Partnering on heavy highway construction projects and its effects on workers' attitudes and perceptions

Heather Ann Northouse
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Partnering on heavy highway construction projects and its effects on workers' attitudes and perceptions

Northouse, Heather Ann, Ph.D.

Iowa State University, 1994
Partnering on heavy highway construction projects and
its effects on workers' attitudes and perceptions

by

Heather Ann Northouse

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For the Graduate College

Iowa State University
Ames, Iowa

1994

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## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>CHAPTER I. INTRODUCTION</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background of the Study</td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>2</td>
</tr>
<tr>
<td>Research Questions</td>
<td>3</td>
</tr>
<tr>
<td>Assumptions</td>
<td>4</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>4</td>
</tr>
<tr>
<td>Conjectures and Hypotheses</td>
<td>5</td>
</tr>
<tr>
<td>Methodology</td>
<td>7</td>
</tr>
<tr>
<td>Subjects</td>
<td>8</td>
</tr>
<tr>
<td>Research Instrument</td>
<td>9</td>
</tr>
<tr>
<td>Data Gathering</td>
<td>10</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>11</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>11</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>12</td>
</tr>
<tr>
<td>Organization of this Report</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHAPTER II. LITERATURE REVIEW</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>14</td>
</tr>
<tr>
<td>Definitions</td>
<td>15</td>
</tr>
<tr>
<td>The Partnering Workshop</td>
<td>17</td>
</tr>
<tr>
<td>History of Partnering</td>
<td>18</td>
</tr>
<tr>
<td>Partnering Research Findings</td>
<td>25</td>
</tr>
<tr>
<td>Conclusions</td>
<td>31</td>
</tr>
</tbody>
</table>
CHAPTER III. METHODOLOGY

Introduction
Design of the Study
Universe of the Study
Subjects
Treatment
  Foundation
  Role Clarification
  Mission Statement
  Objectives
  Implementation and Evaluation
  Partnering Charter
Instrumentation
  Pre-Test
  Participant Questionnaires
    Scoring
    Validity and Reliability
  Non-Participant Questionnaire
    Scoring
    Validity and Reliability
Control Group
Close-Out Data Gathering Report
Data Gathering
  Participants
  Non-Participants
  Control Group
  Close-Out Data Gathering Report
  Interviews
  Response Rates
Data Analysis
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis 4</td>
<td>111</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>112</td>
</tr>
<tr>
<td>Implications for Partnering</td>
<td>115</td>
</tr>
<tr>
<td>Recommendations for Future Research</td>
<td>119</td>
</tr>
<tr>
<td>Conclusions</td>
<td>123</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>125</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>129</td>
</tr>
<tr>
<td>APPENDIX A. HUMAN SUBJECTS REVIEW APPROVAL</td>
<td>131</td>
</tr>
<tr>
<td>APPENDIX B. RESEARCH INSTRUMENTS AND EXAMPLE OF COVER LETTER</td>
<td>136</td>
</tr>
<tr>
<td>APPENDIX C. DEMOGRAPHIC DATA OF SUBJECTS</td>
<td>160</td>
</tr>
<tr>
<td>APPENDIX D. WORKSHOP AGENDA, PROJECT CHARTERS AND PROJECT LOGOS</td>
<td>163</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1. Summary of Chi-square for the Quality Variable 68
Table 2. Summary of Chi-square for the Profitability Variable 69
Table 3. Summary of Chi-square for the Productivity Variable 70
Table 4. Mean Scores and Standard Deviations for the Teamwork Variable 71
Table 5. Summary of ANOVA for the Teamwork Variable Across Questionnaires 72
Table 6. Tukey's Studentized Range (HSD) Test for the Teamwork Variable Across Questionnaires 72
Table 7. Teamwork Variable Mean Scores for each Project on the Pre, Follow-up and Close-out Questionnaires and t-values Between the Pre and Close-out Questionnaires 74
Table 8. Teamwork Variable Mean Scores for each Group on the Pre, Follow-up and Close-out Questionnaires and t-values Between the Pre and Close-out Questionnaires 75
Table 9. Mean Scores and Standard Deviations for the Performance Variable 76
Table 10. Summary of ANOVA for the Performance Variable Across Questionnaires 76
Table 11. Tukey's Studentized Range (HSD) test for the Performance Variable Between Questionnaires 77
Table 12. Performance Variable Mean Scores for each Project on the Pre, Follow-up and Close-out Questionnaires and t-values as Computed Between the Pre and Close-out Mean Scores 78
Table 13. Performance Variable Mean Scores for each Group on the Pre, Follow-up and Close-out Questionnaires and t-values as Computed Between the Pre and Close-out Mean Scores 79
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 14.</td>
<td>Summary of t-values for Overall Mean Scores Between the Questionnaires</td>
<td>80</td>
</tr>
<tr>
<td>Table 15.</td>
<td>Mean Scores for each of the Variables Under Study</td>
<td>81</td>
</tr>
<tr>
<td>Table 16.</td>
<td>Tukey's Studentized Range (HSD) Test for each Variable Between the Three Questionnaires</td>
<td>82</td>
</tr>
<tr>
<td>Table 17.</td>
<td>Project Overall Mean Scores for the Pre, Follow-up and Close-out Questionnaires</td>
<td>83</td>
</tr>
<tr>
<td>Table 18.</td>
<td>Summary of t-values for each Project Between the Three Questionnaires</td>
<td>84</td>
</tr>
<tr>
<td>Table 19.</td>
<td>Summary of Total and Project Mean Scores for each of the Variables as Reported on the Three Questionnaires</td>
<td>85</td>
</tr>
<tr>
<td>Table 20.</td>
<td>Group Overall Mean Scores and Standard Deviations on each of the Questionnaires</td>
<td>86</td>
</tr>
<tr>
<td>Table 21.</td>
<td>The t-values for each Group Between the Questionnaires</td>
<td>87</td>
</tr>
<tr>
<td>Table 22.</td>
<td>Mean Scores for each Variable on each Questionnaire as Broken Down by Demographic Group</td>
<td>88</td>
</tr>
<tr>
<td>Table 23.</td>
<td>Overall Mean Scores, Standard Deviations and t-values for the Participants and Non-Participants on each of the Questionnaires</td>
<td>90</td>
</tr>
<tr>
<td>Table 24.</td>
<td>Frequency of Iowa DOT Personnel</td>
<td>161</td>
</tr>
<tr>
<td>Table 25.</td>
<td>Frequency of Contractor Personnel</td>
<td>161</td>
</tr>
<tr>
<td>Table 26.</td>
<td>Frequency of Other Personnel</td>
<td>162</td>
</tr>
</tbody>
</table>
CHAPTER I.
INTRODUCTION

Background of the Study

Partnering was first initiated within the construction industry by Col. Charles Cowan of the U.S. Army Corps of Engineers in 1988. In 1991, Cowan became the Director of the Arizona Department of Transportation. He started implementing Partnering on heavy highway construction projects and advocating the benefits of Partnering to other Departments of Transportation across the nation.

In September 1991 the Associated General Contractors of America listed the key elements of Partnering as: commitment, equity, trust, mutual goals, work strategies, evaluation and timely responsiveness. Partnering, they suggest, offers an opportunity to create positive and focused working relationships and resolve issues in a timely, cost-effective manner (Associated General Contractors [AGC], 1991).

The U.S. Corps of Engineers identify the following signs of successful Partnering: sharing of goals, clear expectations, trust, confidence, commitment, responsibility, courage, understanding, respect, synergistic teamwork and excellence (Edelman, Carr & Lancaster, 1991).

The Construction Industry Institute, a major contributor of Partnering research and literature defines Partnering as, "a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources. The
relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values" (Hancher, 1989 p. 5). In 1991, the CII elaborated on this definition by stating that Partnering seeks "win-win" solutions, trust and honesty, profitability, participatory problem solving, innovation and value engineering, teamwork and quality (Construction Industry Institute [CII], 1991).

In 1991 the Iowa Department of Transportation, under the direction of Tom Cackler, Construction Engineer, introduced Partnering on six heavy highway construction projects. As of December 1993, eighteen Iowa DOT construction projects have implemented Partnering.

Many claims have been made regarding the benefits of Partnering and these claimed benefits have been incorporated in the definitions of Partnering. Very little research has been conducted, however, to examine or validate these claims. This research assesses problem solving, teamwork, communication, trust, respect and workmanship as perceived by the personnel working on Partnering projects. The quality, profitability and productivity of the Partnering projects is also examined.

Statement of the Problem

This study was begun in the Fall of 1992. The Iowa Department of Transportation was experiencing adversarial relationships with its contractors within the heavy highway construction industry. Based on work with Partnering at the Arizona and Washington Departments of Transportation, headed by Charles Cowan and Norman Anderson, the Iowa DOT decided to implement Partnering on a few of their construction projects.
Project personnel were operating in an environment with limited trust, little cooperation and inefficient communications among the parties. Perceived "win-win" relationships were rare and cost over-runs were not infrequent. Mistrust and poor working conditions have dominated most state-run transportation projects (AGC, 1991). It was assumed that Partnering would help to alleviate the adversarial relationships the Iowa DOT was experiencing.

This study was coordinated through the Iowa DOT to assess, in a quantifiable manner whether Partnering had any measurable effect on personnel relations, project quality, profitability or productivity.

Past and present attitudes and perceptions of the Iowa DOT highway construction personnel and the contractors working on DOT projects were examined. Data was collected to assess subjects' perceptions of past projects, and to assess subjects' perceptions of Partnering projects following their participation in a Partnering workshop. The variables under study were problem solving, teamwork, communication, trust, respect, workmanship, quality, profitability and productivity.

Research Questions

1. Can educational intervention have a positive effect on adversarial relations within the heavy highway construction industry, and in turn enhance trust, respect, teamwork, problem solving, communication and workmanship among the project personnel?

2. Are the benefits of Partnering only apparent in those that participated in the Partnering workshop or are they also apparent in individuals who work with
those who participated in the workshop but who themselves were not a participant in the workshop?

Assumptions
1. There is an adversarial relationship between the Iowa DOT personnel and their private contractors.
   a. This adversarial relationship negatively effects project quality, cost-effectiveness, safety and value-engineering.
   b. This adversarial relationship results from project personnel's negative perceptions of problem solving, teamwork, communication, trust, respect and workmanship.

2. Educational intervention through a Partnering workshop can significantly reduce the typical negative perceptions and attitudes and increase quality, profitability and productivity.
   a. Positive results from the educational intervention will be immediate and will maintain with time.

Definition of Terms
Partnering: Partnering involves an agreement to share the risks involved in completing a given project, it can be short-term or involve an extensive long-term commitment. Partnering is not a legal contractual agreement, but rather a process in which an unusually high degree of cooperation is established to achieve separate but complimentary objectives (AGC, 1991).
Contractor: A company in contract with the Iowa Department of Transportation to complete a pre-defined heavy highway construction project. Contractors are selected based on low-bid criteria as required by the Code of Iowa.

Perception: Perceptions are often exhibited through expectations. They are a result of organizing sensory information and interpreting it within the present environment (Chaffee, 1990). Perceptions are interpretations of external stimuli which are often filtered through attitudes, beliefs and assumptions.

Attitude: Attitudes are often defined as a state of readiness, a tendency towards action or reaction in a specific manner when confronted with certain stimuli (Oppenheim, 1966). Attitudes are composed of cognitive, emotional and behavioral components.

Conjectures and Hypotheses

This study provides data based on quantifiable measurements and the perceptions of Iowa DOT personnel and construction contractors to test the following hypotheses.

1. If there are low levels of teamwork, trust, respect and communication among co-workers on a highway construction project the quality profitability and productivity of the construction work will suffer.
Hypothesis 1- The quality of the project, as measured by the standards put forth in the Iowa DOT project specifications, will be statistically greater (p < .05) on Partnering projects than on non-Partnering projects.

Hypothesis 2- Profitability, as measured by value engineering data, cost control data and litigation claims, will be statistically greater (p < .05) on Partnering projects than on non-Partnering projects.

Hypothesis 3- Productivity, as measured by delayed project completion, lost work days, number of re-works, informal and formal plan changes, and accident reports, will be statistically greater (p < .05) on Partnering projects than on non-Partnering projects.

2. If Partnering is implemented, the participants' perceptions of teamwork and performance on the project will improve.

Hypothesis 1- Teamwork, as measured by perceived levels of trust, respect, teamwork and communication will be statistically more positive (p < .05) on the follow-up and close-out questionnaires than on the pre-questionnaire.

Hypothesis 2- Performance, as measured by workmanship and problem solving will be statistically more positive (p < .05) on the follow-up and close-out questionnaires than on the pre-questionnaire.
3. If a Partnering workshop is conducted, participants will report more positive perceptions and attitudes towards the Partnering projects than towards the non-Partnering projects.

Hypothesis 1- Attitudes and perceptions of Partnering participants will be statistically more positive (p < .05) on the follow-up and close-out questionnaires than on the pre-questionnaire.

4. If workshop participants' attitudes and perceptions regarding the Partnering project they are working on are favorable, these positive attitudes and perceptions will be transferred to their co-workers.

Hypothesis 1- Responses from the non-participants will be statistically more positive (p ≤ .05) than the responses from the participants on the pre-questionnaire, but not statistically different (p ≤ .05) from the responses of the participants on the follow-up questionnaire.

Methodology

This study was initiated in conjunction with the introduction of Partnering within the Iowa Department of Transportation in the Fall of 1992. Six, two-day Partnering workshops were developed and conducted. These workshops served as the treatment for this study. A survey instrument was designed which consisted of a pre-questionnaire, a follow-up questionnaire and a close-out questionnaire. This instrument was administered to workshop participants on
six Partnering projects and personnel on one control project not implementing 
Partnering.

A second instrument was developed and administered to Partnering 
project personnel who did not participate in the Partnering workshop. Data was 
also collected through a form developed by the author and the Iowa DOT to 
assess the quality, profitability and productivity of the projects.

Interviews were conducted to provide elaboration and anecdotal information 
regarding the Partnering experience.

The six Partnering construction projects were conducted in the counties of 
Monroe, Warren, Franklin, Clay, Johnson and Bremer. The control project was 
conducted in Cass County.

Subjects

The sample consisted of 261 subjects. One hundred and forty-six of these 
subjects participated in the treatment. These subjects are referred to as 
participants throughout the rest of this paper. Ninety of the subjects did not 
participate in the treatment but did work on the Partnering project. These 
subjects are referred to as non-participants throughout the rest of this paper. The 
control group consisted of twenty-five subjects.

Seven construction projects were chosen to represent both large, complex 
projects and relatively small, routine projects. Six of these projects were 
Partnering projects and one served as the control project.

Fifteen additional projects were included to provide comparison data for 
hypotheses 1.1, 1.2 and 1.3. The personnel in these projects were not included as
subjects but data was collected on the quality, profitability and productivity of the projects.

Partnering project eligibility criteria included complexity of the project, scheduling, impact of the project on the public and the risks involved if the project was not completed properly. For the purpose of this study the Iowa DOT was responsible for determining which projects would be classified as Partnering projects. The Iowa DOT and project participants were chosen by the Iowa DOT. All subjects were made aware that participation in the Partnering workshop and this research was voluntary and not a condition of bid approval.

The universe of this study consisted of all Iowa Department of Transportation construction personnel and over 400 hundred construction-related companies in the state of Iowa who contract services with the Iowa DOT. The Iowa DOT has pre-approved approximately 75 prime contractors in the state and there are approximately 350 subcontractors, suppliers and related specialty contractors in Iowa.

Research Instrument

An extensive literature review concluded that there were no measuring instruments which assessed the specific attitudes and perceptions under study in this research in a format that was practical. Therefore, a 41-item questionnaire was designed by the author to assess the variables problem solving, teamwork, communication, trust, respect and workmanship. Space was allocated for supplemental comments and demographic information was collected. This instrument was used as a pre-, follow-up, and close-out questionnaire. These questionnaires were administered to the workshop participants and the subjects
working on the one control project. A copy of this questionnaire can be found in Appendix B.

