

National Cooperative Highway Research Program

NCHRP Synthesis 214

Resolution of Disputes to Avoid Construction Claims

A Synthesis of Highway Practice

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National Cooperative Highway Research Program

Synthesis of Highway Practice 214

Resolution of Disputes to Avoid Construction Claims

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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 of the 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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PREFACE

A vast storehouse of information exists on nearly every subject of concern to highway administrators and engineers. Much of this information has resulted from both research and the successful application of solutions to the problems faced by practitioners in their daily work. Because previously there has been no systematic means for compiling such useful information and making it available to the entire community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize useful knowledge from all available sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series reports on various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which these reports are useful will be tempered by the user's knowledge and experience in the particular problem area.

FOREWORD

*By Staff
Transportation
Research Board*

This synthesis will be of interest to transportation agency administrators, including contract administrators; construction, design, claims, and scheduling engineers; project staff and managers; attorneys; and construction contractors. This synthesis describes the state of the practice with respect to procedures used throughout the United States to resolve disputes to avoid construction claims.

Administrators, engineers, and researchers are continually faced with highway problems on which much information exists, either in the form of reports or in terms of undocumented experience and practice. Unfortunately, this information often is scattered and unevaluated and, as a consequence, in seeking solutions, full information on what has been learned about a problem frequently is not assembled. Costly research findings may go unused, valuable experience may be overlooked, and full consideration may not be given to available practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project, carried out by the Transportation Research Board as the research agency, has the objective of reporting on common highway problems and synthesizing available information. The synthesis reports from this endeavor constitute an NCHRP publication series in which various forms of relevant information are assembled into single, concise documents pertaining to specific highway problems or sets of closely related problems.

Fair and timely resolution of contract disputes may help lessen highway construction project administrative costs, benefitting the public, the agency, and the contractor. This report of the Transportation Research Board examines the underlying reasons for contract disputes and identifies methods for dispute avoidance and resolution. It complements the information in *NCHRP Synthesis of Highway Practice 105: Construction Contract Claims: Causes and Methods of Settlement*, which focused on the causes of disputes. This synthesis further emphasizes finding ways to settle disputes at their inception, before they become formal claims or lawsuits.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the Board analyzed available information assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the researcher in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

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The Principal Investigators responsible for the conduct of this synthesis were Sally D. Liff, Manager, Synthesis Studies, and Stephen F. Maher, Senior Program Officer. This synthesis was edited by Linda S. Mason, assisted by Rebecca B. Heaton.

Scott A. Sabol, Senior Program Officer, National Cooperative Highway Research Program, assisted the NCHRP 20-5 staff and the Topic Panel.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance were most helpful.

RESOLUTION OF DISPUTES TO AVOID CONSTRUCTION CLAIMS

SUMMARY

Construction contract disputes and claims have always existed in the highway and transportation construction industry, and it is commonly believed that claims have increased greatly in recent years. Decisions arising from contract and performance issues often lead to disputes between the contractor and the agency, which may result in claims for additional compensation and/or extension of time by the contractor. If not resolved in a timely manner, project disputes often result in formal claims, which cost thousands of dollars each year to process. Thus, the fair and timely resolution of disputes may help lessen administrative costs, benefitting the public, the agency, and the contractor.

Initiated as a follow-up to two previous reports by the Transportation Research Board, this synthesis examines the underlying reasons for construction contract disputes and identifies methods for dispute avoidance, recognition, and resolution. This report further emphasizes finding ways to settle disputes at their inception, before they become formal claims or lawsuits.

To avoid and resolve disputes and claims on construction contracts, it is important to understand, and essentially prevent, the specific types of problems and the common causes of disputes. Resolution requires an understanding of how the underlying problem can be dealt with so that the disputes and conflicts are not addressed on a superficial level.

Common causes of disputes include design defects, actions/inactions of third parties, unknown conditions, and practice of agencies. Common types of disputes include constructive changes (i.e., changes in the scope of the work required by circumstances), design defects, differing site conditions, site access, and utility relocation problems. The time and cost impacts of these types of disputes are manifested in additional costs for work performance, project delays, and labor productivity losses. Other types of disputes include bonus/penalty clauses, environmental permits and hazardous material conditions, and delays by previous phase contractors.

Problems that lead to disputes can be minimized by reviews and quality control procedures implemented during the preconstruction stage. Common procedures include constructibility practices, design reviews, and value engineering (VE), which is the systematic application of techniques for identifying the function of a product or service, establishing a value for the function, and providing it at least overall cost and in a reliable manner. Other procedures include evaluation of geotechnical data (through use of geotechnical design summary reports (GDSRs)) and use of program/construction management consultants.

An important aspect of dispute resolution is the ability of parties to recognize emerging problems so that they can be resolved and the potential for disputes can be minimized. Efforts to avoid disputes often center around design and preconstruction phases, while efforts to resolve disputes involve the ability to monitor the project and anticipate potential problem areas once the project is underway. Several techniques for early dispute recognition

include regular monitoring and updating of project schedules, preconstruction and project meetings, mandatory project scheduling, bid evaluations, job cost/payment projection reports, productivity program documentation, and regular review of project documentation.

Until recently, much of the emphasis in the construction industry has been on the resolution of claims and contested cases rather than early recognition and resolution of problems and disputes. Claims involve formalized or legal procedures, whereas disputes are conflicts and disagreements that may be resolved at the project level. New methods of dispute resolution are being explored to return control of disputes to the project level to avert the need for outside assistance and the possible development of a formal claims process, which can be costly and time consuming. Current techniques for dispute resolution include partnering, disputes review boards (DRBs), and empowerment of project staff through delegation of authority.

Agencies are taking a number of steps to deal with the causes of disputes through avoidance and quality control procedures. More extensive and earlier involvement would help agencies avoid the problems that often lead to disputes. Current agency practices in dispute recognition appear to be adequate to allow early identification of problems before they escalate into formal claims and litigation. Agencies are experimenting with various dispute resolution techniques to allow disputes to be resolved at the project or district level of the agency. Greater use of these techniques could lead to fewer disputes and claims in the future.

INTRODUCTION

BACKGROUND

This study is a follow-up to two previous works by the Transportation Research Board (TRB). A 1979 TRB report, prepared for the Federal Highway Administration (FHWA), *Research and Development Program for Highway Construction Engineering Management*, identified several areas for research to improve the management of highway construction engineering (1). Two areas recommended for study were the identification of causes of contract claims and guidelines for settling claims by administrative procedures. In 1983, *NCHRP Synthesis of Highway Practice 105: Construction Contract Claims: Causes and Methods of Settlement* was published to address these subjects (2).

This synthesis was initiated to study the underlying reasons for construction contract disputes and to identify methods for dispute avoidance and resolution. Whereas the previous synthesis focused on the causes of disputes, this report focuses on their avoidance and resolution and further emphasizes finding ways to settle disputes at their inception, before they become formal claims or lawsuits.

PROGRAM STATEMENT

Construction contract disputes and claims have always existed in the highway and transportation construction industry, and it is commonly believed that claims have increased greatly in recent years. Decisions arising from contract and performance issues often lead to disputes between the contractor and the agency, which may result in claims for additional compensation and/or extension of time by the contractor. Project disputes that are not resolved in a timely manner often result in formal claims. Processing these claims costs thousands of dollars each year due to lost time, management effort, consultant fees, legal expenses, and other costs. The fair and timely resolution of disputes may help lessen administrative costs, benefitting the public, the agency, and the contractor.

SCOPE AND APPROACH OF THE SYNTHESIS

The goals of this synthesis are to 1) identify the most common causes of contract problems and disputes, 2) find ways to avoid and minimize these causes, 3) investigate techniques for early recognition of potential disputes, and 4) explore alternative approaches to resolving disputes before they result in formal claims or lawsuits.

To meet these goals, several sources of information were consulted, including an overview of research literature on trends and practices used in the construction industry to avoid

and resolve claims and disputes; a survey questionnaire of transportation agencies and selected contractors to identify existing methods for early identification, avoidance, and resolution of disputes; and interviews with agency staff, in person and by telephone, to examine their practices in detail.

The information was then analyzed to identify methods most effective in avoiding and resolving disputes; to discuss how individual methods are used to suit the type, size, timing, complexity, and other characteristics of disputes; to examine obstacles to dispute resolution, including the level of dispute resolution authority; and to identify instances where revision of policies, practices, or documents has aided dispute resolution and avoidance.

DEFINITIONS OF KEY TERMS AND CONCEPTS

When dealing with construction disputes, one of the difficulties is defining the terms "dispute" and "claim." For the purposes of this synthesis, a dispute refers to a contract related problem that has not yet become a matter of formal process, such as administrative claims processing or legal action. In contrast, a claim involves the formal process. The distinction between a dispute and a claim is especially relevant to this synthesis, which focuses on how agencies avoid and resolve disputes before they become formal claims or lawsuits.

The definitions that were used in the questionnaire and that are used in this synthesis are as follows:

Dispute: A contractual problem involving conflict between the parties concerning cost, scope, delay, differing site condition, time of performance, etc., which has not yet resulted in a request for contract adjustment or a lawsuit.

Claim: A dispute that has progressed to the stage of a formal request for additional money or a lawsuit. In the context of this questionnaire, a claim is a formal process with contractual and legal implications. For example, a dispute has ripened into a claim when the contractor submits a formal request for a contract adjustment or a legal complaint or lawsuit. Also, a dispute may become a formal claim when it is not resolved at the field or district level, and is passed up to the central office for formal processing. A claim is contrasted to a dispute, which is a problem that has not been formalized with any legal trappings.

The distinction between disputes and claims was confused in some of the questionnaire responses, and during discussions with agencies. For example, in reporting the agency's

Problem	Disagreement	Dispute	Conflict	Litigation
				Formal court documentation and proceedings
			Complex technical and legal studies for quantification and entitlement	
		Attempts at resolution removed from day to day management	"Continental Divide"	
Routine discussions & negotiations	Substantial honest negotiation on defined problem			
← On the Project →			← Removed from the Project →	

FIGURE 1 Escalating nature of problems (3).

dispute experience, one survey respondent provided details of a project that resulted in litigation. In other instances, the questionnaire definition of claim conflicted with the definition according to agency specifications and guidelines. Many agencies consider a claim to consist of any dispute involving delays, extra work, breach of contract, or similar problems. Also, many agencies have administrative and contractual provisions that require formalization of the dispute at an early stage. For instance, about 95 percent of the survey respondents require written notice of a contractual problem within a short time frame before action can be taken by the agency to preserve the contractor's legal and contractual rights. Georgia's *Standard Construction Specification* section 105.13 requires written notice within one week after a problem occurs. If written notice is not given, the contractor waives the right to additional compensation for any damages that accrued more than one week prior to filing notice. Procedural requirements may confuse the distinction between a claim and a dispute because once written notice is provided, some respondents believe a claim has been filed.

Thus, disputes may be confused with claims because of contractual provisions. In these instances, this synthesis focuses on

problem resolution in the field (how underlying problems are solved) rather than adjudication.

A study by a Construction Industry Institute (CII) task force provides other definitions of disputes and claims (3). After surveying the construction industry literature and other sources, the CII defined a claim as

An unresolved request for additional compensation and/or schedule adjustment. Any request for equitable adjustment (time and/or money) becomes a claim when it cannot be resolved at the project level with established procedures in a timely fashion.

The CII study identified the following five stages of the claims process (Figure 1):

1. Problems are part of the normal construction process and are generally resolved by daily management.
2. Disagreements arise when the project participants cannot resolve a problem without substantial negotiation. Certain procedural steps (i.e., notice) and posturing are required, but the result is a negotiated agreement on the project level.

3. Disputes arise when the project participants are unable to resolve a disagreement in a timely manner. Persons outside the field staff become involved to resolve the matter at the project level.

4. Conflicts arise when the dispute cannot be resolved at the project level and internal and specialized consultants are engaged to address dispute entitlement and quantification.

5. Litigation is when final resolution is sought by invoking the process of binding resolution by courts or other legal forums.

In the context of this five-stage process, this synthesis focuses on the first three stages by identifying what can be done at the project level to avoid and resolve problems, and to avert the more formalized and costly claims process (3).

NATURE OF PROBLEMS LEADING TO DISPUTES

To investigate the practices of agencies in resolving disputes, two major sources of information were consulted: 1) questionnaires sent to state transportation agencies and contractors, and 2) follow-up site visits and interviews to several of the responding agencies to clarify responses and obtain more details.

The questionnaire (Appendix A) dealt with three main areas—dispute resolution techniques, dispute avoidance techniques, and methods used to recognize potential disputes in an early manner. Questions dealt with current practices of the agencies, trends concerning these practices, and opinions concerning the most effective practices. The questionnaire asked for background information concerning the individuals responding to the questionnaire, and objective agency information concerning the magnitude, type, and classification of projects undertaken by the agency.

The survey defined several of the key terms (i.e., dispute, claim) to clarify many of the concepts and provide a uniform framework. Opinions were sought regarding trends in both the number and severity of disputes, as well as the reasons perceived for the trends. Finally, actual case histories were requested for projects that had significant disputes. The project profile questionnaire requested background information on the project, information on the types of disputes, levels of assessment, dollar amount and time requested to resolve the dispute, and how the dispute was actually resolved.

The 42 responses received from agencies addressed most of the questions posed. Further, 102 profiles were received for projects involving significant disputes. A similar effort was undertaken to obtain input from contractors and contracting organizations. However, the number of responses received from contractors was minimal despite several follow-up attempts, and the database was not adequate to draw conclusions.

To clarify the agency responses, thirteen agencies were visited and more than 40 persons at different levels and divisions of the agencies were interviewed, including chief engineers, state administrators, chiefs of construction, operational staff, project staff, agency attorneys, claims engineers, scheduling engineers, partnering facilitators, design engineers, and administrators. The interview process clarified many questionnaire responses and provided insight into how agencies deal with disputes.

TYPICAL PROBLEM PROFILES

The magnitude of the problem of disputes and claims facing public transportation agencies is reflected in the dollar amount of disputes and claims reported by the responding agencies in the last 5 years. On the basis of questionnaire results, a profile of this was developed (Table 1). However, of the agencies responding, only 51 percent reported that they maintained a history or record of disputes on projects undertaken in the last 5 years. Nearly all of the respondents provided at least three examples of projects experiencing disputes or claims; it appears, however, that record keeping on disputes is not systematic.

TABLE 1
KEY FINDINGS: THE MAGNITUDE AND EXTENT OF DISPUTES

-
- Records on disputes not universally kept
 - Average number and size of disputes experienced by each agency (during 5-year period)
 - 3 over \$1 million
 - 10 between \$250,000 and \$1 million
 - 54 under \$250,000
 - Opinion as to trends in frequency of disputes
 - 59 percent staying the same
 - 29 percent decreasing
 - 12 percent increasing
 - Why disputes are decreasing/staying the same
 - Quality of contract documents
 - Business climate
-

Note: Based on 42 questionnaire responses received from agencies.

An important finding from the questionnaire was that most of the respondents (59 percent) were of the opinion that both the frequency and severity of highway construction disputes were staying the same, and a significant number (29 percent) thought that the frequency and number of disputes was decreasing. The original TRB study in 1979 (1), and most of the construction industry literature would indicate that the problem of construction disputes and claims is increasing.

