



CONSTRUCTION INDUSTRY INSTITUTE

THE OWNERS' ROLE IN
CONSTRUCTION SAFETY

Construction Industry Institute

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U.S. Department of State	Structural Group
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	Walbridge Aldinger Company
	Washington Group International
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The Owners' Role in Construction Safety

**Prepared by
The Construction Industry Institute
Owners' Role in Construction Safety Project Team**

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Executive Summary

Many parties are involved in the construction process: contractors, subcontractors, suppliers, designers, sureties, financial agencies, attorneys, accountants, engineers, consultants, and others. While each does not necessarily play a role in every project, one party invariably does, the facility owner. It would stand to reason that the owner would also have an influence on the safety performance actually realized on constructed facilities. But what is the nature and extent of the owner's influence on project safety performance?

CII funded this study to determine the role and influence that owners have in the area of construction safety. The research focused on the owner's involvement in safety management as demonstrated through the selection of safe contractors, inclusion of safety requirements in the contract, and active participation in safety during project execution. Improved safety performances are possible through the use of the following practices by owners:

- Careful selection of safe contractors.
- Contractual safety requirements.
- Proactive involvement in the safety practices of projects.
- Establishment of and funding for a safety recognition program.
- Active participation in safety training and orientation and verifying the comprehension of the training.
- Assigning a full-time safety representative on site.

The details of the research and the findings are presented in the following pages. Readers are encouraged to practice the concepts described and to set as the goal on every project that of zero accidents.

Introduction

This research was undertaken by conducting interviews and using a carefully developed questionnaire. The interviews were conducted with owners' representatives who had project safety responsibilities.

While most interviews were conducted in person, several were conducted as telephone interviews when distances were excessive or when the person being interviewed expressed a preference for a telephone interview. The person interviewed was generally the owner's top representative on the project who had a full-time responsibility for safety. The questions in each interview were focused on the practices that were employed on a single large project (half of the projects employed more than 550 workers), but some individuals gave responses representing the practices employed on a group of small capital projects. Projects were either ongoing or had been completed within the past two years. The interviews focused on obtaining information about the demographics of the projects, the manner in which contractors were selected, the types of safety-related provisions included in the contracts, and the type of owner involvement in project execution.

A total of 81 personal interviews were conducted. When the data were analyzed, a constraint was imposed such that projects included in the analysis must have had at least 100,000 hours of worker exposure. This was to ensure that the safety performance measures gave a reliable indication of the actual safety performance. Since some projects were in their early stages of construction, they did not have the requisite hours to satisfy the criteria for inclusion in the data analysis. By excluding the projects with fewer than 100,000 hours of worker exposure and those projects for which complete injury data were not provided, the final analysis included 59 projects.

Findings

Safety performances were measured by using the total number of OSHA recordable injuries per 200,000 hours of worker exposure, commonly known as the Total OSHA Recordable Injury Rate (TRIR). Whenever the term TRIR appears, it should be clear that the measure of safety performance consists of all OSHA recordable injuries, including lost-time injuries and restricted work injuries.

For the 59 projects included in the analysis, the average TRIR was 1.95, with six projects reporting zero OSHA recordable injuries. One of the projects reporting a TRIR of zero had amassed nearly 500,000 hours of worker exposure.

The results presented in this report are based on rigorous statistical analysis of the safety performances associated with each of the different responses. It is only when the differences of the TRIR means (or averages) are statistically significant that the results are presented, unless specifically noted otherwise. Statistical significance was assumed when the level of significance was 0.05 or smaller, meaning that there is less than a five percent probability that the finding is due to chance. Other findings that are presented are those in which the level of significance is between 0.05 and 0.10, being indicative of a tendency toward statistical significance.

Project Descriptions and Safety Performance

Project size descriptors (as measured in terms of worker hours and in total contracted project cost) and TRIRs of the 59 projects included in the final analysis are shown in Table 1. Of these projects, seven were in Canada, three were overseas with U.S. owners, and 49 were located in 18 states of the U.S (included in the U.S. total is one project in the U.S. Virgin Islands). The numbers of interviews conducted in different states are shown in Figure 1.

