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16. Abstract  This report describes a research study which reviewed several sign vandalism countermeasures throughout the country and assessed the extent of sign vandalism in Texas. Countermeasures that were reviewed include hardware implementation measures and legal solutions to reduce sign vandalism and media campaign efforts that targeted specific age and interest groups. Two states and six municipalities were identified as having implemented a combination of these countermeasures. The extent of sign vandalism in Texas, which included determining locations and types of traffic control devices that were frequently vandalized, was assessed by a statewide survey distributed to Texas Department of Transportation personnel. A total of 229 persons responded to the survey. The report also describes the findings, recommendations, and implementation efforts associated with the review and assessment of sign vandalism issues. Recommendations include specific hardware and legal solutions that can be adopted and potential public awareness and media campaign efforts that can be implemented to reduce sign vandalism in Texas.			
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**AN ASSESSMENT OF SIGN VANDALISM**  
**IN THE STATE OF TEXAS**

by

Charles R. McIlroy, P.E.  
Assistant Research Scientist  
Texas Transportation Institute

Dale L. Picha  
Assistant Research Scientist  
Texas Transportation Institute

and

H. Gene Hawkins, Jr., Ph.D., P.E.  
Associate Research Engineer  
Texas Transportation Institute

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The Texas A&M University System  
College Station, Texas 77843-3135



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## IMPLEMENTATION STATEMENT

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This report describes the research activities conducted as part of a one-year study of sign vandalism in Texas. The objective of this research was to recommend effective hardware and legal countermeasures to sign vandalism and to develop recommendations for a sign vandalism public awareness campaign for Texas. The campaign is based on a review of other state practices, which includes a review of hardware and legal countermeasures, other sign vandalism programs that have proven to be effective, and a statewide survey on sign vandalism in Texas. This report contains recommendations which have been developed from the research activities, and the results can be used to prepare a media plan for conducting a public awareness program on vandalism of traffic control devices. The media plan describes target audiences, format of materials, and possible methods of presentation. The implementation of these recommendations was not within the scope of this research but may be instituted through a change in TxDOT practice, an initiation in the legislative agenda, and a consultation with media professionals to develop and conduct the public awareness campaign, based on the recommendations of this report.



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## DISCLAIMER

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The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. This study was conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation, and is not intended for construction, bidding or permit purposes. The engineer in charge of the project was Charles R. McIlroy, P.E. # 68976.

The United States Government and the state of Texas do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

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## **ACKNOWLEDGMENT**

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A statewide survey was developed and administered to personnel of the Texas Department of Transportation in all 25 districts. The researchers would like to acknowledge the 229 individuals who took the time to respond to the survey.



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## SUMMARY

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This report describes research activities intended to assess the extent of sign vandalism in Texas and to identify measures to minimize the extent of vandalism throughout the state. There were three major areas of activity involved in this research study: assessing current programs and practices in other transportation agencies, conducting and analyzing a survey of TxDOT personnel concerning sign vandalism, and developing recommendations for reducing vandalism. Table S-1 summarizes the tasks conducted within each of these activity areas.

**Table S-1. Research Activity Areas and Tasks**

Activity Area	Tasks	Description
Assessment of Current Programs, Practices, and Legislation	Media and Public Relations	Identifying city and state practices
	Hardware	Identifying anti-theft hardware components
	Legislation	Reviewing existing laws and penalties pertaining to property damage and/or sign vandalism
TxDOT Survey	Survey Development	Developing and distributing sign vandalism survey
	Reduce Survey Data	Reducing data from completed, returned surveys
	Analyze Survey Data	Determining the types of traffic control devices vandalized, high frequency locations, and extent of vandalism within TxDOT Districts
Recommended Sign Vandalism Countermeasures	Hardware Solutions	Recommending specific hardware components that are proven to be an effective vandalism deterrent
	Legal Solutions	Clearly defining current legislation on sign vandalism and recommending more rigid penalties for first-time and multiple offenders of these laws
	Public Media Campaign	Identifying target audience and target devices and recommending a media campaign to deter sign vandalism of these devices, including PSAs, "amnesty" period, target audience involvement

The results of the research activities have identified a number of findings which indicate where potential recommendations could reduce vandalism of signs in a cost-efficient manner. Some of the more significant findings include:

- Based on the information received from TxDOT personnel responding to the survey, the most frequently vandalized signs were:
  - ◆ **STOP** signs (R1-1);
  - ◆ **Advance Crossing** signs (W11-Series);
    - ▶ **Deer Crossing** signs (W11-3);
    - ▶ **Cattle Crossing** signs (W11-4); and
    - ▶ Other animal crossing symbol signs.
  - ◆ City or Creek Name signs (I-Series);
  - ◆ Route Number signs (M1-Series); and
  - ◆ **YIELD** signs (R1-2);
- Remote locations, Farm-to-Market highways, school areas, and recreation areas are the most frequently targeted locations; and
- Forty-three percent of TxDOT respondents did not mention using any countermeasure against sign vandalism; thirty-two percent said they have used anti-theft bolts; eleven percent have requested increased law enforcement; six and one-half percent have relocated signs higher or further from the road; three percent have tried public advertisements or announcements; two percent have used grease on signs or poles; and one percent put a warning message on the signs.

The findings from the research activities have led to the development of several recommendations, which are discussed in more detail in Chapter IV. Some of the more significant recommendations include:

- Mount signs so that they are higher than the minimum distance shown in the Texas Manual on Uniform Traffic Control Devices (MUTCD). The minimum height of 1.5 meters is low enough to make the sign within easy reach for spray painting or removal. A height of 2.1 meters would make vandalism more difficult;
- Use available anti-theft sign mounting hardware. In order to use an agency's money in the most efficient manner, these devices should be used only in the locations where they



would most likely be needed. The types of signs where utilization of special hardware should be considered include **STOP** signs (R1-1), **Deer Crossing** signs (W11-3), **Cattle Crossing** signs (W11-4), other animal crossing symbol signs, signs with city or creek names (I-Series), certain popular route number signs (M1-Series, including FM 69, FM 66, etc.), and **YIELD** signs (R1-2). Anti-theft hardware should, whenever possible, be used on these types of signs when the signs are located in remote areas and tampering with the signs could likely go unnoticed;

- Increase law enforcement to the extent possible during peak periods of sign vandalism, such as at the end of the school year, during the summer, at Halloween, and at the beginning of hunting season;
- Conduct a public awareness program, possibly involving newspapers, radio, television, and presentations at junior high and high schools, especially in the rural areas; and
- Implement statewide use of a marking on the back of all signs containing information about the location of the sign and a warning message about the possible consequences of sign vandalism.



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## CHAPTER I

# INTRODUCTION

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The extent of vandalism to traffic control devices on our nation's streets and highways has been a concern for state and local agencies for many years. While it is difficult to assess the costs associated with sign vandalism, millions of taxpayers' dollars are spent each year on direct costs alone to replace stolen, defaced, or mutilated traffic signs and traffic sign hardware. Indirect costs, such as traffic crashes and liability claims against the state as a result of a vandalized traffic sign, can be even higher.

### **THE PROBLEMS OF SIGN VANDALISM**

No one can be quite sure why vandalism of any type of property is such a widespread problem. A decline in social and cultural values is an obvious explanation, but individual actions and peer pressure to act in a malicious manner are more likely reasons that vandalism, particularly of traffic signs, is an increasing concern among governmental agencies. Recognizing the fact that individuals or groups of individuals are responsible for the unlawful acts of sign vandalism, agencies must approach the problem with an understanding of when and where these actions are occurring, what types of devices are primarily affected, and then target the responsible individuals in order to deter their actions.

Vandalism of traffic control devices is an intentional act, one that is performed with the intent to destroy, mutilate, or steal a particular device (*I*). In some cases, however, unintentional destruction or removal of a device may occur as a direct result of a traffic crash. The results, nonetheless, are the same. In either case, the potential exists for a driver not to be informed of the information provided by a traffic sign. This could result in a preventable traffic crash, with the associated costs of possible injuries, fatalities, and property damage. There is also the additional cost of replacing the sign. The time between sign damage and sign replacement is also a concern due to potential tort liability.

## **Types of Vandalism**

There are three basic types of unlawful sign vandalism that are prevalent in all geographical areas: destruction, defacement, and theft. The problems associated with the three types of vandalism extend to all city streets and state highways, as well as to most private and governmental properties, such as recreational areas, park roads, and campgrounds.

### *Destruction*

Destruction of a traffic control device is usually accomplished by means of an intentional action, most commonly with the use of a specific firearm, such as a shotgun or a rifle. Other means of destruction include damage as a result of graffiti, flying objects — such as rocks and eggs — and physical force (bending and/or twisting). The damage that is inflicted upon the sign directly obstructs the information on the sign, as well as ruins the retroreflectivity of the sign sheeting, rendering it ineffective, especially in nighttime conditions (1).

### *Defacement*

Sign defacement, although not as malicious as destruction, is a form of vandalism in which individuals alter the sign face or support by means of spray painting, modifying the sign message to read something other than the intended message, or by posting stickers to “advertise” political, religious, or other messages. The problems associated with sign defacement are typically easier to rectify, especially since spray painting is the predominant means of defacement (1). A protective material (in addition to the standard coating applied to high performance sheeting) can be applied to sign sheeting that allows for easier removal of graffiti. The problem, however, may still lead to motorist confusion about the intended message, and/or potential traffic crashes if the graffiti is not detected and removed in a timely manner. This protective overlay film is expensive; its use is further discussed in Chapter II.

### *Theft*

Because of its widespread extent, the theft of traffic control devices, particularly signs and their supports, is generally viewed as the most critical type of sign vandalism. Individuals

responsible for such action usually either steal traffic signs for personal decorations or to recycle the aluminum material for profit, both of which have minimal chances of deterrence. The critical nature of theft lies in the fact that a device may go unreplaced for a longer period of time as compared to one that may have been destroyed or defaced in-place. Agency personnel responsible for maintenance, as well as motorists, may not be aware of the missing device, thus resulting in delay in the replacement process. Furthermore, the motorists who are unfamiliar with the roadway and its traffic control devices may be subjected to potential and dangerous crashes if they are not aware of the intended message on missing regulatory or warning signs.

## **STUDY OBJECTIVES**

This project was conducted to identify countermeasures to minimize sign vandalism and its associated costs to taxpayers in Texas. The objectives associated with this project included:

- Identify existing and ongoing sign vandalism programs implemented by state and local jurisdictions around the country to determine their respective programs' effectiveness;
- Identify current anti-sign vandalism hardware implemented by state and local jurisdictions;
- Review current Texas Penal Code laws and penalties regarding sign vandalism;
- Assess the extent of sign vandalism in Texas by means of surveying Texas Department of Transportation (TxDOT) personnel. The assessment includes, but is not limited to, identifying specific devices that are vandalized and areas in communities highly susceptible to sign vandalism; and
- Develop recommendations for an anti-sign vandalism program in Texas, including recommendations for specific traffic sign hardware components and improved laws and penalties to deter sign vandalism, as well as recommendations for a public media campaign targeted toward specific traffic devices and individuals likely to vandalize those devices.

## **RESEARCH APPROACH**

In order to meet the project's objectives, the research team identified several tasks to be completed. An extensive literature review was conducted to identify relevant research in the area of sign vandalism. The search also helped establish locations of existing or ongoing sign vandalism programs in cities and states around the country. Available documentation included research reports, brochures, pamphlets, and correspondence with agency representatives. The documentation provided information that outlined countermeasures implemented by these agencies, including specific hardware devices used to deter sign vandalism, enforcement techniques and other established legal solutions, penalties used to enforce and prosecute offenders, and media campaigns aimed at particular target audiences to make them aware of the costs and consequences of sign vandalism. The primary research task, however, was to survey personnel in each of the 25 TxDOT districts in order to assess several issues relevant to sign vandalism.

