# AN EVALUATION OF THE TEXAS 1-800 PROGRAM

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## EXECUTIVE SUMMARY

The Texas 1-800 Program is a railroad notification program in which individuals can report (through a toll-free number) malfunctions of train-activated rail-highway crossing signals to the Texas Department of Public Safety (DPS), who in turn reports the malfunctions to the appropriate railroad company. In 1983, the Texas Legislature enacted and the Governor signed the Railroad Crossing Safety Information Act, which provided the legal framework for the Texas 1-800 Program. In essence, the program is a statewide alert or early warning system for crossing problems in which every motorist, law enforcement officer, and highway maintenance worker is a participant or potential participant.

The objectives of this project are to evaluate the 1-800 Program in order to determine its effectiveness; transferability to other States; costs and benefits; acceptance by railroad management; contribution to rail-highway crossing safety; and use or potential use by railroads as a tool in signal maintenance. As its database, the project uses 9,119 reports from the 47-month period including Sept. 1, 1983 through Aug. 31, 1986, and June 1, 1987-April 30, 1988. The database was later merged with the DOT/AAR Rail-Highway Crossings National Inventory. Of the 13,747 crossings in Texas, 2,002 are on the State-maintained highway system and are included in the 1-800 Program.

In spite of the fact that the program has never been advertised or promoted, as an early warning and problem alert system (which it is designed to be) it is certainly a success. The evidence confirms that the toll-free number is accepted and used by the public. When the railroads are notified about reported crossing problems, they respond. In as much as early notification leads to timely crossing problem correction, the program improves grade crossing safety. It is relatively low cost, and does not place an undue burden on the participants. The program generates a wealth of data which can be used in crossing safety activities.

Unfortunately, the program as it currently operates has not approached its potential as a viable and significant addition to a rail-highway grade crossing safety program. Some of the possible reasons for this include: lack of publicity; limited scope; lack of adequate resources for DPS to organize and format the information; lack of knowledge regarding the data generated; no dissemination of summary information to railroads; and ineffective flow of information at the railroad, resulting in the individual responsible for crossing programs being unaware of the reported problems.

The fact that the program has not been better utilized outside its primary design as an early warning system is not the fault of any single individual or group. Information developed in the program was not furnished in an organized format to those who could best utilize the data -- the railroads. The information is provided piecemeal, and then is compartmentalized to such an extent that it is probably never recognized or considered as an input into grade crossing improvement and safety programs. This is not surprising, considering that even the railroad generating the largest number of reports during the 47-month period covered in this evaluation averaged less than three reports per day. An examination of a large volume of historical information can be

much more revealing than what can be gleaned from one or two reports received over a 24-hour period.

The DPS personnel have done an admirable job in running the program. The reports are handled in an expeditious fashion. Every effort is made to insure that the correct crossing is identified, though it is sometimes difficult because the personnel do not have access to a crossing ID number database and have to look crossing numbers up manually when a caller does not have the number.

Currently the 1-800 Program is used only as specified in the Railroad Safety Information Act. There are a variety of areas, however, in which a properly-designed and monitored 1-800 program could prove useful. Federal/State agencies could use the program: as a supporting database for overall rail-highway crossing improvements; as a supporting and information tool for diagnostic teams and specific crossing improvement decisions; as a supporting database in corridor improvement and evaluation programs; as a method to flag or identify specific crossings which may have design flaws; as an information source for non-signal related crossing problems; or as a low-cost addition to a comprehensive grade crossing safety program.

Railroads could use the program: as it is currently used as an early warning and problem notification system; as input into existing signal and grade crossing maintenance procedures; as a supporting program to aid in the identification of "problem crossings"; as a way to assist in the identification of signal system flaws that may develop due to changes in the crossing environments; as a method to identify train operations near the crossing which may result in motorist confusion and misinformation; or as a program to identify non-signal related grade crossing problems such as rough crossing surfaces, sight distance restrictions, vandalism, etc.

Although the Texas 1-800 Program as it is currently operating is not being used to its potential, the existing limitation can be readily corrected without violating its basic structure. Certainly such a program can be adopted by other States with relatively little costs ($125-252 per location for start-up, and $9-10 per location for annual operation). However, some changes would be in order. For example, it is recommended that all signalized crossings be included. Also, the reporting mechanism should be computer based and include selected AAR/DOT National Inventory data files, log files, and railroad contact dial-up capabilities. Summary reports of the 1-800 calls should be prepared and provided to the railroads on a periodic basis. Summary information should also be provided to the State agency with responsibility for the rail-highway grade crossing safety program (Section 130). It would also help if there was more public awareness of the program, and if procedures to increase local law enforcement and roadway maintenance personnel reporting needs were developed.

## Abstract

The objective of this report is to document the activities, findings, and recommendations of a research study which focused on the Texas Railroad Crossings Safety Information Act (Act) and the railroad notification program (1-800 Program) mandated by this Act. The report presents information on:

- The Act and the workings of the notification program
- Data collected
- Uses of the data
- Current status of the program
- Costs and benefits of the program
- The Act/program's effectiveness, transferability, and the contribution to rail-highway crossing safety

Several recommendations are presented that are formulated to improve the operation of the program and make it more effective in crossing safety and maintenance activities.

The reports contain information and suggested guidelines and recommendations for states considering adopting and implementing a program similar to the Texas 1-800 Program.

## Implementation Statement

The findings of this investigation indicate that programs similar to the Texas 1-800 Program can be adopted by other states as an additional element in crossing safety efforts. This study presents several recommendations that are intended to strengthen the existing program and increase its effectiveness in crossing safety and maintenance activities. The reports presents several uses of the data generated by the Texas 1-800 Program that are in addition to the primary objectives of the enabling legislation--as an early warning and problem identification program.

Finally for those states considering implementing a similar program it is strongly recommended that the legislation safeguards contained in the "Texas Railroad Crossing Safety Information Act," be maintained.

## Disclaimer

**Acknowledgement**

The authors express their appreciation to the Federal Railroad Administration, United States Department of Transportation, sponsor of this study. Ms. Patricia Paolella, Office of Safety served as Contracting Officers Technical Representative and provided invaluable assistance and support. In addition, Mr. Bruce George and Mr. Bruce Fine provided assistance and necessary information and data. They also offered meaningful suggestions and recommendations in the conduct of the project.

The railroads operating in Texas were most generous in providing information and meeting with members of the project staff to discuss the data generated by the Texas 1-800 Program. They explained the operation of the program from the railroad perspective and the response to and disposition of the reports when received by the railroads.

Members of the Texas State Department of Highways and Public Transportation were most helpful in providing information on the development of the program. They also furnished information contained in the fiscal note accompanying the original legislation. Members of the Department provided insight into activities and costs associated with an ongoing notification program.

Members of the Communication Center, Texas Department of Public Safety were extremely helpful and cooperative and provided the primary data used in the research. They explained the operation of the program and answered numerous questions regarding the data. Without their assistance it would not have been possible to conduct this evaluation.

Finally, Ms. Barbara Lorenz and Ms. Tena Measles deserve special thanks for their time, patience, and assistance in preparing the report.

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## 1.0 INTRODUCTION

### 1.1 REPORT OBJECTIVE

The objective of this report is to document the activities, findings, and recommendations of a research study which focused on the Texas Railroad Crossings Safety Information Act (Act) and the railroad notification program (1-800 Program) mandated by this Act. The report presents information on:

- The Act and the workings of the notification program
- Data collected
- Uses of the data
- Current status of the program
- Costs and benefits of the program
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### 1.2 BACKGROUND

In 1983, the Texas Legislature enacted and the Governor signed the Railroad Crossing Safety Information Act, the unique legislation which provides the legal framework by which the 1-800 Program functions. The railroads operating in Texas supported the legislative effort. A copy of the Act is found in the Appendix.

The notification program is simply a mechanism whereby an individual can notify the Texas Department of Public Safety (DPS) of a malfunction of a train-activated rail-highway crossing signal. In turn, the DPS reports the malfunction to the appropriate railroad company. In essence, the program is a statewide alert or early warning system for crossing problems in which every motorist, law enforcement officer, and highway maintenance worker is a participant or potential participant.

The Act directed the DPS to establish toll-free telephone service for receiving calls reporting malfunctions. The State Department of Highways and Public Transportation (SDHPT) was required to attach a sign displaying the toll-free telephone number and the U.S. DOT-AAR National Rail-Highway Crossing Inventory number to each train-activated signal on the State-maintained highway and road system. Also, railroads operating in Texas were directed to permit SDHPT employees to affix the

information sign on their private property.

The Act also contained several significant safeguards relating to reported crossing signal malfunctions and data developed in administering the program. These safeguards included:

- A court may not hold the State, an agency or subdivision of the State, or a railroad company liable for damages caused by an action taken under this Act or failure to perform a duty imposed by this Act.

- No evidence may be introduced in a trial or judicial proceeding that such service exists or is relied upon by the State or railroad company.

- A State agency is not required to make or retain permanent records or information obtained in implementation of this Act.

**It should be noted that railroad companies are not required to take any action upon receiving notification of a crossing problem from the DPS.** Also, there are no follow-up or report back requirements imposed on either the DPS or railroads to determine the disposition or correction of a report.

These aspects of the Act have been significant factors in the acceptance of the 1-800 Program by all participants. State agencies are not required to monitor the performance of the railroads. Railroads are not burdened by additional record keeping. There is no liability incurred due to the Act. Data relating to reported crossing problems or malfunctions are not admissable in court. And, there are no punitive measures contained in the Act.

As stated previously, the 1-800 Program is basically an early warning system designed to inform railroad companies about rail-highway crossing signal problems in a timely manner. Since its beginning, there have been two minor, yet significant, non-legislative expansions in the interpretation and administration of the program. While the Act directed that the SDHPT place the 1-800 information sign only at signalized crossings on the State-maintained highway system (not city streets or county roads), the DPS accepts and relays to the railroads reports concerning crossings off the State system. However, signs are not installed at off-system locations. (The current (71st) Session of the Texas Legislature passed House Bill 2408 which extends the 1-800 Program to crossings at county roads. The Act will be in effect when signed by the Governor. A copy of H.B. 2408 is included in the Appendix.) The DPS also accepts reports and

notifies the railroads about crossing problems which are not signal malfunctions. These include reports concerning crossing surfaces, accidents, train operations, obstructions of view, and similar items.

Because the DPS does accept reports other than those of "malfunctions of signal, cross bars, and other mechanical devices," and because the term "malfunctions" tends to define and describe a specific condition, the term "crossing problems" will generally be used in the remainder of the report.

Since the inception of the 1-800 Program, the DPS has provided the Texas Transportation Institute (TTI) with report information to be used for program evaluation and research purposes. The report logs are retained by DPS for a three-month period, then they are sent to TTI.

## 1.3 PROJECT OBJECTIVES

The objectives of this project are to evaluate the 1-800 Program in order to determine its:

- Effectiveness
- Transferability to other States
- Costs and benefits
- Acceptance by railroad management
- Contribution to rail-highway crossing safety
- Use or potential use by railroads as a tool in signal maintenance

The project was not intended nor designed to critique the railroad companies' performance in crossing signal maintenance, or to enumerate the crossing problems at specific locations. Neither railroads nor individual rail-highway crossings are identified in this report.

The specific tasks, as set forth in the statement of work, include the evaluation of:

- Implementation Procedures
- Program costs
- Analysis of 1-800 Program
- Railroad considerations and attitudes
- Local Police Awareness

## 1.4 REPORT ORGANIZATION

The report is organized into eight sections. Section 2.0 discusses the operation of the program, the DPS data log, the SDHPT role, and the number of call-in reports generated by the program. Section 3.0 focuses on various aspects of the project procedures. Section 4.0 presents an analysis of the report data and how the data can be used as an additional resource in total rail-highway crossing programs. Section 5.0 offers views of the 1-800 Program by the various participants.

Section 6.0 provides information on rail-highway crossing accidents. Section 7.0 addresses cost considerations in establishing and maintaining a 1-800 Program. Section 8.0 offers recommendations, including recommendations addressing the transferability of a 1-800 system to other jurisdictions.

# 2.0 OPERATION OF THE 1-800 PROGRAM

## 2.1 INTRODUCTION

The major participants in the 1-800 Program are SDHPT, DPS, and all railroads operating in Texas. Each of these (as mentioned in the previous section) has specific duties and responsibilities put forth in the enabling legislation. There is one other participant group which is critical to this program: the group composed of the motorists, law enforcement officers, highway maintenance personnel, and others that observe and report rail-highway crossing problems. Without their concern for crossing safety during real-time operations, the 1-800 Program would only be a legislative exercise. Those individuals who take the time and make the effort to record the telephone number and crossing ID and then call in the report are the driving force of the program. Figure 2.1 depicts the typical information flow of the 1-800 Program.

## 2.2 SOURCE AND NUMBER OF REPORTS

Definitive information regarding the source (initiators) of the reports is not available. Conversations with DPS Communication Center personnel indicate that the vast majority of the reports are made by citizens/motorists. A review of the log entries shows that local law enforcement agencies also call in reports. However, not all callers who are representatives of a police agency identify themselves as such. According to both DPS and SDHPT districts, an undetermined number of reports are made by highway department maintenance personnel.

The 1-800 Program was established with virtually no advance publicity, and to date has never been actively promoted. Neither local law enforcement agencies nor SDHPT maintenance employees were ever briefed on the program (even though SDHPT installed the information signs at the crossings). While the 1-800 Program has not been well publicized, it has nevertheless generated a significant volume of reports, as shown in Table 2.1. From September 1, 1983 through March 31, 1989 (67 months), a total of 17,515 reports have been logged by the DPS. Of these, 11,216 are part of the database for this project. Approximately 1,900 reports for the period September 1, 1986 through May 31, 1987 were destroyed by DPS. Almost 2,800 reports are in TTI files but not included in this project's database. The first batch of these reports was received several months after the initiation of the project; reports are currently received on a monthly basis with a three-month lag. As of March 1989, the November 1988 reports had been received. An estimated 1,600 reports from December 1988 through March 1989 are in the possession of DPS, and will be forwarded to TTI on a routine basis.

# FIGURE 2.1 FLOW OF 1-800 REPORTING PROCESS

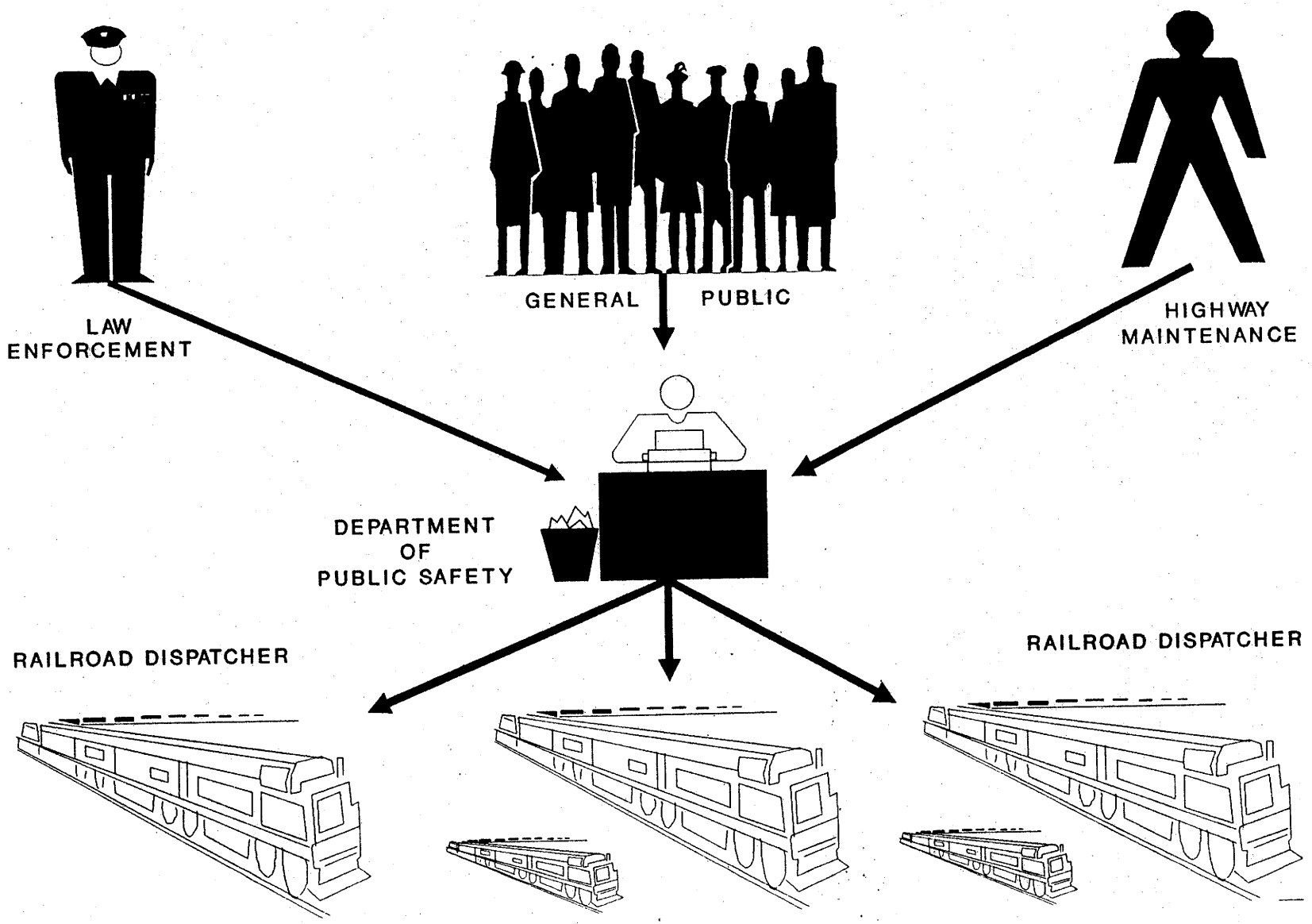

TABLE 2.1
Number of Reports to the Texas 1-800 Program
Since September 1983

| Time Period (months) | Number of Reports | Comments |
|---|---|---|
| September 1, 1983 - August 31, 1986 (36) | 7466 | In TTI database and evaluation project. |
| September 1, 1986 - May 31, 1987 (9) | 1900* | Report logs destroyed by DPS. |
| June 1, 1987 - April 30, 1988 (11) | 3750 | TTI database and evaluation project. |
| May 1, 1988 - November 31, 1988 (7) | 2799 | In separate database not included in evaluation project. |
| December 1, 1988 - March 31, 1989 (4) | 1600* | Report logs not yet sent by DPS. |
| Total | 17,515 | |

*Estimated number of reports

Considering that the 1-800 Program has received no active publicity and that the only information regarding the program is contained on the signs installed by SDHPT, public participation and acceptance appear high. As seen in Table 2.2, the average number of reports per month logged by the DPS has tended to increase since the inception of the program. Initially, the DPS received less that 150 reports per month. For the first 11 months of 1988, reports have averaged approximately 360 per month. For the seven-month period of May-November 1988, reports have averaged 400 per month.* It is apparent that there has been a significant increase in the volume of reports since the beginning of the program.

