JOBSITE SECURITY ON COMMERCIAL CONSTRUCTION PROJECTS

By

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This document is dedicated to my parents.
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Theft and vandalism on construction sites in the commercial construction industry is a problem that can affect productivity and drain profits. To explore the impact of theft and vandalism in the commercial construction industry, a survey was sent to commercial construction firms to gather information by which the magnitude of the problem of theft and vandalism could be estimated; and to determine what techniques have been successfully used to deter thieves and vandals. The responses were analyzed and the following conclusions were developed:

- Firms engaging in all types of projects are susceptible to theft and vandalism.
- Theft and vandalism is more costly to small to medium sized firms (less than $100 million annual volume of construction work) than larger firms.
- Larger firms use a greater number of measures to combat theft and vandalism on their construction sites.
CHAPTER 1
INTRODUCTION

Security considerations are an often-ignored facet of commercial construction projects. Contractors frequently lose materials, tools and expensive equipment to theft and vandalism; both by on-site workers and by criminals who recognize an easy opportunity. Total losses from theft and vandalism on construction sites have been increasing dramatically over the past decade. Although exact figures are not available, reliable estimates place the annual losses in the billions of dollars. Crime prevention on construction sites has become a major concern for many commercial contractors. Losses from theft and vandalism in the United States can make the difference between making a profit or incurring a loss on a job.

There are two objectives of this research that can be satisfied by acquiring information on two facets of theft and vandalism. The first objective is to determine the magnitude of the construction theft and vandalism problem. Although jobsite theft and vandalism are generally regarded as a major problem in the construction industry, little research has been conducted on this subject. By establishing the magnitude of the problem of theft and vandalism, contractors will be able to make more informed decisions when developing security plans for their projects.

The second objective is to understand how to curb the problem of theft and vandalism. One popular approach is to develop a jobsite security program. There is no universally accepted security program because jobsites in different locations will require different protective procedures. Contractors still need to develop a comprehensive
written plan as well as an individual jobsite plan to curb theft and vandalism. By understanding the various mechanisms used to address theft and vandalism, contractors will be better able to devise effective security plans. By learning from the experiences of others, contractors can reduce losses and perhaps make security plans more cost effective. The methods used by successful companies to address jobsite security may offer insights to others for dealing with theft and vandalism on their projects.
CHAPTER 2
LITERATURE REVIEW

Jobsite security is an often-ignored facet of commercial construction projects. The construction industry in the United States lost nearly $1 billion in 2001 because of theft of equipment and tools, according to the National Insurance Crime Bureau (McDowall, 2002). No known studies have determined the distribution of the theft losses among the different sectors of the construction industry. Many insurance companies state that equipment losses due to vandalism account for up to 22% of large contractor equipment losses (Bonesteel 1997). Theft and vandalism is not limited to the United States. According to the Japan Construction Equipment Manufacturers Association, more than 1,000 construction machines were stolen last year alone in Japan (Rental Equipment Registrar Magazine, 2002). According to insurer Zurich Canada, in Canada, the losses totaled at least $32 million, with annual insurance claims representing more than $46 million (The Mechanical Contractors Association of Toronto Fall 1999). While all sectors have problems with theft and vandalism, this literature review focuses on the problem facing commercial contractors in the United States.

A 1990 survey conducted by the Associated General Contractors (AGC) indicated that the average contractor loses more than $13,000 a year from theft and vandalism (Banks 1990). It has been estimated that 90% of stolen construction equipment is stolen from job sites where there may be little security and where equipment remains unattended over the weekends (McDowall, 2002). The magnitude of the problem of theft and vandalism is difficult to estimate with accuracy. Many contractors do not report the
theft of equipment to the police if the object stolen is valued less than the company’s insurance deductible amount. In terms of vandalism, numerous contractors consider an act of vandalism to be “part of the job” if it is not of an extraordinary cost. There has been no systematic method of estimating the magnitude of the problem of theft and vandalism among the many contractors and jobsites that are susceptible to such losses.

Besides the monetary losses resulting from theft and vandalism, associated indirect costs should also be considered. Costly job delays, downtime for operators, higher insurance premiums, and the possible cancellation of an insurance policy, with the accompanying risk of jeopardizing bonding and borrowing power, make jobsite security practices crucial for the commercial construction firm (Middleton, 1999). Because of this, theft and vandalism can be major cost components of a construction project. The cost is potentially sufficient to make the difference of making a profit or incurring a loss on a project.

Because of the magnitude of the problem, it is worthwhile to understand what techniques firms have found to be successful in preventing theft and vandalism on their jobsites. The possible forms of deterrence can be very different depending on the multiple variables that can be associated with any jobsite. These variables include the locale where the work is being done (running the gamut from rural to urban). The locality where the work is being done, along with the type of construction being performed, must also be taken into account when assessing the performance of a particular jobsite security plan.

Regarding jobsite security, the role played by location can be seen in recent research dealing with theft. According to FBI statistics, location is an important risk
factor: the three hottest areas for construction equipment theft are New Jersey, Miami, and Southern California. These three locations also accounted for more than half of the recoveries of equipment in 2002 (McDowall, 2002). Construction theft is also a local issue. In 70% of cases, the equipment never left the local area, (i.e., it was in storage on or near a local job site). Florida, California, Georgia, Texas and Arizona (all with rapid growth rates and large numbers of construction projects) accounted for 83% of the recoveries. It has been theorized that these states have more ongoing winter construction work, and the data were gathered between January and June; hence, it may be weighted or biased. It was also reported that the most theft item recoveries occurred in Florida, at 35%; California at 17%; Georgia at 12%; Texas and Arizona each at 10%; Massachusetts at 7%; New York at 5%; Michigan and Connecticut each at 2% (McDowall, 2002).

Many contractors feel that the best way to help control jobsite theft and vandalism is to develop a thorough jobsite antitheft plan before the start of construction work. The first step is to decide on a sensible, written security plan during the preconstruction period. Money should be set aside when preparing the estimate for proper lighting, alarm systems, fencing, watchdogs, and security guard services if applicable (Banks, 1990). Security responsibilities should be assigned to the project manager, project engineer, superintendent, or any other employee who is in a position of responsibility. One of these individuals then should be made responsible for recording all incoming material deliveries. This will insure that everything is properly recorded when it is stored on site. Police and fire departments should also be contacted and a good line of communication should be established. Local law enforcement must be encouraged to patrol the area at night (when most theft and vandalism incidents occur). A construction company ought to
be aware of the fact that local law enforcement cannot be everywhere at once; and they should encourage vendors and the public to take a vested interest in the security of the jobsite (Bonesteel, 1997). Locals actively watching a construction site can act as another form of security. If everyone involved with a project is made aware of the problems that can result from jobsite theft and vandalism, jobsite security can be made to run more smoothly.

Before implementing a jobsite security plan one should consider the following: the company’s businesses history of recurring theft problems (how much does the company have to lose?). The greater the liability, the greater the company’s investment in security should be. The political aspects of the job must also be weighed. Is the job controversial? Is there a history of crime problems in the area? The answers to these questions will help the company determine the type and amount of security required to reduce the opportunity for theft on the job site (Lumberman’s of Washington, Inc. 2000).