A 20-item questionnaire served as the assessment instrument for the non-participants. This questionnaire was administered to the non-participants one time during their work on a project and the questionnaires assessed the following variables: problem solving, teamwork, communication, trust, respect and workmanship. A copy of this questionnaire can be found in Appendix B. Similar to the participant questionnaires, space was allocated for supplemental comments and demographic information was collected.

Data related to quality, profitability and productivity was gathered through a form designed by the author and the Iowa DOT, titled Close-Out Data Gathering Report. A copy of this form can be found in Appendix B.

Data Gathering

An attitude assessment of the 146 workshop participants was conducted prior to the Partnering workshop through the use of a 41-item questionnaire. A follow-up-questionnaire of an identical nature was administered four to six weeks after initiation of the project (about one-third of the way through) and a close-out questionnaire was administered two weeks prior to completion of the project. Cover letters were included for both the follow-up and close-out questionnaires as was a return-addressed stamped envelope.

For the control group, the pre-questionnaire was administered two weeks into the project, the follow-up questionnaire was administered half-way through the project and the close-out questionnaire was administered two weeks prior to
completion. Scheduling conflicts made it impossible to administer the pre-
questionnaire prior to the start of the project.

The 20-item questionnaires were mailed out in bulk to the non-
participants' superior, usually the Project Manager, who was a participant of the
workshop, and he distributed the non-participant questionnaires to the subjects.
A cover letter and return-addressed stamped envelope were included.

The Close-Out Data Gathering Report was completed by the Resident
Engineers of each project upon completion of the project.

Interviews were conducted throughout the duration of the construction
projects. Subjects for these interviews included representatives from all
departments and organizations involved in this study.

Data Analysis

To test hypotheses 1.1, 1.2, and 1.3 chi-square was used. To test 2.1 and 2.2
the t-test for paired observations, a one-way analysis of variance (ANOVA), and
Tukey's Studentized Range (HSD) test were used. To test hypothesis 3 the t-test
for paired observations and Tukey's Studentized Range (HSD) test were used. To
test hypothesis 4 a t-test for two independent samples was used.

Limitations of the Study

The study was limited to construction projects within the state of Iowa
under the governance of the Iowa DOT. The subjects for the study worked within
the highway construction industry, or were directly involved in the projects (i.e.,
utilities, city officials, etc.).
The self-reporting instruments and interviews assessed the subjects’ perceptions of the variables under study. No overt behavior data was gathered.

The extent to which these findings can be generalized to similar projects in other states is limited as no data outside of Iowa was gathered. In addition, only one Partnering facilitator was used and therefore, the results from a Partnering workshop utilizing a different facilitator may not result in similar conclusions or inferences.

Significance of the Study

This study will add to the literature and body of knowledge related to Partnering. It should also help to promote a further understanding of the importance and relevance of individual attitudes and perceptions of project personnel prior to initiating a construction project. The need to identify, discuss and clarify perceptions regarding the project and its personnel as an initial step in introducing Partnering concepts and principles to groups is also supported.

Partnering was not initiated by the Iowa DOT directly to decrease costs. It was initiated to decrease adversarial relationships between the Iowa DOT and its contractors, improve quality and enhance public relations. This study examines the effects of Partnering on subjects' perceptions of problem solving, teamwork, communication, trust, respect and workmanship on construction projects. This study also examines the effects of Partnering on the quality, profitability and productivity on construction projects.

The data gathered was designed to identify changes in subjects' attitudes and perceptions throughout the duration of the Partnering projects. This study will add
insight into whether Partnering enhances positive perceptions and attitudes of construction personnel within the Iowa DOT system.

Organization of this Report

The following chapters provide greater details regarding Partnering, and the methodology, treatment, instrumentation and findings of this research.

Chapter II offers a review of current Partnering literature, definitions of Partnering and the Partnering process. The recent history of Partnering within the private- and public-sectors is outlined and the conceptual and quantifiable results of other Partnering projects are discussed.

Chapter III provides an extensive description of the methodology of this research. In this chapter the treatment, instrumentation and data gathering procedures are extensively defined.

The results and findings of the data analysis are presented and interpreted in Chapter IV.

Chapter V offers a summary of this research and its implication. Recommendations for further research are also presented in this chapter.
CHAPTER II.
LITERATURE REVIEW

Introduction

This study focused on the relationships between the Iowa Department of Transportation Heavy Highway Construction Department personnel and the independent contractors that work with the Iowa DOT to construct roads and bridges in the state of Iowa. In 1991 the Iowa Department of Transportation made the decision to implement a new program called Partnering within their construction department. Dr. Roy Park, a management consultant, and this author worked with the Iowa DOT to develop the program and the subsequent training. Inquiries into whether Partnering can have a positive effect on trust, respect, problem solving, communication, teamwork and workmanship are the purpose of this research.

The developers of the Iowa DOT Partnering program and this author believed that by changing attitudes, behaviors would also change and as a result construction projects would become more profitable for the contractors and result in a better quality project for the Iowa DOT. The overall goal of the Partnering program was to reduce the adversarial relationships and increase the enjoyability and satisfaction levels of the project personnel (J. Smythe, personal communication, November 1993).

This chapter provides a comprehensive discussion regarding the definition of Partnering and its introduction into the nation’s Departments of Transportation. Many claims have been made about Partnering. These claims are presented here. A very limited number of studies have been conducted on
Partnering. These studies and their results are discussed as well. The principles of Partnering and a description of the Partnering workshop are also presented. Concluding thoughts formulated from the literature are elaborated on at the end of this chapter.

Definitions

There are basically two schools of thought regarding the type of partnership which defines Partnering. One school believes that Partnering is a short-term, project-specific, relatively informal and not legally binding commitment. The other school defines the Partnering relationship as more long-term (a number of years), more formal, and more legally binding. Typically, this latter definition is utilized in the private sector and the former definition is utilized in the public sector. Much has been written about both types of Partnering and that literature is reviewed here. The focus of this research, however, is Partnering within the public-sector and, therefore, the public-sector literature is reviewed more extensively than the private-sector literature.

Creating an environment where trust and teamwork prevail and disputes are worked through instead of held against; where a cooperative bond is developed in which all benefit and a successful project is completed is how the Associated General Contractors of America defines Partnering. The AGC reports that the key elements of Partnering are: commitment, equity, trust, mutual goals, work strategies, evaluation and timely responsiveness (AGC, 1991).

The United States Army Corps of Engineers describes Partnering as "the creation of an owner-contractor relationship that promotes the achievement of mutually beneficial goals" (Edelman et al., 1991, p. 1). The relationship is not a
formal contract and in no way jeopardizes or alters the specifications of the project, but the relationship does include an agreement to share risks and promote mutual growth and success. Ultimately the relationship is a product of the incorporation of the Partnering philosophy to create attitudes in which each party seeks to understand the goals, objectives and needs of the other and identify ways in which these objectives can overlap and be accomplished. The Corps identifies the following signs of successful Partnering: sharing of goals, clear expectations, trust, confidence, commitment, responsibility, courage, understanding, respect, synergistic teamwork and excellence (Edelman et al., 1991).

The Construction Industry Institute has authored a number of publications on Partnering. The CII defines Partnering as, "a long-term commitment between two or more organizations for the purpose of achieving specific business objectives by maximizing the effectiveness of each participant's resources" (CII, 1991, p. 2). The relationship is based upon trust, dedication to common goals, and an understanding of each other's individual expectations and values" (Hancher, 1989, p. 5). The CII elaborates on this definition by stating that Partnering seeks "win-win" solutions, trust and honesty, profitability, participatory problem solving, innovation and value engineering, teamwork and quality. The CII views Partnering as a formal relationship in which all parties commit to openness and developing trusting relationships. Innovation and questioning is encouraged and mutual decision making and understanding of one another's objectives are the goals (CII, 1991).

Each of the definitions previously reported are complimentary and similar in concept, however, the CII's definition focuses on a long-term commitment
and shared vision between the parties. The AGC and Corps' definitions highlight trust and teamwork with the relationship being shorter in duration.

Consistently, Partnering is defined as a process in which two or more parties cooperate to an unusually high degree to achieve their separate but complimentary objectives (Stralkowski & Billon, 1988). Partnering seeks to create a new cooperative attitude within working relationships. Many suggest that this cooperative attitude is the result of first and foremost a Partnering workshop conducted prior to the start of the construction project (AGC, 1991; Edelman et al., 1991; CII, 1991).

The Partnering Workshop

The Association of General Contractors, the Army Corps of Engineers, the Construction Industry Institute, and the Departments of Transportation in Arizona and Washington all suggest essential components of a Partnering workshop. These components include: 1) communication and performance objectives, 2) dispute resolution procedures, 3) evaluation process, and 4) a show of commitment (AGC, 1991; Edelman et al., 1991; CII, 1991; Cowan, 1991; Anderson, 1992).

Early preparation, management commitment, identification of common goals, the creation of a team charter, and follow-up meetings are stressed by the Corps of Engineers. The Corps also suggests that participants in the workshop develop and practice skills and attitudes required for the development of a sense of teamwork. They believe that one of the important by-products of the Partnering workshop should be the learning of lessons from the past and the creation of new experiences to strengthen future relationships. The participants
should develop problem solving strategies which enable individuals to quickly identify problems and efficiently solve them (Edelman et al., 1991).

The AGC provides a sample workshop agenda in their Partnering literature. This agenda includes a Partnering overview; an examination of barriers, problems and opportunities; the development of a mission statement; an analysis of interests, goals and objectives; and the establishment of an evaluation process. The combination of all of these agenda items are used to create the Partnering Charter (AGC, 1989). The CII suggests that the Partnering process be divided into four sequential steps: 1) strategy development, 2) partner selection, 3) contract negotiations and 4) implementation (Hancher, 1989).

The Arizona DOT encourages organizations introducing Partnering to utilize an impartial facilitator who has expertise in team building, consensus building and the development of trust among individuals to conduct the workshops (Jones, 1991).

History of Partnering

Partnering has been introduced and utilized in many different industries throughout the United States. In the private-sector Partnering has been in practice for many years. Within the private-sector Partnering offers an opportunity to negotiate a price and avoid stress and litigation. Company A may agree to use Company B for all work in a given area, in exchange for a large degree of cooperation and flexibility.

Tom Peters (1991) recently studied Partnering within the United States, Germany and Japan. He found that Germany was in the forefront with regard to embracing the Partnering philosophy and entering into partnerships with
suppliers, vendors, competitors and past adversaries. The United States was second based on the criteria Peters used in his evaluation and Japan was third, exercising the most restraint in the sharing of information and the forging of partnerships with others (Peters, 1991). Unfortunately, no specific information regarding how Peters conducted this research or what criteria he used to evaluate and interpret the results could be found.

Some experts herald Henry Ford and the Ford Motor Company as the first organization to implement formal partnerships back in the 1920's (Stralkowski & Billon, 1988). When the Model T was first being produced, Ford Motor Company depended on its suppliers. One company supplied the engines, another the axles, another the bodies, another the windows and so on. Ford's suppliers became economically and industrially its partners with their profits and growth intimately linked to Ford's.

Du Pont is also a pioneer organization with regards to Partnering. In 1986 Du Pont became one of the first organizations to establish formal, universally acknowledged partnerships with other organizations. Over the years Du Pont has established many product development partnerships with numerous customers across all fields (CII, 1991).

Du Pont has found that when their partners profit Du Pont profits as well. Du Pont encourages their partners' efforts by assisting in their innovations and providing a kind of stability when the partners take a risk. The partners benefit by gaining access to Du Pont's resources and Du Pont benefits by securing services and products quickly. This allows Du Pont to bring their products to market quickly and be the exclusive supplier to its customers. After a specified period of time Du Pont's partners are free to share their services and products with other
corporations and reap further benefits of greater profitability and market share. In 1986 Du Pont established a Partnering relationship with Fluor Daniel. As a result of this relationship Fluor Daniel has become responsible for approximately one-third of Du Pont's billion dollar workload and has over 300 employees servicing Du Pont products (Wilkinson, 1988; Rubin & Lawson, 1988).

However, unlike the private-sector, in the public-sector, the "owner" or government agency(ies) are required to work with the prime contractor and their subcontractors who submitted the lowest bid (Cowan, 1991). Some of the problems or fears that the parties must work through prior to formalizing a Partnering relationship include differences in culture, the equalization of risk taking, the maintenance of commitment and the feelings of dependency and overbearance. Interviews conducted with owners and contractors imply that owners are most concerned with control of the organization and the contractors' primary concern involves the communication process (Hancher, 1989; CII, 1991).

A main barrier to a successful relationship, as reported by Lester Edelman, Chief Counsel for the United States Corps of Engineers, is the erroneous assumption that the partnership will require too close a relationship, with little flexibility, objectivity or oversight opportunities. Partnering should not limit power but rather empower. If the parties feel that they are no longer individual entities but rather consumed by a dominant party then Partnering will fail and the relationship will worsen (Edelman et al., 1991).

Another issue which is sometimes overlooked when implementing Partnering is that not all project personnel will be able to attend the Partnering workshop. These individuals will have limited knowledge of Partnering's principles. They may be asked to accept new processes, procedures and goals
which were developed during the Partnering workshop in which they were not a part of. It is important to inform these individuals quickly and secure their commitment to Partnering early in the project (Geary, 1991).

Organizations that have maintained strong Partnering relationships often cite similar guidelines or rules for their relationships, such as: all should experience mutual gain from the relationship; all should look forward to including their partner(s) in opportunities; there should be an understanding of one another's cultures; promises should only be made on what can be delivered; open channels of communication should be developed; and, an agreement should be made that the best decisions are the ones made together (Sonnenberg, 1992). "You have to assume that the other party is honest and intends to do a good job" (Cowan, 1991, p. 3).

The first major organization to introduce Partnering into the public-sector construction industry was the U.S. Army Corps of Engineers. Under the command of Col. Charles Cowan, the Corps began construction on its first project utilizing Partnering principles in 1988 (Edelman et al., 1991). The Mobile District in the South Atlantic Division and the Portland District in the North Pacific Division have become pioneers in the use of Partnering. Partnering was developed by the Corps to combat the deteriorating relationships between their own personnel and their contractor counterparts. During a ten year period dispute/grievance claims filed by contractors against the Corps had risen 200% with an average annual cost of $1 billion (Cowan, 1991).

The Corps and their contractor counterparts took an honest look at their management and construction processes and discovered inefficiencies in decision making, cost control, timeliness of conflict resolution and combative
inconsistencies and insensitivity to one another. The contractors working with the Corps were unaccustomed to and unaccepting of the bureaucracy of the government agency. Because of time-consuming "red tape" the contractors' narrow profit margins were diminishing and costly legal litigations increased while work satisfaction decreased (Hatch, 1991a). "Some government officials actually believe that deliberate, time-consuming thought saves money. They assume that taxpayers will be satisfied if their money is spent judiciously as opposed to efficiently" (Johnson, 1991, p. 2).

The government officials, required to stay within pre-approved budgets were hesitant to risk utilizing new construction methods advised by contractors; the contractors, always trying to increase their profit margins were frustrated by the mandate that they continue to use outdated techniques and processes. In an attempt to resolve these differences in construction philosophy often even minor disputes were referred to a third party. The American Arbitration Association's caseload for construction dispute resolutions was increasing at the rate of 10% a year (Johnson, 1991).

As a result of these conflicting management and construction practices the contractor and owner ended up operating two separate teams with different cultures, objectives and goals. Inevitably, an adversarial relationship developed with each side trying to maximize and accomplish their own agenda regardless of the effect on the other party. The projects became destructive rather than productive.

David Johnson, an attorney with the Corps of Engineers, states that, "This kind of relationship is almost inevitable, regardless of how amiable the parties
were to begin with. The result is increased costs for the taxpayer and declining profit margins for the contractor" (Johnson, 1991, p. 2).

In 1991 Col. Charles Cowan became Director of the Arizona Department of Transportation, by this time his accomplishments within the Corps helped to convince the management of the Arizona DOT that Partnering was a successful alternative to costly adversarial relationships within the public-sector construction industry. He brought the lessons he had learned about Partnering with him and introduced Partnering to the nation's Departments of Transportation. As of January 1993, the Arizona DOT has implemented Partnering on over 60 construction projects (Williams, 1992).