*As seen in Table 2.1, data for this period are not included in the database, but are in the project files.

There are probably several reasons that the number of reports called in has increased. Those which related to the operation of the 1-800 Program are the major focus of this report. DPS has stated that in the beginning of the program, the DPS primarily logged and relayed to the railroads only those reports which were signal related. As the program progressed, non-signal problem reports were accepted. A review of the reports shows them now covering a wide range of crossing problems. It also appears that the public is becoming increasingly aware of the 1-800 Program and is willing to take the time to initiate reports.

TABLE 2.2
Number of Reports Per Year to the Texas 1-800 Program

| Year | Number of Reports | Number of Months | Average Per Month |
|---|---|---|---|
| 1983 | 589 | 4 | 147.3 |
| 1984 | 1,992 | 12 | 166.1 |
| 1985 | 2,491 | 12 | 207.6 |
| 1986 | 2,383 | 8 | 297.9 |
| 1987 | 2,571 | 7 | 367.3 |
| 1988 | 1,178 | 4 | 294.5 |
| No Date | 12 | - - | - - |
| Total in Project | 11,216 | 47 | 238.6 |
| May 1988 - November 1988 | 2,799 | 7 | 399.9 |
| Total | 14,015 | 54 | 259.5 |
| Total 1988 | 3,977 | 11 | 361.5 |

## 2.3 ROLE OF THE DEPARTMENT OF PUBLIC SAFETY

In establishing the program, the major duty of DPS was primarily securing an inbound WATS line. This is a separate line and is answered by personnel of the DPS Communication Center, which is staffed 24-hours per day. When answering the phone, DPS personnel use the phrase "Railroad Crossing Repair Service," not "Department of Public Safety." This is done to reduce the misuse of the service by those wanting information regarding non-railroad crossing items, such as driver's license checks.

DPS obtained railroad contact telephone numbers which in most cases connect with railroad dispatchers. Usually, a railroad furnished DPS with more than one number. Some railroads requested that specific numbers be used to report crossing problems in certain areas, defined primarily as operating districts or divisions. Some railroads furnished up to four telephone numbers; which of the numbers to be used depends on the location of the crossing. While multiple numbers are probably best for the railroads, DPS would prefer one contact number since additional time is required to determine the crossing locations and match it with the correct number. When contacting the railroads, Communication Center dispatchers identify themselves as members of DPS.

Computer listings of all signalized crossings in Texas were given to DPS by SDHPT.* One listing is by DOT/AAR Inventory number, and one is by county and roadway location. The second listing is used when the identifying Inventory Number is not provided by the caller. The DPS does not have the inventory on computer and must manually search the listings. This process requires additional time and increases the possibility of error in transmission of the report.

As the program currently operates, DPS is basically a clearinghouse. DPS receives the reports and informs the railroads. DPS does not attempt to determine the seriousness of the problem or question the caller as to the nature of the problem. Furthermore, DPS does not make any follow-up inquiries concerning the reports. Feedback has been virtually non-existent.

Table 2.3 presents the information entered in the DPS log. An example log is contained in the Appendix, with railroad name and inventory number deleted. It can

*Although only on-system crossings are posted with the information sign, the listing contains all crossings since DPS receives and relays reports concerning off-system crossings.

be seen that not all log items are contained in the TTI database. Initially, DPS provided the information (used in the evaluation) on diskettes which contained the five items indicated. Beginning in June 1987, the DPS started providing TTI with the original logs. At that time it was decided to maintain the existing data entry format. In deciding to maintain the format structure used by DPS, it was recognized that data necessary to evaluate the time required for transmission of reports from DPS to the railroads would not be available in the computerized form. The information presented in a subsequent section of this report regarding DPS to railroad transmission time was, therefore, developed from a sample of log entries.

TABLE 2.3
Log Information of the 1-800 Program

| Entry | Comment | In TTI Database |
|---|---|---|
| Date | Report Received | Yes |
| Time | Report Received (24-hour clock) | No |
| DOT/AAR Inventory | Number | Yes |
| City and/or County | Usually Both Logged | Yes (County only) |
| Location | Street/Road/Highway | No |
| Malfunction | Problem reported. Usually very short and cryptic comment such as "LTS" (Lights) | Yes |
| Railroad | Name | Yes |
| Date | Report Relayed | No |
| Time | Report Relayed | No |
| DPS | Operators Initials | No |

As the program is structured, the DPS is the major State agency participant. The extent of its involvement is, however, limited by the enabling legislation. Also, other than traffic law enforcement, the DPS has no role in rail-highway crossing safety or improvement programs. As stated previously, DPS does not maintain records of the reports and has made no evaluation of the 1-800 Program.

## 2.4 ROLE OF THE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

The Railroad Crossing Safety Information Act directed the SDHPT to install the information signs. Prior to this, however, it was necessary to:

(1) design the signs and develop the required wording;
(2) determine how to affix the signs to the signal mast;
(3) coordinate with railroad officials;
(4) coordinate with SDHPT district offices, and;
(5) attend to a myriad of other details.

All of this was done within a period of approximately three months. The information sign is metal, measures 1 ft. by 2 ft., and is painted white with black lettering. The wording on the sign is:

TO REPORT MALFUNCTION OF
THIS RAILROAD SIGNAL
CALL TOLL FREE 1-800-772-7677
GIVE THIS LOCATION #_ _ _ _ _ _ _ _

According to SDHPT officials involved in development and installation of the information signs, there were approximately 1,700 signalized rail-highway crossings on the State highway system in 1983. Two signs were installed at each location by SDHPT maintenance personnel.

Table 2.4 presents information on the total number of rail-highway crossings in Texas as of April 1988. Of the 13,747 crossings in Texas, only 4,360 are equipped with train-activated signals. Of these, 2,002 are on the State-maintained highway system and are included in the 1-800 Program.

The functions of SDHPT are to replace damaged or missing signs, install signs at those non-signalized on-system crossings being upgraded, and provide a listing of

signalized crossings to DPS. Employees of the SDHPT do not monitor or track the activities of the program, although at one time (prior to September 1986) DPS provided the SDHPT with a computer listing of the reports.

TABLE 2.4
Number of Rail-Highway Crossings in Texas
April 1988

| Signal Type/Location | Number |
|---|---|
| Train Activated Signals | 4,360 |
| On-State Highway System | 2,002 |
| Off-State Highway System | 2,358 |
| Passive signing | 9,387 |
| Total | 13,747 |

## 2.5 ROLE OF THE RAILROADS

The final participants in the 1-800 Program and the major beneficiaries of the reporting process are the railroads. Their role, as specified in the legislation, was to allow SDHPT to affix the sign on railroad property and provide contact telephone number(s) to DPS. The Act does not require the railroads to take any action upon receiving a report.

A discussion of the railroad companies' views of the program, their response upon receiving a report from DPS, and their use of information developed by the program are presented in a subsequent section.

# 3.0 STUDY PROCEDURES

## 3.1 INTRODUCTION

A discussion and overview of various aspects of the study procedure used in the evaluation are presented in this section. Information regarding the different databases which were used and the way they were used is also presented. This section documents many of the activities of the project staff during the research phase.

Included in this section are the following topics:

- Databases
- Railroad Contacts
- SDHPT Contacts
- Local Law Enforcement Contacts

## 3.2 DATABASES

The following databases were used in developing the information presented in Section 4.0.

- DPS Reports: These are the call-in reports to the DPS generated by the 1-800 Program. They provide the basis for most of the information presented in Section 4.0.
- DOT/AAR National Inventory (Texas): This file consists of information on activated rail-highway crossing signal locations in Texas.
- Geographic Location Codes (FIP Codes): This file consists of city-county codes and names.
- Texas Rail-Highway Crossing Accident Files: This file consists of information on accidents at all rail-highway crossings in Texas for the period January 1980 - September 1988.

### 3.2.1 DPS Reports

The primary database used in the project was derived from the DPS reports as provided to TTI. The number of reports (11,216) included and the elements of this database have been previously discussed. The major element in this database is the "malfunction" (problem) description. This was in text format and not easily subject to interpretation and evaluation in its original form. There was a problem in determining exactly what the report originator (caller) actually reported as the crossing problem vis-a-vis what the DPS entered in the log. The project staff had to determine what the

caller was attempting to report, and had to assign a category code that could form the basis for analysis and evaluation.

Working jointly with Federal Railroad Administration (FRA) personnel, the staff developed a three-digit coding system to categorize the reported problems. Each record was reviewed and the code matching the problem description was added to the record. In an effort to reduce subjectivity and misinterpretation, this task was done by one individual under the direct supervision of the Principal Investigator.

The major categories to which the problem definitions were assigned are:

- 100 Series - Warning Equipment, Automatic
- 200 Series - Signs and Markings
- 300 Series - Crossing blocked/highway problem at or near crossing
- 400 Series - Track and Structures
- 500 Series - Trespassers
- 600 Series - Sight Distance
- 700 Series - Train Operations
- 800 Series - Miscellaneous

Instead of dealing with more than 1,800 unique crossing problems described in text format, it was possible to condense these into specific categories. There are eight major categories, 44 sub-categories, and 28 sub-sub-categories. A complete list of the codes and their descriptions is found in the Appendix. Examples of original text definition as found in the DPS log are also in the Appendix.

The "problem code" field was the only addition made to the original DPS database. No attempt was made to edit the 7,466 records provided by DPS on diskettes. However, the information contained in the original logs and provided to TTI (3,750 records) was subject to an edit procedure. Misspelling of city and county names was a common, but minor problem. The most significant data problem encountered was errors in the DOT/AAR Inventory Number. Either the number or the check character was incorrect. In most instances, this problem could not be corrected since it was not possible to independently establish which entry was in error. (This situation could be readily corrected if the inventory was available to DPS on computer rather than the listing currently used. The crossing ID could be entered while the caller was still on the phone and the number immediately verified.)

In addition, this primary file was also adjusted to remove those records which did not have an inventory number (blank field) and those which were duplicates. Duplicate records are defined as those with these characteristics:

- Same ID Number
- Same Date
- Same Problem

Table 3.1 shows the number of records in each of these categories. Of the 11,216 records in the original database provided by DPS, 1,347 (12 percent) were removed due to missing ID numbers (321) or because they were duplicates (1,026).

TABLE 3.1
Adjustments to the 1-800 Database

| Adjustment | Number of Records | Percent of Original Database |
|---|---|---|
| Records in Original Database | 11,216 | 100.0 |
| Records Without Inventory Number | <321> | <2.9> |
| Duplicate Records | <1,026> | <9.1> |
| Total Adjusted Data Base | 9,869 | 88.0 |

### 3.2.2 DOT/AAR National Inventory (Texas)

The second database used in this study contained information on all train-activated signalized rail-highway crossings in Texas. This was a subset of the National Inventory, but did not contain all fields of the primary record. A listing of the fields contained in this database is presented in the Appendix.

By using the data field common to both databases -- crossing ID -- it was possible to join the adjusted 1-800 database records to the inventory records. This provided a record containing information regarding the report, as well as selected characteristics of the crossing environment which would not otherwise be available. The combined database contains 9,119 records (Table 3.2). Seven hundred and fifty records either (1) contained invalid ID's; or (2) the ID number, although valid, was not in the inventory file.

TABLE 3.2
Number of Records in Database Created Joining
Adjusted 1-800 Records with Crossing Inventory Records

| Database | Number of Records | Percent of Original Data Base |
|---|---|---|
| Adjusted 1-800 | 9,869 | 88.0 |
| 1-800 Records Not Joined With Inventory | <750> | <6.8> |
| Total Database | 9,119 | 81.3 |

The database containing 9,119 records was selected by the contractor and FRA for use in the program data analysis phase (Section 4.0). This file was chosen since it: 1) reduces the potential to overstate various problems and occurrences due to multiple-single data reports; 2) removes those reports which cannot be associated with an inventory ID; and 3) provides descriptive information regarding crossing characteristics through the inventory data elements.

### 3.2.3 Geographic Location Codes (FIPS Code)

This database of 10,109 records was created by joining the original 1-800 database (11,216 records) with the inventory file. This file contained a numeric city code available from the inventory. Location information regarding the origin of the 1-800 reports was limited to a county name in the original 1-800 database, and was frequently misspelled or misidentified. The resulting database (10,109) was next joined with the FIPS Code file composed of city code, city name, and county code. This procedure produced a database file of 10,050 records (codes missing or miscoded for 59 records). This file was used to evaluate the location characteristics (city, county, Metropolitan Statistic Area, rural) of the 1-800 reports. **Duplicate records were not removed from this file.**

### 3.2.4 Texas Rail-Highway Crossing Accident File

A database containing limited information (only nine fields) regarding rail-highway crossing accidents for the period 1980-September 1988 is used in Section 4.0. This accident database was joined with the inventory file in order to determine if the crossing was equipped with a train-activated signal. However, the accident file and the 1-800 reports were not joined. No attempt was made to associate individual accidents with the 1-800 reports. The purpose of the accident file, as used in the following section, is to examine total accident trends before and after the inception of the 1-800 Program.

## 3.3 RAILROAD CONTACTS

Members of the project staff met individually with representatives of the following railroads:

- Atchison, Topeka & Santa Fe Railway
- Missouri-Kansas-Texas Railroad
- Union Pacific Railroad
- Texas Mexican Railway
- Southern Pacific Transportation
- Burlington Northern Railroad
- Georgetown Railroad
- Houston Belt & Terminal Railway
- Kiamichi Railroad
- Port Terminal Railroad Association
- Angelina & Neches River Railroad

Prior to each meeting, a report was prepared which documented the call-in reports received by DPS on the individual railroad. This document was used to explain the program and review each railroad's experience. The report was left with each railroad so the railroad could identify any situation which might require its attention.

The purpose of these meetings was to brief the railroads on the project, solicit their views and cooperation, determine how 1-800 reports were handled upon being relayed to railroad personnel, and document the extent of use (if any) or potential use of the information received. A complete discussion regarding the results of the meetings with railroads officials is presented in Section 5.0.

## 3.4 STATE AGENCIES

Personal and telephone interviews were conducted on several occasions with representatives of the two State agencies (SDHPT and DPS). During these meetings, information was developed regarding procedures in establishing the program, program operations, problems and shortcomings, program cost elements, agency views of the program, and suggested areas for improvements. These meetings were extremely useful in documenting the operations of the program. Section 5.0 provides a full discussion of the information developed in these interviews. The cost information provided by the agencies is presented in Section 7.0.

## 3.5 LOCAL LAW ENFORCEMENT AGENCIES

The project surveyed local law enforcement agencies (police and sheriff departments) about their use and views of the 1-800 Program. Agency selection was based upon the volume of reports generated by cities and counties. Forty-five police departments throughout the State were contacted. The results of this aspect of the project are presented in Section 5.0.

# 4.0 ANALYSIS OF 1-800 PROGRAM DATA

## 4.1 INTRODUCTION

In this section, the data developed in the Texas 1-800 Program are presented and examined. The database is composed of the information initially reported to DPS and later merged with the DOT/AAR Inventory. This database consists of 9,119 records. The data presented are not railroad specific, although the number of rail-highway crossings for selected railroads is shown.

The primary purposes of this section are: to illustrate the types of information generated by the 1-800 Program; to present examples of how the information can enhance and support the current rail-highway crossing safety program; and to suggest uses of the information by railroads and others in signal maintenance programs, in corridor evaluations, and in diagnostic team evaluations.

Characteristics of the data presented in this section include: surrogate railroad identification; number and time distribution of reports; consecutive day reports and number of times (repeat days) a crossing was reported; crossing problem classification; location characteristics of the reports; and train movements and vehicular traffic counts at reported crossing locations. As mentioned in Section 2.0, duplicate reports were removed from the database used in this section, **with the exception of information relating to location.**

## 4.2 OVERVIEW OF REPORT FREQUENCY

Table 4.1 shows information on the numbers of reports in the merged database. Previously, Table 2.2 presented information on the total number of reports available to the project. Since the initiation of the 1-800 Program, the average number of duplicate reports per month has tended to increase; currently approximately one of every five reports is a duplicate. At the start of the program, the number of duplicates was about one in 10. The volume of duplicate reports is likely to grow as public awareness of the program increases.