Table 1. Safety Performance and Size of Projects

	Total worker hours expended	Total estimated cost of the project	Total Recordable Injury Rate
Mean	2,426,210	\$379,440,000	1.95
Minimum	100,000	\$3,500,000	0
Maximum	26,300,000	\$5,000,000,000	9.25

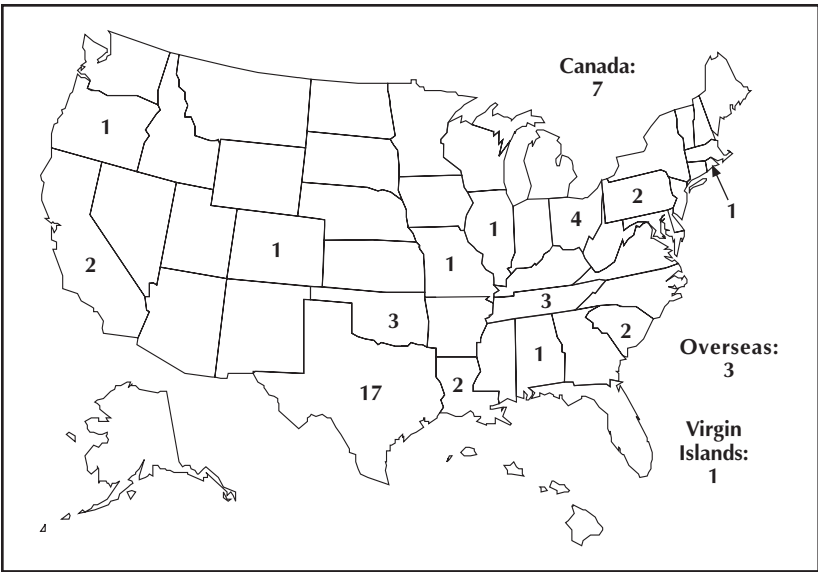


Figure 1. Locations of the projects

Although the safety performances and sizes of the projects ranged widely, it is apparent that the safety performances of most projects are much better than the construction industry average of about 8.2 for the year 2000. It was in this context that the analysis was intended to identify those practices of owners that had a particularly strong impact on the resultant TRIR. It may not be surprising to expect better safety performances on projects where CII members are the project owners. This research, however, was not restricted to projects involving CII members. This perhaps accounts

for the relatively broad range in TRIRs. The TRIR of CII members was reported as being about 1.03 in year 2000, significantly better than the industry average. This research investigated those owner practices that had a direct impact on influencing the safety performances realized on projects.

Although the 59 projects provided OSHA recordable injuries, only 46 were able to provide information on all injuries, including lost-time injuries, OSHA recordables, and first-aid injuries. All injuries were tallied by severity category, and the ratio between different types of injuries was determined as shown in the injury pyramid in Figure 2. The ratio that exists between injuries on the basis of severity has been discussed for many years. While these ratios may vary, the general trend is relatively consistent. Note that the pyramid could be simplified by reporting the ratio between ratio of lost-time, OSHA recordable, and first-aid injuries as being roughly 1:10:300.

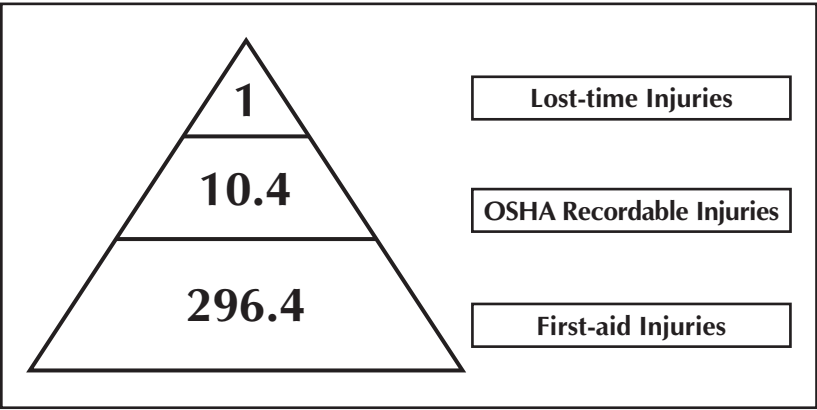


Figure 2. Injury pyramid for the projects

Theoretically, the size of the project, labor arrangements for the project, type of project, and other characteristics of the project are all related to the safety performance of the project. These factors may be influenced by the owner to some extent and therefore were also analyzed.