In Arizona the value of the filed claims for Fiscal Year 1991 was over $23 million, a 70% increase over the previous four years. This $23 million did not take into account the loss in resources by both owners and contractors on the projects as a result of their preparation and defense of the litigations. Because many of these legal complaints were a consequence of differences in interpretation of contractual construction specifications the Arizona DOT re-wrote their Standard Specifications for Road and Bridge Construction. This manual was at one time a small hard bound booklet consisting of 412 pages which easily fit in the pocket of state inspectors. The 1990 edition contains some 800 pages, the desire to meet project intent has disappeared and instead project personnel have to refer to the specifications book before any decision and/or discussions can begin (Warne, [1991]).

In addition to these legal costs, in 1991 27% of the projects under construction were not completed on time and cost-growth dramatically increased
while it took longer and longer for even the simplest of decisions to be made (Warne, [1991]).

During the late 1980s the Washington Department of Transportation also began to study the amount of contractor claims filed against them. The Washington DOT became concerned and started looking for solutions. They established a Disputes Review Board which reduced the number of claims to an "expectable level". However, a Governor's Efficiency Committee, in 1989 found that adversarial relationships existed between contractors and the Washington DOT employees. It was recommended that an Interpersonal Relationships training course be developed. As a result of this recommendation the concept of Partnering was studied and the first Partnering Workshop was conducted in the summer of 1991 for a $24 million project. While developing the workshop, the Washington DOT worked closely with the Corps of Engineers and the Association of General Contractors. The workshop focused on dispute resolution, interpersonal relationships, and the establishment of performance goals (Anderson, 1992).

As of June 1993, the Wisconsin DOT has implemented Partnering on 57 projects ranging in contract value from $74 million to $1 billion.

Since then a number of states have begun constructing projects within the Partnering philosophy. Workshops have been held, charters developed and positive results reported. Travis Chapin and Cristina Wildermuth of Bowling Green State University have just begun to collect information on Partnering within the 50 Departments of Transportation in the United States. Their initial results indicate that as many as 40 DOTs in the U.S. are implementing some form of Partnering on at least one project in their state. Chapin is quick to point
out, however, that Partnering is not a uniform process and one state's
textual representation of this document as if you were reading it naturally.
interpretation of Partnering is not another state's. Some states are conducting
week-long Partnering workshops while others are conducting half-day
workshops. Some states are reporting high levels of cooperation and support
from the contractors involved while others report great challenges and
apprehension by all parties (Chapin & Wildermuth, personal communication,
January 24, 1994).

There are many books and articles written singing the praises of
Partnering but little hard data is available to support these positive testimonials
(AGC, 1991; Sujansky, 1991). The limited data that is available typically focuses on
whether Partnering increases profits or decreases disputes on projects. There has
been very little research or investigation into the results of Partnering on the
relationships between the parties. The majority of the research involves
collecting data either after the project is completed or during the Partnering
project itself through the use of a survey instrument (Anderson, 1992, 1993;
Edelman et al., 1991; CII, 1991). There is very little information regarding changes
in attitudes among project personnel before, during and after a Partnering
experience. A review of the unsupported and supported claims follows.

Partnering Research Findings

When the Partnering literature is reviewed we find two basic trends or
directions in which the writings of Partnering can be grouped: 1) information
regarding individual case studies, opinions and conceptual conclusions; and, 2)
studies in which quantifiable data regarding Partnering is presented. There is an
abundance of literature within the first grouping and very limited information
reported within the second grouping. Many authors are quick to share their own subjective views on the benefits of Partnering but very few authors couple that information with actual research. This section offers a review of both the subjective and objective literature. The subjective and conceptual literature is presented first with the few research studies presented next. It should be apparent to the reader that the conceptual information dominates the Partnering literature while actual research is limited.

The CII, AGC and Arizona DOT have become some of the loudest advocates for Partnering. These organizations have published numerous documents and articles highlighting the benefits of Partnering. They suggest that in order for these benefits to materialize a number of conditions must be present. These conditions include: commitment, trust, development of mutual goals, continuous evaluation of the process, shared risks and a shared vision of success (CII, 1991; AGC, 1991).

Although there is little empirical evidence to support their claims, many organizations and individuals have written about their Partnering experiences, and the benefits they have witnessed. The AGC reports in its Partnering literature that Partnering reduces exposure to litigation; lowers the risk of cost overruns and delays; produces a better quality project; opens communication; lowers administrative costs; increases opportunities for innovation; enhances profitability and productivity; and expedites decision making. The AGC also suggests that by demonstrating integrity and fair-dealing the respect of coworkers is gained which in turn produces a positive reputation within the industry (AGC, 1991).
Marvin Black, President of the AGC is making Partnering his number one priority. He believes Partnering is a critical tool in rebuilding the construction industry and improving project quality and profitability (Bainbridge & Abberger, 1991).

In their publication, In Search of Partnering Excellence, the CII reports successful Partnering case studies in the petroleum, chemical, manufacturing and public works industries. No specific organizations or references are given, however (CII, 1991).

Although many of their claims are still pure speculation or based on very limited data, the CII should be given credit for attempting to initiate some empirical research to assess the benefits of Partnering. The CII was founded in 1983 to improve the cost effectiveness of the construction industry; their efforts have focused on the productivity, profitability and quality of the Partnering projects (Hancher, 1989).

The CII’s literature on Partnering states that the results of Partnering include continuous improvement of quality of services and products; more effective utilization of resources; improved profits and value for all parties; the development of long-term teamwork, trust and commitment; and, the development of new skills and processes (Hancher, 1989). In 1987, the CII established a task force to examine the benefits and risks of Partnering. They surveyed seven owners and eleven contractors. The survey was broken into three categories: 1) existing Partnering relationships, 2) expectations of benefits, and 3) challenges to establishing Partnering relationships (Hancher, 1989). No other information regarding the methodology of the study, the research instrument or the data analysis are reported.
The CII does, however, conclude from its data that over 75% of the respondents indicated less adversarial relationships, improved resource planning, increased openness, increased trust levels, improved safety on projects, fewer project errors, increased quality and improved communication and teamwork. Ten percent of the respondents reported increased contractor profitability and engineering cost reductions and over 7% of the respondents indicated reductions in total project costs and improved scheduling of the project (CII, 1991).

When interpreting the results from the CII study it must be emphasized that the CII has a slightly different definition of Partnering than the definition used for this study. Their sample was composed of very large and well established firms throughout the country, whose Partnering relationships are long-term in nature and whose written agreements or charters are more formal in language and more legally binding. In their 1989 report the CII states that the Partnering relationships they have studied were in existence for at least four years, many of these relationships resembled a task force or separate business division with a Vice President presiding, and a core group of one to four owner representatives and five to ten contractor representatives were organized to lead the Partnering effort (Hancher, 1989).

Similar to the case studies offered by the CII, the Corps provides the Oliver Lock and Dam Replacement and the Bonneville Dam Navigation Lock and Diaphram Wall projects in the Mobile and Portland districts as successful case studies in their literature. The Corps offers an overview of the projects and the objectives for success. They also claim an abundance of Partnering benefits and advocate the use of Partnering. Based on the outcomes of the projects the Corps
concludes that "Partnering was the cause of the success that was realized" (Edelman et al., 1991, p. 13). However, no specifics are mentioned, no data provided and no description is offered regarding how "success" was defined.

Lt. H. Hatch, Chief of Army Engineers, does not think it is a coincidence that cost-growth on Partnering projects has been reduced by 80%, administrative paperwork has been significantly diminished and value engineering opportunities have exceeded their expectations. However, no empirical data is referenced to support these claims (Hatch, 1991b). The only quantifiable data they offer is that the number of value engineering proposals submitted on projects have increased (McGriffen, 1991).

Following the lead of the CII; after reporting results that they could not back up, the Corps of Engineers in 1992 conducted a research study of 37 districts. Of those 37 districts 16 projects were utilizing Partnering principles. A survey designed to measure project costs, cost of change orders, cost of claims, value engineering savings and scheduling was administered and the results were categorically positive. Data was also collected from non-Partnering projects and both sets of data were compared with results showing that Partnering projects performed better than non-Partnering projects in the categories of cost, scheduling, change-order costs, claims costs and value engineering savings. Interviews conducted with project representatives suggest that the project personnel experienced more enjoyable project work environments, reduced communication barriers, and less adversarial relationships (Weston & Gibson, 1993).

Richard Geary, President of Kiewit Pacific Company, an independent contractor who was involved in a Partnering project with the Corps, stated that
some of the most positive results of the Partnering experience were better attitudes among personnel, better access to the designers and technicians and a more open process for identifying problem areas and solving difficult issues (Geary, 1991).

In 1992, the Arizona DOT collected data on seven of its completed Partnering projects. No information has been made available as to how this data was collected, or what type of instrument was used. Nevertheless, they state that Partnering resulted in substantial improvements in conflict resolution, profitability, time savings, relations and effectiveness of decisions. The Arizona DOT claims to have experienced a 23% increase in projects completed on time. These projects were completed 3% under budget, paperwork was decreased by roughly one-half, and by June 1993 they estimated a savings of $11 million through Partnering (Williams, 1992). No further definition or elaboration as to what is meant by effectiveness of decisions, conflict resolution or the other variables is made.

The Washington DOT initiated two separate evaluations on the effectiveness of the Partnering programs in their state. The first study was conducted in 1992 on 22 projects and the second study was conducted in 1993 on 9 additional projects. The surveys used in this study were administered four to six months after the initial Partnering sessions. The surveys assessed conflict resolution, trust, respect, communication, enjoyability and personnel attitudes. On all of the areas assessed at least 70% of the respondents indicated that there were positive results and improvements (Ruth & Paganni, 1993).

The Washington DOT interpreted the results of their study to suggest that there have been significant improvements in communication, trust, respect and
conflict resolution. They state that there is more open communication between the DOT personnel and the contractors and attitudes among all personnel are improving (Ruth et al., 1993). These research conclusions are based not on observable behaviors but rather on data collected from an instrument designed to assess perceived levels of these variables. This is similar to the data assessed through this study. However, the Washington DOT interprets their results to suggest that actual behavioral improvements were reported.

However, similar to the research conducted by CII and the Arizona DOT no elaboration is given regarding the specific data collection procedures other than that data was collected one time during the duration of the project. The instrument used by the Washington DOT has not been tested for reliability or validity and the data analysis allowed for the seven-point scale to be interpreted as 1-3 equals "worse", 5-7 equals "better" and 4 equals "same". Because the data was only collected one time during the project no conclusions can be made as to the maintenance of these results throughout the length of the project. No control data was collected in which to compare these results to.

Conclusions

As the literature supports, a number of Departments of Transportation are collecting data on quality, value engineering opportunities and cost-effectiveness of Partnering (Anderson, 1992, 1993; Williams, 1992). No organizations, however, are collecting data on participant relationships or perceptions of Partnering specifically regarding problem solving, teamwork and workmanship. The Washington DOT and the CII are the only organizations which have collected data on trust, respect and communication, even though the literature
states that these are key elements to successful Partnering projects (CII, 1991; AGC, 1991; Anderson, 1992, 1993; Edelman et al., 1991).

Although the research designs and methodology of the previously reported Partnering research did not provide direct assistance in the design and methodology of this study, previous research did provide assistance in identifying variables which should be studied further. These variables include problem solving, teamwork, communication, trust, respect, and workmanship.

This study was conducted to examine subjects' perceptions and attitudes related to these relationship variables: problem solving, teamwork, communication, trust, respect and workmanship.

Many of the conclusions of previously reviewed research are suspect in that they state, for example, that communication, trust, respect and conflict resolution increased as a result of Partnering. No definitions are provided as to how these variables were defined or at what level they were prior to initiation of Partnering. The researcher(s) simply ask the subjects whether these variables have increased or decreased (Ruth et al., 1993). The instrument used for this study examines these variables and others through a number of different types of questions, not just, "were there improvement or not?" This study also establishes baseline measures for each of the variables under study prior to the start of the Partnering process.

The Partnering literature defines trust and respect as the sharing of information and acknowledging the need for confidentiality of this information. This includes consistent verbal and non-verbal actions and the development of understanding relationships without cynicism. Efficient problem solving and
communication are defined as timely, proactive and inclusive (CII, 1991; AGC, 1991).

The U.S. Army Corps of Engineers states that Partnering success indicators are dependent on the ability of partners to communicate and solve problems. The underlying goal of Partnering is the creation of relationships that enhance the opportunity to achieve mutual, beneficial objectives by establishing and promoting a nurturing environment. This is most commonly referred to as teamwork (Edelman et al., 1991).

Workmanship indicators have received more attention from Partnering advocates. Data has been collected on cost-effectiveness, safety, paperwork, litigation claims, value engineering, timeliness, rework, plan changes and quality (Williams, 1992; CII, 1991). However, this data has traditionally been collected after completion of the project and has been analyzed based on very objective, quantifiable data. No information has been gathered on project participant's perceptions of workmanship indicators during the project. The project may be categorized as a "success" based on organizational specifications but may not be categorized as a "success" by the project participants.

All of the research previously reported were conducted through a one-time data collection design. No conclusions can be made as to the longitudinal effects of Partnering on a construction project. This study was designed to collect data during three intervals of the project: prior to initial start, one-third of the way through the project and again upon completion of the project. The data provided should help in the interpretation of the effects of Partnering throughout the duration of a Partnering project. This study serves as an initial
attempt in conducting a more formal research study and may provide a resource on which to build upon.

This study gathers and analyzes this more subjective, perception-based data directly from the Partnering participants. Data was also collected and analyzed to examine the quality, profitability and productivity of Partnering projects as compared with non-Partnering projects.

In addition, as Geary (1991) reports, it is important to include the project personnel who did not participate in the Partnering workshop in all decisions and assessments of the Partnering process. These individuals were included in this research.

Chapter III provides a comprehensive description of the methodology of this study.
CHAPTER III.
METHODOLOGY

Introduction

The purpose of this study was to assess the attitudes and perceptions of Iowa Department of Transportation heavy highway construction personnel and independent contractors working on highway projects. These attitudes and perceptions were assessed prior to and following participation in a two-day Partnering workshop. The assumptions of this study were that an adversarial relationship exists between the Iowa DOT personnel and their private industry counterparts. It was assumed that this adversarial relationship was based on negative perceptions and attitudes which inhibit trust, respect, teamwork, communication, effective problem solving, profitability and quality of the projects. It was also assumed that a Partnering workshop could positively influence this relationship.

It was conjectured that 1) If there are low levels of trust, respect and communication among co-workers on a heavy highway construction project the quality, profitability and productivity of the construction projects will suffer; 2) If Partnering is implemented the participants' perceptions of teamwork and performance on the Partnering projects will improve; 3) If a Partnering workshop is conducted prior to the start of the construction project the participants' attitudes toward the project and their co-workers will be more positive than before the workshop; and, 4) If workshop participants' attitudes and perceptions regarding the Partnering projects are favorable these positive attitudes and perceptions will be transferred to their co-workers. The subjects for
this study included Iowa DOT personnel and independent construction contractors. The treatment was a two-day Partnering workshop, the research instruments consisted of a series of attitude questionnaires and a close-out data gathering form. The dependent variables were trust, respect, teamwork, communication, problem solving, workmanship, quality, profitability and productivity.

This chapter provides a detailed explanation of the methodology, treatment, instrumentation, data gathering procedures and data analysis used for this research.

Design of the Study

This study was initiated in the Fall of 1992 with the cooperation of the Iowa Department of Transportation. In 1991 the Iowa DOT introduced Partnering on a couple of their highway construction projects. In 1992 they began implementing Partnering on a more wide scale basis. This study was designed in an attempt to assess the effects of Partnering on project personnel relations and project quality, profitability and productivity.

Six Partnering projects and one control project were identified for the purpose of this research. A two-day Partnering workshop was conducted for each of the Partnering projects and an assessment of the workshop participants' attitudes and perceptions regarding past and current projects was gathered.