TABLE 4.1
Distribution of Reports by Year and Average Per Month

| Year | Number of Months | Number of Reports | Average Per Month | Average From Table 2.2 | Average Duplicates Per Month |
|---|---|---|---|---|---|
| 1983 | 4 | 521 | 131.3 | 147.3 | 16.0 |
| 1984 | 12 | 1720 | 144.1 | 166.0 | 21.9 |
| 1985 | 12 | 2026 | 169.3 | 207.6 | 38.3 |
| 1986 | 8 | 1901 | 237.6 | 297.9 | 60.3 |
| 1987 | 7 | 2024 | 290.7 | 367.3 | 76.6 |
| 1988 | 4 | 916 | 229.0 | 294.5 | 65.5 |
| No Date | - | 11 | - | - | - |
| TOTAL | 47 | 9119 | 194.0 | 238.6 | 44.6 |

Table 4.2 shows the distribution of reports by month. The average number of reports received during the months of June, July, and August is considerably larger than other months. However, the late spring and early fall periods also are high-volume report months. This distribution is certainly not unexpected since: (1) the program is limited to on-system locations (city streets not included); 2) the high-volume report months correspond to the months motorists are traveling; and 3) longer days make signs readily visible to motorists for longer periods of time. The inclusion of city street crossing locations in the program **might** tend to "level" the average number of reports per month.

TABLE 4.2
Distribution of Reports by Month

| Months | Number of Reports | Average Per Month* |
|---|---|---|
| January | 690 | 172.5 |
| February | 694 | 173.5 |
| March | 688 | 172.0 |
| April | 791 | 197.8 |
| May | 560 | 186.6 |
| June | 1021 | 255.3 |
| July | 965 | 241.3 |
| August | 994 | 248.5 |
| September | 733 | 183.3 |
| October | 740 | 185.0 |
| November | 650 | 163.0 |
| December | 593 | 148.3 |

*Data available for only three years for month of May; all other months have four years of data.

There are 34 railroad companies on the DPS list of contacts, 44 railroads in Texas according to information supplied by FRA, and 42 in a computer file used in the project. Of the 34 railroads on the DPS contact list, 30 have been reported and are in the database. Unless DPS has the current inventory information, it is not aware of changes in ownership. This results in notification delays and may tend to overstate the experience of individual railroads.

The distribution of reports and the number of crossings reported by letter-coded identification are shown in Table 4.3. Of the 9,119 reports, slightly more than half applied to two railroads. Approximately 1,800 individual (specific) crossing locations have been reported. This amounts to 5.07 reports per location since the start of the 1-800 Program.

TABLE 4.3
Distribution of Reports by Railroad Letter Code Identification

| Railroad Identification Letter Code | Number of Reports | Percent of Total | Number of Crossing Reported | Percent of Total |
|---|---|---|---|---|
| A | 2681 | 29.4 | 466 | 25.9 |
| B | 2027 | 22.2 | 467 | 26.0 |
| C | 825 | 9.0 | 141 | 7.8 |
| D | 1129 | 12.3 | 331 | 18.4 |
| E | 918 | 10.1 | 141 | 7.8 |
| F | 143 | 1.6 | 30 | 1.7 |
| G | 154 | 1.7 | 24 | 1.3 |
| H | 711 | 7.8 | 108 | 6.0 |
| I* | 531 | 5.8 | 90 | 5.0 |
| TOTAL | 9119 | 100.0 | 1798 | 100.0 |

*I = 22 Railroad Companies

Table 4.4 presents data on the on-system and off-system crossings in Texas by railroad. In this case, the railroads are identified since the information is not linked to number of reports or crossings reported. Several ownership changes are not reflected in the inventory file used to prepare this information; therefore, the number of crossings for some railroads is overstated.

## 4.3 CONSECUTIVE DAYS AND NUMBER OF TIMES CROSSINGS REPORTED

The 1-800 report database contains information on the number of consecutive and repeat days a crossing was reported. This information was developed from the "date" entry of the DPS log since the "time" log entry is not available (see Table 2.3). Using "date" rather than "time" may overstate the number of consecutive days a crossing is

TABLE 4.4
Number of On-System and Off-System Crossings
By Railroad

| Railroad | On-System Crossings | Off-System Crossings |
|---|---|---|
| ATSF | 443 | 425 |
| BN | 166 | 127 |
| HBT | 14 | 106 |
| KCS | 30 | 26 |
| LA | 32 | 8 |
| MKT | 143 | 235 |
| PTRA | 5 | 18 |
| SP | 456 | 607 |
| SSW | 100 | 107 |
| TM | 48 | 25 |
| UP | 479 | 563 |
| Others | 86 | 107 |
| TOTAL | 2002 | 2358 |

Source: DOT/AAR Inventory File of Texas Rail-Highway Crossings with Train-Activated Devices

reported. For example, a crossing report at 11:50 p.m. on January 1 and again at 12:10 a.m. January 2 is defined as being reported two consecutive days, even though less than one hour separates the two reports. The removal of duplicate reports mitigates this problem to some extent.

The distribution of consecutive day reports is shown in Table 4.5. More than 85 percent of the reports were one-day reports. The reported problem was either corrected or not reported the next day. The crossing could have been reported the third day, but this report would not be considered consecutive. There were 535 crossings reported on

two consecutive days. Fifty-nine crossings were reported for three consecutive days. Less than 3.0 percent of the crossings were reported more than two consecutive days.

TABLE 4.5
Distribution of Consecutive Day Reports

| Number of Days | Number of Crossings | Percent of Total | Number of Reports | Percent of Total |
|---|---|---|---|---|
| 1 Day | 7789 | 92.7 | 7789 | 85.4 |
| 2 Days | 535 | 6.4 | 1070 | 11.7 |
| 3 Days | 59 | 0.7 | 177 | 1.9 |
| 4 Days | 11 | 0.1 | 44 | 0.5 |
| 5 Days | 4 | * | 20 | 0.2 |
| 6 Days | 2 | * | 12 | 0.1 |
| 7 Days | 1 | * | 7 | 0.1 |
| TOTAL | 8401 | 100.0 | 9119 | 100.0 |

*Less than 0.05%

Table 4.6 shows information on the number of times a crossing has been reported during the 47 months for which data are available. Of the 1,798 unique crossing locations, 506 (28.1 percent) were reported only once, and 70.9 percent were reported less than six times (days). On the average, a crossing was reported 5.07 times over the evaluation period, or approximately once every 10 months.

Of major interest is the 12 percent of the crossings which were reported more than 10 times during the period. In reviewing and using the information in the report database, crossing locations generating a high level of repeat calls can be identified and evaluated by a user to determine if there are specific problems at these locations.

TABLE 4.6
Distribution of Crossings by Number of Days Reported

| Number of Days | Number of Unique Crossings | Percent of Total |
|---|---|---|
| 1 Day | 506 | 28.1 |
| 2-5 Days | 769 | 42.8 |
| 6-10 Days | 302 | 16.8 |
| 11-15 Days | 109 | 6.1 |
| 16-20 Days | 57 | 3.2 |
| 21-25 Days | 26 | 1.4 |
| 26-30 Days | 15 | 0.8 |
| 31-35 Days | 8 | 0.4 |
| >35 Days | 6 | 0.3 |
| TOTAL | 1798 | 100.0 |

## 4.4 REPORTED CROSSING PROBLEMS

As already mentioned, a problem coding system was developed by the project staff and appended to each report record. The coding system provided a procedure to classify the crossing problem textual description into a standard format for evaluation. Eight problem categories were defined. The specific classifications are found in the Appendix. Table 4.7 presents the number of reports in each category.

Reports concerning active warning equipment represent the overwhelming majority of the total. The next highest category (3.5 percent) is track and structure-related problems. This category includes reports relating to, among others things, rough crossing surfaces. Although other types of crossing problems or situations are reported, it is apparent that the public tends to follow the instructions on the information sign and limits most 1-800 calls to signal "malfunctions." Requests for information, complaints, and questions are in the Miscellaneous category.

TABLE 4.7
Distribution of Reports by Crossing Problem Code

| Code Series | Crossing Problem | Number of Reports | Percent of Total |
|---|---|---|---|
| 100 | Active Warning Equipment | 8446 | 92.6 |
| 200 | Signs and Markings | 13 | 0.1 |
| 300 | Crossing Blocked or Highway Problem at or near Crossing | 125 | 1.4 |
| 400 | Track and Structure | 321 | 3.5 |
| 500 | Trespassers | 7 | 0.1 |
| 600 | Sight Distance | 12 | 0.1 |
| 700 | Train Operation | 29 | 0.3 |
| 800 | Miscellaneous | 166 | 1.8 |
| | TOTAL | 9119 | 100.0 |

Since warning equipment problems predominate the reports to DPS, the remainder of this section is devoted to various characteristics of this category. Table 4.8 presents information on active warning equipment problems by type of device. Reports in which the callers indicated problems with lights or lights and bells accounted for 55.7 percent of the total. Problems with gate arms were reported in 25.1 percent of the calls. Reports in which lights, bells, arms, or any combination with arms, represent 16.1 percent of the total. These three types of problems account for 96.9 percent of all calls concerning active warning devices.

Table 4.9 shows the distribution of these reports by consecutive days. Table 4.10 shows the distribution by number of days reported. Not surprisingly, since 92.6 percent of all reports concern active warning devices, the distribution of reports and crossings in these tables closely parallels those shown in Tables 4.5 and 4.6.

For each type of device shown in Table 4.8, the coding system specified the problem condition being reported. For all except "Wires, Signal Housing/Case," the condition description is the same:

- Malfunction not recorded
- Activated, no train apparent/at crossing
- Not activated, train at crossing (not working)
- Improper timing, early/late activation
- Damaged, missing, misaligned

The complete coding system is presented in the Appendix.

TABLE 4.8
Distribution of Active Warning Device Reports by Type

| Type Device | Number of Reports | Percent of Total |
|---|---|---|
| Lights and Lights & Bells | 4702 | 55.7 |
| Gate Arms | 2116 | 25.1 |
| Lights, Bells, Arms or any combination with arms | 1356 | 16.1 |
| Bells | 143 | 1.7 |
| Signal, Not Specified | 97 | 1.1 |
| Wires, Signal Housing/Case | 32 | 0.3 |
| TOTAL | 8446 | 100.0 |

The distribution of reports by problem condition is presented in Table 4.11. Most of the problem conditions reported are in the categories "malfunction not recorded" and "activated, no train apparent/at crossing." The log entry for the first category may simply state "lights" in the "malfunction" column. An entry such as "lights flashing: arms down" would be coded "activated, no train apparent/at crossing." These two conditions

account for 89.0 percent of the total. The problem condition "damaged, missing, misaligned" represents 6.3 percent of the total. Examples of the log entry for this condition include: "arm broken," "lens broken to lights," and "light knocked down."

TABLE 4.9
Distribution of Active Warning Device Reports by Consecutive Days

| Number of Days | Number of Reported Crossings | Percent of Total | Number of Reports | Percent of Total |
|---|---|---|---|---|
| 1 Day | 7159 | 92.4 | 7159 | 84.7 |
| 2 Days | 518 | 6.7 | 1036 | 12.3 |
| 3 Days | 56 | 0.7 | 168 | 2.0 |
| 4 Days | 11 | 0.1 | 44 | 0.5 |
| 5 Days | 4 | 0.1 | 20 | 0.2 |
| 6 Days | 2 | * | 12 | 0.1 |
| 7 Days | 1 | * | 7 | 0.1 |
| TOTAL | 7751 | 100.0 | 8446 | 100.0 |

*Less than 0.005%

TABLE 4.10
Distribution of Active Warning Device Reports by
Number of Days Reported

| Number of Days | Number of Unique Crossings | Percent of Total |
|---|---|---|
| 1 Day | 509 | 29.4 |
| 2-5 Days | 744 | 42.9 |
| 6-10 Days | 275 | 15.9 |
| 11-15 Days | 110 | 6.3 |
| 16-20 Days | 45 | 2.6 |
| 21-25 Days | 23 | 1.3 |
| 26-30 Days | 19 | 1.1 |
| 31-35 Days | 7 | 0.4 |
| > 35 Days | 2 | 0.1 |
| TOTAL | 1734 | 100.0 |

The problem condition "not activated, train at crossing", **which is not necessarily a "false clear" condition,** was reported in 320 instances and represents 3.8 percent of the total. It should be emphasized that the initial log entry does not contain sufficient information to infer with any degree of certainty that these 320 reports are, as a group, "false clear" problems. Log entries being assigned to this problem condition include: "no lights/bells train passing," "no lights," "lights not working," "arms up train passing," "arms not down," "arm goes up when train arrives," and "lights not flashing, arms not going down."

TABLE 4.11
Distribution of Problem Condition Reported for Active Warning Devices

| Problem Condition | Number of Reports | Percent of Total |
|---|---|---|
| Malfunction not Recorded | 3902 | 46.4 |
| Activated, No Train Apparent/ at Crossing | 3589 | 42.6 |
| Not Activated, Train at Crossing (not working) | 320 | 3.8 |
| Improper Timing, Early/Late Activation | 73 | 0.9 |
| Damaged, Missing, Misaligned | 530 | 6.3 |
| TOTAL | 8414* | 100.0 |

*32 Reports for Wires, Signal Housing/Case are not included in this Table.

Table 4.12 shows the distribution of the problem condition "not activated, train at crossing." The vast majority of these reports concern Lights and Lights & Bells. Ten percent of these reports are for Gate Arms. In 10.9 percent of this group, the type of device was not recorded.

However, one of the major reasons for this evaluation and a critical measure of the 1-800 Program's worth is not how many times this specific problem condition is reported, but whether the program facilitates its correction. Do the railroads respond in a timely fashion to reports which imply a "false clear" signal condition?

TABLE 4.12
Distribution of Problem Condition "Not Activated, Train at Crossing" by Active Warning Device

| Type Device | Number of Reports | Percent of Total |
|---|---|---|
| Lights and Light & Bells | 211 | 65.9 |
| Gate Arms | 32 | 10.0 |
| Light, Bells, Arms or any combination with arms | 31 | 9.7 |
| Bells | 11 | 3.4 |
| Signal, Not Specified | 35 | 10.9 |
| TOTAL | 320 | 100.0 |

Tables 4.13 and 4.14 address this question, and the answer appears to be yes. Table 4.13 indicates that in practically all cases (99.4 percent), the problem is corrected the day the report is received. Table 4.14 shows that 84.6 percent of the unique crossings were reported only once during the 47-month period **for this problem condition**. Slightly more than 15.0 percent were reported more than once, but none were reported more than five days.

The information contained in Tables 4.13 and 4.14 show only that the reported problems are apparently corrected in a timely fashion, and that they tend to be single occurrences. The data do not indicate if the 1-800 Program stimulated or confirmed the actions of the railroads which lead to these results. Whether the 1-800 Program is providing first notice on whether the railroad was already aware of the "problem" when the DPS call was received is not known.

TABLE 4.13
Distribution of Reports "Not Activated, Train at Crossing" by Consecutive Days

| Number of Days | Number of Reported Crossings | Percent of Total |
|---|---|---|
| 1 Day | 316 | 99.4 |
| 2 Days | 2 | 0.6 |
| TOTAL | 318 | 100.0 |

TABLE 4.14
Distribution of Reports "Not Activated, Train at Crossing" by Number of Days Reported

| Number of Days | Number of Unique Crossings | Percent of Total |
|---|---|---|
| 1 Day | 225 | 84.6 |
| 2-5 Days | 41 | 15.4 |
| TOTAL | 266 | 100.0 |

## 4.5 LOCATION OF REPORTED CROSSING

In the merged database, it is possible to examine the volume of reports generated by highway designation (US, STATE, FM, LOOP, etc.) and city street name. Such location characteristic information would be useful in using the reports as input into

corridor evaluation and improvement efforts. Reports generated from inside or outside the limits of a city can be identified. In addition, reports can be identified by specific city and/or county names. Following are three locational examples.

Table 4.15 presents information on the crossing reports by their location inside or outside the corporate limits of a city. In this table, both the distribution of reports as well as the distribution of the DOT/AAR Inventory by this field are shown. The distributions tend to be parallel and indicate that reports are generated by this location characteristic in approximately the same percentage as found in the inventory data. Almost 65.0 percent of the reports are for crossing locations inside city limits.

The distribution of reports and the inventory by on and off the State highway system is presented in Table 4.16. As would be expected, since the 1-800 Program is limited to on-system crossings, the majority of reports concern crossings at on-system locations. However, according to the inventory, only 45.9 percent of the crossings in the State are located on-system. It also implies that benefits of the 1-800 Program "spill over" to off-system locations.

The final location characteristic examined is the distribution of reports by Metropolitan Statistical Areas (MSA's) and non-metropolitan areas.* This information is shown in Table 4.17. The report column of this table contains duplicate records since the primary purpose is to determine if the major urban areas of the State generate more reports due to a large population base. Twenty-five percent of the 1-800 reports originate from the four largest MSA's in Texas; however, 36.6 percent of all rail-highway crossings are located in these areas. Conversely, 45.8 percent of the reports are from non-MSA locations, yet only 33.7 percent of the crossings are in these areas. There are several possible reasons for this situation: more railroad maintenance personnel in major urban areas; different rates of crossing problems; political concerns; different 1-800 usage rates by the public; or direct contact with railroads by local law enforcement agencies in the large MSA's. The last item will be discussed in Section 5.0.

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*Metropolitan Statistical Areas are large population centers together with adjacent communities. The boundaries are counties, and MSA's can be composed of more than one county. There are 28 MSA's in Texas, composed of 47 counties. The minimum population in order to be defined as an MSA is 100,000.