### **Summary of Existing Practices**

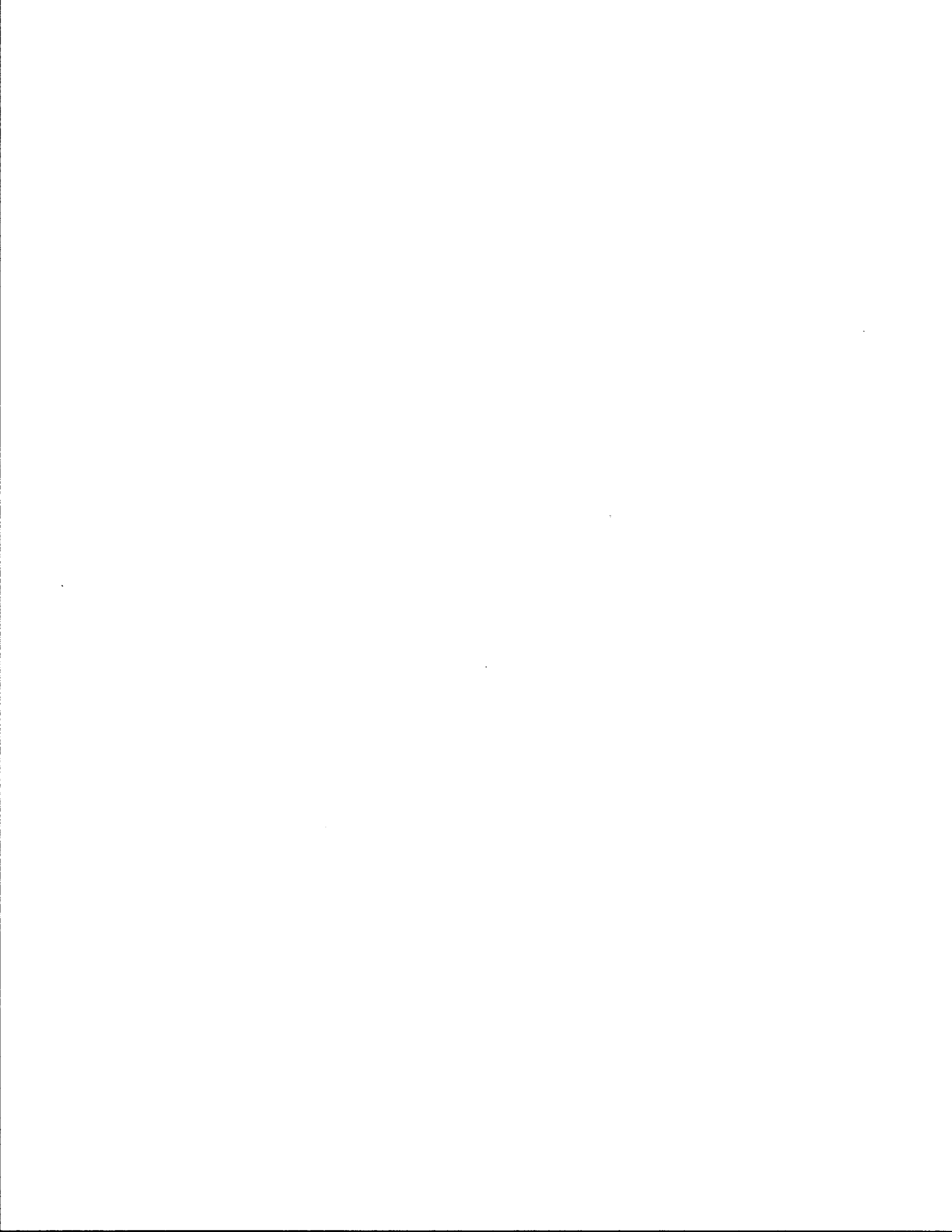
A review of available literature and correspondence with state and local agency personnel was conducted to assess the effectiveness of sign vandalism countermeasures. Chapter II summarizes specific programs being conducted, such as hardware and legal solutions, as well as media campaign efforts.

### **Survey of TxDOT Personnel**

A survey of TxDOT personnel was conducted to assess the extent of sign vandalism in Texas. An eight-question survey instrument was prepared and distributed to all 25 of the TxDOT districts. The researchers sought input from those personnel who had first-hand knowledge of maintenance activities within each district, particularly those who had knowledge and record of sign vandalism activity. Chapter III describes the survey and results. Appendices A and B present the survey instrument and survey response percentages, respectively.

## **Recommendations for Implementation**

Chapter IV of this report summarizes the study recommendations and implementation activities. The results of this one-year research project are being used to identify effective countermeasures that TxDOT can undertake to minimize sign vandalism throughout the state. Chapter IV presents specific recommendations and implementation activities that include recommended hardware devices and practices; recommended legal solutions, including enforcement techniques, improved legislation, and increased fines and penalties; and a recommended media campaign aimed at particular target audiences.





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## CHAPTER II

# SUMMARY OF EXISTING PRACTICES

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The costs and consequences of sign vandalism have been an issue for local and state governments for many years. Several countermeasures, some more effective than others, have been implemented over the years by agencies in order to make the general public more aware of the legalities, costs, and potential hazards created by the theft or destruction of a traffic control device. However, because of the novelty of destroying, defacing, and possessing items such as traffic signs, many of the attempted countermeasures have had only a minor impact on minimizing the costs of sign vandalism. This chapter briefly describes some of the existing anti-sign vandalism programs that have been conducted in different areas of the country, identifies the existing physical treatments which may reduce the extent of sign vandalism, and summarizes the existing anti-vandalism laws in Texas.

### SUMMARY OF SIGN VANDALISM PROGRAMS

Three states and several municipalities around the country were identified as having implemented specific sign vandalism programs. An additional six states were identified as having specific laws and penalties prohibiting defacement and vandalism of traffic control devices; however, it is believed that many, if not all, states have laws/codes relating to the prohibition of defacement of public and private property, including traffic control devices. The following is a summary of the sign vandalism programs that have been identified.

#### **Municipalities**

In a review of existing efforts at combating sign vandalism, the researchers discovered that many municipalities use public information campaigns and/or educational programs, as well as specific hardware treatments, to deter vandals. The following six municipalities were identified, and are summarized below:

- King County, Washington;
- Franklin County, Ohio;
- Mount Vernon, New Hampshire;
- Schleswig, Wisconsin;
- Gulfport, Mississippi; and
- Madison, Wisconsin.

*King County, Washington - 1980*

In 1980, King County, Washington, initiated a program in order to reduce costs, crashes, and fatalities related to traffic sign vandalism. County officials met with other city and law enforcement personnel, the media, and the public in order to develop a sign vandalism program. The weekend prior to the Thanksgiving holiday, at the height of hunting season, the city held "Sign Amnesty Day" in order for anyone who was in possession of stolen property to return it to the county without penalty. The legal penalties of a \$500 fine and six months incarceration were waived if persons turned over the stolen property on this particular day (2).

County officials continued with other methods as well. King County enlisted the aid of the school bus drivers to serve as "eyes and ears" and to report any information concerning sign vandalism, including the location of damaged or vandalized signs. Several citizen organizations in the King County area were also contacted in order to help distribute information to the public concerning the costs and consequences of sign vandalism. Anti-sign vandalism messages were also printed on school buses, milk cartons, and paper bags from grocery stores (2).

Since its inception in 1980, King County's program to reduce sign vandalism has reduced maintenance costs associated with the replacement of vandalized signs, and there has been no reported fatalities as a result of a stolen or defaced traffic control device (2).

*Franklin County, Ohio - 1988*

Franklin County, Ohio, used a series of eight facsimile signs, which were miniature replicas of actual road signs. These were distributed during talks at various locations and were placed in the lobby of the city's traffic office. The program has reduced vandalism and the costs associated with it by up to 40 percent (3).

*Mount Vernon, New Hampshire - 1988*

The town of Mount Vernon, New Hampshire, engraves the appropriate city ZIP code on the back of all signs. If a stolen traffic sign originally from Mount Vernon is found, it can be returned to the city. The city can then investigate and possibly pursue prosecution, if appropriate. (4). The researchers did not contact the city, or find out how many signs are actually recovered. However, it is quite possible that many people would be hesitant to take the time to return a sign that they might find, for fear that they would be accused of stealing it.

*Schleswig, Wisconsin - 1992*

The City of Schleswig, Wisconsin attempted to reduce sign vandalism by using specific hardware treatments. The city uses regular nuts and bolts on traffic signs, but a plastic insert locknut is used between the signpost and each nut. A wrench must be used to remove this plastic insert locknut, which takes a considerable amount of time to accomplish. According to Schleswig personnel, the hardware treatment proves to be an effective deterrent against the vandalization of any sign with such a locknut, due to the fact that it "takes too long to unscrew" (5).

*Gulfport, Mississippi - 1993*

The City of Gulfport, Mississippi, initiated a program in 1993 in order for citizens who were responsible for sign vandalism to return stolen property without any legal repercussions. The City provided a 30-day "amnesty" period allowing stolen property to be returned with "no questions asked." A week after the amnesty period ended, law enforcement personnel sought out individuals still in possession of stolen property and prosecuted these persons to the extent of the law. The arrest

and prosecution of these individuals were coordinated with the media to heighten the public's awareness of the legal consequences (6).

#### *Madison, Wisconsin - 1994*

Similar to Schleswig's attempts, the City of Madison, Wisconsin has also utilized special hardware treatments in its effort to reduce sign vandalism. One treatment that is used with success is the use of two interlocking nuts on each bolt on the back of a sign. Both nuts are screwed onto the bolt, and then the outside nut is removed. The inside nut cannot be removed unless the outside nut is placed back onto the bolt. The city also uses a commercially fabricated nut on some signs that can be installed or removed by only using a special tool (5).

### **States**

Three states were identified as having implemented specific programs to reduce sign vandalism within their jurisdictions. These programs are summarized below.

#### *Wisconsin - 1975*

Wisconsin's anti-vandalism program began in 1975 with the beginning of a statewide information and education campaign. Brochures were developed which illustrated the costs and consequences of sign vandalism. In addition, warning stickers were placed on the backs of traffic signs indicating the penalty for vandalizing the signs. The warning stickers stated, "WARNING: \$25 to \$100 fine or imprisonment for removing or tampering with this sign." The following year, the Wisconsin Legislature passed a stricter sign vandalism law. The new law made the possession of a traffic sign illegal and provided for penalties of up to \$10,000 and/or imprisonment for up to two years if the act of sign vandalism resulted in a death. It was determined that sign vandalism was reduced by 57 percent on the state trunk system in 1976. The anti-vandalism program that was initiated by Wisconsin has served as a model for programs in other states (7).

### *Iowa - 1982*

Iowa began its program in 1982. Similar to Wisconsin, Iowa used a public awareness campaign to indicate the presence of vandalism and its effects. The effort included utilizing a brochure, a bumper sticker, posters, and public service announcements. In 1990, the Iowa Legislature increased the fine for sign vandalism from \$500 to \$1,000 and the possible imprisonment from not greater than six months to one year (8).

### *Virginia - 1984*

The Virginia Department of Transportation has developed a public service information campaign to control sign vandalism. They developed a series of radio spots which carried an anti-vandalism message. In addition, they produced a 15-minute color film entitled *Designs of Life*. This film emphasizes the hazards that are created by vandalizing traffic signs. It has been shown mainly to students in high school driving classes (9).

## **EXISTING PHYSICAL TREATMENTS**

There are different physical treatments that are currently used to reduce and prevent sign vandalism. Some of these have been used in programs implemented by the state and local agencies previously described. The physical treatments include available anti-theft hardware, anti-graffiti spray coatings which can be applied to the sign face, adjustment of the sign mounting height, and the application of an identification feature on the sign. Each of these is described briefly below.