A 41-item and a 20-item questionnaire were developed to conduct this assessment. The 41-item questionnaire was designed as a pre-questionnaire, a follow-up questionnaire and a close-out questionnaire. These questionnaires were administered to participants of the Partnering workshop prior to the
workshop, one-third of the way through the construction project and again two weeks prior to completion of the project. The series of 41-item questionnaires were also administered to the personnel on the control project.

The 20-item questionnaire was administered to personnel on the Partnering construction project who did not participate in the Partnering workshop. These subjects completed the 20-item questionnaire approximately half-way through the construction project. Individual and small group interviews were conducted at offices on the job site or DOT offices in the area.

The variables under investigation were problem solving, teamwork, communication, trust, respect and workmanship.

An additional instrument was developed to gather data related to the projects' quality, profitability and productivity. Fifteen non-Partnering projects served as a control for this analysis.

A number of departments within the Iowa DOT and a wide range of independent contractors, suppliers and civic personnel served as the subjects for this research.

The six Partnering construction projects were conducted in the counties of Monroe, Warren, Franklin, Clay, Johnson and Bremer. The control project was conducted in Cass County.

Universe of the Study

The universe of this study consists of all Iowa DOT construction personnel and over 400 construction-related companies in the state of Iowa who contract services with the Iowa DOT. The Iowa DOT has pre-approved approximately 75
prime-contractors in the state and there are an estimated 350 subcontractors, suppliers and related specialty contractors in Iowa.

At the time of the study, there were approximately 450 individuals employed in the roadway construction department of the Iowa DOT. These individuals and the members of the Iowa construction industry are very diverse. The length of services range from a couple of months to over twenty years, education levels range from GEDs to Masters of Science. The majority of individuals in this field are white males, but females and other minorities are represented as well.

As a result of the passage of the Disadvantaged Business Enterprise Program Act, the Iowa DOT now requires at least one minority contractor on almost all of its heavy highway construction projects. Each of the Partnering projects in this study included a minority contractor.

For the 1991-1992 fiscal year the Iowa DOT had a budget of $310 million for heavy highway construction, the budget for fiscal year 1992-1993 was $220 million (J. Smythe, personal communication, November 1993).

Subjects

The criteria used to identify a project for Partnering was developed by the Iowa DOT and included complexity of the project, scheduling, impact of the project on the public and the risks involved if the project was not completed properly. After approving a bid and awarding the project to a Prime Contractor the Iowa DOT approached the project participants and requested their involvement in the Partnering workshop prior to the start of the project. The Iowa DOT was responsible for determining which projects would be classified as
Partnering projects. Participation in the Partnering workshop was voluntary and not a condition of bid approval.

Seven projects were included in this study, six were chosen for Partnering and one served as the control project. The six Partnering projects were very diverse. Following is an overview of each of the projects.

Project 1 was located in Monroe county, it had a budget of $1,230,000, its timeline was 115 working days and the construction consisted of Grade and Portland Cement Concrete (PCC) Paving on relocated Iowa 137. Project 2 was also a PCC paving project in Warren county on Iowa 92, it had a budget of $1,505,000 and 65 days were allowed to complete it. Project 3 was a $2,616,000 Asphaltic Cement Concrete (ACC) resurfacing project on I-35 from Iowa 3 north to Interchange No. 170 in Franklin county. The contract allowed for 85 working days to complete this project. Project 4 was a PCC paving project in Clay county on US 71. The contract was awarded for $2,863,000 and 115 working days were allocated. Project 5 was constructed in Johnson county, it was the largest monetary project with a budget of $12,515,000. The project was PCC paving job on I-80 and 210 days were allocated to complete it. Project 6 was constructed in Cass county, it was a $662,397 bridge construction project on US 6. Eighty-five days were allocated to complete this project.

Quality, profitability and productivity data was collected on 15 additional non-Partnering projects which served as a control to test hypotheses 1.1, 1.2, and 1.3. No questionnaires were administered to any of these subjects.

The departments of Construction, Design, Maintenance and Administration within the Iowa DOT were most active in the process of Partnering and were most involved in this study. Personnel within these
departments included: Construction Engineers, Resident Construction Engineers, Assistant Resident Engineers, District Construction Engineers, District Engineers, District Materials Engineers, Materials Technicians, Central Materials personnel, Designers, Construction Technicians, Assistant Construction Engineers; and Inspectors. Private companies in the construction industry most involved in this study include: pavers, excavators, project managers, asphalt resurfacers, pavement rehabilitators, erosion controllers, traffic controllers, underground pipe workers suppliers and related specialty sub-contractors; utility personnel; city, county and business professionals.

The sample for this study consisted of 261 subjects. One hundred and forty-six of these subjects participated in the treatment, ninety did not participate in the treatment but worked on the Partnering projects and twenty-five of the subjects were a part of the control project.

A two-day Partnering workshop was conducted for each of the Partnering projects. Participants in the Partnering workshop included both males and females over the age of eighteen and represented the 'management' or decision makers within the Iowa DOT, the contractors' organization, the subcontractors' organization, the suppliers' organization and related individuals who functioned as decision makers with relation to the project.

Participation in this study was strictly confidential and voluntary, no incentives or compensation were given for completing the questionnaires. All subjects were made aware that the purpose of this study was to supply data for a doctoral dissertation and the results of the study would be made available to them upon request.
Based on the data collected in the demographic section of the questionnaires the breakdown of respondents were: 26% were employed with the Iowa DOT Resident offices, 11% were employed with the Iowa DOT District offices, and 4% were employed in the administrative offices of the Iowa DOT. Personnel from the Prime Contractor represented 21% of the respondents, 26% were employed with or were the Sub-Contractor and 2% were independent suppliers. The Federal Highway Administration represented 4% of the respondents, city officials represented 3% of the respondents and 2% did not complete the demographic section of the questionnaire. Males constituted 99% of the respondents and females 1% of the respondents.

For analysis purposes these subjects were grouped based on the project they worked on and by organizational affiliation. Twelve percent of the subjects worked on Project 1, 27% of the subjects worked on Project 2, 12% of the subjects worked on Project 3, 16% of the subjects worked on Project 4, 21% of the subjects worked on Project 5, and 16% of the subjects worked on Project 6. Subjects employed with the Iowa DOT represented 41% of the subjects and those employed with independent contractors represented 48% of the subjects. A small number of subjects (11%) did not work for either of these groups of organizations. A complete demographic breakdown can be found in Appendix C.

Treatment

A two-day (16 hour) Partnering workshop constituted the treatment condition for this study. The workshop was facilitated by Roy Park, Ph D. for the six projects included in this study. A seventh project served as a control and no workshop was conducted. All but one of the workshops, which was conducted
during September 1992, were conducted during a twelve week period between July 1993 and September 1993. The number of participants at each workshop ranged from 28-45 individuals with approximately equal representation from the Iowa DOT and Contractor personnel.

It has been suggested that the most effective site for a Partnering workshop is one which is perceived to be neutral by all parties and far enough away from current working activities that interruptions are held to a minimum (Cowan, 1991). The workshops for this study were conducted at the Memorial Union, Iowa State University; and Holiday Inn, Ames. Both locations were considered neutral sites by the project participants. The fees for the facilitator were shared between the Iowa DOT and the contractors involved on each project. Participation was voluntary and all contractors who were asked to attend did willingly participate.

It has also been suggested that the facilitator of the workshops should be viewed as impartial and be competent in the areas of group dynamics and conflict resolution. In addition, the facilitator should add value to the team by functioning in a consultative role (Bienn, 1992). Dr. Park has over 20 years of experience as a management consultant, focusing in the areas of teamwork, communication, problem solving and interpersonal relations.

Throughout the development phase of the Iowa DOT Partnering program resources from the Corps of Engineers, the Association of General Contractors and the Washington Department of Transportation were utilized. The workshops were identically structured but as groups and personalities differ so did each workshop agenda, although not so significantly as to constitute different or independent treatments. Topics of the workshop included trust, teamwork,
problem solving and communication. Activities included individual assignments, small-group work, large-group work, video analysis, lecturettees and take home assignments. The agenda for the workshop can be found in Appendix D.

Throughout the workshop the participants worked together to develop a Project Charter. The charter consisted of a mission statement, communication objectives, performance objectives and an issue resolution system. At the conclusion of each workshop the charter was printed up and signed by all individuals. The charters from each of the projects involved in this study are presented in Appendix D.

In addition, the participants of each workshop designed a project logo which symbolized their new collaborative relationship. Examples of these logos can be found in Appendix D.

The Partnering workshop is the "formal" starting point for a Partnering project and relationship. The emphasis in the workshop was on identifying shared interests and focusing on cooperative effort. To accomplish this each individual was asked to critically examine their attitudes, beliefs, values, and previous interactions with each other.

**Foundation**

Once the ground rules for the workshop were established and introductions completed individuals in the workshop participated in activities designed to introduce or reintroduce them to key skill areas that would be necessary for Partnering to operate smoothly. The two primary objectives of the workshop were to create a Partnering attitude and a Partnering Charter (Cowan, 1991; Anderson, 1992).
Therefore, during the first half of the workshop the participants worked through activities related to teamwork, trust, leadership, communication and problem solving. This allowed for the participants to work with similar skill foundations and enhanced the spirit of equality necessary to develop the charter (Edelman et al., 1991). These activities also provided a very valuable learning experience as many of the participants had little exposure to management system education.

Rarely can a project be completed or team maintained without the need to solve problems and resolve conflicts, therefore, conflict management and problem solving skills were a part of the workshop. Decisions under the Partnering relationship must be formulated and implemented as a team (Cowan, 1991).

Role Clarification

In order to develop a new working relationship, previous interaction with one another must be examined. All of the workshop participants bring their own and their organization's reputations to the meeting. Positive or negative, these reputations play a part in project relationships (Johnson, 1991). Participants must communicate their concerns, expectations, assumptions, etc., with one another. Often this is done through an exercise in which, for example, Group A tells Group B what Group B does that hinders Group A's work or level of performance and then Group A tells Group B what it thinks it does to hinder Group B's work or level of performance. This activity is then reversed and Group B tells Group A what Group A does that hinders Group B's work or level of performance and then group B tells Group A what it thinks it does to hinder Group A's work or level of performance. This is commonly referred to as "laying
all the cards on the table". It is an absolutely critical step in the workshop. It is a time to dump all the negatives in a constructive, non-threatening manner.

An important outcome of a Partnering workshop is the opportunity for all project personnel to meet, put faces with names and get to know each other on an informal basis. This is why it is very important that the workshop be attended by top management of all organizations involved as well as field personnel (McGiffen, 1991).

**Mission Statement**

Often, but not always, when two or more individuals agree to work together it is because they hold similar views of the project or objectives of the group. They both want to make a profit, contribute to something's success, provide a service, improve upon the past, or enhance quality. Therefore, although their language may differ, their mission and goals are usually similar or at least complimentary (AGC, 1991).

A common mission statement is an essential first step in developing a Partnering Charter. All projects in this study did define their own mission statements prior to beginning construction on any of the projects.

**Objectives**

The bulk of the charter is made up of communication, performance and issue resolution objectives. These objectives were developed as a group, interpreted by the group, and committed to by all before becoming a part of the final charter.

The communication objectives outlined how the individuals would provide, receive and process information during the length of their relationship. The objectives can be very specific, as to when meetings will be held or how
quickly the turn around time will be between receiving information and communicating it to others. Sometimes the objectives are more general with regards to the nature of communication channels, formal and informal, or the creation of a project newsletter, or the decision to have a project completion picnic and softball game.

The performance objectives are often specific guidelines or production benchmarks that will be used to evaluate the project. They include issues such as safety, quality, timeliness, freedom to make changes or modifications, level of professionalism required, budget guidelines, measures of success or processes needed to be established to catch problems before they become a crisis.

It is not uncommon for each group that comes to the Partnering workshop to have different hierarchies and processes for decision making and issue resolution. When groups are combined however, these different procedures often become cumbersome as each individual must clear decisions or talk out problems with their immediate superiors before work can resume. This can be very time consuming, redundant and frustrating when time is limited and progress is hindered. For Partnering relationships to operate smoothly a unified, easily understood issue resolution process must be established (AGC, 1991). The primary rule of thumb is to develop a system in which problems are solved or decisions are made by those working closest to that issue in the shortest amount of time possible.

During the workshops the participants developed communication, performance and issue resolution objectives for the project they were to be working on.
Implementation and Evaluation

Although not always a part of the formal charter, it is necessary to outline the process by which the information discussed and the decisions made during the Partnering workshop are to be shared with those working on the project but not a part of the workshop. It is sometimes not possible to have everyone involved on the project at the Partnering workshop, but it should be possible to help the non-participants understand what the Partnering workshop was about and its results (Geary, 1991). During each of the workshops this issue was discussed.

The final system that needs to be developed is the evaluation system. Measurements need to be identified regarding what the Partnering relationship should look like in one month, two months, six months, etc., and what the project should look like. The Washington DOT evaluate their Partnering projects jointly with the project contractors every fourteen to sixty days (Anderson, 1992). The Corps of Engineers assigns weights to the project objectives which are then used to evaluate the progress of the project which result in a numerical rating (Edelman et al., 1991).

During each of the Partnering workshops conducted for this study the participants developed an evaluation form that was to be used on that project. Each of these forms were unique to the needs and personality of each project. These forms collected valuable information but because they were developed individually for each project and were not uniform in nature the information was not collected or analyzed for this study. Project close-out meetings/celebrations are often held as a means for final evaluation and positive recognition.
**Partnering Charter**

Participants in each workshop developed a specific Partnering Charter which outlined the mission, objectives, and resolution processes for their project. The charters are not legally binding but participants did hold them in high regard.

At the end of the workshop, after everyone had a chance to review the charter it was formally printed up and each individual signed it to symbolize their commitment to the relationship. The signed charter was then photocopied and distributed to each participant before the conclusion of the workshop.

**Instrumentation**

A series of attitude questionnaires served as the primary research instrument for this study. These instruments were developed by the author to assess a number of the critical elements of Partnering presented in the literature.

As reported in Chapter II, the Corps of Engineers state that sharing, clear expectations, trust, confidence, commitment, responsibility, courage, understanding, respect, synergy and excellence are all signs of a successful Partnering relationship. The Corps narrows this list down to two crucial indicators—the ability to communicate and solve problems (Edelman et al., 1991). The AGC list the key elements of Partnering as commitment, equity, trust, development of mutual goals and objectives, problem solving, evaluation and timely responsiveness (AGC, 1991). Similarly, the CII advocates that trust, commitment and shared vision are the three key elements of Partnering (CII, 1991).
At the time of this study the only other organization that was conducting research related to attitudinal changes as a result of Partnering was the Washington Department of Transportation. The survey instrument used by the Washington DOT was consulted by the author. The Washington DOT's instrument was a very informal one and no validity or reliability data was available. Because the nature of this research was not immediately consistent with that of the Washington DOT it was decided that a unique instrument be designed for the purposes of this research. A review of the Washington DOT's research was presented in chapter two.

Two research instruments were created to assess the subjects' perceptions of problem solving, teamwork, communication, trust, respect and workmanship prior to, during and upon completion of six Partnering projects in Iowa. The two instruments consisted of a 41-item questionnaire for workshop participants and a 20-item questionnaire for non-participants. In addition, specific data was gathered regarding the quality, efficiency, profitability and safety of these projects through a Close-Out Data Gathering Report.

The 41-item questionnaire was designed as a pre-, follow-up, and close-out questionnaire. These questionnaires were administered to personnel on the Partnering project who participated in the Partnering workshop and also to the personnel of the control project. Within these questionnaires three questions assessed perceived levels of trust; 4, 25, and 34. Two questions assessed perceived levels of respect; 26 and 36. Seven questions assessed perceived levels of communication; 3, 8, 10, 11, 12, 13 and 27. Twelve questions assessed perceived levels of teamwork; 2, 5, 6, 9, 28, 29, 30, 31, 33, 35, 39, and 41. Thirteen questions assessed perceived levels of problem solving;
1, 7, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, and 24. Four questions assessed perceived levels of workmanship; 32, 37, 38 and 40.

