EXECUTIVE SUMMARY

COMMERCIAL SECURITY FIELD TEST PROGRAM:

IMPACT OF SECURITY SURVEYS ON COMMERCIAL CRIME

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Prepared for

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PREFACE

In October 1979, Public Systems Evaluation, Inc. (PSE) was awarded a grant by the Office of Program Evaluation, the National Institute of Justice (NIJ), U.S. Department of Justice, to evaluate the Commercial Security Field Test (CSFT) Program. The purpose of the CSFT Program was to test the effectiveness of security surveys as a strategy for reducing the incidence of commercial crime -- including burglary, robbery, and larceny (i.e., shoplifting and employee theft) -- in small commercial establishments.

The CSFT Program was carried out in three cities: Denver (CO), Long Beach (CA), and St. Louis (MO). The three sites were selected by NIJ's Program Coordinating Team (PCT) -- composed of representatives from NIJ's Office of Development, Testing, and Dissemination, Office of Program Evaluation, and Office of Research Programs, as well as from the Law Enforcement Assistance Administration's Office of Community Anti-Crime Programs. A contractor -- the University of Research Corporation (URC) -- assisted the PCT in the selection process, which concluded in April of 1980 with the awarding of grants to the Denver Anti-Crime Council, the Long Beach Police Department, and the St. Louis Commission on Crime and Law Enforcement.

As the evaluators, we at PSE were able to monitor the entire CSFT Program. While overall direction and analytical support were provided by PSE's Cambridge office, the Program's process was carefully monitored by our on-site personnel. Further, related technical assistance -- especially in the area of data collection -- was also provided to the site grantees during the course of the Program. In addition to conducting an in-depth evaluation of the CSFT Program, we have tried to consider the implications of our findings, especially from a national, policy-relevant perspective. In sum, we have undertaken a systemic evaluation, which is at once an audit, formative, and summative evaluation, as well as a prospective study addressing such issues as transferability and generalizability.

Our evaluation findings are documented in two reports. The extensive Final Report contains the technical details; copies of the report can be obtained from either the NIJ National Criminal Justice Reference Service or PSE. This Executive Summary contains a non-technically-oriented summary of the Final Report, written especially for the criminal justice practitioner.

ABSTRACT

Given the millions of dollars spent annually in the conduct of security surveys and in the subsequent compliance with survey recommendations, it is reasonable to ask: Is the crime prevention approach of security surveys effective against commercial crimes? For several reasons, previous studies or evaluations of security survey programs have been unable to provide an answer to this very important question. The National Institute of Justice (NIJ)-funded Commercial Security Field Test (CSFT) Program was specifically developed to address the above stated questions, especially in regard to the commercial crime of burglary.

The CSFT Program was carried out in three cities -- Denver (CO), Long Beach (CA), and St. Louis (MO) -- and included conducting security surveys of 430 commercial establishments located in 10 commercial areas throughout the three cities. Some five follow-up visits were made to each surveyed establishment to both enhance and check on tbe degree to which the resultant survey recommendations had been complied with; the final overall compliance level -- defined as the percent of total recommended changes that were complied with -- was 59.1 percent, which is almost twice the level experienced by other similar security survey efforts where no follow-up visits were made. After the final compliance check, the security survey staff in the three cities were asked to undertake for each surveyed establishment (i) a review of what survey recommendations had been made; (ii) a review of which recommendations had been complied with; and (iii) a subjective judgement on whether or not the complied recommendations -- in relation to all the recommendations -- were suhstantial enough to reduce the establishment's risk-to-burglary, thus designating the estahlishment as being either "treated" or "untreated". Out of the 430 surveyed establishments, 194 were considered treated while 236 were considered untreated. (A subsequent analysis revealed that the treated establishments had an overall compliance level of 77.3 percent, as compared to a 42.4 percent figure for the untreated estahlishments.) The nearly even split and comparability between the treated and untreated establishments -- even within a commercial test area -- provided the hasis for implementing a split-area research design. In applying this design to the resultant burglary statistics, it can be concluded that security surveys (with compliance) accounted for a significant 64.8 percent reduction in burglary in Denver; no such impact was observed in either Long Beach or St. Louis.

In sum, in response to the above stated question, the answer is yes; the use nf security surveys can be effective against commercial crimes, but only if the treatment is adequate -- that is, the survey recommendations are (i) systematically identified and (ii) complied with. Interestingly, this important finding suggests that the traditional manner of conducting security surveys -- in which neither the systematic identification of the survey recommendations nor their compliance is emphasized -- is totally inadequate. The importance of these two factors cannot be over-stated. Finally, in addition to summarizing other critical evaluation findings, this Executive Summary discusses two key recommendations.

ACKNOWLEDGEMENTS

This broad and significant field test could not have been developed, implemented and evaluated without active participation of the National Institute of Justice's Program Coordinating Team (PCT), the Program's site personnel, and the Program's training and technical assistance contractor -- the University Research Corporation (URC). The PCT members -- F. Becker, L. Bennet, P. Cascarano, S. Epstein, F. Heinzelmann, L. Mayo, M. O'Connor, R. Rau, R. Titus and R. Tretbric -- should be acknowledged for tbeir vision and guidance; the site personnel -- M. Alvarez, J. Carr, J. Costigan, R. Fuller, M. Wagner, and D. Weller from Denver; S. McAndrew, L. Rhoads, C. Ussery and R. Wood from Long Beach; and L. Bates, S. Hart, P. Herman, J. Huelsmann, P. Newhouse, G. Poelling, and D. Richardson from St. Louis -- should be recognized for their diligence and willingness to be involved in innovative field tests; and the URC Personnel -- J. Bunce, E. Pesce and S. Steinberg -- should be commended for their understanding and recognition of the difficulties associated with an extensive evaluation; tbeir individual and collective contributions to this report are acknowledged, while the authors bear sole responsibility for the points of view and opinions expressed herein.

The authors would especially like to thank Dr. Richard M. Rau, the NIJ Project Monitor, for his guidance, understanding and support. In particular, this Executive Summary has benefitted from careful reviews provided by both Drs. Rau and Heinzelmann.

Other staff members at Public Systems Evaluation, Inc. (PSE) have made essential contributions to the report. PSE's on-site personnel -- A. Crepin, L. Fry, D. Landes, and B. Thomas -- provided invaluable information and insight; PSE's technical staff -- K. Colton, P. Hamlin, R. Larson, S. McMorrow, T. Rich and M. Shattow -- provided critical computer and analytical support, as well as review of the final report; and PSE's administrative staff -- J. Bohmfalk, K. Lillios, R. Moore and D. Godinho -- provided skillful typing and editing support. The final version of this Executive Summary was typed by Ms. Sandra Brown and Ms. Judi Bloomingdale.

TABLE OF CONTENTS

LIST OF EXHIBITS

reducing the identified opportunities. Security surveys are usually conducted following the occurrence of a crime (in most instances, a burglary) or by request of the owner or manager of the business.

Given the millions of dollars spent annually in the conduct of security surveys and in the subsequent compliance with survey recommendations, it is reasonable to ask: Is the crime prevention approach of security surveys effective against commercial crimes? In reviewing the literature, we found that although several studies focus on the general aspects of security surveys and commercial crimes [Small Business Administration, 1969; Kingsbury, 1973; White et al., 1975; International Training, Research, and Evaluation Council, 1977; Gunn et al., 1978; Bickman and Rosenbaum, 1980], only a handful [Touche Ross and Company, 1976; Minnesota Governor's Commission on Crime Prevention and Control, 1976; Lavrakas et al., 1978; Eversen, 1979; Pearson, 1980] deal with the results of an actual implemented security survey program: these are summarized in Exhibit 1.

Several conclusions can be drawn from Exhibit 1 concerning prior security survey programs. First, the programs were all parts of larger, more complex, crime prevention efforts so that the resultant impacts could not have been attributed solely to the intervention of security surveys. Second, data regarding compliance with survey recommendations were conspicuously lacking; whatever evidence was presented, suggested a low level of compliance -- thus, bringing into question whether the conduct of security surveys resulted in an actual "treatment" of the surveyed establishments. Third, the programs' research designs or selection schemes usually called for (i) a dispersed (i.e., city-, county-, or state-wide) focus for the conduct of security surveys, and (ii) a poorly controlled before and after (i.e., pretreatment and posttreatment) analysis of the crime impact measures. Fourth, the reported crime impacts were almost exclusively about burglary, largely because data on larceny were unavailable and data on robbery involved too few incidents. [It should be noted that Exhibit 1 does not include the Seattle Burglary Reduction Project. Since no evaluation report had been issued concerning the project (which had been concluded in December 1979), we made a site visit to Seattle in 1981; it was determined that because of inadequate data collection procedures, no valid conclusions could be forthcoming.]

Given the above described problems of program complexity, low compliance, inadequate research design, and inadequate crime data, it is not surprising that the prior evaluations of security survey programs resulted in findings that are statistically inconclusive. The Commercial Security Field Test (CSFT) [National Institute of Justice (NIJ), 1979] sought to overcome these problems.

2. The Commercial Security Field Test (CSFT) Was Directed At Assessing The Effectiveness of Security Surveys Against Commercial Burglary

In particular, the program complexity problem was to be mitigated by the somewhat singular, security survey-oriented focus of the CSFT; the low compliance problem was explicitly dealt with by the CSFT which called for the carrying out of compliance-enhancing activities; and the inadequate research design problem was likewise addressed by the CSFT's strong emphasis on evaluation. However, the inadequate crime data problem pervading previous

A. BACKGROUND

This Executive Summary is comprised of three sections. Some pertinent issues are addressed in this background section; the critical evaluation findings -- and related implications -- are detailed in Section B; and two important recommendations are presented in Section C.

1. Crimes Against Commercial Establishments Are Widespread and Economically Debilitating

While the economic well-being of a business is primarily affected by market conditions, it is also affected by crime. In 1975, the U.S. Department of Commerce [1975] estimated that crime cost the business community $9.3 billion. Small commercial establishments are especially adversely affected by crime; for some small businesses, the cost of crime could mean the difference between survival and failure [Small Business Administration, 1969; U.S. Congress, 1977]. Typically, small businesses operate on a thin profit margin, leaving no room for losses due to crime.

Of all the commercial crime, it is conjectured that larceny -- including shoplifting and employee theft -- causes the greatest dollar loss to businesses [American Management Association, 1977; Chelimsky, 1979]. Although no data are available, it is generally agreed that larceny is the overwhelming reason for inventory shrinkage, which is becoming a severe problem for most businesses. During 1982, some 0.80 million cases of shoplifting and 1.02 million larcenies from buildings were reported to the Federal Bureau of Investigation (FBI)[1983]. However, as demonstrated by the National Crime Panel Surveys [1977], it should be noted that larceny is an extremely underreported crime. After larceny, burglary -- the unlawful entry of a structure to commit a felony or theft -- is the most costly commercial crime. Some 1.06 million commercial burglaries were reported to the FBI [1983] in 1982; as in the case of larceny and because of underreporting, this figure should be considered an underestimate of the actual number of commercial burglaries in 1982. Although less frequent and costly than either larceny or burglary, robbery -- the unlawful threat or use of force to commit a felony or theft -- is actually a more serious crime since it could lead to a violent confrontation between victim and offender. Some 0.17 million commercial robberies were reported in 1982 [FBI, 1983]; again, this figure should be considered an underestimate. In sum, while larceny, burglary and robbery are the most costly and widespread of all the commercial crimes, there are, of course, other commercial crimes, including arson and vandalism.