One area to look for information on a comprehensive job site security plan is the Associated General Contractors (AGC), which provides information to their members on various topics in construction. Each state differs slightly due to specific needs of the particular region, but on the whole each state echoes the same warnings and advice. The following is taken from the AGC of Washington regarding security recommendations provided to its members:

- Visit the site after dark to evaluate lighting. Additional lighting can be a wise investment against theft.
- Place the tool storage area where it can be seen by law enforcement, neighbors, and others who can report unusual activity.
• Alert neighbors and nearby businesses about the work being performed in the area. Ask them to keep watch for unusual activities. Provide a contact person and phone number to call when suspicious activity is observed.

• Notify the local law enforcement agency when construction work is begun in the area. Provide them with the name of a company contact and telephone number.

• Install adequate perimeter fencing. Check and maintain the security fence weekly.

• Close fences.

• Close locks during the day.

• Develop a key control system and use it, consistently!

• Take tires off small equipment.

• Conduct an inventory of tools and equipment to ensure that all items are marked with the company name and the drivers’ license number of the company principal.

• Maintain an inventory of all tools and equipment used on the project including a list of the items and their model and serial numbers.

• Develop a tool loan policy.

• Remember: engage employees in these prevention techniques. Be sure all tools and equipment are locked up at the end of each work day.

Prepare for long holiday weekends:

• Remove high cost equipment from the site.

• Remove vehicle and equipment batteries.

• Install theft prevention devices to disable fuel, hydraulic, and electrical systems.

• Remove wheels from job trailers, compressors, and generators.

• Take the tongue off equipment (if removable), if bolted, remove from site.

• Remove and secure large amounts of metals, especially copper wire. If it must be left on site, spray paint it black, stack it where it is difficult to load, use case hardened chain to secure it, and surround it with heavy objects.

• If copper or aluminum has been recently installed, consider hiring a guard service.
• Park heavy equipment camp wagon style heel to toe, with generators and compressors inside the circle.

• Post “No Trespassing” signs.

• Remove valuable items from the job trailer. Lock down computers and back-up information on disks. Store disks away from the site.

• Consider having someone stay on site over long weekends.

• Remember: begin planning on the Tuesday prior to a long weekend. Give specific tasks to employees and expect the site to be secured by mid-day Friday.

Sophisticated Scams

Several contractors have fallen victim to costly scams. Unauthorized people, claiming to be employed by the company order several thousand dollars of construction materials. Acting as though nothing is unusual, they arrange a pick-up and when asked to sign for it, they use a fictitious name. Take the following steps to protect the company:

• Check invoices to make sure all charges are authorized.

• Establish clear policies about making purchases. Specific employees should be authorized to make purchases and the vendors should know who is authorized to make purchases for the company. Ask vendors to require identification for all company purchases.

• When a vendor has a question about the authorization of a purchase, there should be a specific person for them to call for approval.

• Purchase order books or forms should not be carried in vehicles. They are too easy for would-be thieves to steal or see, using the correct numbering sequence.

• Remember: a loose purchase tracking system can potentially cost a firm thousands of dollars annually. Maintain an intact control system (Associated General Contractors of Washington. 2002).

An added factor that should be investigated is to identify the culprits involved in incidents of theft and vandalism. It is important for contractors to recognize that construction sites are a natural point of curiosity. Passers-by always want to see what is
being built and if it will be something of interest to them. A typical construction site turns into a “ghost town” after 4 or 5 p.m. and this leaves it very vulnerable to theft and vandalism (Gardner 2003). Research has shown that the majority of theft and vandalism incidents are not done by strangers, but rather by individuals familiar with the jobsite.

Many police statistics indicate that all too often equipment theft is an inside job. The AGC of California states that 85% of jobsite theft is employee related (Moorhouse). This may be due to the fact that many construction workers employed on construction sites are employed for a short-term, but long enough to gain knowledge of company procedures. Since mobile equipment keys and locks are of a common design, equipment becomes an easy or "soft target" that is ripe for theft (Vista Training, Inc., 2003). To help combat potential problems it is recommended that contractors perform background checks on all workers allowed on the site, including employees of subcontractors. These checks include the following suggestions recommended by the Eugene, Oregon Police Department:

- Post and enforce a zero tolerance policy for drugs and alcohol.
- Develop a positive relationship with all company employees. This will help reduce any sense of “entitlement”.
- Develop a positive relationship with neighboring businesses and residents. They can be the eyes and ears of the company during non-work hours.
- Inform the neighbors about who is authorized on the site and at what times they should expect people to be there.
- Communicate with other contractors in the area regarding theft problems.
- Encourage employees to communicate with each other about threats against the firm and other suspicious activities.
- Security guards can be effective on weekends and at night (Lumberman’s of Washington, Inc. 2000).
Rationalization is one of the leading factors of theft on a job site. Some employees may think “The contractor leaves all these tools and equipment unprotected, because they are so rich. Obviously they don’t care. Besides, I need a new drill at home.” The result is a theft (Moorhouse).

Theft and vandalism can also be linked to how an employee is treated. Terminations alone account for many of the causes of vandalism that have been prosecuted. After a difficult termination, a job site should be made extra secure through the use of additional security and possibly the changing of locks (Moorhouse).

Organized crime associated with the theft of construction equipment is another major problem. Construction equipment thieves are generally a sophisticated group that not only has a ready-made market, but that also knows which pieces of equipment are most in demand and lucrative on the black market (Middleton 1999). Four types of equipment account for 70 percent of equipment thefts, according to LoJack Corp., Westwood, Mass. Backhoes are the top targets for professional thieves, followed by air compressors, skid-steer loaders and generators, based on LoJack’s recovery experiences between January and June 2001. The company tracked the top recoveries by type: backhoes 22 percent; air compressors and skid-steers each 17 percent; generators 14 percent; forklifts, light towers and trucks each 5 percent; trailers, graders, loaders and excavators, each 3 percent (McDowall, 2002). Research indicates that a large percentage of stolen equipment remains within about 100 miles of the theft location. A lucrative market also exists in underdeveloped countries around the world, and once stolen equipment is aboard a ship or across a border, recovery of the equipment is nearly impossible (VISTA Training, Inc., 2003). Another finding showed that recent models
are stolen more often than older equipment with almost 75 percent of the recoveries being no more than three years old (McDowall, 2002).

Typically, thieves will not attempt a theft from a jobsite if they cannot enter, load the products and be away within 5 or 10 minutes (Bonesteel 1997). Most thefts are performed by groups of persons that “canvass” jobs by day to see what equipment is available and what hours the contractor works. During the contractor’s off hours, thieves will sometimes pose as the contractor and call a rental firm to arrange for equipment to be immediately moved to another location after hours, where the equipment can be stolen with little difficulty (Krizan, 1987). Since construction theft is often carried out by organized crime rings, tracking one piece of stolen equipment often leads to the discovery of a larger theft operation (McDowall, 2002).

Another problem is that some contractors want manufacturers to provide them with universal ignition keys covering a particular product line so as not to waste time while operators try to locate the correct keys during the day. This exposes many large pieces of construction equipment to theft due to the relative ease that one can obtain the keys to start the equipment and drive it off of the jobsite (Bonesteel, 1997).