The 20-item questionnaire included two questions to assess trust: 8 and 16; one question to assess respect: 17; two questions to assess communication: 4 and 5; eight questions to assess teamwork: 1, 2, 3, 6, 7, 11, 13, and 14; three questions to assess problem solving: 18, 19, and 20; and four questions to assess workmanship: 9, 10, 12, and 15. A copy of all of the research instruments can be found in Appendix B.

Pre-Test

An initial trial of the 41-item questionnaire was conducted among representatives from the Iowa DOT on August 12, 1992. Five individuals were asked to read each of the 41 questions, respond accordingly and indicate any problems in interpreting or responding to each of the questions. After extensive review based on the written and verbal comments of these five respondents all 41 questions were retained but minor wording alterations were made to enhance comprehension, interpretation and understanding.

Participant Questionnaires

The 41-item questionnaire consisted of 10 sections developed as a series of six-point semantic-differential statements designed to assess the subjects' perceptions of problem solving, teamwork, communication, trust, respect and workmanship. Each of the 10 sections within the questionnaire began with a leading statement followed by a varying number of six-point response scales. These 10 leading statements on the pre-questionnaire were: 1) On the majority of the projects I have worked on..., 2) Typically, when decisions are made on projects..., 3) Day to day communication (updates, job feedback, status reports,
schedule changes, etc.)..., 4) Negotiations over informal changes or plan clarification..., 5) Negotiations over formal changes or plan clarifications..., 6) Based on my experience on past projects, conflict and disagreements..., 7) Based on past projects I have worked on, I would say..., 8) Experience on past projects leads me to believe that..., 9) On past projects I have felt that..., 10) On past projects I have worked on....

An even-numbered rating scale was used to eliminate the ambiguous "neutral" rating response common in traditional Likert rating scales (Oppenheim, 1966). Following each of the 10 leading statements within the questionnaire a six-point response scale was presented. Thirty-four percent of the questions were designed in which the positive response was positioned on the right side of the questionnaire and 66% of the questions were designed in which the negative response was positioned on the right side of the questionnaire. This organization of questions was used to diminish the potential for a halo-effect (Oppenheim, 1966).

Example:
all parties are considerate of one another

<table>
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<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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The questionnaire included the following instructions:

Instructions: Please circle the number that most accurately reflects your opinion for each set of responses. Your honest answers are important, therefore, you do not need to sign your name to this form. It would be helpful if you would jot down a few words in the 'comment' sections to elaborate on your responses.
An open-ended question, "Can you think of any specific examples related to the above responses?", was asked at the bottom of each page of the questionnaire to allow for additional thoughts, opinions and ideas from the respondents. These responses consisted of anecdotal instances and/or explained the reasoning behind some of the scaled responses.

The final section of the questionnaire was developed to gather demographic information such as, position held on project and organizational affiliation.

The follow-up questionnaire and close-out questionnaire were identical to the pre-questionnaire except that the tenses were changed from past to present and responses were requested for this project as compared to previous projects. The 10 leading sentences on the follow-up and close-out questionnaires were: 1) In my opinion, on this Partnering project..., 2) When decisions are made during this project..., 3) Day to day communication (updates, job feedback, status reports, schedule changes, etc.)..., 4) Negotiations over informal changes or plan clarification..., 5) Negotiations over formal changes or plan clarifications..., 6) On this Partnering project, conflict and disagreements..., 7) On this project I would say that..., 8) Experience on this project leads me to believe that..., 9) During my work on this project I have felt that..., 10) On this project....

The questionnaire included the following instructions:
Instructions: You have been working on this project for a few weeks now. I would appreciate it if you would take about 10 minutes to complete this questionnaire. Using the two statements as guides please circle the number which best represents your beliefs, perceptions, thoughts, opinions, and/or attitudes regarding this project.
Scoring. Raw scores and mean scores were obtained on each item and for each of the six variables under study. Low scores indicate positive perceptions and/or attitudes and high scores indicate negative perceptions and/or attitudes.

Validity and Reliability. Several experts in the field of construction evaluated the 41 items for content and face validity. The questionnaire was developed in an attempt to measure six variables: problem solving, teamwork, communication, trust, respect and workmanship. To examine the validity of this instrument a confirmatory Principal Components Factor Analysis was conducted on each of the variables.

For the variable Problem Solving, three factors were identified through the analysis. The combined variance within this variable explained by these three factors was 64%. Factor 1 had an eigenvalue of 3.182, which accounts for 32% of the variance for this variable. The questions which indicated the strongest loadings (greater than .50) for this factor included items: 1, 14, 16, 17, 22, 23, and 24.

Factor 2 had an eigenvalue of 2.029, accounting for 20% of the variance within this variable. The questions which indicated the strongest loadings for this factor (greater than .50) included items: 14, 15, 17, and 18. Factor 3 had an eigenvalue of 1.204, accounting for 12% of the variance within this variable. Factor 3 was the weakest of the three factors; the only question which had a factor loading higher than .50 was question 19. Questions 7, 20 and 21 had very weak factor loadings (.116, .479, and .422 respectively), with questions 7 and 20 being most strongly associated with Factor 2, and question 21 being most strongly associated with Factor 1.
To examine whether the questions within this variable correlated positively with one another a correlation matrix was created. A review of the Pearson correlation coefficients for the variable Problem Solving indicates that 48% of the questions reported a statistically significant (p < .05) positive correlation with one another.

For the variable Teamwork, three factors were identified instead of the anticipated one. Sixty-seven percent of the variance among the items included in this variable was accounted for by these three factors. Factor 1 had an eigenvalue of 4.407, accounting for 44% of the variance within this variable. Factor 2 accounted for 13% of the variance among the items included in the teamwork variable with an eigenvalue of 1.315. Factor 3 had an eigenvalue of 1.049, accounting for 10% of the variance among the items included in this variable.

Questions 28 and 30 had the most positive loadings (+.50) on Factor 2. All other questions exhibited the most positive factor loadings (+.50) on Factor 1. Question 35 had the most positive correlation with questions 6, 31, 33 and 39. All four of these correlation coefficients were greater than .50 at the .0001 significance level. No other questions exhibited this strong of a correlation with any other question. However, there were statistically significant (p ≤ .05) correlations among 81% of the item pairings within this variable.

The variable Communication exhibited two factors. These two factors accounted for 33% of the variance among the items included in this variable. Factor 1 had an eigenvalue of 1.947, accounting for 19% of the variance and Factor 2 had an eigenvalue of 1.378, accounting for 14% of the variance. Questions 8, 10, 12 and 13 had the greatest loadings (+.50) on Factor 1. Questions 3, 11 and 27 had the greatest loadings (+.50) on Factor 2. A review of the
correlation coefficients for these items indicate that 29% of the items exhibited a statistically significant (p ≤ .05) positive correlation with another question.

The factor analysis for the variables Trust, Respect, and Workmanship resulted in eigenvalues of 1.538, 1.536, and 2.012 respectively. The items within the trust factor explained 15% of the variance within this variable. The items within the respect factor explained 15% of the variance within this variable. Twenty percent of the variance within the workmanship variable was explained by the items within this variable. Within the factor identified for Trust, 22% of the items correlated positively at the .001 significance level. Within the factor identified for Respect, all of the questions reported statistically significant correlations with one another. For the factor identified for Workmanship 63% of the items reported positive correlation coefficients at the .05 significance level.

This instrument was designed to assess six variables. The factor analysis identified 11 factors. This suggests that the questions did not always assess the particular variable under study. For example, the three factors identified within the problem solving variable may suggest that there are three types or dimensions of problem solving being assessed instead of the overall one dimension anticipated. A more positive interpretation suggests that the questions within the variables of problem solving and teamwork explained over 50% of the variance within each of these variables.

A split-half reliability test was conducted and resulted in a correlation coefficient of .09. This strongly suggests that the reliability of this instrument is quite weak.
Non-Participant Questionnaire

Individuals who participated on the Partnering construction projects but did not participate in the Partnering workshop were administered a 20-item questionnaire approximately half-way through the project. These questions were designed to assess the subjects' perceptions of problem solving, teamwork, communication, trust, respect and workmanship. The questions were broken into five sections distinguished by different leading statements. These statements were: 1) Compared to other projects I have worked on, on this Partnering project..., 2) On this Partnering project, when decisions are made..., 3) Compared to past projects I have worked on, on this project..., 4) Compared to past projects I have worked on, on this Partnering project I would say that..., 5) Compared to past projects I have worked on, on this Partnering project conflicts and disagreements between parties....

The questionnaire included the following instructions:

Instructions: Please circle the number that most accurately reflects your opinion for each set of responses. Your honest answers are important and I want to ensure you of confidentiality, therefore, do not sign your name to this form. It would be helpful if you would jot down a few words in the 'comment' sections to elaborate on your responses.

A varying number of six-point response scales similar in wording and content as the larger 41-item questionnaire follow each of the leading statements. The placement of positive response options were assigned to either side of the six-point response scale with 20% of the positive response options on the right side of the scale and 80% of the opposing response options on the right side of the scale.
An open-ended question, "Can you think of any specific examples related to the above response?", was asked at the bottom of each page of the questionnaire to allow for additional thoughts, opinions and ideas from the respondents. These responses consisted of anecdotal instances and/or explained the reasoning behind some of the scaled responses.

The final section of the questionnaire was developed to gather demographic information such as, position held on project and organizational affiliation.

**Scoring.** Individual and mean scores were obtained on each item and for each of the six variables. Low scores indicate positive perceptions and/or attitudes and high scores indicate negative perceptions and/or attitudes.

**Validity and Reliability.** To examine the validity of this instrument a confirmatory Principle Components Factor Analysis was conducted for each of the six variables. Six factors were identified through the analysis, one for each variable. One factor was identified for the variable problem solving. This factor accounted for 18% of the variance within this variable with an eigenvalue of 1.85. Only two questions correlated significantly with one another at the .05 confidence level (questions 18 and 19). One factor was identified for the variable teamwork, accounting for 64% of the variance within this variable. This factor had an eigenvalue of 6.35 and all of the questions exhibited positive correlations with one another at the .05 confidence level. For the variable communication, one factor was identified accounting for 11% of the variance within this variable (1.15). The two questions included in this variable positively correlated with one another at the .0003 confidence level. One factor was identified for the variable trust, accounting for 17% of the variance within this variable (1.69). The two
questions included in this variable did not positively correlated with one another at the .05 confidence level. Only one question was included in the variable respect and therefore, analysis was incomplete. One factor was identified for the variable workmanship, accounting for 26% of the variance within this variable (2.63). Three of the four questions included in this variable positively correlated with one another at the .05 confidence level.

The results of this analysis indicate that although improvements could be made, overall the questions included within each of the variables do assess that which was anticipated.

A split-half reliability test was conducted on this instrument which resulted in a correlation coefficient of 1.0. This strongly suggests that the reliability of this instrument is significant.

Control Group

The three questionnaires administered to the control group were identical to those questionnaires administered to the treatment group except all questions referred to past or current projects with no reference to Partnering.

Close-Out Data Gathering Report

A data collection form was created by the author with the assistance of Tom Jacobson, Construction Engineer, Iowa DOT. This form gathered data to examine the quality, profitability and productivity of the projects. A copy of this form can be found in Appendix B.
Data Gathering

Based on Iowa DOT project scheduling and their identification-selection procedures for heavy highway construction projects a number of projects were identified for Partnering. Of these, seven projects were selected for the purpose of this study; six were Partnered and one served as the control.

Quality, profitability and productivity data was also collected on 15 additional non-Partnering projects. The personnel working on these projects were not included in this study. The Iowa DOT simply provided quality, profitability and productivity data on these projects to serve as a control to test hypotheses 1.1, 1.2 and 1.3.

Prior for administering any questionnaires approval was obtained from the Iowa DOT and the Iowa State University Human Subjects Review Committee. A copy of this approval can be found in Appendix A. Approval was also obtained from the management of each independent contractor and supplier of the projects.

The 41-item pre-, follow-up and close-out questionnaires were administered to construction personnel who participated in the Partnering workshop, and also to the personnel of the control project. The 20-item non-participant questionnaire was administered to those construction personnel who did not participate in the Partnering workshop. The close-out data gathering form was administered to the Resident Engineer of each of the six Partnering projects and the Iowa DOT provided additional comparison data for 15 non-Partnering projects completed during the 1992-1993 construction seasons.
Individual and small group interviews were conducted with representatives from all projects periodically during the length of this study. The specifics of how this data was collected are explained below.

Participants

The first pre-questionnaires were administered in September, 1992 prior to the start of the Partnering workshop at the workshop site. Through verbal instructions the purpose of the study was briefly explained, the assurance of confidentiality was reinforced and the author agreed to provide the subjects with an abbreviated version of the research results upon request. The subjects were instructed to read each of the 41 statements and circle the number which most reflected their attitudes and perceptions using the dyadic phrases as a guide.

The follow-up questionnaires were mailed to the project site approximately one-third of the way through the project. Each questionnaire was personally addressed to a workshop participant through a cover-letter and a pre-addressed stamped envelope was attached (see Appendix B). The names of the participants were collected through a sign-in sheet circulated during the workshop. The questionnaires were sent to each project site and the Iowa DOT Resident Engineer distributed them to the participants. The participants were allowed work time to complete the questionnaires.

The close-out questionnaires were sent out to the project site approximately two-weeks prior to completion of the project. The questionnaires were mailed out, distributed and returned in an identical fashion as the follow-up questionnaires.

The follow-up and close-out questionnaires were numerically coded referencing the workshop sign-up sheet to enhance data analysis and data
collection. Follow-up letters were sent out to those subjects who had not returned the questionnaires at the end of three weeks, as a result, additional questionnaires were returned.

**Non-Participants**

The non-participant questionnaires were mailed out approximately halfway through the project to the prime contractors' Project Manager at each project site. The questionnaires were attached to a cover letter and a pre-addressed stamped envelope. The cover letter explained the study and requested that subjects complete and return the questionnaire (see Appendix B). The subjects were also informed that their responses were completely confidential and anonymous.

The Project Manager distributed the questionnaires to project personnel who did not participate in the workshop and time was allowed for the subjects to complete the questionnaire during work hours. Because of the logistics and data collection procedures for this group it was too difficult to code the instruments based on respondents. Therefore, unlike the participant questionnaires, the non-participant questionnaires were not numerically coded. A follow-up letter was sent to the Project Manager two-weeks after the initial questionnaires were mailed to enhance the response rates.

**Control Group**

One project was identified to serve as a control. None of the personnel on this project had ever participated on a Partnering project nor had they ever participated in a Partnering workshop. The pre-questionnaires for this project were sent out along with cover letters and pre-addressed stamped envelopes to the Iowa DOT Resident Engineer (see Appendix B). The Resident Engineer was
instructed to distribute these questionnaires to the project personnel. The follow-up and close-out questionnaires were administered in an identical fashion.

Because of scheduling conflicts the pre-questionnaires were administered three weeks into the project, the follow-up questionnaires were administered one-third of the way through the project and the close-out questionnaires were administered two weeks prior to the completion of the project.

**Close-Out Data Gathering Report**

The Close-Out Data Gathering Report was sent out to the Resident Engineer of each project. The form was completed by these individuals and returned to the author. Comparative data from 15 non-Partnering projects was collected by the Department of Construction at the Iowa DOT and this was used for comparative analysis.

**Interviews**

Individual and group interviews were conducted with representative participants of the Partnering workshops from each of the Partnering projects, with non-workshop Partnering project participants, and with the Resident Engineer and Prime Contractor of the control project. This information was not statistically analyzed but served a valuable purpose in gathering anecdotal information which helped in the interpretation of the quantitative data. It is this author's opinion that these interviews also increased the response rate and care in which the respondents completed the questionnaires.

The interviews were held at the project sites, over the telephone and during the close-out meetings. The interviews were conducted throughout the length of the projects, at the subject's convenience.
Response Rates

During the period of September 1992 and November 1993, 438 questionnaires were administered and/or sent out, (146 pre-questionnaires; 146 follow-up-questionnaires; 146 close-out questionnaires; 90 non-participant questionnaires; and, 25 pre-, follow-up, and close-out questionnaires for the control group). In addition, during this period 30 personal interviews were conducted.