### **Available Hardware**

Through the use of special, low-cost vandal-proof bolts which require special tools for installation and removal, it is difficult and time-consuming for a vandal to remove a sign that has been installed with this type of hardware (although not impossible; TxDOT personnel indicate that it can still be removed with a hammer).

Eastern Metal/USA-Sign has several types of bolts that require a special tool for removal (10). These include button-head prison bolts with a center pin, rounded shoulder bolts, set screws with a center pin, stainless-steel saw-tooth set screws, and rounded nuts with tapered and fluted sides.

Hawkins-Hawkins Co., Inc. manufactures a U-bracket, designed to fit 51.6 mm or 64.3 mm i.d. standard pipe posts, for areas with a high risk of sign theft. Once the signs are installed, the bracket screws are inaccessible. The only two accessible bolts are the ones on the outside (sign face) at the top and at the bottom. The company also has special fasteners available to use in place of these two bolts. One type is a "Helmut Nut," and another type is a head that requires a special two-prong tool for removal (11).

VePed manufactures several types of street name sign brackets, for which they also have tamper-proof bolts, set screws, and a wrench required to remove them (12). This tool looks similar to an allen wrench except it has an indentation (or hollow center) to fit over the center pin of the vandal-proof bolt.

### **Anti-Graffiti Spray Coatings and Protective Overlays**

Commercial spray products are available and are used to spray on the sign face. When applied, a solvent can remove graffiti from the sign face. Most spray coatings provide protection from spray paints and/or food items that are used to deface signs; when removed, these paints will not deteriorate the sheeting material.

The Minnesota Mining and Manufacturing (3M) Company manufactures a protective overlay film that can be applied to reflective sheeting for easy cleaning of dirt and graffiti from sign surfaces. It costs \$1.20 per square foot; for a 30" x 30" sign, this would amount to \$7.50 for the film material alone. Assuming the labor costs are equal to the cost of material, the total cost would be \$15.00 per sign. The survey results indicate that approximately 13.5% of signs replaced are replaced specifically because of graffiti. If the protective film were applied to every sign, assuming the cost (materials plus labor) to replace a sign is \$140, then the cost (or actually, savings) would be \$18.90 per each TxDOT sign ( $0.135 \times 140.00 = \$18.90$ ). Due to the lack of precise figures for sign costs, the difference between the \$15.00 and \$18.90 is probably not significant.

## Sign Mounting

Signs should be mounted higher than the minimum allowable distance shown in the MUTCD. The minimum height of 1.5 meters is suggested but is low enough that vandals can easily tamper with the device. A height of 2.1 meters is recommended, especially in a rural environment. Those signs mounted at this height would be more difficult to reach and deface or vandalize. Simple maintenance of the sign and its surrounding area can also help reduce sign vandalism.

## Identification Features

The final type of solution concerns identification features which can be adhered or engraved to the back of a sign, such as warning stickers and/or property identification decals. The warning sticker could indicate the penalty for vandalizing a sign, hopefully deterring any vandalism. Other stickers could be used in order to repossess signs once they are removed or stolen. Property identification seals or agency decals on the backs of traffic signs can aid in the return of stolen traffic signs when they are found. ZIP codes could be used, as well, to ensure that the sign is returned to the jurisdiction from where it was stolen. Figure II-1 shows an example of the warning stickers that the City of Gulfport (Mississippi) and other agencies use on the back of their signs (6, 13).

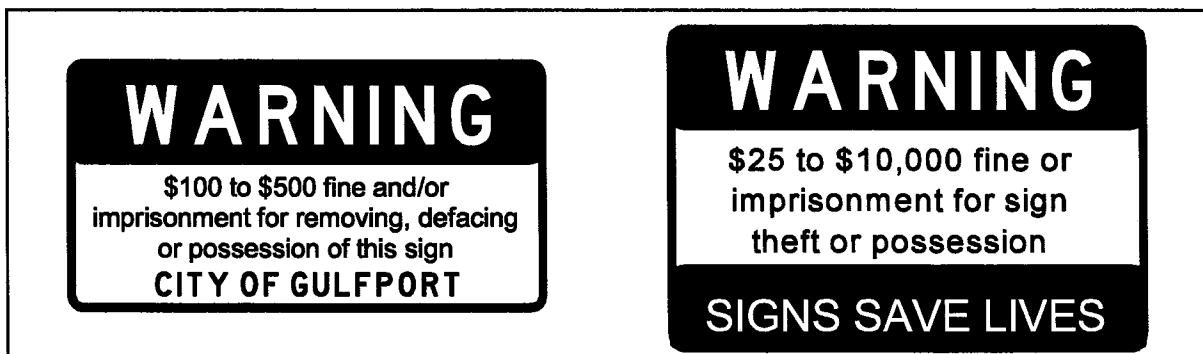


Figure II-1. Example of Warning Sticker Placed on Back of Sign

## EXISTING ANTI-VANDALISM LAWS IN TEXAS

The current statutes of the State of Texas are vague in identifying specific penalties for sign vandalism. The laws prohibiting and the penalties for sign vandalism can be found in various places throughout the civil statutes for the State of Texas (14). The strongest wording prohibiting sign vandalism can be found in Section 37 of Article 6701d (Traffic Regulations). This section states the following:

*“...no person shall without lawful authority attempt to or in fact alter, deface, injure, knock down, or remove any official traffic-control device or any railroad sign or signal or any inscription, shield, or insignia thereon, or any part thereof (14).”*

There is no specific mention, however, of the penalties for such an offense in this particular statute.

Additional text is provided for warning devices in construction areas. Section 2 of Article 6674u-1 states the following:

*“...no person may damage, remove, deface, carry away, or interfere or tamper with a barricade, flare pot, sign, flasher signal or any other device warning of construction, repair or detour on or adjacent to streets or highways of this State... (14).”*

The criminal charge for vandalizing a traffic sign can be found in Section 14 of Article 6701d-11 of the civil statutes. This section states the following:

*“...any person who shall deface, injure, knock down or remove any sign, posted as provided in this Act shall be guilty of a misdemeanor (14).”*

The legal consequences for committing vandalism can be found in Section 3 of Article 6674u-1. This section states the following:

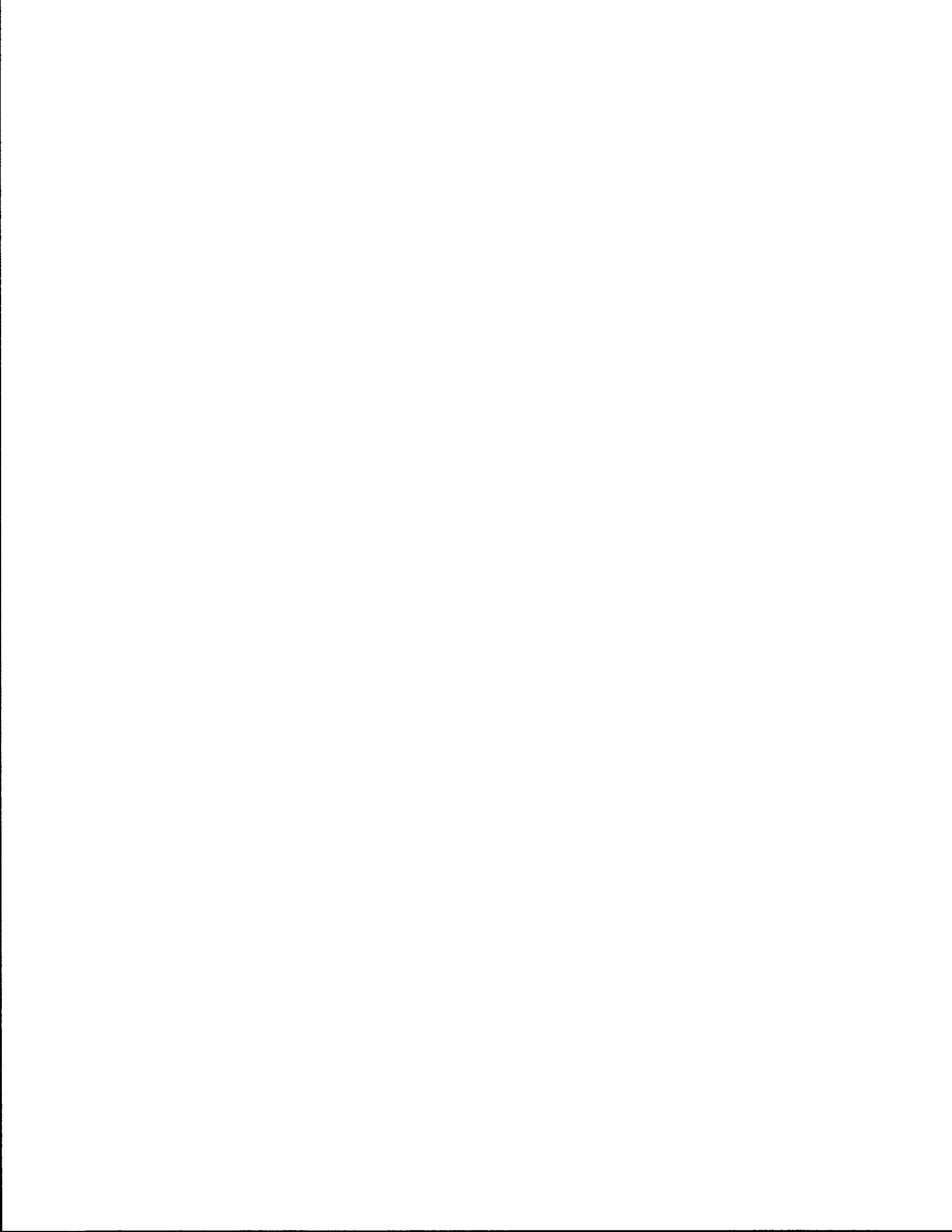


*“A person who violates a provision of this Act is guilty of a misdemeanor and upon conviction is punishable by a fine not less than \$25 nor more than \$1000, or by imprisonment in the county jail for not more than two years or both (14).”*

In Texas, vandalism of a traffic sign is considered criminal mischief, which will likely be a Class A, B, or C misdemeanor charge, depending upon the extent of the damages. The prosecution charge could result in a felony if the damage is extensive. Table II-1 shows the differences between a misdemeanor and felony charge, as well as the respective penalties associated with each charge.

**Table II-1. Classifications of Criminal Mischief and Penalties in Texas**

Type of Offense	Amount of Damage	Maximum Fine	Maximum Jail Term
Misdemeanor - Class C	Less than \$20	\$500	-
Misdemeanor - Class B	\$20 or more, but less than \$200	\$2,000	180 days
Misdemeanor - Class A	\$200 or more, but less than \$750	\$4,000	1 year
Felony - Third Degree	\$750 or more, but less than \$20,000	\$10,000	2 - 10 years
Felony - Second Degree	\$20,000 or more	\$10,000	2 - 20 years



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## CHAPTER III

# SURVEY OF TxDOT PERSONNEL

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An important task of this research study was a survey of TxDOT personnel within each of the 25 TxDOT districts. The survey provided the researchers the opportunity to gather information about the extent of the sign vandalism problem across many different regions and localities within Texas. The survey also provided some insight into the existing countermeasures currently used by TxDOT to deter sign vandalism.

### **OBJECTIVES OF SIGN VANDALISM SURVEY**

Recognizing these opportunities, the following objectives were established:

- Identify the significance of sign vandalism, as viewed by the district personnel;
- Determine the impact of vandalism on signs compared to other factors adversely affecting signs, such as vehicle crashes, replacement due to changes in standards, fading, etc.;
- Determine what types of signs (or other traffic control devices) are most frequently vandalized;
- Identify specific sign locations (i.e., neighborhoods), if any, that are vulnerable to sign vandalism;
- Identify any practices or countermeasures currently used by TxDOT to deter sign vandalism or minimize its effect; and
- Determine, if possible, the approximate extent of sign vandalism (number of signs affected and/or cost of replacing or repairing signs damaged by vandalism).

