

NATIONAL COOPERATIVE  
HIGHWAY RESEARCH PROGRAM REPORT

**341**

**BOND AND INSURANCE COVERAGES  
FOR HIGHWAY CONSTRUCTION  
CONTRACTORS**

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM  
REPORT

**341**

# **BOND AND INSURANCE COVERAGES FOR HIGHWAY CONSTRUCTION CONTRACTORS**

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Texas Transportation Institute  
Texas A & M University  
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ASSOCIATION OF STATE HIGHWAY AND  
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WASHINGTON, D. C.

JULY 1991

## **NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM**

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state and local governmental agencies, universities, and industry; its relationship to the National Research Council is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and the Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation officials, or the Federal Highway Administration, U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical committee according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

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# FOREWORD

*By Staff  
Transportation Research  
Board*

This report contains the findings of a study of factors that affect the cost and availability of bond and insurance coverages for highway construction contractors. The report provides a detailed examination and prioritization of these factors along with recommendations for actions that may relieve cost and availability problems. The contents of this report will be of immediate interest and use to federal, state, and local highway agencies, highway construction contractors, and insurance and bonding industries.

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Highway construction contractors typically need to obtain bonds for bids, performance, and payments as well as insurance coverages in order to undertake public highway construction contracts. In recent years, a number of contractors have observed that the cost of insurance had risen dramatically or the needed insurance coverages were not available. The cost and availability of surety bonds are also often cited as problems for small, less experienced contractors and especially for Disadvantaged Business Enterprises (DBE) attempting to break into public construction. Further, there is concern that these problems may reduce competition and increase costs for highway construction.

It is not clear to what extent various factors influence the cost and availability of bonds and insurance. Some of the factors are related to: highway agency practices for design and construction; the cyclical nature of the insurance industry; shifts in the type of construction toward rehabilitation and reconstruction; social issues; legal climates; environmental issues; OSHA requirements; changes in range and types of insurance coverage; size and number of projects; quality control; state and federal laws, rules, and regulations; risk management; safety programs; and loss-prevention techniques.

NCHRP Project 20-26, Bond and Insurance Coverages for Highway Construction Contractors, was initiated to identify and analyze the primary short- and long-term factors that affect bond and insurance costs and create availability problems for contractors that need such coverages. The research identified and prioritized the primary factors that affect bond and insurance costs and availability through a review of the literature, interviews with industry participants, and questionnaires directed at state highway agencies, highway contractors, surety and insurance agents, and surety and insurance companies.

Based on the prioritization of factors, recommendations for actions that may solve or relieve some of these high-priority problems have been developed. Some of the recommendations are targeted at practices of the state transportation departments, others toward the insurance and bonding industries. However, there are a number of other high-priority factors for which additional research will be needed to fully solve problems. For these factors, research plans have been developed and recommended. Several of these research plans have been submitted for consideration for research within a future NCHRP fiscal year program.

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The following groups have also been very helpful to the research team: the NCHRP Project 20-26 Advisory Panel, the Surety Association of America, the National Association of Surety Bond Producers, the Associated General Contractors of Texas Highway Chapter, the American Subcontractor Association, the National Association of Minority Contractors, and the Federal Highway Administration. Several insurance and surety agents have cooperated with the study, especially Mr. Harry Brownlee, MMT, Inc., Dallas, Texas.

# BOND AND INSURANCE COVERAGES FOR HIGHWAY CONSTRUCTION CONTRACTORS

## SUMMARY

In recent years, a number of contractors have complained that the cost of insurance has risen dramatically or the needed insurance coverage is not available. The cost and availability of surety bonds are also mentioned as problems for small, less-experienced contractors and especially for Disadvantaged Business Enterprises (DBE). The purpose of this study was threefold: (1) to identify and prioritize the factors that affect the availability and cost of bonds and insurance on public highway contracts; (2) to develop recommendations for actions to solve the problems associated with the prioritized factors; and (3) to develop plans for additional research efforts needed in the subject area.

### *Research Methodology*

To accomplish the objectives of this study the following forms of information gathering were used:

1. *Literature review.* An extensive search was undertaken to identify sources of data and other information which would help meet the purposes of the research. This included computer searches of library materials and prior research, information obtained from trade and professional journals, and publications from trade associations.

The literature review provided the researchers with a good overview of the construction bond and insurance market. However, few empirical studies were found that directly had a bearing on this particular project's objectives.

2. *Interviews with industry participants.* Several persons representing the various interests in bonding and insurance issues were contacted throughout all stages of the research project. Their views, comments, and insights were most valuable in developing survey documents, as well as identifying individuals to contact for survey data.

3. *Industry surveys.* A statistical experimental design was established to guide efforts to collect desired data for the study. A comprehensive initial survey was sent to state highway officials; majority highway contractors; DBE highway contractors; surety agents; insurance agents; surety companies; and insurance companies in order to obtain their opinions about the subject matter. Two hundred sixty responses (19 percent) were obtained from 1,355 questionnaires sent, with a very low response rate from majority (non-DBE) contractors (9 percent) and only one response (3 percent) from insurance companies.

A second revised survey was sent to the initial survey respondents in order to further refine their opinions concerning the factors impacting cost and availability, in addition to acquiring possible solutions to the problems presented by bonding and insurance. A very good response (64 percent) was received; however, only about one-third of the contractors contacted (majority and DBE) responded.



### *Findings*

1. The current severity of bonding and insurance problems is rated by the industry participants as “moderate.” With the exception of DBEs, the view that problems in the bonding and insurance industry are “moderate” is prevalent.

2. State highway officials, by a wide margin, endorse the current practice of requiring bonds on highway projects. No alternative to bonding is acceptable to them as a group.

3. Financial factors are the most important in determining the availability and cost of bonds. Specific factors such as working capital, net worth, quality of the financial statements, and profit history are the highest ranked.

4. Several support programs are available to assist DBE contractors in obtaining bonds. However, obtaining bonds will continue to be a problem for small and minority contractors.

5. Factors related to the contractor’s management ability affect insurance cost and availability the most. Specific factors such as a contractor’s insurance claim history, litigation history, project experience, and risk associated with the project were the highest ranked.

6. Bond or insurance coverage on projects involving hazardous wastes are virtually nonexistent for most highway contractors. This is a serious problem needing attention.

7. Workers’ compensation and liability insurance loom as potential serious problems for highway contractors in the continuing climate of high payoffs in legal suits for personal injuries or illnesses.

### *Recommendations*

Several possible solutions to bonding and insurance problems for highway construction projects were evaluated in the study. The ensuing recommendations are based on careful consideration of those solutions deemed most feasible and suitable for easy implementation.

#### • *Bonding*

1. Surety professionals, especially new employees, need to be better informed of the construction process to enable them to better evaluate a contractor’s capabilities to perform satisfactorily. This information could be provided by surety companies, surety associations, academic programs, and on the job training.

2. Transportation agencies should improve their contract resolution procedures for construction projects to allow for more resolution of contract disputes at the project level. Problems not resolved at this level often result in costly claims and inhibited performance on the project by contractors.

3. Transportation agencies should consider the acceptance of alternatives to standard surety bonds when appropriate, such as personal collateral, higher threshold values for jobs requiring bonds, and partial waivers on hazardous waste projects. This may be necessary to enable small or minority firms to bid on highway projects, but will also assist larger contractors.

4. Sureties should assist small and new contracting firms to better understand the construction surety bonding process. Assistance could be provided by surety agents, surety companies, surety associations, and contractor associations.

5. Transportation agencies should pay contractors in a timely manner, especially the final retainer. Many contractors who default do so because of negative cash flow problems due to slow payments by clients. Obviously, payments should only be made for work properly completed, but excessive amounts should not be held for small amounts of uncompleted work.

6. Transportation agencies should provide high quality design drawings and specifications for their construction projects. Lower quality documents will lead to confusion and conflict on projects and potentially higher costs.

7. Sureties should provide highway contractors with detailed reasons for the rejection of their request for bonding. This should assist the contractor in better understanding the requirements to obtain bonding and, in turn, cause sureties to give more thorough analyses to applications.

8. Highway contractors should endeavor to establish closer working relations with surety agents to better understand the bonding requirements. Such relations should benefit them, similar to close working relations with bankers, accountants, and lawyers.

9. Small and minority highway contractors should avail themselves of the special bond support programs available through government agencies such as the Small Business Administration, U.S. Department of Transportation, U.S. Department of Commerce, and, possibly, local transportation agencies.

- *Insurance*

1. Transportation agencies should consider assuming more of the liability on projects involving hazardous wastes. Contractors are unable to obtain insurance coverage for such projects or must pay exorbitant rates if they do. A sharing of the risks could result in much lower costs.

2. All participants in the highway construction industry should support legislative reforms to reduce the number of, and the unrealistic settlements paid for, lawsuits related to highway projects. Such lawsuits, especially for tort liability and workers' compensation, are driving up the costs for insurance and, thus, the costs of highway projects.

3. Transportation agencies should consider the contractor's safety record as an important variable in the prequalification process. Contractors with consistently poor safety records hurt the entire industry by driving up insurance rates and increasing the number of lawsuits.

4. Transportation agencies should consider revising their construction contracts to more equitably share risks with designers and contractors. Although costs may be somewhat higher initially, costs should be lower in the long run as insurance costs diminish and bid prices decrease.

5. Insurance professionals, especially new employees, need to be better informed of the construction process to enable them to better evaluate a contractor's capabilities to perform satisfactorily. This knowledge could be provided by insurance companies, insurance associations, academic programs, and on the job training.

6. Transportation agencies should consider reducing the statute of limitations on completed construction operations to shorter (1 to 3 years) limits, where feasible. Current limits are often indefinite, placing higher risk and thus higher insurance costs on contractors.

7. Transportation agencies should accept more responsibility for design errors on highway construction projects. More DOTs are contracting their design work to consultants with a resulting increase in the number of contract disputes between designers and contractors over alleged design errors. DOTs need to take a more active role in resolving these disputes and accepting more responsibility for problems arising from design errors.

8. Highway contractors need to improve their safety programs. Poor safety performance is disruptive to projects and seriously impacts insurance costs for the highway industry, especially workers' compensation and liability insurance. Research is also needed to assist contractors in finding safer ways to perform their work operations.

### *Future Research*

More research is believed necessary to further study bonding and insurance problems and to develop in-depth solutions. Ten specific research problem statements were developed, including scope, estimated cost, and duration. Five problem statements were identified in the bond area and five in the insurance area. However, several studies would benefit both of the problem areas. The statements are:

- B1: Development of an Introductory Course on Highway Construction for Surety and Insurance Professionals
  - B2: Improved Resolution of Disputes on Highway Construction Projects
  - B3: Alternatives for Bonding of Highway Construction Projects
  - B4: Development of an Introductory Course on Highway Construction Bonds and Insurance Needs for Small Highway Contractors
  - B5: Evaluation of the Quality of Design Documents for Transportation Projects
  - I1: Impact of Transportation Agencies Assuming More Liability on Highway Construction Projects Involving Hazardous Wastes
  - I2: Evaluation of Federal and State Legislative Reforms Needed to Reduce Liability and Insurance Costs in the Highway Construction Industry
  - I3: Distribution of Risk Sharing on Highway Construction Contracts
  - I4: Investigation of the Reduction of Statutes of Limitation for Completed Operation Coverage After Contract Completion on Highway Projects
  - I5: Improvement of Safety on Highway Construction Projects
- 

## CHAPTER ONE

# INTRODUCTION AND RESEARCH APPROACH

This chapter introduces the research problem, delineates the research objectives, and discusses the research approach.

### RESEARCH PROBLEM STATEMENT

Highway construction contractors typically need to obtain bid, performance, and payment bonds, as well as insurance coverage in order to undertake public highway construction contracts. At the time this project was initiated, a number of contractors voiced concerns that the cost of insurance had risen dramatically or the needed insurance coverage was not available. The cost and availability of surety bonds were also mentioned as problems for small, less-experienced contractors, and especially for Disadvantaged Business Enterprises (DBE) that were attempting to break into public construction. In turn, there was concern that these problems may have reduced competition and increased costs for highway construction.

It is not clear to what extent various factors influence the cost and availability of bonds and insurance. Some of these factors may fall into such categories as highway agency design and

construction practices; cyclical nature of the insurance industry; shifts in the type of highway construction toward rehabilitation and reconstruction; social issues; legal climates; environmental issues; Occupational Safety and Health Administration (OSHA) requirements; changes in range and types of insurance coverage; size and number of projects; quality control; state and federal laws, rules, and regulations; risk management; safety programs; and loss prevention techniques.

Research is needed to enable the industry to deal with the primary short- and long-term factors that affect bond and insurance costs and create availability problems for contractors that need such coverage.

### RESEARCH OBJECTIVES

The research objectives were:

1. Identify, analyze, and prioritize the factors that affect the cost and availability of bonds and insurance on public highway construction contracts.

2. Develop recommendations for actions to solve the problems associated with the prioritized factors.
3. Develop plans, including an estimate of cost and duration, for additional research efforts needed in the subject area.

## RESEARCH APPROACH

### Literature Review and Interviews

An extensive literature review was conducted in the early stages of the research project to identify sources of data which would help meet the research objectives. This included computer searches of library materials and previously completed research projects, plus information obtained from trade magazines, professional journals, and industry associations. Although many articles and reports related to construction bonds and insurance were identified, few actually addressed specific issues of concern to the research project. The literature review provided the researchers with a good overview of the construction bond and insurance market.

Several persons representing the various participants involved with bond and insurance issues for highway construction have been contacted throughout all stages of the research project. The input obtained from these persons has been valuable to the researchers in organizing the research process, in developing the survey documents, and in identifying persons to contact for survey data. Several insurance and surety agents have cooperated with the study; however, the response from the insurance associations and companies has been minimal.

### Design of Experiment

The experimental design for this research project was established to identify the priority placed on the factors impacting the cost and availability of bonds and insurance for highway contractors by the different parties involved in the process. A comparison of the relative importance placed on these factors by the different groups would indicate areas for possible improvement of current bonding and insurance practices. This information was to be collected by survey documents sent to a random sample of organizations within the designated groups. Respondents would also be asked to rate the severity of the problems of cost and availability of bonds and insurance, along with recommendations for improvement.

The following population groups were identified for contact: (1) state highway/transportation officials, (2) highway contractors, (3) surety agents, (4) surety companies, (5) insurance agents, and (6) insurance companies.

Statistical sampling rules were used to establish the minimum number of respondents for each population group to estimate a representative viewpoint of each group on the bond and insurance problems issues. The response rate for the questionnaires was estimated to be approximately 30 percent, with an appropriate number of questionnaires mailed out. The individual firms and agencies contacted were randomly selected from the rosters of their appropriate professional associations.

It had originally been arranged to contact key insurance companies through an insurance association in Washington, D.C. However, after holding the survey forms for over a month, they

were returned with an opinion from their legal staff that it was unwise to participate in the study. Attempts to regain their participation were fruitless. Survey forms were then sent to several large insurance companies' underwriting departments; the response was a failure with only one respondent. Several attempts were made to obtain more responses with no success. It is, therefore, assumed that the insurance agents responding adequately represent the insurance industry position.

Sample sizes for each group were determined by using a statistical equation based on a required precision interval and confidence level for the data on bond and insurance factors. In turn, the sample sizes were adjusted for the expected response rate for each group. The statistical equation (from Ref. 1) is:

$$n = \frac{N}{1 + (a^2 N / z^2 w)} \quad (1)$$

where:  $n$  = sample size,  $N$  = population size,  $a$  = required precision expressed as a decimal,  $z$  = the value of the standard normal variate corresponding to a confidence level of specified value,  $w = N s^2 / (N - 1) x^2$ ,  $s$  = sample standard deviation, and  $x$  = sample mean.

The expected response rate for highway contractors was 16.7 percent; surety agents, 33.3 percent; and insurance companies 40.0 percent. These response rates were determined through past experience with similar groups and other studies (2,3). There was no need to employ Eq. 1 to find sample sizes for state highway officials, surety or insurance companies, because it was predetermined to send questionnaires to the entire effective populations of these groups. In other words, questionnaires were sent to 50 state construction engineers (or their equivalent); 36 went to surety companies (16 surety companies write 60 percent of the industry premium); 36 went to insurance companies.

For  $z$  value of 1.645 (i.e., 90 percent confidence level),  $x$  value of 2.8 and  $s = 0.85$  (i.e.,  $s$  determined from Ref. 3) and assuming the population is infinite for each of these groups, the statistical sample size found by Eq. 1 is 98. This value was divided by the expected response rate for each group to find the appropriate number of questionnaires to send. The questionnaires were then distributed geographically according to the 1980 census for each state.

The study groups, the minimum number of respondents expected of each group, and the number of survey forms mailed to each group are given in Table 1.

Table 1. Survey groups sampling information.

GROUPS SURVEYED	DESIRED RESPONSE	SURVEYS MAILED
STATE HIGHWAY & TRANS OFFICIALS	34	50
HIGHWAY CONTRACTORS	98	588
DBE CONTRACTORS	15	100
SURETY AGENTS	98	300
SURETY COMPANIES	27	36
INSURANCE AGENTS	98	245
INSURANCE COMPANIES	27	36
TOTAL	397	1355

A comprehensive list of possible factors that may affect the cost and availability of bonds was identified for evaluation by the appropriate survey groups, state highway and transportation officials, highway contractors, surety agents, and surety companies. After much deliberation, a reduced list of relevant factors was selected for preliminary evaluation. Although it was agreed that all the factors would be included in the survey questions to all potential respondent, it was realized that the list of factors used for the bonding issues would be somewhat different from the list used for insurance issues. The factors selected for each problem issue were originally classified into the following categories:

- C Contractor Character History
- E Contractor Experience
- P Contractor Project Performance
- M Contractor Management Practices
- F Contractor Financial Records
- S Characteristics of the Surety/Insurance Agents/Companies
- O Owner Characteristics
- R Government Regulations
- G General Issues

A complete set of all the preliminary questionnaires was sent to each member of the NCHRP advisory panel early in the study for their comments. Individual questionnaires were also pretested by several selected industry participants. The comments received from all the reviewers were incorporated into the final list of factors to be rated in the surveys. To expedite the respondent's time in completing the questionnaires and to aid in the evaluation of the ratings, a numerical system of 0 to 4 (4 = High, 2 = Medium, 0 = None) was identified to be used for rating both the availability and cost impact of various factors.

Six final questionnaires were developed to send to each of the survey groups. A different series of background questions were developed for each group to help partition the response data. Each respondent was also asked to identify what he/she thinks are the major problems with either bonds or insurance, the severity of the problem, and possible solutions to the problem. The highway officials and highway contractors received questionnaires covering both construction bonds and insurance issues. The surety and insurance groups received only questions about their respective expertise. The length of the questionnaire may have contributed to the low response rate from contractors. It should be noted that a special letter of appeal was sent to all of the original sample set who had not replied by a predetermined date. There were more responses sent in after this time, but not nearly the number expected.

A second survey was conducted to further prioritize the factors having the most impact on the cost and availability of bonds and insurance, and to ascertain the impact and feasibility of several proposed solutions which may mitigate bond and insurance problems. This second survey was directed only at the initial 259 survey respondents.

The second survey questionnaire was much shorter than the first because no background information was requested and more than half of the originally listed factors were eliminated because of the low ratings. Only one questionnaire was distributed to all groups. Several possible solutions (13 for bonds and 12 for insurance) were proposed for evaluation by the respondents, both as to feasibility of adoption and to the possible impact on their organizations.

The results of the second survey are given in Chapter Four. Again, the response rate by contractors was low, now raising the question as to how concerned highway contractors were at the time of the survey with current bond and insurance conditions.

## CHAPTER TWO

# LITERATURE REVIEW

This chapter highlights the pertinent literature pertaining to surety contract bonds and insurance related to highway contractors. In particular, the discussion concerned with surety bonds provides an historical background of the conditions leading up to the present situation; describes the reaction of the construction industry participants to the conditions described previously; presents research related to this study; covers bonding assistance programs available to small construction firms; and discusses small contractor trade associations and their activities and positions in the areas related to contract bonding.

Final sections discuss literature concerning construction insurance availability and discusses workers' compensation and concomitant experience modification rate.

## SURETY BONDS

### Background Information

Problems in the surety industry surfaced in 1984 when contractors struggled to find work. The bid prices on construction projects were lowered to such an extent that profit margins were squeezed, leaving little room for error. As a result of this, an increasing number of project defaults occurred. Since surety premiums are a percentage (typically near 1 percent) of the contract price, the surety industry return was not sufficient to cover for these increased risks (4). In 1984 the contract surety business recorded a combined loss and expense ratio (i.e., loss ratio plus expense ratio) of 117 percent. This was not the worst in surety history, but would become a harbinger of things to come. For the previous 10-year period, the public sector share of new construction declined from about 30 percent to approximately 18 percent. Optimism throughout the industry persisted, nonetheless, because of the improvement in private construction

bonding, stable construction costs as a result of lessening inflation, and increasing bidding volume (5).

According to Robertson (6), however, contractor insolvency was beginning to be a Canadian problem, as well. He indicated that Canadian sureties, at this time, were beginning to be lax in underwriting standards, and that claims experts capable of managing contractor defaults were lacking in Canada. As in the United States, the high construction default rate attracted private owners to seek surety bonds.

In 1985 the combined loss and expense ratio for contract bonds reached 154 percent (7). Claims were so enormous that sureties were requiring claims handling consultants (8). In Canada, the surety industry loss ratios, though not nearly as devastating as in the United States, were examined for the years 1981 to 1984 and reflected the same upward trend. The Canadians concluded that despite an improving economy, the major cause of the surety losses was the result of poor underwriting judgment and aggressive activity in the substandard business (9).

By 1986, the surety industry had experienced its worst year. It had a combined loss and expense ratio of 150 percent and had sustained losses in excess of \$1 billion. Contract bonds, which account for a substantial majority of surety premiums, suffered a combined loss and expense ratio of 163 percent which represented over one-half of all losses suffered since 1975. The high rate of failures among contractors was attributed to an oversupply of contractors, tax law changes, new environmental regulations, and an unevenly developing economy (10).

In 1987, the contract bond business had a 127 percent combined loss and expense ratio. Yet, this included a 30 point improvement over the preceding year's pure loss ratio. This improvement, according to industry spokesmen, was accomplished by increasing rates and establishing improved training programs for underwriters (11).

However, by 1988 the surety industry was profitable again. The combined loss and expense ratio had decreased to 94 percent, principally through more stringent underwriting standards. Several reasons have been set forth as to the causes of the surety crisis: excessive construction capacity, federal government's inconsistent construction program, new tax laws that placed restrictions on completed-contract method of accounting, and the cash flow style of surety underwriting. In the latter case, sureties were betting the investment income would more than offset the losses incurred on underwriting (12).

### Attempts to Rectify Bonding Crisis

The turmoil within the surety industry has instigated much regulatory and legislative dialogue concerning the entire bonding process. Cognizant of the implications of reduced bonding capacity, a few states attempted to force the surety into Joint Underwriting Associations (JUA). Other states introduced legislation creating alternatives for the bonding process, such as letters of credit, self-bonding, and cash equivalent negotiable instruments. Even the Federal Trade Commission (FTC) sought evidence that suretyship was not insurance and, therefore, required tighter regulatory restrictions (13).

The Miller Act, long regarded as favorable legislation for subcontractors and materialmen, began to be scrutinized by both the American Subcontractors Association (ASA) and the Associated General Contractors (AGC). The ASA stated that the Miller Act protection was illusory, pointing to much anecdotal

data. The AGC, in a policy statement, asserted that the alternative forms of surety allowed under the Act were "unworkable and unacceptable" (14). Both ASA and AGC contend that the problem with the Miller Act is its allowance of individual sureties, who are neither regulated nor required to furnish audited financial statements, and who often overpledge assets that cannot be easily verified by federal contract officers.

The combination of large losses in the surety industry, insurance companies abandoning the contract bond market, and perceptions that bonding capacity in general was diminishing have all caused public owners great concern. Some even think that individual sureties could be a viable alternative to corporate sureties. The U.S. Government has used individual sureties for a number of years.

However, the use of individual sureties is causing great alarm in the federal government. The General Accounting Office (GAO) was commissioned to determine the extent of individual surety use in federal agencies, the amount of losses arising from such use, and the number of bid protest decisions due to the use of individual sureties (15). Although a limited amount of data was available, the report cites an official in the Inspector General's Office in the Department of the Interior: "[We] have demonstrated that individual sureties often are secured by insufficient assets that have been overpledged on numerous contracts."

The GAO report stated that the extent of the problems associated with the use of individual sureties within federal agencies can be demonstrated by the number of ongoing investigations reported by the various agencies: 45 reported by the Department of the Interior, and 50 reported by the Department of the Army Criminal Investigation Unit. Some common fraudulent actions reported by the GAO, by individual sureties were as follows: claim nonexistent assets, claim assets they do not have clear title to, inflate the value of the assets they do have, fail to disclose bond obligations, file fictitious financial information, and forge signatures that purport to certify the character of the individual surety.

Concerns about the availability of bonding for small business contractors have been prevalent in the federal government for nearly two decades (16). By 1972 the Small Business Administration (SBA) Guarantee Bond Program, which is similar in many respects to self-bonding, went into full operation.

The success of this program, however, is in serious doubt. It was originally instituted to have standard surety participation, but only 3 percent of the guaranteed contracts are bonded by this segment. (The remaining 97 percent of the guaranteed contracts are covered by the nonstandard market.) A General Accounting Office review found that 87 percent (sample size 600) of approved applications contained serious underwriting deficiencies. In addition to this the GAO found that formal underwriting guidelines and criteria were absent in the program. (By 1983 the program established formal guidelines.) The lack of claims-handling standards and the absence of monitoring contract progress were also cited as problem areas. The problems of assessing the Guarantee Program appear to be confounded since the SBA has refused to use the same loss ratio calculations as corporate sureties, thus making comparisons virtually impossible.

The SBA *Program Statement of Income and Paid Claims* reveals that the Surety Bond Guarantee Program has bonded \$19.8 billion in contracts and has sustained losses of almost \$368 million from program inception to September 30, 1989. This is

almost a loss rate of 1.9 percent on the contract value. From this, one can easily see that typical premiums of between 1 to 1.5 percent of the contract value would not be enough to cover the losses and expenses associated with overhead.

Often overlooked by public officials who believe that self-bonding is a viable alternative are the services that corporate sureties perform. Some of these services are (17):

- Providing financial assistance to avoid a default.
- Qualifying a contractor by verifying and evaluating financial data, the character of the contractor, and the work program of the contractor.
- Providing claims administration.
- Arranging for managerial assistance.
- Providing an additional project monitor.