Because of omissions in responses to a number of questions 141 pre-questionnaires were used for analysis purposes. This resulted in a 97% response rate. The response rate for the follow-up, and close-out questionnaires were 45% (n=65) and 44% (n=64) respectively. A 24% response rate was attained from the non-participant questionnaires administered. The response rates for the control subjects were much lower, a 36% (n=9) response rate for the pre-questionnaires, and a 16% (n=4) response rate for both the follow-up questionnaire and the close-out questionnaire.

Data Analysis

The primary statistical analyses used were the one-way analysis of variance (ANOVA), the t-test for paired observations, Tukey's Studentized Range (HSD) test, and chi-square.

The chi-square test of independence was used to test hypotheses 1.1, 1.2, and 1.3 to examine the quality, profitability and productivity of the Partnering projects as compared against non-Partnering projects.

To test hypotheses 2.1, 2.2, an analysis of variance (ANOVA) one-way classification and Tukey's Studentized Range (HSD) test were used. The t-test for
paired observations was also used to examine whether there were statistical significance among the variables across the three questionnaires and/or between the individual projects and/or groups.

To test hypothesis 3 a series of t-tests for paired observations and Tukey's Studentized Range (HSD) test were used to examine statistical significance among the three questionnaires and between the projects and groups.

The t-test for two samples was used to test hypothesis 4. This test was used to examine whether there was statistical significance among the mean scores between the participants and non-participants.

This chapter elaborated on the research methodology, treatment, instrumentation and data gathering procedures of this research. Chapter IV details the statistical findings of the data analysis.
CHAPTER IV.
ANALYSIS OF THE FINDINGS

Introduction

This study was designed to examine perceived levels of problem solving, teamwork, communication, trust, respect and workmanship among heavy highway construction personnel prior to, during and upon completion of six different Partnering construction projects. The dependent variables, as stated above were assessed through a 41-item questionnaire and a 20-item questionnaire developed by the author. Data was also collected and analyzed on the productivity, profitability and quality of the Partnering projects. This data was collected through a close-out data gathering form developed by the author.

The subjects of this study included three independent sample groups: participants, non-participants and a control group. The participant group completed one 41-item questionnaire prior to the treatment (the Partnering workshop). After the treatment was conducted the participants completed a follow-up 41-item questionnaire one-third of the way through the construction project and a 41-item close-out questionnaire upon completion of the project.

The participants were also categorized based on the project they worked on and based on the organization they worked for. The participants worked on one of six projects and their organizational categorization was determined from the information they provided in the demographic section of the questionnaire. There were two organizational categories: Group 1 includes Iowa DOT personnel and Group 2 includes independent contractors. Six subjects could not be classified
into either of these two groups. These subjects were included in overall and project analysis but they were omitted from group analysis.

The subjects who did not participate in the treatment but did work with the participant group on Partnering projects were categorized as non-participants. These non-participants were employed with the Iowa DOT and many different contractors. Because of the small sample size of the non-participants these subjects were not categorized or analyzed based on project or organizational affiliation. Some of the non-participants worked on the construction project throughout the entire duration of construction, others only worked on the project for a very short time (one-week). Because of these differing lengths of work, differing amounts of interaction with the participant group, and the fact that it was logistically difficult to assess their perceptions regarding the Partnering project at similar periods of time during the project these non-participants were asked to complete a shorter version of the 41-item questionnaire.

A 20-item questionnaire was developed by the author and this served as the assessment instrument for the non-participants. The non-participants completed the questionnaire approximately half-way through the construction of the projects. At this time some of these subjects had worked on the project for a number of weeks and some had only worked on it a very short time (one week).

A single project was selected to serve as a control project. The subjects in the control group did not participate in the treatment and did not work on a Partnering project. These subjects completed a pre-questionnaire identical in nature to the participant pre-questionnaire two weeks after the control project began. A follow-up and close-out questionnaire were also administered to these
subjects one-third of the way through the project and upon completion of the project. Unfortunately, a very small response rate was obtained from the control group. Fifteen pre-questionnaires were returned and only 4 follow-up and close-out questionnaires were returned.

Because of the exceptionally small number of respondents in this sample no statistical analyses could be done to assess these subjects' perceptions and attitudes regarding the project they were working on. However, data related to quality, profitability and productivity as measured by the Iowa DOT specifications manual was collected on 15 non-Partnering projects that were completed during the 1992-1993 construction seasons and this data was used to test hypotheses 1.1, 1.2, and 1.3.

This chapter offers a presentation and explanation of the findings of each of the statistical analyses applied to the seven hypotheses presented in chapter one. For hypotheses 1.1, 1.2, and 1.3 the data is analyzed and compared between the Partnering projects and the 15 control (non-Partnering) projects. For hypotheses 2.1, 2.2, and 3 the data is analyzed among all the subjects and between the projects and groups. For hypothesis 4 the data is analyzed between the participants and the non-participants.

The primary statistical analyses used were the one-way analysis of variance (ANOVA), the t-test for paired observations, Tukey's Studentized Range (HSD) test, and chi-square. Results from the hypotheses will be presented first, followed by a summary of the written comments obtained from the questionnaires and quotes from subject interviews.
Hypothesis 1.1

"The quality of the project, as measured by the standards put forth in the Iowa DOT project specifications, will be statistically greater (p ≤ .05) on Partnering projects than on non-Partnering projects." The data for this analysis was gathered through the Close-Out Data Gathering Report. Responses from the Partnering projects for question 8a were tabulated and analyzed against the responses from the non-Partnering projects. To evaluate this hypothesis the chi-square test of independence was used. The results of this analysis are presented in Table 1.

Table 1. Summary of Chi-square for the Quality Variable

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Partnering Projects N=6</th>
<th>Non-Partnering Projects N=15</th>
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<tbody>
<tr>
<td>High Quality Indicator</td>
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<td>2</td>
</tr>
<tr>
<td>Low Quality Indicator</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Totals</td>
<td>6</td>
<td>15</td>
</tr>
</tbody>
</table>

\((X^2 = 1.11, p ≤ .50)\)

The results of the chi-square indicate that the quality of the Partnering projects were not significantly greater than the quality of the non-Partnering projects. The hypothesis that the quality of Partnering projects will be greater than the quality of non-Partnering projects is not supported.
Hypothesis 1.2

"Profitability, as measured by value engineering data, cost control data, and litigation claims, will be statistically greater (p ≤ .05) on Partnering projects than on non-Partnering projects." The data for this analysis was gathered through the Close-Out Data Gathering Report. Responses from the Partnering projects for questions 6, 8 and 10 were tabulated and analyzed against the responses from the non-Partnering projects.

To evaluate this hypothesis the chi-square test of independence was used. The results, presented in Table 2 indicate that the profitability of the Partnering projects was not significantly greater than the profitability of the non-Partnering projects. Hypothesis 2.1 is not supported.

Table 2. Summary of Chi-square for the Profitability Variable

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Partnering Projects N=6</th>
<th>Non-Partnering Projects N=15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability Indicators</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>Non-Profitability Indicators</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Totals</td>
<td>18</td>
<td>45</td>
</tr>
</tbody>
</table>

\(X^2 = .027, p \leq .10\)
Hypothesis 1.3

"Productivity, as measured by delayed project completion, lost work days, number of re-works, informal and formal plan changes, and accident reports, will be statistically greater (p < .05) on Partnering projects than on non-Partnering projects." The data for this analysis was gathered through the Close-Out Data Gathering Report. The questions used to collect this data were items 5a, 5b, 7, 8 and 9. The responses from the Partnering projects and the non-Partnering projects were tabulated and analyzed. The chi-square test of independence was used to evaluate this hypothesis. The results, presented in Table 3 indicate that the productivity found on the Partnering projects was significantly greater than the productivity levels found on non-Partnering projects. This hypothesis is supported.

Table 3. Summary of Chi-square for the Productivity Variable

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Partnering Projects N=6</th>
<th>Non-Partnering Projects N=15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Productivity Indicators</strong></td>
<td>18</td>
<td>61</td>
</tr>
<tr>
<td><strong>Low Productivity Indicators</strong></td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>30</td>
<td>75</td>
</tr>
</tbody>
</table>

\( (X^2 = 5.23, p \leq .05) \)
Hypothesis 2.1

"Teamwork, as measured by perceived levels of trust, respect, teamwork, and communication will be statistically more positive \((p \leq .05)\) on the follow-up and close-out questionnaires than on the pre-questionnaire." To test this hypothesis the variables teamwork, trust, respect and communication as assessed through the 41-item questionnaires were combined into one variable: teamwork. For a review of the specific questions which make up these variables see chapter 4. The mean scores of this one variable were used for the purpose of analysis. Table 4 presents the mean scores and standard deviations of the teamwork variable as reported by the participants on the three questionnaires (pre-, follow-up and close-out).

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>N</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Questionnaire</td>
<td>141</td>
<td>2.88</td>
<td>1.10</td>
</tr>
<tr>
<td>Follow-up Questionnaire</td>
<td>65</td>
<td>2.52</td>
<td>1.04</td>
</tr>
<tr>
<td>Close-out Questionnaire</td>
<td>64</td>
<td>2.30</td>
<td>1.00</td>
</tr>
</tbody>
</table>

From the data presented in Table 4 it may be ascertained that the subjects' perceptions of teamwork improved (the mean scores decreased) as the projects progressed. To test whether these differences in mean scores were significant, a one-way ANOVA was used. The results of this analysis are presented in Table 5.
Table 5. Summary of ANOVA for the Teamwork Variable Across Questionnaires

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>f</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Questionnaires</td>
<td>2</td>
<td>395.34</td>
<td>197.67</td>
<td>173.34</td>
<td>.0001</td>
</tr>
<tr>
<td>Within Questionnaires</td>
<td>6477</td>
<td>7386.27</td>
<td>1.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6479</td>
<td>7781.62</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the ANOVA indicate that the differences on the teamwork variable across the three instruments were statistically significant. Therefore, the hypothesis that perceived levels of teamwork will be statistically more positive on the follow-up and close-out questionnaires than on the pre-questionnaire is supported.

To examine whether the teamwork variable mean scores differed significantly between each of the three questionnaires Tukey's Studentized Range (HSD) test was used. The results of this analysis are presented in Table 6.

Table 6. Tukey's Studentized Range (HSD) Test for the Teamwork Variable Across Questionnaires

<table>
<thead>
<tr>
<th>Questionnaire Comparison</th>
<th>Simultaneous Lower Confidence Limit</th>
<th>Difference Between Means</th>
<th>Simultaneous Upper Confidence Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre/Follow-up</td>
<td>.283</td>
<td>.359</td>
<td>.436</td>
</tr>
<tr>
<td>Pre/Close-out</td>
<td>.504</td>
<td>.581</td>
<td>.658</td>
</tr>
<tr>
<td>Follow-up/Close-out</td>
<td>.132</td>
<td>.222</td>
<td>.312</td>
</tr>
</tbody>
</table>

*** Significant at the .001 level.
These results show that the differences in the teamwork mean scores were significant between each of the questionnaires. This further supports the hypothesis and suggests that perceived levels of teamwork increased from the pre-questionnaire to the follow-up questionnaire and from the follow-up questionnaire to the close-out questionnaire. These results suggest that as the projects progressed, the subjects' perceptions of teamwork continued to improve.

Analysis of Projects

The results of the ANOVA and Tukey's Studentized Range (HSD) test indicate that overall, the subjects' perceptions of teamwork on the projects improved following the treatment and continued to improve throughout the duration of the projects. It was questioned as to whether subjects within a given project perceived teamwork to be greater on the project they were working on compared to past projects. To test this inquiry individual paired t-tests were calculated between the pre-questionnaire mean scores and the close-out mean score for each project. The results of these paired t-tests and the mean scores for each project on the pre, follow-up and close-questionnaires are presented in Table 7.

This data shows that only the subjects in Project 2 perceived teamwork to significantly improve from the pre-questionnaire to the close-out questionnaire. The subjects in Project 4 perceived teamwork to improve during the first third of the project but by the time the close-out questionnaire was administered these subjects' perceptions of teamwork decreased (as represented by the increase in close-out mean scores).
Table 7. Teamwork Variable Mean Scores for each Project on the Pre, Follow-up and Close-out Questionnaires and t-values Between the Pre and Close-out Questionnaires

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>Pre Questionnaire Mean Score</th>
<th>Follow-up Questionnaire Mean Score</th>
<th>Close-out Questionnaire Mean Score</th>
<th>t-value Between Pre and Close-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1</td>
<td>2.51</td>
<td>2.41</td>
<td>1.93</td>
<td>1.23</td>
</tr>
<tr>
<td>Project 2</td>
<td>2.92</td>
<td>2.29</td>
<td>2.15</td>
<td>2.02*</td>
</tr>
<tr>
<td>Project 3</td>
<td>2.84</td>
<td>2.80</td>
<td>2.51</td>
<td>.89</td>
</tr>
<tr>
<td>Project 4</td>
<td>3.03</td>
<td>2.21</td>
<td>2.44</td>
<td>1.28</td>
</tr>
<tr>
<td>Project 5</td>
<td>2.91</td>
<td>2.68</td>
<td>2.35</td>
<td>1.69</td>
</tr>
<tr>
<td>Project 6</td>
<td>3.04</td>
<td>2.54</td>
<td>2.43</td>
<td>1.60</td>
</tr>
</tbody>
</table>

* Two-tailed significance p ≤ .05 confidence level.

A separate paired t-test was calculated to examine whether this increase in mean score was significant. This t-test resulted in a .51 calculated t-value and therefore, no significance in this difference can be interpreted at the .05 confidence level.

Analysis of Groups

It is also of interest to examine whether individual groups within the study perceived teamwork to improve following the treatment. Individual paired t-tests were calculated between the groups' pre and close-out questionnaire mean scores. The results of these analyses and the mean scores for each of the groups as reported on the pre, follow-up and close-out questionnaires for the variable teamwork are presented in Table 8.
Table 8. Teamwork Variable Mean Scores for each Group on the Pre, Follow-up and Close-out Questionnaires and t-values Between the Pre and Close-out Questionnaires

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Pre Questionnaire Mean Score</th>
<th>Follow-up Questionnaire Mean Score</th>
<th>Close-out Questionnaire Mean Score</th>
<th>t-value Between Pre and Close-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa DOT</td>
<td>2.84</td>
<td>2.55</td>
<td>2.47</td>
<td>1.68</td>
</tr>
<tr>
<td>Contractors</td>
<td>2.72</td>
<td>2.29</td>
<td>2.10</td>
<td>2.58*</td>
</tr>
</tbody>
</table>

* Two-tailed significance $p \leq .05$ confidence level.

The results of the t-tests indicate that only the contractors perceived teamwork to be significantly greater ($p \leq .05$) on the Partnering projects than on prior non-Partnering projects they had worked on. The subjects from the Iowa DOT did not perceive teamwork to improve significantly following the workshop.

Hypothesis 2.2

"Performance, as measured by workmanship and problem solving will be statistically more positive ($p \leq .05$) on the follow-up and close-out questionnaires than on the pre-questionnaire." To evaluate this hypothesis, the variables of workmanship and problem solving were combined to create the performance variable. For a review of which questions were included for each variable see chapter 3. As shown in Table 9, the mean scores across the three questionnaires consecutively decreased/improved.
Table 9. Mean Scores and Standard Deviations for the Performance Variable

<table>
<thead>
<tr>
<th>Instrument</th>
<th>N</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Questionnaire</td>
<td>141</td>
<td>3.05</td>
<td>1.35</td>
</tr>
<tr>
<td>Follow-up Questionnaire</td>
<td>65</td>
<td>2.64</td>
<td>1.24</td>
</tr>
<tr>
<td>Close-out Questionnaire</td>
<td>64</td>
<td>2.52</td>
<td>1.18</td>
</tr>
</tbody>
</table>

A one-way ANOVA was used to test whether these differences in mean scores were significant. The results of the ANOVA are presented in Table 10. From the analysis presented in Table 10 it can be reported that differences between the three mean scores were statistically significant. The hypothesis that perceived levels of performance will be greater on the follow-up and close-out questionnaires than on the pre-questionnaire is supported. Table 11 summarizes Tukey's Studentized Range (HSD) test which was used to examine the significance of the differences between the performance mean scores across the three questionnaires.