These objectives were formulated in order to provide the necessary facts to develop guidelines for an effective program to fight vandalism of signs and other traffic control devices.

## SURVEY INSTRUMENT

The information from TxDOT personnel was obtained by means of a survey, five copies of which were mailed to each of the 25 districts, along with correspondence to the District Engineer explaining the purpose of the survey. This method of requesting information results in a comprehensive geographic cross-section of the state, as each TxDOT district generally has maintenance supervisors (or engineers) in each county.

The correspondence to the District Engineers requested that they distribute the survey to appropriate personnel within the district, including, but not limited to, the District Traffic Engineer, the District Maintenance Engineer, Area Engineers, and Maintenance Supervisors. More than five copies were distributed in some districts.

The survey form was a one-page questionnaire. The eight questions, presented in Table III-1, were designed to get essential information about sign replacement, particularly in reference to vandalism of signs and other traffic control devices. The survey also asked for the name and office location of the respondent, and it allowed opportunities for the person to make additional comments. Appendix A reproduces the survey instrument and the accompanying correspondence to the District Engineers.

**Table III-1. Questions in TxDOT Sign Vandalism Survey**

Question Number	Question
1	To what significance is sign vandalism a problem in your district?
2	Please estimate the percentage of occurrence for the following reasons to replace a sign: change in standards, defacement, removal, damage (holes, bend), knock down, other.
3	Is there a particular traffic sign or other device that is more frequently vandalized than any other?
4	Are there locations within communities that are particularly vulnerable to vandalism?
5	Briefly describe any countermeasures your district has implemented to reduce sign vandalism.
6	What is the estimated number of sign units that have been replaced due to vandalism each year?
7	What is the estimated percentage of the district's maintenance budget spent on sign repair and replacement due to vandalism?
8	Do you have records that indicate the extent of sign vandalism?

## **SURVEY RESULTS**

A total of 229 completed surveys were returned to the Texas Transportation Institute (TTI). The following paragraphs summarize the major results and findings of the survey. This method of information retrieval resulted in a fairly comprehensive geographic cross-section of the state of Texas. There are 25 multi-county districts in the state, with maintenance supervisors in most of the counties. With 229 surveys returned, the result is an average of just more than nine completed surveys per district. Responses were received from 24 of the 25 districts and from 159 of the 254 counties. Figure III-1 shows the geographic distribution of the survey respondents.

Most personnel responding to the survey provided information about their position or title within TxDOT, which provides, to some degree, the level of knowledge and responsibility that person has in the district regarding the maintenance of traffic control devices. Table III-2 summarizes the types of personnel responding to the survey.

The survey responses were analyzed in a number of different ways in order to identify any significant patterns. These patterns were then used to establish guidelines for a program to reduce the occurrence of sign vandalism and/or minimize its effects. Appendix B shows the raw response rates and percentages for answers to each question.

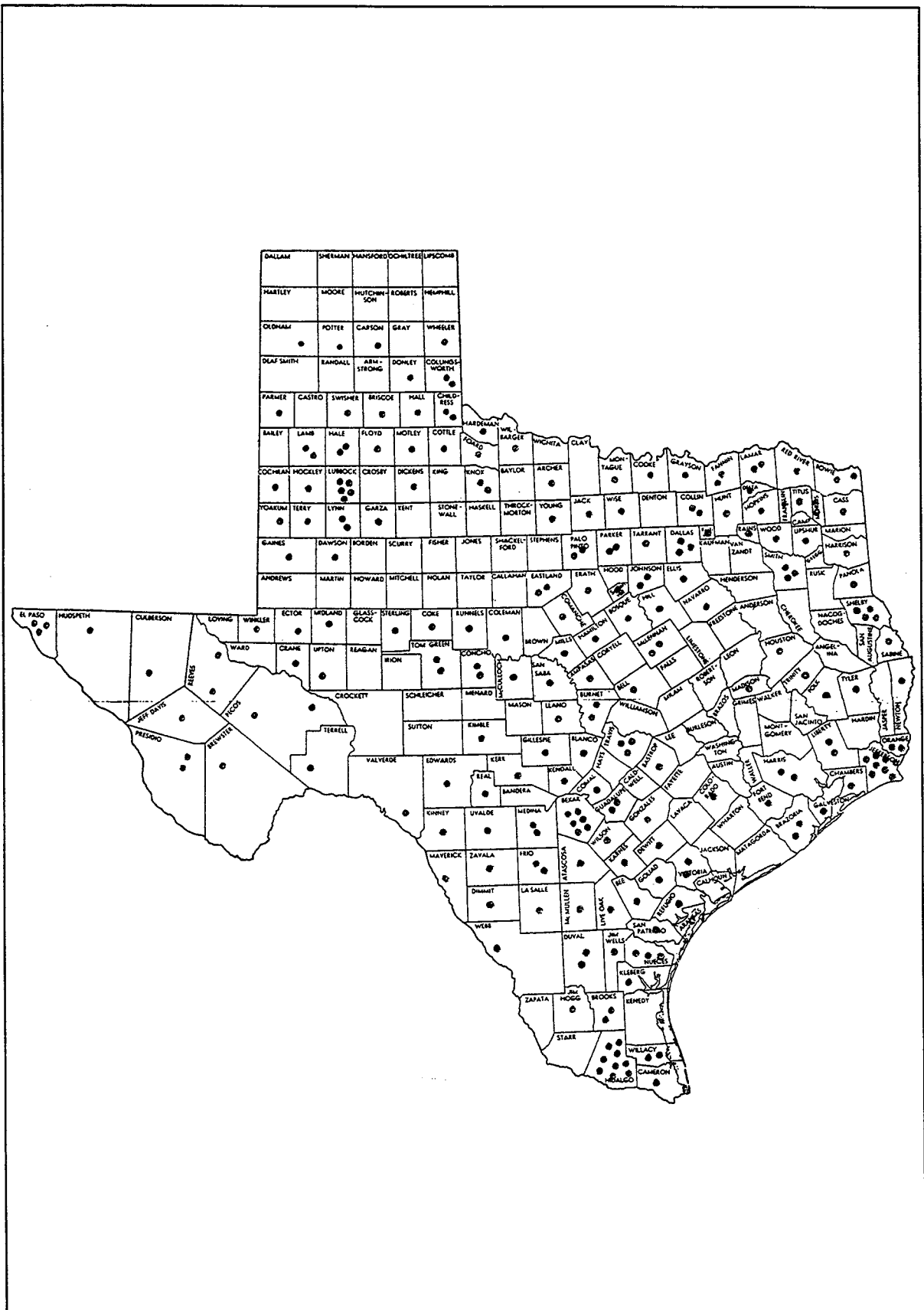


Figure III-1. Geographic Distribution of Survey Respondents

**Table III-2. Positions (Titles) of TxDOT Personnel Responding to Survey**

<b>Position / Title</b>	<b>Number Responding</b>
Maintenance Supervisor	127
Area Engineer	21
Sign Technician	18
Maintenance Technician	13
Assistant Maintenance Supervisor	9
Maintenance Construction Supervisor	6
Maintenance Section Supervisor	6
Director of Transportation Operations	3
Other or Unspecified	26
Total	229

**Significance of Sign Vandalism (Question 1)**

The first question of the survey asked, “To what significance is sign vandalism a problem in your district?” This question was asked to assess, in general terms, how much of a problem the district personnel consider sign vandalism. Table III-3 summarizes responses to this question. The results indicate that 65 percent of the TxDOT respondents consider sign vandalism a “significant” or “very significant” problem in their district. Only 32 percent said that “no problem exists” or a “minor problem exists.” Two percent of those answering the surveys were not sure of the significance of their sign vandalism problem. These numbers confirm the significance of the problem of sign vandalism and the need for accurately determining both the most probable locations to be affected by these acts and a target audience of an effective public awareness program.

**Table III-3. TxDOT Responses to Question 1—Significance of Sign Vandalism**

To what significance is sign vandalism a problem in your district?	
Response	Percent
Very Significant Problem Exists	13.1%
Significant Problem Exists	52.4%
Minor Problem Exists	31.4%
No Problem Exists	0.4%
Not Sure	2.6%

**Primary Reasons for Replacing Signs (Question 2)**

The second question asked respondents to estimate the percentage of occurrence for various reasons for replacing a sign. Five categories were listed, and respondents were also given a sixth choice of “other” and a choice of “not sure.” This question was asked so that the impact of damage from sign vandalism can be compared to other factors that adversely affect signs, such as changes to standards, fading, etc. Table III-4 shows responses and the relative rankings for this question.

**Table III-4. TxDOT Responses to Question 2—Reasons to Replace a Sign**

Please estimate the percentage of occurrence for the following reasons to replace a sign:	
Response	Percent
Damage ( <i>holes, bend</i> )	24.5%
Knock Down ( <i>accident</i> )	23.6%
Removal ( <i>theft</i> )	18.4%
Defacement ( <i>graffiti</i> )	13.5%
Change in Standards	9.1%
Other	11.3%

The largest number of signs (24.5 percent) are replaced because of physical damage (i.e., holes or bent). The second most frequent reason (23.6 percent) is that signs are knocked down during a crash. Removal (theft) of the sign is the next most common occurrence, accounting for 18.4 percent



of the time that a sign is replaced. Other reasons given for replacing signs include defacement/graffiti (13.5 percent of the signs), “other” (usually mentioned specifically as faded, 11.3 percent), and replaced due to changes in standards (9.1 percent). These responses indicated the majority (56.4 percent) of signs are replaced because of some type of vandalism. According to the survey, only about 11 percent of the signs on the roadside ever survive long enough to be replaced due to natural wearing and fading.

### **Most Frequently Vandalized Signs (Question 3)**

The third question asked the respondents if there was “a particular traffic sign or other device that is more frequently vandalized than any other?” This question was asked in order to identify what, if any, signs are more frequently targeted. This information can enable the supervisor to make decisions as to what signs to pay particular attention to, for example, when installing vandal-proof hardware.

The vast majority of respondents (78 percent) indicated that there were certain types of signs that were more frequently targeted for vandalism. Some who answered the question listed two or more of the most commonly targeted signs, and all responses were given equal weight in the tabulation of the responses, although a few respondents may have actually had them listed in the order of their frequency. Table III-5 shows the sign types most commonly mentioned, in order of frequency of responses.

It can be seen, then, that almost one third (32 percent) of all vandalized signs are **STOP** signs (R1-1). Other types of signs which are frequently targeted include: **Advance Crossing** signs (W11-Series), such as the advance symbol signs for cattle crossings, deer crossings, or hog crossings (14 percent); signs containing names of cities or creeks (I-Series, 14 percent); and route number signs (M1-Series, 7.5 percent). Together, these four broad categories make up almost 70 percent of all vandalized signs. It should be noted that those surveys which indicated that the **Hog Crossing** sign (non-standard) was frequently vandalized were all from supervisors in the same district in northwest Texas. The use of these signs is apparently limited to that particular part of the state. The sign is an advance warning sign, similar to the **Deer Crossing** (W11-3) or **Cattle Crossing** (W11-4) signs. It is a black symbol of a “hog” on a yellow background with no legend. The route numbers are, for the most part, limited to certain numbers that seem to be popular and are frequently stolen. Route

numbers mentioned frequently in the survey responses included “66,” “69,” and “666” (see Appendix B for a complete list of route numbers mentioned). The possibility of changing some of these route designations should be considered. One of the respondents noted that the SH 69 designation was changed to SH 112 near Eastland in the Brownwood District. The use of these numbers on future routes should be avoided if possible.