Respondents were asked to explain why they believed disputes were increasing or decreasing (Table 1). Those who stated that the number of disputes was decreasing or staying the same gave two main reasons: 1) improved quality of the contract documents, and 2) the business climate. As will be discussed in Chapter 3, deficiencies in the contract documents often cause disputes, and efforts by agencies to improve the quality of the contract documents may result in fewer disputes. The most common explanation of how the business climate affects the number of disputes is that fewer projects to bid reduces the potential for disputes. Other respondents reported that more disputes resulted when there were few projects; for example, contractors used disputes as a way to generate revenue when there were fewer projects to bid.

Survey respondents were also asked to provide information relating to three representative projects experiencing significant disputes over \$1 million. Nearly all respondents provided three profiles, although it appears that the distinction between informal disputes and formal claims was confused, as many of the respondents indicated that the matter was resolved by litigation, indicating a claim rather than an informal dispute. Nevertheless, the responses provided an informative overview of claims and disputes in highway construction.

It is possible to construct the profile of a typical problem project from the average mean of data provided by the responding agencies (Table 2). On interstate highway projects involving the construction of structures, the most common projects with disputes were new-build (rather than rehabilitation or repair) contracts. The average initial contract amount was \$15.8 million, and the average project duration was 536 days. The limited survey data suggest a possible relationship between the amount recovered by contractors in disputes on problem projects and the difference between their low bid on the project and the next lowest bid. This finding, which requires further substantiation, is discussed in Chapter 5.

On average, projects with disputes required time extensions of 96 days and \$23,770 in liquidated damages for contractor delays. Contracts on these projects experienced an 11 percent average increase in contract amount because of change orders, extra work items, or quantity variations. The average number of change orders over \$300,000 was only one, but there were on average 21 change orders of less than \$300,000, implying that project cost increase was not simply due to one change order or problem.

It is interesting to note the relationship between the average amount of compensation for the disputes requested by the contractor and the amount of the final resolution of the dispute. Nearly 80 percent of the requested time extensions were granted, but only 34 percent of the requested dollar amount was paid to resolve the dispute. The data do not reflect

TABLE 2
TYPICAL PROBLEM PROJECT

-
- \$15.8 million contract
 - 536-day duration required
 - New build construction
 - Interstate highway project
 - Involved construction of several structures
 - 96-day time extensions granted
 - \$23,770 in liquidated damages assessed
 - 11 percent increase in contract amount due to change orders
 - Dispute/claim request
 - 53-day additional time extension
 - \$2.7 million compensation
 - In response to the request
 - 80 percent time granted
 - 34 percent of compensation granted
 - Disputes commonly involved
 - Differing site conditions
 - Design error
 - Utility conflicts
-

Note: From 102 representative projects experiencing disputes of \$1 million, an average mean or "typical" project profile was developed.

whether the amounts requested by contractors were overstated or negotiated downward by agencies.

Commonly reported causes of disputes were differing site conditions, design errors, and utility problems. Thus, the contract adjustment clauses most commonly involved in the disputes included change clauses and differing site conditions clauses. More than 50 percent of the disputes were resolved by change orders, 30 percent by administrative procedures, about 10 percent by out of court settlements, and 5 percent by lawsuit judgment. These findings are discussed in more detail in Chapter 6.

COMMON TYPES OF DISPUTES AND CLAIMS AND THEIR CAUSES

INTRODUCTION

To avoid and resolve disputes and claims on construction contracts, it is important to understand, and essentially prevent, the specific types of problems that commonly cause disputes. Resolution requires an understanding of how the underlying problem can be dealt with so that the disputes and conflicts are not addressed on a superficial level. This chapter provides an overview of common types of disputes, as indicated by the previous NCHRP Synthesis and the survey results.

PREVIOUS SYNTHESIS

Published in 1983, *NCHRP Synthesis of Highway Practice 105: Construction Contract Claims: Causes and Methods of Settlement (2)*, addressed four different types of disputes: 1) unanticipated conditions, 2) ambiguous contract provisions, 3) extra work, and 4) changes in design and specifications. The synthesis provided an exhaustive review of the various causes of claims. Underlying causes were categorized as contractor practices, contracting agency practices, personal factors such as management styles, and institutional factors inherent in the high degree of quality required in highway construction. The 1983 study also examined the types of claims from the perspective of claims associated with contract documents, contract award, contract administration, and claims settlement practices. The list of causes identified is provided in Table 3.

Other efforts have been made to categorize claims more generally. For example, a study cited by the Construction Industry Institute (CII) classifies underlying causes according to project, process, and people involved (Howell, G., and P. Mitropoulos, "A Model For Understanding, Preventing and Resolving Construction Disputes," unpublished document, Department of Civil Engineering, University of New Mexico, Albuquerque, 1993).

- Project uncertainty
 - Pre-existing conditions
 - Outside forces (weather, strikes)
 - Complexity
- Process Problems
 - Imperfect contracts
 - Incomplete scope definition
 - Overly rigid contractual arrangements
 - Poor performance
- People Issues
 - Poor interpersonal skills
 - Poor communications
 - Lack of responsiveness
 - Opportunistic behavior.

TABLE 3

CAUSES OF CLAIMS (2)

Contractor Practices

- Inadequate investigation before bidding
- Unbalanced bidding
- Bidding below cost and over optimism
- Poor planning and use of wrong equipment
- Failure to follow authorized procedures

Contracting Agency Practices

- Changes in plans or specifications
- Inadequate bid information
- Inadequate time for bid preparation
- Excessively narrow interpretation of plans & specs
- Restrictive specifications
- Contract requirements for socioeconomic objectives unrelated to the construction process

Personal Factors

- Incompatible personalities
- Adverse attitudes

Institutional Factors

- Complex construction
- Lengthy performance period
- High quality requirements

Contract Documents

- Exculpatory clauses
- Mandatory notice requirements
- Finality of engineer's decisions
- Changed conditions clauses
- Out of date specifications

Contract Awards

- Diversity of state contract award procedures
- Treatment of bid mistakes

Contract Administration

- Coordination
- Interpretation of policy
- Inspection standards
- Administrative styles
- Documentation
- Funding schedules
- Political considerations

Claims Settlement Practices

- Encouragement of project-level settlements
- Delegation of settlement authority to field supervisors
- Effectiveness of field/headquarters consultation

TABLE 4
 TYPES OF DISPUTES EXPERIENCED BY RESPONDING AGENCIES

Changes	Third Party Actions/Inactions
<ul style="list-style-type: none"> • Estimated quantity variations • Extra work/scope of work • Agency changes • Disputed directed changes/change orders • Constructive changes • Cumulative changes • Contract interpretation • Higher performance standards • Over inspection • Alignment changes 	<ul style="list-style-type: none"> • Governmental actions • Strikes • Utility relocation delay • Right-of-way/easement disputes • Work of previous or adjacent contractors • Transportation delays • Acts of God • Weather • Third party permits
<p>Design/Engineering Defects</p> <ul style="list-style-type: none"> • Design errors • Design omissions • Plan revisions • Layout errors • Dimension problems 	<p>Delay/Impact</p> <ul style="list-style-type: none"> • Project delay • Suspension • Acceleration • Lost labor productivity/inefficiency
<p>Differing Site Conditions</p> <ul style="list-style-type: none"> • Differing geotechnical site conditions • Soil settlement • Mislocated utilities • Higher water table • Hazardous material encountered • Incorrect as-built dimensions • Environmental conditions 	<p>Contractor Management and Performance Problem</p> <ul style="list-style-type: none"> • Inadequate staffing • Equipment failures • Poor planning • Work quality/defective work • Subcontractor defaults • Labor productivity/inefficiency
<p>Site Access or Site Management Failures</p> <ul style="list-style-type: none"> • Right-of-way delays • Restricted or denied site access • Traffic control problems 	

Another study of construction problems classifies the origins of disputes as follows: contract documents, practices by the parties, forces beyond the control of the parties, and project type (4).

CURRENT STUDY

This synthesis examines a wide variety of types of disputes, focusing primarily on those associated with changes, delays, differing site conditions, and site access. The time and cost impacts of these types of disputes are manifested in additional costs for work performance, project delays, and labor productivity losses.

The following key definitions of types of disputes and claims examined in this study are as follows:

- **Constructive change**—a change in the scope of work required by circumstances or the conduct of the agency, engi-

neer, or other agents of the owner that lacks the formality of a directed change order.

- **Delay**—an event or condition that results in initiation or completion of a work activity or project that is later than originally planned.

- **Differing site conditions**—a material difference between the actual site conditions and these conditions indicated by the contract documents, or that could have been reasonably anticipated from the contract or normal circumstances.

- **Site access**—the physical ability to gain passage to or from the project location. This differs from right-of-way, which is the legal right to use the project site.

Many of these types of disputes are overlapping in nature. For instance, a mislocated utility line may involve design error, differing site conditions, and delay. Examples of the various types of disputes experienced by agencies, as obtained from the survey responses, are indicated in Table 4.

SURVEY FINDINGS

Agencies were requested to furnish information on three representative projects with significant disputes involving amounts more than \$1 million. Respondents reported a total of 102 representative projects. The information derived from these problem projects provides insight into the types and causes of disputes and claims experienced by agencies.

The lack of consistency in the theoretical framework for classifying the causes of disputes is not especially problematic for this study, which focuses on how disputes are resolved. However, in the agency questionnaire, underlying causes of disputes are classified directly as unknown conditions, defects in design, agency actions/inactions, contractor management failures, and actions/inactions of third parties. The causes of disputes as perceived by the agency respondents on the 102 projects are outlined in Table 5.

TABLE 5
CAUSES OF DISPUTES: AGENCY PERCEPTIONS

Cause	Percent of Projects
Design defects	38
Third party actions/inactions	36
Unknown conditions	35
Agency actions/inactions	18
Contractor problems	5

Note: Based on 102 representative profiles provided by 42 different agencies. The percentages exceed 100 percent as more than one factor may have been reported to have caused a dispute.

The relatively low number of disputes characterized as contractor problems may be somewhat misleading as compared to commonly encountered disputes on a project. If the agency or other decision maker determined that the contractor was the cause of the problem, then the dispute would have been resolved by a denial. Agencies responding to the questionnaire, however, did not focus on these types of disputes.

The representative projects indicated several common types of problems and disputes. On average, the problem projects resulted in a request of \$2.7 million in compensation and a time extension request of 53 calendar days beyond the 96 days of extension already granted. Underlying the requests for contract adjustments were the following common types of disputes: design errors (38 percent of the projects), concerns over utility relocation (34 percent), and differing site conditions (32 percent). Table 6 provides a more detailed breakdown of the results.

The differing site condition claims involved a number of situations in which conditions at the site differed from those reflected in contract documents, such as undercuts, additional borrow, foundation redesign, removal of existing facilities, wetlands, settlement of structures, excavated material unsuitable for fill, wet subgrade, mislocated utilities or utilities conflicts not indicated on drawings, and pile penetration

TABLE 6
MOST COMMON TYPES OF DISPUTES

Type of Dispute	Percent of Projects
Design Error	38
Bridges	14
Quantity errors	12
Roadway	12
Drainage	7
Other structure	7
Utility Relocation	34
Relocation delay	23
Mislocated	7
Differing Site Condition	32
Foundation related	10
Undercut	2
Add/Borrow	3
Miscellaneous	
Right-of-way	5
User change	5
Other contractor delay	5
Contract interpretation dispute	3
Incentive/disincentive clause	3
Environmental/hazardous material	3
Permit delays	2

Note: From 102 representative projects experiencing disputes exceeding \$1 million, provided by agencies responding to the questionnaire. Projects listed were constructed within 5 years of January 1993. The projects may have experienced more than one type of dispute, and delays resulted from nearly all of the problem types. The percentages are based on the representative problem project profiles and not upon a thorough review of all highway projects undertaken by the agencies; hence, they may not reflect the overall experience of the agencies. The percentages do not sum to 100 percent because more than one type of dispute may be involved in a single project.

problems. Other common problems related to differing site conditions were survey and staking layout difficulties. In many instances, actual survey and layout required significantly different unit quantities than estimated by the contract documents, causing contractors to seek an increase in unit prices. In other instances, the survey layout was in error, but the matter was pursued under the differing site conditions clause. In some cases, the survey errors were treated as design errors.

Design requirements in the contract documents frequently were the subject of disputes; design deficiencies often resulted in change disputes. The most common deficiencies involved engineering of bridges, drainage systems, and other structures; roadway design; and significant errors in estimated quantities, plans, and the specified phasing plan. Other design related disputes included unsuitable construction methods, delays to reissue plans, and errors in standard plan sheets.

Thirty-four percent of the representative projects with disputes experienced problems with utility relocation. The most common dispute of this type arose from delays in relocation and mislocated utility lines.

Some disputes involved interpretation of specifications and contract requirements, but it was not possible to determine

from the survey responses whether the underlying problem was caused by design error, lack of clarity in design, unreasonable interpretation by the contractor, or performance problems of the contractor.

Although most of the disputes involved differing site conditions, design errors, and utility conflicts, there were numerous other types of disputes reported by the responding agencies. Three specific problem areas merit discussion: 1) bonus/penalty clauses, 2) environmental permits and hazardous material conditions, and 3) delays by previous phase contractors.

Common practice in many of the representative projects was to include bonus/penalty clauses in construction contracts, providing both financial incentives and sanctions to encourage timely completion of work. The penalty portion of the clause was accompanied by liquidated damages provisions, although the penalty amount was not directly related to the department's delay costs. Penalty clauses, however, resulted in many disputes on how they were to be interpreted and enforced. In a landmark case, *Milton Construction Co., Inc. v. State of Alabama Highway Department*, 568 So.2d 784 (Alabama 1990), use of the penalty portion of a bonus/penalty scheduling provision was held to be invalid, while use of liquidated damages reflecting the department's daily delay costs was legitimate.

Project disputes were also generated by delays in obtaining environmental permits and encounters with hazardous material. These claims, which have had the greatest impact during the last 5 years, are relatively new and may be handled as

differing site condition problems. Removal of hazardous material can be especially costly and cause significant project delays.

Another problem area concerns contract coordination of phased construction. Delays and disputes may arise when one phase contractor is late, holding up the work of follow-on contractors. Follow-up interviews indicated that some agencies are handling this problem by awarding all related work under one package, or by not issuing notice to proceed until early phase work is complete.

Some of the problems encountered by agencies are addressed through the use of disclaimer clauses. For example, North Carolina and Georgia reported that differing site conditions clauses are not used to compensate contractors for site conditions that significantly differ from those represented in the contract or encountered normally. By law, the contractor assumes the risk for all project site conditions, even if the subsurface or other site conditions are unknown. Some other states try to achieve the same result by using disclaimer clauses that make the contractor responsible for the project site conditions "as is," rather than as represented by the contract documents or prebid soils information. Similar state case law or disclaimers may subject the contractor to the risk of utility conflicts or project delays. If these risk-shifting provisions are enforced by the courts or other adjudicatory bodies, the agency may be relieved of significant types of disputes commonly encountered in highway construction. However, the questionnaire results indicate that a majority of agencies do not use such disclaimers.

