

THEFT AND VANDALISM ON BUILDING SITES (CASE STUDY: LAGOS, NIGERIA)

O. O Farinloye, O. E Ogunsanmi, O. A Adenuga and O. A Emuveyan

Department of Building, University of Lagos, Akoka- Yaba, Lagos, Nigeria

Wherever construction work is going on, there will always be related problems of theft and vandalism, the form taken by theft will depend on the nature of construction work and this varies from enormous projects from new highways and airport to in-fill housing development in suburbs. There is a growing consensus within and outside the building industry that theft and vandalism is endemic and curbing crime is very critical problem. The study examined the nature of the theft and vandalism on building site. In the course of the study, structured questionnaire were administered to construction professionals and literatures were reviewed, certain hypothesis concerning the prevalence of theft and vandalism were postulated to know the significant differences in theft and vandalism amongst different classes (large, medium & small) of construction firms and to identify appropriate strategies of curbing them on building site. Data collected were analysed using mean, standard deviation, and Anova. Findings of the study revealed that theft occurs more in larger construction firms than others and that there is no appropriate strategy used in place to curb or manage theft and vandalism on construction site.

Based on the above findings, the study recommends that construction companies/contractors report all losses due to theft and vandalism to local police department, pay special attention to security of construction materials on site, encourage where and when possible just-in-time deliveries and employing new innovation of surveillance system in perimeter protection to detect various forms of perimeter breaches. .

Keywords: Theft, Vandalism, Construction site

INTRODUCTION

Thieves and vandals can directly impact the success of a project and diminish the potential profitability of the project under construction. Theft is more costly to large sized firms than smaller firms, but vandalism is more costly for smaller firms despite the measures used by larger firms to combat theft and vandalism on their construction sites (Berg 2005).

Crime prevention on construction sites has become a major concern for building contractors and losses from theft and vandalism in Nigeria can make difference between making a profit and incurring a loss on a job. (Crime prevention initiative 2001).

There is a growing consensus within and outside the building industry that theft and vandalism are endemic likewise curbing or managing crime is a very critical problem. In Lagos State alone, the propensity of theft and vandalism has increased in the recent

times and are generally regarded as one of the major problems confronting the construction industry. These problems are due to; lack of new innovation on security measures on site, lack of motivating incentives & welfare facilities for staff, economy deterioration and high unemployment climbs. Also firms that had experienced theft of equipment, tools & materials do not report to police especially when it is valued less than the company's insurance deductible amount and 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. Theft and vandalism is has a serious problem in the construction industry and losing equipment, materials, and tools as a result of theft, costs the average contractor thousands of Naira each year. This study will focus on the nature of theft and vandalism on building sites together with the measures to be employed to reduce or eliminate thefts and acts of vandalism from their projects. For the study two hypotheses were postulated; there is no significant difference in theft and vandalism occurrence amongst small, medium & large construction firms and there is no appropriate strategy to curb or manage theft and vandalism on building sites.

REVIEW

Theft in the Building Industry

A person is guilty of theft if he dishonestly appropriates property belonging to another with the intention of permanently depriving the other of it. According to Webster's Revised Unabridged Dictionary (1913) Theft is defined as 'the act of stealing', specifically, the felonious taking and removing of personal property, with an intent to deprive the rightful owner of the same; larceny.

Security on building sites is an often-ignored facet of construction projects and it is important for contractors to recognize that construction sites are a natural point of curiosity. A typical construction site turns into a "ghost town" after 4 or 5 p.m. and this often makes it vulnerable to theft and vandalism. Research has shown that the majority of theft incidents are not done by strangers, but rather by individuals familiar with the jobsite (Gardner 2003). However, this literature draws attention to at least three other forms of construction site theft:

- Theft by workers of tools and materials; after-hours pilfering of lumber.
- Theft of other materials by opportunist thieves.
- Thefts by habitual offenders and others of fixtures and appliances in the case of homes under construction.
-

Typically, thieves will not attempt a theft from a building site if they cannot readily enter the site, 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 (Berg 2005). Theft of heavy machinery is well organized; thieves usually have a buyer before they steal something (Rawl 2000). Often the heavy equipment thief will set out to steal a specific piece of equipment that has a specific cash value or for which a buyer has been identified prior to the theft. (NUCA 1986). Cunius& Rost had learned from talking with site supervisors while on patrol that the costs of break-ins were of

comparatively little concern to most of them. Only the small builders, who saw their profits being eroded, were seriously concerned about the loss of the appliances and the costs of repairing the damage. For others, when losses climbed above budgeted amounts, these could be passed on to future customers in the form of higher prices (crime prevention initiative 2001).