Table 10. Summary of ANOVA for the Performance Variable Across Questionnaires

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>f</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Questionnaires</td>
<td>2</td>
<td>261.29</td>
<td>130.64</td>
<td>101.50</td>
<td>.0001</td>
</tr>
<tr>
<td>Within Questionnaires</td>
<td>4587</td>
<td>5904.17</td>
<td>1.28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4589</td>
<td>6165.46</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 11. Tukey's Studentized Range (HSD) Test for the Performance Variable Between Questionnaires

<table>
<thead>
<tr>
<th>Questionnaires Comparison</th>
<th>Simultaneous Lower Confidence Limit</th>
<th>Difference Between Means</th>
<th>Simultaneous Upper Confidence Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre/Follow-up</td>
<td>.314</td>
<td>.411</td>
<td>.507 ***</td>
</tr>
<tr>
<td>Pre/Close-out</td>
<td>.433</td>
<td>.530</td>
<td>.627 ***</td>
</tr>
<tr>
<td>Follow-up/Close-out</td>
<td>.005</td>
<td>.119</td>
<td>.233 ***</td>
</tr>
</tbody>
</table>

*** Significant at the .001 level.

The performance mean scores decreased throughout the duration of the projects and this positively interpreted decrease in scores was found to be significant between each of the questionnaires. The results of this test also suggest that as the projects progressed, the subjects' perceptions of performance continued to improve.

Analysis of Projects

As it was with the teamwork variable, it seems to be of interest to examine whether the subjects perceived performance on the Partnering project they were working on to be greater than prior non-Partnering projects they had worked on. The mean scores for each of the projects as reported on the pre-, follow-up and close-out questionnaires for the performance variable are presented in Table 12. Individual t-tests were calculated between the mean scores on the pre-questionnaire and the close-out questionnaire to ascertain whether the differences in mean scores were significant. The results of these t-tests are also presented in Table 12.
Table 12. Performance Variable Mean Scores for each Project on the Pre, Follow-up and Close-out Questionnaires and t-values as Computed Between the Pre and Close-out Mean Scores

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>Pre Questionnaire Mean Score</th>
<th>Follow-up Questionnaire Mean Score</th>
<th>Close-out Questionnaire Mean Score</th>
<th>t-value Between Pre and Close-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project 1</td>
<td>2.46</td>
<td>2.46</td>
<td>2.00</td>
<td>.93</td>
</tr>
<tr>
<td>Project 2</td>
<td>2.97</td>
<td>2.29</td>
<td>2.02</td>
<td>2.20*</td>
</tr>
<tr>
<td>Project 3</td>
<td>2.80</td>
<td>2.70</td>
<td>2.59</td>
<td>.52</td>
</tr>
<tr>
<td>Project 4</td>
<td>2.97</td>
<td>2.28</td>
<td>2.71</td>
<td>.57</td>
</tr>
<tr>
<td>Project 5</td>
<td>2.84</td>
<td>2.67</td>
<td>2.42</td>
<td>1.20</td>
</tr>
<tr>
<td>Project 6</td>
<td>3.03</td>
<td>2.40</td>
<td>2.40</td>
<td>1.70</td>
</tr>
</tbody>
</table>

* Two-tailed significance p ≤ .05 confidence level.

This data indicates that only the subjects in Project 2 perceived a statistically significant improvement in performance from the pre-questionnaire to the close-out questionnaire. This suggests that these subjects perceived performance on the Partnering project to be greater than on non-Partnering projects they had worked on in the past.

The subjects in Project 4 perceived performance to decrease between the time the follow-up questionnaire was administered and the close-out questionnaire was administered. It should be noted, however, that this perceived decrease did not result in perceived performance levels equal to or worse than those reported on the pre-questionnaire. A paired t-test was used to examine whether this decrease in mean score for Project 4 was significant. The calculated t-value was .93, which is not significant at the .05 confidence level.
Analysis of Groups

It is also of interest to examine whether individual groups perceived performance to be greater on the Partnering projects than on prior non-Partnering projects they had worked on. Individual paired t-tests were calculated between the pre-questionnaire mean scores and the close-out questionnaire mean scores. The mean scores for both of the groups as reported on the pre, follow-up and close-out questionnaires for the variable performance are presented in Table 13, as are the results of the t-tests.

Table 13. Performance Variable Mean Scores for each Group on the Pre, Follow-up and Close-out Questionnaires and t-values as Computed Between the Pre and Close-out Mean Scores

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Pre Questionnaire Mean Score</th>
<th>Follow-up Questionnaire Mean Score</th>
<th>Close-out Questionnaire Mean Score</th>
<th>t-value Between Pre and Close-out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa DOT</td>
<td>3.02</td>
<td>2.56</td>
<td>2.63</td>
<td>1.77</td>
</tr>
<tr>
<td>Contractors</td>
<td>2.72</td>
<td>2.44</td>
<td>2.19</td>
<td>2.20*</td>
</tr>
</tbody>
</table>

* Two-tailed significance p ≤ .05 confidence level.

The results of these analyses indicate that only the contractors perceived performance to be greater on the Partnering projects than on prior non-Partnering projects they had worked on. The subjects from the Iowa DOT did not perceive performance to be significantly greater on Partnering projects compared with non-Partnering projects.
Hypothesis 3

"Attitudes and perceptions of Partnering participants will be statistically more positive (p ≤ .05) on the follow-up and close-out questionnaires than on the pre-questionnaire." To test hypothesis 3 all 41 items from the three questionnaires were combined and three paired t-tests were used to examine whether overall mean score differences between the three instruments were significant. This data is presented in Table 14.

Table 14. Summary of t-values for Overall Mean Scores Between the Questionnaires

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>N</th>
<th>Mean Score</th>
<th>t-value</th>
<th>p^a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>141</td>
<td>2.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up</td>
<td>65</td>
<td>2.57</td>
<td>2.40</td>
<td>.05</td>
</tr>
<tr>
<td>Pre</td>
<td>141</td>
<td>2.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Close-out</td>
<td>64</td>
<td>2.39</td>
<td>3.55</td>
<td>.001</td>
</tr>
<tr>
<td>Follow-up</td>
<td>65</td>
<td>2.57</td>
<td>.99</td>
<td>.20</td>
</tr>
<tr>
<td>Close-out</td>
<td>64</td>
<td>2.39</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

^a Two-tailed significance.

The results presented in Table 14 suggest that the overall mean scores on the follow-up and close-out questionnaires were significantly (p < .05) more positive from the overall mean scores of the pre-questionnaire. Therefore, hypothesis 3 is supported. However, unlike the results from hypotheses 2.1 and 2.2 no additional significant improvements were found between the follow-up and close-out questionnaires which would have suggested that as the projects progressed perceptions continued to improve.
To examine whether a particular variable contributed to these overall differences in mean scores Tukey's Studentized Range (HSD) test was used. Table 15 presents the mean scores for each of the variables under study as reported on each of the questionnaires.

Table 15. Mean Scores for each of the Variables Under Study

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>Pre Questionnaire (N=141)</th>
<th>Follow-up Questionnaire (N=65)</th>
<th>Close-out Questionnaire (N=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving</td>
<td>3.23</td>
<td>2.77</td>
<td>2.62</td>
</tr>
<tr>
<td>Teamwork</td>
<td>2.91</td>
<td>2.51</td>
<td>2.28</td>
</tr>
<tr>
<td>Communication</td>
<td>3.08</td>
<td>2.76</td>
<td>2.42</td>
</tr>
<tr>
<td>Trust</td>
<td>2.60</td>
<td>2.24</td>
<td>2.16</td>
</tr>
<tr>
<td>Respect</td>
<td>2.48</td>
<td>2.19</td>
<td>2.19</td>
</tr>
<tr>
<td>Workmanship</td>
<td>2.48</td>
<td>2.21</td>
<td>2.18</td>
</tr>
</tbody>
</table>

Table 16 presents the results of Tukey's (HSD) test. The variables problem solving, teamwork and communication all showed significant decreases in mean scores from the pre- to follow-up and the follow-up to close-out, which resulted in significant differences being found from the pre- to the close-out questionnaires. The variables trust, respect and workmanship also showed significant decreases/improvement from the pre- to the follow-up and from the pre- to the close-out questionnaires. However, no additional significant improvements were recorded for those three variables between the follow-up and close-out questionnaires.
Table 16. Tukey's Studentized Range (HSD) Test for each Variable Between the Three Questionnaires

<table>
<thead>
<tr>
<th>Questionnaire Comparison</th>
<th>Simultaneous Lower Confidence Limit</th>
<th>Difference Between Means</th>
<th>Simultaneous Upper Confidence Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Follow-up .349</td>
<td>.456</td>
<td>.562</td>
<td>***</td>
</tr>
<tr>
<td>Follow-up/Close-out .021</td>
<td>.146</td>
<td>.271</td>
<td>***</td>
</tr>
<tr>
<td>Pre/Close-out .495</td>
<td>.602</td>
<td>.709</td>
<td>***</td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Follow-up .286</td>
<td>.391</td>
<td>.496</td>
<td>***</td>
</tr>
<tr>
<td>Follow-up/Close-out .106</td>
<td>.230</td>
<td>.353</td>
<td>***</td>
</tr>
<tr>
<td>Pre/Close-out .516</td>
<td>.621</td>
<td>.727</td>
<td>***</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Follow-up .176</td>
<td>.324</td>
<td>.472</td>
<td>***</td>
</tr>
<tr>
<td>Follow-up/Close-out .160</td>
<td>.334</td>
<td>.507</td>
<td>***</td>
</tr>
<tr>
<td>Pre/Close-out .510</td>
<td>.658</td>
<td>.806</td>
<td>***</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Follow-up .137</td>
<td>.356</td>
<td>.575</td>
<td>***</td>
</tr>
<tr>
<td>Follow-up/Close-out -.177</td>
<td>.079</td>
<td>.336</td>
<td>***</td>
</tr>
<tr>
<td>Pre/Close-out .215</td>
<td>.436</td>
<td>.656</td>
<td>***</td>
</tr>
<tr>
<td>Respect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Follow-up .064</td>
<td>.297</td>
<td>.529</td>
<td>***</td>
</tr>
<tr>
<td>Follow-up/Close-out -.276</td>
<td>-.003</td>
<td>.270</td>
<td></td>
</tr>
<tr>
<td>Pre/Close-out .060</td>
<td>.294</td>
<td>.528</td>
<td>***</td>
</tr>
<tr>
<td>Workmanship</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Follow-up .064</td>
<td>.264</td>
<td>.465</td>
<td>***</td>
</tr>
<tr>
<td>Follow-up/Close-out -.204</td>
<td>.031</td>
<td>.267</td>
<td></td>
</tr>
<tr>
<td>Pre/Close-out .094</td>
<td>.296</td>
<td>.498</td>
<td>***</td>
</tr>
</tbody>
</table>

*** Significant at the .001 level.
Analysis of Projects

The overall mean scores and the mean scores for each of the variables showed a significant difference between the pre-questionnaire and the close-out questionnaire (Tables 14 & 16). Additional analysis was conducted to identify whether the subjects within individual projects reported improved attitudes and perceptions on the Partnering projects as compared with previous non-Partnering projects they had worked on. Table 17 presents the overall mean scores for each of the six projects on each of the three questionnaires.

Table 17. Project Overall Mean Scores for the Pre, Follow-up and Close-out Questionnaires

<table>
<thead>
<tr>
<th>QUESTIONNAIRE</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
<th>Project 4</th>
<th>Project 5</th>
<th>Project 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>2.59</td>
<td>3.01</td>
<td>2.92</td>
<td>3.10</td>
<td>2.97</td>
<td>3.13</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.50</td>
<td>2.33</td>
<td>2.84</td>
<td>2.29</td>
<td>2.74</td>
<td>2.53</td>
</tr>
<tr>
<td>Close-out</td>
<td>1.94</td>
<td>2.15</td>
<td>2.59</td>
<td>2.56</td>
<td>2.46</td>
<td>2.45</td>
</tr>
</tbody>
</table>

^ Combination of all dependent variables: problem solving, teamwork, communication, trust, respect and workmanship.

The data presented in Table 17 indicates that the subjects in Projects 1, 2, 3, 5 and 6 reported improved attitudes and perceptions for the project they were working on. The subjects in Project 4 reported improvements following the treatment but by the conclusion of the project these positive perceptions and attitudes had diminished, although, to a level still higher than that reported prior to the treatment.
To examine whether these improvements, and in the case of Project 4 regression, were significant, a series of paired t-tests were calculated between the three questionnaires. The results of these analyses are presented in Table 18.

Table 18. Summary of t-values for each Project Between the Three Questionnaires

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
<th>Project 4</th>
<th>Project 5</th>
<th>Project 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre/Follow</td>
<td>.16</td>
<td>1.83</td>
<td>.19</td>
<td>1.97</td>
<td>.69</td>
<td>1.81</td>
</tr>
<tr>
<td>Follow/Close</td>
<td>.94</td>
<td>.42</td>
<td>.60</td>
<td>.58</td>
<td>.71</td>
<td>.20</td>
</tr>
<tr>
<td>Pre/Close</td>
<td>1.30</td>
<td>2.15*</td>
<td>.86</td>
<td>1.25</td>
<td>1.45</td>
<td>1.78</td>
</tr>
</tbody>
</table>

* Two-tailed significance p ≤ .05.

The results presented in Table 18 suggest that only the subjects working on Project 2 perceived statistically significant improvements in overall attitudes and perceptions from prior to the treatment to the conclusion of the project. The increased mean score reported by Project 4 between the follow-up and close-out questionnaires (Table 17) was not significantly significant (Table 18).

Because only one of the projects reported overall significant improvements in attitudes and perceptions it is of interest to examine the mean scores for each project on each of the six variables under study. These mean scores are presented in Table 19.
Table 19. Summary of Total and Project Mean Scores for each of the Variables as Reported on the Three Questionnaires

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>Project 1</th>
<th>Project 2</th>
<th>Project 3</th>
<th>Project 4</th>
<th>Project 5</th>
<th>Project 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.94</td>
<td>3.26</td>
<td>3.21</td>
<td>3.33</td>
<td>3.25</td>
<td>3.38</td>
<td>3.24</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.68</td>
<td>2.48</td>
<td>3.03</td>
<td>2.52</td>
<td>3.00</td>
<td>2.61</td>
<td>2.75</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.10</td>
<td>2.30</td>
<td>2.82</td>
<td>2.79</td>
<td>2.80</td>
<td>2.59</td>
<td>2.61</td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.57</td>
<td>3.05</td>
<td>2.98</td>
<td>3.06</td>
<td>2.98</td>
<td>3.23</td>
<td>3.06</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.53</td>
<td>2.47</td>
<td>2.93</td>
<td>2.26</td>
<td>2.80</td>
<td>2.56</td>
<td>2.62</td>
</tr>
<tr>
<td>Close-out</td>
<td>1.94</td>
<td>2.16</td>
<td>2.68</td>
<td>2.51</td>
<td>2.35</td>
<td>2.36</td>
<td>2.36</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.72</td>
<td>3.13</td>
<td>3.02</td>
<td>3.21</td>
<td>3.17</td>
<td>3.18</td>
<td>3.08</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.74</td>
<td>2.42</td>
<td>2.99</td>
<td>2.43</td>
<td>3.08</td>
<td>2.71</td>
<td>2.78</td>
</tr>
<tr>
<td>Close-out</td>
<td>1.88</td>
<td>2.30</td>
<td>2.63</td>
<td>2.32</td>
<td>2.64</td>
<td>2.55</td>
<td>2.44</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.46</td>
<td>2.72</td>
<td>2.57</td>
<td>2.96</td>
<td>2.77</td>
<td>2.76</td>
<td>2.47</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.04</td>
<td>2.05</td>
<td>2.54</td>
<td>2.05</td>
<td>2.44</td>
<td>2.41</td>
<td>2.31</td>
</tr>
<tr>
<td>Close-out</td>
<td>1.77</td>
<td>2.08</td>
<td>2.27</td>
<td>2.44</td>
<td>2.24</td>
<td>2.36</td>
<td>2.22</td>
</tr>
<tr>
<td>Respect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.29</td>
<td>2.78</td>
<td>2.79</td>
<td>2.90</td>
<td>2.73</td>
<td>3.01</td>
<td>2.53</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.35</td>
<td>2.25</td>
<td>2.75</td>
<td>2.10</td>
<td>2.42</td>
<td>2.50</td>
<td>2.40</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.13</td>
<td>2.06</td>
<td>2.46</td>
<td>2.50</td>
<td>2.18</td>
<td>2.48</td>
<td>2.31</td>
</tr>
<tr>
<td>Workmanship</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>1.99</td>
<td>2.68</td>
<td>2.40</td>
<td>2.61</td>
<td>2.44</td>
<td>2.68</td>
<td>2.50</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.25</td>
<td>2.11</td>
<td>2.38</td>
<td>2.05</td>
<td>2.35</td>
<td>2.20</td>
<td>2.24</td>
</tr>
<tr>
<td>Close-out</td>
<td>1.91</td>
<td>1.75</td>
<td>2.37</td>
<td>2.64</td>
<td>2.05</td>
<td>2.21</td>
<td>2.16</td>
</tr>
</tbody>
</table>

The results of Table 19 support the results shown in Table 16. The subjects in Project 4 perceived problem solving, teamwork, trust, respect and workmanship to actually decrease (as represented by increasing mean scores) from the time the follow-up questionnaire was administered to the time the
close-out questionnaire was administered. Project 1 reported more negative perceptions immediately following the treatment on the variables communication, respect and workmanship, however, on the close-out questionnaires more positive perceptions were reported.