DISPUTE AVOIDANCE TECHNIQUES

OVERVIEW

Problems that lead to disputes often can be minimized by actions taken in the design and preconstruction phases. This is particularly true of design errors, utility conflicts, unknown site conditions, and other common types of disputes encountered by transportation agencies. Through quality control and assurance procedures, many common causes of disputes can be addressed even before construction contracts are awarded. This chapter examines measures taken by the construction industry and agencies to avoid disputes.

INDUSTRY DEVELOPMENTS

Construction industry commentators and publications (1,4–14) have focused primarily on the following five practices and procedures that enable project owners and agencies to minimize problems that generate disputes: 1) constructibility efforts, 2) design reviews, 3) value engineering (VE), 4) thorough evaluation of geotechnical data, and 5) program management procedures initiated in preconstruction phases and implemented during construction.

Constructibility

Constructibility refers to the integration of construction knowledge and experience into planning, design, procurement, and field operations as a means of achieving overall project objectives (5–7). Many construction industry professionals believe integration of construction knowledge and experience into planning and design facilitates bidding and reduces the potential for contract change orders. This integration requires a union of several traditional functions within the engineering and construction industries, including planning, design, right-of-way acquisition, utility, construction, and maintenance. Distinctions between design and construction functions are especially pronounced in public works, where procurement policy (through competitive bids) tends to produce a transfer of project ownership from the design function to the construction function.

In planning and designing a project using the constructibility approach, consideration is given to cost and availability of materials, labor intensity of installation, labor availability, access to the project site, fabrication and delivery times, maintenance of utilities, maintenance and protection of traffic, and other factors affecting the safety, cost, time, and quality of field work. The goal is to reduce the construction cost, time, and changes without impacting design requirements. For example, when applied to a major highway construction project, a constructibility evaluation would entail a review of available

soils information, utility locations including commitments on relocation, status of right-of-way acquisition and site access, phasing of traffic to allow site access, as well as adequate interim capacity and public access, local availability of borrowed and engineered fill, and sufficient fabrication durations for long lead items such as structural steel or structural precast concrete (8).

Constructibility is also integrated into other project decisions such as site selection, scheduling, project budgets, and contracting strategy. As the design is finalized, design documents are thoroughly reviewed to ensure consistency among drawings, standard details, specifications, and special provisions in bid packages, and to ensure coordination among adjacent and interrelated bid packages. This final review provides assurance to the owner that contract documents are well defined, complete, consistent, coordinated, and understandable to bidders (15). Such a review can also serve as a means of checking for design errors and listing potential value engineering savings.

Design Review

As reported in Chapter 2, about 38 percent of major disputes and claims experienced by responding agencies originated in design inadequacies that generated problems during the construction stage. One agency reported that contract amounts increased by over 10 percent on several projects because of change orders stemming from poor design practices. Construction industry commentators also have recognized the severity of this problem and devised solutions.

Three aspects of the design process have been identified as the origin of problems leading to construction claims: 1) lack of coordination of the different design disciplines, 2) failure to provide adequate reviews to identify problem areas, and 3) inadequate detail in the contract documents (9). Reviews of the design documents from an engineering perspective can be undertaken in addition to constructibility reviews to identify and eliminate these problems.

Design of transportation and highway projects entails several different engineering design specialties, including geotechnical, civil, structural, traffic, environmental, and materials engineering. Whether these disciplines are internal to the agency, procured through a multidisciplinary firm, or obtained through specialty subconsultants, they must be incorporated into one comprehensive and coordinated design package. Failure to do so may lead to conflicts, omissions, overlaps, and other deficiencies in the design package and contract documents.

Among the solutions for maximizing interdisciplinary coordination are the following (9):

- Mandatory interdisciplinary team meetings at various stages in design,

- Programs to encourage design team coordination,
- Architect/engineer contract requirements for interdisciplinary coordination,
- Prequalification of designers based on coordination expertise and capabilities, and
- Maximum continuity of key design team members throughout the life of the project.

Thorough review of the design documents at various stages can also help identify various design deficiencies that can lead to disputes during construction. This may include mandatory reviews by design team leaders, assessments by agency personnel in engineering or construction, and evaluations by independent design consultants. The emphasis of design reviews is to ensure compliance with design standards, adequacy of design approach and calculations, and coordination and interface, as well as compliance of design documents with the overall design intent. Reviews for constructibility, value engineering, and safety also have the secondary benefit of identifying aspects of the design that require enhancement and correction.

Insufficient detail in contract documents can be a cause of design quality and construction phase disputes. Inadequate detailing, which can lead to numerous requests for information, clarifications, and changes that generate disputes, may be the result of insufficient allocation of engineering hours by the designer or time provided for design detailing (9).

Solutions for inadequate detailing include explicit identification of the level of design detail required of the designer, greater emphasis on the degree and quality of detail in design reviews and constructibility efforts, and minimal use of performance specifications (which describe functions, standards, and performance results requiring detailed engineering by the construction contractor) (9).

Value Engineering (VE)

Transportation agencies, like other entities involved in the construction industry, must maximize return on construction investments. Many agencies are faced with diminishing resources, but increasing demands for quality, capacity, maintainability, reliability, and safety. VE can be a tool to help meet these seemingly conflicting demands. VE is the systematic application of techniques for identifying the function of a product or service, establishing a value for the function, and providing it at least overall cost and in a reliable manner. The application emerged from efforts to find substitutions for scarce manufacturing materials during World War II, and techniques for it were subsequently refined by General Electric and adopted by the Department of the Navy and several other federal agencies, including FHWA (16).

Traditionally, cost/benefit considerations relative to location, alignment, capacity, materials, life cycle and maintainability have been included initially in the locations, and type, size, location phases of structure design. VE methodology incorporates three features that differ from traditional approaches to cost reduction: 1) a user-oriented function approach, 2) a problem-oriented job plan, and 3) creative problem-solving methods (16).

The user-oriented function approach breaks down the project to define and evaluate its basic function. Meeting users

needs is the ultimate objective, and thus the design specifies the means for doing so. Most traditional approaches start by accepting the product and then proceed to seek ways to build it at least cost. By defining user needs at the outset rather than the product itself, there is less temptation to passively assume that the function performed by the product is the essential one (16).

The job plan organizes the functional approach. Significant steps include information collection, functional identification, creative replacement/alternatives, judicial comparison of alternatives, presentation of recommendations, and implementation.

Creative problem-solving methods, when used in conjunction with the two techniques described above, encourage disciplined innovation. Although VE studies generally result in reduced project costs, occasionally a study will result in higher project costs that are offset by an increased value of the overall project.

VE can be implemented in both the preconstruction and construction phases of a project (16). In the preconstruction phase, VE recommendations are incorporated in the project by design enhancements. Later in the process, they may be incorporated by addendum. VE changes in the construction phase are incorporated in the contract by way of a change order, and any savings that result are usually shared by the owner and the contractor.

Enhanced Geotechnical Data

Differing site conditions are a common source of disputes, not only for transportation agencies but for the construction industry in general. These disputes often arise because the contract documents do not accurately reflect existing conditions or alert prospective contractors about conditions. These problems often stem from geotechnical and subsurface condition information that is not properly provided in the bidding and contract documents.

To address this issue, a committee of the American Society of Civil Engineers (ASCE) has proposed use of geotechnical design summary reports (GDSRs) (17). These reports explain the anticipated subsurface conditions and examine the potential impact on design and construction. The GDSR often contains a concise and unambiguous description of the conditions likely to be encountered pertaining to subsurface ground behavior, dewatering requirements, well design and spacing, drilling conditions, slope stability, support requirements, and water inflows. The GDSR may also examine the geologic setting, geologic and man-made features having engineering and construction significance, and anticipated construction difficulties and their influence on design features and contract documents. The GDSR establishes a baseline for bidders to determine bid conditions, and provides a standard of reference should disputes arise.

ASCE anticipated resistance from construction owners in using the GDSR approach because owners may be concerned that the summary report is incomplete, inadequate, or incorrect, resulting in disputes or change orders. Some agencies expressed concern that a detailed GDSR would lead to an increase in claims from Type I differing site conditions where the actual project conditions claimed differ from the conditions detailed in the contract documents. The more detailed the

contract documents, the more likely a claim of this type will arise. ASCE responded to these concerns by explaining that the GDSR is a risk management tool that balances the cost of high bid prices and potential claims caused by lack of adequate geotechnical data, with the cost of potential changes resulting from variations in the GDSR information. ASCE proposes use of the GDSR approach in defining the geotechnical baseline to avoid costs associated with contractor contingencies, management of disputes, and payment to address claims from unanticipated geotechnical conditions. Well-written GDSRs based on an adequate number of test borings also minimize the potential for unrealistic bids and associated claims (17).

Construction/Program Management

Construction/program management is a professional approach to construction that has emerged in the industry during the last two decades. The strategy integrates management responsibilities of the owner/agency throughout predesign, design, construction, operation, and maintenance stages. This includes management integration of project scope, goals, and performance parameters (time, cost, quality), as well as the development of project teams to implement these responsibilities (10,14). The same approach is also applied to large-scale programs involving numerous construction projects over the course of several years.

Most transportation agencies have adopted some form of overall management approach, often using it to help oversee their annual construction and maintenance programs. However, when large increases in capital or spending are required, agency in-house management resources may not be expanded commensurately to handle the growth. Professional construction/program management consultants have been used on some highway projects, but mainly on transit and airport projects.

AGENCY DISPUTE AVOIDANCE PRACTICES

The questionnaire asked agencies to identify current practices to avoid disputes and to indicate their opinions about the most effective dispute avoidance techniques. Inquiries were made about most of the preconstruction practices discussed above, and other project level procedures used to minimize claims, such as project scheduling, prebid/preconstruction meetings, and progress meetings. However, the project level procedures are more closely related to problem recognition than problem prevention. These procedures are discussed more fully in Chapters 4 and 5.

Table 7 summarizes dispute avoidance practices and opinions of agencies. The results indicate that agencies undertake many of the preconstruction procedures recommended by construction industry analysts. However, improvements in both the level of effort and timing of preconstruction procedures may be warranted. For example, 95 percent of respondents reported using design reviews on large and complex projects. However, more than one-half of the respondents expended less than 40 hours of professional time in conducting the reviews, and most indicated that the reviews were not initiated until the design was 90 percent complete. In follow-up interviews, a commonly cited reason for not emphasizing design review was lack of sufficient agency staff.

Effective quality assurance reviews require significant professional effort during early stages of design. For example, Florida implements its design review process at 60 percent completion of the design documents, and a traffic control feasibility review at 30 percent design completion. In one of its large multicontract projects, Delaware spent over 200 hours reviewing the design for each of the anticipated construction packages, reporting that in each case, reviews were initiated well in advance of bidding phases.

TABLE 7
DISPUTE AVOIDANCE PRACTICES AND OPINIONS

Practice/Technique	Percent Use by Agencies	Consensus Ranking as Best Means of Avoiding Disputes
Predesign/preconstruction investigations	95	1
Design reviews	95	
Bidder access to project site data	95	
Mandatory scheduling	86	5
Prebid/preconstruction meetings	81	2
Coordination of interrelated construction projects	81	3
Value engineering	78	
Constructability	73	4
Program/construction management consultants	46	

Note: Based on the responses of 37 agencies who completely answered this section of the questionnaire.

To improve the quality of the design package, some states have undertaken new approaches. The New Jersey Department of Transportation reported implementing three approaches geared to improving the quality of the design process. First, steps have been taken to increase communication and coordination between the department's construction and design groups to obtain feedback from the field on design and engineering practices. Second, in selecting design consultants, the department emphasizes past performance and quality control programs of the proposed firms. Third, meetings are held just prior to bid letting between the designer and the department's construction staff to ensure accuracy and timely completion of contract documents.

Maryland has been implementing a total quality management program for the last 8 years named TQIC (total quality in construction), which involves over 60 trained facilitators. TQIC projects typically receive more than 200 hours of design review before the design is complete. In addition, quality project reviews are performed annually on at least one project type per district to evaluate compliance with the program. Further, the TQIC program attempts to incorporate lessons learned from design reviews and disputes involving design errors into other ongoing projects.

Generally, agency constructibility reviews are performed late in the design stage. Thirty-two percent of respondents indicated that constructibility reviews are not initiated until the design is 90 percent complete, while 38 percent waited until the design was complete. This is in contrast to recommendations by the Construction Industry Institute (CII), which urges the use of constructibility measures throughout the design process, beginning in the very early stages.

Agencies, however, appear to be involving the essential groups in the constructibility process. Nearly 60 percent of respondents indicated that the constructibility reviews are performed by the agency's construction group rather than the in-house design group. This is in accordance with the goal of constructibility, which is to obtain the perspective of persons involved in field construction. Delaware reported that it involves groups in addition to the agency's construction engineers during constructibility reviews. On one large and complex project, the agency involved several specialty contractors. Maryland's TQIC program also contains a constructibility component in which representatives from various agency divisions participate including bridge, highway, traffic engineering, project engineering, utility, maintenance, and other units. Arizona reported that its constructibility reviews are always performed by an outside consultant with experience as a contractor, a former agency construction engineer, or other with a field construction perspective. Georgia uses a concept similar to constructibility called transition conferences where formal input is received from the district engineer's construction staff, right-of-way staff, utility representatives, agency utility coordinators, design consultants, and other agency staff. Florida studied ways to implement these and other constructibility concepts on highway projects (8), and has implemented many of the recommendations that resulted.

Among the factors considered in agency constructibility assessments are traffic control, construction methodology, staging/sequencing, construction materials, and utility conflicts. Because these areas are often the subject of disputes during construction, their inclusion in constructibility reviews is essential.

Several states indicated that individuals participating in design reviews and constructibility efforts continue to be available to field staff to help resolve problems and disputes during construction. Connecticut has created a formal program intervention group, consisting of both in-house and consultant staff, to handle design, engineering, and construction problems that arise during construction of major projects. The purpose of this group is to resolve problems before they become disputes.

Value engineering (VE) is another means of achieving maximum value and project cost savings, and provides a secondary benefit minimizing the occurrence of problems that lead to disputes. The survey results indicate that VE is performed by 57 percent of respondents through in-house staff at the stage when design is only 35 percent complete, which is in accordance with industry recommendations. VE proposals from contractors were promoted by nearly one-half of the respondents during the construction phase. The contractors are often allowed to share in the savings obtained from the improvements or revisions to the project they formally propose.

The use of VE during preconstruction tends to minimize problems that lead to disputes. On the other hand, VE proposals by contractors during construction may cause disputes, including delays in reviewing and approving the proposals, impacts and revisions on related work areas, and acceptability of material and approach. These problems may minimize the number of VE proposals submitted by contractors as well as the number accepted by agencies.

Agency commitment to VE can make a difference in the success of the program. According to representatives from the Florida Department of Transportation (FDOT), the department's acceptance of partnering has led to significant increases in the number of VE proposals submitted by contractors as well as the value of proposals approved by the department. As will be discussed in Chapter 5, partnering is a conscious effort to build effective teams between the agency and project contractor. When this approach was first employed by FDOT, the dollar amount of VE proposals submitted by contractors increased by over five times. Further, the value of VE proposals accepted by FDOT increased sevenfold, and FDOT's acceptance rate of proposals on partnered projects exceeded 73 percent of the value proposed by contractors. Arizona also reported a significant increase in acceptable VE proposals from contractors on partnered projects. For example, on 18 partnered projects in 1992, Arizona reported over \$400,000 in VE savings (18).