TABLE 4.15
Distribution of Reports and Inventory by Location
Inside or Outside City Limits

| Location | Reports | Percent of Total | Inventory Number of Crossings | Percent of Total |
|---|---|---|---|---|
| Inside City | 5,906 | 64.8 | 3,022 | 69.3 |
| Outside City | 3,056 | 33.5 | 1,160 | 26.6 |
| Not Indicated | 157 | 1.7 | 178 | 4.1 |
| TOTAL | 9,119 | 100.0 | 4,360 | 100.0 |

TABLE 4.16
Distribution of Reports and Inventory by Location
On and Off the State Highway System

| Location | Reports | Percent of Total | Inventory Number of Crossings | Percent of Total |
|---|---|---|---|---|
| On-system | 7,992 | 87.6 | 2,002 | 45.9 |
| Off-System | 1,127 | 12.4 | 2,358 | 54.1 |
| TOTAL | 9,119 | 100.0 | 4,360 | 100.0 |

TABLE 4.17
Distribution of Reports and Inventory by Metropolitan Statistical Areas and Non-Metropolitan Statistical Areas

| Population (000) | Reports | Percent of Total | Inventory Number of Crossings | Percent of Total |
|---|---|---|---|---|
| >1,000* | 2,512 | 25.0 | 1,594 | 36.6 |
| 250-1,000** | 1,444 | 14.3 | 498 | 11.4 |
| 100-250*** | 1,363 | 13.5 | 679 | 15.6 |
| <100**** | 137 | 1.4 | 119 | 2.7 |
| Non-MSA's***** | 4,603 | 45.8 | 1,470 | 33.7 |
| TOTAL | 10,059 | 100.0 | 4,360 | 100.0 |

*Houston, Dallas, San Antonio, and Fort Worth MSA's, and includes 17 counties. **Austin, El Paso, Beaumont-Port Arthur, McAllen-Edinburg-Mission, and Corpus Christi MSA's, and includes 10 counties. ***Brownsville-Harlingen, Killeen-Temple, Lubbock, Galveston-Texas City, Amarillo, Brazoria, Waco, Longview-Marshall, Tyler, Odessa, Wichita Falls, Abilene, Bryan-College Station, Laredo, Texarkana, and Midland MSA's, and includes 19 counties. ****Sherman-Denison, San Angelo, and Victoria MSA's, and includes 3 counties. *****205 Non-MSA counties.

## 4.6 TRAIN OPERATIONS AND VEHICULAR TRAFFIC CHARACTERISTICS AT REPORTED CROSSINGS

Information presented in this section describes certain train operations attributes and vehicle count data at the crossings reported in the 1-800 Program. Only by joining the report records with the DOT/AAR Inventory records is it possible to examine these characteristics. Distributions of the reports are illustrated by train frequency, annual average daily traffic (AADT) volume, number of tracks, train type (through/switch), and warning device.

Table 4.18 shows the distribution of reported crossings by number of trains per day and AADT. Information regarding the inventory is also shown. It is not surprising that most of the reports are on crossings with high vehicular traffic and high train counts. With high vehicle traffic, more people observe the conditions and tend to report malfunctions. With high train frequencies, crossing problems may also be more apparent and of concern to the originator of the report. (While motorists wait for a train, they have time to make a note of the 1-800 number and of the crossing ID number.) In addition, at high AADT locations the incident of vehicle damage to signal equipment, especially gate arms, is probably increased. The distribution of the inventory tends to confirm that low-volume AADT crossings are somewhat under-reported and higher-volume AADT crossings are perhaps over-reported.

TABLE 4.18
Distribution of Reported Crossings and Inventory
by Number of Trains Per Day and AADT

| | REPORTS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Number of Trains Per Day | | | | | | |
| AADT | <1 | 1-2 | 3-5 | 6-15 | >15 | Percent of TOTAL | Total |
| <250 | 7 | 21 | 45 | 51 | 52 | 176 | 1.9 |
| 251-500 | 10 | 72 | 52 | 199 | 120 | 453 | 5.0 |
| 501-1000 | 42 | 194 | 170 | 482 | 240 | 1128 | 12.3 |
| 1001-5000 | 128 | 784 | 919 | 1335 | 699 | 3865 | 42.4 |
| 5001-10000 | 106 | 329 | 421 | 611 | 373 | 1840 | 20.2 |
| >10000 | 84 | 325 | 421 | 626 | 201 | 1657 | 18.2 |
| TOTAL | 377 | 1725 | 2028 | 3304 | 1685 | 9119 | |
| Percent | 4.1 | 18.9 | 22.2 | 36.2 | 18.5 | | 100.0 |
| | INVENTORY | | | | | | |
| <251 | 29 | 54 | 70 | 147 | 109 | 409 | 9.4 |
| 251-500 | 27 | 39 | 53 | 154 | 124 | 397 | 9.1 |
| 501-1000 | 21 | 69 | 65 | 200 | 196 | 551 | 12.6 |
| 1001-5000 | 86 | 242 | 288 | 650 | 449 | 1715 | 39.3 |
| 5001-10000 | 49 | 122 | 123 | 260 | 163 | 717 | 16.4 |
| >10000 | 46 | 96 | 98 | 210 | 121 | 571 | 13.1 |
| TOTAL | 258 | 622 | 697 | 1621 | 1162 | 4360 | |
| Percent | 5.9 | 14.3 | 16.0 | 37.2 | 26.7 | | 100.0 |

The distribution of reports and inventory by number of trains and warning device is shown in Table 4.19. Almost 40 percent of the reported crossings have gate arms, and 60 percent have flashing lights only. This approximates the distribution found in the inventory.

Practically all reported crossing locations have less than three tracks (87.2 percent). This is almost identical to the distribution found in the inventory data, as seen in Table 4.20.

TABLE 4.19

Distribution of Reported Crossings and Inventory
by Number of Trains and Warning Device

| Warning Device | <1 | 1-2 | 3-5 | 6-15 | >15 | TOTAL | Percent |
|---|---|---|---|---|---|---|---|
| **REPORTS** | | | | | | | |
| | Number of Trains Per Day | | | | | | |
| Gates | 5 | 211 | 377 | 1698 | 1335 | 3626 | 39.8 |
| Flashing Lights | 371 | 1508 | 1646 | 1604 | 349 | 5478 | 60.1 |
| Other | 1 | 6 | 5 | 2 | 1 | 15 | 0.1 |
| TOTAL | 377 | 1725 | 2028 | 3304 | 1685 | 9119 | - |
| Percent | 4.1 | 18.9 | 22.2 | 36.2 | 18.5 | - | 100.0 |
| **INVENTORY** | | | | | | | |
| Gates | 16 | 81 | 164 | 732 | 755 | 1748 | 40.1 |
| Flashing Lights | 176 | 490 | 489 | 838 | 371 | 2364 | 54.2 |
| Other | 66 | 51 | 44 | 51 | 36 | 248 | 5.7 |
| TOTAL | 258 | 622 | 697 | 1621 | 1162 | 4360 | - |
| Percent | 5.9 | 14.3 | 16.0 | 37.2 | 26.6 | - | 100.0 |

TABLE 4.20
Distribution of Reported Crossings by Number of Tracks and AADT

| Number of Tracks | <=250 | 251-500 | 501-1000 | 1001-5000 | 5001-10000 | >10000 | TOTAL | Percent |
|---|---|---|---|---|---|---|---|---|
| **REPORTS** | | | | | | | | |
| | | | | AADT | | | | |
| 1 | 140 | 318 | 832 | 2588 | 1134 | 1146 | 6158 | 67.5 |
| 2 | 30 | 82 | 154 | 830 | 354 | 350 | 1800 | 19.7 |
| 3 | 1 | 41 | 110 | 330 | 233 | 149 | 864 | 9.5 |
| 4 | 5 | 7 | 20 | 96 | 93 | 10 | 231 | 2.5 |
| >4 | 0 | 5 | 12 | 21 | 26 | 2 | 66 | 0.7 |
| TOTAL | 176 | 453 | 1128 | 3865 | 1840 | 1657 | 9119 | - |
| Percent | 1.9 | 5.0 | 12.3 | 42.4 | 20.2 | 18.2 | - | 100.0 |
| **INVENTORY** | | | | | | | | |
| 1 | 298 | 269 | 361 | 1097 | 472 | 425 | 2922 | 67.0 |
| 2 | 79 | 70 | 119 | 386 | 147 | 100 | 901 | 20.7 |
| 3 | 18 | 35 | 47 | 142 | 48 | 32 | 322 | 7.4 |
| 4 | 9 | 12 | 17 | 53 | 27 | 9 | 127 | 2.9 |
| >4 | 5 | 11 | 7 | 37 | 23 | 5 | 88 | 2.0 |
| TOTAL | 409 | 397 | 551 | 1715 | 717 | 571 | 4360 | - |
| Percent | 9.4 | 9.1 | 12.6 | 39.3 | 16.4 | 13.1 | - | 100.0 |

The distribution by through and switch trains for both the reported crossings and the inventory is presented in Table 4.21. Almost 49 percent of the reports concern crossings where switch trains are fewer than one per day and there are more than three through trains. The inventory shows that 37.0 percent of all crossings are in this category. Slightly more than 4.0 percent of the reports are from crossings with less than one through train per day and more than one switch train. The inventory indicates 9.4 percent of all crossings are in this classification.

The information presented in Table 4.21 does not support the contention that many reports are the results of signals being activated due to switching activities away from the immediate area of the crossing that the motorist does not observe. While this condition may or may not exist, neither the report nor inventory data provides sufficient information to support or refute this argument. Crossings where through train movements predominate account for most reports. However, such trains may also pickup and setout cars, and otherwise engage in switching activities.

TABLE 4.21
Distribution of Reported Crossings by Number of Through Trains and Switch Trains

| Switch Trains Per Day | <1 | 1-2 | 3-5 | 6-15 | >15 | TOTAL | Percent |
|---|---|---|---|---|---|---|---|
| | | | REPORTS | | | | |
| | | | Through Trains Per Day | | | | |
| <1 Per Day | 377 | 1551 | 1448 | 1879 | 1104 | 6359 | 69.7 |
| 1-2 | 164 | 401 | 468 | 668 | 68 | 1769 | 19.4 |
| 3-5 | 80 | 39 | 98 | 150 | 156 | 523 | 5.7 |
| 6-15 | 126 | 43 | 45 | 43 | 87 | 344 | 3.8 |
| >15 | 17 | 29 | 22 | 37 | 19 | 124 | 1.4 |
| TOTAL | 764 | 2063 | 2081 | 2777 | 1434 | 9119 | - |
| Percent | 8.4 | 22.6 | 22.8 | 30.5 | 15.7 | - | 100.0 |
| | | | INVENTORY | | | | |
| <1 | 258 | 449 | 406 | 783 | 424 | 2320 | 53.2 |
| 1-2 | 163 | 169 | 406 | 783 | 105 | 1043 | 23.9 |
| 3-5 | 91 | 39 | 44 | 125 | 76 | 375 | 8.6 |
| 6-15 | 90 | 37 | 53 | 115 | 123 | 418 | 9.6 |
| >15 | 64 | 18 | 21 | 51 | 50 | 204 | 4.2 |
| TOTAL | 666 | 712 | 755 | 1449 | 778 | 4360 | - |
| Percent | 15.3 | 16.3 | 17.3 | 33.2 | 17.9 | - | 100.0 |

## 4.7 SUMMARY

This section has presented information on various characteristics of the crossings reported in the 1-800 Program, and illustrated how -- when used with other databases -- the data can assist in identifying problem areas. Although individual crossings were not examined, it is obvious that the program provides this capability. The objective of this section was to examine and evaluate the information generated by the 1-800 Program as to its usefulness in enhancing existing rail-highway crossing programs.

Considerable information has been presented, but it is not exhaustive. The data emanating from the 1-800 Program provides an insight into crossing safety, information transfer, signal problems, and problem type and identification. When combined with other databases, the power of the 1-800 Program, as another tool in a total crossing safety program for all participants, is multiplied.

# 5.0 PARTICIPANTS' VIEWS OF THE 1-800 PROGRAM

## 5.1 INTRODUCTION

This section discusses the views of the various 1-800 Program participants about its benefits and effectiveness in crossing safety. There are three major shortcomings in implementing the 1-800 Program, and they all relate to the underutilization of information generated by the program's operations. These shortcomings are:

(1) The inadequate transfer of information publicizing the 1-800 Program.
(2) The underutilization of the information that is transferred.
(3) The underutilization of the database generated from the 1-800 reports called in.

For example, local law enforcement agencies surveyed were not generally aware of the program and don't use the service. The DPS does not routinely (or even occasionally) provide the database to either the railroads or SDHPT. Until this evaluation for FRA, the data had never been compiled or categorized. Railroads were never provided with summary information regarding the experience at their crossings and, consequently, had limited information on which to base an evaluation of the program's effectiveness. Although aware of the program, many railroad officials visited by the project staff were not fully aware of how many reports were received, recorded, and forwarded. The potential of the program is yet to be discovered by most participants. The information presented in this report will stimulate interest in the 1-800 Program and suggest uses of the data developed. However, certain changes will be required, and these are discussed in Section 8.0.

The remainder of this section discusses the views on the 1-800 Program of the SDHPT, DPS, railroads, and local law enforcement agencies. All of these -- except local law enforcement agencies -- are active participants as defined in the legislation. The functions and duties of the three primary participants in the program were previously discussed in Section 2.0.

In addition, this section will present information regarding the notification time from DPS to railroad personnel.

## 5.2 DEPARTMENT OF PUBLIC SAFETY: COMMUNICATION CENTER

The DPS group which is the most knowledgeable of and involved in the day to day operations of the program has virtually no basis to evaluate the effectiveness of the program. The Communication Center is a conduit in a unidirectional flow of information. Receiving and relaying information, not evaluation, are the primary functions of this group. On rare occasions, Communication Center personnel have received anecdotal comments that certain reports contained information that prevented a derailment or accident.

The Communication Center personnel do, however, have specific views regarding the organization and operation of the program. These include:

- There should be only one primary telephone number contact for a railroad rather than several numbers.
- There should be access to a computer file of the DOT/AAR Inventory ID numbers.
- The program should be extended to all rail-highway crossings with train-activated signals.

### 5.2.1 Analysis of DPS Response Times

Since the primary purposes of the DPS Communication Center are to receive and relay the reports, it is considered important to determine how well this function is performed. This aspect serves as an indicator of DPS's view regarding the seriousness of the reports and the importance of timely notification in improving crossing safety.

Information necessary to perform this assessment is not available in the computerized database. Therefore, a sample of the DPS reports was taken to estimate the response time of the dispatchers in notifying the railroad of a crossing problem. Dispatchers record both the time the report is called in and the time the call is made informing the railroad of the situation. A random sample of 420 reports was drawn and analyzed to estimate the distribution of the response times. Each of these 420 original log reports was examined. The results are presented in Table 5.1.

From the sample, it can be seen that the vast majority of the notification calls are made within 15 minutes of the incoming report. Nearly half are made within two minutes of the incoming call. In 11 percent of the reports, more than 15 minutes was required to notify the appropriate railroad.

One possible explanation for this distribution is as follows: In nearly half of the reports, the railroad is notified immediately. In 42 percent of the reports, the dispatcher receives the incoming call, but before the notification call can be made he becomes occupied with other calls on the lines, which delays his call to alert the railroad.

It is those calls which are delayed for more than 15 minutes which cause the greatest concern. The longest delay observed was 566 minutes. After examining the original log book, two explanations are possible. The first possible explanation is that some dispatchers may not be making proper records when the railroad cannot be reached, or when a busy telephone signal occurs. When recorded improperly, the log will show no record of these repeated attempts to notify the railroad and will only record the time when actual contact was made.

The second possible explanation for the delayed response times is that the dispatchers may be waiting until a more convenient time to notify the railroads. The log indicates that on a few occasions, the dispatcher waited until the end of a shift to notify all the railroads of several reports received during the shift. Therefore, it is possible that a report received near the beginning of a shift may not be reported until much later.

TABLE 5.1
Distribution of Department of Public Safety
Communication Center Response Times

| Response Time in Minutes | Number of Observations | Percent of Total |
|---|---|---|
| < =2 | 196 | 46.7 |
| 3-5 | 105 | 25.0 |
| 6-10 | 46 | 10.9 |
| 11-15 | 26 | 6.2 |
| >15 | 47 | 11.2 |
| TOTAL | 420 | 100.0 |

While the above table shows the time distribution for notifying the railroad, it does not indicate certain aspects of the process. The mean of the distribution is 11 minutes, the median is three minutes, and the mode is one minute.

There are delays in the notification process which need to be eliminated. An average response time of 11 minutes can be critical in certain situations and can be reduced by correcting the times on the tail-end of the distribution. However, 50 percent of the response times sampled are three minutes or less, and the most frequent response time is one minute.

## 5.3 STATE DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

SDHPT was furnished a computer printout of the six fields of the 1-800 report until September 1986, when DPS discontinued this practice. Apparently, the information was never used. The data was reviewed, but -- according to SDHPT personnel contacted -- reported problems were thought to be ill-defined; the reliability of the report was of concern; the data was not organized or summarized in a meaningful format; and finally, no one knew how to use the reports or what information regarding crossing safety the reports might convey to a potential user.

When briefed on the activities of the current FRA project, the organization and summary of the data, and the merging of report and inventory records, the SDHPT personnel were most positive in their views of the report data. However, to be of any use to activities of SDHPT, the information needs to be presented in a usable format. Unless this is done, the data output of the program will not be utilized.

[Section 8.0 presents recommendations designed to increase the usability of the data developed in the 1-800 Program. The Texas program was designed as an early warning system and additional or potential uses of the data were not necessarily considered. Any State considering the implementation of a 1-800 type program should determine if and/or how the data are to be used.]