### Related Studies

The search for empirical studies concerning bonding revealed that little substantive work has been done in this area. Three such studies, however, did touch upon the issue of bonding as it relates to contractors. Literature concerning the factors influencing the underwriting criteria could be found from both industry trade publications and technical journals.

The American Subcontractor Association (18) conducted a survey of its members regarding their experience with surety bonding. The survey (sample size of 135) revealed the following:

1. The surety market has changed from previous years, as evidenced by increased premiums, increased underwriting requirements, and reduced bonding capacity.

2. Surety bond agents have significantly demonstrated a pattern of not providing their clients with needed information, such as not providing a reason for decrease in bonding capacity (43 percent), not given advance notice of rate change (50 percent), not advised about change in underwriting criteria (57 percent), and not explaining underwriting criteria in advance of bond application submission (50 percent).

3. Specialty trade contractors actively seek alternative markets to standard sureties, as well as seeking alternatives to corporate sureties. This would include individual sureties, letters of credit, certificates of deposit and cash.

In a very similar study, Webb et al. (19) investigated (sample size of 77) the extent of problems encountered by small or minority contractors in obtaining bonds. This study concluded that small and minority contractors did have difficulty in obtaining bonds, but that racial prejudice did not appear to be involved. Failure to obtain a bond may be due to the contractor contacting the wrong type of bonding agent, because few agents represent both standard and specialty sureties. The study also states that it is not necessarily desirable for all contractors to get bonds, because doing so would ultimately increase the costs for more qualified contractors. The study, furthermore, found that individual sureties served a useful purpose and that letters of credit can serve essentially the same purpose as bonds. Webb made the following recommendations:

1. The surety industry establish a marketing assistance plan in each state to aid small and minority contractors in locating sureties who will bond them.

2. Standard sureties increase efforts to appoint more minority agents.

3. Sureties undertake loss control methods to reduce contractor defaults and costs in order to make more bonds available.

4. Sureties provide contractors with reasons for rejecting bond application.

5. Federal government amend the Miller Act by raising the threshold from \$25,000 to \$200,000.

6. Owners accept individual sureties or letters of credit in place of bonds.

7. Contractors obtain professional assistance.

8. Contractor trade associations keep informed of developments in the surety industry.

9. Contractor trade associations establish a captured surety company.

In an effort to better serve the DBE area, the ASA President's Special Task Force on Minorities and Women (20) determined that the primary obstacles facing these two groups were:

1. *Access to surety bonds.* This is because both minority and women enterprises are primarily small and new. In addition, the surety industry has increased their underwriting standards.

2. *Capitalization.* This refers to the accumulation of liquid and fixed assets. Because of the historical economic status of these groups, they often have neither developed the required financial resources nor established a substantial credit history.

3. *Market access.* This refers to work opportunities within the construction field. This is also related to the concept of preferential procurement programs. Women and minority subcontractors basically want a system that provides them with the opportunity to change attitudes about the capabilities of their companies. Often the lack of a proven track record prohibits successful marketing.

4. *Management and training.* Women and minority subcontractors need more knowledge concerning estimating, bid preparation, contract negotiation, labor management, and general management of their companies.

The general factors that influence obtaining surety bonds have been noted in several publications from the Surety Association of America or the National Association of Surety Bond Producers (21), as well as from some technical journals (22,23). Suretyship is basically a credit function (24,25) closely allied with bank lending. As such, the approval process is similar. In both functions the character, capacity, capital and economic conditions pertaining to the applicant are evaluated. However, the surety should have special expertise in analyzing construction contracts and in assessing the managerial and technical capability of the contractor.

The term "character" pertains to the contractor's basic honesty. By looking at the contractor's references, credit paying history, reputation for honesty, litigation history, and other sundry questions, the surety attempts to assess whether or not the contractor can be trusted to stand behind his agreement to finish the project within design specifications and pay his subcontractors in a timely fashion.

"Capacity" refers to the contractor's basic capability. This involves the contractor's technical ability, project experience, and previous project performance (26). Wallace (27) points out several criteria in this area: the project scope vs. the contractor's

experience; the projects dollar value; and the number of years the contractor has been in business. Associated with capacity, is the contractor's plan of continuity should demise of key employees occur, and the contractor's business plan which should provide for future plans.

The term "capital" pertains to the financial strength of the contractor. Has the contractor enough reserve to undergo a job involving financial loss? Does he have sufficient working capital to pay for subcontractors and materials? Does he have a banking relationship that will provide him with the needed working capital? Are the financial statements of sufficient quality that they accurately reflect the contractor's true financial position? Is the contractor highly leveraged? These are just some of the questions the surety asks in order to evaluate the contractor's capital (28).

#### **Status of Bonding and Financial Assistance Programs for Small Contractors**

Several federal government programs are available to assist small and minority contractors in obtaining surety bonds. The Small Business Administration (SBA) currently provides assistance in the form of bond guarantees to both small and minority firms, while the USDOT and U.S. Department of Commerce programs are earmarked for minority firms only.

The SBA maintains two bond guarantee programs: the Surety Bond Guarantee Program and the Preferred Surety Bond Guarantee Program. These programs differ primarily in the rate of indemnification to sureties and in the procedural aspects of applicant approval. The Surety Bond Guarantee Program, initiated in January 1971, guarantees bid, performance, and payment bonds. It originally guaranteed 90 percent of a participating surety's losses for both small and minority contractors up to a contract amount of \$1,250,000.

Currently, the indemnification rate remains at 90 percent for minority contractors, but for non-DBE/WBE contractors the rate is 90 percent on contracts up to \$100,000 and 80 percent for contracts between \$100,000 and \$1,250,000. Approved contractors pay surety premiums based on the company's filed rates and additionally pay the SBA \$6 per \$1,000 of the contract award. The SBA additionally receives 20 percent of the surety's premium. Eligible contractors are those that possess good character (i.e., not under indictment, not under regulatory suspension, not fraudulent in obtaining bond), certify that the bond is required and otherwise unobtainable, and lastly certify the percent of work to be subcontracted. The final approval of the contractor rests with the SBA and is based on SBA underwriting criteria (29).

The Preferred Surety Bond Guarantee Act of 1988 authorized the SBA to undertake a 3-year pilot program ending on September 30, 1992, for the purpose of improving small and minority businesses access to the standard surety market. For a 70 percent indemnification rate on contracts up to \$1.25 million, selected sureties need not seek SBA approval for the applicant (30). The type of bonds available, contractor eligibility requirements, premiums and all other fees are the same as the Surety Bond Guarantee Program.

The Bonding Assistance Program instituted at the U.S. Department of Transportation Office of Small and Disadvantaged Business Utilization is limited to DBEs/WBEs meeting the 49 CFR Part 23 guidelines. This program offers sureties an 80

percent indemnification on losses arising from transportation-related contracts of \$500,000 or less. These projects should be federally assisted and involve maintenance, reconstruction, rehabilitation, improvement, or revitalization of the nation's transportation modes. The USDOT Bonding Review Committee evaluates the efficacy of the contractor and the surety has final approval. The contractor, so approved, pays no more than 3 percent of the contract value to the surety directly (31).

Under the authorization of subchapter II of the Department of Transportation Act, 49 U.S.C. 332, Public Law No. 97-449, the DOT has instituted the Short Term Lending Program, which provides working capital loans to DOT-certified DBEs/WBEs engaged in transportation-related contracts under the sponsorship of the department. Approved contractors pay the New York prime lending rate, with the DOT paying the difference between the lending rate negotiated between Capital Bank, N.A. and the contractor. The term of the loan is essentially tied to the contract duration and the maximum amount of the loan can not exceed \$150,000; exceptions to this loan maximum can be made only with the director's approval (32).

The Department of Commerce (DOC) has instituted a system of Minority Business Development Centers throughout the nation which can assist contractors in obtaining surety bonds. These MBDCs are private enterprises contracted with the DOC to, as the name implies, help minority firms develop into viable enterprises. For a small fee the MBDC will submit a bond package to surety agents, which basically includes financial statements, contract performance information, schedule of uncompleted work, bank and supplier references, and resumes of company principals along with a company history (33).

#### **Small Contractor Trade Associations**

Two small contractor trade associations which have national influence exist: the American Subcontractors Association (Alexandria, Va.); and the National Association of Minority Contractors (Washington, D.C.). The ASA membership consists mainly of majority subcontractors; however, an effort has been made of late to increase its membership base to include minority and women contractors. Its purpose is to inform and assist subcontractors on issues and trends in the industry. The following positions have been subscribed to by the ASA as it relates to the bonding process:

##### *1. Amend Miller Act as follows:*

a. Require that payment bond copies be attached to subcontracts. According to the ASA (34), subcontractors are increasingly becoming unprotected due to: default and liquidation of Treasury approved sureties; increasing incidents of government contract officers failing to require the prime contractor to provide proper protection mandated by law; increased use of individual sureties.

b. Require that the payment bond equal the performance bond amount. Currently, the Miller Act stipulates the following coverages for payment bonds: 50 percent coverage for projects equal to or less than \$1,000,000; 40 percent coverage if the project is between \$1,000,001 and \$5,000,000; and \$2,500,000 if the project exceeds \$5,000,000. A General Accounting Office Report recommendation was cited as support for this requirement.



- c. Extend the liability to the U.S. Government if its agent fails to assure proper payment bond for a project.
- d. Prohibit any waiver of rights under a payment bond.
- e. Permit the award of attorneys' fees and interest to a successful claimant. ASA contends that court proceedings generally act as a bar to filing a claim.
- f. Extend the Miller Act protection to progress payments. Under the Act, a subcontractor may not file suit until 90 days after a payment is due. The implication is that subcontracts must wait years on projects of long duration.
- g. Extend protection to lower tiers.
- 2. *Require sureties to provide reasons for bond denials (35).*
- 3. *Consider the use of individual sureties only if:*
  - a. Individual sureties demonstrate possession of actual tangible assets.
  - b. Individual sureties demonstrate that possession of tangible assets were available or liquid (i.e., cash or securities easily converted into cash).
  - c. Individual sureties demonstrate that the legitimate claimant would be able to draw upon the assets.

As the name implies, the National Association of Minority Contractors membership is predominantly minority. This organization provides information on procurement, invitations to bid, legislative actions and proposed legislation, and general construction information. In addition, NAMC provides workshops and seminars ranging from technical assistance to construction management (36). With respect to bonding, the NAMC is in favor of the individual sureties, especially the individual surety association concept as proposed in Congress. This bill, H.R. 4179 provides a means for individual sureties to pool their resources and collectively bond federal contracts. These associations could write bonds equal to six times the total amount of resource and would be required to provide a loss reserve of at least 1 percent of total potential liability; and have 0.5 percent of total potential liability held in escrow. The General Services Administration (GSA) would establish regulatory guidelines.

## CONSTRUCTION INSURANCE

Most literature concerning insurance in the construction industry is concentrated on legal, contractual, design, and compliance issues. Anderson (37) pointed out that work-zone safety is and will be an on-going problem. The problems associated with this issue surround the design criteria, law enforcement, jury awards, and the ever present need for both contractors and state highway officials to understand and implement the principles of safe traffic movement. State highway departments that award contracts, which unduly expose motorists and workers to injury and death, could also be guilty of both criminal and civil negligence. It was implied that state highway agencies would be better off in the long-run to pay attention to safety first rather than seek legislative and contractual measures to reduce risk.

Furthermore, the loss of sovereign immunity in tort liability has caused great alarm for state agencies. Sixteen states reported (38) a significant increase in legal costs because of the loss of sovereign immunity. However, government agencies that institute risk management programs found that the potential for negligence is reduced (39).

In view of the current propensity for legal redress, the highway

contractor has been placed in a precarious position. Even when a highway department approves all of the contractor's work, the contractor may be held liable (40). Also, in the case where a subcontractor's actions cause an accident, the prime contractor can be held liable as well (41). The absence of proper quality control methods may also become a litigation issue to both the project owner, who draws up the specifications for manufactured material, and the contractor who purchases the specified material (42).

## Insurance Availability and Costs

Since 1986, the Risk and Insurance Management Society (New York, N.Y.) has conducted an annual survey of its members to evaluate current insurance conditions for the most recent renewal of major commercial insurance coverage. The RIMS 1989 survey (43) was compiled for 1,151 responses, with a broad cross section of industry groups represented from agriculture, construction, manufacturing, utilities, insurance, and governments. Although not specifically for highway construction, it is believed the results are indicative of the trends in the industry as related by insurance agents contacted. A summary of the key findings of the RIMS 1989 survey relative to construction is given below:

1. In general, the industry trend is undergoing a slow and steady improvement.
2. Eighty-eight percent of the respondents reported a *decrease* in premium for umbrella/excess liability premiums by the third quarter of 1988.
3. The "ease to purchase gap" between specialized lines of coverage (e.g., professional liability and bonds) and nonspecialized lines of coverage (e.g., property and general liability) narrowed to 40 percent in 1988 from 51 percent in 1987.
4. Stability was demonstrated in professional liability premiums (40 percent reported premium decreases), environmental impairment (36 percent reported decreases in premiums), and surety bonds (19 percent reported premium decreases).
5. Environmental impairment liability insurance continues to be difficult to obtain (43 percent of the respondents continue to find coverage unavailable and 14 percent reported "much difficulty" in obtaining coverage).

## Workers' Compensation

Workers' compensation acts in all 50 states require that contractors cover their workers' compensation exposure. The most common method of coverage is for the contractor to purchase workers' compensation insurance. Those that do not are either covered by insurance carried by their client, or if they are large enough and the state law allows, they are self-insured.

The cost of insurance coverage to a contractor varies with the type of work and the contractor's accident record. The insurance industry classifies each type of job into groups called classification codes. These four digit codes are used to determine a contractor's base premium to be charged per \$100 of payroll. These are known as "manual rates." These rates vary considerably from state to state based on the injury experience for the particular type of work in the rating state. This part of the insurance

premium is constant for all contractors doing similar work in a specific state.

The National Joint Heavy and Highway Construction Committee, *Heavy and Highway News* (44), ranked the 50 states and the District of Columbia according to an average cost of workers' compensation. This was based on the average of the classifications of carpenters, concrete work, excavation, pile-driving, and steel erection, which is representative of heavy and highway construction contractors. Table 2 contains the states average cost and ranking according to this article. As can be seen there is a tremendous variation in the average rates, from \$8.18 in Indiana to \$65.56 in Montana, a ratio of 8 to 1. The median value is \$19.23, with about 25 percent of the states very near this value.

The other factor in determining a contractor's, workers' compensation insurance premium is a multiplier applied to the manual rate known as an "experience modification rate" (EMR). The insurance industry has developed this as an equitable means of adjusting each contractor's premium based on past experience. The EMR is calculated with an actuarial formula using each employer's record of losses (direct medical, hospital, and wage costs) caused by worker injury over the first 3 of the last 4 years. The formula basically involves comparing the employer's actual incurred losses during this rating period to the expected losses based on a comparison of firms doing similar types of work. If the employer's actual losses are greater than his expected losses, the EMR is greater than one and, therefore, on applying the multiplier to the manual rate, his premium will go up. Conversely, if the employer's actual losses are less than his expected losses, the EMR is less than one and therefore this would cause his rates to go down. Typical EMRs range from a low of 0.3 to a high of 2.0, with an average around 1.0 (45).

Since the manual rates are fixed for all contractors performing a certain type of work, it is evident that the contractor's EMR can play a very important role in giving him an advantage over the competition. Those firms with poor safety performance can easily pay twice the premium cost for insurance than those with better safety performance, per the example shown below.

On a \$1,000,000 highway project (assume the direct labor is 25 percent of the project cost \$250,000, and the manual rate is \$22.26 per \$100 direct labor), the following two costs of workers' compensation premiums are possible:

*Safe Contractor (EMR = 0.5)*

$$\text{Premium} = \frac{\$250,000}{100} \times 22.26 \times 0.5 = \$27,825$$

*Less Safe Contractor (EMR = 1.5)*

$$\text{Premium} = \frac{\$250,000}{100} \times 22.26 \times 1.5 = \$83,475$$

As can be seen, there is a difference of \$55,650 in workers' compensation insurance premium costs, a ratio of 3 to 1, for the two contractors bidding on the same project. Obviously, safety pays in the construction industry. Moreover, workers' compensation insurance is a very significant expense to contractors in most states.

Table 2. Average cost of workers' compensation.

\$ PER			\$ PER		
RANK	STATE	\$100	RANK	STATE	\$100
1	INDIANA	8.18	26	MISSISSIPPI	19.86
2	KANSAS	9.43	27	OKLAHOMA	20.39
3	UTAH	9.97	28	ARIZONA	22.15
4	NEBRASKA	10.33	29	MICHIGAN	23.20
5	NORTH CAROLINA	10.78	30	NEW MEXICO	25.07
6	MISSOURI	10.81	31	NEW HAMPSHIRE	26.28
7	NEW JERSEY	11.08	32	WASHINGTON, DC	26.31
8	VIRGINIA	11.23	33	HAWAII	28.58
9	SOUTH CAROLINA	11.30	34	COLORADO	28.70
10	MARYLAND	12.10	35	TEXAS	30.83
11	NEW YORK	13.51	36	CONNECTICUT	31.68
12	SOUTH DAKOTA	13.62	37	RHODE ISLAND	31.92
13	TENNESSEE	14.64	38	ALASKA	33.23
14	VERMONT	14.65	39	MINNESOTA	33.91
15	DELAWARE	15.89	40	ILLINOIS	34.77
16	IDAHO	16.54	41	MAINE	35.79
17	LOUISIANA	16.59	42	MASSACHUSETTS	36.76
18	CALIFORNIA	18.22	43	FLORIDA	38.62
19	IOWA	18.82	44	OREGON	45.18
20	WISCONSIN	18.87	45	MONTANA	65.56
21	ALABAMA	19.03	46	NEVADA	N/A
22	GEORGIA	19.14	47	NORTH DAKOTA	N/A
23	PENNSYLVANIA	19.23	48	OHIO	N/A
24	ARKANSAS	19.24	49	WASHINGTON	N/A
25	KENTUCKY	19.51	50	WEST VIRGINIA	N/A
			51	WYOMING	N/A

Source: Heavy and Highway News, March 1990

## SUMMARY

Construction bonds and insurance have been used for highway construction for many years and most participants in the highway construction process are familiar with their use. However, there are many different attitudes about the actual practices followed, the impact of revising current practices, and the methods which may be used to improve the state of practice for the benefit of all concerned. Bid, payment, and performance bonds are required for most state DOTs; the impact of revising these requirements is uncertain. Surety companies are rigorous in evaluating contractors for bonding, and they believe that they operate on too close a profit margin to loosen their requirements. Insurance for highway contractors, especially workers' compensation and liability insurance, is expensive because of the high risks involved in highway construction work. There is no activity to reduce the premiums or to loosen the evaluation procedures for policy coverage.

## CHAPTER THREE

## INITIAL SURVEY FINDINGS

This chapter presents the findings of the initial survey along with a description of the groups responding to the survey. The first section depicts the number of survey instruments mailed and the corresponding response rate according to group affiliation. The next section shows the geographical representation of the respondents, followed by seven sections which provide statistical profiles of responding state highway officials, highway contractors, DBE highway contractors, surety agents, surety companies, insurance agents, and insurance companies, respectively. The final section presents the results of the primary study issues, i.e., respondent opinion on bonding severity, respondent opinion on insurance severity, respondent opinion on factors influencing bonding availability and cost, and respondent opinion on factors influencing insurance availability and cost.

It should be noted, in the tables provided in this chapter, that the number of responses for each group will vary from table to table because some of the respondents did not choose to answer all of the questions posed on the survey instrument.

## RESPONSE RATE OF GROUPS

Table 3 gives the response rate according to group affiliation. Of the 1,355 surveys mailed, 260 (19 percent) from all groups responded. State Highway and Transportation Officials (SHTO) responded with the highest rate (82 percent), followed by surety companies (56 percent), DBEs (27 percent), surety agents (26 percent), and insurance agents (16 percent). Groups lagging the average response by a significant margin were majority contractors (9 percent) and insurance companies (3 percent).

## GEOGRAPHICAL DISPOSITION OF RESPONDING GROUPS

Figures 1 through 7 show the geographical profiles of the responding groups. As indicated by Figure 1, 41 state highway officials (i.e., typically state construction engineers or their staff), including one who withheld his identity and that of his agency, responded to this survey. A majority of the nonresponding SHTOs come from predominantly rural states.

Figure 2 points out that 53 majority highway contractors, from across the United States, responded to the survey. Responses came from all major industrial states; however, the poor response from California was disappointing. More than 40 survey instruments were sent to California highway contractors, but only one was returned.

DBE highway contractor responses are shown in Figure 3. The 27 responses came primarily from the southwest and the midwestern states. However, such major states as Texas, Illinois, Michigan, Ohio, and Pennsylvania were represented by DBEs.

Figure 4 presents the surety agent response for each state.

Seventy-nine of these agents responded. All sections of the United States were well represented.

Figure 5 depicts that 20 surety companies responded to the survey. These companies were concentrated in the Northeast, Midwest, and West Coast. Five responses could not be classified geographically because of respondents withholding their corporate identity.

As shown in Figure 6, 39 insurance agents from across the United States responded. However, absent were responses from the Rocky Mountain, Great Plains, and the Atlantic Coast states. Responses came from most large states, with the exception of Florida.

Insurance company responses are shown in Figure 7. The single response came from New Jersey.

## PROFILE OF STATE HIGHWAY OFFICIALS

## Dollar Size of Typical Highway Contract

The approximate size of the average highway contract is shown by state in Figure 8. The average contract size was obtained for each state by taking the current annual construction volume (in dollars) and dividing that value by the current number of contracts let annually. Often a respondent would provide interval estimates for both the construction volume and number of contracts let. In these cases, the midpoint of each interval was used to obtain the average highway contract size. Hence, the values presented in Figure 8 represent general approximations. Accordingly, the average or mean contract size in the United States is \$1.514 million and the median is \$1.086 million. Those states where the average highway contract size is in the bottom 25th percentile are basically rural and midwestern. On the other hand, large highway contract states (i.e., average contract above

Table 3. Initial survey response rate by group affiliation.

GROUP RESPONDING	RESPONSES	NUMBER OF SURVEYS MAILED	RESPONSE RATE
STATE HWY & TRANS OFFICIALS	41	50	82%
MAJORITY CONTRACTORS	53	588	9%
DBE CONTRACTORS	27	100	27%
SURETY AGENTS	79	300	26%
SURETY COMPANIES	20	36	56%
INSURANCE AGENTS	39	245	16%
INSURANCE COMPANIES	1	36	3%
TOTAL	260	1355	19%

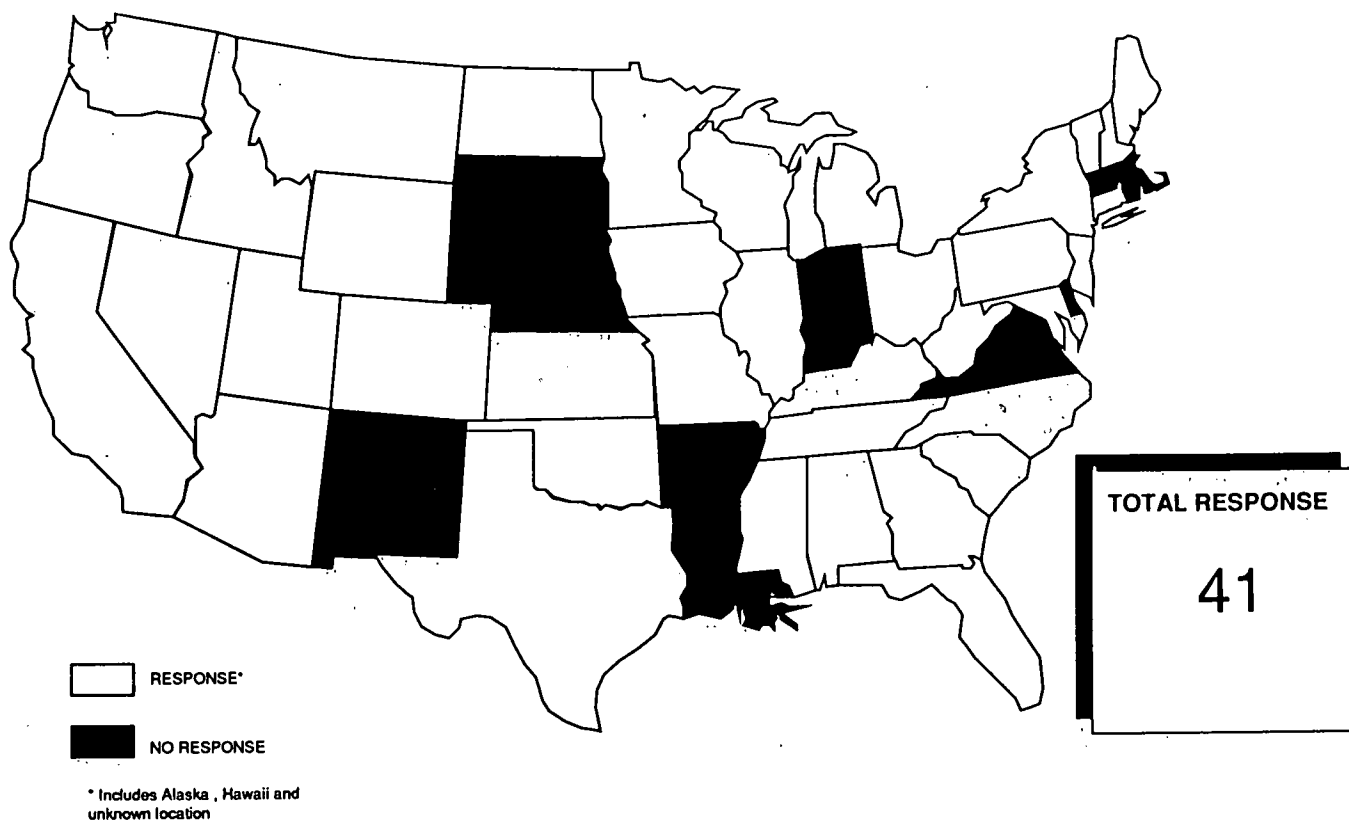


Figure 1. State highway officials responding to survey.