To combat equipment theft Liberty Mutual Insurance’s Loss Prevention Department recommends scratching an identifying mark into equipment (spray paint and initials on a piece of equipment does not qualify as being “positively” identified). It also suggests asking for identification from drivers before equipment is loaded onto trailers, and removing keys and securing the jobsite at the end of the day (Middleton 1987). One should also immobilize equipment when it is not in use; this can be done by removing rotors, lowering blades and buckets, and disabling batteries and electric starting systems.
(Bonesteel 1997). If immobilization is not possible then equipment should be parked in a “wagon train” formation, using larger equipment to protect small equipment (Bonesteel 1997). Using backhoes and front-end loaders to block trailer entrances can also help protect equipment on site.

A recent form of theft that has been on the rise is the occurrence of office equipment theft from jobsite offices. Popular equipment that has attracted thieves includes fax machines, computers, copiers, and telephones. It is recommended that a company should try to position the site or trailer office in an area with limited access to the opportunist thief, yet highly visible to the public. Expensive pieces of office equipment should be well-marked with indelible markings (Insurance Journal, 2001). Valuable business information such as payroll figures, work schedules and future ventures, or anything that could undermine a company’s strategy if it was lost or put in the hands of rivals should also be recognized as a potential target and protected accordingly (Neighborhoodwatch.Net, 1992).

One of the most important factors that is rarely taken into account when dealing with theft on a construction project is the reporting of any incident that involves the theft of heavy equipment or materials. It is beneficial to everyone involved, as well as potential future victims, when local law enforcement is made aware of the occurrence of theft or vandalism. This will enable law enforcement to be able to work at assisting the contractor in locating the stolen equipment.

When reporting an incident, one should include as much detail as possible; including year, make, model, serial numbers, company identification (e.g. logos, decals, internal numbers, unique paint), and any attachments or customized features to assist the
authorities in trying to locate a piece of stolen equipment (Bonestel 1997). If a firm feels that someone is offering to sell property that could be stolen, then one is encouraged to call authorities. In the event that a suspect is apprehended, police encourage those victimized to prosecute to the fullest extent of the law to discourage any future thefts. The reporting of theft and vandalism is of utmost importance. The steps that are taken can make the difference between solving a crime and no solution at all (Bonesteel, 1997).

A construction site will never be able to claim that it is theft or vandal proof, but commercial contractors can make it difficult for professional thieves and vandals to cause large amounts of damage. The review of literature has provided evidence that becoming proactive in securing a jobsite will result in crime becoming a minor nuisance instead of a major problem that has the potential of draining profits from an otherwise successful project.
Based on the various references in the literature, it is clear that losses from theft and vandalism can be substantial. The objective of this research was to more accurately define the magnitude of these losses and to gather information on effective techniques being employed to curtail or reduce these losses. This type of information is not readily available from any known source, so it was decided that this information could better be acquired directly from the construction community. In order to obtain this information from a large number of contractors, it was determined that a mailed survey questionnaire was the most effective means of obtaining the quantity and type of information needed to fulfill the goals of this research.

The literature on jobsite security was used as a primary resource for developing an appropriate questionnaire (see appendix A) that was used to conduct this research. The literature that was reviewed dealt specifically with theft and vandalism incidents and prevention techniques on commercial construction job-sites. The literature review was the initial source of information used to develop the questionnaire. Refinements were then made to the questionnaire and these modifications were based on the results of an unpublished research report (pilot study) prepared by Dr. Jimmie Hinze of the M.E. Rinker, Sr. School of Building Construction at the University of Florida. In addition, this questionnaire evolved at the same time that another study was being developed on theft and vandalism in the area of residential construction. The final version of the
questionnaire resulted after several iterations of revisions, with each iteration improving the survey clarity and ease of understanding.

The final version of the questionnaire was submitted to the University of Florida Institutional Review Board for approval on May 26, 2003. The form was approved on June 2, 2003 with minor changes required to be made to the cover letter. After these changes were made, the cover letter and questionnaire were mailed to approximately 1200 commercial contractors. The list of contractors was obtained from the M.E. Rinker, Sr. School of Building Construction at the University of Florida. The list included 800 to 900 contractors who were located in the southeast with the majority of these being in the state of Florida. These contractors had had some type of communication with the Rinker School in recent years, primarily for the purpose of recruitment for the firm.

In administering the survey, employees of the targeted companies were asked to fill out the survey to the best of there ability and to return it through an enclosed postage paid envelope. No names or identification were asked to be provided on the questionnaire unless the respondent wanted to receive a summary report. Sixty surveys were returned due to bad addresses or which were undeliverable for some reason. From a statistical perspective, 30 samples would have been adequate to generate conclusions of the population. A total of 100 surveys were completed and returned. The data gathered from these 100 surveys were entered into the SPSS statistical analysis software during the week of June 23, 2003 to June 27, 2003 with the primary focus being to identify specific factors that are associated with theft and vandalism on commercial construction sites. Findings were considered to be statistically significant if the level of significance (p) was
less than or equal to 0.10. All findings of interest are reported, but specific notations will be made when a particular finding is not statistically significant.
CHAPTER 4
RESULTS

One hundred questionnaires were completed and returned. The data, excluding all open-ended questions, were analyzed by calculating the frequencies of responses for all of the questions which required specific responses. The next pages provide information on these frequencies. The results include a discussion of specific experiences that respondents had with theft and vandalism on their construction sites. Since all respondents did not answer every question, some frequencies are presented on the responses given.

The 100 companies that responded were classified into two categories for further statistical analysis, namely ‘small to medium’ sized companies with less than $100 million annual volume of work performed and ‘large’ companies with over $100 million annual volume of work performed (Figure 4-1).

![Figure 4-1 Annual dollar volume of work performed (n=100)]

Figure 4-1 Annual dollar volume of work performed (n=100)
Respondents were grouped according to the type of firm, namely general contractor, subcontractor, or vendor/supplier. Of the respondents who gave this information, most were general contractors; twelve worked as subcontractors, and one was a vendor/supplier (see Figure 4-2). In general, the responses reflect the experiences of general contractors, the target population of this study.

The firms were further classified according to the type of projects constructed. There were 67 firms who specialized in commercial projects, 16 firms who specialized in both commercial and residential projects, eleven in residential projects, four in industrial projects, two in highway roadwork, and one in ‘other’ who specialized in healthcare work (see figure 4-3). The experiences of commercial contractors and commercial/residential contractors are represented to the greatest extent.
The percentage of work subcontracted by the firm was broken down into four categories. The majority of respondents, fifty-six, subcontracted more than seventy-five percent of their work (Figure 4-4). Sixteen respondents subcontracted 100% of their work.
THEFT

The following paragraphs present information obtained that pertains specifically to jobsite theft. A variety of types of theft information are presented along with a number of approaches used to curtail these types of theft incidents.