## 5.4 RAILROADS

The individual railroads, via the public, are primary beneficiaries of the 1-800 Program. The problems being reported concern their crossings. They, in turn, must investigate the problems. The project staff met with 11 railroads operating in Texas to determine: (1) their views of the program; (2) their use of the reports; (3) problems associated with the program, and (4) areas for improvements in the information

provided.

Railroad personnel included:

- Railroad President
- Engineer, Maintenance of Way
- Manager Signals
- Project Engineer
- Chief Engineer
- Public Project Engineer
- Assistant General Manager
- Manager Safety Services
- Director Signals
- Engineer Programs

Except for some "small railroads," which account for few calls, none of the individuals interviewed were the initial recipients of the DPS calls. Several did not know, until contacted, where or who the DPS contacted.

The results of the interviews are summarized below.

- The overall view of the 1-800 Program ranged from unenthusiastic acceptance to whole-hearted support. A majority supported the program and were not aware of any problems associated with the program. All were familiar with the 1-800 Program, and most had made inquiries within their organization concerning experiences with the program. Most were unaware of the number of reports they received prior to being provided a summary report on their experience by the project staff. Few monitored the program or were aware of the findings of the signal maintainer when responding to a report. However, one chief engineer of a Class I railroad indicated that he receives a daily "morning report" on all 1-800 calls for the previous day.

- The DPS calls are not the only calls received by a railroad relating to crossing signal problems. Calls are also received from local police/sheriff departments and citizens. The railroads in Houston have a "Railroad Coordinator" who also receives calls (both local and DPS) about crossing problems in Houston/Harris County. The railroad dispatchers receiving the calls do not, necessarily, record the origin of the call in their logs. Therefore, it was not possible to determine from their records the percentage of total crossing-related calls that originate in the 1-800 Program. Some railroads indicated that in approximately 50 percent of the reports, the crossing problem had already been

reported by other sources.

• Only one railroad provided information on the findings of the signal maintainer when responding to a crossing related call (both DPS and others). A review of this information tended to confirm the reported crossing problem in the DPS log, but with a more detailed explanation. One Class I agreed to monitor the 1-800 calls and record the findings of the signal maintainer. Forms were developed and provided by the project staff for this purpose. However, this information has yet to be returned. The railroad contact has indicated that he is trying to locate the information within his system. Attempts to authenticate the crossing problem reported to and by DPS have not yet been successful. A copy of the form provided is in the Appendix.

• No railroad indicated that it was using the 1-800 reports for signal maintenance or for crossing safety programs. However, based on the findings presented in Tables 4.13 and 4.14, this may not be the case. The group of crossings examined in those tables that imply a "false clear" condition also exhibit a very low rate of recidivism. The problem was corrected, or perhaps the signal is monitored or inspected more closely to prevent recurrence of the problem. It is not likely that the distributions in these tables are explained purely by chance.

While the information provided by the 1-800 Program may not be formally incorporated in railroad maintenance practices, it seems apparent that it is probably used in an informal, and perhaps unrecognized, fashion.

• The railroads indicate that the information relayed by the DPS was adequate. As a group, they were opposed to any process by a third party to attempt to "rank" the seriousness of a reported crossing problem. Almost all the railroad personnel indicated that reports regarding signal problems (regardless of the source) were of immediate concern. Based on these comments, efforts to develop a question and answer dialogue for use between the DPS dispatcher and the caller in order to determine the specific nature of the problem need not be considered.

• Generally, all railroads contacted have a positive view of the program. The fact that the information developed in the 1-800 Program is not used may relate more to the structure of the program than to any other one factor. If the information was organized, summarized, and provided to the railroads in a usable format, the output of the 1-800 Program could be reviewed and compared with information generated internally.

Some comments received before and during this evaluation are shown below.

"I believe the Railroad Safety Information Act has worked real well. For example, Monday, October 20, Chief Dispatcher received three calls from the Department of Public Safety in Austin advising us of signal malfunctions, and these were corrected promptly. It is my opinion that this has worked out successfully enough that it should be considered in other States. It is possible that we could save a considerable amount of money in lawsuits as we are better able to correct signal problems before someone becomes injured."

"The Chief Dispatcher's Office has received very few phone calls in connection with this program, and then those calls pertained to crossing signals in southeast Texas. In fact, the most recent call was regarding a crossing signal malfunction, and the individual calling stated the reason for calling was due to the inability to contact the office. Our Chief Dispatcher's office did, however, contact the office by telephone and reported the trouble."

"Those who have called our Chief Dispatcher's office have been very courteous and we have encountered no problem with this program. However, since we have not been involved to any great extent, we are unable to make any specific recommendations."

"Since this Program has been in effect, our Dispatchers' Office has received numerous calls, particularly on weekends and late at night, concerning malfunctions which have permitted us to dispatch a maintainer without undue delay. Quite possibly this Act could have avoided several crossing accidents."

"We have no negative aspects of the current Program, and it would appear to be worthy of consideration for adoption in other States."

"We have solicited comments from our Chief Dispatcher, Trainmaster and others regarding the positive and/or negative aspects in regard to the Railroad Safety Information Act, and our Chief Dispatcher advises he feels that the program is successful. We have had no problem with the Department of Public Safety, and in nearly all cases incoming reports are something the railroad had no knowledge of at the time."

"Inasmuch as most of the incoming calls from the Department of Public Safety are reporting items involving safety at intersections of railroad tracks and public roads,

it would appear this program should be considered in other States."

"We have no objections to the present program which requires our furnishing a telephone number to the Texas Department of Public Safety for the purpose of notifying the railroad company to relay reported problems with crossing warning devices."

"We do have a problem with follow-up reports that require us to describe corrective action taken. The benefits gained versus the amount of time required for extra reporting are not justified. The fact is we do respond to these calls, and we do take the necessary corrective action. Any further requirements would serve little benefit."

- There was unanimous opposition to any requirement for reporting the signal maintainers' findings back to DPS. All railroads supported the restrictions regarding the use of the 1-800 data in court proceedings.

In summary, the railroads support the 1-800 Program as it is structured. They indicated that they want to be notified when a problem exists at a crossing. However, no railroad contacted has incorporated the information developed by the 1-800 Program into its maintenance practices. Currently, no railroad uses the data in a systematic manner.

## 5.5 LOCAL LAW ENFORCEMENT AGENCIES

To determine law enforcement agency views and use of the 1-800 Program, 70 sheriff and police departments were surveyed. Initially, the DPS was asked to record on the log sheet if the caller was a representative of such a department. DPS had indicated that these callers usually identify themselves as law enforcement personnel.

Before discussing the results of the law enforcement survey, certain aspects of the 1-800 need to be reemphasized:

- The program was instituted with virtually no advance publicity.
- In only one publication, *Texas Railroad Emergency Response Handbook* - published by the Texas Railroad Commission (a non-participant in the program), has the toll-free number appeared. This publication is supplied to county judges, mayors, fire chiefs, and law enforcement agencies.
- Since its inception, the 1-800 Program has not been actively promoted.

- The program is specifically directed to on-system crossing locations, which excludes practically all city streets and all county roads.

In conducting the survey of law enforcement agencies, the project staff asked if they:

- were aware of the 1-800 Program,
- used the service,
- contacted the railroads directly,
- thought the program improved response time for correcting crossing problems, and
- thought the program should be extended to off-system locations.

The selection of the agencies to survey was based on the number of 1-800 calls originating from a city or county. The survey was non-random and biased toward large population centers and centers of high railroading activities. Of the 70 departments surveyed, there were 45 police departments and 25 sheriff departments. Seventy-one percent of the police departments and 92 percent of the sheriff departments responded.

Table 5.2 shows the results of the survey. Less than half of all law enforcement agencies contacted were aware of the program. Only 40.6 percent of the police departments and 43.5 percent of the sheriff departments use the services of the program. In the event of a crossing problem, 56.3 percent of the police and 52.2 percent of the sheriff departments contacted railroad personnel directly (in lieu of the 1-800 service). Less than one-third of the police departments thought that the program improved response time, and only five sheriff departments had the opinion that response times were reduced. However, a large percentage (56.3 and 70.0) of the respondents had an opinion (or perhaps experience) on this question. Interestingly, 65.6 percent of the police and 65.2 percent of the sheriff departments were of the opinion that the program needs to be extended to off-system locations. More than 31.0 percent of the police departments and 26.1 percent of the sheriff departments did not express an opinion on this issue.

The survey results, as presented above, do not constitute overwhelming awareness or use of the 1-800 Program. A relatively small percentage of the respondents thought the program improved the response time for correction of a reported problem. However, the comments received from several agencies tend to temper the actual responses. Since
less than half of all those responding were aware of the program, the reason for the low

level of use is obvious. In addition, the high percentage of respondents expressing "no opinion" regarding improved response time is a function of program awareness.

In order to better understand the information presented in Table 5.2, a listing of the comments received by the survey is presented in the Appendix.

TABLE 5.2
Results of the Survey of Police and Sheriff Departments

| Question | Department | | | |
|---|---|---|---|---|
| | Police | Percent | Sheriff | Percent |
| Total Response | 32 | 100.0 | 23 | 100.0 |
| Aware of 1-800 Program | 15 | 46.9 | 11 | 47.8 |
| Use 1-800 Program | 13 | 40.6 | 10 | 43.5 |
| Use 1-800 Exclusively | 7 | 21.9 | 3 | 13.0 |
| Use 1-800 and Contact RR | 6 | 18.7 | 6 | 26.1 |
| Contact RR Directly | 18 | 56.3 | 12 | 52.2 |
| Program Improves Response | 10 | 31.3 | 5 | 21.7 |
| No time Opinion | 18 | 56.3 | 16 | 70.0 |
| Program Should be Extended | 21 | 65.6 | 15 | 65.2 |
| No Opinion | 10 | 31.3 | 6 | 26.1 |

## 5.6 SUMMARY

This section has presented information on the participants' views of the 1-800 Program. There is a lack of knowledge regarding various aspects of the program and a lack of information flowing from the DPS to the railroads, SDHPT, and local police agencies. This lack of information exchange is unfortunate, and certainly is a limiting condition in the use of the 1-800 reports. Although the railroads indicate they generally approve of the service and respond to DPS calls, they do not, apparently, compile or use the information generated by the program in a systematic fashion. However, as an early

warning system the information is used to dispatch signal maintainers and, as such, is used implicitly as a tool in crossing safety.

The evidence presented regarding those reports which might be interpreted as "false clears" reflects favorably on railroad maintenance practices. Whether or not the 1-800 Program is the stimulus to correcting these types of problems cannot be determined from the available data.

# 6.0 RAIL-HIGHWAY CROSSING ACCIDENTS

## 6.1 INTRODUCTION

This section presents information regarding rail-highway crossing accidents for the period of 1980 to September 1988. Information is presented for both train involved and non-train involved accidents at all crossings, both on and off the State highway system. Data provided by both DPS and SDHPT were used in developing the information in this section.

The purpose of this section as defined in the Statement of Work is to "help determine if the notification program has resulted in an improvement in the warning device credibility and in increased public safety through timely problem response by the railroad."

Data elements in the accident tapes consist of the following items:

(1) Crossing Identification Number (DOT/AAR Inventory)
(2) Month/Day/Year of Accident
(3) Accident Severity Code
(4) Object Struck Code
(5) Train/Nontrain Involved Code
(6) On-System/Off-System Code
(7) Accident Report Number

## 6.2 NUMBER OF ACCIDENTS

Table 6.1 presents information on the total number of rail-highway crossing accidents in Texas for the period of 1980 to September 1988. There are a total of 13,875 accidents in the database, 9,467 (or 68.2 percent) of which occurred at crossings equipped with train-activated signals. However, since the accident file did not contain information regarding the signal device, it was necessary to use the inventory file to determine signal type. The inventory file indicated only the current signal type and does not account for changes in signal status. Therefore, the number of accidents at crossings with activated signals is probably overstated, and accidents at crossings without active signals are probably understated. For example, an accident occurring in 1980 at a location without active signals would appear in the "activated" column if the crossing signal was subsequently upgraded. While this situation might be a serious problem to a statistical accident analysis exercise, it was not considered to be a significant limitation

for this project.

As seen in Table 6.1, there has been a downward trend in accidents at both active and non-active signal locations. During this nine-year period, there has been a simultaneous and significant effort, through rail-highway crossing safety programs and crossing improvement projects, to reduce accidents.

TABLE 6.1
Number of Rail-Highway Crossing Accidents
(both Train Involved and Nontrain Involved)
in Texas 1980 to September 1988 by
Signal Type and Year

| | Signal Type | | | | | |
|---|---|---|---|---|---|---|
| | Activated | | Non-Activated | | | |
| Year | Number | Percent | Number | Percent | Total | Percent |
| 1980 | 1,431 | 15.1 | 615 | 14.0 | 2,046 | 14.7 |
| 1981 | 1,369 | 14.5 | 578 | 13.1 | 1,947 | 14.0 |
| 1982 | 1,127 | 11.9 | 531 | 12.0 | 1,658 | 11.9 |
| 1983 | 1,170 | 12.4 | 492 | 13.4 | 1,662 | 12.0 |
| 1984 | 1,120 | 11.8 | 559 | 12.7 | 1,679 | 12.1 |
| 1985 | 907 | 9.5 | 470 | 10.7 | 1,377 | 9.9 |
| 1986 | 932 | 9.8 | 458 | 10.4 | 1,390 | 10.0 |
| 1987 | 840 | 8.9 | 433 | 9.8 | 1,273 | 9.2 |
| 1988* | 571 | 6.0 | 272 | 6.2 | 843 | 6.1 |
| Total | 9,467 | 100.0 | 4,408 | 100.0 | 13,875 | 100.0 |

*Only 8 months of data.

Accident experience at on-system and off-system locations as well as train/nontrain involvement is shown in Table 6.2. Of the 13,875 accidents, only one-third occurred at on-system locations, and less than half involved a train. Information is presented for accidents in which a train was involved, as well as for those in which no train was involved. Nontrain involved accidents are predominately vehicle-vehicle accidents.

Both Table 6.1 and 6.2 present information on all rail-highway crossing accidents. Since the 1-800 Program currently applies only to on-system crossings equipped with train-activated signals, it is important to examine the accident experience at these crossings. However, because crossing problems are also being reported at off-system locations, it is necessary to include all train-activated signals in the evaluation. The following section examines accident experience at these crossings.

TABLE 6.2
Number of Rail-Highway Crossing Accidents in
Texas by Location and Involvement from 1980 to September 1988

| | Location | | | | | |
|---|---|---|---|---|---|---|
| Accident Type | On-System | Percent | Off-System | Percent | Total | Percent |
| Train Involved | 1,747 | 12.6 | 4,952 | 35.7 | 6,699 | 48.3 |
| Nontrain Involved | 2,836 | 20.4 | 4,340 | 31.3 | 7,716 | 51.7 |
| Total | 4,583 | 33.0 | 9,292 | 67.0 | 13,875 | 100.0 |

## 6.3 ACCIDENTS AT LOCATIONS WITH TRAIN-ACTIVATED SIGNALS

Table 6.3 presents information on the number of accidents at rail-highway crossing locations that are equipped with train-activated signals, including crossings both on and off the State highway system. The data are for the years 1980 to September 1988. However, 1983 is divided into a "before" and "after" period corresponding to the

start of the 1-800 Program. During the period, there were 9,467 accidents at crossings with automatic warning devices, of which 3,948 (41.7 percent) were on-system locations.

From January 1980 through August 1983, a 44-month period prior to the start of the 1-800 Program, there were 1,930 accidents (43.9 per month) at on-system locations. For the 60-month period of September 1983 through August 1988, there were 2,018 accidents (33.6 per month) at these locations. Of the 5,519 accidents (58.3 percent) which occurred at off-system crossing locations, 2,761 (62.7 per month) happened prior to the initiation of the program. There have subsequently been 2,758 accidents (46.0 per month) during the program operation. (Table 6.4)

TABLE 6.3
Number of Accidents at Crossings Equipped with Train-Activated Devices by Location and Year

| | Location | | | | | |
|---|---|---|---|---|---|---|
| Year | On-System | Percent | Off-System | Percent | Total | Percent |
| 1980 | 549 | 13.9 | 882 | 16.0 | 1,431 | 15.1 |
| 1981 | 576 | 14.6 | 793 | 14.4 | 1,369 | 14.5 |
| 1982 | 463 | 11.7 | 664 | 12.0 | 1,127 | 11.9 |
| 1983 (Before) | 342 | 8.7 | 422 | 7.6 | 764 | 8.1 |
| 1983 (After) | 160 | 4.1 | 246 | 4.6 | 406 | 4.3 |
| 1984 | 445 | 11.3 | 675 | 12.2 | 1,120 | 11.8 |
| 1985 | 402 | 10.2 | 505 | 9.2 | 907 | 9.6 |
| 1986 | 385 | 9.8 | 547 | 9.9 | 932 | 9.8 |
| 1987 | 363 | 9.2 | 477 | 8.6 | 840 | 8.9 |
| 1988 | 263 | 6.7 | 308 | 5.6 | 571 | 6.0 |
| Total | 3,948 | 100.0 | 5,519 | 100.0 | 9,467 | 100.0 |

TABLE 6.4

Average Number of Accidents* Per Month at Crossings Equipped with Train-Activated Devices Before and After the Initiation of the 1-800 Program

| Time Period | Number of Months | Location | | TOTAL |
|---|---|---|---|---|
| | | On System | Off System | |
| Before 1-800 | 44 | 43.9 | 62.7 | 106.6 |
| After 1-800 | 60 | 33.6 | 46.0 | 79.6 |
| Percent Decline | | 23.5% | 26.6% | 25.3% |

*Includes both train involved and nontrain involved.