According to Berg (2003) from an analysis done out of one hundred construction firms 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 years 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.

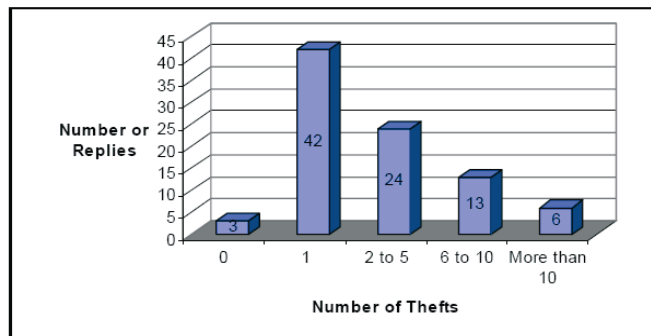


Figure 1: Number of thefts per year
Adopted from Berg (2003).

In addition, a spokesman for the National Association of Home Builders, stated, “Statistics on theft and vandalism are hard to nail down because many incidents simply are not reported. According to Pfeffer (2001) tool theft is a significant issue for construction companies, and the arrival of sites on the Internet has made the problem worse.” Websites can be used to quickly sell stolen products. This practice is becoming a Steal-to-Order Business. Another target, besides tools, is heavy machinery, such as bobcats and tractors. Denis Taylor and Co, a company that rents larger equipment and operators to many Atlanta contracting firms reported that about ten machines were stolen in the past 25 years (Bond 2000). These are expensive losses Bobcats cost about \$30,000 and crawler loader backhoes cost around \$80,000. Reports from the Insurance Services Office, Inc. (ISO) show an annual increase of up to 20% in the value of stolen equipment since 1996. The report also shows theft as the most common cause of loss of heavy equipment, representing more than 50% of all causes of loss. Perhaps the most worrisome statistic for owners and insurers is that as little as 10 to 15% of the stolen equipment is ever recovered (National Equipment Register, Inc. 2002). 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).

Vandalism in the building industry

Vandalism is generally a nuisance crime on construction sites. Cohen (1984) suggests that acts of vandalism are motivated by anger, boredom, catharsis, erosion of already damaged objects, or aesthetic factors. Nonetheless, any losses detract from company

profits and the threat of vandalism cannot be ignored. Broken glass, graffiti, destruction of in-place materials and damage to construction equipment are types of vandalism that can occur on building sites. The most suspected culprits are people that live in the neighbourhood. Strangers, disgruntled workers, fired workers and site visitors.

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 secured through the use of additional security and possibly the changing of locks (Moorhouse 2000).

Montealegre (2003) carried out a survey about the estimated value of vandalism incidents. Based on 110 responses, the mean answer was \$3,767 and the median answer was \$300. In addition the minimum value of these incidents according to the data was \$50 and the maximum was \$100,000 in three years. Companies experienced about \$100,000 in losses reported about 233 cases of vandalism per year. According to the findings, 44.5% of the companies in the study had not experienced any incident over the same period of time. However, 23.7% have suffered losses that cost between \$1 and \$1,000 during the same period (see Figure 1).

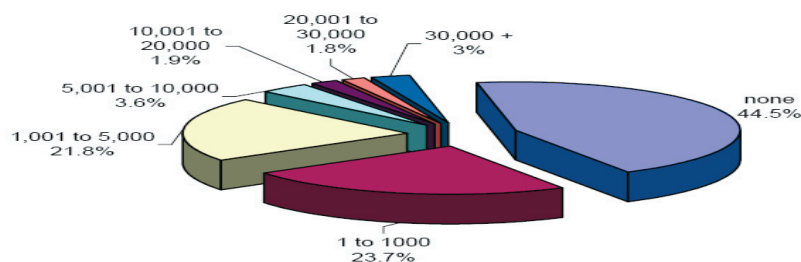


Figure 2: Estimated total losses due to vandalism in the past 3 years
Adopted from Montealegre, 2003

In summary, approximately 45% of the homebuilders did not have any vandalism incidents on their jobsites; nevertheless, another 45% experienced losses estimated at less than \$5,000, and the remaining 10% experienced vandalism losses exceeding \$5,000. Montealegre further examined the data to determine the frequency of the types of vandalism acts on construction site.