Inasmuch as many of the offenses committed against commercial establishments are crimes of opportunity (i.e., largely unplanned acts committed by amateurs in situations where merchandise, money, or equipment are readily accessible and the risk of detection is relatively low), the law enforcement focus has been primarily in the area of crime prevention or opportunity reduction. In particular, nearly every law enforcement agency in the country is conducting crime prevention or security surveys, which typically involves first the inspection of a commercial premise from a crime opportunity perspective and then the recommendation of physical, procedural and/or behavioral changes that are directed at

EXHIBIT 1

Summary of Major Commercial Security Survey Studies

Location	Nature of Program	Survey Compliance Findings	Reported Crime Impacts	Comments
Atlanta, GA (Touche Ross & Co., 1976)	As a part of the Target Hardening Opportunity Reduction (THOR) program (which included residential security surveys, property marking, emergency contact, public awareness, and organizational involvement), some 19,356 commercial security surveys were administered during the first 18 months of the program.	75% of all surveyed establishments implemented at least one survey recommendation, while 58.1% of all recommendations were implemented.	In comparison with a linear regression based forecast, commercial burglary decreased by 25.4%, while, on a before/after basis, burglary decreased by 12.7%.	Inasmuch as the reported crime impacts were not judged to be statistically significant, there are no conclusive findings.
Greendale, WI (Everson, 1979)	As a part of a broad crime prevention program (which included property marking, public presentations, training sessions for store employees, high visibility patrols, and stakeouts), an unknown number of commercial security surveys were administered.	No explicit information provided about survey compliance.	On a before/after, six-month comparison basis, shoplifting decreased by 12%, while reported fraud increased by 43% (due at least partially to greater reporting).	The abbreviated evaluation period, the multi-faceted nature of the program, and ignorance about the survey compliance level render the reported crime impacts inconclusive.
Minnesota State Minnesota Governor's Commission on Crime Prevention and Control, 1976)	As a part of a broad crime prevention program (which included crime prevention training, information dissemination, property marking, and residential security surveys), some 964 commercial security surveys were administered.	In a survey of one community, 35% of all security survey recipients (most of whom were residential survey recipients) implemented at least one survey recommendation.	Looking at statewide crime data, it was determined that on a before/after basis, crime increased in all categories, although not in a statistically significant manner.	The multi-faceted nature of the program and the relatively few commercial security surveys (i.e., in terms of the statewide requirements) render the reported crime impacts inconclusive.
Multnomah County, OR Pearson, 1980)	As the principal component of the commercial burglary prevention program, some 433 commercial security surveys were administered, resulting in an average of 4.5 recommendations per establishment.	Based on a telephone survey conducted six months after the administration of the security surveys, it was determined that 31.7% of all recommendations were complied with. Additionally, 16.0% of all surveyed establishments failed to comply with any recommendations, 23.3% complied with at least half of the recommendations, while 3.3% complied with all the recommendations.	Based on experimental/control, before/after and time-series analyses, no statistically significant crime impacts were observed.	A relatively low compliance rate, together with a high likelihood that it was a somewhat inflated figure due to the fact that it was ascertained by a telephone survey), suggest that the "treatment" was indeed quite weak, especially since it was applied to a large, county-wide area; thus, the absence of any reported crime impacts is not surprising.
Portland, OR (Lavrakas et al., 1981)	As a part of an extensive crime prevention through environmental design (CPTED) program which included street lighting, landscaping, organizational involvement, and police patrol, some 220 commercial security surveys were administered.	Based on follow-up visits six and twelve months after the administration of the security surveys, it was determined that 80% of the 150 establishments receiving survey recommendations complied with "at least some of the recommendations."	Based on a before (16 months)/after (20 months) analysis, it was determined that the 48% decrease in the monthly commercial burglary rate was statistically significant.	The multi-faceted nature of the program and the possible impact of other extraneous variables make it impossible to discern the extent to which the commercial security surveys impacted the resultant burglary rate.

studies could not be overcome by the CSFT; again, extreme underreporting of larcenies and low robbery rates, together with the fact that the resultant security survey recommendations were minimally focused on reducing the opportunities for larcenies and robberies, resulted in a CSFT Program that was almost exclusively directed at the commercial crime of burglary.

Although the CSFT Program grants were officially awarded by the NIJ to the Denver Anti-Crime Council, the Long Beach Police Department and the St. Louis Commission on Crime and Law Enforcement in April 1980, program-related activities had been on-going for more than a year. In particular, and as is the custom in all NIJ-sponsored field tests, a CSFT Program Coordinating Team (PCT) -- supported by an external Advisory Committee of crime prevention experts and a consultant staff from Abt Associates, Cambridge, Massachusetts -- was formed in the latter part of 1978. While identifying candidate cities in which to conduct the CSFT Program, the PCT completed the Test Design [NIJ, 1979] for the Program in May 1979. This design document reviewed pertinent background material; articulated a set of program purposes, goals and objectives; defined an experimental selection scheme or research design; discussed a number of evaluation-related concerns; and suggested criteria for city selection as well as strategies for program implementation. Although the document did not name candidate cities, by its publication date, a list of more than 20 cities -- obtained from cities of 250,000 population or more and on the basis of their burglary, robbery and larceny statistics, as compiled by the FBI's Uniform Crime Reports -- had been reduced to less than ten. Subsequently, the CSFT Program's technical assistance contractor, University Research Corporation (URC), conducted site visits to the most interested of these cities and solicited detailed statements of capability from each. By the time the evaluation grant was awarded to Public Systems Evaluation, Inc. (PSE) in October 1979, the list had, for all intents and purposes, been reduced to the final three candidates -- Denver, Long Beach and St. Louis.

Following the grant awards to the three cities in April 1980 and assisted by URC and PSE, the three grantees endeavored to meet the requirements of the Test Design [NIJ, 1979] by identifying candidate pairs of commercial test (i.e., experimental and control) areas which had relatively high commercial crime rates as well as other specified characteristics. By October 1980 and following PSE's review of the submitted site information, the PCT had randomly -- by coin tosses -- assigned them to experimental and control groups. Subsequently, security surveys were conducted in the experimental areas and several follow-up visits were made both to encourage compliance with survey recommendations and to determine the level of compliance. Finally, on April 1, 1981, it was decided that the formal one-year test or evaluation period could begin. A year later, a final set of compliance checks was made in the experimental areas, while some security surveys were conducted in the control areas.

Because of evaluation considerations, the CSFT Program that was eventually implemented in the three cities reflected a revised version of the program stipulated in the Test Design [NIJ, 1979]. First, while the Test Design called for 20-60 business establishments per test area, the grantees were encouraged for evaluation purposes to select test areas with a larger number of establishments. Second, the emphasis in the Test Design on establishing a close cooperative relationship between business and police could have resulted in a more complex Program where other crime prevention activities (e.g., special Police patrols assigned to the experimental areas) might have occurred -- and,

therefore, confounded the evaluation findings. Instead, the grantees were advised to cooperate with the business people only to the extent of facilitating the conduct of the security surveys and enhancing compliance with survey recommendations. Third, pairwise-matching commercial areas on the basis of multiple criteria (i.e., crime rates, social demographics, traffic patterns, police community relations, etc.) -- as originally envisioned in the Test Design -- could not be accomplished. In fact, it was not possible to even find one matched pair among the ten pairs proposed by the grantees.

In response to the latter design difficulty, we, as evaluators, were able to develop and implement an alternative ("split-area") research design in which the surveyed (i.e., experimental) areas were split into two groups according to whether the CSFT crime prevention staff categorized them as "treated" or "untreated". Identifying an establishment as treated meant that it was judged to be less prone to burglary victimization as a result of compliance with the survey recommendations. This conceptual split was undertaken toward the end of the one-year test period by the same police officers and CSFT staff who were initially involved in the conduct of the security surveys; they categorized each surveyed establishment by reviewing from a risk-to-burglary perspective the establishment's compliance with the survey recommendations. It should be noted that while it would have been preferable to have had a team of crime prevention specialists categorize the surveyed establishments independently, the retrospective application of the split-area design, together with the limited project resources, precluded such an approach. Overall, 194 of the surveyed establishments were considered treated, while 236 were considered untreated. Actually, as expected, compliance -- as defined by the percent of recommended changes complied with -- was a determining factor in whether an establishment was considered treated; the treated establishments had an average compliance level of 77.3 percent, as opposed to a 42.4 percent figure for the untreated establishments. Further, the sets of treated and untreated establishments were determined to be equivalent in terms of the types of businesses contained in each. In evaluation terms, this would have constituted an experimental design. However, because it was implemented retrospectively, the split-area research design can be considered to be a quasi-experimental design for the purpose of this study. In sum, the above indicated modifications to the original Test Design reflected the CSFT's emphasis on evaluation.

3. A Purposeful And Systematic Evaluation Approach Was Employed To Assess The CSFT

It is widely recognized that a major reason for the failure of program evaluations is inadequacy of the evaluation designs. One of the prevalent factors contributing to this inadequacy is that the design does not occur in conjunction with the development of the program itself. As stated in the Preface, we were fortunate in the case of the CSFT Program to have been able to specify the evaluation design in parallel with the final development of the Program's initial Test Design [NIJ, 1979] -- prior to Program implementation. Our attendance at the major Program planning sessions, as well as at NIJ's Program Coordinating Team (PCT) meetings, was critical in two respects. On the one hand, the planning effort benefitted from our presence since all planning decisions were continuously assessed relative to their potential impact on the evaluation effort; as discussed earlier, several Program components were modified because they threatened to invalidate the anticipated evaluation

findings. On the other hand, the fact that the PCT's decision-making process in regard to the Program's rationale, objectives, and components was fully exposed to us resulted in the development of a sound, systemic evaluation design, characterized by pertinent test hypotheses, a quasi-experimental selection scheme, an appropriate measures framework, relevant measurement methods, and valid analytic techniques. As identified by Tien [1979], a systemic evaluation views a program from a systems perspective and includes input, process, outcome, and systemic measures and issues, including those of transferability and generalizability. Alternatively, a systemic evaluation is at once an audit, formative and summative evaluation.

The evaluation design for this CSFT effort was based on an explicit application of the "dynamic roll-back" approach advanced by Tien [1979]. The "roll-back" aspect of the approach is reflected in the ordered sequence of interrogatories or steps that must be considered before an evaluation design can be developed: the sequence rolls back in time from (i) a projected look at the range of program characteristics (i.e., from its rationale through its operation and anticipated findings); to (ii) a prospective consideration of the threats (i.e., problems and pitfalls) to the validity of the final evaluation; and to (iii) a more immediate identification of the evaluation design elements. Thus, the anticipated program characteristics identify the possible threats to validity, which in turn point to the design elements that are necessary to mitigate, if not to eliminate, these threats. The "dynamic" aspect of the approach refers to its nonstationary character; that is, the components of the process must be constantly updated, throughout the entire development and implementation phases of the evaluation design. In this manner, the design elements can be adaptively refined, if necessary, to account for any new threats to validity which may be caused by previously unidentified program characteristics. In sum, the dynamic roll-back approach is an adaptive process for developing purposeful and systematic evaluation designs.