Since the initiation of the 1-800 Program, accidents at on-system locations have declined 23.5 percent and those at off-system locations 26.6 percent. However, this decline is not necessarily the result of the program, and, in fact, off-system crossings -- which are outside the scope of the legislation and not equipped with the information sign -- exhibit the largest decline.

During the nine years of accident experience examined, other crossing safety programs and projects have been in effect. These have also had effects on rail-highway accident experience, and confound the interpretation of the effectiveness of the 1-800 Program in reducing accidents. Considerably more data regarding various aspects of the program, as well as information on other crossing safety efforts, would be necessary before attempting a statistical evaluation. Such an evaluation is outside the scope of this effort.

## 6.4 SUMMARY

The 1-800 Program, as structured, is an early notification and warning system to alert railroads to unsafe or potentially unsafe conditions at rail-highway crossings. When used as intended, the reported unsafe condition can be corrected or eliminated. When such action is taken and/or credibility restored to the warning device, motorists' safety is

maintained or enhanced. The 1-800 Program in Texas was implemented during a period of falling accident rates at railroad crossings. The reductions in accidents following the implementation of the program are likely to be partially attributable to the operation of this early warning notification program. But there is no evidence that the 1-800 Program *per se* has reduced crossing accidents in Texas.

# 7.0 PROGRAM COSTS

## 7.1 INTRODUCTION

This section presents information on the initial and ongoing operation costs associated with the Texas 1-800 Program. The cost figures shown are estimates, since detailed records which reflect the total costs of the program are not maintained by either the SDHPT or the DPS. In developing these estimates, the following agencies and individuals were contacted:

-- Mr. John Dodson, SDHPT, retired: Mr. Dodson was with the department when the 1-800 Program was instituted and was involved in developing the information sign and installation procedures, coordinating with the railroads, and preparing the fiscal note accompanying the legislation.

-- SDHPT District Offices: Three district maintenance engineers were contacted to develop information on sign costs, labor and equipment requirements, sign vandalism and replacement rates, new installations, etc.

-- Safety and Maintenance Division, SDHPT: This division provided information on material, labor and equipment rental cost as percent of total costs.

-- DPS Communication Center: Several meetings were held with DPS supervisors in the Communication Center to discuss the 1-800 Program and obtain information on telephone costs and current hours used.

-- Telephone Company: Information was obtained concerning WATS installation costs, fixed rate charges and allowed hours of service, and charges for additional hours of service.

Limited assumptions were made in developing the cost estimates presented. Primarily these deal with program enhancements and system-wide expansion of the current operation. In addition to information concerning the costs of the Texas 1-800 Program, estimates are presented to assist others in determining the expected costs of establishing a similar program in their States.

## 7.2 FISCAL NOTE ESTIMATE

In Texas, a fiscal note is prepared to accompany all bills introduced in the legislature. The note contains information on the costs for the initial and four subsequent fiscal years of the program being legislated. The purpose is to provide the legislature with an estimate of the budget implications of the proposed act on State agencies' budgets. The Railroad Crossing Safety Information Act contained a fiscal note which was prepared by SDHPT.

The initial costs of the program and first year of operation were estimated to be $1,096,227. This included the costs of installing approximately 3,400 signs at 1,700 locations, and the expenses incurred by DPS in establishing and operating the telephone system. This amounts to $322 per sign, or $644 per crossing, to initiate the 1-800 Program. Cost for the next four fiscal years was estimated at $295,809 per year.

In considering these cost figures, it is important to remember that:

- This was a unique experiment with several undefined elements.
- The estimates were developed prior to initiation and operation of the program.
- There was no experience on which to base the expected volume of calls received and DPS operating costs and staffing requirements.
- The method and costs of installation had not been determined when the fiscal note was prepared.

In addition, since a fiscal note provides information on the expected cost of an agency to implement proposed legislation and the effect upon its budget, there is probably a tendency to inflate these estimates.

In retrospect, and with almost six years of program operating experience, the fiscal note estimates are high. The costs presented later are formulated on program experience. Unfortunately, no accounting records are available to determine the actual program costs. Finally, the purpose of developing program costs is not to challenge those costs in the fiscal note, but rather to furnish more realistic estimates which are based on experience gained during the past six years, so that other States can better determine if they wish to initiate a similar program.

## 7.3 ESTIMATED PROGRAM COSTS

The cost information presented in this section is based upon the experience of the program in Texas and information from individuals involved in its operation. The elements included in development of the estimates are:

- Program Development
- Program Management and Staffing
- Information Sign and Material Costs
- Information Sign Installation Cost (Labor and Equipment)
- WATS Installation Cost
- Program Operating Equipment -- computer
- WATS Fixed Rate Charges
- Sign Replacement
- New Crossing Locations

Although some of the cost elements are fixed, most vary with the number of crossings included in the program and the volume of reports generated. The Texas program does not currently include off-system crossings, however, the costs presented are based upon system wide implementation. It is estimated that a program in Texas which would include all signalized crossings would generate between 9,000 and 12,000 reports annually. The program produces approximately 4,000 calls annually and includes less than half of the signalized crossings in Texas.

Table 7.1 presents a summary of the data and information sources used to develop cost estimates for establishing and operating the 1-800 Program. There is a wide range in the basic information provided.

Table 7.2 presents the estimated start-up and operating costs of the program. As would be expected, the largest single cost element of the program is for signing. In developing the estimates for sign costs, the following information was used:

- A cost of $80 for materials (sign, brackets, straps) was used for the high and low estimates. This was the highest material cost information received from the SDHPT districts contacted. The district providing the information also furnished the labor and equipment costs shown in the low estimate.

Table 7.1. Information Used to Develop Cost Estimates of Initiating the Texas 1-800 Program

| Cost Element | Type | Estimated Costs | Source |
|---|---|---|---|
| Program Development | Start-up | $50,000-$100,000 | Developed by project staff and based upon discussions with Mr. J. Dodson. Composed of expenses incurred in sign development and design, contacting railroads, and coordinating with DPS. |
| Program Management and Staffing | | | |
| 1st Year | Start-up | $30,000-$50,000 | Based on meetings with DPS and current staffing, report volume, time spent to complete report, and discussions with SDHPT District Maintenance Personnel. |
| Subsequent Years | Operating | $30,000-$52,500 | |
| Information Sign and Materials (per location) | Start-up | $56-$80 | Based on discussions with SDHPT District Maintenance Personnel and correspondence from Safety & Maintenance Division, SDHPT |
| Labor | | $17-$112 | |
| Equipment | | $8-$24 | |
| WATS Installation Costs | Start-up | $250-$500 | Based on discussions with Telephone Company Representative. |
| Program Operating Equipment | Start-up | $5,000 | Estimated Costs of Computer needed to handle DOT/AAR Inventory and related program information. Not currently available to DPS. |

Table 7.1. Information Used to Develop Cost Estimates of Initiating the Texas 1-800 Program (cont.)

| Cost Element | Type | Estimated Costs | Source |
|---|---|---|---|
| WATS Fixed Rate Charges | Operating | 10 Hours Service = $220 $19.30 per additional hour | Based on discussions with Telephone Company Representative and DPS |
| Sign Replacement Due to Vandalism and Weather | Operating | 2% per year 65-100 Locations/year | Based on discussions with SDHPT District Maintenance Personnel. |
| New Crossing Locations | Operating | 100-220 Locations/year | Based on discussion with SDHPT, Bridge Division Personnel. Additions are a function of grade crossing improvement program. |

- The high estimates for the sign are based upon the highest materials cost information. Labor and equipment estimates were developed from information provided by the Safety and Maintenance Division showing the percent labor and equipment represented of material costs and total costs.

Start-up costs on a per location basis (two signs) are estimated to range between $125 and $252.

Program Annual Operating Costs, as presented in Table 7.2, range from $68,100 to $122,000 per year. Four categories were included in operating costs: (1) Program Operations and Management, (2) Sign Replacement, (3) New Crossing Additions to the Program due to improvement projects, and (4) WATS Service Costs. It is estimated that report volume increases would range from 55 percent to 250 percent if all signalized crossings were included. The high percentage increase is based upon the fact that the vast majority of rail-city streets (high traffic count locations) are not in the program, and it is assumed this addition would generate a significant increase in report volume. The response to the survey of law enforcement agencies tends to confirm this assumption.

Operating costs are estimated to range between $16 and $28 per crossing location annually (yearly additions not included). However, since the purpose of the program is to provide for a reporting mechanism, it is appropriate to express operating costs on a per report basis, even though the WATS service is the least expensive item. Viewed from this perspective, the operating costs are between $9-$10 per report.

## 7.4 EXPECTED COSTS TO ESTABLISH 1-800 PROGRAM IN OTHER STATES

In attempting to determine the costs that other States may be expected to incur in adopting a 1-800 Program, certain assumptions were made.

- There would be no substantive change from the Texas program.
- The information sign and installation procedure would remain the same.
- The program would be implemented and operated by a State agency(ies).
- Call in report volume would approximate the Texas experience (approximately 2.4 reports per year/per signed crossing).

Based on these assumptions, the expected costs to other jurisdictions would parallel those estimated for the Texas program. However, in developing the cost estimates to assist other States in their evaluation of the program, some adjustments in funding

TABLE 7.2
Estimated Start-up and Operating Costs
of the Texas 1-800 Program

| Costs Element | Estimate Low | Estimate High |
|---|---|---|
| Start-up | | |
| Program Development | $50,000 | $100,000 |
| First Year Operations and Management | 30,000 | 50,000 |
| Information Sign | | |
| Material | 350,000 | 350,000 |
| Labor | 75,000 | 488,320 |
| Equipment | 35,000 | 104,640 |
| Total Sign Costs | 460,000 | 947,960 |
| Program Operating Equipment* | 5,000 | 5,000 |
| WATS Installation Costs | 250 | 500 |
| **Total Start-up Costs** | **$545,250** | **$1,098,460** |
| Start-up Costs Per Location | $125 | $252 |
| Annual Operating Costs | | |
| Program Operations and Management | $30,000 | $52,500 |
| Sign Replacement | 13,000 | 20,000 |
| New Crossing Locations and Additions** | 22,000 | 44,000 |
| WATS Service | 3,100 | 5,500 |
| **Total Operating Costs** | **$68,100** | **$122,000** |
| Operating Costs Per Location*** | $16 | $28 |
| Operating Costs Per Report | $9 | $10 |

*For Computer -- not in program at present.

**Most changes from crossbucks to activated signals are at off-system locations and not currently in the program.

***New crossing locations and additions are not included in estimates.

requirements were made. These are presented in Table 7.4.

For a program with 2,500 crossing locations, it is estimated that Total Start-up costs would be between $483,000 and $653,000. Program Development costs have been reduced, since it is assumed that the design and development work has been done and will be adopted by other states. Also, Program Management costs have been reduced due to the smaller number of sign replacements and additions and the lower volume of anticipated reports.

Figure 7.1 presents costs estimates for several levels of signalized crossing, ranging from 1,000 to 4,000. Total Start-up costs are estimated at $560,000. Operating costs are estimated to range from $35,000 to $86,000 for the various categories of crossing. These estimates are based upon information contained in Tables 7.2 and 7.3.

Regardless of the size of the program a State might have, there are some program development and management costs to be incurred. At a minimum, a State can expect to spend $30,000 in the program development phase. In addition, even the smallest program will incur annual operation and management costs of $20,000-$25,000.

## 7.5 SUMMARY

This section has presented information on the estimated and expected costs of a 1-800 Program. These are based on the experience, operation, and level of activity of the Texas program.

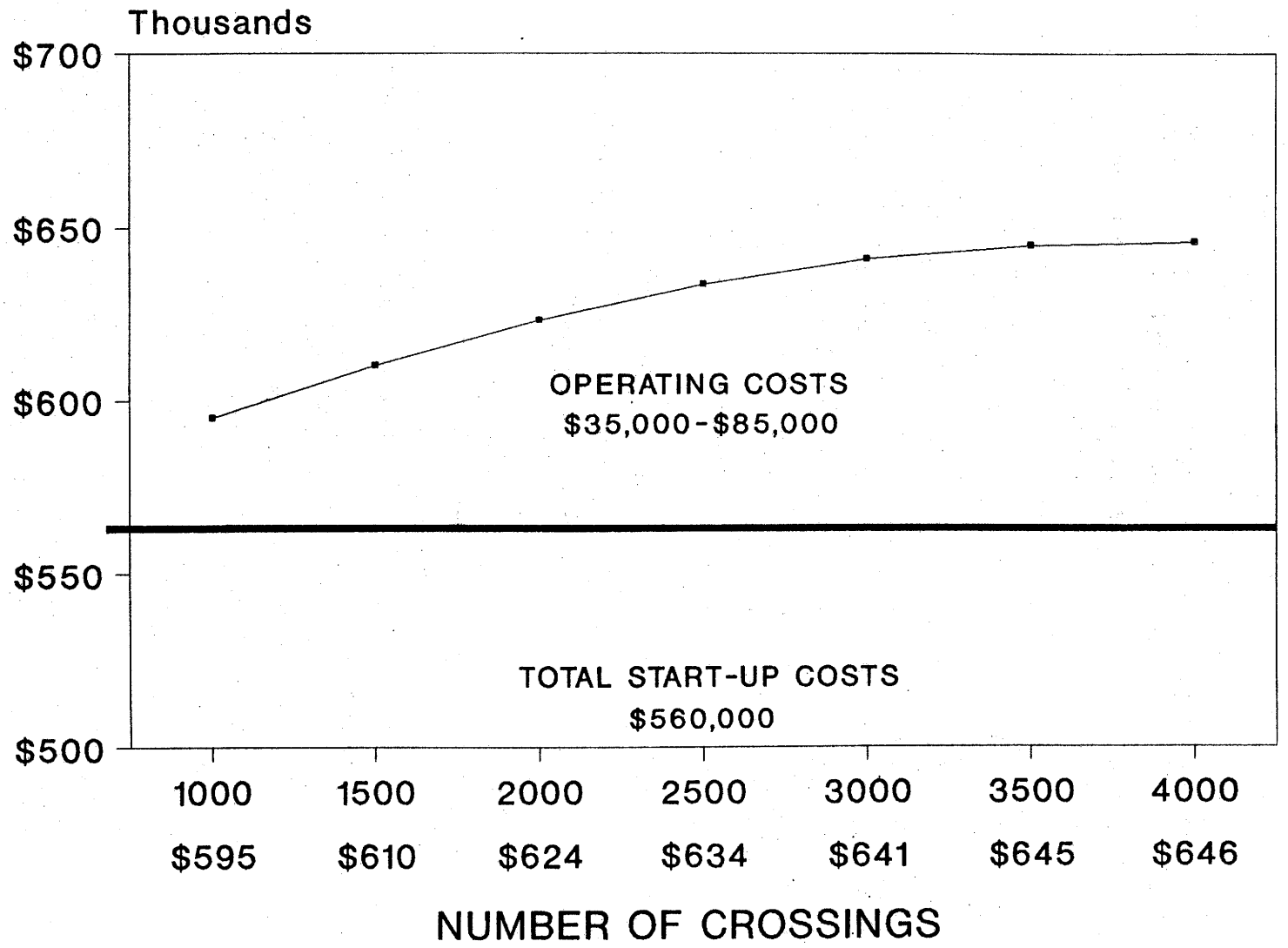
While neither SDHPT nor DPS charge these costs to a specific account for the 1-800 Program, the information presented reflects the "best" estimates of the project staff. The largest single element in the program is the information signs installed at crossing locations. The costs of these were developed from information provided by SDHPT district maintenance personnel who were involved in both the initial and continuing installation process.

Although the DPS did not, nor has it, added any personnel to the Communication Center as a result of the 1-800 Program, there are certainly costs other than telephone charges which are incurred. These costs are real and should be recognized. Obviously, any State evaluating such a program needs to be aware of the cost considerations.

TABLE 7.3
Estimated Costs Incurred by Other States
Adopting a 1-800 Program

| Cost Elements | Estimate Low | Estimate High |
|---|---|---|
| Start-up Costs | | |
| Program Development | $60,000 | $75,000 |
| Information Signs (2500 Locations) | 387,500 | 537,500 |
| Equipment and WATS Installation | 5,250 | 5,500 |
| First Year Operation and Management | 30,000 | 35,000 |
| **Total Start-up Costs** | **$482,750** | **$653,000** |
| Start-up Costs Per Location | $193 | $261 |
| Annual Operating Costs | | |
| Program Operations and Management | $36,000 | $42,000 |
| Sign Replacement (50-85) | 7,750 | 18,275 |
| New Crossing Locations and Additions (50-75) | 7,750 | 16,125 |
| WATS Service (5000-7500) | 2,640 | 3,800 |
| **Total Operating Costs** | **$54,140** | **$80,200** |
| Operating Costs Per Location | $22 | $32 |
| Operating Costs Per Report | $7-$11 | $11-$16 |

FIGURE 7.1 ESTIMATED RANGE OF TOTAL PROGRAM COSTS



# 8.0 RECOMMENDATIONS

## 8.1 INTRODUCTION

This section presents and discusses several recommendations regarding the 1-800 Program, the data developed by the program and its uses, information transfer, adoption by other jurisdictions, and its place in a total crossing safety effort. Also, certain aspects regarding its current use in Texas are presented.

