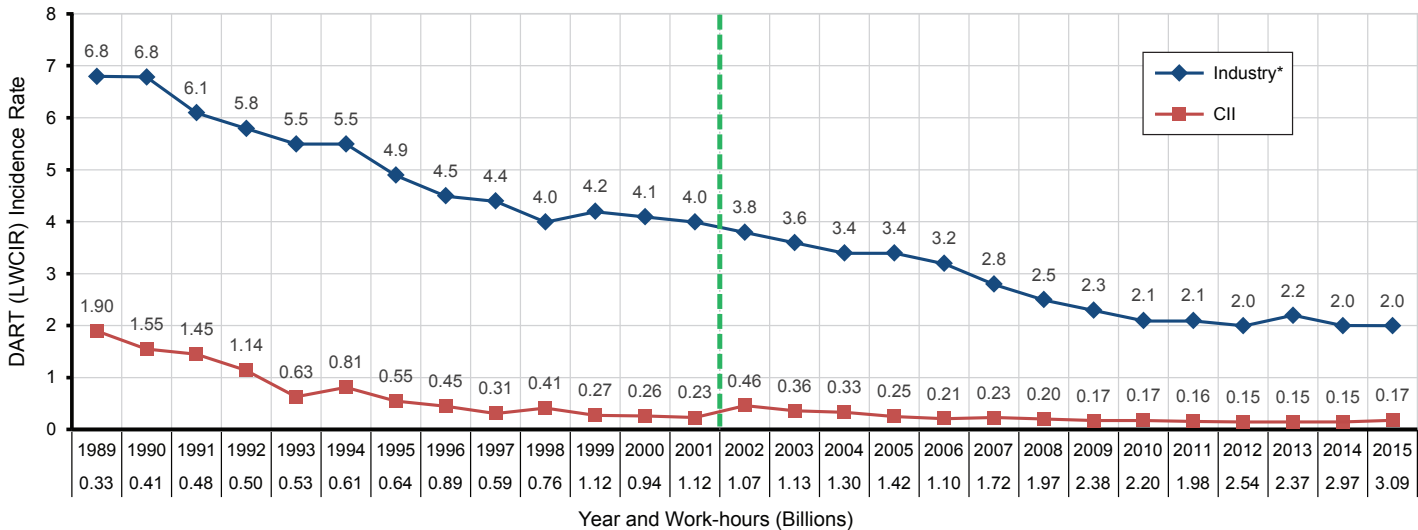
Figures 2 and 3 display the trends of TRIR (known as RIR prior to 2002) and DART (called LWCIR prior to 2002) rates for CII members and for the U.S. construction industry from 1989 to 2015. CII members continue to surpass the U.S. construction industry in safety by a significant margin. That said, in the past few years, the differences in safety rates have narrowed between CII members and the U.S. industry at large. In 2015, the U.S. construction industry continued to progress with regard to safety performance in terms of TRIR rate, while the overall TRIR rate for CII members had changed only slightly.

When OSHA changed its record-keeping rules on January 1, 2002, it altered some of the criteria that determine which injuries and illnesses are recorded. As a result, OSHA suggests that readers should use reasonable caution when comparing data produced under previous regulations with data produced under the new rules. Consequently, since 2003, the CII Annual Safety Report has distinguished the safety data collected before and after the record-keeping rule changes, wherever necessary. For example, in Figures 2 and 3, a dashed green line marks the 2002 OSHA rule changes.



*OSHA Construction Division, NAICS 236–238 (SIC 15-17) --- Reflects OSHA reporting change

Figure 2. TRIR (RIR) Rate, Aggregated Data, 1989–2015



*OSHA Construction Division, NAICS 236–238 (SIC 15-17)

--- Reflects OSHA reporting change

Figure 3. DART (LWCIR) Rate, Aggregated Data, 1989–2015

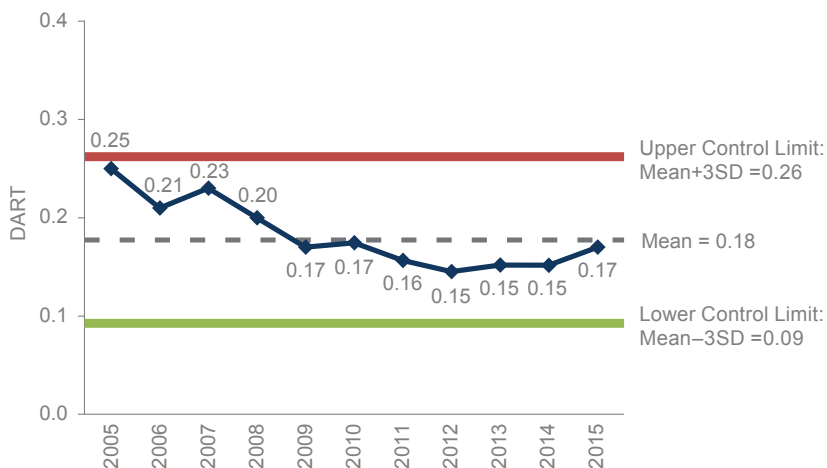
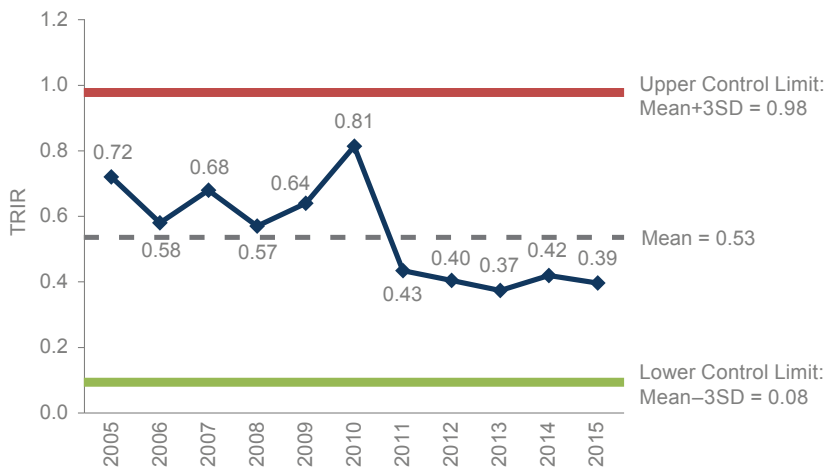


Figure 4. Control Charts of Safety Rates from 2005–2015

3

Industrial Sector Analyses

This chapter presents analyses of the safety data for four industry sectors:

- heavy industrial
- light industrial
- infrastructure
- buildings

These classifications differ from both the system OSHA currently uses, the 2002 North American Industrial Classification System (NAICS), and the Standard Industrial Classification (SIC) system that OSHA used prior to 2003. Notably, the construction industry divisions of the NAICS and the SIC system consist of three major groups:

1. General Building (NAICS 236 and SIC 15)
2. Heavy Construction Except Buildings (NAICS 237 and SIC 16)
3. Special Trade Contractors (NAICS 238 and SIC 17).

Consequently, OSHA data at this level of aggregation are not uniformly comparable to CII data. This incongruity results from the fact that some industry groups included in the Construction Industry Division (e.g., Residential Building Construction) are not represented in the CII database. Appendix B further explains the industry sectors addressed by the CII Annual Safety Survey.

As in 2014, the 2015 contractor-reported data showed that the heavy industrial sector outperformed the other three sectors in terms of both TRIR and DART rates. These data also indicated that, for contractors, the building sector had the highest TRIR and DART rates, followed by the infrastructure sector. (See Figures 5 and 6.)