Shutdown projects

Although new projects do not show a significantly different safety performance when compared to renovation projects, shutdown projects were found to have poorer safety performances. The average TRIR of the eight shutdown projects included in this research had higher TRIRs than the other projects (see Figure 3).

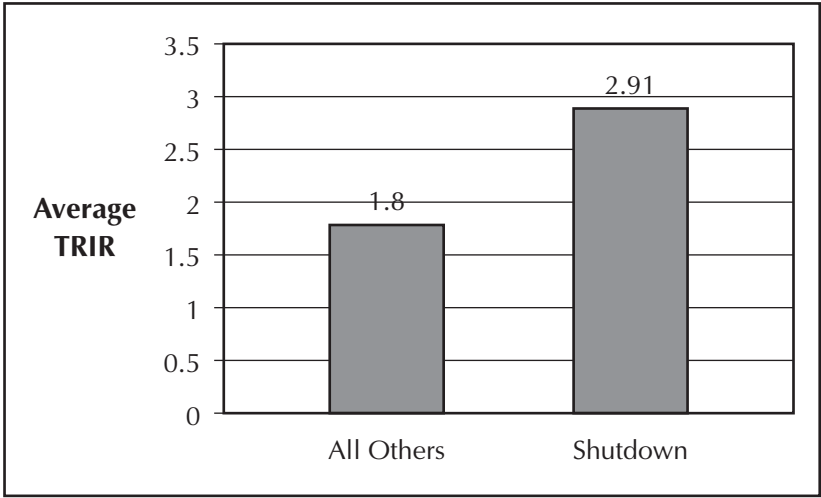


Figure 3. Injury rates of shutdown projects and all other projects

Shutdowns are characterized as having tight schedules, significant amounts of overtime work, frequently working multiple shifts, and generally having a rapid buildup of the work force. When workers and managerial personnel work extended hours for one or two months, the possibility of human errors increases, and so will the probability of injury causation.

Public or private project

The comparison of the TRIRs of public projects and private projects, excluding the shutdown projects (which are all private projects), is illustrated in Figure 4. Some public agencies, especially Federal agencies, may require the contractor to comply with their own safety manuals in addition to the OSHA 1926 regulations. However, the involvement of the owners in the safety management of the public projects was generally viewed as being minimal when compared to owner involvement on private projects.

Petrochemical and manufacturing projects

Petrochemical projects, which accounted for nearly half of the projects analyzed (30), had the best safety performances (see Figure 5). Note that the shutdown projects have been isolated in the figure in order to provide an accurate depiction of the differences between the safety performances between petrochemical and manufacturing projects. Petrochemical owners interviewed consistently reported having strong upper management commitment to construction safety and as having successfully integrated safety into their company cultures. They have a clear understanding of the zero injury philosophy, and jobsite responsibilities are defined to strengthen the safety culture.

Safety performance on manufacturing projects was consistently poorer than that of petrochemical projects. Note that residential and commercial projects are not included in this comparison, primarily because only a few such projects were in the entire sample.

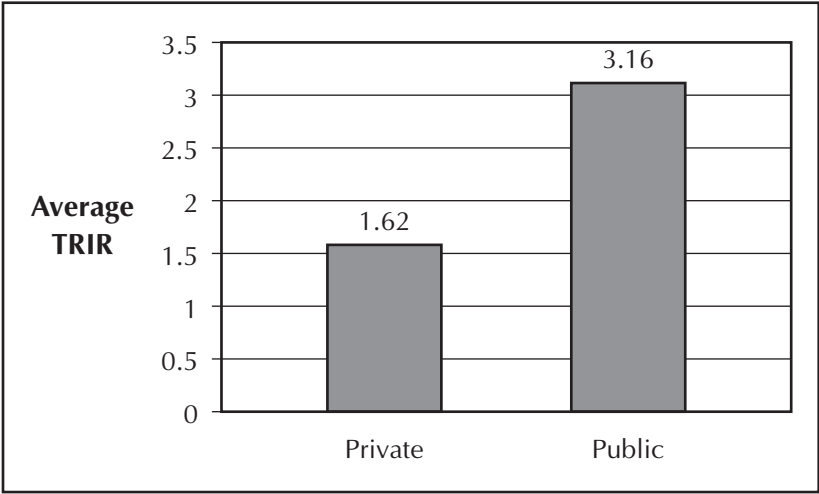


Figure 4. Type of facility owner and safety performance (excludes shutdown projects)