## 8.2 CURRENT USE IN TEXAS

The evidence confirms that the toll-free telephone number is accepted and used by the public. When the railroads are notified about reported crossing problems, they respond. The program as an early warning and problem alert system (which it is designed to be) is certainly a success. Inasmuch as early notification leads to timely crossing problem correction, the program improves crossing safety. It is relatively low cost and does not place an undue burden on the participants. The program generates a wealth of data which can be used in crossing safety activities.

Unfortunately, the program as it currently operates has not approached its potential as a viable and significant addition to a rail-highway crossing safety program. There are probably several reasons for this. They include:

- Lack of publicity regarding the program.
- Limited scope of the program.
- Lack of adequate resources for DPS to organize and format the information.
- Lack of knowledge regarding the data generated by the program.
- No dissemination of summary information to the railroads.
- Within the railroads the flow of information on the 1-800 calls seems to be from the dispatcher to the signal maintainer and, perhaps, a daily summary to the signal engineer. The individual responsible for crossing improvement and safety program (i.e. Public Safety, Public Projects Engineer) may not be aware of the reported problems.

The fact that the program has not been better utilized outside its primary design as an early warning system is not the fault of any single individual or group. The program has been self limiting due to the nature of its initial design. Information developed in the program was not furnished in an organized format to those who could best utilize

the data -- the railroads. Information is compartmentalized to such an extent that it is probably seldom recognized or considered as an input into crossing improvement and safety programs. This is not surprising, considering that even the railroad generating the largest number of reports during the 47-month period covered in this evaluation averaged receiving less than three reports per day. These are certainly not many reports on a system-wide basis; however, the availability and examination of a large volume of historical information can be much more revealing than what can be gleaned from one or two reports received over a 24 hour period.

The SDHPT has never used the information generated by the 1-800 Program and does not currently receive any data regarding the reports. It is not surprising that the department has not been able to benefit from the program. Being furnished a computer listing of the raw data on a monthly basis is certainly not sufficient to suggest problem areas or identify crossings with a history of high report frequencies.

The DPS Communication Center has done an admirable job in running the 1-800 Program. There were no negative comments received concerning their performance. The reports are handled in an expeditious fashion. Every effort is made to insure that the correct crossing is identified. Non-signal related problems are relayed to the railroads. The fact that better use is not made of the 1-800 Program is not the fault of this group. Their purpose is to receive and relay to the proper railroads the reports called in. They certainly do not know the needs of SDHPT, the railroads, or other groups involved in crossing safety and maintenance programs.

## 8.3 USES OF A 1-800 PROGRAM

Currently, the Texas 1-800 Program is used only as specified in the Railroad Safety Information Act. The railroads are notified regarding the reported problem. The database -- prior to this study -- is not compiled or summarized in any way. It seems that a database such as this could be used in several ways, as well as support other rail-highway crossing programs while still maintaining the essential safeguards of the Act. Suggested uses of the data--developed either alone or when merged with other supporting databases--are presented below.

### 8.3.1 Federal/State Program

There appear to be several areas in which a properly-designed and monitored 1-800 program can complement and/or support current Federal/State initiatives. These include:

- As a supporting database for overall rail-highway crossing improvements.
- As a supporting and information tool for diagnostic teams and specific crossing improvement decisions.
- As a supporting database in corridor improvement and evaluation programs.
- As a method to flag or identify specific crossings that may have design flaws.
- As an information source for non-signal related crossing problems.
- As a low-cost addition to a comprehensive crossing safety program.

### 8.3.2 Railroads

Suggested uses of the 1-800 database by railroads include the following:

- As it is currently used, i.e., an early warning and problem notification system.
- As input into existing signal and crossing maintenance procedures.
- As a supporting program to aid in the identification of "problem crossings."
- As a way to assist in the identification of signal system design flaws that may develop due to changes in the crossing environments.
- As a method to identify train operations near the crossing that may result in motorist confusion and misinformation.
- As a program to help identify non-signal related crossing problems such as rough crossing surfaces, sight distance restrictions, vandalism, etc.

### 8.3.3 Use by Other Agencies and/or Organizations

Public awareness of both the 1-800 Program and rail-highway crossing safety can be increased by incorporating information regarding the program into existing education activities. Drivers training, defensive driving courses, and Operation Lifesaver are types of programs that might consider incorporating information regarding the 1-800 Program into their current activities. These activities do not require access to the data and their role would be limited to public education and awareness of the program.

## 8.4 RECOMMENDED CHANGES FOR ADOPTION BY OTHER STATES

Although the Texas 1-800 (as it is currently operating) is not being used to its potential, the existing limitation can be readily corrected without violating its basic structure. Certainly such a program can be adopted by other States with relatively little costs. There are, however, specific additions and changes which are recommended to enhance the usefulness of the program. This section addresses these suggested changes. The suggestions (where appropriate) are directed at both the Texas program as currently

structured, as well as other States considering adoption. However, an adopting State may find it prefers to establish the program in its entirety in one rather than two agencies. Therefore, the following recommendations are not agency specific.

### 8.4.1 State Agency

**Recommendation 1: The legal safeguards relating to the use of 1-800 reports incorporated in the Texas Railroad Safety Information Act should be maintained.**

*Rationale: The success of the Texas program is the primary testimony for this recommendation. Without these safeguards, it is doubtful that the railroads would have cooperated; in fact, they probably would have fought the program. Also, the vast majority of reports are (and will probably continue to be) made by motorists/citizens who are laymen in the area of signals, circuitry, train operations, maintenance, etc. While the reports are important as an early warning mechanism, they are not necessarily problem specific. In Texas, the full meaning of the somewhat cryptic log entry is not always apparent and, therefore, can be misleading. It is doubtful that a Q&A dialogue could be developed that would eliminate the subjectivity and reduce the ambiguity of the reports.*

*For these same reasons a call-back requirement on the railroads does not appear justified. Such a requirement would add costs to the program, unnecessarily burden the state agency and the railroads, and does not significantly contribute to the primary objective of the program as an early warning system.*

**Recommendation 2: The 24-hour toll-free service should be retained.**

*Rationale: Since the program is primarily an early warning system, it must be available 24-hours a day. Obviously crossing signal problems are not an eight- or 12-hour phenomena, and they need to be reported and corrected as soon as possible. The agency assigned the responsibility for the operation of the program needs to be staffed 24-hours, seven days a week.*

**Recommendation 3: All rail-highway crossings with train-activated signals should be included in the program.**

*Rationale: Similar to the previous recommendation, it is obvious that all crossings with activated signals should be included in the program. The on system-off system dichotomy does not apply to the occurrence of signal problems.*

**Recommendation 4: The reporting mechanism should be computer based and include selected data elements from the DOT/AAR National Inventory. The log procedure can then incorporate these items in periodic summary reports. The information will also be available for problem identification and evaluation. It is recommended that railroad contact dial-up capabilities be included in the computer log.**

*Rationale: The immediate availability of selected crossing information from the inventory -- such as ID number, railroad, highway and/or street number (name), railroad milepost, and signal class -- will help reduce the likelihood of error, enable the operating agency to transmit to the railroad detailed information on location and signal type, and reduce delays in notification. Finally, the availability of the computerized inventory coupled with direct 1-800 data entry facilitates the development of summary reports.*

**Recommendation 5: Summary reports of the 1-800 calls should be prepared and provided to the railroads on a periodic basis. The reports should include only the calls relating to individual railroads. The data elements included and the format of the reports should be mutually agreeable. At a minimum, the reports should identify the crossings and furnish information on frequencies, types of problems reported, signal types, and location. The availability of the inventory provides the capability to develop customized reports to meet the needs of the users.**

*Rationale: As previously mentioned, one of the major concerns regarding the Texas operation is the void of information provided to the primary beneficiaries of the program -- the railroads. While timely notification to the railroads of signal problems is the primary objective of the program, the availability of historical data generated by the program is considered critical to evaluation and problem solution. The "trickling in" of two, three, or four reports to a railroad on a daily basis may result in immediate problem correction, but not necessarily problem identification or long-term solutions. Chronic problems relating to a specific crossing, group of crossings or corridor are not apparent or easily recognized without the benefit of properly-structured historical data such as that generated by a 1-800 type program.*

**Recommendation 6: Summary information should be furnished to the State agency with responsibility for the rail-highway crossing safety program (Section 130).**

*Rationale: This recommendation is similar to Recommendation 5. If the agency responsible for the 1-800 Program is also assigned the crossing safety program, the flow of information is internal and easily accommodated. If the program is structured as it is in Texas, the data elements and summary formats need to address the requirements of the*

*using agency. In line with the basic concept of the 1-800 Program, this recommendation applies only to the State agency responsible for Section 130 in order to assist in the administration of that program.*

**Recommendation 7: Effort needs to be made to increase public awareness, participation, and understanding of the 1-800 Program.**

*Rationale: While the experience in Texas indicates that a 1-800 Program can be initiated with virtually no promotion, the need remains to increase public awareness of the program. This does not necessarily require a large effort. Existing mechanisms such as Operation Lifesaver, defensive driving, drivers training, and similar programs provide an excellent opportunity to inform motorists of the program. Procedures to incorporate the 1-800 Program into those areas need to be developed.*

**Recommendation 8: Procedures to increase local law enforcement and roadway maintenance personnel reporting need to be developed.**

*Rationale: This recommendation is a companion to Recommendation 7. Personnel of these agencies are out on a daily basis and have the opportunity to observe and report signal problems. They are usually in contact with their dispatcher who can notify the 1-800 operator. Also, a program could be developed to train these groups in signal problem identification so that more complete information can be relayed to the railroads. This does not need to be an extensive effort, since the mechanisms are in place; rather, the basic need is for improved communication.*

### 8.4.2 Railroads

**Recommendation 1: Railroads should work jointly with the responsible State agency to insure that information reported and summary reports developed meet their needs in the areas of crossing safety and signal maintenance.**

*Rationale: Just as the State agency should not develop and initiate a 1-800 Program in a vacuum, the railroads should not take a passive position. They need to actively involve themselves in the development and implementation to insure that: the information reported and relayed is of the highest quality; the summary reports provide insight to problem identification; and the objectives of the 1-800 Program are met.*

**Recommendation 2: If possible, and consistent with the railroad companies' organization, there should be only one contact location/phone number to receive 1-800 telephone reports.**

*Rationale: The computerization of the 1-800 report process coupled with the inventory file and railroad dial-up capabilities will alleviate the problems and confusion of multiple contacts for the State agency. With one central location receiving the telephone reports, the railroad would be in an improved position to identify, evaluate, and correct recurring problems.*

**Recommendation 3: Summary reports furnished to the railroads by the State operating agency should be provided to the railroad personnel at the State level responsible for crossing improvement and safety programs.**

*Rationale: During meetings with railroad personnel with responsibilities for crossing improvement and safety programs, it was found that some were not aware of the volume or frequency of 1-800 reports, or the types of crossing problems being reported. Although aware of the program, they did not know how it operated in their railroad or the type of problem found by the signal maintainer. While the objective of the 1-800 Program is to correct the reported problem, the information can also be used to reduce the re-occurrence of problems. This latter aspect of the program may not be met unless the railroad personnel working with State officials in crossing improvement and safety programs are aware of the volume and types of reports received. If summary reports are not provided by the State agencies, the railroads should be sure that personnel working with these groups are aware of the reports received.*

## 8.5 RECOMMENDED 1-800 PROGRAM DEVELOPMENT GUIDELINES

This section presents suggested guidelines for the development and implementation of a 1-800 Program by other States. These are not intended to be step-by-step procedures but rather guidelines and benchmarks for States considering adoption of the notification concept.

**Initial Involvement and Activities**

- Legislative Staff
- Railroad Interest
  - Management
  - Labor
  - State Association

- State Implementing and Operating Agency(ies)
- Program Objectives and Goals
- Agency(ies) role
- Railroads role
- Identify information needs and data uses

**Legislation Should**

- Maintain confidentiality of reports
- Prohibit use of program information in courts
- Include all crossings with active warning devices
- Provide adequate funding to State agency(ies) for program implementation and operation

**Implementation**

- Design (or adopt) information sign
- Develop procedures to install signs at newly improved crossings and notification of program operation agency of status change
- Provide operating agency with State inventory file of crossings with active warning devices
- Obtain telephone numbers for railroad contacts
- Install toll-free telephone service
- Determine information needs, data uses and summary reports format

**Program Output**

- Notification of railroads regarding crossing related problems as reports received
- Provide summary information on a periodic basis to railroads regarding reports received about their crossings
- Provide summary information to State agency responsible for rail-highway crossing program

## 8.6 RECOMMENDED LOG

A copy of the log used in Texas is presented in the Appendix. This log meets the basic requirements of the program--to record reports and verify railroad contact. In using a computer based logging procedure and selected data elements from the DOT/AAR National Inventory, however, a state can design and structure the log to meet unique reporting and information needs mutually agreeable to both the agency and the railroads.

## 8.7 RECOMMENDED LEGISLATION

A copy of the legislation establishing the Texas 1-800 Program as well as a copy of a House Bill extending the scope of the program to certain off-system crossings and placing additional responsibilities on the DPS are in the Appendix. These two items of legislation, coupled with recommendations in this Section provide a framework to be used by states implementing a call-in program.

## 8.8 SUMMARY

The recommendations, if adopted, would greatly enhance the overall effectiveness of the Texas 1-800 Program. Importantly, these enhancements can be fairly easily achieved at relatively low cost. For states that are contemplating a similar call-in program, the knowledge gained from the evaluation of the Texas 1-800 Program coupled with the information of these recommendations will provide a robust full-dimensioned approach that can be tailored to the unique requirements, needs, and characteristics of all the states in the U.S.

## 9.0 APPENDIX

- Article 6370a. Telephone Service to Report Malfunctions of Mechanical Safety Devices at Crossing
- House Bill 2408
- Railroad Malfunction Log (blank)
- 800 Number Reported "Malfunction" Codes
- Railroad Malfunction Log (with entries)
- List of Fields DOT/AAR National Inventory (Texas)
- Examples of Reported Crossing Problems
- Form Provided Railroad to Authenticate Reported Crossing Problems
- Comments Received from Police and Sheriff Departments

Art. 6370a. **Telephone service to report malfunction of mechanical safety device at crossings**

Section 1. The Texas Department of Public Safety shall establish throughout the state an incoming toll-free telephone service to receive calls about malfunctions of signals, crossbars, and other mechanical devices erected to promote safety at intersections of railroad tracks and public roads. The State Department of Highways and Public Transportation shall affix the telephone number, an explanation of its purposes and the crossing number on the crossbars at each intersection of railroad tracks and ana state-maintained public road at which a mechanical safety device is erected. Each railroad company shall permit department personnel to affix the telephone number on their private property. The Texas Department of Public Safety shall maintain the operation of the telephone service. The Department of Public Safety will notify the identified railroad company of the report.

Section 2. A court may not hold the state, an agency or subdivision of the state, or a railroad company liable for damages caused by an action taken under this Act or failure to perform a duty imposed by this Act. No evidence may be introduced in a trial or judicial proceeding that such service exists or is relied upon by the state or railroad company.

Section 3. A state agency is not required to make or retain permanent records of information obtained in implementation of this Act.

Acts 1983, 68th Leg., p. 2245, ch. 419, 1 to 3, eff. Sept. 1, 1983.

Title of Act:

An Act relating to railroad crossing safety information. Acts 1983, 68th Leg., p. 2245, ch. 419.

By [signature] Route to: Jack Lamkin

H.B. No. 2408

A BILL TO BE ENTITLED

AN ACT

relating to railroad crossing safety information regarding railroad intersections in unincorporated areas of the state.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Sections 1 and 3, Chapter 419, Acts of the 68th Legislature, Regular Session, 1983 (Article 6370a, Vernon's Texas Civil Statutes), are amended to read as follows:

Sec. 1. (a) The Texas Department of Public Safety shall establish throughout the state an incoming toll-free telephone service to receive calls about malfunctions of signals, crossbars, and other mechanical devices erected to promote safety at intersections of railroad tracks and public roads. The State Department of Highways and Public Transportation shall affix the telephone number, an explanation of its purposes, and the crossing number on the crossbars at each intersection, at which a mechanical safety device is erected, of railroad tracks and a state-maintained public road. The political subdivision of the state responsible for maintaining a public road that is not maintained by the state and that is outside the boundaries of a municipality shall affix the telephone number, an explanation of its purposes, and the crossing number at each intersection, at which a mechanical safety device is erected, of railroad tracks and the public road [at which a mechanical safety device is erected]. Each railroad company shall permit [department] personnel to affix the telephone

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TRANSPORTATION DIVISION
AUSTIN, TEXAS

number on their private property as provided by this section. The Texas Department of Public Safety shall maintain the operation of the telephone service. The Department of Public Safety will notify the identified railroad company of the report.

(b) The Texas Department of Public Safety shall develop and maintain a computerized system for recording and identifying all intersections of railroad tracks and public roads that are outside the boundaries of a municipality and the railroad crossing safety equipment located at those intersections.

(c) An agency of the state, including the State Department of Highways and Public Transportation, or a political subdivision of the state shall, not later than three days before the date of installation of any railroad crossing safety equipment at an intersection subject to this section, notify the Texas Department of Public Safety of the location of the installation and the equipment to be installed.

Sec. 3. Except as provided by Section 1(b) of this Act, a [A] state agency is not required to make or retain permanent records of information obtained in implementation of this Act.

SECTION 2. The Department of Public Safety shall establish a computerized system as required by Section 1(b), Chapter 419, Acts of the 68th Legislature, Regular Session, 1983 (Article 6370a, Vernon's Texas Civil Statutes), as added by this Act, not later than January 1, 1991.

SECTION 3. The importance of this legislation and the crowded condition of the calendars in both houses create an emergency and an imperative public necessity that the

constitutional rule requiring bills to be read on three several days in each house be suspended, and this rule is hereby suspended, and that this Act take effect and be in force from and after its passage, and it is so enacted.