It was the application of this dynamic roll-back approach that prompted us to recommend larger test areas; to advise against establishing a closer cooperation between the police and the business people beyond facilitating the conduct of security surveys and enhancing compliance with survey recommendations; and to develop an alternative split-area research design. Additionally, we undertook several activities that contributed to the validity of our evaluation findings. First, we were particularly careful about monitoring compliance with survey recommendations, since with low compliance, it would have been questionable whether there was indeed a sufficient Program treatment.

Second, we undertook extensive on-site monitoring; in addition to periodic site visits from our Cambridge, Massachusetts office, we had an on-site person in Long Beach and in St. Louis during the entire period of evaluation. [Because of staff turnover, our on-site presence in Denver was not continuous.] Further, we developed and administered several data collection instruments and questionnaires; all of this contributed to a multi-measurement approach to data collection and analysis. Conclusions based on a range of measurements are likely to be more reliable because they go beyond the limits of any one measure; they help to prevent wrong conclusions which arise from misleading -- single-sourced -- data.

Third, perhaps one of the major contributions of this evaluation effort has been the highlighting of the importance of risk as a measure within the context

of crime prevention. Although the concept of risk is not new, the development and application of a risk model -- as developed in Appendix I and discussed in Section C -- is ground-breaking. While the modeling process explicitly contributed to this evaluation (i.e., in defining "treated" and "untreated" establishments), we feel that the model could provide a much needed framework for arriving at systematic survey recommendations.

Fourth, although the split-area research design provided a perfect control for neighborhood and other environmental factors (because of the co-location of both treated and untreated establishments in a test area), the retrospective implementation of the design raised a potentially severe regression artifact problem, as recognized by Campbell and Erlebacher [1979]. More specifically, because the selection of treated and untreated establishments did not take into account the key measure of crime, the two groups of establishments would most likely not be equivalent in terms of this measure; as a result, a selection-regression artifact interaction could occur and threaten the validity of the observed impact on crime. Fortunately, we were able to develop a statistically-based model which was able to correct for this threat; further, the model was able to correct for another problem -- the selection-intervention interaction threat to validity -- that is typically also a consequence of a retrospectively configured research design. In sum, while the difficulties associated with a retrospectively implemented design would usually preclude it from being an effective design, we feel that, in this case, since we have comparability among the test units as well as a statistical model that corrects for the two most significant statistically-related difficulties, it is justified to say that we have an effective design that would yield valid findings concerning the impact of security surveys on crime. The statistical model for the split-area design is developed in Appendix II.

B. FINDINGS

The CSFT Program shed light on three critical subject matters: the impact of security surveys on commercial burglary, the impact of security surveys on fear, and the impact of business/police relations on the conduct of security surveys and the compliance with survey recommendations.

1. In Terms of Burglary Reduction, Security Surveys (With Compliance) Accounted For A Significant 64.8 Percent Reduction In Denver But Had No Measurable Impact In Long Beach and St. Louis

A common -- hut not scientifically sound -- approach to considering the impact of a treatment is to compare the before (i.e., pretreatment) values or statistics of each impact measure with its after (i.e., posttreatment) statistics. In Exhibit 2, we provide the burglary rate (i.e., number of burglaries per establishment per year) statistics in terms of "treated" and "untreated" establishments, which, as indicated earlier, were categorized from a risk-to-burglary perspective that was based on which survey recommendations had been complied with. In reviewing Exhibit 2, we note that although there are some impressive changes in burglary rate on a pretreatment-posttreatment basis, the changes are not statistically significant, as per a one-sided z-test of the difference between two sample means at a 0.05 level of significance. The reason for this apparent contradiction is, of course, the dispersed nature of the distribution of the burglary rate (as reflected in the relatively large standard deviation figures); in fact, if one were to compute the coefficient of variation (i.e., ratio of standard deviation to the -- average -- rate) for each set of rate and standard deviation entries in Exhibit 2, one would find quite large coefficient of variation values ranging between 2.37 and 4.13.

Careful scrutiny of Exhibit 2 reveals two interesting trends: the treated establishments experienced a decrease in burglary (except in the case of St. Louis), while at the same time the untreated establishments experienced an increase. Again, although encouraging, these trends are not credible since they are based on a non-experimental or weak pretreatment-posttreatment research design that cannot control for a number of environmental factors that might have changed from the pretreatment period to the posttreatment period. In particular, it is important not only to consider the burglary statistics of the treated and untreated establishments separately, on a pretreatment-posttreatment basis, but also to compare both sets of statistics in a single statistical test, as is done in our split-area analysis. In this manner, any environmental changes -- except for the treatment (i.e., security surveys with compliance) -- affecting the treated establishments would be controlled for by considering their affect on the untreated establishments (which are located in the same areas as the treated establishments).

Exhibit 3 contains the results of applying the split-area model developed in Appendix II to the burglary statistics in Exhibit 2. Overall, the net impact of security surveys (with a high level of compliance) was determined to be an 11.9 percent decrease in burglary rate. While not statistically significant, this result is still quite impressive and somewhat credible (in that it is based on a quasi-experimental split-area design that, although retrospectively implemented,

Exhibit 2

Commercial Burglary Statistics:

Pretreatment-Posttreatment Design Analysis

City	Number of Establishments	Pretreatment Period (10/1/79 - 9/30/80)		Posttreatment Period (4/1/81 - 3/31/82)		Percent Change in Burglary Rate	z-Statistic[1]
		Burglary Rate	Standard Deviation	Burglary Rate	Standard Deviation		
Denver							
Treated	70	0.257	0.652	0.114	0.363	-55.6%	-1.60
Untreated	76	0.184	0.687	0.237	0.709	+28.8%	0.47
Total	146	0.219	0.670	0.178	0.572	-18.7%	-0.56
Long Beach							
Treated	62	0.323	1.113	0.226	0.525	-30.0%	-0.62
Untreated	63	0.079	0.326	0.095	0.390	+20.3%	+0.25
Total	125	0.200	0.823	0.160	0.465	-20.0%	-0.47
St. Louis							
Treated	62	0.210	0.792	0.290	0.687	+38.1%	0.60
Untreated	97	0.247	0.693	0.278	0.800	+12.6%	0.29
Total	159	0.233	0.731	0.283	0.756	+21.5%	0.60
All Cities							
Treated	194	0.263	0.863	0.206	0.538	-21.7%	-0.78
Untreated	236	0.182	0.616	0.216	0.684	+18.7%	0.57
Total	430	0.219	0.738	0.212	0.622	- 3.2%	-0.15

[1] At a 0.05 level of significance, the z-statistic must be less than -1.64 for the change to be statistically significant. Using this criterion, none of the reductions in commercial burglary rates listed above is statistically significant.

Exhibit 3

Commercial Burglary Statistics: Split-Area Design Analysis

Statistic	12-Month Evaluation Periods				21-Month Evaluation Periods in Denver
	Denver	Long Beach	St. Louis	Total	
$\bar{X}_{..}$	0.219	0.200	0.233	0.219	0.163
$\bar{X}_{.t}$	0.257	0.323	0.210	0.263	0.171
$\bar{X}_{.u}$	0.184	0.079	0.247	0.182	0.156
$\bar{Y}_{.t}$	0.114	0.226	0.290	0.206	0.106
$\bar{Y}_{.u}$	0.237	0.095	0.278	0.216	0.218
c_t	0.173	0.124	0.381	0.157	0.322
c_u	0.382	-0.088	0.173	0.248	0.800
$\bar{Y}^*_{.t}$	0.108	0.211	0.299	0.199	0.103
$\bar{Y}^*_{.u}$	0.250	0.085	0.276	0.225	0.224
b	-0.142	0.126	0.023	-0.026	-0.121
$S(Y^*_{it})$	0.346	0.510	0.621	0.512	0.230
$S(Y^*_{iu})$	0.658	0.389	0.790	0.666	0.528
T	70	62	62	194	70
U	76	63	97	236	76
z-Statistic[1]	-1.65	1.55	0.20	-0.46	-1.82
Net impact in Percent $(\frac{b}{\bar{X}_{..}} \times 100\%)$	-64.8%	+63.0%	+9.9%	-11.9%	-74.2%

[1] At a 0.05 level of significance, the z-statistic must be less than -1.64 for the change to be statistically significant. Using this criterion, only the reductions in Denver's commercial burglary as listed above are statistically significant.

can control for any environmental changes). Of critical interest are the Denver results. On a 12-month basis, the net impact of the CSFT Program in Denver was a statistically significant 64.8 percent reduction in burglary rate, while on an extended 21-month basis, the corresponding figure was an even more significant 74.2 percent reduction. [Inasmuch as Denver maintained its crime statistics on a readily accessible computer, we decided in the interest of research to obtain additional data from Denver; we were able to obtain an additional 9 months of posttreatment data, resulting in an extended posttreatment evaluation period of 4/1/81 - 12/31/82, and, similarly, additional pretreatment data was obtained, resulting in an extended pretreatment evaluation period of 1/1/79 - 9/30/80.] In sum, these statistically significant and credible results constitute strong evidence of the effectiveness of commercial security surveys -- given that survey recommendations are complied with -- as a strategy for reducing the incidence of commercial burglary. Further, because the 21-month results represent an improvement over tbe 12-month results, there is some evidence that the effectiveness is lasting.

Several other comments should be made regarding Exhibit 3. First, given Long Beach's quite favorable results when employing the pretreatment-posttreatment design (see Exhibit 2), it is surprising to see in Exhibit 3 that the net CSFT impact under the split-area design was a 63.0 percent increase! Actually, it should be noted that it was inappropriate to have applied the split-area design to the Long Beach burglary statistics; the reason is that the corresponding pretreatment burglary rates of the two groups (i.e., treated and untreated) of establishments were very different, as indicated in Exhibit 2. This significant difference, in turn, implied that the two groups of establishments were not even closely comparable or equivalent with respect to burglary, so that no statistical model -- including the split-area model -- could have corrected for the difference. In sum, the net impact statistic for Long Beach in Exhibit 3 is not valid. Second, as might have been expected (given the results in Exhibit 2), the net impact of a 9.9 percent increase in burglary rate for St. Louis is not surprising; however, interestingly enough, this figure seems less dramatic than the comparable pretreatment-posttreatment figures in Exhibit 2. Third, despite integrating the invalid but large increase for Long Beach and the slight increase for St. Louis, the net overall impact for the three cities is still a significant -- though not statistically significant -- reduction in the burglary rate of 11.9 percent; this result highlights the fact that the split-area model is not a simple additive model but a sophisticated statistical model. Fourth, if Long Beach were to be excluded from the split-area analysis, then the overall findings in Exhibit 3 would be correspondingly and significantly improved.