**Table III-5. TxDOT Responses to Question 3—Frequently Vandalized Signs**

Is there a particular traffic sign or other device that is more frequently vandalized than any other?	
Sign Type	Percent
STOP Signs	32.1%
City Names, Including City Limit and Destination Signs	10.2%
Route Number Signs	7.5%
Deer Crossing Signs	5.8%
Cattle Crossing Signs	5.0%
YIELD Signs	4.7%
Creek Names Signs	4.2%
Curve Signs	3.0%
Speed Limit Signs	2.8%
Unspecified “Animal” Crossing Signs	2.2%
Unspecified Warning Signs	2.2%
Unnamed County Road Signs	2.2%
Driving While Intoxicated (DWI) Signs	1.4%
DO NOT ENTER Signs	1.1%
Hog Crossing Signs	1.1%

**Particular Locations or Neighborhoods (Question 4)**

The fourth question asked was: “Are there locations within communities that are particularly vulnerable to vandalism?” Possible answers were “Yes,” “No,” or “Not Sure.” If respondents answered “Yes,” they were asked to name the types of locations. This question was asked in order

to identify what, if any, locations (i.e., neighborhoods) are particularly vulnerable to being damaged by vandalism. Table III-6 summarizes the results for this question.

**Table III-6. TxDOT Responses to Question 4—Locations Vulnerable to Vandalism**

Are there locations within communities that are particularly vulnerable to vandalism?	
Location	Percent
Remote Locations	48.5%
Farm-to-Market Highways	13.5%
Vicinity of City Limits	6.7%
School Areas	6.7%
Parks and Recreational Areas	5.5%
Underpasses	2.5%

As far as whether certain types of locations may be more vulnerable to being vandalized, about 70 percent of those surveyed said that there are indeed locations that are more frequently targeted. Approximately 24 percent said there are not any specific locations targeted, and the remaining six percent said they were not sure. Persons answering “Yes” to whether certain locations are more often vandalized were asked to identify these types of locations. Of the respondents providing an explanation, the most commonly mentioned response was “remote” locations (48 percent). Thirteen percent specifically said Farm-to-Market highways. Other frequently given answers were: “just outside of town” (near city limits) or variations of this (seven percent); school areas (seven percent; and parks, recreation areas, and “places where people gather to party” (five percent). Locations particularly vulnerable to sign vandalism, along with the information provided elsewhere in this report on particular sign types, can be helpful when making decisions on where to use vandal-proof hardware on signs.

**Previously (or Currently) Used Countermeasures (Question 5)**

The fifth question asked the respondents to “briefly describe any countermeasures your district has implemented to reduce sign vandalism.” The purpose of this question was to identify any previously attempted countermeasures that may have been missed during the literature search or other

reviews. More than 43 percent did not mention any specific countermeasures. Table III-7 shows a list of the countermeasures used. The most commonly used method to reduce vandalism to signs, at present, is vandal-proof hardware, such as “anti-theft” bolts. This was the only countermeasure extensively used (almost 32 percent have used this). Other measures, such as requesting police assistance, moving signs, greasing sign poles, and newspaper and television advertising all had been attempted by less than 11 percent.

**Table III-7. TxDOT Responses to Question 5—Countermeasures Implemented**

Briefly describe any countermeasures your district has implemented to reduce sign vandalism.	
<b>Responses</b>	<b>Percent</b>
No Mention of Specific Countermeasures	43.1%
Anti-Theft Bolts	31.9%
Police Enforcement	10.9%
Move Sign (higher or further from road)	6.6%
Newspaper Advertisements / Announcements	3.1%
Grease on Sign Pole	1.7%
Meetings With Schools	1.3%
Use Words / Warnings on Signs	0.9%
Television Advertisements	0.4%

### **Number of Vandalized Signs (Question 6)**

The sixth question asked district personnel “what is the estimated number of sign units that have been replaced due to vandalism each year?” This question was asked to get an idea of the extent of the problem of sign vandalism, as well as to determine if the problem is greater in certain districts or offices than in others. Based on the returned surveys, approximately half of the TxDOT supervisors were not able to estimate the number of sign units that their section replaced each year because of damage resulting from vandalism. The considerable number of respondents not answering this question may be due to the fact that the information was simply not available to them and/or accurate records were not kept. When a number was given, the average number of units replaced annually due to vandalism was approximately 170 for each respondent.

### **Percentage of Maintenance Budget Spent on Vandalism Repairs (Question 7)**

The seventh question asked “What is the estimated percentage of the district’s maintenance budget spent on sign repair and replacement due to vandalism?” This question was asked, as was question six, in order to try to quantify the extent of the problem, or at least to use when comparing offices or districts across the state.

The overwhelming majority of respondents declined to give an estimate of the percentage of the district’s maintenance budget spent on replacing or repairing vandalized signs. Most respondents probably do not make a distinction in their record keeping between signs replaced because of vandalism and signs replaced for other reasons. Even those who make that distinction and keep accurate records may not be knowledgeable about the rest of the district maintenance budget. Among those who could give an answer as a percentage, the average was approximately 12 percent of the maintenance budget.

### **Current Record-Keeping (Question 8)**

The eighth, and final, question asked the respondent “Do you have records that indicate the extent of sign vandalism (i.e., high frequency locations, costs)?” The purpose of this question was to identify what, if any, records are currently kept that document the extent of the severity of sign vandalism. Possible choices of answers were “Yes,” “No,” or “Not Sure.” Slightly more than half (50.2 percent) indicated that they kept records, which indicates the extent of sign vandalism.

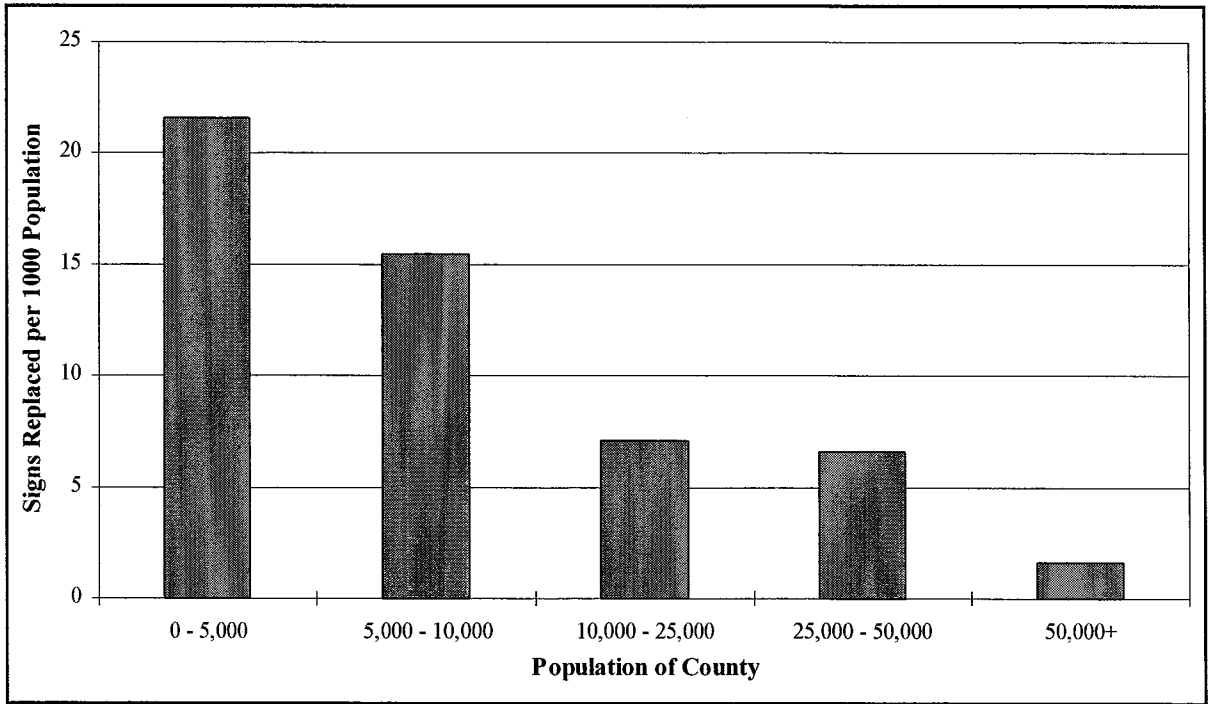
### **FURTHER ANALYSIS**

The results of the survey were analyzed to determine if the general statements mentioned in question four (locations vulnerable to sign vandalism) could be verified by the number of signs vandalized according to location. This was done by comparing rural counties with predominantly “remote” areas to heavily populated, mostly urban counties, to determine if the rural areas are the most targeted areas for sign vandalism. In question six respondents were asked to give an estimate of the number of sign “units” replaced due to vandalism. An estimate of the number was given by 109 of the respondents; however, some apparently did not understand the question or for some reason were unable to give the answer in the requested format. Some gave the answer as a percentage of all

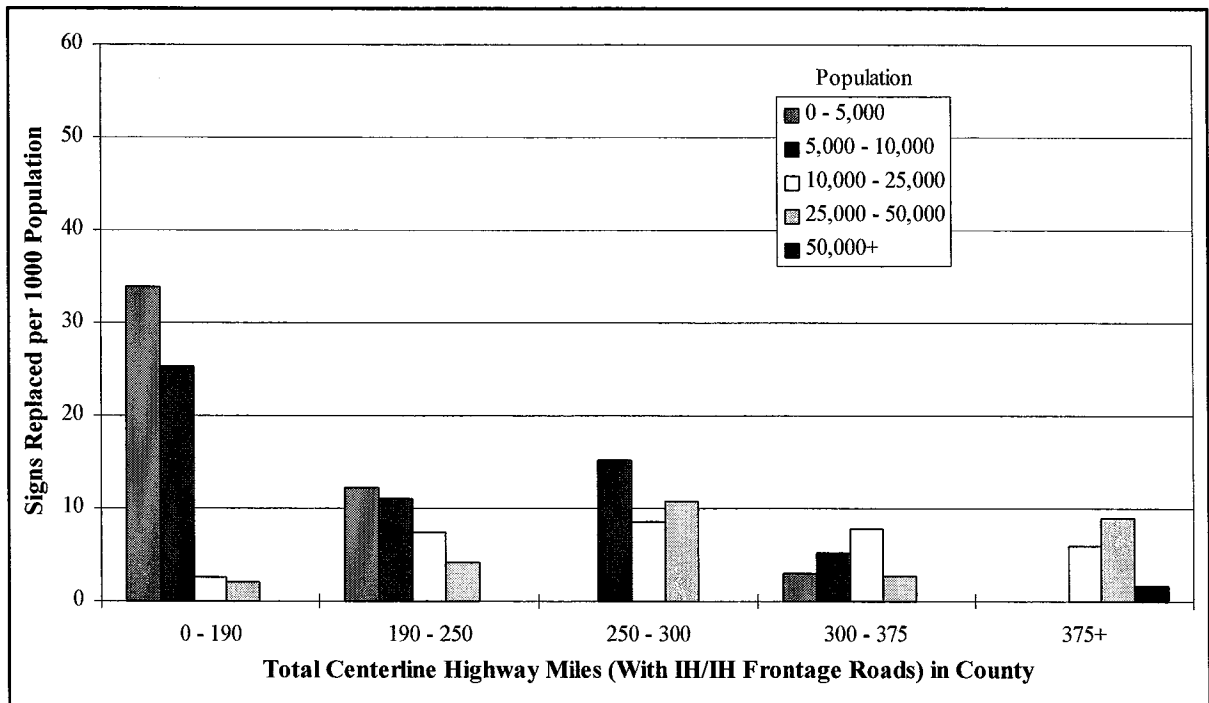
signs replaced or as a percentage of all signs on the road. Some gave a number of sign units, but their area of supervision covered an entire district, two counties, or only just a section of a county. The ones of this nature were disregarded, and only the ones whose area of supervision was clearly determinable were included. These were supervisors whose responsibility was for one county. There were 70 respondents who met this description. These, then, represent 70 different counties across Texas and range from very sparsely populated rural counties to heavily populated urban counties. Some of the state's most populated counties, including Dallas, Bexar, Harris, and Tarrant, were not included in this particular analysis because supervisors in those areas are responsible for only a part of the county, and it was not possible to determine the population characteristics of their zone of supervision.