Because differing site condition disputes are common, inquiries were made in the survey and site visits about preconstruction site investigations and availability of these investigation results to bidders. Ninety-five percent of the respondents indicated that they routinely disclose soil borings, 81 percent perform utility surveys to determine possible conflicts, and 70 percent conduct more detailed surveys of project conditions. Although 95 percent of the respondents made this information available to the potential bidders, none indicated that the information was given to bidders in detailed GDSRs (as promoted by ASCE). ASCE has reported that at least three state departments of transportation have used the GDSR approach on one or more projects (17).

A common source of disputes reported by survey respondents involved utility interference and relocation delays. To avoid these types of problems, FDOT representatives indicated

they employ two effective practices. First, the utility company may be required to relocate its services before construction begins. Alternatively, the construction contractor may be given responsibility to relocate the utility lines as part of its contract work or pursuant to a separate joint project agreement. Other agencies reported that similar practices are used to avoid utility conflicts and disputes.

Management at the project site can also play an important role in minimizing problems and avoiding disputes. Two key tools to accomplish this are construction scheduling and program/construction management consultants. Scheduling can ensure that the contractor properly plans the execution of the work; it can also provide a management tool to monitor contractor progress. However, some agency representatives reported that scheduling can have drawbacks by documenting delays that can be used against agencies in the event of delay claims. Construction schedules were used by more than 86 percent of the responding agencies, but were ranked fifth in

terms of value in avoiding disputes. Because scheduling may be more valuable in providing early recognition of problems that lead to disputes, it is discussed further in Chapter 4.

The use of program/construction management consultants to enhance the field management for agencies was not as widespread as other techniques. Only 46 percent of the respondents used these consultants. During the follow-up interviews, it was determined that in many instances, agencies used such firms to provide on-site inspectors who did not have significant management responsibilities. Overall management and significant project management were retained by the agencies, dictated by federal funding provisions and internal department policies. The use of such consultants was not perceived by most agencies to be valuable in avoiding disputes on projects. However, two agencies (Florida, Delaware) reported the use of consultants to provide senior level resident engineers and management staff for large or unique projects, even though agency staff were in charge of the overall project.

EARLY DISPUTE RECOGNITION TECHNIQUES

OVERVIEW

An important aspect of dispute resolution is the ability of parties to recognize emerging problems so that they can be resolved and the potential for disputes can be minimized. It is recommended that agencies develop techniques that permit early recognition of the disputes most common to highway construction, such as utility conflicts, design errors, and differing site conditions.

INDUSTRY DEVELOPMENTS

In recent years there has been an increased focus on dispute avoidance and quick resolution. Efforts to avoid disputes often center around design and preconstruction phases, while efforts to resolve disputes often focus on quality of the relationship between parties. Recognition of potential problems involves a different dimension—the ability to monitor the project and anticipate potential problem areas once the project is underway.

Industry analysts have promoted several tools for early problem recognition, the most important of which is regular monitoring and updating of the project schedule. Network schedules (critical path method of scheduling (CPM)) and detailed linear schedules are valuable to understanding the interrelationship of construction activities, although bar chart schedules are commonly used. Large construction agencies such as the U.S. Army Corps of Engineers have developed scheduling techniques and procedures to allow the timely identification of potential problems and delays, enabling field staff to respond quickly to events and mitigate the impact of problems as they arise (19).

Other early dispute recognition techniques promoted by industry analysts include job cost/payment projection reports, productivity improvement program documentation, and review of project documentation (11). Project cost/payment projections compare estimated payments to actual payments to identify overall progress. If divided into work areas or payment categories, these comparisons can identify specific areas that are behind schedule. Productivity improvement documentation, such as labor-hour reports, time-lapse photography, and work sampling studies, can be used to identify specific activities that are potentially subject to problems and disputes. Such documentation, if kept by contractors, is rarely made available to owner agencies. Finally, potential disputes are often noted in job meetings, progress reports, daily logs, and memos. Incidents that may cause disputes will likely be discussed in such documents before they result in a formal claim. Periodic review of such records may serve to identify problems that should be promptly addressed to avoid disputes.

Disputes Potential Index (DPI)

According to a study by the Construction Industry Institute (CII), the likelihood of having serious construction disputes on a project can be predicted long before they occur (20,21). A CII research team developed a computerized self-audit tool called the DPI, which measures the potential for a project being subject to serious disputes.

The DPI is a statistical model that predicts the probability of experiencing disputes based on research from 159 projects. The projects in the research database included a wide spectrum of project types (highway, commercial, industrial, transportation, heavy civil); payment terms (lump sum, unit price, cost-plus); size (20 percent less than \$20 million and 5 percent over \$100 million); and contract types (general contract, construction management, design-build). From this extensive research, the DPI model was developed into an easy-to-use computer program.

The DPI program reports two significant aspects related to disputes: 1) an overall numerical score between 1 and 100 that predicts the likelihood of disputes, and 2) an identification of areas of potential weaknesses where disputes may originate.

Three major categories of factors were developed to assist in predicting disputes: people, process, and project.

People factors include evaluation of both the agency's and contractor's project staff, organization, and management. Specifically, they include an evaluation of management support and responsiveness, the effectiveness of decision-making and responsibility structure, the contractor's experience with the type of project, past successes or failures, the experience and competence of the contractor's staff, the interpersonal skills of the project staff, and the past history of the agency and contractor working together. As was anticipated by the CII research team, these people factors were the most important in minimizing disputes on a project.

Process factors relating to the likelihood of disputes involve many preconstruction activities such as financial planning; quality reviews (design evaluation, value engineering (VE), constructibility); definition of project scope; developing adequate plans and specifications; establishing realistic contract obligations (time, cost); and risk allocation in the contract. During the construction phase, disputes can be mitigated by implementing practical management procedures such as schedule updating, submittal control, regular meetings, and enhanced informal communications. To the extent that these process elements are implemented, disputes are minimized.

Project factors, surprisingly, had the least impact relating to disputes. In essence, this means that the conditions relating to the type of project, site conditions, environmental concerns, and other project-specific aspects do not "cause" disputes. Only three project factors were statistically associated with claims: complexity of the design, complexity of the construction

TABLE 8
TECHNIQUES USED IN ATTEMPTS TO ANTICIPATE OR IDENTIFY DISPUTES ON AN EARLY BASIS

Technique	Percent of Agencies Using Technique	Percent of Agencies Indicating it is one of 3 Best Methods
Preconstruction meetings	95	57
Project meetings	92	70
Mandatory project scheduling	84	70
Proactive problem management at meetings	73	54
Bid evaluations	70	32
Regular review of project documentation	35	32
Project cost/payment forecasting	11	0

Note: Agencies were requested to identify techniques being used, as well as to identify the three best ways to identify disputes on an early basis.

methods, and whether the project was unusually large for either the agency or the contractor. The CII suggests that even the most challenging project can be built without major disputes, if a competent and experienced project staff implements quality management procedures during both design and construction.

The DPI test is a valuable tool for agencies to evaluate the likelihood of disputes before the project commences, and long before the field problems arise. More importantly, the DPI tool identifies potentially weak areas, allowing action to be taken to strengthen the management of the project and to minimize the likelihood of claims. Although the DPI tool was developed after this survey of agencies was completed, the findings of the CII study provide a useful framework for evaluating dispute recognition techniques.

AGENCY DISPUTE RECOGNITION PRACTICES

According to questionnaire responses, most agency efforts to recognize potential problems and disputes take place in preconstruction meetings, project meetings, and schedule monitoring activities (Table 8).

Preconstruction meetings are the most commonly used methods for recognizing potential disputes, although they were not rated the most effective by responding agencies. Nearly all of the respondents indicated that preconstruction meetings are usually required for all projects, but only one-half indicated that they are the best means of recognizing the potential for disputes. Among the meeting topics most frequently listed by the survey respondents are scheduling, utility conflicts, environmental concerns, right-of-way, safety, staging/sequence, shop drawings/submittals, and design clarifications/revisions. To the extent that these topics are among the most common causes of disputes (Table 6), preconstruction meetings can be an effective means for early recognition of potential disputes.

Although there was considerable variance in the frequency with which project meetings were scheduled (Table 9), they

TABLE 9
REGULARITY OF PROJECT MEETINGS

Interval	Percent of Responses
Monthly	14
Weekly	26
Not regular	40
Other	20

Note: Based on the questionnaire responses provided by 42 agencies.

were commonly used (92 percent) and were the top-rated method of recognizing potential disputes. The project meetings were also described by 54 percent of the respondents as the forum for “proactive problem management,” with activities such as straightforward discussions, decisive assessments, and a management plan and timetable for action, rather than passive note taking. The reported agenda items for the project meetings included all of the items listed for preconstruction meetings with two important additions—construction problems, and disputes and claims, adding the dimension of possible contractor-caused problems and recognized problem areas.

Mandatory project scheduling was reported by 84 percent of the agencies as a method of early dispute recognition. Schedule submissions were required from contractors, but monthly or periodic updates were only reportedly required by less than one-third of the agencies.

Seventy percent of the agencies reported evaluating bids for the purpose of recognizing potential disputes. Although agencies are required by law to determine the lowest responsive bid, an unusually low bid may indicate a misunderstanding by the bidding contractor of the scope of work, which might lead to disputes as the work gets underway. As indicated by the agency visits, a common belief of agency representatives is

that some contractors bid very low to win the contract, and then request for change orders or raise disputes to obtain additional compensation. This perception is commonly held by public owners, who select contractors on the basis of the lowest responsive bid (15). Agency officials expressed concern that the public bidding process is sometimes circumvented by disputes and claims.

An examination of the limited set of 102 representative projects with disputes provides some evidence in support of this notion. Nearly all of the projects with disputes had a sizable difference (6 percent) between the lowest and the next lowest bids. There was a similar difference (5 percent on average) between the lowest bid and the engineer's estimate on these projects. The average amount of compensation requested for the disputes was nearly three times the amount of the bid differential, although the average amount received was nearly 95 percent of the bid differential. This observation, based on a review of only 102 projects may be coincidental, but an interesting subject of further research.

Only 35 percent of agencies reported they regularly review project documentation to identify pending disputes (Table 8). Proactive management and participation in project meetings would have the same result. However, several agency representatives indicated that a point is reached when the tone of correspondence and other project documentation becomes adversarial. This often occurs when communication becomes

oriented to self-justification and accusation rather than to problem resolution. Two agencies indicated that at this point, some contractors have requested a partnering workshop and implementation of a partnering program to prevent further project disputes (see section on Partnering, Chapter 5). One agency manager indicated that at this point it is important to "stop building the lawsuit and start building the project." In addition, several agencies stated that partnering activities or simply listening to the contractor's representatives was the best means of recognizing potential disputes.

Finally, 11 percent of the responding agencies indicated they used cost or payment forecasting to anticipate potential disputes, although none of the respondents believed this is an especially effective means of recognizing the potential for disputes. Many believe that loading payments at the front-end of a project, which is common, enables contractors to increase the economic returns early such that smaller payments at the end may not provide sufficient incentive to finish the project. In these cases, the value of the final payments may be significantly less than the cost to complete the work.

Payment forecast curves can provide a graphic depiction of a project that is heavily front-end loaded. In the early months of the project, the curve will rise steeply; during the final months, the curve will flatten. A payment curve can indicate the need to realign payments to prevent delays in project completion due to lack of financial incentive.

DISPUTE RESOLUTION TECHNIQUES

OVERVIEW

Until recently, much of the emphasis in the construction industry has been on the resolution of claims and contested cases rather than early recognition and resolution of problems and disputes. As discussed previously, claims involve formalized or legal procedures, whereas disputes are conflicts and disagreements that may be resolved at the project level. This chapter examines techniques used by agencies and others in the construction industry to solve problems at the project level to avoid formal claims. The most prevalent techniques are empowerment of project staff through delegation of authority, partnering, disputes review boards (DRBs), and negotiation/settlement enhancement methods such as mediation.

ESCALATING NATURE OF PROBLEMS

As discussed in Chapter 1, problems and disagreements on the construction site relating to interpretation of performance requirements often escalate in terms of the intensity of conflict, costs incurred, number of persons involved in problem resolution, formality, and effort required for problem resolution.

For example, on a highway project, the contractor may encounter a gas utility line not located in any of the contract drawings or indicated in the site data made available during the bidding stage. Dealing with the *problem* may require relocation of the gas line, the cost of which the contractor may contend was not included in the bid price. The agency staff may request the relocation regardless, resulting in a *disagreement*. If the disagreement is not resolved in a timely manner by the agency and contractor personnel, a *dispute* will arise and the parties will involve others in their organizations to handle the matter.

Other organizations may also become involved; for instance, the utility company may be challenged for not properly locating its gas lines in the field or on the plans. The engineering consultant may be admonished for not properly researching and documenting utilities on the contract drawings. All of the participants in the dispute may focus on protecting their individual interests rather than solving the underlying problem. Additional costs may be incurred if the problem is not quickly unresolved. For instance, work crews may be made idle, crucial work activities may be delayed, and utility service may be disrupted. As costs increase, specialized consultants and lawyers may be brought into the *conflict* to address legal entitlement and to quantify costs. *Litigation* may result when the many parties are unable to resolve the matter, and therefore use the courts to resolve the matter through monetary judgment. The matter escalates from a field problem to a complex

and expensive legal battle involving more and more persons and organizations (3) (see Figure 1, Chapter 1).

A key step in the above process occurs between the dispute and conflict stages, when the project staff involve persons from outside the project and the emphasis shifts from problem solving to the determination of legal rights and cost quantification. This step is sometimes referred to as “the continental divide of dispute resolution” (3). Problems resolved at this stage can return control of the matter to those at the project level; otherwise, the problems may become subject to a formal process that makes them costly and time consuming to resolve.

RECENT INDUSTRY DEVELOPMENTS IN DISPUTE RESOLUTION: PROJECT LEVEL TECHNIQUES

Industry is exploring new methods of dispute resolution that attempt to return control of disputes to the project level to avert the need for outside assistance and the possible development of a formal claims process (12). Two methods with increasing application are partnering and disputes review boards (DRBs). Another concept, step negotiations, has not received widespread attention, but may be considered by agencies as part of a larger process of empowerment to the project level staff to resolve disputes.

Partnering

Partnering is a team-building concept promoted by the U.S. Army Corps of Engineers. According to the Corps, it was developed to counter adversarial relationships between agencies responsible for administering long-term construction programs and contractors performing the work on fixed price contracts. The Corps observed that antagonism often develops between the two groups. Partnering seeks to replace the *we/they* relationship with a *teamwork* relationship as a way of reducing the conflict that often results from problems encountered on a project. This is achieved through development of a project management team made up of the agency, the contractor, and others. The Corps’ partnering program stresses several key concepts including team building, group awareness, conflict management, open communications, and development of common goals. The program involves team-building workshops held shortly after the contract award. Common project goals are developed at workshops. For example, goals shared by both the agency and the contractor may include scheduling, safety, value engineering (VE), quality, and job satisfaction. A conflict review and resolution procedure is set up to involve

higher levels of management with the goal of resolving disputes as they emerge (22,23).