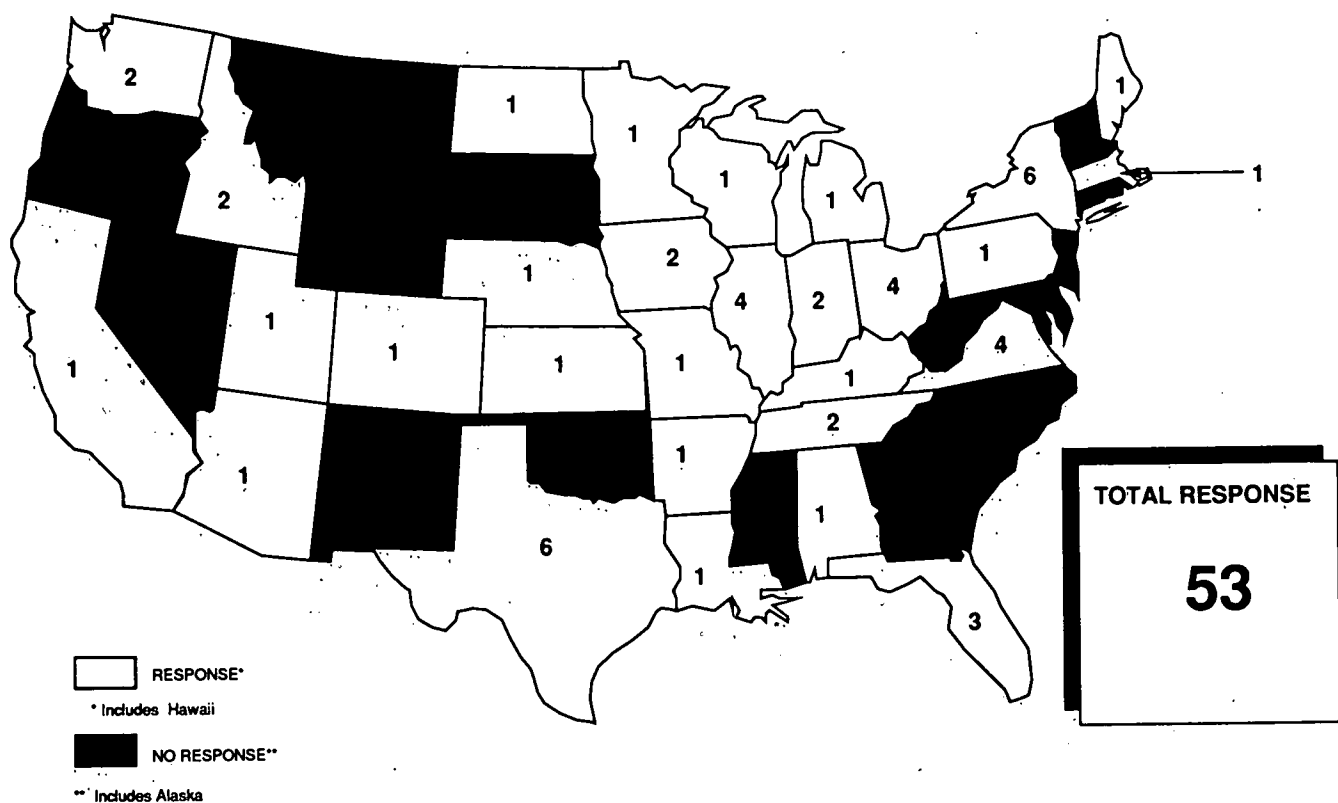


Figure 2. Number of majority highway contractors responding to survey by state.

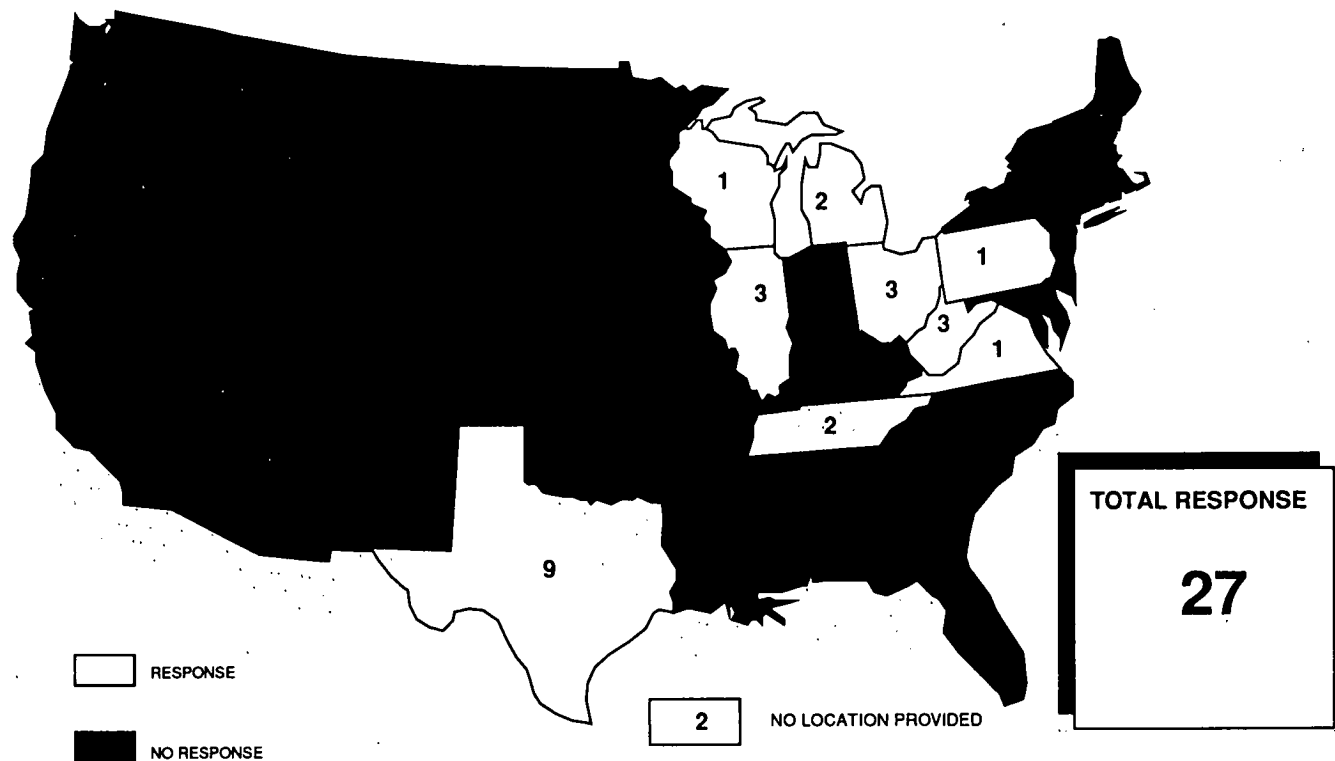


Figure 3. Number of DBE highway contractors responding to survey by state.

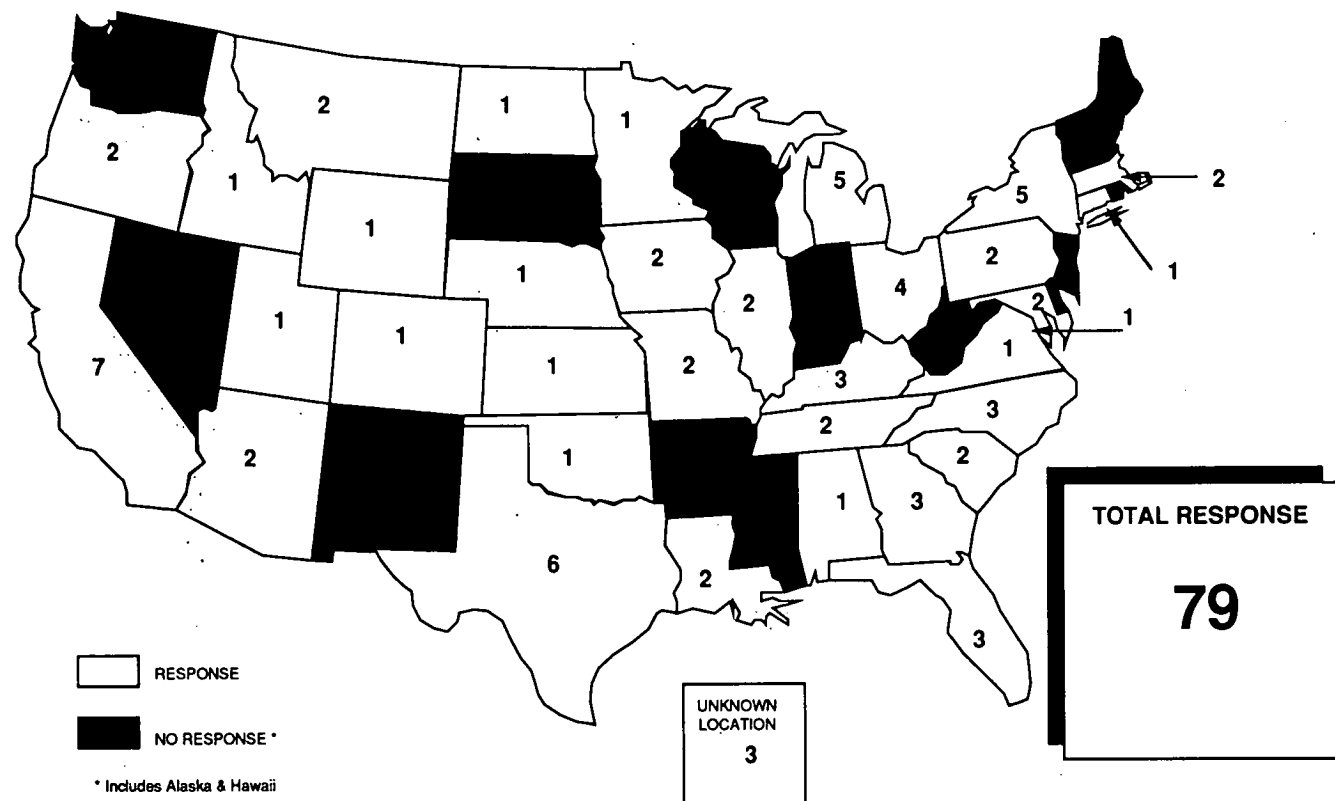


Figure 4. Number of surety agents responding to survey by state.

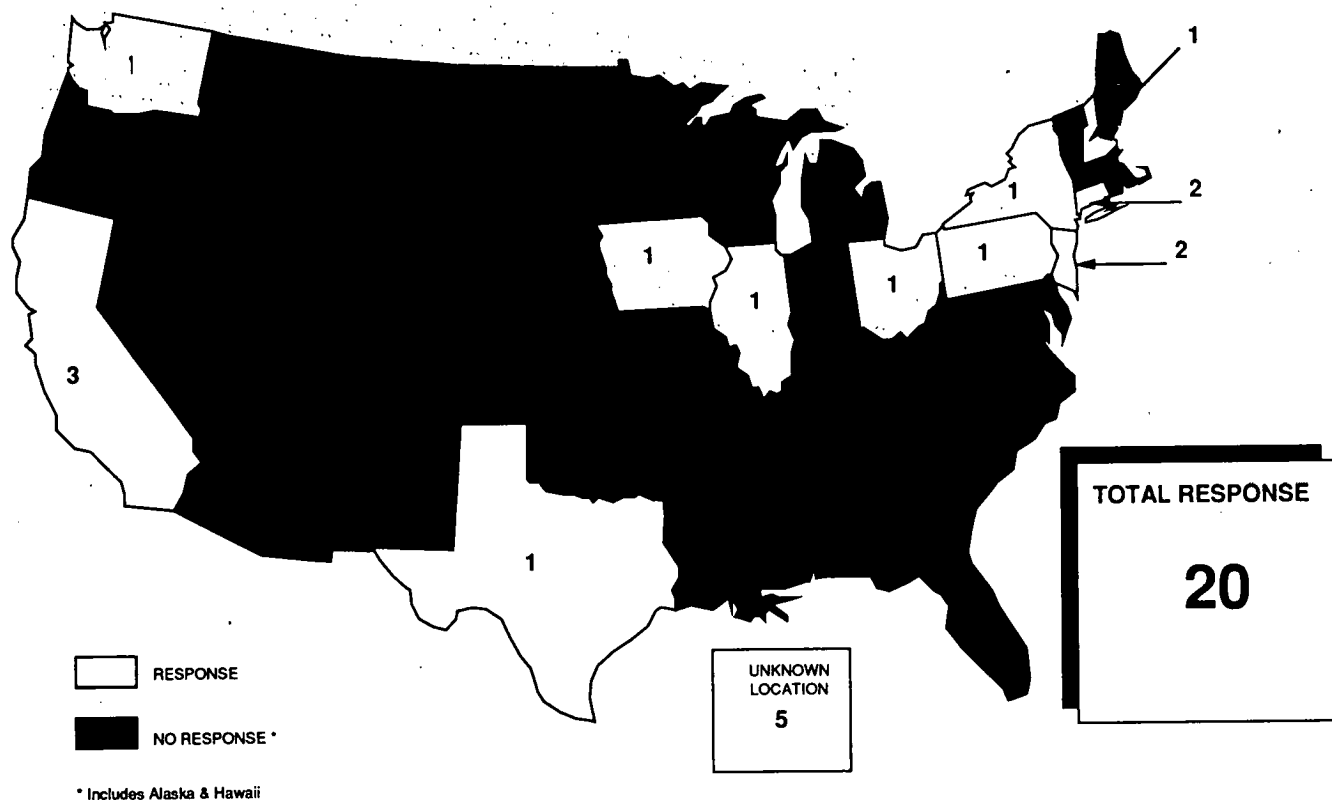


Figure 5. Number of surety companies responding to survey by state.

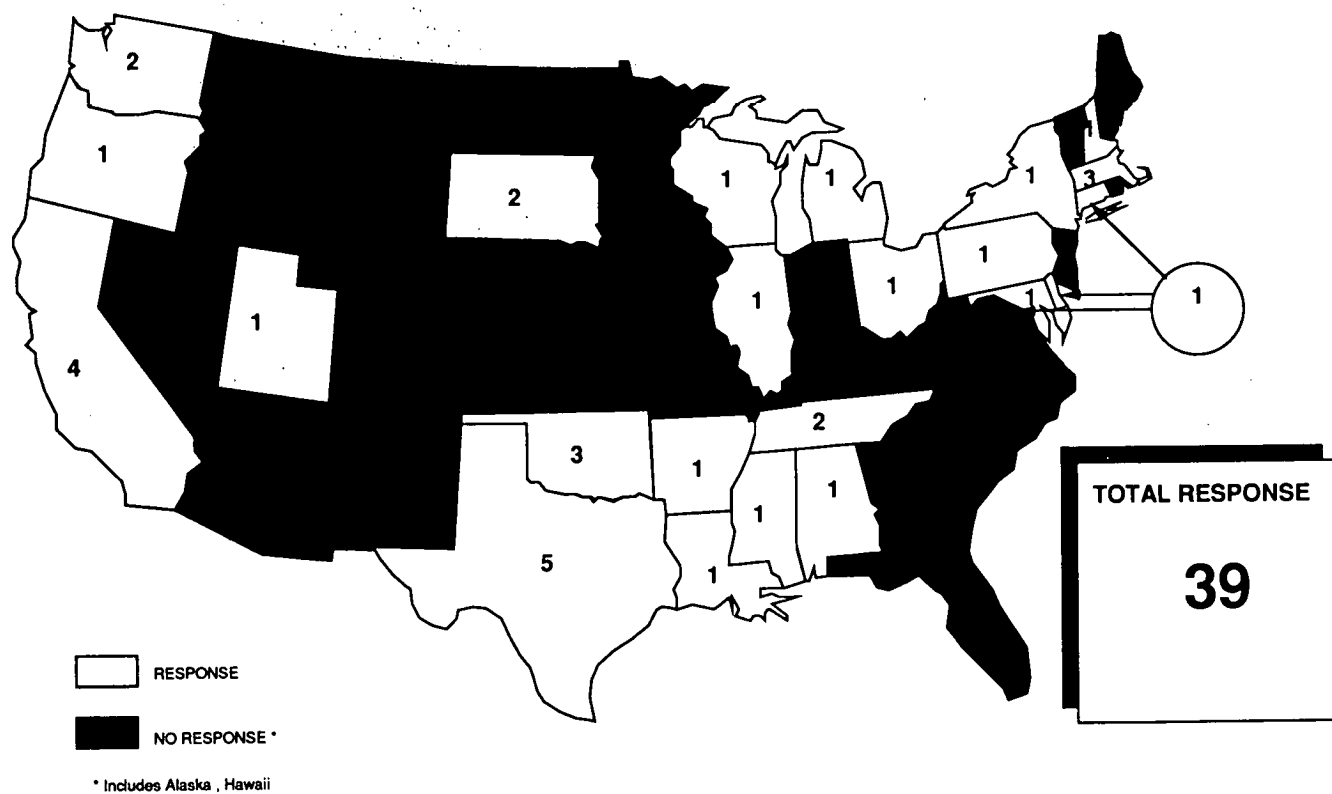


Figure 6. Number of insurance agents responding to survey by state.



Figure 7. Number of insurance companies responding to survey by state.

\$ 2 million) tend to be located at the extremities of the contiguous United States.

Statistics related to the bonding practices of the responding SDOTs can be found in Appendix C. From a review of these statistics it can be shown that approximately 15 percent of state DOT respondents replied that individual sureties are allowed; over one-half of the state highway officials responded that less than 1 percent of performance bonds were invoked; over 75 percent of responding state DOTs had some kind of highway contractor prequalification procedure; and, finally, state DOTs do not emphasize safety in prequalification (88 percent responded that safety is not a consideration in contractor prequalification and 56 percent noted they do not require contractors to have special training in handling hazardous material).

#### State Highway Officials' Opinions about Contract Bonds

Tables 4 through 6 are concerned with highway officials' opinions and attitudes about the bonding process. Table 4 focuses on the use of methods limiting the risk of owners, such as: bid bonds, performance/payment bonds, retainage, progress payments, and prequalification procedures. Almost all of the respondents (95 percent) believed that such risk limitation methods provided the desired protection, were worth the added costs (100 percent), and did not place a disproportionate risk on highway contractors (97 percent).

Table 4. State highway and transportation officials opinion about current risk limitation methods.

DO CURRENT RISK LIMITATION METHODS PROVIDE DESIRED PROTECTION?			ARE RISK LIMITATION METHODS WORTH THE ADDED COST?		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	39	95%	YES	39	100%
NO	2	5%	NO	0	0%
TOTAL	41	100%	TOTAL	39	100%
DO RISK LIMITATION METHODS PLACE DISPROPORTIONATE RISK ON CONTRACTORS?			DO BOND REQUIREMENTS CURRENTLY LIMIT COMPETITION?		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	1	3%	YES	8	20%
NO	38	97%	NO	32	80%
TOTAL	39	100%	TOTAL	40	100%
DOES BONDING SIGNIFICANTLY INHIBIT THE CREATION OF NEW, BUT POTENTIALLY SUCCESSFUL, FIRMS?					
RESPONSE	NUMBER	PERCENT			
YES	8	21%			
NO	31	79%			
TOTAL	39	100%			

\* e.g. BID BONDS, PERFORMANCE/PAYMENT BONDS, RETAINAGE, PROGRESS PAYMENTS, PREQUALIFICATION, ETC.

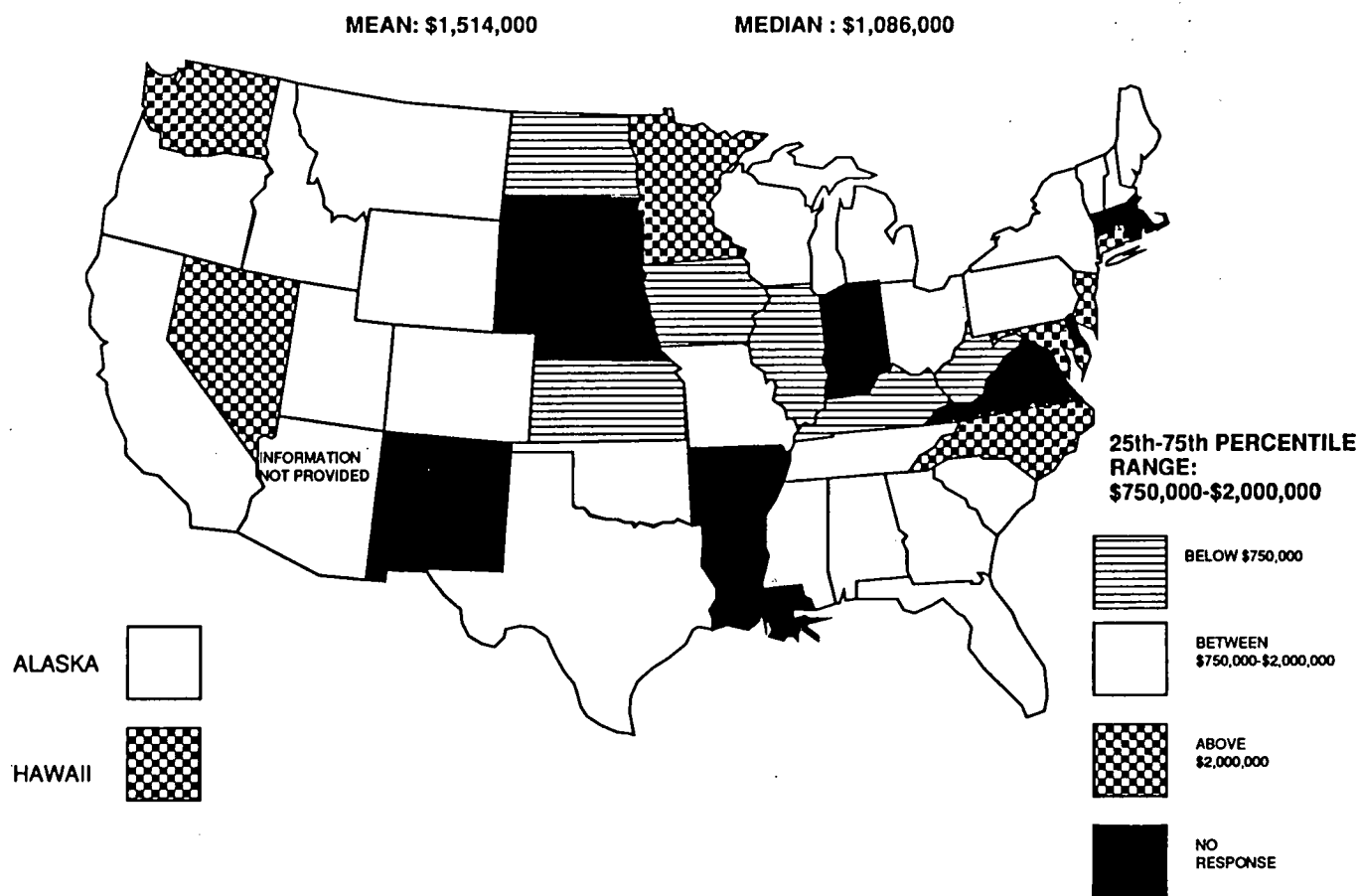


Figure 8. Approximate size of average highway contract.

A large majority (79 percent) also believed that bonding requirements do not currently limit competition nor does bonding significantly inhibit the creation of potentially successful firms.

Reasons for requiring bonds are given in Table 5. The main reason for requiring bid, performance and payment bonds, according to the respondents, is that they are required by state law. If one assumes that state laws are passed for the protection of the public in general, these respondents are implying that the primary reason for requiring bonds is for the protection of state taxpayers. The next highest ranked reason was that by requiring these bonds, contractors would be motivated to perform the contract.

In Table 6, the desire to retain or increase the present bonding requirement, with respect to their own states, is demonstrated. All of the respondents desire to keep or increase bid bond requirements in their own state; 90 percent would either increase or maintain performance bond requirements; while 91 percent favor the same action regarding payment bonds.

It appears that the state highway and transportation officials have a great deal of confidence in the current bonding system. They do not think the bonding system inhibits viable enterprises. Contract bonds, in their opinion, are worth the extra cost and provide taxpayers with sufficient protection.

#### PROFILE OF MAJORITY HIGHWAY CONTRACTORS

Table 7 presents some general characteristics of the highway contractors who were surveyed. This study's rule for classifying a contractor as prime, or not prime, was that at least 50 percent of the respondent's dollar volume must be done as a prime contractor; otherwise, the contractor was classified as a subcontractor. By using this rule, 87 percent of these respondents can be classified as true prime contractors, although almost all of the respondents had some prime contracting experience; 92 percent of the respondents chose to organize themselves as a corporation. The typical majority contractor derives 72 percent of his work volume via public ownership and 28 percent through private owners.

Tables 8 and 9 report the number of years experience the highway contractor has as a prime contractor and the percent of construction volume attributed to highway work, respectively. From Table 8, one can see that the distribution is skewed right, with a median years experience as a prime of 30, and the average years experience of 30.2. According to Table 9, one-half of the respondent contractors received over 77 percent of their construction volume from highway work.