In addition to the above cited statistical reasons for the different findings in the three cities, there are other reasons. Most importantly, through our on-site monitoring and subsequent analysis of the survey recommendations, the Denver staff arrived at their survey recommendations in a more systematic manner than their counterparts in Long Beach and St. Louis. For example, before conducting a security survey of a business establishment, the Denver staff reviewed the reports of any prior burglaries at that establishment; on the other hand, prior burglary reports were not available in Long Beach at the time security surveys were conducted, and only partially available in St. Louis. Additionally, in analyzing the survey recommendations, we noted that Denver had a wide range of recommendations, while Long Beach had similar recommendations

for each establishment, and St. Louis tended only to make inexpensive recommendations that stood a better chance of being implemented. Consequently, the lack of a systematic approach in arriving at survey recommendations could cast doubt on whether adequate treatments had been implemented in Long Beach and St. Louis. Another possible reason for the poor findings in St. Louis is the observation that the surveyed establishments were located in areas which were so depressed that they could not be "turned around"; indeed, the burglary rate in each of St. Louis' commercial test areas increased significantly during the period of evaluation.

In sum, in response to the question of whether security surveys are effective against commercial burglary, the answer is yes; the use of security surveys can be effective against commercial crimes, but only if the treatment is adequate -- that is, the survey recommendations are (i) systematically identified and (ii) complied with. Interestingly, this important finding suggests that the traditional manner of conducting security surveys -- in which neither the systematic identification of the survey recommendations nor their compliance is emphasized -- is totally inadequate. The importance of these two factors cannot be over-stated. As discussed later in this report, the former factor can be dealt with simply by recognizing that each survey recommendation should be directed at decreasing an establishment's risk to a particular crime; that is, it should decrease either the crime's likelihood (i.e., probability of it being attempted), and/or vulnerability (i.e., probability of it being successful, given an attempt), and/or cost (i.e., amount of loss, given a successful attempt). The latter factor likewise is critical, and by implication, it can be stated that the millions of dollars spent annually in the conduct of security surveys are wasted if the proprietors of the establishments choose not to comply with the survey recommendations. Certainly, the positive and significant findings of this CSFT evaluation effort should encourage proprietors to comply.

Finally, although the split-area design was able to control for the environmental factors and the underlying model was able to correct for several statistical threats to validity, one threat or problem that remains bothersome is the issue of crime displacement. Since the treated and untreated establishments in the split-area design are obviously physically close to each other, there is naturally a potential for crime displacement. Further, as Reppetto [1976] indicates, geographical displacement is only one possibility; there could also be temporal, tactical, target and functional displacements of crime. Perhaps the only way to ascertain crime displacement is to undertake an extensive offender interview study, which remains a costly and controversial method of research. Another issue which we would have liked to have addressed -- if the data were available -- was the impact of the CSFT on attempted burglary. In particular, to what extent were security surveys -- and compliance with survey recommendations -- a factor in the burglary being only an attempt? Unfortunately, such detailed data were not available; even a conscientiously-written crime report seldom addresses why a burglary attempt was unsuccessful. A third issue of interest is which, if any, of an establishment's characteristics are correlated with its crime or victimization rate. Although we looked at several characteristics (e.g., type of business, years in business, etc.) for which we had some reasonably reliable data (from the Security Survey Instrument), we found only that the type of business seemed to correlate with its crime rate; as might be expected, food and drink establishments were burglarized most often, while professional businesses were victimized the least.

2. In Terms Of Fear Reduction, The Majority of Business Proprietors Felt Less Vulnerable to Burglary But Felt No Change In Regard to Personal Safety

An obvious corollary to the question of crime reduction is whether there was a commensurate fear reduction. Being a highly subjective and emotional measure, fear is difficult to gauge. Nevertheless, if it were defined to be fear of being burglarized, then Exhibit 4(a) indicates a definite reduction in the level of such fear -- some 61.8 percent of the surveyed proprietors stated that they felt less vulnerable to burglary as a result of the CSFT Program. On the other hand, if it were defined to be fear of personal safety, then Exhibit 4(b) indicates no change in the level of such fear -- some 54.4 percent of the surveyed proprietors stated that they felt no change to their personal safety as a result of the CSFT Program.

The above stated results are not surprising given the burglary-oriented focus of the CSFT Program. Certainly, we would have hoped that the Program would lower the proprietors' fear of being burglarized, while we would not have expected any effect on their fear of personal safety (inasmuch as burglary is a crime against property, not person).

3. In Terms of Business/Police Relations, Enhanced Relations Facilitated Survey Conduct and Encouraged Compliance With Survey Recommendations

Lowering the proprietors' fear of being burglarized was just one aspect of improved relations between the business establishments and the police, as a result of the CSFT Program. In fact, as indicated in Exhibit 5, 88.5 percent of the proprietors felt that the Program constituted an effective means of responding to the problem of commercial crimes against small business. Additionally, when asked whether the CSFT Program should continue and be funded locally, 77.1 percent of the proprietors responded in the affirmative.

The enhanced business/police relations was due, primarily, to the proprietor-surveyor relationships established as a result of the follow-up compliance checks, and, secondarily, to the area-specific crime prevention newsletters which were circulated periodically to the surveyed establishments. In Long Beach, these relations helped to establish a new business organization, which in time got involved in activities other than crime prevention. Again, as has been found in other studies, the long-term vitality of any organization depends on its involvement in a range of issues, even though it may have been initiated by a singular issue like crime prevention.

What did the enhanced business/police relations do for the CSFT Program? It facilitated survey conduct and encouraged compliance with survey recommendations. Although it could possibly have done more (e.g., encouraged special police patrols), it was limited to these two aspects in order, as explained earlier, not to confound the resultant evaluation findings. In regard to the first aspect, it should be noted that survey team members in police uniform were more credible and readily acceptable to the business proprietors than were those in civilian clothes, especially on their first visit. Although this might suggest that the conduct of security surveys be solely a police function, it should be noted that a private security firm could also conduct security surveys, provided it receives the backing of the local business organization (which in fact might formally recommend the firm to its members).

Exhibit 4

Business Proprietors' Perception of Program's Impact on Burglary and Personal Safety

"Compare how vulnerable to the following crimes you feel your business is now (since April 1981) as compared to before the CSFT (before 1980)."

Percent Answering: / City	"Much Less Vulnerable"	"Less Vulnerable"	"No Change"	"More Vulnerable"	Much More Vulnerable"	"Don't Know"
Denver (N=112)	33.0%	38.4	25.9	0.0	0.0	2.7
Long Beach (N=74)	13.5%	26.0	50.7	0.0	0.0	13.7
St. Louis (N=55)	21.8%	38.2	29.1	1.8	0.0	9.1
Total (N=241)	24.5%	37.3	30.3	0.4	0.0	7.5

(a) Impact on Burglary

"How would you compare your personal safety now (since April 1981) with that before the CSFT (before October 1980)?"

Percent Answering: / City	"Increased Substantially"	"Increased Somewhat"	"No Change"	"Decreased Somewhat"	"Decreased Substantially"	"Don't Know"
Denver (N=108)	4.6%	17.6	57.4	4.6	5.6	10.2
Long Beach (N=78)	1.3%	14.1	47.4	16.7	1.3	19.2
St. Louis (N=51)	2.0%	11.8	58.8	7.8	2.0	17.6
Total (N=237)	3.0%	15.2	54.4	9.3	3.4	14.8

(b) Impact on Personal Safety

Exhibit 5

Business Proprietors' Reaction to Program

"Do you believe the CSFT Program to be an effective way to respond to crimes against small business?"

Percent Answering	Denver (N=108)	Long Beach (N=68)	St. Louis (N=50)	Total (N=226)
"Yes"	91.7%	80.9%	92.0%	88.5%
"No"	8.3	19.1	8.0	11.5

(a) Reaction to CSFT Concept

"After federal funding runs out, should the CSFT be funded locally?"

Percent Answering	Denver (N=105)	Long Beach (N=71)	St. Louis (N=47)	Total (N=223)
"Yes"	78.1%	76.1%	76.6%	77.1%
"No"	21.9	23.9	23.4	22.9

(b) Reaction to CSFT Program Continuation

In regard to compliance with survey recommendations, several remarks should be made. First, as detailed in Exhibit 6, the business establishments complied much less with the recommended physical changes than with the recommended procedural changes. As might be expected, recommendations involving physical improvements -- and, therefore, expenditures of money and labor -- received less attention than recommendations involving procedural changes that typically were cost free to implement. Overall, a significant 59.1 percent compliance rate was achieved by the CSFT Program.

Second, while several different compliance strategies (i.e., low interest loans, hardware discounts, insurance discounts, etc.) were envisioned by each city in August 1980, in reality the five follow-up visits became the strategy of choice in all three cities; in fact, it would be safe to say that most of the others were never seriously explored. For example, the effectiveness of seminars on crime prevention techniques and procedures was limited by their low attendance. In order to determine the impact of follow-up visits on compliance, one test area in Denver received security surveys only, with no follow-up visits except for the final compliance check at the end of the test period. This test area achieved a 31.5 percent compliance rate -- almost precisely equal to the 31.7 percent rate achieved in Multnomah County [Pearson, 1980], under very similar treatment conditions. Consequently, it can be stated that follow-up visits resulted in nearly a doubling (from 31.5 to 59.1 percent) of the CSFT's measured compliance level.

Third, as for the question of the general effect of prior victimization on compliance, Exhibit 7(a) indicates a definite, though not pronounced, trend. The 372 unvictimized (by prior burglary) establishments evidenced a lower compliance rate than either the 33 establishments which had been burglarized once during the 12-month pretreatment period or the 12 establishments which had been burglarized twice during the same period.

Fourth, as summarized in Exhibit 7(b), compliance is a reasonable proxy measure for risk reduction or degree of treatment; the treated establishments had a 77.3 percent compliance level, while the untreated establishments had a 42.4 percent compliance. Exhibit 7(b) highlights another interesting point; it says -- according to the subjective assessment of the Program staff -- that a 42.4 percent compliance level implies non-treatment. Given that the available information from other security survey programs -- including the Multnomah County program -- suggest that their compliance levels, however measured, are less than 40 percent, one can question whether those programs were actually "treated".

Fifth, in terms of generalizing the CSFT Program findings, it was obvious that the costly compliance-enhancing activity of follow-up visits rendered the Program somewhat atypical. However, at issue was whether security surveys <u>with</u> compliance can result in a decrease in commercial crime, since we already knew from previous studies that security surveys with limited compliance did not seem to affect crime. Thus, if the CSFT Program could demonstrate the former result, then it could have been generalized that security surveys do constitute an effective crime prevention approach, <u>provided</u> there is compliance with the survey recommendations. Indeed, this is exactly what the CSFT Program has been able to demonstrate, together with the observation that the survey recommendations must be arrived at in a systematic manner.