In studies of its partnering program, the Corps points to better cost control, reduction in project cost growth and paperwork, achievement of VE objectives, and, most importantly, avoidance of litigation on the partnered projects (22–24). As stated by the Corps' chief counsel, "We do not think these results are coincidental; rather, they are directly attributable to a new attitude instilled by partnering—an attitude that we plan to promote throughout the Corps" (24).

There are a number of obstacles to successful implementation of partnering for low-bid, public construction such as highway projects; many of these obstacles reside in the attitudes and practices of owners, designers, and contractors, who traditionally have adversarial relationships. Other obstacles include discussion but not implementation of the partnering process, a rush to accomplishment, inadequate attention to building interpersonal relationships, inclusion of outsiders and others not heavily involved in the project, and failure to follow-up on items (25,26).

Many in the industry believe that partnering should be fully evaluated, especially its potential to hold down costs and produce timely construction completion. However, there are indications that the concept is engendering a more congenial work environment and better cooperation from contractors. From the Corps' experience on partnered projects, there are three main elements to successful partnering. First, full commitment to the partnering process must be obtained from all of the project participants. While commitment must begin at the top of an organization, it must extend to every level for partnering to be effective. Second, the partnering program must address the mutual goals and concerns of the contracting parties. Partnering cannot be one-sided. Possible problems likely to be encountered on the project must be among these stated concerns, because the avoidance of issues is a precursor to failure. Third, the partnering program must encompass the entire life of the project, and not emerge only when major problems arise. The team approach must be applied consistently (22,23,27).

The Corps' partnering model may apply to highway construction. Like the Corps, most highway agencies have a long-term, on-going construction contracting program, and large construction and maintenance contracts are awarded regularly. Specialty contractors often depend on the contracts for a large share of their work. Because contracts are awarded on a fixed price basis, tensions often rise during consideration of performance quality, timing, scope of work, and costs. Project staff often become the focus of the tension, and therefore may develop adversarial expectations that they bring with them to the project site. When problems arise at the site, they may be affected by the tension, resulting in disputes rather than constructive resolution efforts. Partnering seeks to minimize this tension and replace it with a team approach emphasizing the goal of problem resolution.

Disputes Review Boards (DRBs)

Another technique increasingly used in the construction industry is the DRB. A DRB is an on-site, project-specific dispute resolution technique, based on the concept of a pre-selected neutral body to hear disputes and resolve them on an

on-going basis (17). The first highway application of a DRB was on a tunneling project in 1975, on the second phase of the Eisenhower Tunnel in Colorado. The Colorado Highway Department sought to resolve differing site conditions disputes that were anticipated because of the unique and complex geotechnical aspects of the project. Three major disputes arose; during the project, each was resolved without litigation through use of a DRB.

DRB programs were revived in the 1980s by other agencies (state and local) for tunneling, as well as hydroprojects, bridges, transit, and other large civil engineering projects. The concept is also being applied to private projects such as housing subdivisions (17). The Construction Industry Institute (CII) (3) and the American Arbitration Association (28) are promoting the use of DRBs on office buildings, process plants, and other private sector projects. DRBs are used on construction projects with special features that might lead to substantial claims or disputes. However, they are less likely to be cost effective for small projects, although they have been used on projects as small as \$2 million. The initial success of the DRB in resolving disputes on the Eisenhower Tunnel project has been repeated on other projects: on 21 DRB projects valued over \$1.1 billion, 64 disputes were heard and none were litigated. In addition, \$5.4 billion in contracts, planned or under construction, entail use of DRBs on another 57 projects (17).

The DRB concept has been further developed and promoted by a committee of the American Society of Civil Engineers (ASCE) (17). The DRB program advocated by the committee consists of a three-member panel composed of people whose experience in the type of work involved in the project is valued. The panel is selected by the contractor and the agency. Panels meet regularly on project sites and are kept informed of work progress and the status of any problems. When disputes arise, the panel provides independent assessments and recommendations for dispute resolution.

A DRB is not intended to replace an agency's existing dispute resolution mechanism, but to supplement it with an intermediate, project level device to provide nonbinding recommendations early in the dispute process. The panel not only provides an independent assessment of the dispute, but also encourages the parties to view the dispute more objectively. Rather than each party developing a point of view that becomes stronger during the project, earlier discussion and examination results in a more open-minded approach by the parties (3).

ASCE sees the selection of the panel members as crucial. Besides being experienced in the pertinent type of construction, the panel members must be objective and impartial to obtain the confidence of the parties necessary for acceptance of board recommendations (3).

Another important aspect of the DRB is that it increases the potential for resolution to occur at the project level. Project staff can employ the DRB without extensive delays required for decisions or involvement of superiors and legal staff. With other alternative dispute resolution (ADR) methods, neutral advisors are often engaged *after* the matter has been reviewed by administrative or management staff and counsel; typically the neutral parties are retained by counsel.

The typical DRB panel does not simply wait for disputes to be brought to them. Most are more proactive, meeting on-site with the parties, monitoring projects, and convening periodically to note potential disputes. The DRB is initiated at the

beginning of the project, and seeks to deal with disputes before the parties become entrenched in their positions (29).

For DRBs to be successful in resolving disputes at the project level, ASCE believes they must have certain characteristics, including the following (3,17):

- A DRB must be required by the contract and delineated in the contract documents.
- The DRB panel members must be respected by both parties, be impartial, and be experienced in the particular type of construction.
- A DRB panel must be selected and organized at the very early stages of the project.
- The DRB should meet regularly throughout the duration of the project.
- The DRB should hear disputes and provide recommendations on an expedited basis.
- The DRB should provide recommendations to resolve disputes, but the parties are primarily responsible to perform the work, deal with problems, and settle disagreements.

Step Negotiations

The Center for Public Resources is promoting a dispute resolution technique known as “step negotiations” that begins at the project level (12). The concept encourages project staff to make the first attempt to resolve disputes arising from a problem. If the dispute is not resolved, the project staff take the issue to their immediate supervisors, who may provide additional perspective. If resolution is not achieved at this level, the matter advances to higher management in the agency and contracting organization. Although these steps may occur naturally, they are formally acknowledged in the contract provisions, project manuals, and other project records. Specific individuals and a hierarchy are identified in most cases. Step negotiations are often integrated into partnering programs. The step negotiation process is most successful when each responsible person has an interest in ending disputes before they reach higher management.

RECENT INDUSTRY DEVELOPMENTS IN DISPUTE RESOLUTION: BEYOND THE PROJECT LEVEL

Although the scope of this synthesis focuses on project level dispute resolution, it is relevant to briefly discuss dispute resolution techniques applied beyond the project level. There are two reasons for this overview: 1) parties may become confused trying to apply these other techniques to the project site; and 2) an understanding of how to resolve disputes at the project level must consider why some techniques are effective in later stages, but not at the project level.

Mediation

Mediation entails the use of neutral parties to assist in the negotiated settlement of disputes. The process tends to be formalized, usually initiated after the parties have developed strong positions that hinder their ability to resolve problems

mutually. The mediator only facilitates negotiations. Although DRBs are an adaptation of the mediation process to the project level, traditional mediation only begins after involvement of top management and counsel. The American Arbitration Association has established rules for mediation that are more flexible and informal than litigation or arbitration procedural rules, but which still reflect a high level of structure and require a well-developed conflict history (30).

Arbitration

Arbitration is a voluntary process in which disputes are submitted to a neutral panel for a decision. Hearings are arranged where parties present their supporting evidence and arguments. Arbitration may result in binding decisions or advisory opinions. Typically, arbitration is an alternative to courtroom proceedings, and the arbitration panel comprises professionals from the industry rather than judges or lay juries. Knowledge of the construction industry is more important to the decision-making process than knowledge of the legal process. Arbitration may be administered by the agency or by an independent administrative entity such as the American Arbitration Association.

The process of arbitration is adversarial in nature and well removed from the project level. Although not required, attorneys often make the presentations. Arbitration is considered to be an alternative dispute resolution procedure and has been in use by the construction industry for several decades. The arbitration process as applied to highway construction disputes was examined in detail in *NCHRP Synthesis 105* (2).

Minitrial

A minitrial is a nonbinding adversarial procedure in which the parties make a presentation of their positions in a summary manner to an independent facilitator who evaluates the merits of the disputes and provides a nonbinding assessment, or an advisory opinion. Senior executives of both the contractor and the agency listen to the presentations and judge firsthand the merits of their own position as well as of the opposing party. The entire process usually takes only 1 or 2 days of executive sessions to reach a mutual resolution of the dispute (11). Although this technique has been applied to many areas of construction, it has generated little interest among highway agencies.

RECENT INDUSTRY DEVELOPMENTS IN DISPUTE RESOLUTION: BID DATA

Another technique promoted by ASCE, and used by some state highway agencies on large projects, is the use of escrowed bid documents. This technique is employed to preserve the contractor's calculations and information used in preparing bids. It is especially helpful in price negotiations relating to disputes. ASCE proposes that the three lowest bidders submit their supporting documentation and a certificate of authenticity shortly after bid opening. Only the successful bidder's documents are kept in escrow and are opened when either the agency or the contractor believe they would help resolve a dispute.

ASCE reports that this method has been used by 15 public agencies including three state transportation agencies (17). However, many contractors have opposed the practice because of concern about safeguarding their bid information for proprietary and competitive reasons (31).

SURVEY FINDINGS: PROJECTS WITH DISPUTES

The agency questionnaire responses indicate that most disputes are analyzed at more than one level over a relatively long period of time. The final resolution of most disputes (in 57 percent of projects with disputes) was incorporated into contract documentation by change order, supplemental agreements, or quantity variations. This suggests most were referred back to the project level for implementation.

Administrative procedures were used to bind the outcome of nearly one-third of the disputes. Administrative procedures included claims boards, central office determinations, and other formalized practices. Nine percent of the disputes were resolved by a formal settlement rather than by a change order, administrative decision, or court verdict. Few disputes (5 percent) were the subject of a lawsuit (Table 10).

TABLE 10
METHODS OF DISPUTES RESOLUTION

Method	Percent
Change order or supplemental agreement	52
Quantity variation	5
Administrative procedure finding	27
Formal settlement agreement	9
Court judgment	5
Other	2

Note: Based on 100 representative projects experiencing disputes provided by agencies responding to the questionnaire. The data are not necessarily representative of all project dispute resolutions, but only the examples provided by agencies.

The average time to resolve a dispute from submission to final resolution was 15 months. Although this appears to be a relatively long period, the figure may be too small. A more salient fact is the length of time required to resolve the dispute from when it first arose as a problem in the field. Unfortunately, this information is often difficult to ascertain, especially from questionnaire responses in which respondents may not have been aware of when the department was first notified of the problem.

As previously mentioned, evaluation of the disputes typically involves many different levels of administrative review. On average, dispute resolution requires more than two levels of administrative assessment. The options given to the respondents in reporting required assessment levels were the following:

- Project level (including resident engineer)
- District construction unit

- District (including district engineer)
- Dispute analysis/resolution group in district construction office
- Dispute analysis/resolution group in central office
- Dispute analysis/resolution by outside consultant.

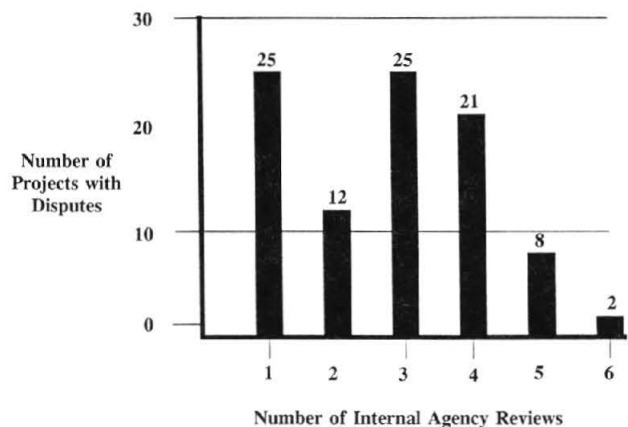
Responses by the agencies are summarized in Table 11.

TABLE 11
AGENCY ASSESSMENT OF DISPUTES

Level of Internal Review	Percent
Project level	62
District construction unit	50
District (including district engineer)	43
Dispute analysis/resolution group in district	11
Dispute analysis/resolution group in central office	70
Dispute analysis/resolution by outside consultant	17

Note: Based on 102 representative projects experiencing disputes provided by agencies responding to the questionnaire. The data are not necessarily representative of internal review practices of agencies.

In nearly every case, resolution of disputes required involvement by agency staff beyond the project level. It is interesting to note that more disputes were reviewed by the central office claims group (70 percent) than were reviewed by the project staff (62 percent). This may indicate that some project staff refer disputes to the central office without review. The number of administrative reviews, the average of which is between two and three, are shown in Figure 2. Most dispute reviews begin at the project level, followed by reviews by the central office claims group. This process may reflect the desire by agencies to ensure proper checks and balances by carefully examining and considering disputes. It would be expected that more than one review of disputed matters would be warranted, especially where the average amount of the dispute was more than \$2 million.



Note: Based upon 102 representative projects with disputes provided by agencies responding to the questionnaire.

FIGURE 2 Number of internal agency reviews.

AGENCY DISPUTE RESOLUTION PRACTICES

Another section of the questionnaire concerned agency practices in resolving disputes before they evolve into formal claims. The techniques used by the agencies over the last 5 years to resolve disputes (i.e., partnering, DRBs) were examined, as were agency resources at different levels (i.e., legal, central office claims staff) to resolve disputes. The techniques and resources were categorized according to those geared to resolving disputes at the project level, and those geared to resolving disputes by district or central office staff. This distinction becomes important in the agency's policy to empower the project staff to manage claims, or to manage disputes beyond the project level using a more centralized approach. Table 12 categorizes the questionnaire options according to this project/beyond the project distinction.

The results from the questionnaire show a pattern of agency practices in delegating responsibility for dispute resolution to the project staff (with approval from the district office), rather than controlling dispute resolution centrally. This pattern was indicated both in the responses concerning actual practices of the agencies and in the opinions about the most effective techniques to resolve disputes. The responses indicate that project staff are usually responsible for fixing the underlying problem and resolving the associated disputes. The agencies' central offices often make available in-house dispute analysis staff to assess the merits of the disputes. However, there is a

TABLE 12
PROJECT EMPOWERMENT/CENTRALIZED APPROACH FOR DISPUTE RESOLUTION PRACTICES

Project Level Options to Resolve Disputes

- Issue change orders to settle contract disputes
- Use job meetings to settle disputes
- Informal negotiations*
- Collaborative problem solving**
- Disputes review board
- Partnering program
- Delegating more authority to project staff
- Training field personnel in claims avoidance and dispute resolution

Options Beyond Field Level to Resolve Disputes

- Decisions of administrative agency at different levels
- Mediation
- Formal negotiations***
- More authority to district staff to settle disputes
- Settlement approval required from central office
- Involvement of legal staff
- Involvement of federal staff (FHWA)
- Involvement of district engineer
- Involvement of outside claims consultants
- Involvement of agency claims analysts

* Questionnaire defined informal negotiations as "an attempt to settle a dispute through casual discussions or settlement without the structured procedures or legal trappings. For example, an informal negotiation may take place at a job meeting or telephone conversation without involvement of legal counsel."