**Table 5. State highway and transportation officials reasons for bonding requirements.**

BID BONDS		
REASON	AVG RANK*	NUMBER RESPONDING
STATE LAW	1.35	34
MOTIVATES CONTRACTOR TO PERFORM	2.09	33
SURETY PREQUALIFIES	3.00	24
TRANSFERS RESPONSIBILITY TO OTHERS	3.50	26
REDUCES NEED FOR ADDED PERSONNEL	3.91	22
PERFORMANCE BONDS		
REASON	AVG RANK *	NUMBER RESPONDING
STATE LAW	1.49	37
MOTIVATES CONTRACTOR TO PERFORM	2.38	32
TRANSFERS RESPONSIBILITY TO OTHERS	3.00	30
SURETY PREQUALIFIES	3.29	28
REDUCES NEED FOR ADDED PERSONNEL	3.71	24
PAYMENT BONDS		
REASONS	AVG RANK *	NUMBER RESPONDING
STATE LAW	1.39	34
MOTIVATES CONTRACTOR TO PERFORM	2.51	29
TRANSFERS RESPONSIBILITY TO OTHERS	2.93	29
SURETY PREQUALIFIES	3.20	25
REDUCES NEED FOR ADDED PERSONNEL	4.63	22

\* 1=HIGHEST RANK,....,5=LOWEST RANK

**Table 6. State highway and transportation officials attitude about changes in current bonding requirements.**

BID BONDS		
RESPONSE	NUMBER	PERCENT
INCREASE REQUIREMENTS	1	3%
KEEP REQUIREMENTS THE SAME	37	97%
REDUCE THE REQUIREMENTS	0	0%
ELIMINATE THE REQUIREMENTS	0	0%
TOTAL	38	100%
PERFORMANCE BONDS		
RESPONSE	NUMBER	PERCENT
INCREASE REQUIREMENTS	1	2%
KEEP REQUIREMENTS THE SAME	35	88%
REDUCE THE REQUIREMENTS	3	8%
ELIMINATE THE REQUIREMENTS	1	2%
TOTAL	40	100%
PAYMENT BONDS		
RESPONSE	NUMBER	NUMBER RESPONDING
INCREASE REQUIREMENTS	2	6%
KEEP REQUIREMENTS THE SAME	31	85%
REDUCE THE REQUIREMENTS	2	6%
ELIMINATE THE REQUIREMENTS	1	3%
TOTAL	36	100%

**Table 7. General characteristics of majority highway contractor respondents.**

CONTRACTING STATUS CLASSIFIED BY WORK VOLUME (i.e. ≥ 50% \$ volume)		
RESPONSE	NUMBER	PERCENT
PRIME	46	87%
SUB	7	13%
TOTAL	53	100%
OWNERSHIP TYPE		
RESPONSE	NUMBER	PERCENT
CORPORATION	49	92%
PARTNERSHIP	4	8%
SOLE PROP.	0	0%
JOINT VENTURE	0	0%
TOTAL	53	100%
PROJECT OWNER CLASSIFICATION FOR TYPICAL FIRM *		
RESPONSE	AVERAGE PERCENT	
MUNICIPALITY	19%	
STATE AGENCY	47%	
FED. AGENCY	6%	
PRIVATE	28%	
TOTAL	100%	

\* 51 RESPONSES

**Table 8. Years experience as prime contractors for majority contractors.**

From: (>)	To: (≤)	Number:	Percent:
0	20	22	41.5%
20	40	11	20.8%
40	60	16	30.2%
60	80	2	3.8%
80	100	2	3.8%
Total		53	100.0%
Mean=30.2		Median=30.0	

**Table 9. Percent of construction volume in highway work for majority contractors.**

From: (>)	To: (≤)	Number:	Percent:
0	20	5	10.9%
20	40	6	13.0%
40	60	5	10.9%
60	80	8	17.4%
80	100	22	47.8%
Total		46	100.0%
Mean=67.2		Median=77.5	

## PROFILE OF DBE CONTRACTORS

In contrast to majority contractors, Table 10 depicts the general characteristics of the DBE contractors who responded to the survey. Seventy percent of the 27 DBE contractors are sub-contractors, using the same rule of classification as defined previously; 78 percent of DBE respondents said they organized as corporations; and the typical DBE obtains 89 percent of his work from public owners.

Table 11 shows that more than 60 percent of the responding DBEs have been in business 10 years or less. The average business experience is less than 5 years, while 50 percent of the responding DBE contractors report that they have been in business 3 years or less.

Table 12 shows the percent of construction volume that the respondent DBEs performed in highway construction activities. The average DBE respondent derives 69 percent of his volume from highway work; the median respondent has 95 percent of his work volume tied to highway construction.

**Table 10. General characteristics of DBE highway contractor respondents.**

CONTRACTING STATUS CLASSIFIED BY WORK VOLUME (i.e. $\geq 50\%$ \$ volume)		
RESPONSE	NUMBER	PERCENT
PRIME	8	30%
SUB	19	70%
TOTAL	27	100%
OWNERSHIP TYPE		
RESPONSE	NUMBER	PERCENT
CORPORATION	21	78%
PARTNERSHIP	3	11%
SOLE PROP.	3	11%
JOINT VENTURE	0	0%
TOTAL	27	100%
PROJECT OWNER CLASSIFICATION FOR TYPICAL FIRM *		
RESPONSE	AVERAGE PERCENT	
MUNICIPALITY	9%	
STATE AGENCY	59%	
FED. AGENCY	21%	
PRIVATE	11%	
TOTAL	100%	

\* 27 RESPONSES

## PROFILE OF SURETY AGENTS

Table 13 describes the business characteristics of the surety agencies responding to the study. Over 50 percent of the agencies have been operating continuously for more than 30 years. On the other hand, 61 percent of the responding firms could be considered small in terms of average annual commissions of less than or equal to \$3 million.

Table 14 provides a statistical description of the typical or average surety agent's clientele in terms of annual construction volume, contractor type, construction activity, and by project owner. Most (53 percent) of a typical surety agent's commission volume is generated by contractors having a construction volume of between \$1 million and \$20 million per year; whereas, only 6 percent of commissions are generated by large, (i.e., \$50 million per year) contractors. Two-thirds of the commissions are generated by prime contractors for the typical surety agent. The typical surety agent derives 18 percent of his commissions from contractors performing highway work, 33 percent from building

**Table 11. Years experience as prime contractors for DBE contractors.**

From: (>)	To: ( $\leq$ )	Number:	Percent:
0	5	7	43.8%
5	10	3	18.8%
10	15	4	25.0%
15	20	2	12.5%
20	25	0	0.0%
Total		16	100.0%
Mean=4.9		Median=3.0	

**Table 12. Percent of construction volume in highway work for DBE contractors.**

From: (>)	To: ( $\leq$ )	Number:	Percent:
0	20	3	12.0%
20	40	2	8.0%
40	60	3	12.0%
60	80	2	8.0%
80	100	15	60.0%
Total		25	100.0%
Mean=69.0		Median=95.0	

**Table 13. Surety agency business description.**

NUMBER OF YEARS IN BUSINESS			DISTRIBUTION OF AVG ANNUAL COMMISSIONS		
CATEGORY	NUMBER	PERCENT	IN \$ MIL	NUMBER	PERCENT
1-5	2	3%	0-3	46	61%
6-10	11	14%	4-7	14	19%
11-20	13	17%	8-11	7	9%
21-30	9	12%	12-15	3	4%
31+	42	55%	16+	5	7%
TOTAL	77	100%	TOTAL	75	1

Table 14. Distribution of average surety agency commissions.

BY CONTRACTOR ANNUAL CONSTRUCTION VOLUME		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
\$0-\$1,000,000	26%	75
\$1,000,001-\$20,000,000	53%	76
\$20,000,001-\$50,000,000	15%	76
> \$50,000,000	6%	76
	100%	
BY CONTRACTOR TYPE		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
PRIME CONTRACTORS	67%	77
SUB CONTRACTORS	33%	77
	100%	
BY CONSTRUCTION ACTIVITY		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
HIGHWAY CONSTRUCTION	18%	76
BUILDING CONSTRUCTION	33%	75
UTILITY CONSTRUCTION	17%	76
INDUSTRIAL CONSTRUCTION	13%	68
OTHER	19%	75
	100%	
BY PROJECT OWNER		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
MUNICIPAL AGENCY	25%	76
STATE AGENCY	35%	76
FEDERAL AGENCY	24%	76
PRIVATE FIRM	16%	76
	100%	

Table 15. Description of surety company clientele.

AVERAGE ANNUAL REVENUE OF CONTRACTOR THAT GENERATES MOST* OF SURETY PREMIUMS		
CATEGORY	NUMBER RESPONDING	PERCENT
\$0-\$1,000,000	1	6%
\$1,000,001-\$20,000,000	10	56%
\$20,000,001-\$50,000,000	2	11%
> \$50,000,000	5	28%
TOTAL	18	100%
BY CONTRACTOR TYPE		
CATEGORY	NUMBER RESPONDING	PERCENT
PRIME CONTRACTORS	15	83%
SUB CONTRACTORS	3	17%
TOTAL	18	100%
BY CONSTRUCTION ACTIVITY		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
HIGHWAY CONSTRUCTION	16%	20
BUILDING CONSTRUCTION	58%	20
UTILITY CONSTRUCTION	12%	20
INDUSTRIAL CONSTRUCTION	13%	20
OTHER	1%	20
	100%	
BY PROJECT OWNER		
CATEGORY	NUMBER RESPONDING	PERCENT
GOVERNMENTAL AGENCY	16	89%
PRIVATE FIRM	2	11%
TOTAL	18	100%

\* MOST REFERS TO THE CATEGORY HAVING THE HIGHEST %

construction, 17 percent from utility construction, 13 percent from industrial construction, and 19 percent from other activities. The owner of the project is usually a government agency (84 percent) rather than a private firm (16 percent).

## PROFILE OF SURETY COMPANIES

Table 15 presents a description of the responding surety companies clientele classified by annual revenue of the contractor, contractual status (i.e., prime or sub), construction activity, and project ownership type. Accordingly, the surety companies in the sample primarily had clients who had annual construction volume between \$1 million and \$20 million (58 percent). This was followed by clients in the \$50 million plus category (28 percent). The study asked each company to present a breakdown, by percentage, of each of four annual revenue categories regarding their clientele. Therefore, this measurement refers to the modal value interval (i.e., the category that had the highest percentage attached to it) that each company reported. Table 15 also reveals that a high percentage of clients were prime contractors (83 percent); most of their clients were engaged in building construction (58 percent) versus highway work (16 per-

cent) or utilities (12 percent); and the project owner was nearly always (89 percent) a governmental agency rather than a private (11 percent) firm.

Table 16 describes the bonding experience of the surety companies surveyed. Well over half of the companies responded that their bonding limitations were over \$41 million (54 percent). Exactly 50 percent revealed that they had imposed higher underwriting standards over the last 3 years, and that they lost more money in the prior 3 to 5 years in building construction (25 percent of premiums), rather than in highway construction (17 percent premiums) or in utility construction (15 percent of premiums).

## PROFILE OF INSURANCE AGENTS

Tables 17 and 18 describe the business characteristics of the typical insurance agency or agent. In Table 17, it can be seen that most (74 percent) of the responding agencies have been in continuous operation for more than 21 years. However, like surety agencies, most (68 percent) of these respondents report annual commissions at \$3 million. As shown in Table 18, the insurance agencies surveyed are similar to the surety agencies in

Table 16. Description of surety company bonding experience.

SURETY SIZE IN TERMS OF BONDING LIMITATION		
CATEGORY	NUMBER RESPONDING	PERCENT
\$0-\$10,000,000	4	31%
\$11,000,000-\$20,000,000	0	0%
\$21,000,001-\$30,000,000	2	15%
\$31,000,000-\$40,000,000	0	0%
≥ \$41,000,000	7	54%
TOTAL	13	100%
UNDERWRITING STANDARDS COMPARED TO 3 YEARS AGO		
CRITERIA	NUMBER RESPONDING	PERCENT
HIGHER STANDARDS	9	50%
NO CHANGE IN STANDARDS	9	50%
TOTAL	18	100%
AVERAGE % OF PREMIUMS LOST BY CONSTRUCTION TYPE		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
HIGHWAY CONSTRUCTION	17%	11
BUILDING CONSTRUCTION	25%	11
UTILITY CONSTRUCTION	15%	11
INDUSTRIAL CONSTRUCTION	14%	11

Table 17. Insurance agency business description.

NUMBER OF YEARS IN BUSINESS		
CATEGORY	NUMBER	PERCENT
1-5	2	5%
6-10	1	3%
11-20	7	18%
21-30	9	23%
31+	20	51%
TOTAL	39	100%
DISTRIBUTION OF AVG ANNUAL COMMISSIONS IN \$ M		
CATEGORY	NUMBER	PERCENT
0-3	26	68%
4-7	5	13%
8-11	0	0%
12-15	1	3%
16+	6	16%
TOTAL	38	100%

that the bulk of their commissions (46 percent) come from the \$1 million to \$20 million contractor, who is most likely a prime contractor (67 percent). The typical insurance agency, in this study, most frequently obtains its commissions from building contractors (31 percent) as opposed to highway construction (17

Table 18. Distribution of average insurance agency commissions.

BY CONTRACTOR ANNUAL CONSTRUCTION VOLUME		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
\$0-\$1,000,000	27%	39
\$1,000,001-\$20,000,000	46%	39
\$20,000,001-\$50,000,000	15%	39
> \$50,000,000	12%	39
	100%	
BY CONTRACTOR TYPE		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
PRIME CONTRACTORS	67%	39
SUB CONTRACTORS	33%	39
	100%	
BY CONSTRUCTION ACTIVITY		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
HIGHWAY CONSTRUCTION	17%	39
BUILDING CONSTRUCTION	31%	39
UTILITY CONSTRUCTION	15%	34
INDUSTRIAL CONSTRUCTION	13%	35
OTHER	24%	
	100%	
BY PROJECT OWNER		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
MUNICIPAL AGENCY	22%	35
STATE AGENCY	31%	35
FEDERAL AGENCY	19%	35
PRIVATE FIRM	28%	35
	100%	
BY INSURANCE LINE		
CATEGORY	AVG PERCENT	NUMBER RESPONDING
GENERAL LIABILITY	30%	36
WORKERS COMP	19%	36
AUTO/EQUIP	22%	35
OTHER	29%	35
	100%	

percent) or utility construction (15 percent). The project owner is basically a governmental agency (72 percent) rather than a private concern (28 percent). The lines of insurance that the agency derives its commissions from are general liability (30 percent), auto/equipment (22 percent), and workers' compensation (19 percent).

#### PROFILE OF INSURANCE COMPANIES

The study team spent a great deal of effort attempting to elicit responses from the insurance industry. A national insurance association was contacted initially and had agreed to assist with the project by mailing out several questionnaires to its members. After holding the questionnaires for a month, they returned them. Their chief counsel stated that "... as a trade association, we can not place ourselves in a position that would appear to sanction this study. . . ."

Subsequent contacts yielded no response. As a result of this environment, the study team compiled its own list of insurance companies and sent the survey to the presidents of each company. The result was one response.

## STUDY RESULTS ON PRIMARY ISSUES

## Severity of Bond and Insurance Problems

Tables 19 and 20 record the opinion of each responding group about the severity of bonding and insurance problems, respectively. Respondents to the research survey were asked to indicate their rating of the severity of the cost and availability of both bonds and insurance to their current business activities. The following choices were listed from which the respondents could choose: A—Very Serious, B—Serious, C—Moderate, D—Little, and E—None. Each of the responses was assigned a numerical value from 1 to 5 in the analysis, with 5 assigned to “Very Serious” down to 1 assigned to “None”.

The bond severity ratings, see Table 19, indicate that a “moderate” problem exists. An investigation of the individual ratings shows that highway officials and surety companies find the problem to be of little concern, with majority highway contractors finding it of more concern, and surety agents rating the problem as moderate. As expected, DBEs believe that the problem is serious. The lower rating from the majority of highway contractors is somewhat uncertain because such a small number responded. One would suspect that more of those who feel bonds are a problem would respond; however, 56 percent believed there was little or no problem. Because the average business experience age of those responding was 30 years, it would be expected that they do not have the trouble getting bonds that less-experienced firms have. The reason for the difference in opinion between DBE and majority contractors may be seen by examining Table 21.

Table 21 depicts the mean bonding capacity for both DBE and majority contractors for the years 1987 through 1989. The average bonding capacity in 1989 for DBE respondents increased 4.4 percent over 1987. On the other hand, majority contractor respondents' bonding capacity, on average, increased by 34.7 percent for the same period. If inflation were taken into account

Table 19. Bond severity.

NUMBER RESPONDING							
	RATING	SHTO	MAJ CONT	DBE CONT	SURETY AGENTS	SURETY CO'S	TOTAL
VERY SERIOUS	5	0	6	13	4	0	23
SERIOUS	4	0	7	5	15	0	27
MODERATE	3	6	9	5	34	6	60
LITTLE	2	22	15	3	19	7	66
NONE	1	7	14	0	4	3	28
TOTAL		35	51	26	76	16	204
WTD AVG		1.97	2.53	4.08	2.95	2.19	2.76
PERCENT RESPONDING							
		SHTO	MAJ CONT	DBE CONT	SURETY AGENTS	SURETY CO'S	TOTAL
VERY SERIOUS		0%	12%	50%	5%	0%	11%
SERIOUS		0%	14%	19%	20%	0%	13%
MODERATE		17%	18%	19%	45%	38%	29%
LITTLE		63%	29%	12%	25%	44%	32%
NONE		20%	27%	0%	5%	19%	14%
TOTAL		100%	100%	100%	100%	100%	100%

Table 20. Insurance severity.

NUMBER RESPONDING							
	RATING	SHTO	MAJ CONT	DBE CONT	INSUR AGENTS	INSUR CO'S	TOTAL
VERY SERIOUS	5	1	8	11	4	0	24
SERIOUS	4	2	10	4	11	0	27
MODERATE	3	8	14	6	13	1	42
LITTLE	2	15	9	4	6	0	34
NONE	1	10	6	1	0	0	17
TOTAL		36	47	26	34	1	144
WTD AVG		2.14	3.11	3.77	3.38	3.00	3.05
PERCENT RESPONDING							
		SHTO	MAJ CONT	DBE CONT	INSUR AGENTS	INS CO'S	TOTAL
VERY SERIOUS		3%	17%	42%	12%	0%	17%
SERIOUS		6%	21%	15%	32%	0%	19%
MODERATE		22%	30%	23%	38%	100%	29%
LITTLE		42%	19%	15%	18%	0%	24%
NONE		28%	13%	4%	0%	0%	12%
TOTAL		100%	100%	100%	100%	100%	100%

(assuming 4 percent per annum inflation rate), DBE contractors *lost* more than 7 percent of their bonding capacity, while majority contractors *gained* almost 20 percent in bonding capacity.

An interpretation of the insurance severity ratings (see Table 20) indicates that a “moderate” problem exists. The individual

Table 21. Comparison of DBE and majority contractors.

DBE CONTRACTORS	
FOR YEAR	\$(MIL) MEAN BONDING CAPACITY
1987	1.14
1988	1.17
1989	1.19
% INCREASE 1987-89	4.4%
MAJORITY CONTRACTORS	
FOR YEAR	\$(MIL) MEAN BONDING CAPACITY
1987	17.0
1988	20.7
1989	22.9
% INCREASE 1987-89	34.7%

ratings indicate highway officials feel it presents little concern, while highway contractors and insurance agents feel it is definitely of more serious concern. Again, the DBEs believe that insurance is a serious problem for them, although not as serious as the bond problem.

A chi-square test was made on the bond and insurance severity ratings to see if they are of the same severity or different. The results of the test are given in Table 22 and indicate that there is a 0.21 probability of obtaining a chi-square value of at least 5.96. Thus, it is concluded that there is no statistical difference between the two groups; therefore, both bonding and insurance have the same level of severity — "moderate".

#### Bond Availability and Cost Factors

Each respondent was asked to rate the importance of bond availability and cost factors on an integer scale from 0 (no importance) to 4 (extremely important). Tables 23 and 24 show the summary scores received for each of the factors proposed as important to the availability and cost of bonds to highway contractors. The scores for each of the survey groups, plus the weighted average for all, are shown, with the factors listed in order of their ranking by overall weighted average. The top ten rankings given for each group are also noted in boxes. Seven out of the top ten factors, as shown in Table 23, affecting bond availability were categorized as financial factors (F) (code definitions appear in Chapter One). Since it is a well-known practice that surety agents and companies place a great deal of weight on financial factors in their bond qualification process, these results are certainly not surprising. The overall weighted average score for the bond availability factors was 2.74.

There are several factors that are judged quite different by the groups. Transportation officials and both sets of highway contractors rated asset size (F1) highly, while surety agents and surety companies rated this low. This same difference between the groups existed for surety loss experience (S4), performance quality (P3), contractor report/control system (M2), and contract stipulations (O9). Groups inconsistent with the consensus opinion on factors were: contractors low on contractor credit payment history (C2); surety companies high on surety prequal procedures (S3); and surety agents high on construction expertise of surety agent (S1). The concern of these differences is that all parties should understand the key factors of the surety when evaluating contractors for bonds. The differences in the rating of these factors is an indication that there exist some problems in the transfer of information from the surety to the company being bonded. This could cause some contractors to have a diminished bonding capacity.

Six out of the top ten factors impacting bond cost, according to Table 24, were also categorized as financial. One observation is that the average of all of the cost impact ratings by the surety companies was 0.8, signifying virtually no impact. What the major cost factor in setting bond rates may be is debatable. It has been suggested that overhead and agents' commission could be the factors missing. However, space was provided on the questionnaire for sureties to add important factors that might have been missing from the questionnaire. No such indication was received. The research team conclude that, from a surety company perspective, cost is not an issue due to competition within the industry. However, the real issues are the factors

Table 22. Chi-square test of association of problem severities.

SUMMARY STATISTICS		VALUES	
DEGREES OF FREEDOM		4	
TOTAL CHI-SQUARE		5.9589	
PROBABILITY		0.21	
OBSERVED FREQUENCY TABLE			
SEVERITY CATEGORY	PROBLEM AREA		
	BONDING	INSURANCE	TOTALS
NONE	28	17	45
LITTLE	66	34	100
MOD	60	42	102
SERIOUS	27	27	54
VERY SERIOUS	23	24	47
TOTALS	204	144	348
PERCENT OF COLUMNS TABLE			
SEVERITY CATEGORY	PROBLEM AREA		
	BONDING	INSURANCE	TOTALS
NONE	13.73%	11.81%	12.93%
LITTLE	32.35%	23.61%	28.74%
MOD	29.41%	29.17%	29.31%
SERIOUS	13.24%	18.75%	15.52%
VERY SERIOUS	11.27%	16.67%	13.51%
TOTALS	100%	100%	100%
EXPECTED VALUE TABLE			
SEVERITY CATEGORY	PROBLEM AREA		
	BONDING	INSURANCE	TOTALS
NONE	26.38	18.62	45
LITTLE	58.62	41.38	100
MOD	59.79	42.21	102
SERIOUS	31.66	22.34	54
VERY SERIOUS	27.55	19.45	47
TOTALS	204	144	348

affecting the availability of bonds and whether or not underwriting standards are being tightened or loosened.

Some irregularities in these cost ratings are: SHTOs ranked the construction expertise of the surety agent (S1) and state regulation of surety companies (R1) much lower than the other groups; contractors rated the construction industry economic climate (I2) much higher than the others; finally, surety companies rated contractor payment history (C2) and state regulation of surety companies much higher than the other groups.

#### Cost and Availability of Insurance

Tables 25 and 26 show the summary scores received for each of the factors proposed as important to the availability and cost of insurance to highway contractors. As described earlier, these factors were also rated on a 0 to 4 scale. The scores for each of the survey groups and the weighted average are shown, with the

Table 23. Bond availability factor scores and ranking.

FACTOR	CODE	N=32		N=51		N=27	
		SHTO		MAJORITY	CONT	DBE CONT	
		SCORE	RANK	SCORE	RANK	SCORE	RANK
WORK CAP	F4	3.61	1	3.80	1	3.79	1
NET WORTH	F3	3.58	2	3.67	2	3.61	3
FINAN STMT QUAL	F2	3.40	5	3.51	4	3.68	2
PROFIT HIST	F5	3.32	6	3.63	3	3.46	5
HAZARD WASTE	G7	3.29	7.5	3.22	10	3.11	13.5
CONT TYPE SIZE PROJ	E3	3.45	3	3.33	7	3.11	13.5
FIN RATIOS	F6	3.13	12.5	3.39	5.5	3.48	4
SURETY RELA	M14	3.29	7.5	3.24	8.5	3.00	15.5
BANKING REL	F10	3.00	16	3.08	11	3.30	7
ASSET SIZE	F1	3.42	4	3.24	8.5	3.32	6
CONT CR PMT HIST	C2	3.19	9	2.63	21.5	3.18	11.5
TIMELY COMPL RECORD	P1	3.10	14	2.98	12	2.89	18
INEXPERIENCED CONTR	I3	2.83	18	2.83	17	3.29	8
CONT YRS BUS	E5	3.16	10.5	2.86	14.5	3.00	15.5
SURETY LOSS EXP	S4	3.13	12.5	3.39	5.5	3.19	10
SURETY PREQUAL	S3	2.84	17	2.78	19.5	2.67	26
EXP KEY PERS	E6	2.74	20.5	2.82	18	2.75	23.5
CONT LITIG HIST	C4	3.07	15	2.52	24	2.89	18
PERF QUALITY	P3	2.61	24	2.63	21.5	2.89	18
CONS EXPERT-SURETY	S2	2.42	30	2.96	13	2.81	21
CONS EXPERT-SUR AGT	S1	2.36	32	2.78	19.5	2.63	28
CONST VOL \$	P2	3.16	10.5	2.84	16	2.75	23.5
FIN STABILITY OWNER	F8	2.71	22.5	2.35	27	3.18	11.5
REPORT/CONTL SYS	M2	2.23	36	2.39	26	2.39	35
CONTRACT STIPUL	O9	2.39	31	2.02	36.5	2.54	31.5
CONST IND ECO	I2	2.77	19	2.86	14.5	2.79	22
PERS FINAN STMTS	F7	2.45	29	2.61	23	3.25	9
OWNERS BOND REQ	O1	2.58	25.5	2.51	25	2.70	25
EQUIP RES	P4	2.74	20.5	2.14	31	2.36	37
CONT REFS	C1	2.29	34	2.02	36.5	2.82	20
OWNERS LITIG HIST	O8	2.00	41	2.08	32.5	2.64	27
BONDED SUBS	M9	2.58	25.5	2.18	29	2.04	39
BUSINESS PLAN	M12	2.55	27	2.08	32.5	1.96	41
INS COV	M8	2.48	28	2.06	34	2.54	31.5
% SUBBED	M11	2.32	33	1.80	39	2.07	38
SAFETY RECORD	M5	2.26	35	2.04	35	2.57	30
OWNERS RETAIN	O3	2.16	38	1.78	40.5	2.00	40
% PROJ VAL BONDED	O5	2.71	22.5	2.16	30	2.61	29
REGULATORY	R1	2.19	37	2.24	28	2.39	35
OWNERS BID ASSUR	O10	2.07	39.5	1.78	40.5	2.48	33
OWNERS PREQUAL	O2	1.84	42	1.86	38	2.39	35
WORK FORCE SIZE	M10	2.07	39.5	1.49	42	1.71	42
AVERAGE		2.75		2.63		2.81	

Boxes  
denote those  
factors  
ranking in  
top 10

Table 23. Continued

FACTOR	CODE	N=79		N=20		N=209	
		SURETY AGTS		SURETY COMPANIES		WTD AVG	
		SCORE	RANK	SCORE	RANK		
WORK CAP	F4	3.92	1	3.74	2	3.82	1
NET WORTH	F3	3.75	3	3.63	5	3.68	2
FINAN STMT QUAL	F2	3.82	2	3.70	3	3.67	3
PROFIT HIST	F5	3.73	4	3.65	4	3.61	4
HAZARD WASTE	G7	3.71	5	3.75	1	3.46	5
CONT TYPE SIZE PROJ	E3	3.56	6	3.60	6	3.44	6
FIN RATIOS	F6	3.38	7	3.10	17	3.34	7
SURETY RELA	M14	3.33	8	3.25	12	3.27	8
BANKING REL	F10	3.10	12.5	2.95	20.5	3.11	9
ASSET SIZE	F1	2.99	21	2.32	33	3.10	10
CONT CR PMT HIST	C2	3.17	10	3.15	15	3.05	11
TIMELY COMPL RECORD	P1	3.01	18.5	3.11	16	3.02	12
INEXPERIENCED CONTR	I3	3.00	20	3.06	18	3.00	13
CONT YRS BUS	E5	3.03	15.5	2.70	26.5	2.99	14.5
SURETY LOSS EXP	S4	2.77	24	2.21	34	2.99	14.5
SURETY PREQUAL	S3	3.03	15.5	3.44	9	2.94	16
EXP KEY PERS	E6	3.01	18.5	3.20	14	2.92	17
CONT LITIG HIST	C4	2.95	22	3.37	11	2.91	18.5
PERF QUALITY	P3	3.03	15.5	3.50	8	2.91	18.5
CONS EXPERT-SURETY	S2	3.03	15.5	3.05	19	2.90	20
CONS EXPERT-SUR AGT	S1	3.20	9	2.35	32	2.83	21
CONST VOL \$	P2	2.66	25	2.79	22	2.81	22
FIN STABILITY OWNER	F8	2.84	23	3.21	13	2.79	23
REPORT/CONTL SYS	M2	3.11	11	3.40	10	2.75	24
CONTRACT STIPUL	O9	3.10	12.5	3.53	7	2.71	25
CONST IND ECO	I2	2.51	28	2.56	28	2.69	26
PERS FINAN STMTS	F7	2.54	27	2.45	30.5	2.64	27
OWNERS BOND REQ	O1	2.34	33	2.45	30.5	2.48	28
EQUIP RES	P4	2.39	31	2.74	24.5	2.43	29
CONT REFS	C1	2.41	30	2.74	24.5	2.40	30.5
OWNERS LITIG HIST	O8	2.56	26	2.75	23	2.40	30.5
BONDED SUBS	M9	2.42	29	2.70	26.5	2.38	32
BUSINESS PLAN	M12	2.38	32	2.95	20.5	2.34	33
INS COV	M8	1.99	35	2.55	29	2.22	34
% SUBBED	M11	2.06	34	2.05	36	2.06	35
SAFETY RECORD	M5	1.54	41	1.85	37	1.95	37
OWNERS RETAIN	O3	1.94	36	2.15	35	1.95	37
% PROJ VAL BONDED	O5	1.53	42	0.90	42	1.95	37
REGULATORY	R1	1.62	38	1.32	40.5	1.93	39
OWNERS BID ASSUR	O10	1.60	40	1.32	40.5	1.81	40
OWNERS PREQUAL	O2	1.61	39	1.37	39	1.79	41
WORK FORCE SIZE	M10	1.72	37	1.53	38	1.71	42
AVERAGE		2.75		2.76		2.74	

Boxes  
denote those  
factors  
ranking in  
top 10

Table 24. Bond cost factor scores and ranking.