Eighty-eight firms responded to the number of thefts that they experienced in the last three years. Forty-two of these reported that they experienced two or less incidents of theft in the last year while the mean number of theft incidents experienced by all 88 firms was 7. The companies that experienced more than 10 theft incidents in the last three years reported a wide range in the number of theft incidents. Two respondents reported more than one fifty incidents and one respondent reported 192 theft incidents.

Eighty-one respondents provided information on the estimated total dollar loss resulting from thefts. Of these, 29 respondents reported theft losses of less than $2,000. The mean reported estimated dollar loss resulting from incidents of theft for all 81 respondents was $39,692. This mean is influenced considerably by one outlier value of $2,300,000 as to the dollar amount of loss resulting from theft. The median value of theft losses per firm was $3,733, which is more descriptive of all of the responses.
Figure 4-6 Estimated total dollar loss resulting from theft in the last three years (n=81)

The estimated dollar loss resulting from theft in the last three years was divided by three to calculate the yearly volume of loss and then divided by the amount of work performed by the company. This was converted into a value representing the annual theft loss per one million dollars of construction work. Eighteen companies lost less than $20, fifteen between $21 and $50, ten $51 to $100, twenty-six $101 to $500 and ten greater than $500 for every $1,000,000 of work performed by the company (see Figure 4-7). The mean was $217 lost per $1,000,000 of work performed.

Figure 4-7 Theft loss per $1 million of work performed (n=79)
Ninety-five firms indicated the percentage of theft incidents that they reported to law enforcement. A majority (76%) reported more than 75% of the theft incidents to law enforcement (see Table 4-8). Sixty respondents stated that all known theft incidents were reported to the police. No significant relationship was found when comparing the annual volume of work performed to the percentage of theft incidents reported to law enforcement.

![Figure 4-8 Percentage of theft incidents reported to law enforcement (n=95)](image)

Information on the number of tool theft incidents were provided by 75 firms. Forty-two of these respondents had experienced an incident of tool theft but did not provide a specific number of incidents. Many respondents simply checked that they had experienced this type of theft incident but did not provide an exact figure. Nineteen of the thirty respondents who provided a specific number experienced less than five incidents of tool theft in the last three years (see Figure 4-9). The average loss resulting from tool theft was $1,617 per incident.
Eleven respondents reported experiencing incidents involving the theft of licensed vehicles. Six respondents did not indicate the number of vehicle theft incidents. Two respondents indicated that they had experienced one incident each, and three respondents indicated that they had experienced two vehicle theft incidents. The average loss per theft for these incidents was $25,950.

There were forty-one reported incidents of equipment theft with 23 respondents indicating that they had been victims of equipment theft. Eleven of the respondents experienced less than four equipment theft incidents while seven experienced four or more incidents. The average loss per incident was $4,802.

Thirty-six respondents indicated that their firm had been a victim of the theft of office equipment such as computers, fax machines, printers, copiers, etc. in the last three years. Twelve of the respondents reported that they experienced less than five such incidents in the last three years. Four respondents reported experiencing five to ten incidents and two respondents experienced more than ten incidents. The average loss per incident resulting from the theft of office equipment was $2,025.
Forty-seven respondents indicated that they had experienced an incident of the theft of construction materials in the last three years. Twenty-one of these provided a specific figure as to the number of construction material theft incidents experienced in the last three years. Eleven of these respondents experienced less than five incidents with six experiencing five to twenty-five and four experiencing more than twenty-five. The average loss for each incident of the theft of office equipment was $3,586.

The average values of the losses reported by the respondents for the theft of tools, licensed vehicles, equipment, computers, and construction materials are summarized in Figure 4-10.

![Figure 4-10 Average value of loss per theft incident](image)

Most theft incidents are reported to law enforcement despite the dollar value of the loss. Fifty-three percent of the respondents (42 out of 80 respondents) reported theft losses ranging from as little as $1 to $500 to law enforcement (see Figure 4-11).
Builder's risk insurance coverage generally provides protection against perils (fire, wind, hail, theft, etc.) to buildings under construction and additions to existing buildings. It extends coverage to such cost items as materials, architect/engineer fees and testing; and deals with "permission to occupy" issues. The deductible amount on the insurance policy is a value stated in the builder’s risk policy that exempts the insurer from paying an initial specified amount in the event that the insured sustains a loss. The typical deductible amount for the builders risk insurance policy for the responding firms ranged from $1,500 to $5,000 (see Figure 4-12).
The study found that stolen items are rarely recovered in incidents of theft. The percentage of theft incidents where items were recovered was less than 10 percent as reported by 76 responses. No respondent stated that more than 50% of the items were recovered. Overall, about seven percent of the stolen items were reportedly recovered.

![Figure 4-13 Percentage of theft incidents in which stolen items have been recovered (n=92)](image)

In general, contractors did not feel that their employees or former employees were the prominent perpetrators of theft on their projects. The majority of respondents (61 out of 84 respondents) indicated that they thought that less than 50 percent of the theft incidents involved current employees or former employees (see Figure 4-14). An average of 33% of the theft incidents are thought to involve employees or former employees.
Figure 4-14 Percentage of thefts thought to be caused by employees/former employees (n=84)

The survey asked about measures used to ensure jobsite security on construction sites. A number of practices are employed. Respondents were asked to indicate all measures that had been utilized. The breakdown of responses was as follows:

Nine respondents provided additional information on other techniques that they had employed to reduce thefts on their jobsites. These responses were the following:

- Gated entrance (4 responses)
- Plywood enclosed lockup area built in the work area
- Arrange with the local police department to patrol the site
- Lock tools, equipment, and miscellaneous items in the office trailer
- Do not have night security guard as we have found theft to increase. It is more effective to have random police/sheriff patrols.
- We have bought jobsite trailers that superintendents pull home at night with all small power and hand tools.
Table 4-1 Measures utilized to ensure jobsite security on the construction site
(percentages out of 100 responses)

88% Lockboxes
80% Security fencing
70% Posting of warning signs
55% Use of exterior lighting
42% Strategic parking of large equipment
37% Use of an alarm system
35% Removal of unused equipment
31% Use of a night security force
23% Use of police patrols
22% Requiring of all workers to possess a badge
14% Use of security cameras
11% Guard stationed at entry gate
7% Neighborhood Watch
0% Use of guard dogs

A question was asked to help determine what specific measures are used to prevent the theft of tools on the construction site. Respondents were asked to check all measures that applied. The responses were as follows:

Table 4-2 Measures used to prevent the theft of tools on the construction site

71% Maintaining a secure storage area
67% Marking of tools
61% Maintaining tool inventory
58% Minimizing tools left on site
49% Making workers responsible for tools
35% Requiring workers to provide their own tools

Nine respondents also provided information on other techniques that they had employed to reduce the theft of tools. They were the following:

- Tool box on truck or tool chest in the trailer (5 responses)
- We implement an asset tag tracking system
- Onsite security guard
- Employees pay for one-half the cost of replacing lost or stolen tools
- Assign an employee to hand out and check in tools
A question was asked to help determine what measures are commonly used to prevent the theft of machinery and equipment on construction sites. Respondents were asked to check all measures that applied. The responses are shown in table 4-3:

Table 4-3 Measures used to prevent the theft of machinery and equipment on the construction site