** "A cooperative team approach between the parties to a dispute in which they focus primarily on solving the immediate problem rather than affixing blame or responsibility."

*** The questionnaire defined formal negotiations as "an attempt to settle a dispute, claim, or lawsuit through discussion or compromise in a formal manner, for example, with all parties being represented by counsel, with structured procedures, and with written submissions."

trend toward delegating authority to the district level to settle major disputes rather than involving central office managers. Administrative procedures are then employed to provide formal decisions on disputes if the district and project level staff are unable to reach settlement. These generalized conclusions are derived from the following data.

TABLE 13
PROJECT LEVEL DISPUTE RESOLUTION PRACTICES

Technique/Resource Used to Assist in the Resolution of Disputes	Percent of Respondents
Informal negotiations	100
Job meetings	95
Change orders	95
Training project staff in dispute resolution	86
More authority to project staff to settle disputes	70
Partnering	63
Collaborative problem solving	59
Disputes review board	22

Note: Based on questionnaire responses from 37 different agencies who responded to this section of the questionnaire.

Nearly all of the agencies use project level techniques in managing claims, as shown in Table 13. This primarily includes informal negotiations, job meetings, and change orders. To reinforce project staff ability to deal with disputes, most of the respondent agencies have delegated more authority to the project level staff, training them in claims avoidance and dispute resolution methods. When asked to select the most effective resources to deal with claims, 70 percent of the respondents chose delegation of more authority to the project staff. For example, to enhance the project staff's ability to deal with claims, agencies are using project level dispute resolution procedures such as collaborative problem solving. Collaborative problem solving was defined as a "cooperative team approach between the parties to a dispute in which they focus primarily on solving the immediate problem rather than affixing blame or responsibility." When respondents were asked their opinion about the three best means of settling disputes, two of the three most frequent answers involved informal negotiations and collaborative problem solving.

A resource for dealing with disputes, made available to project staff by many agencies, is the creation of in-house analysts to assess the merits of disputes and claims, and to assist in their resolution. Although agency claims analysts are a relatively recent development, New York has used such a group for over 30 years. The project profile data indicate that most of the agencies have a disputes analysis resolution group. These specialized analysts are usually located in the central office (70 percent) rather than in the district offices (11 percent). In addition, 66 percent of the agencies have used outside consultants specializing in dispute analysis. However, in assessing disputes early in the project, 51 percent of the agencies used in-house dispute analysts, and 46 percent believed early involvement of in-house claims staff was effective in assisting in the resolution of disputes.

Training programs on how to handle construction disputes are another resource for project staff. Several states (Maryland, Pennsylvania, Delaware, North Carolina, New York, New Jersey,

Georgia, Florida) indicated that they have formal programs to train project level staff to evaluate and resolve disputes in the field. Topics include training sessions on contract provisions, application of contract terms to disputes, documentation and record keeping, technical analysis of disputes, schedule evaluation, problem resolution, need for timely action, dispute resolution techniques, and legal considerations. North Carolina noted that a particularly helpful aspect of training was the education of the field staff in applying a "reasonableness" approach to the application of contract documents in managing disputes. Department counsel and engineers determined that a rigid interpretation of contract requirements often resulted in the disputes turning into formal claims, even when some could have been resolved in the field without sacrificing construction quality or incurring additional costs.

If the efforts of the project staff do not resolve the dispute after assessment by in-house claims specialists, responsibility must be taken by either the district staff or central staff. The pattern indicated by the questionnaire responses is that most agencies delegate more authority to the district office to settle disputes (78 percent), rather than requiring approval from the central office (38 percent). When asked to identify which was most effective in resolving claims, the majority of the respondents chose delegation of responsibility to district level staff rather than central office approval. This does not mean that the central office is not involved in the process, but indicates that most agencies use the district office rather than the central office as the primary administrative authority to settle disputes. Administrative review practices beyond the project level are shown in Table 14.

TABLE 14
DISPUTE RESOLUTION PRACTICES BEYOND THE PROJECT LEVEL

Technique/Resource Used to Assist in the Resolution of Disputes	Percent of Respondents
Administrative decisions	84
More authority to district office	78
District engineer	68
Formal negotiations	62
In-house claims analysts	51
Federal agency staff	51
Agency legal staff	43
Approval from central office	38
Outside claims consultants	24
Mediators	24

Note: Based on questionnaire responses from 37 different agencies who responded to this section of the questionnaire.

Formal administrative decision making through a claims review board, arbitration, or other administrative agency is generally required if the matter is not resolved at the project or district level. Often these formal determinations are not made until project closeout, and are typically used as an administrative alternative to legal proceedings. *NCHRP Synthesis 105* examined these procedures in detail, providing a state-by-state listing of the special administrative review bodies (2). Although the focus of this synthesis is on dispute resolution rather than claims adjudication, it is worth mentioning that 84

percent of the responding agencies indicated that administrative boards are used to make formal decisions.

Sixty-two percent of the agencies reported using partnering agreements to resolve disputes, and 54 percent indicated that the use of partnering is increasing. Several states are making extensive use of this project level dispute resolution technique. In particular, at the time of the interviews, Florida used partnering on 35 projects and Arizona on 91 projects. Other states (New Jersey, Georgia, North Carolina, California) indicated that partnering had been implemented on a few projects, and would be implemented on several more projects in the next fiscal year.

Florida and Arizona provide for a comprehensive program on projects where partnering is used. The partnering program includes an all-encompassing approach: pre-bid briefings on the partnering concept, post-award (but preconstruction) workshops emphasizing team building, monthly partnering evaluations, efforts by higher management in the agencies to reinforce project partnering, decision escalation procedures (similar to the step negotiation process), follow-up workshops, and post-completion debriefings.

While the site visit interviews indicate benefits from partnering, it is still in the early stages of implementation on most projects. Many agency representatives reported that partnering has been beneficial in improving communications, changing relations from adversarial to cooperative, and developing a team approach to resolving project problems. Pennsylvania officials reported that one of the most valuable aspects of partnering was that it provided a formal process of communications that reduces delay in answering questions and resolving problems. Several agencies (Florida, North Carolina, Arizona) reported that their project staff preferred partnered projects because of improved working relationships with contractors and other project participants. North Carolina representatives reported that project partnering was most effective when the various groups within the agency first teamed together—internal agency partnering—with the goal of making the project successful.

The most extensive use of partnering was reported by the Arizona Department of Transportation. One agency representative stated that partnering is the business philosophy of the department. Although the results of partnering are still being evaluated in many other agencies, Arizona reported many positive results. Agency representatives reported that final costs averaged 2.5 percent over initial contract amounts on the partnered projects, compared with 4.5 percent on non-partnered projects. The direct costs of partnering include the workshop facilitator, workshop site, and salaries of workshop attendees, totalling approximately 0.2 to 0.4 percent of overall project costs (Williams, R.C., "Partnering Successes in Arizona's Transportation Industry," unpublished document, Arizona Department of Transportation, 1993).

One benefit of partnering reported by Arizona is a reduction of time necessary to complete projects. Of the 18 partnered projects completed in 1992, the average time of completion was 18.5 percent less than originally planned (18). In one case, it was reported that partnering reduced a 13-month project to 6 months (32). Because of the reduction in contract time, Arizona reported reductions in overall engineering, traffic control, and administrative costs associated with the 18 partnered projects, resulting in savings of more than \$2.1 million (18).

Although Arizona representatives reported that disputes have occurred on partnered projects, each was resolved through partnering. At the time of the interviews, only eight formal claims were pending resolution, all on non-partnered projects. Prior to implementation of the agency's partnering program, the number of active claims averaged between 60 and 70 annually.

Arizona and Florida also noted a positive trend between partnering and contractor VE proposals accepted by their departments. This outcome, which is discussed in greater detail in Chapter 3, reportedly resulted in significant savings for the agencies.

Many states note in bid documents that partnering is voluntary, requiring acceptance by the successful bidder for a partnering agreement to be formalized. However, Florida reported that in 1994, it would stipulate that partnering be mandatory on at least six projects. Several agencies (Florida, Georgia, North Carolina, New Jersey) accepted contractor-initiated proposals for partnering on projects not initially designated for the process.

Staff from several agencies expressed some concerns that partnering may evolve into opportunities for contractors to prevail on disputes, claims, and pricing adjustments, or for agency staff to become lax in enforcing the contract specifications or quality standards. It is recommended that the reported benefits of partnering be weighed against these concerns.

To supplement partnering efforts, several agencies have established formal public relations programs to enhance communications with contractor organizations and the construction industry. The programs involve the use of contractor representatives on claims review boards, open training sessions on the agency's partnering programs, input from the contracting community on proposed changes to standard specifications, and staff participation in speaking at construction industry functions. North Carolina and Connecticut both reported significant efforts and results from such programs.

The use of DRBs was reported by 22 percent of the respondents, but only 8 percent indicated that use of the boards was increasing. More states have considered using DRBs in response to the fact that DRBs have been effective in underground construction projects as reported by ASCE. The Washington State Department of Transportation indicates that DRBs have caused a dramatic decline in claims and disputes (31). Several states reported developing specifications for DRBs based on Washington's model, but had not yet used them. When asked to give reasons for not implementing the DRB specification on a project, some agencies reported that costs of DRBs are too high, projects were not sufficiently complex, and logistical difficulties prevented implementation of the DRB. Florida reported that because partnering was working so well, there was no need to resort to another project level dispute resolution technique.

The questionnaire asked for opinions about the main obstacles to early resolution of disputes. The top choices involved adversarial attitudes and behavior, and the inability to obtain or assess information relevant to the dispute (Table 15).

Agencies provided options on methods to overcome these obstacles such as partnering programs to address the adversarial attitudes and behaviors, as well as to obtain information from the contractors. Another option was to organize an independent panel of experts in the type of construction that could help in assessing the information relevant to the dispute. A

TABLE 15

MAIN OBSTACLES TO EARLY RESOLUTION OF DISPUTES

Item	Percent of Respondents
Self-serving posturing by parties	68
Belligerent manner of parties	35
Department policy to defer disputes resolution until end of project	35
Lack of information from contractor	27
Too much involvement by contractor attorney	27
Lack of technical support	11

Note: Based on opinions of 37 agency respondents.

DRB with the relevant expertise on the panel may assist with claims assessment. Alternatively, a problem intervention group composed of design, engineering, or contract administration professionals may be the solution to this obstacle. However, only 38 percent of the agencies indicated they had such a support group.

Lack of information from contractors relating to disputes was one of the top five reasons given for not solving disputes early. During the interviews, a common complaint concerned the lack of cost data to support pricing of contractor costs relating to the dispute. Often this information is not provided, requiring use of a formal audit to obtain it. Audits often occur only during project closeout.

Cost disputes are often centered around the contractor's estimated costs, other than what was listed in the contract as the unit price. For example, estimated cost data would be helpful in pricing quantity variations exceeding 15 percent, material escalation claims, or labor cost escalation. This could be verified by accessing documents supporting the contractor's bids. Ready access could be obtained by the use of escrowed bid documents. However, only 8 percent of the agencies responding to the questionnaire reported having this procedure. Further research indicated that seven states (Washington, Georgia, Oregon, Montana, South Carolina, New Jersey, Colorado) use escrowing bid documents on selected projects. Georgia reported that examining the escrowed bid documents helped the department minimize costs associated with disputes on six projects.

During the interviews, many agency representatives indicated that use of escrowed bid documents is often resisted by the contracting community out of concern that bid documents might be made available to competitors (31). To deal with this concern, the New Jersey Department of Transportation makes the escrow of bid documents a voluntary procedure. Bid documents are examined to determine costs related to the dispute only if a claim is appealed to the administrative Claims Review Board. Further, to protect the confidentiality of bid documents, only the three members of the Claims Review Board can review the contractor's bid documents and back-up estimates. No other department personnel can view the information.

Finally, Florida reported the occasional use of unilateral change orders to compensate contractors for a claim, even when the agency determined that the amount was significantly less than what the contractor would accept. Generally, this averts more formal litigation as contractors may accept the payment and not pursue the matter further.

CONCLUSIONS

OVERVIEW

This chapter contains a summary of conclusions from each of the subject areas addressed in this synthesis, including ways to avoid disputes, to recognize the potential for disputes, and to resolve disputes on the project level to avoid their escalation into more formal and costly claims, and suggestions for further investigation.

CAUSES OF DISPUTES

The most common causes of disputes experienced by transportation agencies are design deficiencies, utility conflicts, and unknown site conditions. Many of these problems are not insurmountable or beyond the ability of agencies to prevent or resolve; quality control measures can improve a deficient design; enhanced site investigations can identify many utility conflicts and unknown site conditions that may lead to disputes. Improved coordination can minimize problems with utility companies and other third parties that may be involved in construction of transportation projects.

Record Keeping

Only one-half of the agencies surveyed reported having a systematic means of recording and tracking disputes and problems (as opposed to claims). Enhanced monitoring and keeping records of disputes could provide a larger body of information on ways to avoid recurring problems, to identify escalating problems that could grow to be claims, and to minimize the overall costs of transportation projects.

Bid Process

The limited data from the survey of agencies provides some possible evidence that the dollar amount recovered on disputes and the difference between the lowest and next lowest bidder are related. This suggests that further research to investigate the relationship between extremely low bids and the occurrence of disputes could be the subject of a more thorough investigation to determine the degree to which the public bidding process might be circumvented by disputes and claims.

DISPUTE AVOIDANCE

Many agencies are employing preconstruction procedures such as design reviews, constructibility programs and value engineering (VE) to minimize problems that often lead to

disputes during construction. Steps could be taken to enhance the professional effort involved in such procedures and to ensure that these efforts are initiated early in the design process. For example, the majority of agencies do not perform design reviews until design is 90 percent complete. Design reviews could be implemented earlier, such as at 35 percent and 75 percent design completion. Similarly, constructibility programs are not implemented by most agencies until the design is 90 to 100 percent complete. Earlier implementation of constructibility procedures, as recommended by the Construction Industry Institute (CII), would appear to be appropriate.

These procedures require additional professionals—either in-house or outside consultants. This can increase project costs, while benefits may not be immediately recognized. Investment in professional reviews often has an indirect, long-term benefit that may not be recognized within a short-term focus. The value of such efforts is not only to avoid and minimize disputes, but to provide real benefits to the quality and value of projects.

Site Condition and Geotechnical Investigations

As many disputes originate due to a lack of information concerning the condition of the project site, more extensive geotechnical investigations could be considered by agencies. Another approach is to include detailed geotechnical reports in the contract documents, such as the geotechnical design summary reports (GDSR) proposed by ASCE. To avoid excessive detail in contract documents, such reports may be made available to bidders, but not formally incorporated into the contract documents. While the risk of disputes from unknown subsurface conditions cannot be totally eliminated, more complete investigation and detailed evaluations may allow agencies to manage these risks more effectively.

Greater use of program/construction management techniques, either by in-house staff or consultants, could be considered. For short-term, intensive construction programs, the use of professionals (in-house or consultants) in this role would assist agencies in managing risks and minimizing problems leading to disputes.

EARLY RECOGNITION OF DISPUTES

The agencies surveyed are using many tools to recognize potential problems before they become the source of disputes. Both preconstruction and project meeting agendas generally cover matters that often lead to disputes. Since only one-third of the agencies require monthly or periodic schedule updates,

a requirement for more frequent schedule updates from construction contractors may assist agency staff in recognizing trends that often underlie disputes, especially those that are time related.