FACTOR	N=32 SHTO	N=51 MAJORITY CONT	N=27 DBE CONT
CODE	SCORE RANK	SCORE RANK	SCORE RANK
WORK CAP	F4 3.45 1	2.64 4	3.24 3
NET WORTH	F3 3.29 4	2.67 3	3.20 5
FINAN STMT QUAL	F2 3.07 8	2.49 9	3.04 6
HAZARD WASTE	G7 3.36 3	3.00 2	3.32 2
PROFIT HIST	F5 3.19 5.5	2.58 6	2.88 7.5
FIN RATIOS	F6 3.10 7	2.42 10	2.87 9
SURETY LOSS EXP	S4 3.37 2	3.09 1	3.21 4
ASSET SIZE	F1 3.19 5.5	2.40 11	2.76 11
INEXP/UNQUAL CONT-II	I3 2.87 9	2.62 5	3.52 1
CONT TYPE SIZE PROJ	E3 2.84 10.5	2.54 8	2.20 32.5
SURETY RELA	M14 2.81 13.5	2.20 16	2.33 25
CONT YRS BUS	E5 2.61 20.5	2.22 15	2.56 16.5
CONST VOL \$	P2 2.84 10.5	2.17 17	2.32 26.5
CONS EXPERT-SUR AGT	S1 2.16 34.5	2.27 13	2.43 23
SURETY PREQUAL	S3 2.68 17	2.14 19	2.46 21
CONT CR PMT HIST	C2 2.81 13.5	1.89 25.5	2.56 16.5
CONST IND ECO	I2 2.67 18	2.56 7	2.68 12
CONS EXPERT-SURETY	S2 2.26 29	2.36 12	2.58 15
REGULATORY	R1 2.16 34.5	2.25 14	2.48 19.5
BANKING REL	F10 2.62 19	2.16 18	2.83 10
CONT LITIG HIST	C4 2.81 13.5	2.00 23	2.64 13.5
TIMELY COMPL RECORD	P1 2.81 13.5	2.09 20.5	2.48 19.5
PERS FINAN STMTS	F7 2.19 31.5	1.98 24	2.64 13.5
PERF QUALITY	P3 2.19 31.5	1.87 27	2.24 31
BONDED SUBS	M9 2.61 20.5	1.80 29	2.29 28.5
REPORT/CONTL SYS	M2 2.23 30	1.57 36	1.88 37
OWNERS BOND REQ	O1 2.58 22	2.09 20.5	2.52 18
CONTRACT STIPUL	O9 2.39 26	1.71 31	2.36 24
EXP KEY PERS	E6 2.42 25	1.89 25.5	2.08 35.5
% PROJ VAL BONDED	O5 2.77 16	2.05 22	2.20 32.5
FIN STABILITY OWNER	F8 2.36 27.5	1.82 28	2.88 7.5
OWNERS LITIG HIST	O8 1.90 37.5	1.73 30	2.44 22
BUSINESS PLAN	M12 2.36 27.5	1.50 38	1.76 40
INS COV	M8 2.45 24	1.67 32	2.28 30
EQUIP RES	P4 2.52 23	1.57 36	1.80 38
SAFETY RECORD	M5 2.03 36	1.57 36	2.32 26.5
% SUBBED	M11 2.16 33	1.48 40.5	1.75 42
OWNERS BID ASSUR	O10 1.90 37.5	1.48 40.5	2.29 28.5
OWNERS PREQUAL	O2 1.45 42	1.64 33	2.08 35.5
CONT REFS	C1 1.71 41	1.35 41	2.12 34
OWNERS RETAIN	O3 1.84 39.5	1.59 34	1.76 40
WORK FORCE SIZE	M10 1.84 39.5	1.33 42	1.76 40
AVERAGE	2.54	2.06	2.48

Boxes  
denote factors  
ranking in  
top 10

Table 24. Continued

FACTOR	N=79 SURETY AGTS	N=20 SURETY COMPANIES	N=209 WTD AVG
CODE	SCORE RANK	SCORE RANK	SCORE RANK
WORK CAP	F4 3.20 2	1.78 1.5	2.98 1
NET WORTH	F3 3.22 1	1.78 1.5	2.97 2
FINAN STMT QUAL	F2 2.99 3	1.33 6.5	2.73 3
HAZARD WASTE	G7 2.48 6	1.06 8.5	2.70 5
PROFIT HIST	F5 2.79 4	1.44 5	2.67 4
FIN RATIOS	F6 2.71 5	1.50 4	2.60 6
SURETY LOSS EXP	S4 1.91 12	1.33 6.5	2.51 7.5
ASSET SIZE	F1 2.47 7	0.78 18	2.44 7.5
INEXP/UNQUAL CONT-II	I3 2.04 8	0.78 18	2.36 9
CONT TYPE SIZE PROJ	E3 1.94 10	0.78 18	2.14 10
SURETY RELA	M14 1.95 9	0.72 22	2.07 11
CONT YRS BUS	E5 1.87 14	0.94 11	2.06 13
CONST VOL \$	P2 1.92 11	0.78 18	2.06 12
CONS EXPERT-SUR AGT	S1 1.90 13	0.83 14.5	1.98 14
SURETY PREQUAL	S3 1.66 15	0.89 13	1.94 15
CONT CR PMT HIST	C2 1.60 18	1.06 8.5	1.92 17
CONST IND ECO	I2 1.35 25	0.56 27.5	1.92 19
CONS EXPERT-SURETY	S2 1.61 17	0.83 14.5	1.92 17
REGULATORY	R1 1.56 19	1.56 3	1.91 17
BANKING REL	F10 1.37 24	0.61 24	1.84 22
CONT LITIG HIST	C4 1.41 23	0.50 33	1.83 21
TIMELY COMPL RECORD	P1 1.43 22	0.50 33	1.83 20
PERS FINAN STMTS	F7 1.48 20	0.94 11	1.79 23
PERF QUALITY	P3 1.44 21	0.56 27.5	1.67 25
BONDED SUBS	M9 1.24 26	0.72 22	1.66 26
REPORT/CONTL SYS	M2 1.62 16	0.78 18	1.65 24
OWNERS BOND REQ	O1 1.04 29	0.50 33	1.65 28
CONTRACT STIPUL	O9 1.23 27.5	0.72 22	1.61 29.5
EXP KEY PERS	E6 1.23 27.5	0.50 33	1.60 27
% PROJ VAL BONDED	O5 0.96 31.5	0.44 36.5	1.59 29.5
FIN STABILITY OWNER	F8 0.96 31.5	0.41 38	1.57 31
OWNERS LITIG HIST	O8 0.91 34	0.50 33	1.40 35
BUSINESS PLAN	M12 1.03 30	0.56 27.5	1.39 33
INS COV	M8 0.76 37	0.44 36.5	1.39 34
EQUIP RES	P4 0.94 33	0.56 27.5	1.39 32
SAFETY RECORD	M5 0.76 37	0.94 11	1.35 36
% SUBBED	M11 0.82 35	0.56 27.5	1.27 37
OWNERS BID ASSUR	O10 0.76 37	0.39 40.5	1.24 38
OWNERS PREQUAL	O2 0.73 40	0.39 40.5	1.18 40
CONT REFS	C1 0.75 39	0.39 40.5	1.17 41.5
OWNERS RETAIN	O3 0.70 41	0.39 40.5	1.17 39
WORK FORCE SIZE	M10 0.67 42	0.56 27.5	1.13 41.5
AVERAGE	1.56	0.80	1.86

Boxes  
denote factors  
ranking in  
top 10



factors listed in order of their ranking by overall weighted average. The top ten rankings given for each group are also noted in boxes.

In Table 25 an agreement among the survey groups on the most significant factors impacting the availability of insurance to highway contractors is indicated. Most of the factors were either related to the insurance agent/company (S) or the contractors management practices (M). The only outlier was for transportation officials who rated the safety records of subcontractors (M11) much higher than the other groups. The overall weighted average score for all factors was 2.61.

A review of Table 26 reveals that there was agreement on the top factors impacting insurance cost for highway contractors. They were almost the same group of factors indicated on the availability issue. It should be noted that the top ten factors were exactly the same with the hazardous wastes factor (G7) being rated the highest impact. The overall weighted average score for cost factors was 2.52. The only two disparities for cost impact ratings were the high ratings given by SHTO for safety records for subs (M11) and both sets of contractors for state laws governing projects (R2), which are much higher than the other groups. DBEs ranked contractor's years in business (E5) significantly higher than the other groups.

#### Comparison of Group Ratings for Correlation

Correlation analyses were made to quantify the amount of agreement between the different groups surveyed as to their ratings. For purposes of this study, positive correlations indicate agreement, negative correlations denote disagreement, and correlations of small magnitude indicate nonagreement.

Table 27 shows the results of the analysis made for the rating of the bond availability factors, while Tables 28 through 30 depict correlations between groups for factors influencing bond cost, insurance availability, and insurance cost, respectively. For the bond factors the ratings of the SHTO, majority contractors, DBE contractors, and surety agents were correlated with the factors deemed important by the surety companies. For insurance factors, insurance agents were used as the key group on which to base correlations. In Table 27 (a), the results indicate that all groups had a fairly good agreement with surety companies (range of 0.769 to 0.916 for nonsurety groups) on the primary 10 factors, as rated by the surety, affecting bond availability. The first four rows of this correlation matrix show quite good agreement among themselves. The ten secondary factors, according to Table 27 (b), however, show a level of nonagreement between the sureties and the other groups (row 5 ranges between -0.019 and 0.407 for nonsurety groups), and agreement among nonsurety groups persists (row 4 ranges from 0.67 to 0.881). It is surprising that SHTOs have substantially more agreement with sureties than do the other groups.

Table 28 (a) shows that there is a considerable discrepancy between the surety and the other participants on the primary ten factors affecting bond costs, according to sureties. As expected, surety agents have the highest correlation (0.719); however, SHTO, majority and DBE contractors all have correlations around the 0.5 level. Secondary bond cost factors cause the same amount of nonagreement as do secondary bond availability factors. In this case majority contractors have a better understanding of these factors than DBEs (0.333 vs. 0.130).

Table 25. Insurance availability scores and ranking.

FACTOR	CODE	N=33 SHTO		N=51 MAJORITY CONT		N=27 DBE CONT	
		SCORE	RANK	SCORE	RANK	SCORE	RANK
HAZARD WASTE	G7	3.68	3	3.78	1	3.52	4.5
CONT INS CLAIM HIS	M9	3.84	1	3.61	2	3.67	1
CONT LITIG HIST	C4	3.74	2	3.41	4	3.56	3
SAFETY RECORD	M5	3.58	4	3.43	3	3.44	6
RISK ASSOC W/PROJ	O10	3.39	5	3.28	6	3.64	2
INS LOSS EXP	S4	3.03	6	3.39	5	3.52	4.5
CONS EXPERT-INS CO	S2	2.77	9.5	3.10	7	2.92	10
CONS EXPERT-INS AGT	S1	2.52	14.5	2.78	10	2.92	10
CONT REL W/INS AGT	M14	2.97	7	2.65	11	2.96	8
CONT TYPE SIZE PROJ	E3	2.48	17	2.86	9	2.89	12
CONST IND ECO	I2	2.32	20.5	3.00	8	2.88	14
CONT YRS BUS	E5	2.74	11	2.63	12	3.04	7
INS QUAL PROCED	S3	2.77	9.5	2.33	21	2.92	10
CONTRACT STIPUL	O9	2.52	14.5	2.39	19.5	2.56	25
ASSET SIZE	F1	2.32	20.5	2.55	16	2.88	14
CONT SEC MEAS AT JOB SI	M13	2.65	12	2.08	27	2.67	20
FINAN STMT QUAL	F2	2.19	25.5	2.59	13.5	2.88	14
PERF QUALITY	P3	2.00	29	2.49	17	2.74	17
PROFIT HIST	F5	2.23	23.5	2.39	19.5	2.65	21.5
SAFETY REC SUBS USED	M11	2.90	8	2.04	28.5	2.64	23
CONST VOL \$	P2	2.23	23.5	2.41	18	2.65	21.5
REGULATORY	R1	2.39	19	2.59	13.5	2.80	16
STATE LAWS GOV PROJ	R2	2.42	18	2.56	15	2.68	19
EXP KEY PERS	E6	2.52	14.5	2.29	22	2.59	24
WORK FORCE SIZE	M10	2.10	27.5	2.20	23	2.37	30
OWNERS LITIG HIST	O4	2.19	25.5	2.04	28.5	2.50	28
EMPL DRUG POLICY	M12	2.52	14.5	1.96	31.5	2.54	26.5
PROJ OWN MONIT SAFETY	O3	2.26	22	1.98	30	2.44	29
REPORT/CONTL SYS	M2	1.97	30	2.12	25.5	2.20	32
TIMELY COMPL RECORD	P1	1.71	32.5	2.12	25.5	2.70	18
EQUIP RES	P4	2.10	27.5	1.96	31.5	2.04	33
OWNERSHIP TYPE	M4	1.87	31	2.16	24	2.33	31
PERS FINAN STMTS	F7	1.71	32.5	1.88	33	2.54	26.5
AVERAGE		2.56		2.58		2.83	

FACTOR	CODE	N=37 INSUR AGTS		N=148 WTD AVG	
		SCORE	RANK	SCORE	RANK
HAZARD WASTE	G7	3.92	1	3.74	1
CONT INS CLAIM HIS	M9	3.87	2	3.74	2
CONT LITIG HIST	C4	3.45	3	3.52	3
SAFETY RECORD	M5	3.37	5	3.45	4
RISK ASSOC W/PROJ	O10	3.37	5	3.38	5
INS LOSS EXP	S4	3.34	7	3.33	6
CONS EXPERT-INS CO	S2	3.29	8	3.04	7
CONS EXPERT-INS AGT	S1	3.37	5	2.90	8
CONT REL W/INS AGT	M14	2.58	14	2.76	9
CONT TYPE SIZE PROJ	E3	2.74	10	2.75	10
CONST IND ECO	I2	2.61	13	2.73	11
CONT YRS BUS	E5	2.40	18	2.67	12.5
INS QUAL PROCED	S3	2.90	9	2.67	12.5
CONTRACT STIPUL	O9	2.68	11.5	2.52	14
ASSET SIZE	F1	2.29	20.5	2.49	15
CONT SEC MEAS AT JOE	M13	2.68	11.5	2.47	16
FINAN STMT QUAL	F2	2.18	23	2.45	17.5
PERF QUALITY	P3	2.55	15	2.45	17.5
PROFIT HIST	F5	2.50	16	2.43	19.5
SAFETY REC SUBS USED	M11	2.40	18	2.43	19.5
CONST VOL \$	P2	2.40	18	2.41	21
REGULATORY	R1	1.89	28	2.39	22.5
STATE LAWS GOV PROJ	R2	1.97	27	2.39	22.5
EXP KEY PERS	E6	2.11	25.5	2.35	24
WORK FORCE SIZE	M10	2.21	22	2.21	25
OWNERS LITIG HIST	O4	2.16	24	2.19	26
EMPL DRUG POLICY	M12	1.84	29	2.15	28
PROJ OWN MONIT SAFET	O3	2.11	25.5	2.15	28
REPORT/CONTL SYS	M2	2.29	20.5	2.15	28
TIMELY COMPL RECORD	P1	1.71	30	2.03	30
EQUIP RES	P4	1.68	31	1.93	31
OWNERSHIP TYPE	M4	1.32	33	1.91	32
PERS FINAN STMTS	F7	1.40	32	1.83	33
AVERAGE		2.53		2.61	

Denotes factors ranking in top ten

Table 26. Insurance cost scores and ranking.

FACTOR		N=33 SHTO		N=51 MAJ CONT		N=27 DBE CONT	
CODE		SCORE	RANK	SCORE	RANK	SCORE	RANK
HAZARD MATERIALS	G7	3.71	2.5	3.89	1	3.70	1.5
CONT INS CLAIM HIS	M9	3.81	1	3.78	2	3.68	3
CONT LITIG HIST	C4	3.71	2.5	3.61	3	3.48	5
SAFETY RECORD	M5	3.55	4.5	3.44	6	3.44	6
RISK ASSOC W/PROJ	O10	3.55	4.5	3.46	5	3.70	1.5
INS LOSS EXP	S4	3.07	6	3.49	4	3.58	4
CONS EXPERT-INS CO	S2	2.81	8.5	3.04	7	2.63	13.5
CONT TYPE SIZE PROJ	E3	2.45	15.5	2.96	9	2.92	9
CONS EXPERT-INS AGT	S1	2.45	15.5	2.72	12	2.58	17
CONST IND ECO	I2	2.39	18.5	3.00	8	2.92	9
CONT SEC MEAS AT JOE	M13	2.77	10	2.13	22.5	2.59	15
CONT REL W/ INS AGT	M14	2.81	8.5	2.38	15.5	2.42	23
CONTRACT STIPUL	O9	2.68	11	2.50	13.5	2.43	21
REGULATORY	R1	2.42	17	2.78	11	2.96	7
STATE LAWS GOV PROJ	R2	2.39	18.5	2.84	10	2.74	11
INS QUAL PROCED	S3	2.65	13	2.15	21	2.63	13.5
CONT YRS BUS	E5	2.65	12	2.37	17	2.92	9
CONST VOL \$	P2	2.19	25.5	2.50	13.5	2.58	17
SAFETY REC SUBS USED	M11	2.94	7	2.11	24	2.39	26
WORK FORCE SIZE	M10	2.29	21	2.28	19	2.56	19
ASSET SIZE	F1	2.23	24	2.38	15.5	2.67	12
FINAN STMT QUAL	F2	2.19	25.5	2.34	18	2.58	17
PERF QUALITY	P3	2.10	28	2.13	22.5	2.40	25
PROFIT HIST	F5	2.13	27	2.17	20	2.42	23
OWNERS LITIG HIST	O4	2.26	22.5	1.96	26.5	2.46	20
PROJ OWN MONIT SAFET	O3	2.26	22.5	1.87	29.5	2.42	23
EXP KEY PERS	E6	2.36	20	1.96	26.5	2.28	29
EMPL DRUG POLICY	M12	2.58	14	1.85	31	2.29	28
REPORT/CONTL SYS	M2	1.94	30	1.93	28	2.00	32
EQUIP RES	P4	2.03	29	1.83	32	1.96	33
TIMELY COMPL RECORD	P1	1.74	32	1.87	29.5	2.24	31
OWNERSHIP TYPE	M4	1.81	31	2.00	25	2.32	27
PERS FINAN STMTS	F7	1.65	33	1.57	33	2.25	30
AVERAGE		2.56		2.52		2.70	

FACTOR		N=37 INSUR AGTS		N=148 WTD AVG	
CODE		SCORE	RANK	SCORE	RANK
HAZARD MATERIALS	G7	3.97	1	3.81	1
CONT INS CLAIM HIS	M9	3.76	2	3.75	2
CONT LITIG HIST	C4	3.40	4	3.54	3
SAFETY RECORD	M5	3.53	3	3.48	4
RISK ASSOC W/PROJ	O10	3.16	7	3.42	5
INS LOSS EXP	S4	3.24	6	3.34	6
CONS EXPERT-INS CO	S2	3.11	8	2.92	7
CONT TYPE SIZE PROJ	E3	2.97	9	2.83	8
CONS EXPERT-INS AGT	S1	3.26	5	2.78	9
CONST IND ECO	I2	2.21	18	2.63	10
CONT SEC MEAS AT JOE	M13	2.84	10	2.55	11
CONT REL W/ INS AGT	M14	2.61	11	2.54	12
CONTRACT STIPUL	O9	2.30	16	2.48	13
REGULATORY	R1	1.78	27	2.45	14
STATE LAWS GOV PROJ	R2	1.84	25	2.44	15.5
INS QUAL PROCED	S3	2.58	12	2.44	15.5
CONT YRS BUS	E5	2.00	21.5	2.43	17.5
CONST VOL \$	P2	2.45	14	2.43	17.5
SAFETY REC SUBS USED	M11	2.40	15	2.42	19
WORK FORCE SIZE	M10	2.53	13	2.39	20
ASSET SIZE	F1	2.16	19	2.33	21
FINAN STMT QUAL	F2	1.82	26	2.20	22.5
PERF QUALITY	P3	2.26	17	2.20	22.5
PROFIT HIST	F5	2.11	20	2.18	24
OWNERS LITIG HIST	O4	2.00	21.5	2.13	25
PROJ OWN MONIT SAFET	O3	1.97	23	2.08	26
EXP KEY PERS	E6	1.73	28	2.04	27.5
EMPL DRUG POLICY	M12	1.66	29	2.04	27.5
REPORT/CONTL SYS	M2	1.90	24	1.94	29
EQUIP RES	P4	1.65	30	1.85	30
TIMELY COMPL RECORD	P1	1.53	31	1.81	31
OWNERSHIP TYPE	M4	1.16	32	1.78	32
PERS FINAN STMTS	F7	1.05	33	1.57	33
AVERAGE		2.39		2.52	

Denotes factors ranking in top ten

Table 27. Correlation matrix for bond availability factors.

(a) Primary ten factors according to Surety Co.

	SHTO	MAJ	DBE	SUR_AGT	SUR_CO
SHTO	1				
MAJ	0.956	1			
DBE	0.912	0.934	1		
SUR_AGT	0.904	0.909	0.916	1	
SUR_CO	0.829	0.769	0.837	0.916	1

(b) Secondary ten factors according to Surety Co.

	SHTO	MAJ	DBE	SUR_AGT	SUR_CO
SHTO	1				
MAJ	0.486	1			
DBE	0.52	0.625	1		
SUR_AGT	0.67	0.881	0.795	1	
SUR_CO	0.407	-0.019	0.172	0.295	1

Table 28. Correlation matrix for bond cost factors.

(a) Primary ten factors according to Surety Co.

	SHTO	MAJ	DBE	SUR_AGT	SUR_CO
SHTO	1				
MAJ	0.843	1			
DBE	0.912	0.907	1		
SUR_AGT	0.83	0.677	0.794	1	
SUR_CO	0.527	0.486	0.514	0.719	1

(b) Secondary ten factors according to Surety Co.

	SHTO	MAJ	DBE	SUR_AGT	SUR_CO
SHTO	1				
MAJ	0.504	1			
DBE	0.403	0.659	1		
SUR_AGT	0.637	0.715	0.413	1	
SUR_CO	-0.183	0.333	0.13	0.208	1

Table 29. Correlation matrix for insurance availability factors.

(a) Primary ten factors according to Insurance Agents

	SHTO	MAJ	DBE	INS_AGT
SHTO	1			
MAJ	0.812	1		
DBE	0.898	0.83	1	
INS_AGT	0.77	0.821	0.711	1

(b) Secondary ten factors according to Insurance Agents

	SHTO	MAJ	DBE	INS_AGT
SHTO	1			
MAJ	-0.031	1		
DBE	0.498	0.69	1	
INS_AGT	0.264	0.184	0.178	1

For the primary factors affecting insurance availability (see Table 29 (a) ), there is reasonable agreement between SHTOs, majority and DBE contractors, and insurance agents. The secondary factors, as in the preceding paragraphs, produced the most disagreement, with groups other than insurance agents all having correlations at the 0.2 level.

Table 30 shows the same pattern repeating for insurance cost factors; fair-to-good agreement for the primary factors, and non-agreement for the secondary factors.

The correlation analysis reveals that these groups have a fundamental understanding of the primary factors affecting them in terms of availability and cost. How much and to what extent this fundamental understanding aids in their obtaining bonds and insurance at reasonable prices is merely conjecture at this time.

However, it would seem reasonable to suggest, as pointed out earlier, that lack of knowledge concerning the key surety factors, such as performance quality (P3), contractor report/control system (M2), and contract stipulations (O9), could inhibit erroneously informed contractors from obtaining surety bonds.

Table 30. Correlation matrix for insurance cost factors.