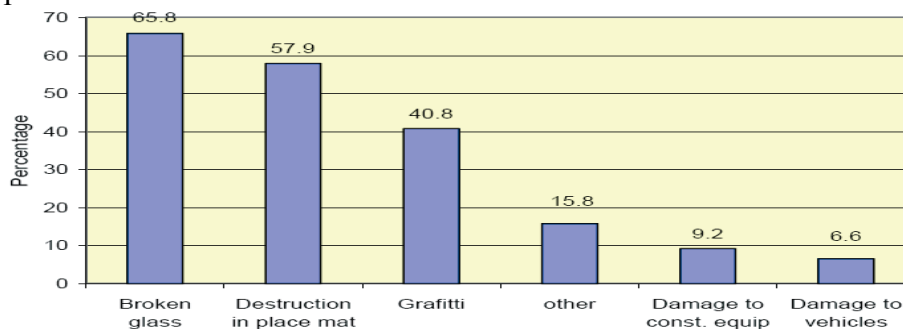


Figure 3: Vandalism by type
Adopted from Montealegre, 2003

Figure 3 illustrates the most frequent acts of vandalism. “Broken glass” accounted for the largest percentage, 65.8% of the six types of incidents examined in this study. “Destruction of in-place materials” accounted for 57.9% of the responses. “Graffiti”

was reported by 40.8% of the respondents. This analysis includes a category called "other" that accounts for 15.8% of the respondents. For example, destruction of framed walls, damage to toilets, stolen or destroyed plans, and driving over graded site work were included in these acts of vandalism. Damage to construction equipment and damage to vehicles accounted for 9.2% and 6.6% respectively. These incidents are the least likely to happen, according to this study. In summary, residential contractors not only should pay special attention to protecting glass in windows, doors, and equipment, but also in-shielding in place materials and fixtures.

Effects of theft and vandalism on building sites

Besides the monetary losses resulting from theft and vandalism, the following associated indirect costs should also be considered.

5. Costly job delays
6. Downtime for operators
7. Higher insurance premiums
8. The possible cancellation of an insurance policy
9. Risk of jeopardizing bonding and borrowing power.
- 10.

Because of this, theft and vandalism can be major cost components of a construction project and sometimes, theft of an appliance and a delay in replacement might also delay a house closing, with associated financial penalties. These indirect costs resulting from administrative action and other consequences of theft can easily account for "anywhere from two to ten times more than direct costs" (Constructor 1999). The cost is potentially sufficient to make the difference between making a profit and incurring a loss on a project (Middleton 1999).

The possible forms of deterrence can be very different depending on the multiple variables that are associated with building sites. These variables include the locale where the work is being done, running the gamut from rural to urban settings. The locality where the work is being done must also be taken into account when assessing the performance of a particular building site security plan. Regarding building site security, the role played by location is evident in recent research dealing with theft. According to FBI statistics, location is an important risk factor (McDowall 2002).

Appropriate strategies to curb and manage theft and vandalism on construction sites

Implementing a jobsite security plan, firms' related history of recurring theft problems and political aspect should be considered to determine the type and amount of security required to reduce the attractiveness of a construction site for theft (Lumberman's of Washington, Inc. 2000).

An important factor that is rarely taken into account when dealing with theft and vandalism on construction projects is the reporting of incidents to law enforcement agents. When reporting an incident details should include the 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 (Bonesteel 1997).

The reward to the thief far outweighs the risks taken. The low recovery rate is a clear indication of the low risk for a thief. Even if an item is recovered, an arrest may not be

made. When an arrest is made, a conviction may not be secured. Even when a conviction is secured, the penalty is likely to be light (National Equipment Register, Inc. 2002).

According to Danek (2000), recovering stolen equipment is difficult. He also states that one reason the thieves can get away with such crimes is that, unlike automobiles, heavy equipment does not have universal identification numbers, i.e., each manufacturer has its own system of identification.