As discussed in Chapter 4, a payment forecast curve could provide a graphic illustration of a highly front-end loaded project. The submission of a payment curve projection by contractors may indicate a need to realign payments to prevent delays at the end of the project due to insufficient financial incentive.

DISPUTE RESOLUTION

There is a growing trend among agencies to shift away from centralized dispute resolution and move toward empowering district and project level staff to resolve disputes. This empowerment is being implemented through training, partnering, and delegation of authority. To complement these efforts, the central offices of many agencies provide resources for district and project level staff to manage disputes, including access to technical claims staff, legal advisors, problem intervention groups, and training programs.

Approaches being used to enhance the ability of project staff in resolving disputes are the use of partnering programs and dispute review boards (DRBs). These mechanisms facilitate dispute resolution at the project level, while allowing involvement of district and central office managers to resolve disputes, and then returning the matter to project staff for implementation.

Many of the aspects of project partnering are designed to avoid the antagonistic environment that often leads to disputes,

and to provide a procedure to solve problems and resolve disputes at the project level. Yet, partnering is a practice that has been fully developed by a few agencies, and is only beginning to be implemented by several other agencies. Many of the reported benefits of partnering are anecdotal, and more complete documentation of the results is necessary to convince other agencies to participate in partnering programs. Many of the prospective benefits are quantifiable—reduction in disputes and claims, shared VE savings, reduction in project duration, and agency construction engineering/administration savings. The ultimate goal of partnering, which the criteria help measure, is to ensure timely completion of projects within budget and with minimal deficiencies. The relationship between partnering and VE by contractors merits further study. As more agencies implement partnering programs, the costs and benefits of partnering can be more fully evaluated.

Providing access to relevant cost information through the practice of escrowing bid documents may also enable project staff to resolve problems concerning disputed costs. Providing access to claims staff, legal advisors, and other expertise may also facilitate the resolution of disputes at the project level. This can be accomplished by making available central office claims personnel and problem intervention groups to project staff. The need for technical assistance in analyzing disputes could also be met by DRBs, in which specialized technical experts serve on the board. Finally, DRBs could be used as an impartial nonbinding decision-making mechanism in lieu of administrative hearing boards, so that decisions to resolve disputes are made at the project level.

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APPENDIX A

Questionnaire and Interview Guide

Project 20-5, Topic 24-01 Agency: _____

I. RESPONDENT PROFILE/AGENCY

QUESTIONNAIRE INSTRUCTIONS

1. This questionnaire deals with your agency's experience in construction disputes, as distinct from construction claims or lawsuits. As defined in Section II, a dispute is a contract problem involving conflict between the parties which has not yet formalized into a claim or lawsuit. We are interested in finding out how agencies avoid and resolve disputes before they become formal claims or lawsuits.
2. Please read the definitions section of the questionnaire before proceeding with your answers. This will help to minimize confusion. In the text of the survey, defined terms are *italicized* for easy identification.
3. Although one individual may be tasked to respond, this questionnaire requires responses from various sections from within your agency (construction, legal, design, etc.) to obtain an overall agency response.
4. Please answer all questions to your best knowledge. If you do not know the answer to a specific question and/or cannot research the answer, please go on to answer the other questions.
5. If there are questions about the intended meaning of any parts of the questionnaire, please feel free to contact:

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(215) 975-6609
Mark D. Cipolini, P.E.
(215) 975-6625
D&Z, Inc.
280 King of Prussia Road
Radnor, PA 19087

A. INDIVIDUAL PROFILE

Name: _____

Agency: _____

Mailing Address: _____

Telephone Number: _____ Fax Number: _____

Title: _____ Years of Experience _____

Department/Function: _____ Office: _____

- | | |
|--|---|
| <input type="checkbox"/> Legal | <input type="checkbox"/> Central Office |
| <input type="checkbox"/> Design | <input type="checkbox"/> District |
| <input type="checkbox"/> Pre-Design/Planning | <input type="checkbox"/> Field |
| <input type="checkbox"/> Construction | |
| <input type="checkbox"/> Contract Administration | |

Note: Please consult with as many departments/functions as necessary to give accurate responses.

Project 20-5, Topic 24-01 Agency: _____

I. RESPONDENT PROFILE/AGENCY

B. AGENCY PROFILE

Miles of Roads: _____ National Highway _____ Other _____ No. of Bridges
Surface Transp. Program

\$ Value of Construction Projects Awarded \$ _____

Number of Projects Rural Urban

New build highway _____

New build other roadway _____

New build bridge _____

New build tunnel _____

Rehab highway _____

Rehab secondary _____

Rehab bridge _____

Rehab tunnel _____

Agency Consultant Use % or No. of Projects

Design _____

Construction Inspection/Management _____

Program Management (Construction) _____

Dispute Analysis/Claims _____

As a prerequisite to filing a claim against your agency, a contractor must:

Provide written notice

Escrow bid documents

Provide cost records

Provide revised schedules

Other: *(specify)* _____

APPENDIX A (Continued)

Project 20-5, Topic 24-01

Agency: _____

Project 20-5, Topic 24-01

Agency: _____

I. RESPONDENT PROFILE/AGENCY

Acceleration

The performance of the construction work at a faster pace than in the original contract schedule in an attempt to meet an earlier completion date or to overcome delays.

Alternative Dispute Resolution

Informal or formal methods of resolving and settling disputes without going to court, arbitration, or agency boards of contract appeals.

Claim

A dispute that has progressed to the stage of a formal request for additional money or a lawsuit. In the context of this questionnaire, a claim is a formal process with contractual and legal implications. For example, a dispute has ripened into a claim when the contractor submits a formal request for an contract adjustment or a legal complaint or lawsuit. Also, a dispute may become a formal claim when it is not resolved at the field or district level, and is passed up to the central office for formal processing. A claim is contrasted to a dispute (see below) which is a problem which has not been formalized with any legal trappings.

Collaborative Problem Solving

A cooperative team approach between the parties to a dispute in which they focus primarily on solving the immediate problem rather than affixing blame or responsibility.

Constructability

Obtaining the input of construction knowledge and expertise throughout the planning, design, procurement, construction, and field operations to improve the means and methods of achieving the design intent.

Construction Management

The management of the design, bid, procurement and construction process usually thought of as being performed by an outside firm rather than by in-house agency staff.

Constructive Change

A change in the scope of work required by circumstances or the conduct of the owner, engineer or other agents of the owner which lack the formality of a directed change order.

Cumulative Impact

Cost overruns or schedule delay caused by the indirect or combined effect of several change orders, rather than the direct effect of one change order.

Delay

An event or condition that results in the project completion or a work activity starting or completing later than originally planned.

Design Completion

Stage of the engineering or design when everything required for the construction work is completed.

I. RESPONDENT PROFILE/AGENCY

Differing Site Condition

A material difference between the actual site conditions and those conditions indicated by the contract documents, or that could have been reasonably anticipated from the contract or normal circumstances. An example of differing site conditions is rock below the surface which was not indicated by the soil boring logs included with the bid package.

Dispute

A contractual problem involving conflict between the parties concerning cost, scope, delay, differing site condition, time of performance, etc. which has not yet formalized into a request for contract adjustment or lawsuit. Investigating ways to resolve disputes is the purpose of this questionnaire. (Contrast this term with claim)

Disputes Review Board

An independent panel for a specific project set up under the terms of the construction contract which meets regularly to consider and settle disputes and claims as they arise during the course of the project.

Formal Negotiations

An attempt to settle a dispute, claim or lawsuit through discussion or compromise in a formal manner, for example, with all parties being represented by counsel, with structured procedures, and with written submissions. In contrast with informal negotiations (see below).

Impact Claim

Typically, in construction disputes, an impact claim includes delay, disruption, acceleration or lost labor productivity rather than the direct costs of performing the work.

Informal Negotiations

An attempt to settle a dispute through casual discussions or settlement without the structured procedures or legal trappings. For example, an information negotiation may take place at a job meeting or telephone conversation without involvement of legal counsel.

Mediation

A method of trying to resolve a dispute or claim by the use of impartial to intermediary to suggest ways to settle a dispute. A mediator does not have the authority to impose a decision upon the parties to a dispute.

Multiple Prime Contract

A construction contracting approach whereby the owner enters into separate contracts with different trade contractors for one project, rather than one contract with a general construction contractor.

APPENDIX A (Continued)

Project 20-5, Topic 24-01

Agency: _____

I. RESPONDENT PROFILE/AGENCY

Partnering

A team or team building approach for a project in which the agency, designer and/or contractor organize the project or agreements to emphasize team building, conflict management, open communication, and common goals. A key element is often a conflict review and resolution procedure to resolve disputes as they emerge.

Problem Intervention Group

A special group of design, engineering or contract administration professionals which are part of the agency's staff, and which can be involved on an immediate intensive basis to resolve critical design, construction, contract or dispute issues.

Right of Way

A legal right of passage or access over another person's real estate. In highway construction, this often requires the purchase or condemnation of property through a formal legal process, as opposed to obtaining an easement or permission for a limited use.

Site Access

The physical ability to gain passage to or from the project location. Distinguished from right of way which is the legal right.

Suspension

Temporary stopping of work activities on all or part of a construction project, either by direct order or indirectly caused by the actions or inactions of the owner or its agents.

Total Quality Management

TQM is an agency-wide effort to improve performance, and to make quality a primary strategic objective. It involves an integrated effort by personnel at all levels, including top management commitment, continual improvement, customer focus, team structure, and training.

Undercut

A significant amount of additional excavation or overexcavation at a project site required to deal with unsuitable material to achieve required capacity of subgrade.

User Change

A change in the original construction program prompted by the end user or occupant of a facility or project. For example, in highway construction, the relocation of an exit ramp may be prompted by a new shopping center or commercial facility being built or planned after the commencement of construction. User changes are contrasted with other changes which may be caused by design errors, regulatory requirements, and differing site conditions.

Value Engineering

A study of alternative construction methods, material and building systems to identify potential cost savings, such as short-term costs, life cycle factors, and energy efficiency. This can be done during design or during construction through the use of value engineering incentive clauses.

5

Project 20-5, Topic 24-01

Agency: _____

III. AGENCY DISPUTE EXPERIENCE

1. Does your agency maintain history/record of project *disputes* (for projects undertaken during past five years)?

Yes No

2. Approximately how many individual project *disputes* have arisen on highway construction projects undertaken during the past five years? (If appropriate, please attach back-up documentation).

- Above \$ 1 million in dispute
 \$250,000 - \$1 million in dispute
 below \$250,000 in dispute

Is the frequency and severity of highway construction *disputes* increasing, decreasing or staying the same (over last five years)?

Increase Decrease Same

Why? (Your Opinion)

- Type of Work (More difficult to bid)
 Business Climate
 Quality of Contract Documents
 Agency Staffing/Budget limitations
 Quality/Expertise of Contractor labor/supervision.
 Mandatory inclusion of federal differing site conditions clause.
 Other (Explain): _____

6

APPENDIX A (Continued)

Project 20-5, Topic 24-01 Agency: _____

III. AGENCY DISPUTE EXPERIENCE - PROJECT #1

For at least three representative projects with significant disputes above \$1,000,000 on projects undertaken during the past five years for which information is available please provide the following information. If there have been no disputes over \$1,000,000, then select three projects with the largest dollar amount in dispute. If appropriate, please attach back-up documentation.
Source person for additional information: _____

Phone: _____ Fax: _____
District: _____

Project Name: _____

Location: Urban Rural
Description: New Build Interstate Roadway
 Mainline Rehab Secondary
 Structure Interchange Intersection
Type of Specifications: Detailed Design Performance Combination
Contractor: _____

Initial Contract Amount: _____

Engineer Estimated Range: _____

Second Bid Amount: _____

% subcontracted: _____

In-house design: Yes No Consultant Design: Yes No
Notice To Proceed Date: _____

Construction Duration: _____

Liquidated Damages: _____

Time Extension: _____

Final Completion Date: _____

Adjusted Constr. Amount: _____

% Increase: _____

In house inspection: Yes No
Consultant inspection/
Project Management: Yes No
Number of Change Orders: _____ Under \$300,000 _____ Over \$300,000

Project 20-5, Topic 24-01 Agency: _____

III. AGENCY DISPUTE EXPERIENCE - PROJECT #1

Cause of Disputes: Right of Way
 Differing Site Condition (specify)
 Undercut add/borrow fdn redesign
 User Change
 Utility Relocation (specify) Relocation Delay Mislocated
 Design Error Omission (specify)
 bridge interchange lighting
 drainage roadway phasing
 quantity structure estimating
 Other (specify): _____

Agency Assessment: *indicate level of internal review of dispute or claim performed by agency*

- Project level (including resident engineer)
- District Construction Unit
- District (including district engineer)
- Dispute Analysis/Resolution Group in District Construction Unit
- Dispute Analysis/Resolution Group in Central Office
- Dispute Analysis/Resolution by outside Consultant

Initial Submission of Dispute:

Date Submitted: _____

Amount Requested: _____

Time Extension Requested: _____

Applicable Contract Clauses:

- No Damages for delay for: R-of-W Utility conflicts
- Changes Clauses
- Differing Site Condition Clauses
- Site "As Is" Disclaimer
- Other clauses: *(Please attach if central to the dispute)*

Final Resolution of Dispute:

Date: _____

Amount: _____

Time Extension: _____

Method of inclusion into contract

- Change Order Quantity Variation Administrative Procedure Finding
- Lawsuit Judgment Lawsuit Settlement

APPENDIX A (Continued)

Project 20-5, Topic 24-01 Agency: _____

III. AGENCY DISPUTE EXPERIENCE - PROJECT #2

For at least three representative projects with significant disputes above \$1,000,000 on projects undertaken during the past five years for which information is available please provide the following information. If there have been no disputes over \$1,000,000, then select three projects with the largest dollar amount in dispute. If appropriate, please attach back-up documentation.
 Source person for additional information: _____

Phone: _____ Fax: _____
 District: _____

Project Name: _____

Location: Urban Rural
 Description: New Build Interstate Roadway
 Mainline Rehab Secondary
 Structure Interchange Intersection
 Type of Specifications: Detailed Design Performance Combination

Contractor: _____

Initial Contract Amount: _____

Engineer Estimated Range: _____

Second Bid Amount: _____

% subcontracted: _____

In-house design: Yes No Consultant Design: Yes No
 Notice To Proceed Date: _____

Construction Duration: _____

Liquidated Damages: _____

Time Extension: _____

Final Completion Date: _____

Adjusted Constr. Amount: _____

% Increase: _____

In house inspection: Yes No
 Consultant inspection/ Yes No
 Project Management: Yes No
 Number of Change Orders: _____ Under \$300,000 _____ Over \$300,000

Project 20-5, Topic 24-01 Agency: _____

III. AGENCY DISPUTE EXPERIENCE - PROJECT #2

Cause of Disputes: Right of Way
 Differing Site Condition (specify)
 Undercut add/borrow fdn redesign
 User Change
 Utility Relocation (specify) Relocation Delay Mislocated
 Design Error Omission (specify)
 bridge interchange lighting
 drainage roadway phasing
 quantity structure estimating
 Other (specify): _____

Agency Assessment: indicate level of internal review of dispute or claim performed by agency

- Project level (including resident engineer)
- District Construction Unit
- District (including district engineer)
- Dispute Analysis/Resolution Group in District Construction Unit
- Dispute Analysis/Resolution Group in Central Office
- Dispute Analysis/Resolution by outside Consultant

Initial Submission of Dispute:

Date Submitted: _____

Amount Requested: _____

Time Extension Requested: _____

Applicable Contract Clauses:

- No Damages for delay for: R-of-W Utility conflicts
- Changes Clauses
- Differing Site Condition Clauses
- Site "As Is" Disclaimer
- Other clauses: *(Please attach if central to the dispute)*

Final Resolution of Dispute:

Date: _____

Amount: _____

Time Extension: _____

Method of inclusion into contract

- Change Order Quantity Variation Administrative Procedure Finding
- Lawsuit Judgment Lawsuit Settlement

APPENDIX A (Continued)

Project 20-5, Topic 24-01 Agency: _____

III. AGENCY DISPUTE EXPERIENCE - PROJECT #3

For at least three representative projects with significant disputes above \$1,000,000 on projects undertaken during the past five years for which information is available please provide the following information. If there have been no disputes over \$1,000,000, then select three projects with the largest dollar amount in dispute. If appropriate, please attach back-up documentation.