Exhibit 6

Survey Compliance By Type of Recommendation

Recommendation Category	Denver		Long Beach		St. Louis		Overall	
	Percentage of Changes in Category (N = 1,808)	Final Compliance	Percentage of Changes in Category (N = 712)	Final Compliance	Parcentage of Changes in Category (N = 1,591)	Final Compliance	Percentage of Changes in Category (N = 4,111)	Final Compliance
Exterior	6.2%	51.9%	7.2%	57.4%	8.7%	47.1%	7.3%	52.0%
Doors	27.2	39.2%	27.9	40.6%	28.1	43.2%	27.7	40.9%
Windows	14.1	30.8%	8.7	55.3%	15.2	42.0%	13.6	38.3%
Skylights, Vents Float Hatches	3.2	20.4%	3.8	33.6%	1.1	11.7%	2.5	22.6%
Alarms	4.1	43.6%	9.4	58.7%	6.7	61.2%	6.0	55.7%
Miscellaneous	0.7	62.7%	0.6	50.4%	0.8	40.7%	0.7	51.0%
Safes	1.5	59.8%	0.4	33.6%	0.4	52.9%	0.8	55.7%
Interior Sight Lines	2.3	83.9%	5.9	79.3%	1.0	72.7%	2.4	81.1%
Special Security	11.6	49.4%	23.5	67.1%	4.4	54.3%	10.8	57.5%
Inventory Controls	3.0	93.6%	0.3	100.0%	0.8	89.4%	1.7	91.8%
Access Control	1.9	60.2%	1.1	37.8%	2.0	76.0%	1.8	64.2%
Procedures	24.3	94.4%	11.2	76.9%	30.7	98.3%	24.5	94.3%
Total	100.0%	56.5%	100.0%	57.2%	100.0%	63.0%	100.0%	59.1%

Exhibit 7

Compliance by Prior Burglary and Burglary Treatment Status

Number of Burglaries in Pretreatment Period	Average Compliance (Percent)
0 (N=372)	57.5%
1 (N=33)	65.9%
2 (N=12)	73.3%
3 (N=4)	33.8%
4 (N=3)	46.7%
5 (N=1)	58.0%
8 (N=1)	0.0%

(a) Compliance by Prior Burglary

Denver	Number of Establish-ments	Final Compliance (Percent)
Treated	69	73.6%
Untreated	76	38.5%
Total	145	55.2%
Long Beach		
Treated	62	85.9%
Untreated	63	30.5%
Total	125	58.0%
St. Louis		
Treated	61	72.8%
Untreated	95	53.3%
Total	156	60.9%
All Cities		
Treated	192	77.3%
Untreated	234	42.4%
Total	426	59.1%

(b) Compliance by Burglary Treatment Status

C. RECOMMENDATIONS

Based on the findings highlighted in the previous section and the current state of knowledge regarding commercial crime prevention and security surveys, two recommendations are outlined herein.

1. Development Of A Risk-Based Security Survey Instrument Which Would Enhance The Systematic Development Of Survey Recommendations

As noted earlier, our review of the security survey recommendations pointed to the fact that they were somewhat inconsistent; further, they seemed to lack a systematic basis. Although it is usually assumed that a security surveyor first assesses the potential crime problem of an establishment before making recommendations, we observed at times that certain recommendations were made irrespective of what could have been the crime problem. Additionally, available security survey instruments do not provide a process by which purposeful and consistent recommendations can be developed; they simply list the possible recommendations that could be made. In sum, we strongly recommend the development of a security survey instrument which would enhance the systematic development of survey recommendations. Such an instrument must, we believe, recognize the explicit "risk" that an establishment faces with respect to a particular crime of interest. We provide an initial version of such an instrument in Exhibit 8. It incorporates an explicit risk-to-burglary assessment step that is based on a simple -- yet intuitively satisfying -- risk model that we developed as part of a self-imposed task to consider risk within the context of commercial crime prevention [Cahn and Tien, 1983]. A preliminary version of such a risk model is contained in Appendix I.

Our risk model recognizes that a crime (in this case, burglary) can be prevented or mitigated at three possible points during its commission. First, a burglary attempt may not even be made if, for example, the would-be burglar realizes that his or her chance for being detected and apprehended outweighs his or her potential gain from the burglary. Thus, good indoor/outdoor lighting or a guard dog might serve to deter a burglary attempt. Second, even if a burglary attempt is made, it is still possible to have, for example, chicken-wired windows and metal doors which might discourage the would-be burglar or at least slow his or her progress so that he or she would stand a greater chance of being detected and apprehended. Third, even if a burglary attempt is successful, it is yet possible to have the valuable items in a strong safe so that the loss would be minimal, apart from the damage-related cost. These three steps of a burglary commission can be measured by the following three variables, respectively: (i) L, the <u>likelihood</u> of a burglary attempt on an establishment; (ii) V, the <u>vulnerability</u> of the establishment to the attempt; and (iii) C, the <u>cost</u> of the loss associated with a successful attempt.

Four comments should be made about the model represented by equation (I.3) in Appendix I. First, although intuitively satisfying, the model represented by (I.3) is actually a simple version of perhaps a more complex -- and, hopefully, more realistic -- model. For example, the model assumes that the vulnerability of an establishment to any burglary attempt is the same. However, it might be

A Preliminary Risk-Based Security Survey Instrument for Commercial Burglaries

File #

BUSINESS NAME _____

ADDRESS _____

_____

_____

_____

TELEPHONE _____

1. VISIT LOG

DATE DAY	MO.	YR.	TIME	INSPECTOR ID#
☐☐ /	☐☐ /	☐☐	☐☐☐☐	☐☐

COMMENTS _____

2. CHECK MOST APPROPRIATE STATEMENT

SURVEY COMPLETED ☐

SURVEY PARTIALLY COMPLETED ☐

UNABLE TO CONDUCT SURVEY ☐

EXPLAIN (IF NOT COMPLETED) _____

/ _____

3. NAME OF RESPONDENT _____

4. TITLE OF RESPONDENT _____

5. NAME(S) OF BUSINESS OWNER(S) _____

_____

6. BUSINESS LICENSE # _____

PART I: BURGLARY HISTORY AT THIS ADDRESS

A. NUMBER OF RECORDED BURGLARIES AT THIS ADDRESS IN THE PAST FIVE YEARS

☐☐☐

B. RECORDED BURGLARIES

COPIES OF ALL ASSOCIATED INCIDENT REPORTS FOR THE PAST FIVE YEARS SHOULD BE IN THE FOLDER AND SUMMARIZED BELOW

1. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐ / ☐☐ / ☐☐

c. VALUE OF LOSS $ ☐☐☐ ☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

2. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐ / ☐☐ / ☐☐

c. VALUE OF LOSS $ ☐☐☐ ☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

File #

PART I (CONTINUED)

3. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐/☐☐/☐☐

c. VALUE OF LOSS $☐☐☐,☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

4. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐/☐☐/☐☐

c. VALUE OF LOSS $☐☐☐,☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

5. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐/☐☐/☐☐

c. VALUE OF LOSS $☐☐☐,☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

PART I (CONTINUED)

6. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐/☐☐/☐☐

c. VALUE OF LOSS $☐☐☐,☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

7. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐/☐☐/☐☐

c. VALUE OF LOSS $☐☐☐,☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

8. a. COMPLAINT # ☐☐☐☐☐☐

b. DATE ☐☐/☐☐/☐☐

c. VALUE OF LOSS $☐☐☐,☐☐☐

d. COMMENTS (M.O., SUSPECTS, EMPLOYEES PRESENT ...) _____

_____

_____

File #

PART II: BUSINESS INFORMATION

A. BUSINESS OPERATION

1. TYPE OF BUSINESS (MAJOR PRODUCT) _____

_____

_____

2. IS BUILDING OWNED BY BUSINESS?

a. YES ☐ NO ☐ IF NO, ANSWER THE FOLLOWING:

b. NAME OF BUILDING OWNER/AGENT _____

_____

3. HAVE THESE PREMISES HAD A PREVIOUS SECURITY SURVEY?

a. YES ☐ NO ☐ IF YES, ANSWER THE FOLLOWING:

b. DATE OF MOST RECENT SURVEY ☐☐/☐☐

c. WHO CONDUCTED THE SURVEY?

POLICE ☐

OTHER (SPECIFY) ☐ _____

d. LIST RECOMMENDATIONS IMPLEMENTED _____

_____

_____

PART II (CONTINUED)

B. PHYSICAL CHARACTERISTICS

1. BUILDING CONSTRUCTION:

BRICK ☐ SHEET METAL ☐

CINDERBLOCK ☐ FRAME ☐

OTHER ☐ _____

2. ACCESS:

a. NUMBER OF EXTERIOR DOORS ☐☐

b. NUMBER OF WINDOWS ☐☐

c. NUMBER OF SKYLIGHTS ☐☐

3. DOES THIS ESTABLISHMENT HAVE AN INSTRUSION ALARM?

a. YES ☐ NO ☐ IF YES, ANSWER THE FOLLOWING:

b. MAKE AND MODEL # _____

c. IS THERE ZONE PROTECTION? YES[ ] NO[ ]

IF YES, HOW MANY ZONES? ☐☐

d. SIGNAL TYPE: LOCAL (AUDIBLE) [ ]

CENTRAL STATION [ ]

POLICE STATION [ ]

File #

PART II (CONTINUED)

e. IS ALARM REGULARLY TESTED?

YES ☐ NO ☐ IF YES, HOW OFTEN PER YEAR? ☐☐

f. HOW IS THE ALARM ACTIVATED? _____

_____

4. TOTAL NUMBER OF FALSE ALARMS IN LAST 12 MONTHS ☐☐

C. ASSESSMENT OF FINANCIAL EXPOSURE

1. ESTIMATED ASSETS

a. CASH ON HAND $ ☐☐,☐☐☐

b. INVENTORY $☐☐☐,☐☐☐

c. EQUIPMENT $☐☐☐,☐☐☐

2. DOES THIS BUSINESS HAVE CRIME INSURANCE?

YES ☐ NO ☐

PART III: RISK ASSESSMENT

A. VULNERABILITY TO BURGLARY

1. EXTERIOR DOORS*

DOOR ASSEMBLY

	1	2	3	4	5	6	7	8	9	10	N/A
COMPOSITION											
HINGE UNIT											
LOCK UNIT											
FRAME											
OVERALL CONDITION											
AUXILIARY LOCKING DEVICES											

COMPOSITION[1]
- METAL 1
- SOLID WOOD 2
- HOLLOW WOOD 3-5
- GLASS 5

HINGE UNIT
- RECESSED HINGE PIN 1
- INTERIOR HINGE 1
- ADJUSTABLE PIN 1
- REMOVABLE HINGE PIN 1

LOCK UNIT[2]
- DEADBOLT (1") 1
- DEADBOLT (UNDER 1") 2-4
- LOCK-IN-KNOB 4-5

FRAME
- METAL 1-3
- WOOD 3-5

[1] IF DOOR HAS A WINDOW, INCREASE RATING BY 1 POINT, UP TO A MAXIMUM OF 5.

[2] IF STRIKE GRADUATES, INCREASE RATING BY 1 POINT, UP TO A MAXIMUM OF 5.