The lack of security control to combat these losses indicates that contractors need to expand their understanding of the problem and to implement practical solutions (Rowerdink 1987).

Construction Site Security Survey

According to Berg (2003) states that Employees of small to medium sized firms do not put as much emphasis on building site security measures as do large firms. 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. 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.

Staff Crime Prevention Awareness

Security measures are to be discussed at top level and that all staff fully understands the implications of poor security. Good control of staff and vehicles on site is essential. Security staff should regularly check and search all employees, lockers and contractors' vehicles. Employees' private vehicles should be kept off the site. There are a number of measures that should be taken to raise staff awareness of security (Dumfries & Galloway 2004):

- Individual staff should be held responsible for company equipment they use.
- Everyone on site knows the company policy on crime & security management.
- Report any suspicious incidents on site.
- Stolen equipment/plants/materials should be reported immediately to the local police.

On-Site Security

To combat equipment theft Liberty Mutual Insurance's Loss Prevention Department recommends permanently etching an identifying mark on the 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 lowboys, 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).

The utilities plant theft scheme (UPTS) and Vehicle Identification Number (VIN) scheme help in combating plant theft by keeping list of serial and engine number, making machinery easily identifiable and undermining the lucrative second hand

stolen plant market. In the interest of preventing theft on site the following rules applied:

- Lock up all your tools when you are not using them.
- Clearly mark all your property.
- Remove ignition keys from all unattended plant.
- Immobilize all plant when not in use
- Whenever possible, park vehicles off the road at night and weekends.
- Return all keys to the Site Manager or whoever is responsible for the keys.
- If you have been given a security pass - wear it!
- Report theft or suspicious behaviour -immediately to your Site Manager.
-

Perimeter Protection

The new innovation of surveillance system in perimeter protection enables one guard to do the job of ten in detecting and addressing security problems which allow construction site benefit from the ability to detect various forms of perimeter breaches. According to Marman (2008) the system is monitored remotely at the security company's 24/7 control centre. Security chip of each breach is sent immediately to a remote guarding station. It takes only seconds to accurately verify if an alarm is real or false. Then, through live streaming video, the operator see exactly what is happening at the site and the audio IP they can respond instantly. This system proved to be far more effective than static guards or mobile patrols. Other obvious safeguards are:

- Lighting: good portable lights help ensure good visibility out with working hours. Floodlights operated by sensors could also be installed.
- CCTV and Alarm Systems: either standalone or integrated, should be used to protect the security compounds and offices.
- Warning Notices: stating that security precautions are in force around the perimeter, without providing details.

Site Arrangement

Site office should be position in an area with limited access, tools, heavy equipment, computers and fax machines, now common in construction site trailers, have been a target of thieves (Bond 2000). Office equipment such as fax machines, computers and telephones should be secured with indelible marking, branding the company logo and postcode onto equipment (Insurance Journal 2001).

Valuable business information's like payroll figure, work schedules and future ventures, or anything that could undermine the company strategy if lost or put in hands of rivals should be protected (Neighborhoodwatch.Net 1992).

Order the minimum amount of materials needed and excess ordering materials in bulk to be stored in a security compound or in an area where theft will be noticed quickly.

Methodology

A total of 120 questionnaires were posted out to gathered responses from construction professional (Architects, Builders, Civil Engineers, Quantity Surveyors, Estate Managers, and Project Managers) in small, medium and large construction firms, Sub Contractors, Suppliers and Security outfits. Method of analysis is mean, standard deviation, ANOVA, One-sample t-test, and Independent sample test. The

predetermined alpha level at which any of the Null hypothesis could be rejected was fixing at 0.05 (5%) significant level.

A total of 48 questionnaires (40%) were received. Responses of respondents gathered from small construction firm SCF is 16.7%, medium construction firm MCF 14.6%, large construction firm LCF 20.8% and security outfit 47.9%

Findings

One of the questions posed to know the period that the respondent companies have been operating. 25.5% of these companies have been in operation over twenty years, 42.6% between ten and twenty years and 31.9% precisely are companies that have not spent up to ten years in operation. 82.8% and 6.9% of the firms set out an annual budget above #200,000:00 and less than #200,000:00 respectively while 6.9% has no budget for crime prevention.