(a) Primary ten factors according to Insurance Agents

	SHTO	MAJ	DBE	INS_AGT
SHTO	1			
MAJ	0.81	1		
DBE	0.868	0.894	1	
INS_AGT	0.746	0.813	0.678	1

(b) Secondary ten factors according to Insurance Agents

	SHTO	MAJ	DBE	INS_AGT
SHTO	1			
MAJ	-0.068	1		
DBE	-0.22	0.751	1	
INS_AGT	0.526	-0.208	-0.154	1

## CHAPTER FOUR

# SECOND SURVEY FINDINGS

A second survey was conducted to: (a) prioritize the factors having the most impact on bond/insurance availability and cost, and (b) assess both the impact and feasibility of solutions proposed to mitigate bonding and insurance problems for highway contractors. This second survey was sent to the initial survey respondents and was shorter than the initial survey because of the deletion of background questions and a reduction in the number of factors to be rated by the respondent. The factors included in this second survey were selected using the following criteria: "A factor must either receive a total weighted average score equal to or above the total weighted score for all factors related to an issue (i.e., Bond Availability, Bond Cost, etc.), or be ranked within the top factors for a particular group."

For instance, personal financial statements (F7), as shown in Table 23, received an overall rating of 2.64; yet, this was a highly ranked factor for DBEs and, therefore, was included in the second survey.

This selection criterion reduced the number of such factors by approximately 50 percent.

The following sections report the number and group affiliation of second survey respondents. The next two sections provide the prioritized factors having the most impact on bond availability/cost, and insurance availability/cost, respectively. The analysis and evaluation of solutions which mitigate bond and insurance problems is included in the final section of this chapter.

## RESPONSE RATE BY GROUP AFFILIATION

Table 31 depicts the response rate for the second survey. Sixty-four percent of the initial 259 survey respondents com-

Table 31. Second survey response rate by group affiliation.

GROUP RESPONDING	RESPONSES	NUMBER OF SURVEYS		RESPONSE RATE
		MAILED		
STATE HWY & TRANS OFFICIALS	33	41		80%
HIGHWAY CONTRACTORS	19	53		36%
DBE CONTRACTORS	10	27		37%
SURETY AGENTS	60	79		76%
SURETY COMPANIES	10	20		50%
INSURANCE AGENTS	33	39		85%
TOTAL	165	259		64%

pleted the second survey. Insurance agents had the highest response rate (85 percent) followed by state highway and transportation officials (80 percent), and surety agents (76 percent). Fifty percent of the 20 surety company representatives completed the second survey, while slightly better than one-third of all highway contractors (36 percent majority and 37 percent DBE) responded. The low response rate of the contractors, both in this and the initial survey, may be because of the following reasons: (1) highway contractors are busy working and did not take the time to answer the surveys; and (2) bonding and insurance problems are not currently critical enough to highway contractors for them to respond.

## FACTORS INFLUENCING BOND AVAILABILITY AND COST

As in the initial survey, respondents were asked to rate each factor on an integer scale from 0 (no impact) to 4 (high impact).

The 130 responses concerning the bond availability and bond cost factors are depicted in Tables 32 and 33, respectively.

From Table 32 it is observed that the respondents judged the 28 factors, on the average, to have a relatively high impact (rated of 2.91 out of 4.0) on bond availability. The SHTO rated the factors presented, on average, the lowest of the groups (2.72), while the surety company representatives rated these factors, on average, the highest (3.09). There has been no substantial change in the ratings of these factors from the initial survey. Financial factors such as working capital (F4), net worth (F3), financial statement quality (F2), profit history of the contractor (F5) and financial ratios (F6) still remain leading factors. The type and size of the contractor's previous projects (E3) remains an important factor influencing bond availability.

There are, however, some surprises from the initial survey. First, the financial factors of asset size (F1) and the contractor's banking relationships (F10) dropped out of the top ten factors, principally because of the lower ratings by surety agents. Second, surety prequalification (S3) gained top ten status because of higher ratings by SHTOs (3.66 vs. 2.84). Finally, contractor's credit payment history (C2) moved up in overall rank from 11 to 10.

Considering all factors rated 2.91 or above, it can be shown that they can be dichotomized into three major classifications: factors that depict the contractor's capital position, factors that demonstrate the contractor's capacity, such as his experience and job performance, and lastly factors that show the contractor's character, such as his credit payment history and litigation history. These broad classifications — character, capacity and capital — are those mentioned in the literature that influence a surety on his decision to bond contractors (24,25).

However, some interesting anomalies persist between the groups in rating the factors that impact bond availability. First, surety companies rated financial ratios (F6) relatively low compared to the contractor and agent groups. This seems to imply that financial ratios are not as important to surety companies as would be expected. This is contrary to current financial thinking in as much as a large body of empirical research shows, beyond reasonable doubt, that financial ratios and their trends often predict bankruptcy (46). Therefore, another explanation is necessary. The study team believes that because surety agents screen prospective clients to such an extent, sureties see only those prospective firms that have acceptable financial ratios. As a consequence, this factor becomes less important to the surety.

Second, it is noted that DBEs do not place as much emphasis on establishing a relationship with a surety (rated 2.9 vs 3.5 for surety). This may be a partial explanation of why DBEs find it difficult to obtain bonds. The establishment of business relationships is of paramount importance in the construction industry, where virtually everything is accomplished on goodwill and trust. The surety is part of that trust relationship. The surety must be able to trust the judgment of the contractor, and he must trust his managerial expertise.

Third, the contractor's performance quality (P3) is regarded highly important by both DBEs (rated 3.3 and ranked 6) and sureties (rated 3.7 and ranked 2.5), while this factor is essentially overlooked by majority contractors (rated 2.53 and ranked 23) and SHTOs (rated 2.43 and ranked 21).

Finally, the contract stipulations (O9) are regarded by sureties as a highly influencing factor (rated 3.7 and ranked 2.5); however, SHTOs (rated 1.83 and ranked 28), majority contractors

Table 32. Bond availability factor scores and ranking (second survey).

FACTOR	INITIAL SURVEY		N=32		N=19		N=10	
	RANK		SHTO		HWY CONT		DBE CONT	
	CODE	SCORE	RANK		SCORE	RANK	SCORE	RANK
WORK CAP	1 F4	3.40	2.5		3.58	3.5	3.40	2.5
HAZARD WASTE	5 G7	3.03	9		3.26	11	3.22	8
NET WORTH	2 F3	3.33	4		3.63	1.5	3.40	2.5
FINAN STMT QUAL	3 F2	3.07	6.5		3.58	3.5	3.30	6
PROFIT HIST	4 F5	3.07	6.5		3.47	5.5	3.20	11
CONT TYPE SIZE PROJ	6 E3	3.10	5		3.47	5.5	3.40	2.5
FIN RATIOS	7 F6	2.83	14		3.37	8	3.20	11
SURETY PREQUAL	S3	3.66	1		2.79	19.5	2.80	20.5
SURETY RELA	8 M14	2.93	11.5		3.37	8	2.90	16.5
CONT CR PMT HIST	C2	3.03	9		2.63	22	3.20	11
SURETY LOSS EXP	S4	3.03	9		3.63	1.5	3.30	6
TIMELY COMPL RECORD	P1	2.93	11.5		3.11	13.5	3.10	14
CONT LITIG HIST	C4	2.76	17		2.79	19.5	3.40	2.5
ASSET SIZE	10 F1	3.40	2.5		3.37	8	3.00	15
CONT YRS BUS	E5	2.87	13		3.11	13.5	3.20	11
PERF QUALITY	P3	2.43	21		2.53	23	3.30	6
INEXP/UNQUAL CONT-IND	I3	2.77	15.5		3.16	12	2.80	20.5
BANKING REL	9 F10	2.55	18		3.00	15.5	2.80	20.5
CONS EXPERT-SURETY	S2	2.07	25		2.68	21	2.50	23
CONST VOL \$	P2	2.77	15.5		3.32	10	3.20	11
CONS EXPERT-SUR AGT	S1	2.10	23		2.37	25	2.40	25
EXP KEY PERS	E6	2.53	19		2.84	18	2.90	16.5
REPORT/CONTL SYS	M2	2.07	25		2.32	26	2.80	20.5
CONST IND ECO	I2	2.48	20		3.00	15.5	2.40	25
FIN STABILITY OWNER	F8	2.07	25		2.47	24	2.90	18
CONTRACT STIPUL	O9	1.83	28		2.16	27	2.40	25
PERS FINAN STMTS	F7	2.23	22		2.95	17	2.20	27
REGULATORY	R1	1.93	27		1.84	28	1.70	28
AVERAGE			2.72		2.99		2.94	
FACTOR	INITIAL SURVEY		N=59		N=10		N=130	
	RANK		SURETY AGTS		SURETY COMPANIES		WTD AVG	
	CODE	SCORE	RANK		SCORE	RANK		
WORK CAP	1 F4	3.85	1		3.40	9.5	3.63	1
HAZARD WASTE	5 G7	3.80	2		4.00	1	3.52	2
NET WORTH	2 F3	3.59	4		3.30	13	3.50	3
FINAN STMT QUAL	3 F2	3.69	3		3.50	5.5	3.48	4
PROFIT HIST	4 F5	3.54	5		3.40	9.5	3.38	5
CONT TYPE SIZE PROJ	6 E3	3.34	7		3.40	9.5	3.31	6
FIN RATIOS	7 F6	3.43	6		2.80	21	3.21	7
SURETY PREQUAL	S3	2.93	13		3.60	4	3.12	8
SURETY RELA	8 M14	3.03	11		3.50	5.5	3.09	9
CONT CR PMT HIST	C2	3.19	8		3.20	14	3.07	10
SURETY LOSS EXP	S4	2.75	19		2.60	22	2.98	11
TIMELY COMPL RECORD	P1	2.76	17.5		3.40	9.5	2.93	12
CONT LITIG HIST	C4	2.85	15		3.40	7	2.91	13.5
ASSET SIZE	10 F1	2.70	21		1.80	28	2.91	13.5
CONT YRS BUS	E5	2.78	16		2.90	19	2.89	15
PERF QUALITY	P3	2.93	13		3.70	2.5	2.84	16
INEXP/UNQUAL CONT-IND	I3	2.74	20		3.00	18	2.83	17
BANKING REL	9 F10	2.76	17.5		2.90	20	2.76	18
CONS EXPERT-SURETY	S2	3.09	10		3.10	17	2.75	19
CONST VOL \$	P2	2.46	25		2.50	24	2.72	20
CONS EXPERT-SUR AGT	S1	3.16	9		2.40	26	2.68	21
EXP KEY PERS	E6	2.56	24		3.20	15	2.67	22
REPORT/CONTL SYS	M2	2.93	13		3.30	12	2.66	23
CONST IND ECO	I2	2.43	26		2.60	23	2.54	24
FIN STABILITY OWNER	F8	2.59	23		3.20	16	2.52	25
CONTRACT STIPUL	O9	2.66	22		3.70	2.5	2.45	26
PERS FINAN STMTS	F7	2.41	27		2.40	25	2.43	27
REGULATORY	R1	1.44	28		2.30	27	1.70	28
AVERAGE			2.94		3.09		2.91	

Denotes factors ranking in the top ten

(rated 2.16 and ranked 27), DBEs (rated 2.4 and ranked 25), and surety agents rate this factor significantly lower (2.66 and ranked 22).

While there is substantial agreement from the initial survey to the second survey within the groups concerning the top ten factors, there are some differences that could affect a contractor's ability to obtain a bond due to his lack of knowledge concerning some factors designated important by the surety.

Bond cost factor ratings for the second survey (Table 33) appear to replicate the initial survey's ratings and ranking. Nine

Table 33. Bond cost factor scores and ranking (second survey).

INITIAL SURVEY		N=32		N=19		N=10	
FACTOR	RANK	SHTO		HWY CONT		DBE	
CODE		SCORE	RANK	SCORE	RANK	SCORE	RANK
WORK CAP	1	F4	3.18 2	2.83	5	2.88	3.5
HAZARD WASTE	5	G7	3.15 3	3.00	3	2.57	11
NET WORTH	2	F3	3.04 4	2.83	5	2.75	6
FINAN STMT QUAL	3	F2	2.71 8	2.61	8	2.63	9
ASSET SIZE	8	F1	3.30 1	2.33	12	2.63	9
SURETY LOSS EXP	7	S4	2.96 5	3.50	1	2.75	6
PROFIT HIST	4	F5	2.82 6	2.50	9	2.25	17
FIN RATIOS	6	F6	2.57 12.5	2.44	10	2.13	19.5
INEXP/UNQUAL CONT-IN	9	I3	2.71 8	3.17	2	2.63	9
CONT YRS BUS		E5	2.57 12.5	2.17	14	3.00	2
CONT TYPE SIZE PROJ	10	E3	2.54 14	2.38	11	2.88	3.5
SURETY RELA		M14	2.46 15	2.67	7	2.38	15
CONST VOL \$		P2	2.61 11	2.06	15.5	2.50	13
CONT CR PMT HIST		C2	2.67 10	1.78	25	2.75	6
TIMELY COMPL RECORD		P1	2.71 8	2.00	18	2.50	13
CONS EXPERT-SURETY		S2	1.67 27	2.06	15.5	2.00	22
PERF QUALITY		P3	2.21 19	1.83	22	2.50	13
CONS EXPERT-SUR AGT		S1	1.63 28	1.77	26	1.63	28
CONST IND ECO		I2	2.44 16	2.83	5	2.25	17
CONT LITIG HIST		C4	2.41 17	1.82	24	3.13	1
SURETY PREQUAL		S3	2.15 20	1.83	22	1.75	25.5
REPORT/CONTL SYS		M2	1.86 24	1.50	28	1.75	25.5
EXP KEY PERS		E6	2.32 18	1.89	20	2.25	17
PERS FINAN STMTS		F7	1.96 22	2.00	18	2.13	19.5
REGULATORY		R1	1.71 25.5	2.22	13	1.75	25.5
BANKING REL		F10	2.04 21	1.83	22	2.00	22
CONTRACT STIPUL		O9	1.71 25.5	2.00	18	1.75	25.5
FIN STABILITY OWNER		F8	1.89 23	1.67	27	2.00	22
AVERAGE			2.43		2.27		2.36
INITIAL SURVEY		N=59		N=10		N=130 (a)	
FACTOR	RANK	SURETY AGTS		SURETY COMPANIES		WTD AVG	
CODE		SCORE	RANK	SCORE	RANK	SCORE	RANK
WORK CAP	1	F4	3.30 1	0.67	4.5	2.98	1
HAZARD WASTE	5	G7	3.10 3	1.33	1	2.97	2
NET WORTH	2	F3	3.23 2	0.67	4.5	2.92	3
FINAN STMT QUAL	3	F2	3.09 4	0.67	4.5	2.72	4
ASSET SIZE	8	F1	2.40 7	0.33	10.5	2.45	5
SURETY LOSS EXP	7	S4	2.02 12.5	0.33	10.5	2.41	6
PROFIT HIST	4	F5	2.56 5	0.17	19	2.41	7
FIN RATIOS	6	F6	2.52 6	0.33	10.5	2.36	8
INEXP/UNQUAL CONT-IN	9	I3	2.06 9	0.17	19	2.30	9
CONT YRS BUS		E5	2.19 8	0.67	4.5	2.20	10
CONT TYPE SIZE PROJ	10	E3	2.00 14	0.17	19	2.11	11
SURETY RELA		M14	2.04 10.5	0.17	19	2.10	12
CONST VOL \$		P2	2.04 10.5	0.50	7.5	2.07	13
CONT CR PMT HIST		C2	1.81 16	0.17	19	1.95	14
TIMELY COMPL RECORD		P1	1.46 20	0.17	19	1.82	15
CONS EXPERT-SURETY		S2	1.98 15	0.00	27	1.81	16
PERF QUALITY		P3	1.71 18	0.17	19	1.80	17
CONS EXPERT-SUR AGT		S1	2.02 12.5	0.17	19	1.75	18
CONST IND ECO		I2	1.28 25	0.00	27	1.74	19
CONT LITIG HIST		C4	1.42 21	0.17	19	1.71	20
SURETY PREQUAL		S3	1.53 19	0.17	19	1.64	21
REPORT/CONTL SYS		M2	1.75 17	0.00	27	1.61	22
EXP KEY PERS		E6	1.30 24	0.17	19	1.60	23
PERS FINAN STMTS		F7	1.35 22	0.33	10.5	1.57	24
REGULATORY		R1	1.33 23	1.00	2	1.56	25
BANKING REL		F10	1.14 26	0.17	19	1.43	26
CONTRACT STIPUL		O9	1.07 27	0.50	7.5	1.38	27
FIN STABILITY OWNER		F8	0.81 28	0.17	19	1.21	28
AVERAGE			1.95		0.34		2.02

Denotes factors ranking in top ten

of the initial survey factors ranking in the top ten repeat as leading factors. The one factor that does not maintain its ranking is the type and size of the projects completed by the contractor (E3), which moved from a ranking of 10 to 11. Six of the top ten factors were financially related; the rest pertained to the number of inexperienced/unqualified contractors within the construction industry (I3), hazardous wastes (G7), surety loss experience (S4), and the contractor's number of years business experience (E5). Similar to the initial survey, surety company representatives rated the cost factors as having basically no effect (0.34 on a scale of 4). The overall ratings (2.02) indicate that, in

the opinion of the respondents, these factors, while influencing bond availability, affect the cost structure of bonds only moderately.

It is interesting that sureties rate the influence of regulatory bodies (R1) in affecting costs as the second leading cost influencing factor, while the other groups rank this quite low (range from 13 to 25.5).

#### FACTORS INFLUENCING INSURANCE AVAILABILITY AND COST

Tables 34 and 35 show the summary scores received for each of the factors proposed as important to the availability and cost of insurance to highway contractors. The scores for each of the survey groups, in addition to the weighted average for all groups, are depicted. The factors are listed in order of importance, as determined by the weighted average score. All groups rated each factor using the same integer scale as described in the previous section.

The weighted average score of 2.83 in Table 34 suggests that the factors posed in this second survey are judged by these groups of individuals as relatively important. All groups appear to agree with one another regarding the importance of the individual factors. Seven of the top eight factors from the initial survey remain highly rated and ranked. As in the initial survey, five of the leading eight factors influencing insurance availability can be characterized as contractor capacity factors or project risk factors. Specifically, these factors are: the contractor's safety record (M5), contractor's insurance claim history (M9) and the type and size of previous projects of the contractors (E3), hazardous waste (G7), and lastly the risk associated with the project (O10). Insurance industry factors—construction expertise of the insurance company (S2), insurance company loss experience (S4), and contractor's litigation history (C4)—make up the remaining top eight (8) factors.

There are two major disparities in the ratings. The first points out that contractors do not believe that their insurance claim history (M9, rated 2.56 and ranked 11.5) impacts insurance availability as do the respondents as a whole (rated 3.64 and ranked 2). The second points out that insurance agents believe that their construction expertise (S1) affects insurance availability (rated 3.03 and ranked 8), while the consensus opinion is otherwise (rated 2.56 and ranked 10).

Factors affecting insurance costs (Table 35) enjoy the same amount of agreement with the initial survey as do the availability factors. Seven of the eight previous top factors repeat. In fact, the top eight factors affecting costs are the same factors affecting availability. Only the order of importance is slightly different. Hazardous wastes (G7) is first in affecting cost, but third in affecting availability.

#### IMPACT OF PROPOSED SOLUTIONS

In the initial survey respondents were asked to submit solutions which, in their opinion, would mitigate problems associated with both bonding and insurance. Virtually all groups participated in offering solutions. Each of the solutions underwent a preliminary evaluation regarding adequacy, sufficiency, and viability prior to submission to the survey respondents. In this

Table 34. Insurance availability scores and ranking (second survey).

INITIAL SURVEY		N=28		N=18		N=10		N=33		N=89	
FACTOR	RANK	SHTO		HWY CONT		DBE CONT		INSUR AGTS		WTD AVG	
		CODE	SCORE RANK	SCORE RANK	SCORE RANK	SCORE RANK	SCORE RANK	SCORE RANK	SCORE RANK	SCORE RANK	SCORE RANK
SAFETY RECORD	4	M5	3.39 3	3.11 5	3.00 7	3.64 3	3.82 1				
CONT INS CLAIM HIS	2	M9	3.64 1	2.56 11.5	3.20 3.5	3.82 2	3.64 2				
HAZARD WASTE	1	G7	3.46 2	3.39 1	3.50 1	3.94 1	3.63 3				
CONT LITIG HIST	3	C4	3.29 5	3.22 2.5	3.10 5.5	3.46 4	3.32 4				
RISK ASSOC W/PROJ	5	O10	3.36 4	3.12 4	3.10 5.5	3.27 7	3.25 5				
INS LOSS EXP	6	S4	2.68 8.5	3.22 2.5	3.30 2	3.33 5.5	3.10 6				
CONT TYPE SIZE PROJ		E3	2.96 6	2.83 6	3.20 3.5	2.94 9	2.96 7				
CONS EXPERT-INS CO	7	S2	2.18 14	2.56 11.5	2.50 10.5	3.33 5.5	2.72 8				
CONT YRS BUS		E5	2.86 7	2.61 9.5	2.70 8	2.61 12	2.70 9				
CONS EXPERT-INS AGT	8	S1	2.11 15	2.44 13	2.50 10.5	3.03 8	2.56 10				
CONT REL W/ INS AGT		M14	2.68 8.5	2.67 7.5	2.40 13.5	2.42 14	2.55 11				
INS QUAL PROCED		S3	2.57 10	2.17 15	2.00 16	2.67 11	2.46 12				
CONST IND ECO		I2	2.25 13	2.61 9.5	2.50 10.5	2.30 16	2.37 13				
SAFETY REC SUBS USED		M11	2.54 11	1.83 17	2.30 15	2.81 10	2.27 14.5				
CONT SEC MEAS AT JOB SITE		M13	2.32 12	1.89 16	1.90 17	2.55 13	2.27 14.5				
CONTRACT STIPUL		O9	2.07 16	2.28 14	2.50 10.5	2.33 15	2.26 16				
STATE LAWS GOV PROJ		R2	1.89 17	2.67 7.5	2.40 13.5	2.18 17	2.21 17				
AVERAGE			2.72	2.66	2.71	2.98	2.83				

Denotes factors ranking in top eight

Table 35. Insurance cost scores and ranking (second survey).

INITIAL SURVEY		N=28		N=18		N=9		N=33		N=88		
FACTOR	RANK	SDOTS		HWY CONT		DBE CONT		INSUR AGTS		WTD AVG		
		CODE	SCORE RANK		SCORE RANK		SCORE RANK		SCORE RANK		SCORE RANK	
HAZARD WASTE	1	G7	3.57	2	3.22	3	3.56	1	3.91	1.5	3.63	1
CONT INS CLAIM HIS	2	M9	3.61	1	3.28	1.5	3.00	5	3.91	1.5	3.59	2
SAFETY RECORD	4	M5	3.46	3	2.89	6	2.89	7	3.52	3	3.31	3
RISK ASSOC W/PROJ	5	O10	3.43	4	3.06	5	3.33	3	3.03	8	3.30	4
CONT LITIG HIST	3	C4	3.25	5	3.11	4	3.00	5	3.42	4.5	3.26	5
INS LOSS EXP	6	S4	2.79	6	3.28	1.5	3.44	2	3.42	4.5	3.19	6
CONT TYPE SIZE PROJ		E3	2.52	8	2.67	7	3.00	5	2.79	9	2.70	7
CONS EXPERT-INS CO	7	S2	1.96	14.5	2.11	13	2.22	14	3.27	6	2.51	8
CONS EXPERT-INS AGT	8	S1	1.86	16	2.00	14	2.22	14	3.12	7	2.40	9
CONT YRS BUS		E5	2.50	9	2.22	12	2.33	11	2.30	12.5	2.35	10
CONT SEC MEAS AT JOB SITE		M13	2.57	7	1.50	16	1.89	16	2.55	10	2.27	11.5
CONT REL W/ INS AGT		M14	2.18	12	2.28	11	2.44	9.5	2.30	12.5	2.27	11.5
CONST IND ECO		I2	2.07	13	2.33	9.5	2.67	8	2.18	14.5	2.23	13
INS QUAL PROCED		S3	2.25	11	1.89	15	1.88	17	2.46	11	2.22	14
CONTRACT STIPUL		O9	1.96	14.5	2.33	9.5	2.44	9.5	2.18	14.5	2.17	15
STATE LAWS GOV PROJ		R2	1.82	17	2.61	8	2.25	12	1.94	17	2.07	16
SAFETY REC SUBS USED		M11	2.39	10	1.39	17	2.22	14	2.00	16	2.02	17
AVERAGE			2.60		2.48		2.63		2.84		2.68	

Denotes factors ranking in top eight

Table 36. Impact of bond solutions.

GROUP	SAMPLE SIZE	IMPACT RATING RANGE: -2(MOST DETRIMENTAL) TO +2 (MOST BE SOLUTION NUMBER												
		1	2	3	4	5	6	7	8	9	10	11	12	13
SHTO	32	-0.6	-0.5	-1.4	-0.6	0.5	0.7	1.2	0.8	1.3	-0.6	0.8	0.9	0.7
NON DBE HWY CONTRACTORS	19	-0.4	0.0	-0.9	-0.6	0.4	0.9	1.2	0.7	0.5	0.9	1.9	1.4	0.9
DBE HWY CONTRACTORS	10	0.3	1.1	0.6	0.5	1.0	1.1	1.5	0.1	1.3	1.0	1.8	1.1	1.4
SURETY INDUSTRY	69	0.7	-0.4	-1.8	-0.7	0.3	1.0	1.4	0.9	1.4	0.9	1.7	1.3	1.3
AVG OF GROUPS	---	0.0	0.0	-0.9	-0.3	0.6	0.9	1.3	0.6	1.1	0.6	1.5	1.2	1.1
OVERALL FEASIBILITY	RATING RANGE: 0 TO 4	1.8	1.7	0.9	1.6	2.0	2.5	2.7	2.2	3.0	2.1	3.3	2.9	3.0

## Notes:

Refer to Table 37 for solution number explanations

 Denotes solution with most beneficial impact ( $\geq 0.7$ )

second survey the respondents were asked to rate both the impact of each proposed solution on their respective organization, and the feasibility of implementing the solution. Two different integer scales were used to rate the impact and feasibility of each solution. The solution impact was to be rated on a scale from -2 (denoting a most detrimental impact to that particular organization) to +2 (indicating a most beneficial impact to the organization). Feasibility of a solution was rated on a scale from 0 (infeasible solution) to 4 (most feasible solution). For each group, every solution impact and feasibility score was averaged.