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>67%</td>
<td>Parking of equipment and machinery in well-lighted areas</td>
</tr>
<tr>
<td>43%</td>
<td>Parking of equipment in a specific formation at the end of the day</td>
</tr>
<tr>
<td>37%</td>
<td>Including additional identification on equipment and machinery</td>
</tr>
<tr>
<td>20%</td>
<td>Using a distinctive color to mark machinery and equipment</td>
</tr>
<tr>
<td>11%</td>
<td>Modifying the ignition or fuel lines</td>
</tr>
</tbody>
</table>

Eleven respondents also provided information on other techniques that they had employed to reduce equipment theft. They were as follows:

- Subcontract work (3 responses)
- Remove key, secure with chains and locks (3 responses)
- Park equipment in fenced area (2 responses)
- Install tracking devices on large equipment
- Take equipment home each night
- LOJACK provided by insurance

Project layout decisions might directly influence or impact jobsite security. The survey asked about layout decisions that were made specifically to address the security of items on the jobsite. Twenty-nine respondents offered suggestions and examples of jobsite layout decisions that they have used to discourage theft. Some of the measures given did not specifically address jobsite layout, but they did provide additional approaches that are being implemented. The twenty-nine answers provided were the following:

- Place trailer in well-lit and fenced area (14 responses).
- Utilize roll-off lockboxes for tools and equipment with concealed (protected) locks (3 responses).
- Store trailers away from public access and out of view (3 responses).
- Place trailers so doors face road (2 responses).
- Store containers so they are positioned in lighted areas and close to the office.
- Use a closet of a small room with lock for expensive stored materials.
- Use low cost (almost disposable) computer equipment.
- Use security fencing, lockable storage buildings, material and tool control utilizing bar codes, and scanner badges.
- Have appliances delivered and installed the same day, use portable motion detectors, and activate built-in security system early.
- Stock materials on upper floors of a building to increase difficulty of theft.
- Secure the area (no specifics provided).

The theft loss per million dollars of construction effort was compared to security measures utilized to determine if any were particularly effective. It was generally found that lower theft losses were associated with the use of each measure. The three exceptions were the use of lockboxes, the use of a worker badge system, and the removal of unused equipment. None of these comparisons were statistically significant.
Table 4-4 Measures commonly used to ensure security on the construction site as related to annual theft loss per million dollars of construction effort

<table>
<thead>
<tr>
<th>Measure *</th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lockboxes</td>
<td>$129</td>
<td>11</td>
<td>197</td>
<td>$45</td>
<td>0.28</td>
</tr>
<tr>
<td>yes</td>
<td>$234</td>
<td>67</td>
<td>307</td>
<td>$100</td>
<td></td>
</tr>
<tr>
<td>Neighborhood</td>
<td>$224</td>
<td>74</td>
<td>299</td>
<td>$95</td>
<td>0.57</td>
</tr>
<tr>
<td>no</td>
<td>$137</td>
<td>4</td>
<td>227</td>
<td>$35</td>
<td></td>
</tr>
<tr>
<td>Watch</td>
<td>$259</td>
<td>26</td>
<td>335</td>
<td>$136</td>
<td>0.41</td>
</tr>
<tr>
<td>yes</td>
<td>$200</td>
<td>52</td>
<td>275</td>
<td>$76</td>
<td></td>
</tr>
<tr>
<td>Warning Signs</td>
<td>$290</td>
<td>18</td>
<td>383</td>
<td>$150</td>
<td>0.25</td>
</tr>
<tr>
<td>no</td>
<td>$198</td>
<td>60</td>
<td>264</td>
<td>$83</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>$219</td>
<td>62</td>
<td>274</td>
<td>$117</td>
<td>0.99</td>
</tr>
<tr>
<td>Security Fence</td>
<td>$253</td>
<td>58</td>
<td>320</td>
<td>$129</td>
<td>0.11</td>
</tr>
<tr>
<td>no</td>
<td>$122</td>
<td>20</td>
<td>185</td>
<td>$41</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>$221</td>
<td>46</td>
<td>266</td>
<td>$129</td>
<td>0.97</td>
</tr>
<tr>
<td>Worker Badge</td>
<td>$220</td>
<td>16</td>
<td>379</td>
<td>$35</td>
<td></td>
</tr>
<tr>
<td>System</td>
<td>$253</td>
<td>58</td>
<td>320</td>
<td>$129</td>
<td>0.11</td>
</tr>
<tr>
<td>Night Security</td>
<td>$253</td>
<td>55</td>
<td>330</td>
<td>$100</td>
<td>0.13</td>
</tr>
<tr>
<td>no</td>
<td>$140</td>
<td>23</td>
<td>173</td>
<td>$75</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>$238</td>
<td>68</td>
<td>309</td>
<td>$113</td>
<td>0.15</td>
</tr>
<tr>
<td>Security Cameras</td>
<td>$94</td>
<td>10</td>
<td>130</td>
<td>$42</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>$212</td>
<td>52</td>
<td>262</td>
<td>$90</td>
<td>0.75</td>
</tr>
<tr>
<td>Removal of Unused Equipment</td>
<td>$235</td>
<td>26</td>
<td>359</td>
<td>$69</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>$243</td>
<td>39</td>
<td>308</td>
<td>$133</td>
<td>0.48</td>
</tr>
<tr>
<td>Exterior Lighting</td>
<td>$196</td>
<td>39</td>
<td>285</td>
<td>$67</td>
<td></td>
</tr>
<tr>
<td>no</td>
<td>$227</td>
<td>71</td>
<td>299</td>
<td>$97</td>
<td>0.48</td>
</tr>
<tr>
<td>yes</td>
<td>$143</td>
<td>7</td>
<td>264</td>
<td>$16</td>
<td></td>
</tr>
<tr>
<td>Guard Stationed at Entry Gate</td>
<td>$227</td>
<td>60</td>
<td>301</td>
<td>$83</td>
<td>0.7</td>
</tr>
<tr>
<td>yes</td>
<td>$196</td>
<td>18</td>
<td>283</td>
<td>$97</td>
<td></td>
</tr>
</tbody>
</table>

Note: None of the differences of the means are statistically significant
* No respondent used guard dogs

The theft loss per million dollars of construction effort was compared to security measures utilized to prevent the theft of tools to determine if these measures had an observable impact. It was found that the majority of the firms that employed a security measure to prevent the theft of tools experienced a higher rate of theft loss per million dollars of construction. The maintaining of tool inventory and the marking of tools were the only statistically significant findings. It could not be ascertained if the measure to prevent tool theft were implemented because of the past experiences of tool theft. Neither could it be determined if the tool theft exposure differed among the respondents.
Table 4-5 Measures commonly used to prevent the theft of tools as related to annual theft loss per million dollars of construction effort