The first analysis compared the rate of sign vandalism (signs per one thousand population) between rural counties and urban counties. The counties were grouped into five categories based on their population (15). The average rate of sign vandalism per 1,000 capita was then calculated for each of these categories (see Figure III-2). A pattern can be seen of more signs being vandalized per person in the sparsely populated areas. In fact, there are approximately ten times as many signs vandalized per capita in the least populated areas as there are in the urban areas (about 20 signs per one thousand population vs. about two signs per one thousand population). Just from this one analysis it remained unclear whether this correlates to, or validates, the locations that were mentioned as high-frequency sign vandalism locations. Perhaps the rural counties having more signs *per capita* than the urban counties could account for this difference. Therefore, further analysis was done.

Another comparison was made among counties having roughly the same number of centerline miles of state-maintained highways. This may be a better comparison than the previous one, since the number of signs in a county may be more closely correlated to the number of highway miles in the county. Heavily populated counties, however, may have more signs per mile than the less populated counties. The 70 counties with data were divided into five groups based on the number of state-maintained highway miles in the county (16). Therefore, the counties in each group have approximately the same amount of miles of highway (although as mentioned previously, not necessarily the same number of signs). A pattern can still be seen where the less populated counties have a higher rate of sign vandalism (Figure III-3).



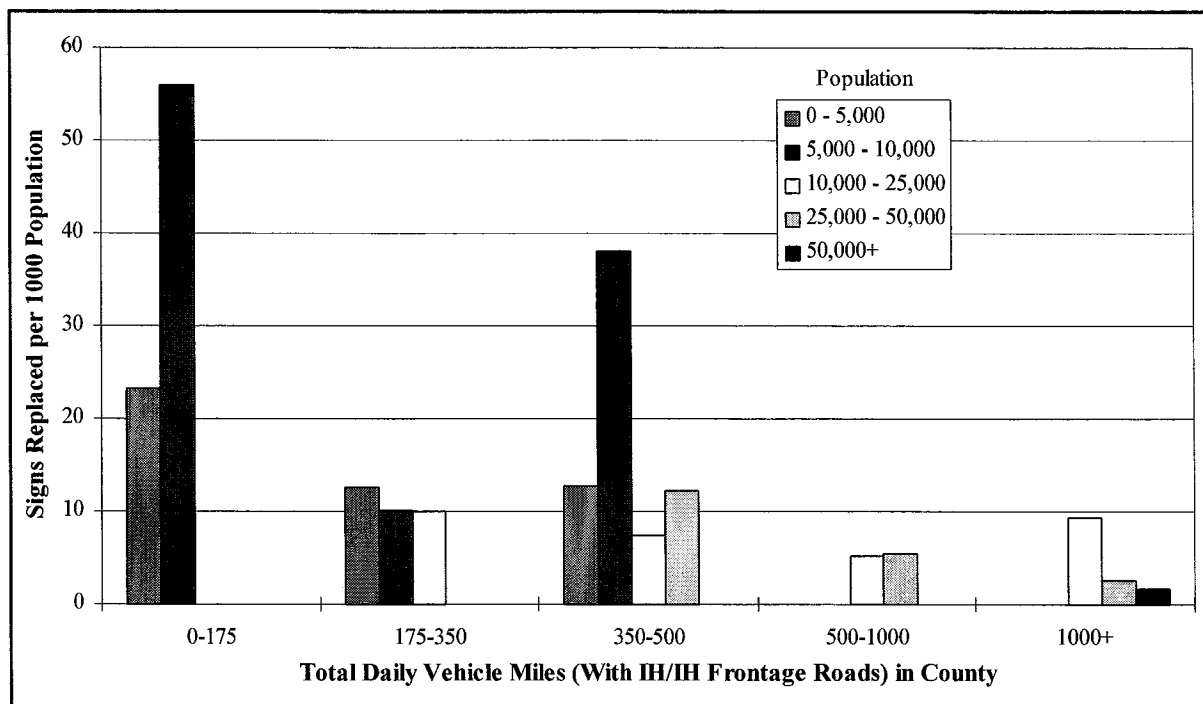
**Figure III-2. Signs Replaced in Counties Per Capita**



**Figure III-3. Signs Replaced Based on Total Centerline Miles**

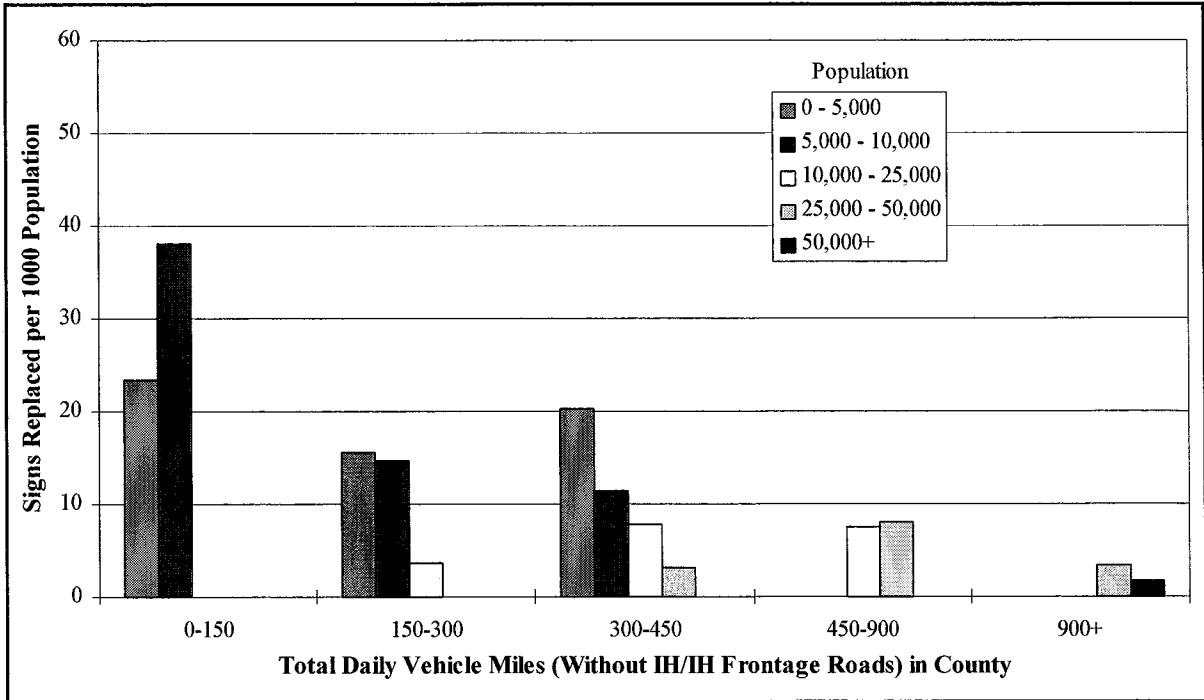
Another comparison was done, this time comparing counties having similar vehicle-miles of travel. The results of this analysis can be seen in Figure III-4. The differences between sign vandalism rates based on population are not as noticeable here. One more relevant comparison was made using miles (or traffic) of non-interstate highways when comparing sign vandalism rates of counties having different population characteristics. This comparison is more relevant, since signs on interstate highways are more difficult to deface or steal due to their visibility and the resulting increased enforcement possibilities. Figure III-5 shows the relationship using these non-interstate highway miles only.

In this chart, counties are put into categories with other counties having similar characteristics of population and traffic, thereby reducing or eliminating the effects of those factors when making comparisons. The chart shows a pattern of decreasing sign vandalism rates as the population (urbanization) increases. It also reveals that the rate decreases as traffic volumes increase. This seems to confirm the statements/comments given by respondents to the survey, such as the prevalence of sign vandalism in “remote” areas or on “F.M. Highways where there are no houses in sight.”



**Figure III-4. Signs Replaced Based on Total Daily Vehicular Mileage**





**Figure III-5. Signs Replaced Based on Total Centerline Miles Maintained by State (No Interstate Highways)**

## SUMMARY OF TxDOT SURVEY FINDINGS

The following are some of the more important findings from this survey:

- Sixty-five percent of TxDOT respondents said that sign vandalism is a significant or very significant problem in their district;
- Fifty-six percent of sign replacement is due to vandalism;
- Only about 11 percent of signs are replaced due to reaching the end of service life;
- Of the 82 percent of respondents who mentioned a particular sign or signs as frequently vandalized, the types of signs most often mentioned were: **STOP** signs, **Advance Crossing** signs (i.e., deer, cattle, etc.), city and creek name signs, certain route number signs (such as “66,” “69,” and “666”), and **YIELD** signs;
- Remote locations, Farm-to-Market highways, school areas, and recreation areas are the most frequently targeted locations;
- Forty-three percent of respondents did not mention using any “countermeasures” against vandalism; thirty-two percent said they have used anti-theft bolts; eleven percent have

requested increased law enforcement; six and one-half percent have relocated signs higher or further from the road; three percent have tried public advertisements or announcements; two percent have used grease on signs or poles; and one percent put a warning message on the signs;

- Of those providing data, approximately 170 signs per county are replaced annually due to vandalism; and
- Approximately 12 percent of the districts' maintenance budgets are spent on replacing or repairing vandalized signs.

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## CHAPTER IV

# A PLAN OF ACTION FOR REDUCING VANDALISM

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Each year, TxDOT must repair or replace signs and traffic signals due to vandalism and theft. This effort costs the taxpayers a considerable amount of money. The goals of this research project were: to identify problematic areas such as specific devices that are stolen or vandalized, to identify areas where devices are affected, to determine target audiences and potential effectiveness of a media campaign, and to summarize the programs in other states. The previous chapters in this report describe the study activities conducted and the findings resulting from those activities. This chapter presents recommendations that were developed from those findings.

### SUMMARY OF FINDINGS

The research activities were concentrated in the following areas: identifying and evaluating existing programs and practices, including anti-theft hardware and legislation pertaining to sign vandalism; and identifying the extent of the sign vandalism problem, including specific information such as types of signs or locations that could be used in recommendations for action. Each of the research activities and the associated findings are discussed in detail in earlier chapters of this report. However, the most significant of the findings are described below.

#### **Existing Programs**

The survey results reveal that vandal-proof hardware is used by about a third of TxDOT respondents as a means of countering sign vandalism (although some TxDOT personnel indicated that this hardware does not deter sign removal). The results indicate that other methods, including media programs, have not been used in many locations. For example, only seven responses stated that they had used newspapers as a medium for conveying information to the public about sign vandalism. One respondent conducted visits with school officials and students and two respondents conducted visits with school districts.

It appears that no extensive, organized campaign has been conducted in Texas. The only organized campaign that was discovered during this survey was a district that published an advertisement in every newspaper in the district. The advertisement attempted to bring attention to the costs and penalties of damaging or stealing highway signs.

Three states and several municipalities from around the country were identified as having implemented specific sign vandalism programs. Most of these included some type of public information campaign. Additional means that have been attempted include providing amnesty periods in which stolen signs can be returned, engraving ZIP codes on the back of signs, enlisting the aid of school bus drivers in identifying missing or damaged signs, and using special sign mounting hardware. Chapter II describes these programs in more detail.