Table 1: Firms/outfits partnership in preventing Theft and Vandalism

In Partnership	Frequency	Percentages	Cumulative Percentage
Yes	43	89.6	89.6
No	5	10.4	100.0
Total	48		

The study gathered that about 90% of these firms/outfits actually engage in partnership in order to prevent crime/ theft on construction sites.

In the past five years, on construction site only 35.6% of the respondents had experienced the incident rate of theft less 10, 20% of the respondent experienced between 10 and 20, 8.9% respondents experienced between 20 and 50, and 35.6% of the respondents had experienced the incident rate of theft that is above 50. Unlike theft, vandalism is not rampant on site 86.4 experienced an incident rate less than 20, 9.1% experienced between 10 and 20, 2.3% had experienced vandalism.

Security Measures on Construction sites

Respondents level of satisfaction and appropriateness to each security measures.

Table 2: The degree of Appropriateness of security measures on construction sites.

Measures	Agree	Disagree	Percentage (%)	Position
Night security Guard on site	47	—	97.9	1 st
Security Fence	46	—	95.8	2 nd
Station a Guard at the Entry Gate	46	1	95.8	3 rd
Exterior Lighting on the site	45	1	93.8	4 th
Warning sign post	44	—	91.7	5 th
Remove unused equipment from site	41	1	85.4	6 th
Bars on windows	36	4	75.0	7 th
Alarm systems	34	9	70.8	8 th
Dead bolts	33	7	68.8	9 th
Security cameras	28	10	58.3	10 th
Police patrol	13	13	27.1	11 th
Traditional lockets	13	15	27.1	12 th

Use workers badge system	13	17	27.1	13 th
Guard dogs	11	23	22.9	14 th

The table shows the level of satisfaction of which each measure could be appropriate for ensuring adequate security on construction sites. The use of night security guard on site is the most appropriate, the use of security fence is second placed and the next is stationing a guard at the entry gate construction site and Alarm system took the 8th position, use of security cameras tenth position while Guard dogs is the least appropriate measures.

Hypothesis testing

H1: There is no significant difference in theft and vandalism occurrence amongst the different levels of construction firms.

The research furthers to know if there is any difference amongst the type of company (large, medium, small) in theft and vandalism.

Table 3: Descriptive

Company type	Number	Theft mean	Vandalism mean	Stand Deviation Theft	Stand deviation vandalism
Small firms	8	1.88	1.14	1.36	0.50
Medium firms	6	1.50	1.33	0.84	0.34
Large firms	9	2.44	1.11	1.33	0.44
Total	23	2.00	1.17	1.24	0.26

Table 3 shows the average theft occurrence, large firms having the highest mean 2.44, small firm 1.88 and medium 1.50 and that vandalism amongst the types of construction firms does not really have large difference. Medium firms having mean of 1.33, small firm 1.13 and large firm 1.11.

Table 4: One-way Between Group Analysis of Variance of Theft size

	Sum of squares	Df	Mean Sqaure	F	Sig
Between groups	3.403	2	1.701	1.112	0.345
Within groups	30.597	20	1.530		
Total	34.000	22			

Table 5: One-way Between Group Analysis of Variance of Vandalism

	Sum of squares	Df	Mean Sqaure	F	Sig
Between groups	0.207	2	0.104	0.669	0.523
Within groups	3.097	20	0.155		
Total	3.304	22			

Table 4 & 5 reveals that $F(2,20) = 1.112$, $p > 0.05$ means that there is no difference in the number of theft occurrence among large, medium and small construction firms, thus, accepting the null hypothesis. $F(2,20) = 0.669$, $p > 0.05$ thus, accepting null hypothesis that there is no significant difference in vandalism occurrence amongst the construction firms.

H2: There is no appropriate strategy to curb or manage theft and vandalism on building sites.

To ascertain the appropriate strategies adopted by the construction and security companies to curb theft and vandalism. The respondents were required to indicate the measures they took in preventing theft of machineries, equipments and materials. The test when conducted, gave the following results.