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain</td>
<td>$290</td>
<td>48</td>
<td>341</td>
<td>$153</td>
<td>0.01</td>
</tr>
<tr>
<td>Tool Inventory</td>
<td>$107</td>
<td>30</td>
<td>151</td>
<td>$44</td>
<td></td>
</tr>
<tr>
<td>Maintain</td>
<td>$236</td>
<td>55</td>
<td>318</td>
<td>$97</td>
<td>0.44</td>
</tr>
<tr>
<td>Secure Storage</td>
<td>$179</td>
<td>23</td>
<td>237</td>
<td>$56</td>
<td></td>
</tr>
<tr>
<td>Minimize</td>
<td>$234</td>
<td>45</td>
<td>326</td>
<td>$97</td>
<td>0.62</td>
</tr>
<tr>
<td>Tools Left on Site</td>
<td>$200</td>
<td>33</td>
<td>252</td>
<td>$48</td>
<td></td>
</tr>
<tr>
<td>Mark Tools</td>
<td>$266</td>
<td>53</td>
<td>331</td>
<td>$133</td>
<td>0.04</td>
</tr>
<tr>
<td>Make Workers</td>
<td>$250</td>
<td>38</td>
<td>322</td>
<td>$88</td>
<td>0.37</td>
</tr>
<tr>
<td>Responsible</td>
<td>$190</td>
<td>40</td>
<td>270</td>
<td>$90</td>
<td></td>
</tr>
<tr>
<td>Workers Provide</td>
<td>$199</td>
<td>24</td>
<td>305</td>
<td>$61</td>
<td>0.69</td>
</tr>
<tr>
<td>Own Tools</td>
<td>$228</td>
<td>54</td>
<td>294</td>
<td>$113</td>
<td></td>
</tr>
</tbody>
</table>

There is a substantial difference between the estimated total dollar losses resulting from theft when compared to the volume of work performed by the company. Table 4-6 indicates that small to medium sized companies experienced an average loss of $7,767 while large firms had an average loss of $103,543. This result would be expected as larger firms would have a greater loss exposure.

Table 4-6 Estimated annual dollar loss of theft incidents as related to the size of the company

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= $100 Million</td>
<td>$7,767</td>
<td>54</td>
<td>13,492</td>
<td>$3,167</td>
</tr>
<tr>
<td>&gt; $100 Million</td>
<td>$103,543</td>
<td>27</td>
<td>439,726</td>
<td>$12,667</td>
</tr>
<tr>
<td>Total</td>
<td>$39,692</td>
<td>81</td>
<td>255,002</td>
<td>$3,733</td>
</tr>
</tbody>
</table>

Note: not statistically significant (p= 0.11)

The average loss was determined by dividing each respondents reported loss resulting from theft by the number of theft incidents experienced in the last three years. This average loss was then compared to the annual dollar volume of work performed by the company. The cost per loss incident was considerably higher for the larger firms. These findings appear intuitive as larger firms would be expected to have a greater loss exposure.
Table 4-7 Average loss experienced by each company as related to the size of the company

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt; = $100) Million</td>
<td>$2,986</td>
<td>52</td>
<td>4,002</td>
<td>$1,393</td>
</tr>
<tr>
<td>(&gt; $100) Million</td>
<td>$5,020</td>
<td>25</td>
<td>4,441</td>
<td>$3,800</td>
</tr>
<tr>
<td>Total</td>
<td>$3,646</td>
<td>77</td>
<td>4,230</td>
<td>$2,000</td>
</tr>
</tbody>
</table>

Note: this is statistically significant (p = 0.05)

The dollar value of loss experienced due to theft was divided by the annual dollar volume of work performed by each company and then divided by three to get a yearly value of loss. This figure was then compared to the size of the company. It was found that small to medium sized companies experienced a higher dollar amount of loss from incidents of theft when compared to large companies (see Table 4-8).

Table 4-8 Annual dollar value of theft loss per million dollars of work performed as related to company size.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt; = $100) Million</td>
<td>$286</td>
<td>48</td>
<td>324</td>
<td>$139</td>
</tr>
<tr>
<td>(&gt; $100) Million</td>
<td>$90</td>
<td>27</td>
<td>179</td>
<td>$27</td>
</tr>
<tr>
<td>Total</td>
<td>$215</td>
<td>75</td>
<td>295</td>
<td>$83</td>
</tr>
</tbody>
</table>

Note: this is statistically significant (p = .005)

The number of measures that were being utilized by the respondents was compared to the annual dollar volume of work performed by the company. Examples of measures can be found in Table 4-1. Of the fourteen measures identified, larger firms used an average of 6.2 measures while smaller firms used 4.6 measures.

Table 4-9 Number of measures checked by participants as being used to ensure jobsite security as related to the size of the company

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt; = $100) Million</td>
<td>4.6</td>
<td>65</td>
<td>2.1</td>
<td>5</td>
</tr>
<tr>
<td>(&gt; $100) Million</td>
<td>6.2</td>
<td>35</td>
<td>2.5</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>5.2</td>
<td>100</td>
<td>2.3742</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: this is statistically significant (p = 0.001)

Small to medium sized firms tended to report smaller losses ($760) to law enforcement compared to larger firms ($1,492).
Table 4-10 Minimum value of loss reported to law enforcement in incidents of theft as related to the size of the company

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= $100 Million</td>
<td>$719</td>
<td>53</td>
<td>1108</td>
<td>$500</td>
</tr>
<tr>
<td>&gt; $100 Million</td>
<td>$1,461</td>
<td>31</td>
<td>2606</td>
<td>$500</td>
</tr>
<tr>
<td>Total</td>
<td>$993</td>
<td>84</td>
<td>1866</td>
<td>$500</td>
</tr>
</tbody>
</table>

Note: this is statistically significant (p= 0.07)

The amount of the company’s builders risk insurance policy was found to be related to the size of the company. Small to medium sized firms had a smaller average deductible of $5,329 as compared to larger firms who had an average deductible of $7,264 (see Table 4-11). These figures excluded 14 outliers from companies that had a deductible greater than $10,000.

Table 4-11 The deductible of the company’s builders risk insurance policy as related to the size of the company

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= $100 Million</td>
<td>$5,329</td>
<td>42</td>
<td>15,300</td>
<td>$1,750</td>
</tr>
<tr>
<td>&gt; $100 Million</td>
<td>$7,264</td>
<td>25</td>
<td>19,598</td>
<td>$5,000</td>
</tr>
<tr>
<td>Total</td>
<td>$6,050</td>
<td>67</td>
<td>16,911</td>
<td>$2,500</td>
</tr>
</tbody>
</table>

Note: not statistically significant (p= 0.65)
VANDALISM

Vandalism is generally a nuisance crime for contractors and does not present serious losses for most contractors. Nonetheless, any losses detract from company profits and the threat of vandalism cannot be ignored. The study examined the experiences that firms had with losses due to vandalism.

Seventy-six firms gave information on the number of vandalism incidents that they experienced. Twenty-six of these respondents reported that they had not experienced an incident of vandalism while thirty-two respondents reported that they had experienced less than 2 incidents of vandalism. The mean was 3.6 vandalism incidents experienced as one respondent had experienced 42 incidents and one had experienced 109 incidents.