### **Existing Anti-Theft Hardware**

Several companies manufacture, and many states and other agencies use, special sign-mounting hardware to make sign theft more difficult. Many TxDOT districts already use some of these available devices. Chapter II describes some of these devices in more detail.

### **Existing Legislation**

The current Texas statutes are vague in identifying specific penalties for sign vandalism. Also, it is difficult to prosecute the ones responsible for vandalizing traffic control devices because of the inherent enforcement problems. Chapter II explains enforcement solutions from other states and municipalities, such as the use of “amnesty periods” to repossess stolen traffic control devices. Chapter II also describes the existing legislation in Texas pertaining to sign vandalism.

### **Survey Findings**

The key findings resulting from the survey of TxDOT district personnel include:

- Sign vandalism is perceived as a significant problem for TxDOT. Most of the TxDOT personnel responding to the survey consider sign vandalism a significant or a very significant problem.

- Fifty-six percent of signs are replaced due to vandalism. Only 11 percent of signs are replaced due to reaching the end of their service life (i.e., fading)—most are stolen or damaged before that occurs;
- **STOP** signs are the object of most of the vandalism. Other types of traffic control devices commonly vandalized include **Advance Crossing** signs (deer, cattle, etc.), signs with city or creek names, certain popular route number signs, and **YIELD** signs;
- Remote locations have the highest frequency of vandalism activity, even though they generally have less traffic. This is likely the reason they have more vandalism—the activity is likely to go unseen while it is occurring;
- Based on the results of the survey, it appears that 45 percent of the respondents have not attempted any countermeasures to deter sign vandalism. The methods that were mentioned as having been used include: anti-theft bolts, increased law enforcement, relocating signs, public announcements or advertisements, grease, and warning messages; and
- Of those providing data, approximately 170 signs are replaced annually per county due to vandalism and approximately 12 percent of a district's annual maintenance budget is typically spent on replacing or repairing signs affected by vandalism.

## POTENTIAL HARDWARE SOLUTIONS

Although hardware modifications will not deter someone who is dedicated to the task of damaging a sign, the devices can make the task more difficult and time consuming, thereby reducing the number of signs that may be damaged.

Based on some survey responses and especially the review of literature from other states, use of vandal-resistant hardware is effective in reducing sign theft. One report, described in a Transportation Research Board article, states a reduction of 40 to 60 percent by using vandal-proof fasteners (1).

However, some TxDOT crews have apparently tried this type of hardware and found little success because someone desiring to remove the sign can still do so with a hammer.

Many states and municipalities now make use of stickers applied to the backs of signs. These stickers contain ownership information and also may contain a warning about penalties for sign theft. Some municipalities use ZIP codes on the backs of signs to aid in identifying ones that are recovered.

Another recommendation is to mount signs higher in rural locations. The minimum height from the near edge of the pavement to the bottom of the sign is 1.5 meters in rural areas. Erecting the signs at a height of 2.1 meters should make the task of removing or painting a sign more difficult, as a ladder or some type of vehicle would be required in order to reach the sign.

### **Best Locations for Use of Anti-Theft Hardware**

The actual theft of a sign and the subsequent replacement of it may be the best indication that special hardware should be used. In other instances (such as the installation of new signs), the guidelines described here may help in this decision.

Consideration should be given to using special hardware when installing signs in close proximity to schools, in parks or other recreation areas, and on low-volume Farm-to-Market highways. Although it may not be feasible to do this on all F.M. highways, TxDOT personnel should consider the sections of highway from the city limits (edge of the developed residential area) extending out approximately five miles. It may not be necessary, however, to do this on every sign even in these areas. Some types of signs are more likely targets of the vandals' activities.

### **Type of Signs**

Keeping in mind the *locations* discussed in the previous section, special hardware should be used when installing the following types of signs in those areas: **STOP** signs; Advance Crossing signs warning of deer, cattle, or other livestock and animals (especially when these messages are represented by a symbol of the animal); **City Limit** signs; destination signs; creek name signs; and **YIELD** signs. If a particular route number may be popular or desirable for some reason, then the route markers should also be included in the high risk category. Route numbers that are frequently stolen include "69," "66," and "666."

## **Available Hardware Devices**

Several companies manufacture, and many states and other agencies use, special sign-mounting hardware in order to make sign theft more difficult. Many TxDOT districts already use some of these devices. Chapter II describes some of the different types of hardware available.

## **RECOMMENDED LEGISLATION**

The current Texas statutes are vague in identifying specific penalties for sign vandalism. A specific law is needed that prohibits sign vandalism, including defacing, damaging, removing, or knocking down a sign. This legislation should state the specific penalties involved if found guilty of violating this law (e.g., Class C misdemeanor for first-time offenders, Class B for second-time, etc.). It is also recommended that enforcement be heightened during peak periods of sign vandalism, such as during hunting season, or during the summer when teenagers have more idle time.

## **A MEDIA PLAN FOR A PUBLIC AWARENESS PROGRAM**

A public information campaign effort, via printed and broadcast media and educational efforts, is recommended to make the public more aware of the legal issues, the costs, and the safety implications of sign vandalism. Using the right message, targeting the appropriate sector of the population, and using an appropriate acronym (for example, “STOP” or “Sign Theft Observance Program”) and sufficient publicity, the overall program would likely be more effective. The following sections outline in more detail each of these subjects.

### **Target Audience**

The target audience should include junior high and high school students, both in urban and rural areas. This research project shows that rural areas do have a considerable problem with sign vandalism, even though they have smaller populations. Rural students generally have a greater “opportunity” to commit acts of sign vandalism than those living in more urban areas because of the lesser likelihood of being seen or caught by local law authorities. Another reason, a product of their rural environment, is that fewer social outlets are available than might be in an urban area, providing idle time for such mischievous activity.

Although male teenagers are primarily responsible for the vandalism (7, 17), the target audience should include both males and females in this age group.

### **Target Message**

The message should emphasize the following two points. First, the importance of signs to the safety of drivers and their passengers (and to the safety of the students themselves) should be emphasized. Specific examples of how the absence of a certain type of sign could cause a crash should be pointed out. Second, the seriousness of the act of committing sign vandalism and the consequences if caught are important for the students to understand. Another point to include is the cost to the taxpayers that results from sign vandalism. This would likely have a more positive effect on an older audience (i.e., parents of these students).

### **Format of Materials**

The public information campaign effort should be accomplished through multiple media simultaneously. The media will include printed materials for newspaper advertisements or articles, prepared advertisements for broadcast via radio, and possibly video for television advertisements and for presentations to the schools.

### **Method of Presentation**

The recommended approach for newspapers is to provide a short but informative press release that can be printed at minimal costs to the sponsor. This press release should contain information about the extent of sign vandalism (cost to taxpayers) and the hazards to the traveling public that could result when there are missing or illegible signs due to sign vandalism. The article should also point out the maximum penalties allowed under current state law for sign vandalism.

Radio and television announcements would be more effective than newspaper media at communicating the adverse affects of sign vandalism, with television media being the most preferred. Public service announcements (PSAs) on television could show more graphic representations of the hazards associated with missing or illegible signs. The PSAs would be most effective at the times



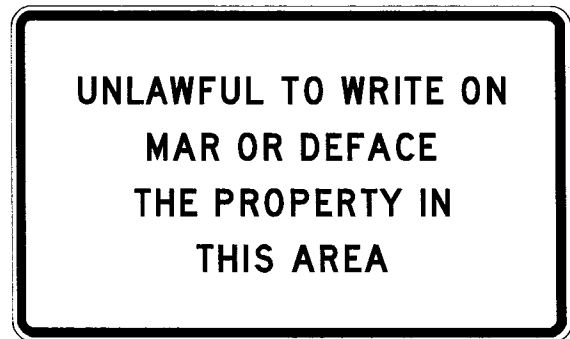
and on the stations when teenagers (12 to 20 years old) make up a large portion of the viewer or listening audience.

Probably the most effective and important method of presentation can be done by TxDOT personnel and/or law enforcement officers or other community leaders at the junior high and high schools, especially in the small towns and rural areas. Presentations, videos (extended versions of PSAs), and/or group discussions by these persons would have a more lasting impression on the audience than other methods previously discussed.

## **OTHER IMPLEMENTATION ACTIVITIES**

Existing countermeasures can be used more cost effectively with these guidelines discussed above in regards to location and sign types. For example, it would be more effective to install warning messages on the backs of new or existing signs that would be considered a high-risk for sign vandalism (these decals warn about tampering with signs and also include ownership identification information). Chapter II contains examples of the warning stickers that the City of Gulfport (Mississippi) and other agencies use on the backs of their signs. Those districts relocating signs to a position higher or further from the road, making requests for added law enforcement patrolling, etc. can utilize the information here.

An area for further consideration is the installation of signs warning of the consequences of sign vandalism. The use of these signs would be similar to that of anti-litter signs (“Don’t Mess with Texas”). TxDOT already has a standard sign (R19-4, depicted in Figure IV-1) that can be used to warn of vandalism, and perhaps minimum variations of it can be developed for use in more specific situations. The use of these types of signs should be limited to the high-risk areas discussed earlier in the report, such as recreational areas and F.M. highways near the edges of towns. Perhaps before-and-after studies could be conducted on some test sections to evaluate the effectiveness of these signs in reducing sign vandalism.



**Figure IV-1. Regulatory Sign to Deter Vandalism (R19-4)**



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**CHAPTER V**  
**REFERENCES**

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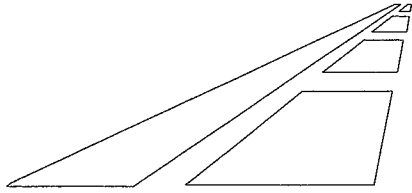
**APPENDIX A**

**SIGN VANDALISM SURVEY INSTRUMENT**

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This appendix contains a duplication of the cover letter and sign vandalism survey instrument that was distributed to the District Engineer in each of the 25 TxDOT districts. Included with each correspondence were five copies of the survey, each attached with a mailing label for the Texas Transportation Institute. Each District Engineer was asked to distribute the five surveys and mailing labels to appropriate personnel within their district, as well as make additional copies of the survey, as needed.

The cover letter, presented in Figure A-1, identified the TTI research study and the objective of the survey instrument, which was to assess the extent of sign vandalism around the state and to obtain other pertinent information essential to the research study. Personnel within TxDOT were asked to answer the questions in the survey to the best of their knowledge and then to return to survey via mail or FAX transmittal. Figure A-2 presents the distributed survey instrument.



TEXAS TRANSPORTATION INSTITUTE

SYSTEM IMPLEMENTATION PROGRAM

Area Code 409  
Telephone 845-6004  
Fax: 409-845-9761

<Date>

<FirstName> <LastName>, P.E.  
District Engineer, District No.  
Texas Department of Transportation  
<Address>  
<City>, <State> <ZipCode>

Dear <LastName>,

The Texas Transportation Institute (TTI) in College Station, Texas is working with the Texas Department of Transportation on a research project to identify issues that will benefit the Department in minimizing sign vandalism in the State of Texas and to develop a Sign Vandalism Awareness Program. In order to accomplish this, TTI is conducting a survey of all the TxDOT districts to determine the significance of sign vandalism, as well as other pertinent information that may benefit the research project.

Please distribute this one-page survey, along with the attached mailing label, to appropriate personnel within your district, including, but not limited to, the District Traffic Engineer, Area Engineers, Area Maintenance Engineers, Maintenance Supervisors, or other appropriate personnel. Your cooperation with this study is appreciated.

If you should have any additional questions or comments concerning this project or the survey itself, please contact me at (409) 845-6004. Thank you for your cooperation.