Table 6: One-Sample Test

	Test Value=28					
	N	Mean	T	Df	Sig (2tailed)	Mean Difference
Preventive measures	46	25.76	-3.775	45	0.000	-2.239

From table 6, the average score on preventive measure is 25.75; whereas the test value (expected average score) is 28. This denotes that the average score on preventive measure is significantly less than the test value by 2.239. This means that the preventive measure adopted by construction and security firms to curb and prevent theft and vandalism has not been effective. Hence, there is no appropriate strategy to curb or manage theft and vandalism on building sites.

CONCLUSIONS

The purpose of this study is to understand the scope of the problem of theft and vandalism in the construction industry. The results of this study reveal the importance of construction site security for construction firms and it highlight the issues affecting security on construction projects. According to results, 82.8% of Construction Companies use above 200, 000 naira for crime prevention projects and 89.6% are in partnership with security companies.

Small construction firms tend to use less expensive, simple methods to curtail site crime with the use of traditional locksets, warning signs, dead bolts, and removing equipment from the site daily, etc. are methods commonly used. Larger firms use more sophisticated means and methods to protect the construction site, they use alarm systems, night guards, tracking devices, security cameras, etc.

Theft appears to be a greater problem than vandalism because theft is a more damaging and construction materials lost due to theft can cost thousands to millions of Naira leading to loses time, productivity, and ultimately profits as well.

RECOMMENDATIONS

Every year construction company/contractors lose thousands of Naira due to theft and vandalism. These losses will continue occurring unless appropriate precautions are taken which can make the difference between a company's success and its failure. It is essential that construction companies/contractors report all losses due to vandalism or theft to the local police department or Security Company. Attention to be paid on the security of construction materials on site. Builders should minimize the time that materials are left on site before installing them and where and when possible enforce just-in-time deliveries. Also, they should focus on protecting glass in doors, windows, and equipment, as glass is a primary target for vandals.

Developing a good relationship with the neighbors has proven to be helpful in reducing theft and vandalism on site and if possible use a reward system.

REFERENCES

- Anon (1999) A Billion here and a billion there. "The Constructor", 81(11). Retrieved January 2003 from www.agc.org/NewsBulletins/Constructor_Nov_1999/nov99_page2.asp,
- Banks, T (1990) Equipment Theft. "The Constructor", 42-43.
- Bond, J (2000) "Contractors protect tools and equipment from theft". Atlanta: Business Chronicle.
- Bonesteel, M (1997) "NUCA", 15-17.
- Anon (1986) Combating jobsite equipment theft "NUCA", 10(5), 20.
- Anon (2000) Construction Site Theft "Lumberman's of Washington", 25(1). Retrieved January 2008 from <http://www.lumbermensbuilding.com/builders/buildersxpress/BuildersXpressArticle.asp>
- Anon (2001) Contractors Equipment Losses: Knowledge of Hazards Can Reduce Risk. "Insurance Journal". Retrieved 19 February 2009 from <http://www.insurancejournal.com/magazines/southcentral/2001/02/19/features/22326.htm>
- Danek, S (2000) No construction site is immune from theft. "Denver Business Journal", 52(7), 20.
- Danek, S (2000) Building-site theft increasing. "Triangle Business Journal", 16, (3), 25.
- Gardner, T (2003) "Security in Construction and Beyond; Protecting Your Site, Even During Build-up." Virgo Publishing, Inc.
- McDowall, J (2002) "Backhoes, Air Compressors, Skid-steers, Generators Head the Hit List." Retrieved from <http://www.rentalmanagementmag.com/newsart.asp?ARTID=677>
- Middleton, S (1999) "Equipment Theft; Finding the Solutions to a Billion Dollar Problem". Heavy Equipment News.
- Moorhouse, N "Cost Retention and Safety Enhancement, Protecting Your Assets". Retrieved from <http://www2.agc-ca.org/services/SH&E/Safety/Sb01-2.pdf>.
- Pfeffer, S (2001) "Mark tools to cut theft at construction sites". Buffalo Business First.

The Problem of heavy equipment. "National Equipment Register". Retrieved November 2002 from www.nerusa.com.
Rawl, J (2000) Theft Prevention. "Heavy Equipment News", 13(6), 36.
Rowerdink R (1987) "Security and material controls on the job site". Washington: National Association of Home Builders.
Neighborhoodwatch (1992). "Site theft - A