A total of 63 respondents gave an estimate of the total dollar losses resulting from vandalism. Of these, 34 experienced vandalism losses of less than $1,000, while the mean was $9,689. This relatively high mean can be attributed to a response of $433,333 in losses by one respondent.
The estimated dollar loss resulting from vandalism in the last three years was divided by three to calculate the yearly volume of loss and then divided by the amount of work performed by the company. Twenty-five companies lost less than $10, twenty-four between $11 and $40, ten $41 to $200 and four greater than $200 for every $1,000,000 of work performed by the company (see Figure 4-17). The mean was $73 lost per $1,000,000 of work performed.

The majority of the respondents (23 out of 33 respondents) indicated that they had experienced incidents of graffiti on their jobsite. Only ten gave information on the
number of vandalism incidents. Two respondents experienced one incident, four experienced two incidents, three experienced three incidents, and one respondent experienced fifty incidents.

There were forty-five respondents who indicated they had experienced an incident of broken glass on construction sites. Sixteen gave information on the number of broken glass incidents. Most of them (13 out of 16 respondents) indicated that they experienced less than six incidents. Three firms experienced more than seven incidents of broken glass.

Twenty-four respondents indicated that they had experienced incidents of destruction of in-place materials with nine providing the actual number of such incidents. Five of the eight experienced less than five incidents. Four respondents experienced five or more incidents of the destruction of in-place materials, fixtures or appliances.

There were fourteen respondents who indicated that they had experienced incidents of vehicle damage vandalism with six providing the actual number of such incidents. Four respondents experienced one incident, one experienced two incidents, and one respondent experienced three such incidents.

There were twenty-four respondents who indicated that they had experienced incidents of damage to construction equipment on the jobsite. Six of the eight who indicated a specific number of such incidents experienced less than five. Two respondents experienced more than five incidents (7 and 15, respectively) of damage to construction equipment.

The question of who were the vandals in incidents of vandalism proved to garner few responses. Apparently, vandals are seldom caught. The most common culprit was
thought to be neighborhood children followed by strangers. All other possible culprits were suspected less frequently (Figure 4-18).

![Figure 4-18 Suspected identity of vandals](image)

Fifteen respondents offered suggestions and examples of steps they have taken to discourage vandalism. The fifteen approaches are summarized as follows:

- Use of fences/lighting (5 replies).
- Security guards on vandalism prone projects (3 replies)
- Secure the areas (2 replies).
- Video cameras, employee meetings.
- Site well lit, signs in place, web cams.
- Lock up buildings when possible.
- Temporary door and window closures.
- Cover windows with ¼” mesh fence material

The dollar value of loss experienced due to vandalism was divided by the annual dollar volume of work performed by each company and then divided by three to compute an annual loss. This figure was then compared to the size of the company. It was found that small to medium sized companies who participated experienced a higher dollar
amount of loss from incidents of vandalism when compared to large companies (see Table 4-12).

Table 4-12 Annual dollar value of vandalism loss per million dollars of work performed as related to company size.

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>N</th>
<th>Std. Dev.</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= $100 Million</td>
<td>$106</td>
<td>40</td>
<td>231</td>
<td>$25</td>
</tr>
<tr>
<td>&gt; $100 Million</td>
<td>$17</td>
<td>23</td>
<td>35</td>
<td>$12</td>
</tr>
<tr>
<td>Total</td>
<td>$73.20</td>
<td>63</td>
<td>190</td>
<td>$17</td>
</tr>
</tbody>
</table>

Note this is statistically significant (p= 0.07)
CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The purpose of our study was to gather data that could be used to help to understand the scope of the problem of theft and vandalism in the commercial construction industry. The conclusions are based on the information provided by 100 responding firms.

Theft on construction jobsites is a considerable problem in the construction industry and will continue to be a threat. The direct losses from theft and vandalism are estimated to be $1,861 per million dollars of construction work, with theft constituting about 85% of this amount. Based on an annual construction volume of approximately $700 billion in the United States, it is estimated that the direct costs of theft and vandalism on construction sites exceed $1.3 billion. Note that this estimate does not take into account the indirect costs that are associated with these losses. These values are consistent with the costs reported in several literature sources. The loss values estimated by the study results represent the losses of general contractors. Since most of the exposure to loss be theft and vandalism is borne by subcontractors, it is reasonable to expect that the true direct costs of thefts on construction projects is probably 10 to 20 times greater. The major losses from theft in terms of direct costs are associated with the theft of vehicles and construction equipment. Other thefts cannot be ignored as their costs can be considerable. Incidents the theft (whether it be tools, equipment and
machinery, office equipment, and construction materials) can prove detrimental in the running of a successful project because of the associated indirect costs. These indirect costs are not always evident but the loss of productivity because a tool or piece of equipment was stolen the night before can cause work to be halted for hours or even days until a replacement can be found. This can be a burden on any project that falls victim to theft.

Employees of small to medium sized firms do not put as much emphasis on jobsite security measures as do large firms. As firms get larger they tend to utilize a more sophisticated approach to protecting their jobsites. This is evident in the finding that small to medium sized companies experienced a greater theft loss per million dollars of work in place when compared to the losses experienced by large companies. Because of the larger volume of work being undertaken by large firms they are in a position where there is a greater chance for theft and vandalism on their jobsites. These larger firms utilize more techniques for the protection of their jobsites then do small to medium sized companies. Large firms tend to realize that theft and vandalism are very real problems that need to be addressed through appropriate prevention measures. The utilization of more sophisticated jobsite security techniques by larger construction firms could be paralleled to research findings that show that large firms are more proactive in developing extensive safety programs than are small to medium sized firms. In addition to the added security measures used by large firms, it is likely that their projects tend to be larger and pose a more imposing obstacle to a potential thief.

The percentage of work subcontracted and the type of work being done was not found to have a relationship with such variables as the number of theft or vandalism
incidents in the last three years or the dollar value of losses resulting from theft or vandalism. This would seem to suggest that these are factors that are not central in effecting jobsite security. Firms engaging in all types of projects are susceptible to theft and vandalism.

Vandalism was not a big concern of many contractors. This may be due to the fact that measures used to prevent vandalism may be regarded as being more costly than the cost of damage resulting from the vandalism. The findings for the vandalism losses per million dollars of construction work indicated that the cost of vandalism effects small to medium sized firms more than large firms. These larger firms are more proactive and utilize better techniques in the prevention of vandalism on their construction sites. It is more likely larger firms construct larger projects and that these projects tend to be located further from neighborhood areas where vandals may live.

RECOMMENDATIONS

In conducting the literature review for this research we found a shortage of prior research and data on the subject of jobsite security. This was puzzling because of the large dollar figure (roughly $1 billion lost annually from incidents of theft and vandalism) associated with theft and vandalism on the construction site. This large potential of loss can obviously have severe negative impacts on the success of a. It is important that a better understanding of the problem be determined, and this can only be achieved through further research.

The ninety-three responses received were beneficial in performing a good initial study of jobsite security and getting an indication of the depth of the problem as well as what techniques have proven to be successful for companies. Future studies should seek a larger and more nationally focused survey. This would prove to be a greater help in the
understanding of the breadth of the problem of theft and vandalism in the construction industry. Future studies could focus strictly on either theft or vandalism. Another possibility is looking only at equipment theft or tool theft and the resultant impact on productivity. Understanding more about vandalism may require research to identify the types of individuals who are most often involved in vandalism.