Tables 36 through 41 summarize the average ratings for solutions pertaining to bond impacts, bond feasibility, insurance impact, and insurance feasibility. Furthermore, on each table an average for the responding groups is provided. This average of the groups is obtained by simply summing each group average score for a particular solution and dividing by the number of responding groups. For example, in Table 36, the average of the groups for solution 1 is obtained by summing the average ratings of -0.6, -0.4, 0.3, 0.7 and dividing by 4, for an average of 0. This method of averaging is believed to negate any bias introduced due to a high response rate by any one group. Also, this method treats all groups equally with respect to overall impact.

Solutions believed to be most beneficial toward all groups are selected according to the following criterion: "A solution is beneficial if the average of the groups is greater than or equal to 0.7."

The average of the groups for feasibility is obtained in the same manner as described in the preceding paragraph. Only the scale differs. Solutions that are characterized as feasible were selected according to the following criterion: "A solution is feasible if the average of the groups is greater than 2.5."

Table 37. Explanation to bond solution numbers.

- 1 DOTs should reduce size (\$) of their construction projects
- 2 DOTs should establish programs to assist small contractors in obtaining bonding for their projects
- 3 DOTs could self bond (i.e. require no bonds) their projects
- 4 DOTs raise the value (\$) of contracts requiring bonds in order to allow small contractors to bid on more work
- 5 Sureties should re-evaluate the fairness and appropriateness of their standards in warding bonds
- 6 Programs should be developed for surety professionals to better inform them about the construction process
- 7 DOTs should improve the contract resolution methods for projects in order to resolve more problems at the project level to reduce potential claims
- 8 DOTs should only approve standard surety companies for construction work
- 9 Sureties should assist small and new contracting firms in understanding the construction bonding business
- 10 State highway contracts should be revised so that risks are more equitably shared among the participants
- 11 DOTs should pay contractors in a timely manner, especially the final retainer
- 12 DOTs should provide higher quality project designs and specifications
- 13 Sureties should provide contractors detailed reasons for rejection

### Solutions Mitigating Bonding Problems

From Table 36 it is observed that the following solutions meet the criterion previously set forth (in order of their organizational benefit):

1. Solution 11 (rated 1.5): DOTs should pay contractors in a timely manner, especially the final retainer.
2. Solution 7 (rated 1.3): DOTs should improve the contract resolution methods for projects in order to resolve more problems at the project level.
3. Solution 12 (rated 1.2): DOTs should provide higher quality project designs and specifications.
4. Solution 13 (rated 1.1): Sureties should provide contractors detailed reasons for rejecting bond applications.
5. Solution 9 (rated 1.1): Sureties should assist small and new contracting firms in understanding the construction bonding process.
6. Solution 6 (rated 0.9): Programs should be developed for surety professionals to better inform them about the construction industry.

The respondent groups also think that these solutions are the most feasible, according to Table 38. Three of these "high" impact solutions are directly related to what state DOTs can do to alleviate bonding problems, while two solutions (9 and 13) are related to surety companies. In the SHTO's opinion, none of the DOT-related solutions negatively impacts their organization. Only solutions 1 to 4, and 10 are considered detrimental to state DOTs. Even the solutions related to what sureties can do may be beneficial to the surety industry.

It is surprising that solution 1 (DOTs should reduce the dollar size of their construction projects) ranked as low as it did. This solution, or various forms of it, was the most frequently mentioned in the initial survey. Also, this solution should provide

definite advantages to minority contractors, such as being able to bid on more projects, lowering bonding amounts on projects, and so on. However, DBEs rated this as marginally beneficial to them (0.3). Another interesting result was that solution 4 (DOTs raising the threshold value for bonding) was thought to be highly beneficial to DBEs; yet, DBEs rated this solution only a 0.5, on average.

### Solutions Mitigating Insurance Problems

Table 39 shows that all of the proposed insurance solutions, except one, were designated, according to the average of all groups' criterion, beneficial. These solutions were (in order of organizational benefit):

1. Solution 5 (rated 1.4): State legislators should reform tort liability and workers' compensation laws for the construction industry.
2. Solution 3 (rated 1.3): State and federal legislative reforms are needed to limit unrealistic payouts for public project claims.
3. Solution 11 (rated 1.3): Contractors need to improve their safety record.
4. Solution 2 (rated 1.2): Legislative reforms are needed to fairly assess a contractor's liability in order to reduce the number of lawsuits by the public against contractors.
5. Solution 10 (rated 1.2): DOTs should accept more responsibility for design errors.
6. Solution 7 (rated 1.1): Programs should be developed for insurance professionals to better inform them about the construction process.
7. Solution 12 (rated 1.1): Construction industry needs to support more research to improve safety on construction projects.
8. Solution 6 (rated 0.9): State highway contracts should be revised so that risks are more equitably shared.

Table 38. Feasibility of bond solutions.

GROUP	SAMPLE SIZE	RANGE OF RATING: 0(INFEASIBLE) TO 4 (MOST FEASIBLE)												
		SOLUTION NUMBER												
		1	2	3	4	5	6	7	8	9	10	11	12	13
SHTO	32	1.4	1.3	0.6	1.3	2.2	2.3	2.6	2.0	2.9	1.3	2.8	2.5	2.6
NON DBE HWY CONTRACTORS	19	1.7	1.4	0.8	1.7	2.2	2.4	2.8	2.5	2.8	2.4	3.5	3.0	2.8
DBE HWY CONTRACTORS	10	2.0	3.1	2.1	2.0	2.0	2.8	2.6	2.1	3.3	2.6	3.4	3.2	3.4
SURETY INDUSTRY	69	2.0	1.1	0.2	1.4	1.7	2.6	2.9	2.4	3.0	2.2	3.4	2.9	3.2
AVG OF GROUPS	---	1.8	1.7	0.9	1.6	2.0	2.5	2.7	2.2	3.0	2.1	3.3	2.9	3.0

Notes:

Refer to Table 37 for solution number explanations

  Denotes most feasible solutions (≥2.5)



Table 39. Impact of insurance solutions.

IMPACT RATING RANGE: -2(MOST DETRIMENTAL) TO +2 (MOST BENEFICIAL)													
GROUP	SAMPLE SIZE	SOLUTION NUMBER											
		1	2	3	4	5	6	7	8	9	10	11	12
SHTO	31	-0.5	0.2	1.1	0.5	0.6	-0.3	0.7	-0.7	0.3	0.0	1.3	1.2
NON DBE HWY CONTRACTORS	19	1.2	1.3	1.6	1.2	1.8	1.4	1.2	-0.4	0.8	1.7	1.1	0.9
DBE HWY CONTRACTORS	9	1.6	1.8	1.2	0.8	1.8	1.6	1.3	0.4	1.1	1.7	1.3	1.0
INSURANCE INDUSTRY	32	1.5	1.5	1.3	0.9	1.4	1.1	1.4	0.3	1.2	1.6	1.7	1.4
AVG OF GROUPS	---	0.9	1.2	1.3	0.8	1.4	0.9	1.1	-0.1	0.8	1.2	1.3	1.1
OVERALL FEASIBILITY	RATING RANGE: 0 TO 4	2.7	2.4	2.8	2.4	2.6	2.2	2.7	1.7	2.7	2.9	3.1	2.9

## Notes:

Refer to Table 40 for solution number explanations

 Denotes solution with most beneficial impact (≥0.7)

Table 40. Explanation to insurance solution numbers.

- 1 DOTs should assume liability for hazardous materials discovered on projects
- 2 Legislative reforms needed to fairly assess contractor's liability in order to reduce the number of lawsuits by the public against contractors
- 3 State and federal legislative reforms needed to limit unrealistic payouts for public project claims
- 4 DOTs should consider the contractor's safety record as an important variable in prequalification
- 5 State legislators should reform tort liability and worker's comp for the construction industry
- 6 State highway contracts should be revised so that risks are more equitably shared
- 7 Programs should be developed for insurance professionals to better inform them about the construction process
- 8 DOTs should reduce the size (\$) of their construction projects for construction work
- 9 Completed operation coverage should be limited to 1-3 years following contract completion, depending on the type of project
- 10 DOTs should accept more responsibility for design error
- 11 Contractors need to improve their safety program
- 12 Construction industry needs to support more research to improve safety on construction project

9. Solution 1 (rated 0.9): DOTs should assume liability for hazardous materials discovered on projects.

10. Solution 9 (rated 0.8): Completed operation coverage should be limited to 1 to 3 years following contract completion, depending on the type of project.

11. Solution 4 (rated 0.8): DOTs should consider the contractor's safety record as an important variable in prequalification.

There were no particular surprises with respect to these solutions. However, notice that SHTOs assessed solution 1 (rated -0.5) as having relatively little detrimental impact as was solution 6 (rated 0.3). Solution 8 (DOTs reducing the dollar size of projects) had the most detrimental impact, according to SHTOs (rated -0.7).

According to Table 41 the most infeasible of the above 11 solutions were: solution 2 (rated 2.4), solution 4 (rated 2.4), and solution 6 (rated 2.2).

Table 41. Feasibility of insurance solutions.

GROUP	SAMPLE SIZE	RANGE OF RATING: 0(INFEASIBLE) TO 4 (MOST FEASIBLE)											
		SOLUTION NUMBER											
		1	2	3	4	5	6	7	8	9	10	11	12
SHTO	31	1.9	1.5	2.2	1.8	2.0	1.5	2.2	1.5	2.2	2.4	2.9	2.9
NON DBE HWY CONTRACTORS	19	3.2	2.6	2.9	2.6	2.7	2.2	2.5	1.7	2.8	3.1	3.1	2.7
DBE HWY CONTRACTORS	9	2.9	3.1	3.3	2.9	3.0	2.9	3.4	1.9	3.1	3.2	3.2	3.1
INSURANCE INDUSTRY	32	2.8	2.4	2.4	2.2	2.3	2.2	2.6	1.7	2.5	2.9	3.4	3.1
AVG OF GROUPS	---	2.7	2.4	2.7	2.4	2.5	2.2	2.7	1.7	2.6	2.9	3.1	2.9

Notes:

Refer to Table 40 for solution number explanations

 Denotes most feasible solutions ( $\geq 2.5$ )

## CHAPTER FIVE

## CONCLUSIONS

## BONDS FOR HIGHWAY CONTRACTORS

Bonds are required for most public agency highway projects by law. This typically involves the requirement for a bid, performance and payment bond for each project. Agencies responding in this study feel that bonds provide protection to the public and are worth the added cost to require them for their projects. In terms of being a problem for highway contractors, it is basically a small contractor problem. Firms having adequate financial resources and good experience have little problems in obtaining bonding. Since most DBE contractors are typically small firms, bonding can be a serious problem for DBE highway contractors. Small highway contractors have two problems with bonding—availability and cost.

A common misconception amongst contractors is that surety bonds are insurance to protect the owner in case of contractor default. Although they do provide the owner some protection, bonds are not insurance. Premiums for insurance are set to cover the losses anticipated by the insurer; however, sureties do not plan on losses, but set their premiums as service charges for providing the bonds. If they do incur losses on projects, they seek restitution from the contractor. Because of the risk involved, sureties are very “hard-nosed” in their evaluations of bond applications and will continue to be so in the future.

Older well-established firms pay a premium of about 1 percent of the performance bond value on their projects, which usually includes the bid and payment bonds also. Small, less-experienced firms usually pay a premium nearer 3 percent of the performance

bond value, when they can get coverage. The premiums charged by individual sureties can be even higher.

Most DOTs look upon sureties as another line of defense in prequalifying contractors. Twenty-five percent of those responding to this study (see Appendix C) do not prequalify contractors, while most of those that do, do not spend much money on it. This indicates that their processes may not be very rigorous. With the many alternatives being promoted in lieu of surety bonds it may be wise for DOTs to increase their prequalification efforts in the future to screen potential bidders on their projects.

## Factors Impacting Bond Availability and Cost

The scores and rankings of the factors impacting bond availability and bond cost, respectively, are given in Tables 32 and 33. The rating results of the second survey indicate that there is reasonable consistency for the top ten factors with all of the groups having picked at least seven of the ten as their top choices. Eight of the top ten factors for availability were in the top ten of the first survey with the remaining two still rated fairly high. Nine of the top ten factors for cost were the same as in the first survey with the tenth factor coming in eleventh in the second survey. As anticipated, the majority of the top rated factors were “financial”. Also, the involvement of hazardous wastes is a critical factor for both concerns. Actually, sureties believe that “hazardous wastes” is a go-no go factor; if involved on a project, no bond will usually be given.

The bond availability factor scores do indicate that there is a communication problem between some of the groups as to what is important. DOTs feel that the contractor's total assets (F1) is very important, as is obvious in many of the formulas used for prequalification by DOTs. Contractors go along with this ranking; however, sureties feel that total assets are much less important. Surety companies perceive that the contractor's repu-

tation for quality performance (P3) is very important, and DBEs agree; however, the other groups rank quality much lower. Contract stipulations (O9) are conceived as being very important by insurance companies, but the other groups rank this factor much lower. Contractors feel that their construction volume (P2) is important to sureties, who rank this factor much lower. It would be beneficial for the groups to work closer together to understand what is important.

The bond cost factor scores also indicate that some miscommunication amongst the parties exists, but to a much less degree than that for bond availability. DBEs ranked contractor's litigation history (C4) as the top factor impacting cost, whereas the other groups ranked this factor much lower. Nonminority contractors feel that the construction industry economic climate (I2) is important to sureties; however, sureties ranked this as having little to no influence. The low scores given by the small sample of surety companies make any inferences about their attitudes on cost factors suspect.

A major goal of the study was to identify the key factors impacting the cost and availability of bonds for highway contractors. Sureties claim that the main concerns they have with a contractor basically involve the "three C's" which include character, capacity and capital. The factors rated about contractors fell into these three categories. It was identified that the cost of bonds is not as significant as qualifying for bonding. This was verified by the low value given to cost factors by surety companies.

The following 15 factors would represent the key factors for contractors to consider when dealing with surety agents/companies for surety bonds. These factors were selected from the survey ratings from the contractor's perspective, i.e., what factors he can control or address that the surety feels is important when reviewing contractors. As can be seen from the following listing, the major factors of concern are financial in nature:

1. Working capital of contractor's firm (F4).
2. Project involvement in hazardous wastes (G7).
3. Net worth of contractor's firm (F3).
4. Quality of contractor's financial statements (F2).
5. Contractor's profit history (F5).
6. Type and size of projects completed by contractor (E3).
7. Financial ratios of contractor (F6).
8. Surety's prequalification procedures (S3).
9. Contractor's relations with surety (M14).
10. Contractor's trade credit payment history (C2).
11. Contractor's reputation for quality performance (P3).
12. Contractor's record for timely contract completion (P1).
13. Contractor's litigation history (C4).
14. Construction expertise of surety agent (S1).
15. Construction expertise of surety company (S2).

#### Individual Sureties

Bonding needs of firms interested in competing for federal construction contracts can also be met by persons acting as individual sureties. Such persons have been used mostly by small or minority firms. However, individual sureties are neither regulated by state insurance departments, nor are they approved by the Treasury Department. According to the General Accounting Office, increasing numbers of abuses and problems have resulted

from using individual sureties. Many of the abuses center on fraudulent listing of the same assets on multiple individual surety bonds. A new rule in the federal acquisition regulations (FAR) now requires an individual surety to pledge specific assets (which may be put in escrow) to assure its obligations. A contractor may also meet bonding requirements by offering the bonds of two individual sureties, each of whom pledges to be personally liable for the penal sum of the bond. Verification of assets will be required of the sureties.

A bill was recently introduced in Congress, which would establish a pilot program providing for federally approved associations of individual sureties. The members of the association could pool their resources and collectively bond federal projects. Guidelines would be established by the General Services Administration to regulate the associations.

The Office of Federal Procurement Policy (OFPP) also recently developed a proposal (47) that outlines the concept of government-approved individual surety associations. The OFPP has the authority to test such a program for government purchasing, but is still reviewing public comments about the concept before deciding further action.

#### Other Bonding-Related Political Activities

There are several other activities underway to investigate alternatives to surety bonding of government projects. One such program is a 3-year pilot plan testing surety bond waivers. Authorized by Section 301 of Public Law No. 100-656, the Business Opportunity Development Reform Act of 1988, the plan permits the waiver of Miller Act bonding requirements for certain participants in the SBA's Minority Small Business and Capital Ownership Development Program, commonly referred to as the SBA 8(a) Program. As a condition of the bond waiver authority, provision must be made for the disbursement of approved payments due suppliers and subcontractors of the 8(a) prime contractor.

More recently, Section 833 of Public Law No. 101-189, the National Defense Authorization Act of Fiscal Years 1990 and 1991, require the Department of Defense to make every reasonable effort to award not less than 30 construction contracts in each fiscal year to firms participating in the SBA 8(a) program, who qualify for the program authorized by Pub. L. No. 100-656. The stated objective of this provision is to obtain a substantial test of the new bond waiver authority (with direct disbursement). The pilot bond waiver program is limited to contracts with an anticipated award value of \$3 million or less. The General Accounting Office is to conduct a study of the program to assess its effectiveness.

The problem of obtaining surety bonds on projects involving hazardous wastes remains a serious problem, with bonding of the EPA's Superfund projects especially difficult. The EPA is concerned with the low number of bidders on its projects, with most of the work being performed by five firms. The major concern of corporate sureties' reluctance to bond these projects is the risk of liability from third party suits. One short-term action of the EPA will be to try to modify the language in contract solicitations to clarify the intent of performance bonds to guarantee project completion and not serve as insurance for third party liability claims. The EPA also feels that better com-

munication is needed with sureties to educate them of the remedial technologies used on projects and the risks involved.

Some of the solutions recommended in a recent EPA study on bonding problems for Superfund projects include improved acquisition planning, use of service contracts that do not require performance bonds, a complete or partial waiver of bonds on construction contracts, and the pursuit of negotiated procurements rather than invitations for bids. The outcome of these attempts to resolve bonding problems by the EPA should be very helpful in resolving the bonding problems for highway construction projects involving hazardous wastes.

Current Miller Act provisions require surety bonding on federally funded projects at a threshold value of \$25,000 or more. The Office of Federal Procurement Policy is reviewing the possibility of raising the threshold for surety bonds and allowing the use of letters of credit in lieu of bonds. These types of changes take some time to implement, but the OFPP has the authority to do so under their "innovative procurement" mandate. At the present time the only group in the construction industry supporting this concept is the minority contractors.

#### **Bonding Support Programs for DBEs/Small Contractors**

As mentioned in Chapter Two of this report there are several government support programs available to small and minority contractors. The Small Business Administration has bond assistance programs for both small and minority contractors, while the U.S. Department of Transportation and the Department of Commerce have assistance programs for minority firms only. Interested firms need to contact the appropriate agency for application information. Also, considerable efforts are underway by both the National Association of Minority Contractors and the American Subcontractors Association to relieve the bonding problems of the small or minority contracting firm. Information is also available from local surety and insurance agents concerning surety bonds, their use, the cost to obtain, and the bond application process. An essential goal for small and/or minority highway contractors would be to establish a close working relationship with a local surety agent, preferably one who represents multiple surety companies.

#### **Bonding and Agency Prequalification**

The major purpose of surety bonds is to protect the owner from nonperformance by contractors on the owner's construction projects. Although sureties attempt to evaluate factors other than financial ones when considering surety applications, the owner is often in a better position to evaluate the technical capabilities of the contractor to perform the work specified for a project. Prequalification is an excellent method for transportation agencies to evaluate the capabilities of potential bidders for their projects. Contractors who are qualified by both the agency and a surety should be a better risk for all involved with a specific project, including the contractor. However, the results of the first survey in this study revealed either minimal or no efforts by several agencies to prequalify. Such agencies are encouraged

to consider initiating or increasing their use of prequalification procedures.

#### **INSURANCE FOR HIGHWAY CONTRACTORS**

Contractors performing on public agency highway projects are required to carry adequate insurance coverage. Requirements usually include workers' compensation, motor vehicle liability, general liability, and builder's risk insurance. Premiums for insurance for contractors is set by state boards of insurance. Insurance companies lobby to establish rates that will cover their anticipated losses plus provide for a profit. Although all insurance rates typically rise over time, the two types of coverage causing difficulties for highway contractors are workers' compensation and general liability.

Lawsuits are commonplace in the construction industry, with many judgments resulting in very high payoffs to plaintiffs. An especially sensitive problem area for today's highway contractors involves accidents related to work zone safety, especially on rehabilitation projects. Another sensitive area involves injuries of workers and the claims for workers' compensation, plus lawsuits by third parties. Insurance companies are very aware of the high costs associated with construction insurance claims and are very critical in granting coverage. If the project involves hazardous wastes, it is virtually impossible for the contractor to obtain general liability coverage without a specific exclusion for pollution liability. The best course for contractors is to have good safety records, safe performance, and avoid high risk projects that are outside the firm's expertise.

#### **Factors Impacting Insurance Availability and Cost**

Tables 34 and 35 contain the scores and rankings of insurance availability and cost. There is very good agreement amongst the groups with respect to the key factors of concern for evaluating insurance coverage for highway contractors. All of the top eight factors for each concern were the same. Seven of the top eight had been selected as one of the top eight factors in the first industry survey. There were no significant differences for the rankings by the various groups for insurance as there was for bonds.

A major goal of the study was to identify the key factors impacting both the cost and availability of insurance for highway contractors. The following ten factors would represent the key factors for contractors to consider when dealing with insurance agents for insurance coverages. These factors were selected from the survey ratings from the contractor's perspective, i.e., what factors he can control or address that the insurance agent feels is important when reviewing contractors:

1. Contractor's safety record and safety program (M5).
2. Contractor's insurance claim history (M9).
3. Project involvement in hazardous wastes (G7).
4. Contractor's insurance litigation history (C4).
5. Risk associated with project (O10).
6. Insurance company's loss experience (S4).
7. Type and size of projects completed by contractor (E3).
8. Construction expertise of insurance company (S2).
9. Construction expertise of insurance agent (S1).
10. Contractor's relations with insurance company (M14).

## Workers' Compensation Insurance

Workers' compensation acts in all 50 states require that contractors cover their workers' compensation exposure. The most common method of coverage is for the contractor to purchase workers' compensation insurance, either from private carriers or from mandatory state programs. Those that do not are either covered by insurance carried by their client or, if they are large enough and the state law allows, they are self-insured.

The cost of insurance coverage to a contractor varies with the type of work and the contractor's accident record. The insurance industry classifies each type of job into groups called classification codes. These four digit codes are used to determine a contractor's base premium to be charged per \$100 of payroll. These are known as "manual rates." These rates vary considerably from state to state based on the injury experience for the particular type of work in the rating state. This part of the insurance premium is constant for all contractors doing similar work in a specific state. However, these rates are usually set by state insurance boards, and contractors can lose money on multiyear projects if rates are raised significantly after contract award because no recovery is allowed.

The insurance industry has developed an "experience modification rate" (EMR) as an equitable means of adjusting each contractor's premium based on past experience. The EMR is calculated with an actuarial formula using each employer's record of losses (direct medical, hospital, and wage costs) caused by worker injury over the first 3 of the last 4 years. The formula basically involves comparing the employer's actual incurred losses during this rating period to the expected losses based on a comparison of firms doing similar types of work. If the employer's actual losses are greater than his expected losses, the EMR is greater than 1.0 and, therefore, on applying the multiplier to the manual rate his premium will go up. Conversely, if the employer's actual losses are less than his expected losses, the EMR is less than 1.0 and this would cause his rates to go down. Typical EMRs range from a low of 0.3 to a high of 2.0, with an average around 1.0. Those firms with poor safety performance can easily pay twice the premium cost for insurance than those with better safety performance.

A serious problem developing for contractors is the liberal awarding of workers' compensation claims by several state agencies. Employees in several states can sue their employer on the basis of gross negligence. The net result of this situation is that workers' compensation insurance costs continue to rise and significantly impact the cost of construction projects.

## Liability Insurance

The subject of professional liability has become an increasing concern to both professional designers and contractors. There is a growing tendency to sue for damages whenever the unexpected occurs or because of dissatisfaction. The result has been an increased frequency of lawsuits. This is not to say that such suits are not valid claims against acts of negligence of the professional. It is the professional's responsibility to exercise "ordinary," reasonable, technical skill, ability and competence to complete a job. However, many recent lawsuits have resulted in large awards that were based on liberal interpretation of ordinary or reasonable. The most catastrophic liability is for personal injury that often results in huge settlements. Liability for physical damages or corrections is also prevalent, but usually easier to evaluate. Damages for economic injuries, such as loss of revenue or delay-related expenses, may also be collected by other parties.

Contractors need to implement risk management methods into their operations to reduce the risk of losses due to lawsuits. There are two basic types of risk management: risk control and risk finance. Risk control involves taking actions to lower the potential for legal suits. Example actions include hiring only highly qualified personnel, demanding high quality performance, avoiding projects that are outside the firm's expertise, and carefully entering into contracts, making sure that risk is fairly assigned to all parties to the contract. Risk finance is concerned with lowering the severity of the loss if encountered. The basic method is to obtain adequate professional liability insurance. Care should be taken to obtain as broad a coverage as possible for a fee, taking care to understand exclusions in the policy and to seek large deductibles to reduce costs.

The premiums for liability insurance for highway contractors have risen significantly in recent years as they have for other professions. Coverage for projects involving hazardous wastes is virtually nonexistent for most contractors. If a contractor encounters previously unknown hazardous materials on a project and property damages occur, this is covered by a general liability policy. However, even then the contractor may find the insurance company seeking exclusions to apply to the claims. Highway contractors must develop risk management systems to reduce the potential for and the severity of losses that may arise in liability suits on their projects. They also need to become better informed of the legal aspects of their work and retain the services of competent lawyers familiar with construction law. They must also develop a close relationship with an insurance agent and seek adequate liability insurance protection.

## CHAPTER SIX

# RECOMMENDATIONS

Several recommendations for possible implementation to alleviate some of the current problems associated with bonding and insurance have been developed and are presented in this chapter.

The chapter also contains several recommendations for future research projects which could be beneficial in reducing highway construction costs and problems.

Two of the main research objectives of this study were to (1) develop recommendations for actions to alleviate problem areas in bonds and insurance for highway contractors, and (2) develop plans for additional research efforts needed to resolve existing problems. A detailed discussion of the several solutions considered as part of the research effort and evaluated by industry

participants was presented in Chapter Four. The possible solutions and research needs deemed most feasible are presented in this chapter as recommendations for potential action by the appropriate participants in the highway construction industry. Although the researchers believe that several of the other possible solutions evaluated have merit and should be considered for implementation, it was deemed appropriate to recommend only actions with current industry support or potential for easy implementation. More research is needed to develop in-depth solutions to many of the bond and insurance problems identified during the study.