2. WINDOWS*

ACCESSIBLE WINDOW UNIT

	1	2	3	4	5	6	7	8	9	10	N/A
CONFIGURATION											
GLAZING											
HARDWARE (INCL. HINGE & LOCK)											
FRAME											
OVERALL CONDITION											
ANCILLARY PROTECTION											

CONFIGURATION
- FIXED 1
- OPERABLE 3-5

GLAZING
- BULLETPROOF LAMINATE 1
- POLYCARBONATE 1-2
- GLASS 3

FRAME
- GALVANIZED METAL[3] 1
- METAL 1-2
- WOOD 3-4

[3] LESS THAN 1/4" SPALTE

3. WALLS*

WALL UNIT

	1	2	3	4	5	N/A
EXTERIOR						
INTERIOR PARTNER DIVIDER						

CONSTRUCTION
- CINDER BLOCK 1
- BRICK 1-2
- FRAME 3-5
- SHEET METAL 2-4

PART III (CONTINUED)

4. OTHER POTENTIAL ACCESS POINTS*

	1	2	3	N/A
SKYLIGHT				
ROOF HATCH				
VENT				
COMMON ATTIC				
SUBLEVEL				
[OTHER]				

5. MISCELLANEOUS*

	N/A
BAT CONTROL	
CLOSING PROCEDURES	

B. COST OF LOSS DUE TO BURGLARY

1. DUE TO ACCESS TO VALUABLE ITEMS*

	N/A
BABY (INCL. LOCATION & RECORDS)	
CASH STORAGE	
DISPLAY CASES	
INVENTORY ACCESS (INTERIOR)	
VALUABLE MERCHANDISE IN DISPLAY WINDOW	
LOOSE (CHANGE & BILLS)	

2. DUE TO REDUCED DURABILITY*

	N/A
TAG & MARK EQUIPMENT	

3. DUE TO REDUCTION IN BURGLAR'S TIME ON PREMISES OR INCREASED CHANCE OF APPREHENSION*

	N/A
AUDIBLE DISPLAY	
INTRUSION ALARM	

C. LIKELIHOOD OF BURGLARY ATTEMPT

1. LIGHTING*

	N/A

2. ACCESS TO PREMISES*

	N/A
FENCING	
ROOF & SECOND STORY	

*ALL RATINGS ARE ON A SCALE OF (1) TO FIVE (5):

5 - VERY HIGH VULNERABILITY

4 - HIGH VULNERABILITY

3 - MODERATE VULNERABILITY

2 - LOW VULNERABILITY

1 - VERY LOW VULNERABILITY

File #

PART IV: SURVEY RECOMMENDATIONS/COMPLIANCE FORMS

A. SURVEY RECOMMENDATIONS

Recommendation Number	Survey Item Number*	Number of Changes	Description of Recommended Changes	Estimated Cost (Optional)	Priority (High, Medium, Low)	Comments/ Possible Resources
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

* Survey Item Numbers refer to the specific survey recommendations which appear on the attached Survey Recommendations Checklist.

File #

PART IV (CONTINUED)

B. COMPLIANCE VISIT LOG

COMPLIANCE VISIT LOG

Visit	DATE Day	Mo.	Yr.	Inspector ID #
1				
2				
3				
4				
5				

C. COMPLIANCE RECORD

Recommendation Number	Survey Item Number	Number of Changes	Description of Recommended Change	Progress by Visit (F = Full, P = Partial, N = None) 1	2	3	4	5	Comments
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

File #

SURVEY RECOMMENDATIONS CHECKLIST

A. EXTERIOR DOORS (TO LIMIT VULNERABILITY)

1. ☐ REPAIR/REPLACE DOOR
2. ☐ REPLACE/PROTECT GLAZING
3. ☐ REPAIR JAMB(S)/FRAME(S)
4. ☐ REPLACE/INSTALL STRIKE
5. ☐ MODIFY HINGES
6. ☐ INSTALL DEADBOLT
7. ☐ REPAIR/REPLACE LOCK
8. ☐ PROTECT BOLT
9. ☐ INSTALL PADLOCK/HASP
10. ☐ INSTALL TRACK FILLER
11. ☐ UTILIZE CHARLIE BAR
12. ☐ INSTALL FLUSH BOLTS
13. ☐ SECURE WITH BAR AND LOCK
14. ☐ SECURE PERMANENTLY
15. ☐ OTHER (SPECIFY) _____

B. WINDOWS (TO LIMIT VULNERABILITY)

16. ☐ REPAIR/REPLACE HARDWARE
17. ☐ INSTALL LOCKS
18. ☐ REPLACE GLAZING
19. ☐ INSTALL BURGLARY-RESISTANT GLASS
20. ☐ SECURE PERMANENTLY
21. ☐ PIN
22. ☐ PROTECT WITH BARS, SCREENS, OR GRILLS
23. ☐ OTHER (SPECIFY) _____

C. WALLS (TO LIMIT VULNERABILITY)

24. ☐ REPAIR/IMPROVE EXTERIOR WALLS
25. ☐ REPAIR/IMPROVE INTERIOR WALLS
26. ☐ OTHER (SPECIFY) _____

D. OTHER EXTERIOR ACCESS POINTS -- SKYLIGHTS, VENTS, ROOF HATCHES, CRAWL SPACE, ATTIC, SUB-LEVEL, ETC. (TO LIMIT VULNERABILITY)

27. ☐ PROTECT WITH BARS, SCREENS, OR GRILLS
28. ☐ COVER WITH STEEL
29. ☐ IMPROVE ATTACHMENT TO ROOF/WALL
30. ☐ PROVIDE LOCK
31. ☐ SECURE CRAWL/SERVICE OPENINGS
32. ☐ SECURE UTILITY TUNNELS
33. ☐ OTHER (SPECIFY) _____

E. MISCELLANEOUS (TO LIMIT VULNERABILITY)

34. ☐ IMPROVE CLOSING PROCEDURES
35. ☐ ESTABLISH/IMPROVE KEY CONTROL
36. ☐ OTHER (SPECIFY) _____

F. ACCESS TO VALUABLE ITEMS (TO LIMIT COST OF LOSS)

37. ☐ CHANGE SAFE LOCATION
38. ☐ ANCHOR/SECURE SAFE AGAINST REMOVAL
39. ☐ CHANGE SAFE COMBINATION REGULARLY
40. ☐ IMPROVE CASH STORAGE SECURITY
41. ☐ STAMP CHECKS "FOR DEPOSIT ONLY"
42. ☐ CHANGE AND REKEY LOCKS
43. ☐ REMOVE VALUABLE MERCHANDISE FROM STORE WINDOWS AT CLOSING

G. REDUCTION OF ITEM DESIRABILITY (TO LIMIT COST OF LOSS)

46. ☐ TAG AND MARK EQUIPMENT
47. ☐ USE ELECTRONIC TAGGING METHODS
48. ☐ OTHER (SPECIFY) _____

H. REDUCTION IN BURGLAR'S TIME ON PREMISES OR INCREASED CHANCE OF APPREHENSION (TO LIMIT COST OF LOSS)

49. ☐ DISPLAY ADDRESS (INCLUDING REAR)
50. ☐ INTRUSION ALARM:
    a. ☐ INSTALL
    b. ☐ REPAIR
    c. ☐ ADD OR CHANGE SENSOR(S)
51. ☐ DEVELOP ALARM TESTING PROCEDURE
52. ☐ TRAIN EMPLOYEES IN ALARM USE
53. ☐ OBTAIN ALARM SYSTEM SPECIFICATIONS
54. ☐ TRAIN EMPLOYEES IN EVIDENCE PRESERVATION
55. ☐ OTHER (SPECIFY) _____

I. LIGHTING (TO LIMIT LIKELIHOOD OF ATTEMPT)

56. ☐ IMPROVE EXTERIOR LIGHTING
57. ☐ PROTECT EXTERIOR LIGHTING
58. ☐ FOCUS EXTERIOR LIGHTING ON ENTRY POINTS
59. ☐ PROVIDE/IMPROVE INTERIOR LIGHTING
60. ☐ LIGHT SAFE
61. ☐ OTHER (SPECIFY) _____

J. ACCESS TO PREMISES (TO LIMIT LIKELIHOOD OF ATTEMPT)

62. ☐ INSTALL/REPAIR FENCING
63. ☐ TRIM SHRUBS/TREES
64. ☐ REMOVE DEBRIS
65. ☐ LIMIT ROOF/SECOND-STORY ACCESS
66. ☐ OTHER (SPECIFY) _____

more realistic to assume that there is a "learning process" so that the establishment becomes less vulnerable with each attempted burglary; in such a case, V would be a function of n, the number of burglary attempts per year. Similarly, C could also be a function of n. Another level of complexity might be the potential interaction between the variables L, V and C.

Second, irrespective of how simple or unreal the model represented by (I.3) might be, it still does provide at least an initial framework within which systematic survey recommendations could be developed. Thus, as suggested by the security survey instrument in Exhibit 8, a security surveyor would first assess the likelihood, vulnerability and cost components of risk from a risk-to-burglary perspective, and then make appropriate recommendations. Exhibit 9, which contains a completed version of page 5 of 8 in Exhibit 8, provides an example of a burglary risk assessment as applied to an actual hardware store that had been surveyed during the conduct of the CSFT. The discussion which follows is organized according to the three sections in Exhibit 9 -- vulnerability, cost and likelihood, respectively -- and is intended to explain the rationale behind the example ratings as well as the concepts which underlie the design of the form.

- o <u>Vulnerability to a Burglary Attempt</u>

  As the reader can observe, the majority of the risk assessment form is devoted to a premise's vulnerability to burglary; this is consistent with the focus of a security survey-based burglary reduction program -- thus, doors, windows, walls, and other access points are emphasized, as they are designed to prevent a would-be burglar from breaking into the establishment. Crime prevention experience has demonstrated that improvements in such physical structures can be expected to have a greater impact on reducing the risk to burglary than improvements aimed at reducing the likelihood that a burglary is attempted in the first place or at reducing the cost of a successful burglary attempt. In the former instance, so much of the likelihood factor is determined by the prevailing crime rates that it cannot be immediately impacted by improvements to a particular establishment. In the latter instance, once a burglar has gained access to an establishment, cost reduction-based improvements or measures can have, at best, a limited impact on the losses sustained due to the removal of valuables or the associated damages to the premise itself.

  In examining the ratings applied to the five exterior doors, we observe that the composition of the doors ranges from the highly vulnerable glass front doors (assigned a "5" rating) to the secure metal back door (assigned a "1" rating). In between these extremes, we find a solid wood door (with a "2" rating) that adjoins the neighboring establishment, as well as a second solid wood door that opens into the side parking area -- this door would have received a "2" rating but was instead downgraded to a "4" by virtue of the high vulnerability presented by the glass window within the door itself. The size of the window in the door and thickness of the glass are two key factors which influence a door's rating (i.e., whether 1 or 2 points are deducted).

  We further observe that the secured interior hinge units were all judged to be very solid and therefore assigned a "1" rating for very low vulnerability. Similarly, the door locks were all deadbolts with a

Exhibit 9

Sample Burglary Risk Assessment of A Commercial Establishment

PART III: RISK ASSESSMENT

A. VULNERABILITY TO BURGLARY

1. EXTERIOR DOORS*

DOOR ASSEMBLY

	1	2	3	4	5	6	7	8	9	10	N/A
COMPOSITION	5	5	4	1	2						
HINGE UNIT	1	1	1	1	1						
LOCK UNIT	1	1	1	1	1						
FRAME	1	2	1	1	2						
OVERALL CONDITION	2	2	2	2	2						
BURGLARS LOCKING DEVICES											X

COMPOSITION[1]
- METAL 1
- SOLID WOOD 2
- HOLLOW WOOD 3-5
- GLASS 5

HINGE UNIT
- SECURED HINGE PIN 1
- INTERIOR HINGE 3
- ANTILIFT PIN 3
- REMOVABLE HINGE PIN 5

LOCK UNIT[2]
- DEADBOLT (1"+) 1
- DEADBOLT (UNDER 1") 3-5
- LOCK-IN-KNOB 4-5

FRAME
- METAL 1-2
- WOOD 3-5

[1] IF DOOR HAS A WINDOW, INCREASE RATING BY 2 POINTS, UP TO A MAXIMUM OF 5.