 Contractors need to be proactive in order to curtail theft and vandalism on the jobsite, rather than waiting for problems to arise. The initial investment in developing a complete jobsite security plan prior to beginning construction work can be miniscule when compared to the losses that can result from the theft of an expensive piece of equipment. Contractors should also take into account the specific area that they are working in and realize that there are different potential problems associated with different sites such as remote, metropolitan, or neighborhood sites. Recognizing that potential problems of theft or vandalism exist on every construction site, contractors can implement measures to reduce the probability of being a target for thieves and vandals. Utilizing many different measures and techniques in the prevention of theft and vandalism has proven to be successful. Contractors are encouraged to expand the number of measures to prevent theft and vandalism. Incidents of theft should be reported to law enforcement, no matter how seemingly insignificant the loss.

 Finally, this study relied only on the opinions and perceptions of the employees of the firms surveyed. A more accurate technique that could be utilized in the future is the use of controlled experiments. Construction sites with differing variables such as region, type of project, and size of project could be observed throughout the life of the job to find out what the potential problems are and what solutions proved to be most beneficial. A
large amount of data could be generated and further prove to be beneficial in the prevention of theft and vandalism in the construction industry.
APPENDIX A
MAILED QUESTIONNAIRE COVER LETTER

June 2, 2003

Subject: Survey on Jobsite Security

Dear Contractor,

The M. E. Rinker, Sr. School of Building Construction at the University of Florida is conducting a study on jobsite security. The focus of the study is to identify specific practices that are being employed by contractors pertaining to security on their construction projects. In this study we are attempting to identify typical practices and techniques that are related to reducing theft and vandalism.

The short survey questionnaire contains a variety of questions related to jobsite security in construction projects. If you feel that you are not the appropriate individual to complete the survey, please forward it to someone who you feel is knowledgeable on the subject covered. Many of the questions can be answered by simply checking the applicable answers. There are no risks associated with participating in this study and participation is entirely voluntary. The survey can be completed in a few minutes. Naturally, you are asked to answer only those questions that you feel comfortable in answering.

Results of this study will be compiled and summarized in a report. We will provide a complimentary summary report to you if you want one. The information presented in the report may prove to be beneficial to you and your firm. Should you have any questions please feel free to contact me.

Responses provided by specific firms will be kept strictly confidential to the extent provided by law. Research data will be summarized so that the identity of individual participants will be concealed. You have my sincere thanks for participating in this study.

Yours truly,

Jimmie Hinze
Director, Fluor Program for Construction Safety
(352) 273-1167 FAX: (352) 392-9606 Email: hinze@ufl.edu

P.S. For information about participant rights, please contact the University of Florida Institutional Review Board at (352) 392-0433 or Email: IRB2@ufl.edu
APPENDIX B
JOBSITE SECURITY QUESTIONNAIRE

Information about the size and type of company:

How is the firm best described?
☐ General contractor    ☐ Subcontractor    ☐ Vendor/supplier

What type of projects does your firm undertake (More than one answer may be selected)?
☐ Commercial    ☐ Highway/roadwork
☐ Utility    ☐ Residential
☐ Industrial    ☐ Public buildings
☐ Other (please describe):
___________________________________________________________________________

What is the approximate annual dollar volume of work performed by the company? $__________.

If a general contractor, what percent of the work is typically subcontracted? ______ % subbed

What measures are commonly used to ensure the security on the construction sites? (Check all that apply)
☐ Lockbox for tools/small equipment    ☐ Strategic parking of large equipment
☐ Neighborhood watch    ☐ Alarm system
☐ Guard dogs    ☐ Security cameras
☐ Warning signs posted    ☐ Remove unused equipment from site
☐ Security fence    ☐ Exterior lighting on the site
☐ Use worker badge system    ☐ Station a guard at entry gate
☐ Night security guard on site    ☐ Police patrols
☐ Other, describe:
___________________________________________________________________________

Theft
In the past 3 years, what has the company experienced in terms of incidents of theft?
Approximate number of theft incidents in the past 3 years: ______
Estimated total loss of these thefts: $_______________

How many of the following types of theft incidents has the firm experienced in the past 3 years?

_____ Tools (hand tools and power tools), Value of Loss = $__________
_____ Licensed vehicles, Value of Loss = $____________
_____ Equipment, Value of Loss = $____________
___ Computers, printers, copiers, etc., Value of Loss = $_________
___ Construction materials, Value of Loss = $_________

If applicable, give an example of a jobsite layout decision that has been used to discourage theft.

________________________________________________________________________
________________________________________________________________________

What percent of the theft incidents are reported to the police? _____ %
What is the minimum value of a theft loss that is reported to the police? $_________
What is the deductible amount on the firm’s builder’s risk insurance policy? $_________

What percent of the theft incidents have the stolen items actually been recovered? _____ %

What percent of jobsite thefts on your projects are assumed to involve employees or former employees? ________%

What measures are commonly used to prevent theft of tools? (√ all that apply)
- [ ] Maintain tool inventory
- [ ] Mark tools
- [ ] Maintain secure storage area
- [ ] Make workers responsible for tools
- [ ] Minimize tools left on site
- [ ] Workers provide their own tools
- [ ] Other, describe: ____________________________________________

What measures does the firm take to prevent theft of machinery and equipment? (√ all that apply)
- [ ] Park equipment in well-lighted areas at night
- [ ] Modify ignition or fuel lines to make it difficult for others to start the engine
- [ ] Include additional identification on the equipment
- [ ] Use a distinctive color for the equipment
- [ ] Park the equipment at a central location/specific formation at end of each day
- [ ] Other, describe: ____________________________________________

Vandalism
In the past 3 years, what has the company experienced in terms of incidents of vandalism?

Number of vandalism incidents in the past 3 years: ________
Total estimated loss due to vandalism: $_________
Number of vandalism incidents that were reported to the police? ________

How many of the following vandalism incidents did the firm experience in the past 3 years?

___ Graffiti
___ Broken glass
___ Destruction of in-place materials, fixtures, or appliances
___ Damage to licensed vehicles
___ Damage to construction equipment
___ Other: ____________________________________________

For how many instances of vandalism in the past 3 years were the vandals on your firm’s projects actually caught? ________

If known, who were the vandals? (Check all that apply)
- [ ] Disgruntled workers
- [ ] Workers who had been fired
- [ ] Strangers
- [ ] Persons who had been on the site for some reason
☐ Neighborhood kids   ☐ Other: _____________________________
What other steps, if any, does your firm take to curtail vandalism?
________________________________________________________________________

Optional:
A summary of this research study will be prepared. If you would like a complimentary
copy of the report as soon as it is available, you may include your name and address
below and one will be provided to you. Note that your firm’s identity will not be used in
any way other than to get a report to you. Thank you for your participation.
Name: ____________________________________________
Firm: ____________________________________________
Street Address: ____________________________________________
City: ______________________________ State: _____ Zip: ________


I possess a Bachelor of Science in Finance from the University of Florida and will have completed a Master of Science in Building Construction from the University of Florida in August of 2003. In the past I have worked in the financial industry as a registered securities trader and in the construction industry with a general contractor in the state of Florida.