Sincerely,

Dale L. Picha  
Assistant Research Scientist

**Figure A-1. Cover Letter Distributed to TxDOT District Engineers**

## SIGN VANDALISM AWARENESS PROGRAM

The Texas Transportation Institute is conducting a TxDOT-sponsored research study to develop a Sign Vandalism Awareness Program for Texas. Your answers to the following survey questions will assist the research team in developing a more effective program.

**Name:** \_\_\_\_\_  
**District:** \_\_\_\_\_  
**Title:** \_\_\_\_\_  
**Phone:** (\_\_\_\_) \_\_\_\_\_

Please answer each question to the best of your staff's knowledge. If a question is not applicable to your district, please check **Not Sure** or **N/A**, and feel free to make additional comments. Thank you for your time.

1. To what **significance** is sign vandalism a problem in your district?
- Very Significant Problem Exists
  - Significant Problem Exists
  - Minor Problem Exists
  - No Problem Exists
  - Not Sure

*Comments* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. Please estimate the percentage of occurrence for the following reasons to replace a sign:

Change in Standards	_____	%
Defacement ( <i>graffiti</i> )	_____	%
Removal ( <i>theft</i> )	_____	%
Damage ( <i>holes, bend</i> )	_____	%
Knock Down ( <i>accident</i> )	_____	%
Other	_____	%
<input type="checkbox"/> Not Sure		
Total	<u>100</u>	%

3. Is there a particular traffic sign or other device that is more frequently vandalized than any other?

Yes       No       Not Sure

*If Yes, explain:* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

4. Are there locations within communities that are particularly vulnerable to vandalism?

Yes       No       Not Sure

*If Yes, explain:* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

5. Briefly describe any **countermeasures** your district has implemented to reduce sign vandalism.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 N/A (*No countermeasures implemented*)

6. What is the estimated number of sign units that have been replaced due to vandalism each year?

Not Sure       N/A

7. What is the estimated percentage of the district's maintenance budget spent on sign repair and replacement due to vandalism? \_\_\_\_\_ %

Not Sure       N/A

8. Do you have records that indicate the extent of sign vandalism (*i.e., high frequency locations, costs*)?

Yes       No       Not Sure

*Additional Comments* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Please FAX This Survey To The Following FAX Number: **(409) 845-9761** or mail to the following address:  
**Dale L. Picha Texas Transportation Institute TAMU College Station, TX 77843-3135**  
 If you need additional information, please call (409) 845-9929

**Figure A-2. Sign Vandalism Survey Instrument**





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**APPENDIX B**

**SUMMARY OF SURVEY RESPONSES**

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This appendix presents a summary of the responses of each of the survey questions. The number of responses is shown for each answer, followed by the response percentage.

1. To what significance is sign vandalism a problem in your district?

**Table B-1. TxDOT Responses to Question 1— Significance of Sign Vandalism**

Response	Number of Responses	Percent
Very Significant Problem Exists	30	13.1%
Significant Problem Exists	120	52.4%
Minor Problem Exists	72	31.4%
No Problem Exists	1	0.4%
Not Sure	6	2.6%

Samples of the 95 comments received:

- “. . . weekend occurrence . . .”;
- “. . . the presence of vandalized signs seem(s) to promote more vandalism”;
- “a problem when part of a scavenger hunt”;
- “. . . knocked down by long plows on tractors . . .”; and
- “worse when school is out.”

2. Please estimate the percentage of occurrence for the following reasons to replace a sign:

**Table B-2. TxDOT Responses to Question 2—Reasons to Replace a Sign**

Response	Percent
Damage ( <i>holes, bend</i> )	24.5%
Knock Down ( <i>accident</i> )	23.6%
Removal ( <i>theft</i> )	18.4%
Defacement ( <i>graffiti</i> )	13.5%
Change in Standards	9.1%
Other	11.3%

3. Is there a particular traffic sign or other device that is more frequently vandalized than any other?




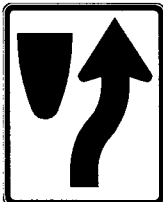




**Table B-3. TxDOT Responses to Question 3—Particular Sign Vandalized**

Response	Number of Responses	Percent
Yes	179	78.2%
No	33	14.8%
Not Sure	17	7.4%


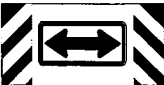






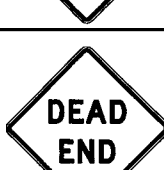
**Table B-4. TxDOT Responses to Question 3—Frequently Vandalized Signs**

Sign Type	Number of Responses	Percent Based on Number Answering Yes to Question 3 (179)	Percent Based on Total of All Signs Mentioned (361 sign types)
STOP Signs	116	60.7%	32.1%
City Name (Incl. City Limit, Destination Signs)	37	20.7%	10.2%
Route Number Signs	27	15.1%	7.5%
Deer Crossing Signs	21	11.7%	5.8%
Cattle Crossing Signs	18	10.1%	5.0%
YIELD Signs	17	9.5%	4.7%
Creek, River Names	15	8.4%	4.2%
Curve Signs	11	6.1%	3.0%
Speed Limit Signs	10	5.6%	2.8%
County Road Signs	8	4.5%	2.2%
Unspecified Animal Crossing Signs	8	4.5%	2.2%
Unspecified Warning Signs	8	4.5%	2.2%
D.W.I. Signs	5	2.8%	1.4%
DO NOT ENTER Signs	4	2.2%	1.1%
Hog Crossing Signs	4	2.2%	1.1%
Other Regulatory Signs	3	1.7%	0.8%

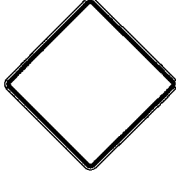
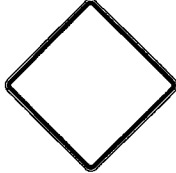
**Table B-5. Regulatory Signs Mentioned in Answers to Question 3**

Sign	Label	Illustration	No. of Responses	Response Percent
STOP	R1-1		116	64.8
YIELD	R1-2		17	9.5
Speed Limit	R2-1		10	5.6
Keep Right	R4-7, 7a, 7b		2	1.1
DO NOT ENTER	R5-1		4	2.2
WRONG WAY	R5-1a		1	0.6
Fasten Safety Belts	R19-8		1	0.6
Other (Unspecified)			3	1.7
Don't Mess With Texas	R19-6a		1	0.6
<b>TOTAL</b>			<b>155</b>	<b>86.6</b>







**Table B-6. Warning Signs Mentioned in Answers to Question 3**

Sign	Label	Illustration	No. of Responses	Response Percent
Curve	W1-2		11	6.1
Dead-End Arrow Board	W1-10		1	0.6
Stop Ahead	W3-1		1	0.6
Deer Crossing	W11-3		21	11.7
Cattle Crossing	W11-4		18	10.1
Tractor Crossing	W11-5		2	1.1
Truck Crossing	W11-10		1	0.6
Hog Crossing	Note: This is not a standard TxDOT sign, but is used in at least one district		4	2.2
DEAD END	W14-1		2	1.1









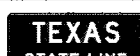
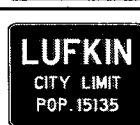



**Table B-6. Warning Signs Mentioned in Answers to Question 3 (Cont.)**

Unspecified Animal Symbols	W11-		8	4.5
Other Unspecified Warning			8	4.5
TOTAL			77	43.0

**Table B-7. Route Markers Mentioned in Answers to Question 3**

Sign	Label	Illustration	No. of Responses	Response Percent
Interstate	M1-1		2	1.1
U.S.	M1-4		9	5.0
County	M1-5		4	2.2
State	M1-6T		0	0.0
F.M.	M1-6F		3	1.7
Other (Unspecified)	M1		8	4.5
Direction Plate	M3		1	0.6
TOTAL			27	15.1

**Table B-8. Conventional Guide Signs Mentioned in Answers to Question 3**

Sign	Label	Illustration	No. of Responses	Response Percent
County Roads (Named)	D-3		8	4.5
Destination	D-1		8	4.5
Distance	D-2		2	1.1
Street Names	D-3		2	1.1
Picnic Area	D-5		3	1.7
State Park	D-7		2	1.1
Mile Post	D-10		1	0.6
County Line	I-2		3	1.7
State Line	I-2		1	0.6
City Limit	I-2a		20	11.2
City, Town, Community Name	I-2c		7	3.9
Creek/River	I-3		15	8.4
Airport/Airplane	I-5		3	1.7
School, College Name, Other (Unspecified)			5	2.8
<b>TOTAL</b>			<b>80</b>	<b>44.7</b>

**Table B-9. Other Types of Signs Mentioned in Answers to Question 3**

Sign	Label	No. of Responses	Response Percent
School	S1-1	1	0.6
D.W.I.		5	2.8
Adopt-A-Highway		1	0.6
Overhead/ Expressway		3	1.7
Traffic Signals/ Lights		3	1.7
Mailboxes		3	1.7
Delineators	D-SY, SW, SK, DY, DW	3	1.7
Aluminum		2	1.1
Object Markers		1	0.6
TOTAL		22	12.3

Additional comments:

- “In farming areas, some tractor operators think it is a game to knock down signs. They think it is fun to brush signs with their plowing implements . . . ”; and
- “. . . many aluminum signs, especially when the price of scrap aluminum is on the rise .”

Route numbers mentioned as commonly stolen or vandalized:

- 69            9    (US 69-7, FM 69-1, other-1);
- 66            2    (US 66-1, FM 66-1);
- 666           1    (FM 666);
- 1              1    (RR 1);
- 27            1    (IH 27);
- 35            1    (IH 35);
- 101           1    (Unspecified); and
- unspecified 7.



4. Are there locations within communities that are particularly vulnerable to vandalism?

**Table B-10. TxDOT Responses to Question 4—Particular Locations Vandalized**

Responses	Number of Responses	Percent
Yes	163	71.2%
No	51	22.2%
Not Sure	15	6.6%

**Location:** (The percentage shown is of the responses to a particular sign to the total number of “Yes” responses above.)

**Table B-11. TxDOT Responses to Question 4—Locations Vulnerable to Vandalism**

Location	Number of Responses	Percent
Remote	79	48.5%
Farm-to-Market Highways	22	13.5%
Adjacent to City Limits	11	6.7%
School Areas	11	6.7%
Park and Recreational Areas	9	5.5%
Overhead Structures	4	2.5%

5. Briefly describe any countermeasures your district has implemented to reduce sign vandalism.

**Table B-12. TxDOT Responses to Question 5—Countermeasures Implemented**

Response	Number of Responses	Percent
No Mention of Specific Countermeasures	99	43.1%
Anti-Theft Bolts	73	31.9%
Police	25	10.9%
Move Sign (higher or further from road)	15	6.6%
Newspaper	7	3.1%
Grease on Sign Pole	4	1.7%
Use Words/Warnings on Signs	2	0.9%
Television Advertisements	1	0.4%

Samples of additional comments:

- “We have tried vandalism proof bolts, but did not work... if they cannot get bolts off, they pull the post & sign down . . . ”;
- “Vandal nuts . . . thieves chisel around nuts to remove . . . ”; and
- “. . . replacing vandalized signs as soon as possible . . . should capture their attention.”

6. What is the estimated number of sign units that have been replaced due to vandalism each year?

- Of those responding, the average number of signs replaced annually was 170.

7. What is the estimated percentage of the district’s maintenance budget spent on sign repair and replacement due to vandalism?

- Of those giving an answer, the average was 12% of the maintenance budget.

8. Do you have records that indicate the extent of sign vandalism (i.e., high frequency locations, costs)?

**Table B-13. TxDOT Responses to Question 8—Retain Records of Sign Vandalism**

Response	Number of Responses	Percent
Yes	115	50.2%
No	96	41.9%
Not Sure	29	12.7%

Samples of additional comments received:

- “. . . signs are stolen because they are made of aluminum scrap . . . price range from 40 cents to 60 cents pound”; and
- “Help!!!”