RAILROAD MALFUNCTION LOG

MONTH _____ PAGE _____

| DAY | TIME | DOT | CITY AND/OR COUNTY | LOCATION | MALFUNCTION | RR | DAY | TIME | OPR |
|---|---|---|---|---|---|---|---|---|---|
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## 800 Number Reported "Malfunction" Codes:

1-- Warning Equipment, Automatic
10- Signal, unspecified
100 Malfunction not recorded
101 Activated, no train apparent/at crossing
102 Not activated, train at crossing (not working)
103 Improper timing, early/late activation
104 Damaged, missing, misaligned

11- Lights and Lights & Bells
110 Malfunction not recorded
111 Activated, no train apparent/at crossing
112 Not activated, train at crossing (not working)
113 Improper timing, early/late activation
114 Damaged, missing, misaligned

12- Gate Arm
120 Malfunction not recorded
121 Activated, no train apparent/at crossing
122 Not Activated, train at crossing (not working)
123 Improper timing, early/late activation
124 Damaged, missing, misaligned

13- Lights, Bells, Arm or any combination w/arm
130 Malfunction not recorded
131 Activated, no train apparent/at crossing
132 Not Activated, train at crossing (not working)
133 Improper timing, early/late activation
134 Damaged, missing, misaligned

14- Bells
140 Malfunction not recorded
141 Activated, no train apparent/at crossing
142 Not Activated, train at crossing (not working)
143 Improper timing, early/late activation
144 Damaged, missing, misaligned

15- Wires, signal housing/case
150 Malfunction not recorded
154 Damaged, missing, misaligned
155 Control Box open

2- Signs and Markings
21 Damaged
22 Missing
23 Misaligned

3- Crossing blocked/highway problems at or near crossing
30 Accident-not explained
31 Train-vehicle accident/collision
32 Vehicle-vehicle accident at/near crossing
33 By train(s)/car(s)/equipment
34 By highway traffic signals
35 Train-pedestrian accident
36 Problem at crossing-miscellaneous

4- Track and Structures
41 Rough crossing surface/pot holes/damaged vehicles
42 Protruding/loose spikes
43 Broken/loose crossing surface timbers/boards/panels
44 Broken/loose/rotten tracks/bolts/ties
45 Ballast/ditch/drainage problems, washout
46 Fencing/guard rail damage/destroyed/missing
47 Other

5- Trespassers
51 Vandals/hobos/trespassers on property
52 Injuries
53 Body/body parts found

6- Sight Distance
6- View of train obstructed/confused
61 By foliage
62 By structures/topography/geometry
63 By rail cars
64 By advertising signs/lights or background lights

6- Approach road/view of signs/signals obstructed/confused
65 By foliage
66 By structures/topography/geometry
67 By parked vehicles
68 By advertising signs/lights or background lights
69 Other

7- Train Operations
71 Too fast/too slow/too frequent
72 Endangered, tracks blocked, vehicle caught/stalled
73 Vehicle lost load on tracks
74 Train damaged, hot box, heat/fire/sparks from train
75 Train car leaking/losing load
76 Dragging/derailed equipment
77 Other

8- Miscellaneous
81 Complaint
82 Questions

| | |
|---|---|
| 83 | Information |
| 84 | Other |
| 85 | Information - easement |
| 86 | Highway appurtenances |
| 87 | Damage to poles - unspecified |
| 88 | Power lines |

RAILROAD MALFUNCTION LOG

MONTH December 1988 PAGE 1

| DAY | TIME | DOT | | CITY AND/OR COUNTY | LOCATION | MALFUNCTION | RR | DAY | TIME | OPR |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0002 | | | ——— | TEST | ——— | | 01 | 0002 | LDM |
| 31 | 2237 | | | San Marcos/Hays | FM 12 | Lts fl | | 01 | 0240 | [illegible] |
| 01 | 0153 | | | Austin/Travis | FM 969 | lts on | | 01 | 0808 | MC |
| 01 | 0758 | | | Austin/Travis | East MLK | lts on | | 01 | 0808 | MC |
| 01 | 0951 | | | Anna/Collin | Main St. | lts flshing-arms↓ | | 01 | 0955 | TLH |
| 01 | 1136 | | | Winchester/Fayette | FM 153 | arms stuck ↓ | | 01 | 1139 | TLH |
| 01 | 1249 | | | Kyle/Hays | FM 150 | ARMS ↓ | | 01 | 1249 | MC |
| 01 | 1313 | A-9 | | Holliday/Archer | subj. wants signals put on all 3 X's | in Holliday- ADV RR CO. | | 01 | 1318 | MC |
| 01 | 1317 | | | Liverpool/Brazoria | FM 2917 | lts flashing | | 01 | 1327 | TLH |
| 01 | 1612 | | A | VERNON/WILBARGER | [redacted] MAIN US283 | ARMS BROKEN | | 01 | 1614 | RJP |
| 01 | 1657 | | B | MINEOLA/WOOD | FM 2422 | LTS DON'T FLASH | | 01 | 1658 | RJP |
| 01 | 1947 | | W | SPLENDORA/MONTGOMERY | 1ES & 1ST | ARMS DN | | 01 | 1948 | RJP |
| 01 | 2137 | | J | Midland/Midland | Terrell St. | Car on track | | 01 | 2138 | [illegible] |
| 01 | 2148 | | R | MT VERNON/FRANKLIN | FOREMAN/HOLBROOK | LTS FL ARMS UP/DN | | 01 | 2149 | RJP |
| 02 | 0010 | | | ——— | Test | ——— | | 02 | 0010 | [illegible] |
| 02 | 0403 | | | Nacogdoches/Nacogdoches | Fredonia St. | arms down | | 02 | 0405 | [illegible] |
| 02 | 0403 | | | Nacogdoches/Nacogdoches | Fredonia St. | arms down | | 02 | 0405 | [illegible] |
| 02 | 0803 | | | ——— | TEST-OK | | | | | MMG |
| 02 | 0830 | | F | Ft. Worth/Tarrant | Sycamore St. | arms ↓ | | 02 | 0834 | TLH |

RAILROAD MALFUNCTION LOG

MONTH December PAGE 2

| | DAY | TIME | DOT | | CITY AND/OR COUNTY | LOCATION | MALFUNCTION | RR | DAY | TIME | OPR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 02 | 0948 | | M | Brenham/Washington | FM 109 | wanted # for crossing owner | | 02 | 0945 | TLH |
| * | 02 | 1151 | | Y | Lamarque/Galveston | SH 348 | lts flashing | | 02 | 1153 | TLH |
| | 02 | 1300 | | | Moody/McClennan | FM 107 | Arms brkn off | | 02 | 1301 | M |
| * | 02 | 1311 | | Y | Texas City/Galveston | FM 1765 + SH 146 | Bells-no train | | 02 | 1313 | TLH |
| | 02 | 1316 | | K | Moody/McClennan | FM 107 | arm broken off | | 02 | | TLH |
| | 02 | 1420 | | | Raymondville/Willacy | FM 490 | lts damaged | | 02 | 1423 | TLH |
| | 02 | 1632 | | | | test | | | | | Sim |
| * | 02 | 1830 | | Y | Texas City/Galveston | → called in 1151 and 1311 | lts | | 02 | 1934-b | Sim |
| | 02 | 1900 | | X | Pittsburg/Camp | Smitman St/Hwy 11 | lts | | 02 | 1946-b 2011 | Sim |
| | 02 | 1910 | | T | Port Arthur/Jefferson | Hwy 87 | lts | | 02 | 1923 | Sim |
| | 02 | 2030 | | O | Pittsburg/Camp | Mt Pleasant/LF 238 | spikes | | 02 | 2037-na | Sim |
| * | 02 | 2219 | | Y | Tx City/Galveston | Hwy 348 | additional info. train cars parked on xing | | 02 | 2227 | Sim |
| | 03 | 0002 | | | Lubbock/Lubbock | 4th St + FM 40 | lts ll/arms ↓ | | 03 | 0025 | TLH |
| | 03 | 0800 | | | | test ok | | | | | M |
| | 03 | 0902 | | | Perryton/Ochiltree | US 83 | Arms broken off | | 03 | 0902 | M |
| | 03 | 1036 | | | Greenville/Hunt | lp. 302 | lts/bls on | | 03 | 1037 | M |
| | 03 | 1220 | | | Murchison/ | FM 773 | Arms brkn off | | 03 | 1255 | M |
| | 03 | 1253 | | | Decatur/Wise | FM 730 | Arms ↓/lts on | | 03 | 1257 | M |
| | 03 | 1610 | | M | Tomball/Harris | FM 2978 | arms ↓ | | 03 | 1614-b 1643 | Sim |
| | 03 | 1611 | | | | | | | | | |

RAILROAD MALFUNCTION LOG

MONTH December PAGE 3

| DAY | TIME | DOT | | CITY AND/OR COUNTY | LOCATION | MALFUNCTION | RR | DAY | TIME | OPR |
|---|---|---|---|---|---|---|---|---|---|---|
| 03 | 2030 | | | Midland / Midland | Front & Terrell | lts fl | | 03 | 2031 | RA |
| 03 | 2121 | | M | —— / Montague | Mill St / US 287 | lts, arms ↓ | | 03 | 2123 | JSM |
| 04 | 0002 | | | Mission / Hidalgo | Business 83 | lts - no train | | La Joya | good DC | TCH |
| 04 | 0039 | | | Hereford / Deaf Smith | Hwy 60 & Main | N/B arm doesn't go down | | 04 | 0042 | TCH |
| 04 | 0109 | | | Telferner / Victoria | FM 1686 | lts - no train | | 04 | 0112 | TCH |
| 04 | 0628 | | H | Greenville / Hunt | Lee St. | lts - no train | | 04 | 0631 | TCH |
| | | | | | | test ok | | 04 | 0800 | RA |
| 04 | 0833 | | | Ft. Worth / Tarrant | Forest Hill Dr / IH 820 | lts bells no tr. | | 04 | 0836 | RA |
| 04 | 1016 | | | Sulphur / Hopkins | FM 69 & Hwy 11 | Arms DN / LTS FL | | 04 | 1018 | TGG |
| 04 | 1332 | | A | League / Galveston | 500 E Main | Arms up/dn | | 04 | 1333 | TGG |
| 04 | 1635 | | | —— | Test | —— | | 04 | 1635 | TGG |
| 04 | 1805 | | | Kermit / Winkler | SH 115 | spikes sticking up, planks loose | | 04 | 1809 | TGG |
| 04 | 2116 | | | Jenaha / Shelby | Main St + FM 947 | arms ↓ | | 04 | 2140 | TGG |
| 04 | 2135 | | | Stratford / Sherman | Popular St + 21 & 287 | arm broken off | | 04 | 2140 | TGG |
| 05 | 0005 | | | —— | TEST | —— | | —— | | TCH |
| 05 | 0110 | | L | Tyler / Smith | Golden Rd. | arms ↓ - lts flashing | | 04 | 0113 | TCH |
| 05 | 0628 | | | Forest Hill / Tarrant | Forest Hill Dr. | lts & bells - no train | | 05 | 0632 | TCH |
| 05 | 0730 | | / | Plano / Collin | [illegible] 18th & Ave I | arm ↓ - lts | | 05 | 0734 | TCH |
| 05 | 0821 | | L | Paris / Lamar | 19th St / FM 137 | lts | | 05 | 0832 | RA |
| 05 | 0832 | | | —— | —— | —— | | —— | —— | —— |

List of Fields DOT/AAR National Inventory (Texas)

ID
CITY
NEAREST
RRCODE
RRDIV
RRSUB
HIGHWAY_NO
STREET
DAY_TRAINS
DAY_SWITCH
NITE_THRU
NITE_SWITCH
ONE_PER_DA
MIN_SPEED
MAX_SPEED
MAIN_TRAKS
OTHER_TRKS
PRO_CLASS
STATE_HWY
HWY_SYSTEM
TYPE_HWY
AADT_1
PER_TRUCKS

# EXAMPLES OF REPORTED CROSSING PROBLEMS

Arm - Arms raised while train passing
Arm - Broke
Arm - Broken Off
Arm - Down
Arm - Not Working Properly
Arm - One Arm Off
Arm - Slow to Activate
Arm - Mast Holding Arms Down
Arm - 1/2 Down
Arm - Bent Across Tracks
Arm - Delayed
Arm - Destroyed
Arm - Down Half Way Train Passing
Arm - Traffic Jam
Arm - Down/Lights Broke
Arm - Hit By Car
Arm - Removed
Arm - Broken Laying Across Track
Bells - Not Ringing
Bells - Not Loud ENough
Bells - On-All Night
Bells - Weak
Bells/Lights - On 4 Days
Car on track
Car on track leaking white powder
Cattle on tracks
Cars blocking crossing
Chemical leak
Control block open
Child laying face down in boxcar
Cross sign broken
Cross ties to close to roadway
Crossing lights on
Deep holes on track
Empty cars causing lts/bls to work
Equipment not working at all
Fire from train
Flashing lights bells
Fuse box tampered with
Gate broken
Gates down and lights
Grass fires
Ice/snow on tracks
Information only
Large hole in middle of railroad
Lights-late turning on, train too close

## EXAMPLES OF REPORTED CROSSING PROBLEMS (Continued)

Lights out
Loose section of tracks
Loose ties
Lights activate too slow
Lights on past 8 days
Lights burned out
Lights did not come on when train passed
Lights flash no train cars parked on tracks
Lights knocked down by car
Lights not operating
Lights on/bells ringing for week
Lights - south side on
Lights stolen
Lights missing
Lights not on while train passing
Lights on one arm up one arm down no train
Lights & bells malfunctioning-ties shifted
Lights & bells not working until train in intersection
Lights & bells not working when train passes
Lights & bells on each time rains hard
Mayor selling gravel to public
Major accident
Need arms removed, no tracks 2 yrs.
New pole needed
No lights - shot out
Not relaying over to stop lights
Noisy (Bang Sound)
Other - car stalled on tracks
Other - crossing needs repair
Other - chug holes
Other - loose spikes
Other - no signals
Other - pole down
Other - pole hit
Other - signal on ground
Other - tank car sparking
Other - ties sticking up
Other - train stalled on track
Other - arm catching on broken light
Other - arms came down too late when train pass
Other - blind crossing/trees
Other - blocking track
Other - broken fence
Other - complaint - spike Damage
Other - cross tie sticking up
Other - equipment on tracks
Other - fire dept on track

Other - rail bent
Other - lock loose in box
Other - limbs near xing
Other - line to signals down
Other - loose boards crossing
Other - loose cross ties
Other - lights dangling
Other - lights delayed
Other - lights pulled down by tractor
Other - no action
Other - needs to dig
Planking loose
Pole down
Possible burning train
Potholes between tracks
Power lines down
Problem with drainage-causes flooding
Rail split by lightning
Rail train pushed into a car
Rail up
Rough crossing
Rough road
RR lts causing traffic problems
Sign down
Sign knocked down
Sign needs to be re-aligned
Signal box hit-accident
Signal broken
Signal flash
Signal housing hit by car
Signal lts pole lying on RR track
Signals late
Signals not working
Signals on no train
Signals slow to activate
Sparks under train
Spikes up ties rotten
Tank tipped off track
Ties broken
Ties loose
Ties missing on RR bridge crossing
Ties on fire
Tracks damaged
Tracks rough
Tracks vandalized
Vehicle stalled on tracks
Wire cut

EXAMPLES OF REPORTED CROSSING PROBLEMS (Continued)

Wires on track
Wire exposed to RR LTS/BLS
Working on road need help
Xing maintainer need more information
Xing sign knocked down

# 1-800 Log

## Grade Crossing Signal Reports Received from Texas Department of Public Safety

| Date | Time | Crossing ID # | Problems Reported by DPS | Problem Found at Location |
|---|---|---|---|---|
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## Comments Received from Police and Sheriff Departments

- Program is a flop; we get response only after calling directly to the office.
- To our knowledge we received no notification of this program.
- This is the first I have heard of this program. I have worked in communications for 5 years. If this is the same # for all crossing/railroads it would be nice.
- As of this writing this system will be utilized in the future but this agency was heretofore unaware of this service.
- Better ability to communicate this type of information to agencies such as ours.
- We were aware of the program only because of the signs posted at the crossings.
- I was unable to locate anyone in this department that was aware of the program.
- Made aware by the posted signs at the crossings, very helpful. No suggestions at this time.
- Phone number & ID # of all crossing arms posted in dispatch office.
- The 800 system should be placed at all crossings. As it is in the county, there are only two places.
- Our department will be using the toll-free number in the future, along with the railroads in case of emergencies.
- More publicity-at scheduled intervals for constant reminder.
- First we have been notified of proposal.
- Send annual memo as reminder
- Not aware it was part of DPS. Could the railroad supply a list of the ID #'s for the crossings to the appropriate agency to avoid delays in reporting malfunctions on the reporting agencies response.
- Pass legislation to fine the railroad companies for not repairing defective crossing signals. I have one crossing that has been reported 7 days straight.
- All officers call in on radio, and the dispatcher makes the call on the 1-800 number.
- Speed up railroad response time after call.
- Biggest problem experienced is response to correct crossing.
- Sometimes crossing #'s are not available. I think the location should be efficient.
- Sometimes when we call it takes a while to correct the problem.
- Expansion of Program to include RR crossings. Notification of program to all law enforcement agencies statewide to increase awareness.
- Perhaps a statewide notification to inform police departments about the existence of the program.
- We have only 2 at-grade crossings on state maintained highways in the city limits. Neither are posted with the 1-800 number.
- More publicity about the toll-free call-in program.