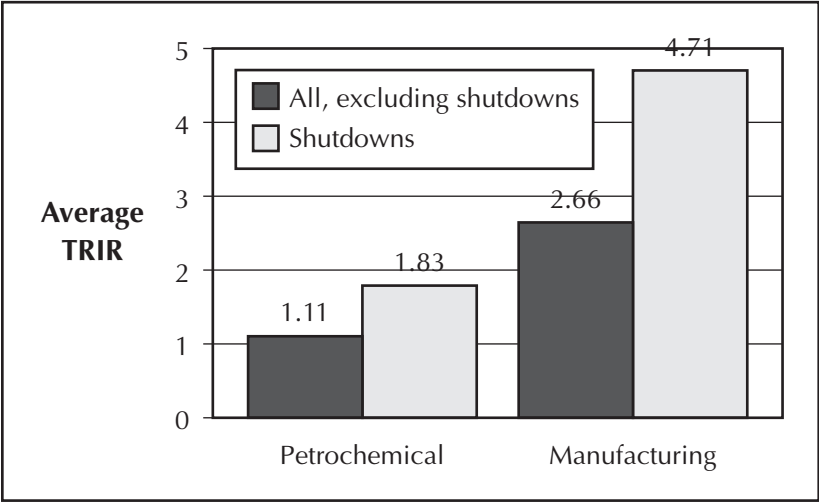


Figure 5. Type of project facility and injury rates

Union projects or open shop projects

A fairly even distribution of open shop projects, union shop projects, and merit shop projects was found in the database. In general, owners may have little to say about employing union or open shop contractors as local conditions often dictate the type of firms that are available to perform the work.

“Merit shop” projects are those in which the labor posture is not a consideration in the selection of contractors. It is on the merit shop projects that both union shop and open shop contractors may be employed at the same time (see Figure 6). Since Canadian

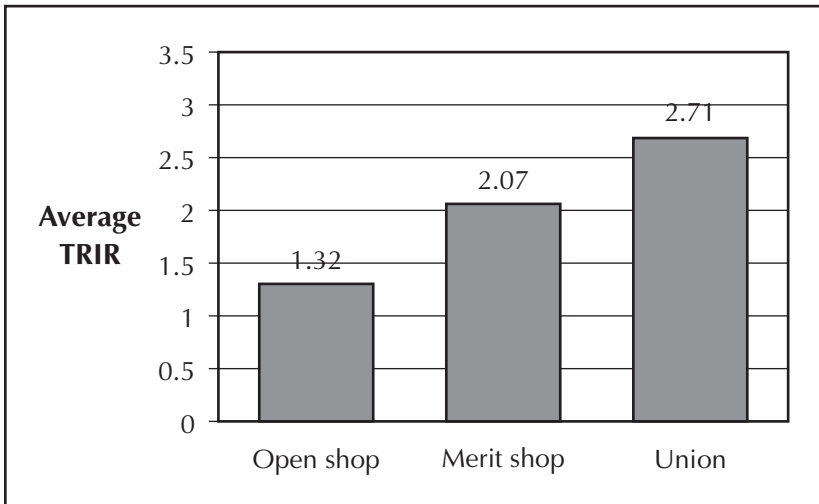


Figure 6. Type of labor and safety performance (U.S. projects only)

projects in the sample were all union shop and since international projects are in environments different from those in the U.S., the figure presents information on only the U. S. projects. Figure 6 shows that safety performance in the database for this research was better on open shop projects than on union shop projects. Note that this same pattern of TRIR values was found to exist when only petrochemical projects (exclusive of shutdown projects) were examined.