## **BONDING**

1. Surety professionals, especially new employees, need to be better informed of the construction process to enable them to better evaluate a contractor's capabilities to perform satisfactorily. This information could be provided by surety companies, surety associations, academic programs, and on the job training.

2. Transportation agencies should improve their contract resolution procedures for construction projects to allow for more resolution of contract disputes at the project level. Problems not resolved at this level often result in costly claims and inhibited performance on the project by contractors.

3. Transportation agencies should consider the acceptance of alternatives to standard surety bonds when appropriate, such as personal collateral, higher threshold values for jobs requiring bonds, and partial waivers on hazardous waste projects. This may be necessary to enable small or minority firms to bid on highway projects, but would also assist larger contractors.

4. Sureties should assist small and new contracting firms to better understand the construction surety bonding process. Assistance could be provided by surety agents, surety companies, surety associations, and also by contractor associations.

5. Transportation agencies should pay contractors in a timely manner, especially the final retainer. Many contractors who default do so because of negative cash flow problems due to slow payments by clients. Obviously, payments should only be made for work properly completed, but excessive amounts should not be held for small amounts of uncompleted work.

6. Transportation agencies should provide high quality design drawings and specifications for their construction projects. Lower quality documents will lead to confusion and conflict on projects and potentially higher costs.

7. Sureties should provide highway contractors with detailed reasons for the rejection of their request for bonding. This should assist the contractor in better understanding the requirements to obtain bonding, plus cause sureties to give more thorough analyses to applications.

8. Highway contractors should endeavor to establish closer working relations with surety agents to better understand bonding requirements. Such relations should benefit them, similar to close working relations with bankers, accountants, and lawyers.

9. Small and minority highway contractors should avail themselves of the special bond support programs available through government agencies such as the Small Business Administration, the U.S. Department of Transportation, the U.S. Department of Commerce, and possibly local transportation agencies.

## **INSURANCE**

1. Transportation agencies should consider assuming more of the liability on projects involving hazardous wastes. Contractors are unable to obtain insurance coverage for such projects or must pay exorbitant rates if they do. A sharing of the risks could result in much lower overall costs.

2. All participants in the highway construction industry should support legislative reforms to reduce the number of, and the unrealistic settlements paid for, lawsuits related to highway projects. Such lawsuits, especially for tort liability and workers' compensation, are driving up the costs for insurance and, thus, the costs of highway projects.

3. Transportation agencies should consider the contractor's safety record as an important variable in the prequalification process. Contractors with consistently poor safety records hurt the entire industry by driving up insurance rates and increasing the number of lawsuits.

4. Transportation agencies should consider revising their construction contracts to more equitably share risks with designers and contractors. Although costs may be somewhat higher initially, costs should be lower in the long run as insurance costs diminish and bid prices decrease.

5. Insurance professionals, especially new employees, need to be better informed of the construction process to enable them to better evaluate a contractor's capabilities to perform satisfactorily. This knowledge could be provided by insurance companies, insurance associations, academic programs, and on the job training.

6. Transportation agencies should consider reducing the statute of limitations on completed construction operations to shorter (1 to 3 years) limits, where feasible. Current limits are often indefinite, placing higher risk and thus higher insurance costs on contractors.

7. Transportation agencies should accept more responsibility for design errors on highway construction projects. More DOTs are contracting their design work to consultants with a resulting increase in the number of contract disputes between designers and contractors over alleged design errors. DOTs need to take a more active role in resolving these disputes and accepting more responsibility for problems arising from design errors.

8. Highway contractors need to improve their safety programs. Poor safety performance is disruptive to projects and seriously impacts insurance costs for the highway industry, especially workers' compensation and liability insurance. Research is also needed to assist contractors in finding safer ways to perform their work operations.

## **RECOMMENDED RESEARCH**

Ten problem areas were identified for further research. Research problem statements were developed for each of the problem areas, including problem definition, proposed research, potential implementation, and estimated costs and duration of each project. Five problem statements were developed for both bonding and insurance. However, several of the projects would be of benefit to both problem areas. The titles of the ten problem statements are given below (the problem statements are described following these titles):

• **Bonding Problem Statements:**

B1: Development of an Introductory Course on Highway Construction for Surety and Insurance Professionals

B2: Improved Resolution of Disputes on Highway Construction Projects

B3: Alternatives for Bonding of Highway Construction Projects

B4: Development of an Introductory Course on Highway Construction Bonds and Insurance Needs for Small Highway Contractors

B5: Evaluation of the Quality of Design Documents for Transportation Projects

• **Insurance Problem Statements:**

I1: Impact of Transportation Agencies Assuming More Liability on Highway Construction Projects Involving Hazardous Wastes

I2: Evaluation of Federal and State Legislative Reforms Needed to Reduce Liability and Insurance Costs in the Highway Construction Industry

I3: Distribution of Risk Sharing on Highway Construction Contracts

I4: Investigation of the Reduction of Statutes of Limitation for Completed Operation Coverage After Contract Completion on Highway Projects

I5: Improvement of Safety on Highway Construction Projects

NCHRP PROJECT 20-26  
Bonds and Insurance for Highway Contractors

RESEARCH PROBLEM STATEMENT      DATE: July 1, 1990

I. PROBLEM TITLE:

Development of an Introductory Course on Highway Construction for Surety and Insurance Professionals

II. PROBLEM STATEMENT:

Surety and insurance professionals play a vital role in the highway construction process. Contractors must obtain bonding and insurance coverages to qualify for highway construction projects. Surety and insurance professionals instruct and evaluate contractors in their applications for coverage; however, most of these persons have no background in construction. Gaining such knowledge through job experience is a very slow and inefficient process; an introductory course would be beneficial.

III. RESEARCH PROPOSED:

Develop an introductory course on the highway construction process to acquaint surety and insurance professionals with the responsibilities and roles of all parties involved. Educational materials would be developed for either self-study or for short courses presented by instructors. Existing materials would be utilized as available to the researchers.

IV. POTENTIAL IMPLEMENTATION:

The educational materials developed would be available for sureties and insurance companies and agents to use in training young persons joining their firms who will be involved in the highway construction business. Such education should greatly expedite their knowledge of the construction process and make them more valuable for their firms and their clients.

V. ESTIMATED COST/DURATION: \$150,000      1.5 Years

VI. SUBMITTED BY:

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University

NCHRP PROJECT 20-26  
Bonds and Insurance for Highway Contractors

RESEARCH PROBLEM STATEMENT      DATE: July 1, 1990

I. PROBLEM TITLE:

Improved Resolution of Disputes on Highway Construction Projects

II. PROBLEM STATEMENT:

Construction contract disputes and claims have always existed in the construction industry, but have been increasing greatly in recent years. Project disputes which are not resolved on the project often result in legal claims. These claims cost the parties thousands of dollars each year in lost time, legal expenses and settlement costs. An investigation is needed to identify the causes of contract disputes and effective resolution methods.

III. RESEARCH PROPOSED:

The proposed research would involve the determination of the most common causes of contract disputes on highway construction projects and the claims history of the past five years. This would be accomplished by surveys of and interviews with several DOT construction personnel and highway contractors. Information would also be sought on methods used by transportation agencies to handle disputes and claims. Specific recommendations would be developed to help resolve the sources of disputes and to resolve construction contract claims.

IV. POTENTIAL IMPLEMENTATION:

The data collected about highway contract disputes and claims would be available to all transportation agencies. Applicable recommendations could be implemented to reduce the number of claims and disputes on highway contracts, thus saving dollars which could be used for new projects. The results of the study could also be used to develop in-house training programs to prepare construction personnel to avoid dispute situations and to handle disputes and claims that do arise, especially the documentation of facts.

V. ESTIMATED COST/DURATION: \$250,000      2 Years

VI. SUBMITTED BY:

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University

NCHRP PROJECT 20-26  
Bonds and Insurance for Highway Contractors

RESEARCH PROBLEM STATEMENT      DATE: July 1, 1990

I. PROBLEM TITLE:

Alternatives for Bonding of Highway Construction Projects

II. PROBLEM STATEMENT:

Obtaining surety bonds for highway projects remains a problem for several contractors, especially small and/or minority contractors. Obtaining bonds on projects involving hazardous wastes is also difficult, if not impossible, for any size contractor. There are currently several alternatives to traditional surety bonding procedures being proposed or under consideration by several government agencies. Some of these alternatives include: individual surety associations, complete or partial waiver of bond requirements for certain types of projects, raising the Miller Act threshold for bonds on Federal construction contracts, and increased use of collateral in lieu of a surety bond. More in-depth study is needed of all of these proposed alternatives to evaluate the full impact of implementing them into practice on all the parties involved.

III. RESEARCH PROPOSED:

Alternative methods to traditional surety bonds for highway construction projects will be identified by contacts with government agencies, surety associations, contractor organizations, and transportation agencies. An in-depth evaluation of each of the proposed alternatives will be made to assess the impact of its implementation on owners, contractors, suppliers, and sureties. Special emphasis will be given to risk sharing, financial impact, and the difficulties of implementation.

IV. POTENTIAL IMPLEMENTATION:

The results of the research would serve as a guideline for transportation agencies who are considering alternatives to traditional surety bonding for their construction projects. It would also allow agencies to consider special programs to enable small and/or minority firms to qualify for their construction projects. Guidelines would also be provided for risk protection on the increasing number of projects involving hazardous wastes.

V. ESTIMATED COST/DURATION: \$100,000      1.0 Years

VI. SUBMITTED BY:

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Texas Transportation Institute, Texas A&M University

**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Development of an Introductory Course on Highway Construction Bonds and Insurance Needs for Small Highway Contractors**

**II. PROBLEM STATEMENT:**

Contractors must obtain bonding and insurance coverages to qualify for highway construction projects. Most new highway contractors are small firms whose principals have limited knowledges of these requirements or the methods used by surety and insurance professionals to evaluate their applications for coverage. Gaining such knowledge is vital to the potential success of the small firm; an introductory course would be extremely beneficial.

**III. RESEARCH PROPOSED:**

Develop an introductory course to acquaint small highway contractors with the requirements for bonds and insurance for highway construction projects, plus the application procedures used by surety and insurance companies. The roles and responsibilities of all parties involved would also be defined. Educational materials would be developed for either self-study or for short courses presented by instructors. Existing materials would be utilized as available.

**IV. POTENTIAL IMPLEMENTATION:**

The educational materials developed would be available for transportation agencies, contractor organizations, plus sureties and insurance companies or agents to use with persons entering the highway construction business. Such education should greatly expedite their knowledge of highway construction bonding and insurance coverages and enhance their potential for success.

**V. ESTIMATED COST/DURATION:** \$100,000      1.0 Years

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
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**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Evaluation of the Quality of Design Documents for Transportation Projects**

**II. PROBLEM STATEMENT:**

Two problems are commonly espoused by highway contractors with respect to the design documents provided by transportation agencies for highway construction projects. First, it is believed that the quality of the design documents, including the specifications, are not of high quality. Second, there are many disputes on highway construction projects related to alleged design errors and design document deficiencies. A study is needed to validate the extent of these problems and their impact on highway projects, and to develop recommendations for alleviating these problems.

**III. RESEARCH PROPOSED:**

The proposed research would involve the identification of the perceived quality of the design documents being used for highway construction projects. This would be accomplished by surveys of and interviews with appropriate persons in DOT's, design firms, and highway construction companies. Data would also be collected on the impact of design document errors and deficiencies on contract disputes in recent years. Recommendations to alleviate such problems would be developed.

**IV. POTENTIAL IMPLEMENTATION:**

The results of the study could be used by transportation agencies to investigate their own situation with respect to design problems on their construction projects. Applicable recommendations could be implemented by the agencies to reduce the potential for conflicts on their construction projects due to design document deficiencies, plus improve the quality and lower the costs of their projects.

**V. ESTIMATED COST/DURATION:** \$150,000      1.5 Years

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
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**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Impact of Transportation Agencies Assuming More Liability on Highway Construction Projects Involving Hazardous Wastes**

**II. PROBLEM STATEMENT:**

Hazardous wastes are causing serious problems on highway construction projects. When encountered, special and expensive methods must be used for handling and disposal. Contractors virtually can not obtain bond or insurance coverage for hazardous wastes on their projects since sureties and insurance companies will not assume the risk. They have to raise their bid prices to very high levels to protect themselves or simply ignore this type of work. It appears that one alternative would be for transportation agencies to assume some of this liability on their projects to avoid unreasonable prices.

**III. RESEARCH PROPOSED:**

Current practices used to handle hazardous wastes encountered on highway projects will be studied with special emphasis on the assignment of liability to the parties involved. Data will be collected through literature reviews, plus surveys and interviews with transportation agencies, highway contractors, sureties and insurance companies. Alternatives will be studied and the impact assessed for distributing the liability, especially for larger roles by transportation agencies. It would still require that contractors be liable for their own actions on projects.

**IV. POTENTIAL IMPLEMENTATION:**

If deemed feasible for transportation agencies to assume more liability for hazardous wastes, then the methods identified could be implemented as special provisions in construction contracts. The result could be more qualified bidders on highway projects with hazardous wastes, plus the potential for more competitive prices and fewer contract disputes.

**V. ESTIMATED COST/DURATION:**      \$100,000      1 Year

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University

**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Evaluation of Federal and State Legislative Reforms Needed to Reduce Liability and Insurance Costs in the Highway Construction Industry**

**II. PROBLEM STATEMENT:**

Insurance costs for highway contractors continue to rise, especially for tort liability and workmens compensation. Much of this inflation is due to unrealistic payouts for claims related to public projects. It is believed that legislative reforms should be sought to alleviate this situation, both at the federal and state levels. These costs exacerbate the severe shortage of infrastructure funds.

**III. RESEARCH PROPOSED:**

Data would be collected on the types and amounts of legal settlements for liability suits and workmens compensation claims related to highway projects. Special attention will also be given to identifying the amount of the settlements considered as punitive damages. This data will be collected from transportation agencies, highway contractors and insurance companies. Opinions will be sought as to possible legislative reforms that may be feasible for alleviating unreasonable settlements. These alternatives will then be checked with legal sources to identify the legislative reforms needed to implement the alternatives.

**IV. POTENTIAL IMPLEMENTATION:**

The results of the research would be shared with all the parties involved in the highway construction industry for their support and presentation to their appropriate legislative representatives for possible reform. The statistics developed in the study would be useful for illustrating the extent of the problem. Also, some practices not requiring legislative reform may be discovered which could be implemented immediately.

**V. ESTIMATED COST/DURATION:**      \$250,000      2 Years

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University



**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Distribution of Risk Sharing on Highway Construction Contracts**

**II. PROBLEM STATEMENT:**

Construction is a high risk business and contractors understand that they must assume this risk if they want to obtain contracts for projects. Owners and designers also have risk, but traditional highway construction contracts assign a large portion of the risk to the contractor. With the high cost of insurance and the difficulty of obtaining either bonds or insurance on high risk projects, contractors and insurance agents feel that DOT's and designers should share more in the risks. This would require a review of existing contract systems, an evaluation of current assigned risks, and the development of possible revisions to balance the risks.

**III. RESEARCH PROPOSED:**

An evaluation would be made of the contract systems used by transportation agencies for both design and construction with emphasis on the allocation of risks and the associated costs. Input will also be sought from transportation officials, designers, contractors, and insurance professionals concerning possible revisions to existing contract systems and the expected impact. Recommendations would then be developed for possible contract revisions which would more equitably assign risk to the appropriate parties and help reduce adversity on projects.

**IV. POTENTIAL IMPLEMENTATION:**

Transportation agencies could utilize the findings of the research study to evaluate their own construction and design contract systems for possible revisions. If implemented successfully, the potential exists for lower insurance costs, lower project costs, less contract disputes and claims, plus a more cooperative team approach to the building of transportation facilities.

**V. ESTIMATED COST/DURATION:**      \$225,000      2 Years

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University

**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Investigation of the Reduction of Statutes of Limitation for Completed Operation Coverage After Contract Completion on Highway Projects**

**II. PROBLEM STATEMENT:**

Current statutes of limitation for completed highway facilities often have unlimited, or very long, time commitments imposed on the contractor. Such liability is a serious concern to insurance companies who are often reluctant to provide coverage. Also, contractors are often brought into lawsuits for reasons beyond their responsibility due to the "deep pockets" mentality prevalent today. There should be more reasonable time limits on the liability of contractors for completed facilities, perhaps also for designers.

**III. RESEARCH PROPOSED:**

Data would be collected on the current limitations imposed on highway contractors and designers for liability for completed transportation facilities. Data would also be collected on lawsuits and settlements against these parties for the past several years. Transportation officials, designers, contractors, plus legal and insurance professionals will be surveyed for their opinions and recommendations for needed improvements. Final recommendations will be developed on the most feasible alternatives.

**IV. POTENTIAL IMPLEMENTATION:**

The data collected and the recommendations developed can be utilized by the transportation agencies and professionals in each State to pursue improvements deemed feasible for local situations. The result could be much better working relations on transportation projects, reduced costs for designers and contractors, and lower project prices for transportation agencies.

**V. ESTIMATED COST/DURATION:**      \$200,000      2 Years

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University

**NCHRP PROJECT 20-26**  
Bonds and Insurance for Highway Contractors

**RESEARCH PROBLEM STATEMENT**      **DATE: July 1, 1990**

**I. PROBLEM TITLE:**

**Improvement of Safety on Highway Construction Projects**

**II. PROBLEM STATEMENT:**

Poor safety on highway construction projects is very detrimental to all parties involved. The results of poor safety are human injury, property losses, project delays, increased costs of insurance for all, and costly legal claims. While many other industries have made great strides in construction safety, the highway industry still lags behind. Although a lot of effort has been devoted to work zone safety, research is needed to identify key safety problems in other construction operations and possible solutions.

**III. RESEARCH PROPOSED:**

Data will be collected to identify the major types of safety problems on highway construction projects, possible causes, and associated costs. This data will be obtained via surveys and interviews with highway contractors, transportation agencies, and insurance companies. Details will also be sought on effective contractor safety programs, for both highway contractors and for contractors in other industries with good safety records. Recommendations will be developed to improve the safety of highway construction operations.

**IV. POTENTIAL IMPLEMENTATION:**

The results of the research will pinpoint major areas of highway construction needing safety improvement plus programs to implement by contractors or DOT's to promote better safety in their operations. Transportation agencies may also use the results to develop safety criteria as part of their contractor prequalification process. Special problems needing more research to find safer construction techniques will also be identified.

**V. ESTIMATED COST/DURATION:**      \$200,000      2 Years

**VI. SUBMITTED BY:**

Dr. Donn E. Hancher, Research Engineer  
Texas Transportation Institute, Texas A&M University

## APPENDIX A

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# APPENDIX C

## ANCILLARY TABLES

**Table C-1. Statistics related to State DOT bonding and retainage.**

STATES PERMITTING INDIVIDUALS AS SURETIES			PERCENT OF PRICE COVERED BY BID BOND		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	6	15%	< 5%	2	6%
NO	35	85%	5% BUT < 8%	25	71%
			≥ 8%	8	23%
TOTAL	41	102%	TOTAL	35	100%
PERCENTAGE OF PERFORMANCE BONDS INVOKED ANNUALLY			PERCENT OF CONTRACTS TERMINATED FOR CONVENIENCE		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
0%	5	15%	0%	15	42%
< 1%	15	44%	< 1%	9	25%
1% BUT < 3%	12	35%	1% BUT < 3%	10	28%
≥ 3%	2	6%	≥ 3%	2	5%
TOTAL	34	100%	TOTAL	36	100%
PERCENTAGE OF BID BONDS INVOKED ANNUALLY			APPROXIMATE RETAINAGE PERCENTAGE		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
0%	7	22%	<2%	4	10%
< 1%	13	41%	2% BUT < 4%	9	23%
1% BUT < 3%	11	34%	4% BUT < 6%	21	54%
≥ 3%	1	3%	6% BUT <8%	1	3%
			≥ 8%	4	10%
TOTAL	32	100%	TOTAL	39	100%

**Table C-2. State DOT statistics related to prequalification.**

STATE DOTS PREQUALIFYING PRIMES			STATE DOTS PREQUALIFICATION PROCEDURE vs SURETY		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	31	76%	MORE EXTENSIVE	3	10%
NO	10	24%	SAME AS SURETY	4	13%
			LESS EXTENSIVE	9	30%
TOTAL	41	100%	UNKNOWN	14	47%
			TOTAL	30	100%
DOLLAR AMOUNT SPENT ON PREQUALIFICATION ANNUALLY (000's)					
RESPONSE	NUMBER	PERCENT			
< \$20	7	32%			
\$20 BUT < \$100	9	41%			
≥ \$100	6	27%			
TOTAL	22	100%			

**Table C-3. State DOT responses on other bond-related issues.**

STATE DOTS REQUIRING SUBS TO BE BONDED			STATE DOTS HAVING SPECIAL PROGRAMS FOR SMALL FIRMS TO OBTAIN BONDING		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	0	0%	YES	13	32%
NO	41	100%	NO	28	68%
TOTAL	41	100%	TOTAL	41	100%
STATE DOTS REQUIRING BONDS ON ALL CONSTRUCTION WORK			STATE DOTS PUBLISHING THE ENGINEER'S ESTIMATE		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	35	85%	YES	3	7%
NO	6	15%	NO	38	93%
TOTAL	41	100%	TOTAL	41	100%

**Table C-4. State DOT responses to safety-related issues.**

STATE DOTS EVALUATING SAFETY RECORD OF PRIMES			STATE DOTS REQUIRING SPECIAL TRAINING IN HANDLING HAZARDOUS MATERIAL		
RESPONSE	NUMBER	PERCENT	RESPONSE	NUMBER	PERCENT
YES	5	15%	YES	16	43%
NO	29	85%	NO	21	57%
TOTAL	34	100%	TOTAL	37	100%

**Table C-5. Bid bond premiums (% of bid price) of majority contractors by contract size.**

LESS THAN \$1,000,000			
From: (≥)	To: (<)	Number:	Percent:
0.00	1.02	42	95.5%
1.02	2.04	0	0.0%
2.04	3.06	0	0.0%
3.06	4.08	0	0.0%
4.08	5.10	2	4.5%
Total		44	100.0%
Mean= .278		Median=0.0	
\$1,000,000 - \$5,000,000			
From: (≥)	To: (<)	Number:	Percent:
0.00	1.02	41	97.6%
1.02	2.04	0	0.0%
2.04	3.06	0	0.0%
3.06	4.08	0	0.0%
4.08	5.10	1	2.4%
Total		42	100.0%
Mean= .146		Median=0.0	
GREATER THAN \$5,000,000			
From: (≥)	To: (<)	Number:	Percent:
0.00	1.02	41	97.6%
1.02	2.04	0	0.0%
2.04	3.06	0	0.0%
3.06	4.08	0	0.0%
4.08	5.10	1	2.4%
Total		42	100.0%
Mean= .141		Median=0.0	

Note: Bid Bonds typically are included in performance bonds at no extra price

**Table C-6. Bonding capacity of majority contractors by year.**

BONDING CAPACITY _1989 ( IN \$MIL)			
From: (≥)	To: (<)	Number:	Percent:
0	25	34	72.3%
25	50	3	6.4%
50	75	8	17.0%
75	100	0	0.0%
100	125	1	2.1%
125	150	0	0.0%
150	175	1	2.1%
Total		47	100.0%
Mean= 22.9		Median= 9.0	
BONDING CAPACITY _1988 ( IN \$MIL)			
From: (≥)	To: (<)	Number:	Percent:
0	25	35	74.5%
25	50	4	8.5%
50	75	5	10.6%
75	100	1	2.1%
100	125	0	0.0%
125	150	1	2.1%
150	175	1	2.1%
Total		47	100.0%
Mean= 20.7		Median= 6.0	
BONDING CAPACITY _1987 ( IN \$MIL)			
From: (≥)	To: (<)	Number:	Percent:
0	25	38	80.9%
25	50	3	6.4%
50	75	3	6.4%
75	100	0	0.0%
100	125	3	6.4%
125	150	0	0.0%
150	175	0	0.0%
Total		47	100.0%
Mean= 17.0		Median= 5.0	

**Table C-9. Insurance agency construction education.**

NUMBER OF RESPONDENTS OFFERING CONSTRUCTION TRAINING PROGRAM FOR AGENTS		
RESPONSE	NUMBER	PERCENT
YES	11	28%
NO	28	72%
TOTAL	39	100%

**Table C-7. Insurance rates of majority contractors (\$ of premium per \$1,000 coverage) by line of insurance.**

WORKERS COMPENSATION			
From: (≥)	To: (<)	Number:	Percent:
5.44	56.352	19	51.4%
56.352	107.264	8	21.6%
107.264	158.176	5	13.5%
158.176	209.088	3	8.1%
209.088	260	2	5.4%
Total		37	100.0%
Mean=72.98		Median=55	

BUILDER'S RISK			
From: (≥)	To: (<)	Number:	Percent:
1.06	4.314	4	50.0%
4.314	7.568	2	25.0%
7.568	10.822	1	12.5%
10.822	14.076	0	0.0%
14.076	17.33	1	12.5%
Total		8	100.0%
Mean=5.51		Median=3.75	

AUTO/EQUIPMENT			
From: (≥)	To: (<)	Number:	Percent:
0.41	9.528	11	50.0%
9.528	18.646	6	27.3%
18.646	27.764	1	4.5%
27.764	36.882	2	9.1%
36.882	46	2	9.1%
Total		22	100.0%
Mean=12.68		Median=8.92	

GENERAL LIABILITY			
From: (≥)	To: (<)	Number:	Percent:
1.02	46.816	20	55.6%
46.816	92.612	13	36.1%
92.612	138.408	1	2.8%
138.408	184.204	1	2.8%
184.204	230	1	2.8%
Total		36	100.0%
Mean=42.48		Median=26.36	

**Table C-8. Surety agent prequalification description.**

NUMBER OF STAFF COMPETENT IN CONTRACTOR PREQUAL		
CATEGORY	NUMBER	PERCENT
1-5	66	84%
6-10	9	11%
11-15	0	0%
16-20	2	3%
21-30	0	0%
31+	2	3%
TOTAL	79	100%
NUMBER OF RESPONDENTS OFFERING FINANCIAL TRAINING PROGRAM FOR AGENTS		
RESPONSE	NUMBER	PERCENT
YES	36	47%
NO	40	53%
TOTAL	76	100%
NUMBER OF RESPONDENTS OFFERING CONSTRUCTION TRAINING PROGRAM FOR AGENTS		
RESPONSE	NUMBER	PERCENT
YES	29	38%
NO	47	62%
TOTAL	76	100%

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