Source person for additional information: _____

Phone: _____ Fax: _____
 District: _____

Project Name: _____

- Location: Urban Rural
 Description: New Build Interstate Roadway
 Mainline Rehab Secondary
 Structure Interchange Intersection
 Type of Specifications: Detailed Design Performance Combination

Contractor: _____

Initial Contract Amount: _____

Engineer Estimated Range: _____

Second Bid Amount: _____

% subcontracted: _____

In-house design: Yes No Consultant Design: Yes No
 Notice To Proceed Date: _____

Construction Duration: _____

Liquidated Damages: _____

Time Extension: _____

Final Completion Date: _____

Adjusted Constr. Amount: _____

% Increase: _____

In house inspection: Yes No
 Consultant inspection/ Yes No
 Project Management: Yes No
 Number of Change Orders: _____ Under \$300,000 _____ Over \$300,000

Project 20-5, Topic 24-01 Agency: _____

III. AGENCY DISPUTE EXPERIENCE - PROJECT #3

- Cause of Disputes: Right of Way
 Differing Site Condition (specify)
 Undercut add/borrow fdn redesign
 User Change
 Utility Relocation (specify) Relocation Delay Mislocated
 Design Error Omission (specify)
 bridge interchange lighting
 drainage roadway phasing
 quantity structure estimating
 Other (specify): _____

Agency Assessment: *indicate level of internal review of dispute or claim performed by agency*

- Project level (including resident engineer)
 District Construction Unit
 District (including district engineer)
 Dispute Analysis/Resolution Group in District Construction Unit
 Dispute Analysis/Resolution Group in Central Office
 Dispute Analysis/Resolution by outside Consultant

Initial Submission of Dispute:

Date Submitted: _____

Amount Requested: _____

Time Extension Requested: _____

Applicable Contract Clauses:

- No Damages for delay for: R-of-W Utility conflicts
 Changes Clauses
 Differing Site Condition Clauses
 Site "As Is" Disclaimer
 Other clauses: *(Please attach if central to the dispute)*

Final Resolution of Dispute:

Date: _____

Amount: _____

Time Extension: _____

Method of inclusion into contract

- Change Order Quantity Variation Administrative Procedure Finding
 Lawsuit Judgment Lawsuit Settlement

APPENDIX A (Continued)

Project 20-5, Topic 24-01

Agency: _____

IV. DISPUTES RESOLUTION TECHNIQUES

A. In the past five years, has your agency used any of the following procedures or techniques in an attempt to resolve *disputes* before they are formalized into *claims* or lawsuits? Is your agency's use of this technique increasing or decreasing?

1. By issuing change orders to settle a contract dispute matter (rather than extra work items)
 - Yes No Increasing Use Decreasing Use
2. By trying to settle the disputes in the job meetings?
 - Yes No Increasing Use Decreasing Use
3. By dealing with disputes through *informal negotiations* (See definition)?
 - Yes No Increasing Use Decreasing Use
 - a. If yes, at what administrative level were the informal negotiations held?
 - field level regional/district level central office legal dept.
4. By dealing with disputes through *formal negotiations* (See definition)?
 - Yes No
 - a. If yes, at what administrative level were the informal negotiations held?
 - field level regional/district level central office legal dept.
5. By decision of administrative agency at different levels of review with increasing authority?
 - Yes No Increasing Use Decreasing Use
6. By *collaborative problem solving* (see definition):
 - Yes No Increasing Use Decreasing Use
 - If yes, with:
 - The contractor The design engineer Other consultants
7. By *mediation* (see definition)?
 - Yes No Increasing Use Decreasing Use
8. By the use of an independent *disputes review board* (see definition)?
 - Yes No Increasing Use Decreasing Use
9. By implementing the terms and procedures of a *partnering* agreement or *partnering* program (see definition)?
 - Yes No Increasing Use Decreasing Use

Project 20-5, Topic 24-01

Agency: _____

IV. DISPUTES RESOLUTION TECHNIQUES

B. Which three of the following dispute resolution techniques in your opinion have been most effective in resolving disputes? (Rank three)

- Informal Negotiations*
 - Job meetings Field level Regional/district level Central Office
- Formal Negotiations*
 - Job meetings Field level Regional/district level Central Office
- Administrative Process*
- Collaborative Problem Solving*
 - With the Design Engineer
 - With the Contractor
- Mediation* *Disputes Review Board* *Partnering Implementation*
- Unilateral Change Order
- Other *specify*: _____

C. In the past five years, has your agency employed any of the following administrative techniques or resources as a way to assist in the resolution of *disputes*? Is your agency's use of these techniques increasing or decreasing?

1. Delegating more authority to settle *disputes* to the field office or project staff?
 - Yes No Increasing Use Decreasing Use
2. Delegating more authority to settle *disputes* to the district level staff?
 - Yes No Increasing Use Decreasing Use
3. Requiring that approval to settle all major *disputes* come from the central office?
 - Yes No Increasing Use Decreasing Use
4. Involving agency legal staff early in the *dispute*?
 - Yes No Increasing Use Decreasing Use
5. Involving federal agency staff early in the *dispute*?
 - Yes No Increasing Use Decreasing Use
6. Involving the district engineer early in the *dispute*?
 - Yes No Increasing Use Decreasing Use
7. Involving outside claims consultants early in the *dispute*?
 - Yes No Increasing Use Decreasing Use
8. Involving in-house claims analysts early in the *dispute*?
 - Yes No Increasing Use Decreasing Use
9. Training of field personnel in claims avoidance and dispute resolution.
 - Yes No Increasing Use Decreasing Use

APPENDIX A (Continued)

Project 20-5, Topic 24-01

Agency: _____

V. DISPUTES AVOIDANCE TECHNIQUES

If your agency has performed constructability studies, at what point in time were the constructability studies performed?

- 35% Design Completion 50% Design Completion 75% Design Completion
 90% Design Completion 100% Design Completion
 Other Stage of Design Completion: specify _____

If your agency has performed constructability studies, what factors were within the scope of the constructability study?

- schedules materials construction methodology
 potential cost savings staging/sequencing traffic control
 general conditions disputes/claims procedures disputes/claims prevention
 utility conflicts

5. Does your agency have a design, engineering, or contract administration support group which can be involved on an immediate, intensive basis to resolve critical design, construction or *dispute* issues? (*Problem Intervention Group*)

- Yes No

a. If yes, what level of authority is required to mobilize the group to assist on a problem-ridden project.

- Resident Engineer Construction Engineer District Engineer
 Central Office Bureau Chief Other

6. *Value Engineering* (see definition)

- Yes No

- By in-house staff
 Design Group Construction Group Design Liaison Group
 Maintenance Group

- By the Engineer of Record By a construction management firm
 By an independent engineering firm By a bidder/construction contractor
 By others

a. If your agency has performed *value engineering*, at what point in time was the value engineering studies performed?

- 35% Design Completion 50% Design Completion 75% Design Completion
 90% Design Completion 100% Design Completion
 Other Stage of Design Completion
 During Construction by use of VE incentive clause

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Project 20-5, Topic 24-01

Agency: _____

V. DISPUTES AVOIDANCE TECHNIQUES

b. If your agency has performed *value engineering* studies, what savings were consistently achieved by value engineering?

- less than 5% of the estimated construction cost
 more than 5%, but less than 7% of the estimated construction cost
 more than 7%, but less than 10% of the estimated construction cost
 more than 10%, but less than 15% of the estimated construction cost
 more than 15% of the estimated construction cost

7. Construction/Program Management Consultants

a. Does your agency use construction/program management consultants?

- Yes No

b. Type of Services

- Construction Sequencing/Scheduling Construction Inspection/Quality Control
 Contract Administration Preconstruction Services
 Design Phase Services Other: specify _____

c. Type of firms providing Construction/Program Management Services

- Professional Construction Managers
 Inspection firm Engineering firms
 General Contractors Other: specify: _____

8. Prebid Meetings?

- Yes No

- Mandatory attendance by all bidders Non-mandatory attendance by bidders

- Are minutes taken Yes No
 Are minutes distributed to all attendees Yes No
 Are minutes distributed to all bidders Yes No

Attendees generally include:

- Engineer of Record Agency Contract Administration Staff
 Utility Company Representatives Agency Legal Staff
 Federal Agency Representatives

9. Preconstruction Meetings (*After award but prior to notice to proceed*)

- Generally required Always required

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APPENDIX A (Continued)

Project 20-5, Topic 24-01 Agency: _____

Project 20-5, Topic 24-01 Agency: _____

V. DISPUTES AVOIDANCE TECHNIQUES

V. DISPUTES AVOIDANCE TECHNIQUES

Attendees generally include:

- Agency Contract Administration Representative
- Agency Field Representative
- Agency Legal Staff
- Subcontractor Representatives
- Engineer of Record
- Utility Company Representatives
- Federal Agency Representatives

Topics addressed generally include:

- Staging/Sequencing
- Scheduling
- Right of Way/Site Access
- Utility Conflict
- Change Order Procedures
- Claims Procedures
- Procurement Items
- Other: (specify)
- Design Clarification/Revision
- Payment Processing
- Mobilization Requirements
- Manpower Projections
- Safety
- Environmental
- Shop Drawings/Submittals

10. Periodic Construction Meetings

a. Frequency

- Weekly
- Bi-weekly
- Monthly
- Periodic but not regularly scheduled
- Other

b. Attendees generally include:

- Contractors
- Subcontractors
- Utility Company Representative
- Agency Contract Administration Staff
- Suppliers
- Engineer of Record
- Agency Field Staff
- Others: (specify)

c. Topics addressed generally include:

- Scheduling
- Change Orders
- Progress to date
- Other: (specify)
- Procurement Items
- Claims/Disputes
- Construction Problems
- Mandatory Schedule Updates
- Shop Drawings/ Submittals
- Utility Conflict

11. Does your agency allow the bidders access to project data prior to bid?

- Yes
- No
- Soil Studies
- Utility Location Maps/Reports
- Right of Way Information
- Site Investigation Reports
- Site Surveys
- As built drawings for rehab work

12. Is Construction Scheduling mandatory on most large projects?

- Yes
- No

a. Performed by:

- Program Manager
- Independent Scheduling
- Agency in-house staff
- Engineer of Record
- Contractor
- Other: _____

Consultant retained by the Agency

b. Are any of the following mandatory scheduling submissions?

- 30 day Schedule
- Monthly Updates
- Schedule Revisions to Support Time Extensions
- 90 day Schedule
- Periodic but not monthly updates
- Complete Construction Schedule
- Weekly Lookahead Schedules

13. Please indicate the value of the following techniques in reducing the number or severity of disputes/claims or resolving disputes/claims?

1 Very Valuable 2 Valuable 3 Not Valuable 4 Counterproductive

- _____ Contract Coordination
- _____ Predesign/Preconstruction Investigations
- _____ Constructability Reviews
- _____ Problem Intervention Group
- _____ Value Engineering
- _____ Construction/Program Management Consultants
- _____ Pre bid Meetings
- _____ Preconstruction Meetings
- _____ Periodic Construction Meetings
- _____ Increased Access for Contractors to Site Information
- _____ Mandatory Construction Scheduling
- _____ Other: (specify)
- _____ None of the above

B. In the past five years, has your agency reorganized its standard project organization or departmental structures in an attempt to minimize or avoid potential contract disputes or claims on your construction or rehabilitation projects?

- Yes
- No

APPENDIX A (Continued)

Project 20-5, Topic 24-01

Agency: _____

V. DISPUTES AVOIDANCE TECHNIQUES

1. If yes, which of the following would apply:

- Integration of Design/Construction staff/responsibilities
- Separation of Design/Construction staff responsibilities
- More responsibilities of construction field staff for claims/dispute resolutions
- Less responsibilities for construction field staff for claims/dispute resolution
- More involvement of legal staff in the project administration
- Less involvement of legal staff in project administration
- Creation/addition of in-house scheduling expertise
- Creation of a *Problem Intervention Group*
- More in-house design responsibilities
- Less in-house design responsibilities
- More delegation of responsibilities to contractors
- Use of multiple prime contracts
- Formation of *partnering* agreements with design/engineering firms
- Formation of *partnering* agreements with construction contracts
- Commitment to your *Total Quality Management*

VI. EARLY RECOGNITION OF DISPUTES

A. In the past five years, has your agency used any of the following techniques or procedures in an attempt to anticipate or identify disputes on an early basis?

1. Bid evaluation/comparisons

- Yes No

2. Preconstruction Meetings

- Yes No

3. Project Meetings

- Yes No

a. If yes, how regularly are they scheduled?

- Weekly Monthly Not Regular
 It depends Other (*specify*): _____

4. Mandatory Project Scheduling

- Yes No

5. Project Cost/Payment Forecasting

- Yes No

Project 20-5, Topic 24-01

Agency: _____

VI. EARLY RECOGNITION OF DISPUTES

6. Regular review of project documentation to identify pending disputes?

- Yes No

7. Proactive management of problems at project meetings?

- Yes No

8. In your opinion, what are the three best ways to recognize or anticipate disputes on an early basis?

- | | |
|---|--|
| <input type="checkbox"/> Bid Evaluation/Comparison | <input type="checkbox"/> Preconstruction Meetings |
| <input type="checkbox"/> Project Meetings | <input type="checkbox"/> Project Scheduling |
| <input type="checkbox"/> Cost/Payment Forecasting | <input type="checkbox"/> Review of Project Documentation |
| <input type="checkbox"/> Proactive Management at Project Meetings | <input type="checkbox"/> Other (<i>specify</i>) _____ |

Thank you for your assistance in this National Cooperative Highway Research Program Project. Please return the completed questionnaire to:

Barry B. Bramble
D&Z, Inc.
280 King of Prussia Road
Radnor, PA 19087
Phone (215) 975-6609
Fax (215) 976-6700

19670

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Bramble, Barry B.

Resolution of disputes to
avoid construction claims

DUE DATE	DUE DATE

19670

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