[2] IF ENTRY INADEQUATE, INCREASE RATING BY 2 POINTS, UP TO A MAXIMUM OF 5.

2. WINDOWS*

ACCESSIBLE WINDOW UNIT

	1	2	3	4	5	6	7	8	9	10	N/A
CONFIGURATION	4	4	3								
GLAZING	3	3	3								
HARDWARE (INCL. HINGE & LOCK)	3	3	2								
FRAME	1	2	2								
OVERALL CONDITION	3	3	3								
BURGLARS PROSECUTION	5	5	1								

CONFIGURATION
- FIXED 3
- OPERABLE 3-5

GLAZING
- ROLLED/DRAWN LAMINATE 1
- POLYCARBONATE 1-2
- GLASS 3

FRAME
- CRIMPED METAL[3] 1
- METAL 1-2
- WOOD 3-4

[3] LESS THAN 12" SPACER

3. WALLS*

WALL UNIT

	1	2	3	4	N/A
EXTERIOR	1	1	1	1	
EXTERIOR PREMISE					X

CONSTRUCTION
- CINDER BLOCK 3
- BRICK 1-3
- FRAME 4-5
- SHEET METAL 3-4

PART III (CONTINUED)

1. OTHER EXTERIOR ACCESS POINTS*

	1	2	3	N/A
SKYLIGHT	4	5		
ROOF HATCH	2			
VENT	2			
COMMON ATTIC				X
SUBLEVEL	2			
OTHER				X

B. MISCELLANEOUS*

	N/A
KEY CONTROL	3
CLOSING PROCEDURES	4

B. COST OF LOSS DUE TO BURGLARY

1. DUE TO ACCESS TO VALUABLE ITEMS*

	N/A
SAFE (INCL. LOCATION & SECURITY)	3
CASH STORAGE	X
DISPLAY CASES	2
INVENTORY ACCESS (IMPRESSION)	3
VALUABLE MERCHANDISE IN DISPLAY WINDOW	4
LOCKS (CHANGE & REKEY)	2

2. DUE TO REDUCED DESIRABILITY*

	N/A
TOOL & MAKE EQUIPMENT	5

3. DUE TO REDUCTION IN BURGLAR'S TIME ON PREMISES OR INCREASED CHANCE OF APPREHENSION*

	N/A
ROBBERY DISPLAY	5
EXTINGUISH ALARM	5

C. LIKELIHOOD OF BURGLARY ATTEMPT

1. LIGHTING*

	N/A
	4

2. ACCESS TO PREMISES*

	N/A
FENCING	1
ROOF & SECOND STORY	2

*ALL RATINGS ARE ON A SCALE OF ONE TO FIVE (5).
- 5 - VERY HIGH VULNERABILITY
- 4 - HIGH VULNERABILITY
- 3 - MODERATE VULNERABILITY
- 2 - LOW VULNERABILITY
- 1 - VERY LOW VULNERABILITY

principally affect the amount of time a burglar might have on the premises as well as the chance of apprehending the burglar. In the case of an address display, the precision with which the report of a burglary in progress can identify the address is directly related to the speed of police response. Additionally, intrusion alarms are considered as predominantly a cost-related protection, inasmuch as they cannot prevent a burglar's access (thereby reducing vulnerability) and, according to crime prevention experts, rarely deter a burglar from attempting a break-in. Thus, the sounding of, say, an audible alarm might cause the burglar to flee the premise sooner and therefore remove fewer valuables, while at the same time increase the chance of apprehending the burglar. In the hardware store example, no exterior address display was present, while the intrusion alarm was found to be inoperative! Thus, both items received the highest vulnerability rating.

- o Likelihood of a Burglary Attempt

  Because the lighting outside the hardware store was so poor, it was the surveyor's opinion that it was unlikely to deter a prospective burglar from breaking in. On the other hand, the high barbed wire fencing surrounding a locked parking area and the structure of the building roof were judged to be a burglary deterrent, thereby reducing the probability that a break-in might even be attempted. [Actually, it should be noted that a burglary is not committed until an attempt is made to enter the building itself -- simply entering the grounds is considered trespassing.]

The third comment concerning the risk model is that while the risk model represented by (I.3) may be mathematically simple and straightforward, applying the model -- as illustrated in Exhibit 9 -- was indeed a difficult task; it raised some very basic issues. For example, it became obvious that although likelihood and vulnerability are probabilistic concepts (and therefore, by convention, measured on a continuous scale between 0 and 1), the security surveyors, especially the police officers, were more practiced in making judgements on a discrete scale between 1 and 5. While a change in scale range presented no problem, the discreteness of the measures did mean a loss of detail. A 1 to 5 scale was also employed for the cost measure. As another example, we had to limit the likelihood assessment to that of a single burglary attempt, inasmuch as the assessment of a distribution of probabilities would have been overwhelming, especially given the preliminary nature of our investigation. Nevertheless, we worked closely with the CSFT staff in implementing that part of the survey instrument pertaining to (I.3) (i.e., page 5 of 8 in Exhibit 8). After a period of lively discussion in which the concepts of likelihood, vulnerability, cost and risk were introduced and reviewed within the context of their own experience, the CSFT staff were almost unanimous in their feeling that an explicit risk assessment should have been carried out as part of their initial survey conduct, although they would have undoubtedly been less than enthusiastic about the additional work that would have been required. Comments such as "although I usually go through a risk assessment in my head, this instrument would have helped," "I never paid much attention to likelihood and cost, but I can see that they are important," and "although not perfect, we should have used this instrument instead of the other [security survey instrument]," are encouraging, since they suggest that security surveyors are not averse to using a systematic approach for developing survey recommendations.

Following a quick review of an establishment's file folder, the grantee staff were able to complete the pretreatment and posttreatment risk assessments in a few minutes. While they disagreed with a few of the vulnerability-related guidelines on the instrument, the staff were able to complete the instrument with no difficulty.

Fourth, during our discussions with the CSFT staff, we also raised the issue of how we might analyze the risk assessment data so that we could obtain overall measures for L, V, C and R for each establishment. In reviewing Exhibit 9, it is obvious that there are several ways -- especially in the case of vulnerability -- of aggregating the detailed assessment ratings into overall measures. One suggestion was to take the arithmetic average of all the entries, which, by implication, would have meant equally weighting all the entries. [In the case of the assessment detailed in Exhibit 9, this would have resulted in average vulnerability, cost and likelihood measures of 2.3, 3.4, and 2.3, respectively -- suggesting low to moderate levels of vulnerability and likelihood, coupled with a moderate to high expected cost.] Another suggestion was to arithmetically weight the detailed entries within a category (i.e., exterior doors, windows, walls and other exterior access points) and then to apply different weights to the categories before aggregating the measures; however, there was no general agreement as to what those weights should be. A third vulnerability-related suggestion was based on a "weakest link" approach, whereby the largest of all the vulnerability ratings within each category and between categories should be retained as it would reflect the weakest link. Although it made good sense, this approach would have effectively resulted in nearly all the establishments having the highest (i.e., a 5) vulnerability rating, since there is usually at least one weak link in an establishment. [Indeed, such would have been the result in the case of the sample assessment in Exhibit 9.] Many other suggestions and thought-provoking ideas were brought up in these discussions. In the end, given the preliminary nature of our analysis, we decided to employ the simple arithmetic averaging scheme and we correlated the risk assessment results with the actual burglary statistics. As detailed in the Final Report [Cahn and Tien, 1983], a relatively poor correlation was obtained, due to several possible reasons:(i) the risk model, as applied (including the assessment of the likelihood of only one burglary attempt), was inadequate; (ii) the simple arithmetic averaging procedure used to aggregate the risk assessments was inadequate; or (iii) the risk model itself was inadequate. We suspect all three reasons and recommend that this preliminary risk model be further developed, evaluated, and incorporated into an appropriate security survey instrument, together with a "how to" manual.

2. Conduct Of Additional Evaluations of Security Survey Programs And Development Of A Training Manual On The Conduct Of Security Surveys

A parallel and, indeed, complementary recommendation to the above recommendation of developing a risk-based security survey instrument, is to conduct additional evaluations of security survey programs in which such an instrument is employed and then to develop a training manual on the conduct of security surveys.

In regard to the conduct of additional evaluations, we would suggest using the split-area design in a prospective manner; that is, the "treated" business establishments are randomly selected in each test area prior to program

implementation. The treated establishments might be subjected to a risk-based security survey with a heavy emphasis on compliance, while the untreated establishments might either receive no security surveys or be subjected to a traditional survey (in which neither the systematic development of survey recommendations nor the compliance with survey recommendations are emphasized). Our recommendation that several evaluations be undertaken is based on the recognition that each evaluation yields but one data point; a number of data points are required before a sound judgement can be made. In this vein, we would also recommend that additional data be collected from the three CSFT Program cities to see if the longer term impacts sustain our earlier findings; again, this would be an important exercise, given the positive Denver findings for the extended 21-month evaluation period.

In regard to developing a training manual, we would suggest that it be written by a police training specialist for use by police officers and other security personnel. The manual should include a ready-to-use, risk-based security survey instrument, and it should clearly indicate how to use the instrument in the conduct of a security survey. The links between risk assessments and survey recommendations should be clearly identified and emphasized. Finally, the manual should be disseminated to all police departments and private organizations which are engaged in the conduct of security surveys; further, it should serve as a text in law enforcement curriculums, including those at the National Crime Prevention Institute and the Texas Crime Prevention Institute.

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APPENDIX I

A Preliminary Model for Assessing A Commercial Establishment's Risk-to-Burglary

To begin, the following three variables are defined:

(i) Likelihood [L(n)]: probability that n burglary attempts will be made in, say, a one year period.

(ii) Vulnerability [V]: probability that, given a burglary attempt, the attempt will be successful.

(iii) Cost [C]: average cost or loss, given that a burglary attempt is successful.

Mathematically, it can he shown that the expected number of attempted burglaries per year is equal to:

$$E\,[\text{Attempted Burglaries}] = \sum_{n=0}^{\infty} nL(n) \qquad (I.1)$$

Similarly, the expected number of successful burglary attempts per year is equal to:

$$E\,[\text{Successful Burglaries}] = \sum_{n=0}^{\infty} nL(n)V \qquad (I.2)$$

The risk-to-burglary -- R -- can then be defined as the expected cost or loss due to all successful burglaries per year; that is, it can be shown to be equal to:

$$R = E\,[\text{Burglary-Related Cost}] = \sum_{n=0}^{\infty} nL(n)VC \qquad (I.3)$$

In sum, a crime prevention effort would attempt to minimize the risk to burglary by implementing strategies which would decrease either L, or V, or C, or any combination of the three; for example, an intrusion alarm might impact all three risk components.

It should be recognized that (I.3) is for a single establishment. Obviously, in a group of, say, J establishments, each individual establishment, j, is unique and would therefore possess unique L(n,j), V(j) and C(j) values, as well as a unique risk measure equal to:

$$R(j) = \sum_{n=0}^{\infty} nL(n,j)\ V(j)\ c(j) \qquad (I.4)$$

For a group of establishments, we could also define average (i.e., expected or mean) values for the risk-related parameters, namely:

$$\bar{L}(n) = \sum_{j=1}^{J} L(n,j)/J, \qquad (I.5)$$

$$\bar{V} = \sum_{j=1}^{J} V(j)/J, \qquad (I.6)$$

$$\bar{C} = \sum_{j=1}^{J} C(j)/J, \text{ and} \qquad (I.7)$$

$$\bar{R} = \sum_{j=1}^{J} \sum_{n=0}^{\infty} nL(n,j)\ V(j)\ C(j)/J \qquad (I.8)$$

APPENDIX II

A Statistical Model for the Split-Area Design

To begin, the model assumptions are:

1. A single selection measure X (i.e., pretreatment crime rate)
2. A single impact measure Y (i.e., posttreatment crime rate)
3. Two groups: j = t (treated), u (untreated)
4. A treatment Z_j, where $Z_j = \begin{cases} 0, & j = u \\ 1, & j = t \end{cases}$
5. A disturbance or error term e, which is uncorrelated with other measures and possesses an expected value of zero.
6. A linear causal relationship between Y_{ij} and X_{ij}; that is,

$$Y_{ij} = a + bZ_j + c_j (X_{ij} - \bar{X}..) + e_{ij} \qquad \text{(II.1)}$$

where

Y_{ij} = value of impact measure for test unit i in group j

X_{ij} = value of selection measure for test unit i in group j

e_{ij} = value of error associated with test unit i in group j

Z_j = value (i.e., presence) of treatment in group j

$\bar{X}..$ = X_{ij} averaged over both i and j (i.e., the "grand mean")

In the above expression, it should be noted that (i) b reflects the (net) impact of the treatment or intervention; (ii) $c_j = 0$ reflects the presence of a selection regression artifact interaction threat to validity, and (iii) $c_u = c_t$ reflects the presence of a selection-intervention interaction threat to validity.

In deriving the impact b, let us first find

$$\bar{Y}._u = E[Y_{ij} | j=u] = a + bE[Z_u] + c_u (\bar{X}._u - \bar{X}..) + E[e_{iu}]$$
$$= a + c_u(\bar{X}._u - \bar{X}..) \qquad \text{(II.2)}$$

Similarly,

$$\bar{Y}_{\cdot t} = E[Y_{ij} | j=t] = a + bE[Z_t] + c_t (\bar{X}_{\cdot t} - \bar{X}_{\cdot\cdot}) + E[e_{it}]$$
$$= a + b + c_t (\bar{X}_{\cdot t} - \bar{X}_{\cdot\cdot}) \qquad \text{(II.3)}$$

Subtracting (II.2) from (II.3) and solving for b, we have:

$$b = \bar{Y}^*_{\cdot t} - \bar{Y}^*_{\cdot u} \qquad \text{(II.4)}$$

where

$$\bar{Y}^*_{\cdot t} = \bar{Y}_{\cdot t} - c_t(\bar{X}_{\cdot t} - \bar{X}_{\cdot\cdot}) \qquad \text{(II.5)}$$

and

$$\bar{Y}^*_{\cdot u} = \bar{Y}_{\cdot u} - c_u(\bar{X}_{\cdot u} - \bar{X}_{\cdot\cdot}) \qquad \text{(II.6)}$$

The above expressions can perhaps be best understood by a graphical presentation, as contained in Exhibit 10. The b displayed in the exhibit is actually the impact of the intervention on a test unit with $\bar{X}_{\cdot\cdot}$ as its selection measure. In general, for a test unit with a different selection measure -- say X_a -- we have

$$b|X_a = \bar{Y}^*_{\cdot t}|X_a - \bar{Y}^*_{\cdot u}|X_a \qquad \text{(II.7)}$$

where

$$\bar{Y}^*_{\cdot t}|X_a = \bar{Y}_{\cdot t} - c_t(\bar{X}_{\cdot t} - X_a) \qquad \text{(II.8)}$$

and

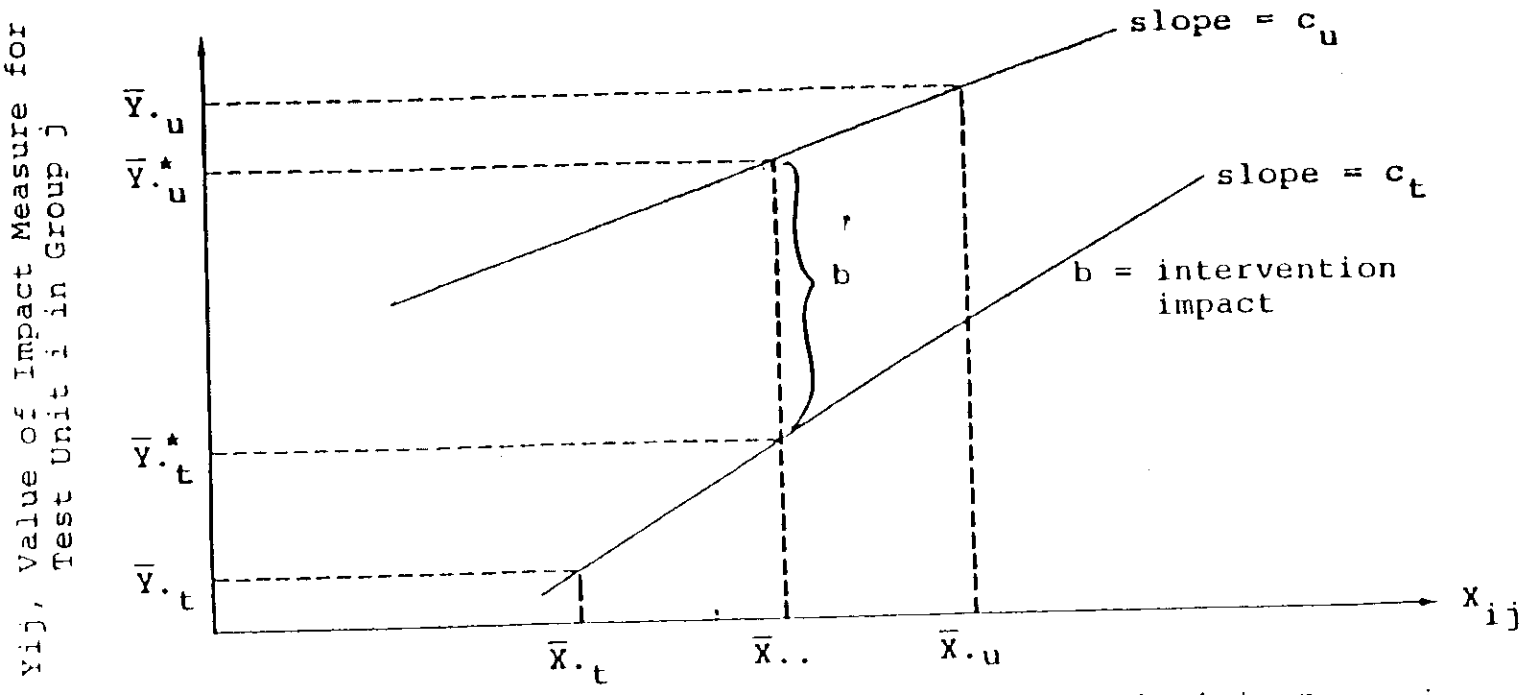
$$\bar{Y}^*_{\cdot u}|X_a = \bar{Y}_{\cdot u} - c_u(\bar{X}_{\cdot u} - X_a) \qquad \text{(II.9)}$$

It can also be seen from Exhibit 10 that if $c_t = c_u$, then $b|X_a = b|\bar{X}_{\cdot\cdot} = b$; that is, the impact of the intervention or treatment is the same for all test units, even if they possess different selection measure values. Further, if $\bar{X}_{\cdot t} = \bar{X}_{\cdot u} = \bar{X}_{\cdot\cdot}$ (i.e., the two groups are equivalent), then, as expected, b is simply equal to $(\bar{Y}_{\cdot t} - \bar{Y}_{\cdot u})$.

Finally, in order to determine if the impact b is statistically significant, we must conduct a t-test of the difference between two sample means with the null hypothesis being "$b = \bar{Y}^*_{\cdot t} - \bar{Y}^*_{\cdot u} = 0$" and, if it is desirable for the impact to be negative (i.e., a decrease in crime rate), the alternative hypothesis being "$b = \bar{Y}^*_{\cdot t} - \bar{Y}^*_{\cdot u} < 0$." More specifically, assuming T total treated units, U

Exhibit 10

Split-Area Research Design: Impact of Intervention



X_{ij}, Value of Selection Measure for Test Unit i in Group j

total untreated units, and a pooled sample standard deviation of $S(\bar{Y}^*_{it} - \bar{Y}^*_{iu})$, the t-statistic is equal to

$$\text{t-statistic} = (\bar{Y}^*_{.t} - \bar{Y}^*_{.u})/S(Y^*_{it} - Y^*_{iu})(1/T + 1/U)^{1/2} \qquad \text{(II.10)}$$

with (T + U - 2) degrees of freedom. The pooled sample standard deviation is equal to

$$S(Y^*_{it} - Y^*_{iu}) = \left[\frac{(T-1)S^2(Y^*_{it}) + (U-1)S^2(Y^*_{iu})}{T+U-2}\right]^{1/2} \qquad \text{(II.11)}$$

where

$$S^2(Y^*_{it}) = \sum_{i=1}^{T}(Y^*_{it} - \bar{Y}^*_{.t})^2/(T-1) \qquad \text{(II.12)}$$

and

$$S^2(Y^*_{iu}) = \sum_{i=1}^{U}(Y^*_{iu} - \bar{Y}^*_{.u})^2/(U-1) \qquad \text{(II.13)}$$

and, from (II.5) and (II.6),

$$Y^*_{ij} = Y_{ij} - c_j(X_{ij} - \bar{X}..) \text{ for } j = t, u \qquad \text{(II.14)}$$

[It should, of course, be noted that in the above computations, the Y_{ij} and the X_{ij} variables are measured, while all other variables are derived.] Now, assuming a Type I error or level of significance of $\alpha = 0.05$, then we would undertake a one-sided test and would "accept" or not reject the alternate hypothesis that $b < 0$ if the t-statistic value in (II.10) is less than $(-t_{0.05})$ with (T+U-2) degrees of freedom. Obviously, if (T+U-2)>30 (which is typically the case in this study), then the t-test becomes a z-test, which employs the unit normal distribution. In particular, we would "accept" the alternate hypothesis that $b < 0$, if the computed z -- as computed by (II.10) -- is less than $-z_{0.05} = -1.64$.

Finally, it should be noted that the above split-area model can be applied to many situations where there are two -- including experimental and control -- groups, one deemed treated and the other not. Further, the one-selection measure model developed herein can be straightforwardly extended to the case of several selection measures.