Analysis of Groups

It is also of interest to examine whether the individual group's attitudes and positive perceptions were more positive regarding the Partnering projects than those for prior non-Partnering projects they had worked on. A summary of the groups' overall mean scores for each of the questionnaires is presented in Table 20.

Table 20. Group Overall Mean Scores and Standard Deviations on each of the Questionnaires

<table>
<thead>
<tr>
<th>GROUP/QUESTIONNAIRE</th>
<th>n</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa DOT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>57</td>
<td>3.06</td>
<td>1.04</td>
</tr>
<tr>
<td>Follow-up</td>
<td>42</td>
<td>2.65</td>
<td>.98</td>
</tr>
<tr>
<td>Close-out</td>
<td>36</td>
<td>2.60</td>
<td>.96</td>
</tr>
<tr>
<td>Contractors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>73</td>
<td>2.88</td>
<td>1.17</td>
</tr>
<tr>
<td>Follow-up</td>
<td>28</td>
<td>2.52</td>
<td>1.20</td>
</tr>
<tr>
<td>Close-out</td>
<td>29</td>
<td>2.22</td>
<td>1.08</td>
</tr>
</tbody>
</table>

The overall mean scores for both groups decreased from the pre- to the follow-up and from the follow-up to the close-out questionnaires. The data presented in Table 20 suggests that the subjects within each group reported overall attitudes and perceptions to be more positive on Partnering projects than on non-Partnering projects they had worked on in the past.
To ascertain whether these improvements were significant a series of paired t-tests were calculated. The results of these analyses are presented in Table 21. The results of the t-tests (Table 21) suggest that both groups reported more positive perceptions and attitudes on the Partnering projects than on prior non-Partnering projects. The Iowa DOT personnel reported that these improvements occurred sometime during the first third of the project while the contractors did not report significant improvements until well into the construction project.

Table 21. The t-values for each Group Between the Questionnaires

<table>
<thead>
<tr>
<th>QUESTIONNAIRES</th>
<th>Iowa DOT</th>
<th>Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre/Follow-up</td>
<td>2.05*</td>
<td>1.38</td>
</tr>
<tr>
<td>Follow-up/Close-out</td>
<td>.23</td>
<td>1.00</td>
</tr>
<tr>
<td>Pre/Close-out</td>
<td>2.19*</td>
<td>2.75*</td>
</tr>
</tbody>
</table>

*Two-tailed significance at the .05 confidence level.

To ascertain whether these improvements in perceptions and attitudes were consistent for each of the variables under study an additional analysis was conducted. The data presented in Table 22 indicates that both of the groups perceived positive improvements following the treatment for each of the variables. However, these positive perceptions diminished for some of the variables by the conclusion of the project, particularly as reported by the Iowa DOT subjects. These subjects perceived problem solving, trust, respect and workmanship to decrease during the second half of the project's construction.
Table 22. Mean Scores for each Variable on each Questionnaire as Broken Down by Demographic Group

<table>
<thead>
<tr>
<th>VARIABLE/QUESTIONNAIRE</th>
<th>Iowa DOT</th>
<th>Contractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.29</td>
<td>3.19</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.71</td>
<td>2.90</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.80</td>
<td>2.47</td>
</tr>
<tr>
<td>Teamwork</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.06</td>
<td>2.81</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.66</td>
<td>2.38</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.50</td>
<td>2.11</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>3.13</td>
<td>3.03</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.84</td>
<td>2.67</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.63</td>
<td>2.27</td>
</tr>
<tr>
<td>Trust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.61</td>
<td>2.59</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.34</td>
<td>2.13</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.38</td>
<td>2.00</td>
</tr>
<tr>
<td>Respect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.58</td>
<td>2.48</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.39</td>
<td>2.00</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.40</td>
<td>2.03</td>
</tr>
<tr>
<td>Workmanship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>2.75</td>
<td>2.26</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.42</td>
<td>1.98</td>
</tr>
<tr>
<td>Close-out</td>
<td>2.47</td>
<td>1.92</td>
</tr>
</tbody>
</table>
Hypothesis 4

"Responses from the non-participants will be statistically more positive (p ≤ .05) than the responses from the participants on the pre-questionnaire, but not statistically different (p ≤ .05) from the responses of the participants on the follow-up questionnaire." Because the non-participants were only assessed once (half-way through the project) and because there was little consistency in how long each of the subjects within this group had worked on the project no questionnaire to questionnaire comparisons can be made between the non-participants and the participants. However, this hypothesis suggests that the non-participants will report perceptions and attitudes that are more positive than the participants' responses prior to the treatment and that they will also report responses similar to those of the participants following the treatment because of the transfer of treatment effects between the two groups.

To evaluate this hypothesis a series of two sample t-tests were used. The overall mean score obtained from the 20-item questionnaire administered to the non-participants was compared with the overall mean scores from the three 41-item questionnaires administered to the participants. The overall mean scores, standard deviations and t-values from the t-tests are presented in Table 23.

The findings presented in Table 23 suggest that the mean score for the non-participants did not differ significantly from the pre-questionnaire mean score of the participants. This suggests that the non-participants perceived the Partnering projects similar to how the participants perceived non-Partnering projects. In addition, the non-participant mean score was not significantly different from the participant mean scores following the treatment.
Table 23. Overall Mean Scores, Standard Deviations and t-values for the Participants and Non-Participants on each of the Questionnaires

<table>
<thead>
<tr>
<th>QUESTIONNAIRE COMPARISON</th>
<th>N</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>t-value Between Questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Participant Pre</td>
<td>22</td>
<td>2.91</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>Participant Pre</td>
<td>141</td>
<td>2.97</td>
<td>1.13</td>
<td>.37</td>
</tr>
<tr>
<td>Non-Participant Follow-up</td>
<td>22</td>
<td>2.91</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>Participant Follow-up</td>
<td>65</td>
<td>2.57</td>
<td>1.06</td>
<td>1.17</td>
</tr>
<tr>
<td>Non-Participant Close-out</td>
<td>22</td>
<td>2.91</td>
<td>1.52</td>
<td></td>
</tr>
<tr>
<td>Participant Close-out</td>
<td>64</td>
<td>2.39</td>
<td>1.30</td>
<td>1.79</td>
</tr>
</tbody>
</table>

The first part of the hypothesis is not supported but the second half of the hypothesis is supported. However, the entire hypothesis is what is important and therefore, all conditions must be met. The hypothesis that responses from the non-participants will be statistically more positive than the responses from the participants on the pre-questionnaire, but not significantly different from the responses from the participants on the follow-up questionnaire is not supported.
Additional Analysis

Written Comments

Many written comments were obtained from the subjects on the questionnaires they completed. A review of these comments is warranted as they assist in interpreting some of the data and provide greater insight as to how Partnering was perceived by the subjects. Some of the more positive comments included:

"I enjoy working with the team concept, I try not to let my ego get in the way."

"Even though the weather was bad, cooperation has been very good. The forum has been beneficial in presenting all sides of a problem."

"Partnering helped the working relationships and to solve problems."

"My job is easier on me and my family thanks to Partnering."

"Communication between the DOT and the Contractor was probably one of the strong points. Partnering enabled many of the decisions to be made at the project level. My opinion is that Partnering is a positive factor in contract administration and construction."

"Feel that this is definitely a positive thing towards the construction industry."

"Partnering is the only way to go. Everyone was open and communicated well."

"The only people who were suspicious of the process were those that did not participate in the workshop."

The previous comments came from subjects working on various projects within different organizational affiliations. It is also of interest to examine the comments from each group. Subjects working within the DOT made the following comments:

"I don't know if contractors have been unusually friendly or whether all should be attributed to Partnering but it has been enjoyable"
working on this project. Resolutions to problems are approached as 'our problem'--hats off to attitudes of the contractors!"

"I think all parties have Partnered extremely well to work through the obstacles and achieve the progress and quality product we have to date."

"Overall tried to keep Partnering in mind but all did slip back into old tendencies--this was evident on both sides."

"Some of the subcontractors were not on board with Partnering. Old tendencies were visible but overall, Partnering concept was evident. The down side was some phases of work may have been substandard due to trying extra hard to promote Partnering atmosphere."

Not all DOT personnel felt this positive, below are additional comments:

"We failed to communicate...each sub and prime contractor were thinking along different lines when the bids were taken--caused some problems later in the project."

"Disputes are here, they don't want to change. They've done it this way for 10 years, want to continue another 10 years."

"Past experience has very great impact on how people relate on project. To challenge past experiences or perceptions is very difficult."

"The system seems to have developed into an adversarial contest."

"One side against the other contributes to a lot of problems."

"Most relationships have been positive but bottom line is money and these issues have become a problem on occasion."

The contractors also expressed opinions and interpretations of the projects they worked on and the Partnering process. Their comments follow:

"We want to communicate better within our own company so everyone knows what's going on."

"Change orders have been easily negotiated because communications have been kept on a personal and friendly basis. DOT has listened and respected my ideas."

"If I listen to the prime and they listen to me things can be worked out."
"I feel that there is a comraderie [sic] among all players including higher-ups on both sides. I have never seen an atmosphere of friendship like this on any other job."

"One member didn't accept Partnering, this had a ripple effect which touched others—unless all engage sincerely in the process a negative can result and a small infection can grow into a larger problem."

"There have been normal difficulties which have been solved with ease because of Partnering. DOT feels pressure to cooperate, hope it stays this way."

The contractors offered more negative comments, primarily about their relationship with the DOT. Most of these comments were made by subjects working on Projects 5 and 6. These subject's comments are listed below:

"DOT has problem at the Ames level."

"DOT decision making is slow—hope one or two bad apples don't spoil the whole bunch."

"Lack of cooperation from the subcontractor, trying to score points with one leader or project manager."

"There are Resident Engineers and Inspectors who won't try to work through a reasonable solution."

"Disputes are usually, 'what's in it for me?' Inspectors have a chip on their shoulder—forget to communicate. Most contractors need teamwork, DOT just wants teamwork."

"Decisions from the DOT takes extremely long time."

"Communication if often fragmented—rumors and misinterpretations start flying around. Often safety comes second to productivity, quick tendency to blame others versus team attitude."

These comments, both positive and negative do offer insight into how the subjects perceived the projects and the Partnering process. No statistical analysis was conducted on them however. They are presented here to help in comprehension and will be addressed further in the next chapter.
Interviews

Individual and group interviews were conducted throughout the duration of the projects included in this study. It is this author's opinion that these interviews increased the commitment of the subjects to complete the questionnaires. The comments made in these interviews were similar to those written on the questionnaires. No statistical analysis was done regarding the comments obtained from these discussions.

Comments made during the interviews conducted shortly after the treatment (4-6 weeks) indicate that the subjects were skeptical of Partnering. Some comments include:

"We've been doing this all along."
"This sounds like common sense."
"Everything would be just fine if they changed."
"Things are going well, but I don't know if it's because of Partnering."

One question that was frequently asked of the subjects towards the conclusion of the projects was: "How has Partnering helped you in your work, what effect has it had on this project?" Some of the answers to this question are listed on the following page:

"...has helped me handle decisions better, speeded up the process and made it easy to make decisions and stick to them."
"It was fun to go to the workshop, but I don't consciously think about what I learned or did there."
"Realized that effective communication may take more time and effort than ineffective communication but it's worth it."
"I think Partnering has the potential to come into play but I can't think of any specific examples on this project so far."
"There is less tension on this project than on other projects I've worked on. I think this is because we all got to know one another during the workshop prior to starting construction."
"I think I tried to be more approachable and open to discussion. I am working on some of these issues within my family life as well. Not just a process for construction, but for living."

When asked for suggestions on how to improve or enhance the Partnering workshop the following comments were made:

"Include more people. All subs and suppliers should be present".
"Spend more time on communication skills."
"The best part of it were the breaks when we could just all talk and get to know each other better."
"Spend more time talking about the project and less time talking about relationship building."
"Need to develop a system to get this information back to the field personnel."
"I liked it, really fun and insightful. Really enjoyed the discussion regarding paradigms."

The subjects appeared to enjoy talking about the project they were working on and the Partnering process but, overall, they offered few suggestions as to how to improve it and few specific examples as to the changes that had occurred as a result of Partnering. However, there were no negative comments regarding the goals of Partnering and all were willing to go to another Partnering workshop and work on another Partnering project.

Interviews were also conducted with the personnel who did not participate in the Partnering workshop. Specific questions included "Have you been informed of the Partnering workshop that your co-workers went to?", "Have you witnessed any effects of Partnering in your work?", and "Do you feel a part of the Partnering process?" Very few of the non-participants really knew what Partnering was all about. They were not informed in any formal manner regarding what took place during the Partnering workshop, many had not even
seen the charter developed. Some specific comments from these interviews include:

"I don't know what this Partnering is all about, this is just like any other project."

"My boss gave me this sticker and told me to put it on my vest, I'm not exactly sure what it means, but a friend of mine designed it--it's cool I guess."

"Inspectors are just as hard-assed, I don't see them trying any harder, isn't that what Partnering is all about?"

"I wish we could get paid to go sit in a 2-day meeting sometime like the higher-ups, they get all the breaks."

"I just do my job and don't ask questions."

"Someone showed me the charter but I don't get it."

"I think this is just another trick by the DOT to get us to be more cooperative, they don't understand that we have to make a living."

"I've heard some of the guys talking about, they enjoyed the workshop and thought that this project was easier to work on then some others--I think we should know more about it. We're the ones actually do all the work."

These comments seem to indicate that additional efforts are needed to include the non-participants in the Partnering process.
CHAPTER V.
SUMMARY, DISCUSSION, LIMITATIONS, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSIONS

Introduction

In the previous chapter the data collected during this study was analyzed. This chapter provides a summary of the study, a discussion of the results and limitations of the study, implications for Partnering and recommendations for future research in the area of Partnering.

Summary of the Study

The purpose of this study was to assess the attitudes and perceptions of Iowa DOT personnel and independent contractors working on heavy highway construction projects. These subjects' perceptions of previous non-Partnering projects were compared with their attitudes and perceptions regarding the Partnering project they were working on following a Partnering workshop. The Partnering workshop constituted the treatment for this study and the dependent variables were problem solving, teamwork, communication, trust, respect and workmanship.

Data was also collected on quality, performance and profitability of the Partnering projects. This data was based on actual project results and not on perceptions of the subjects.

The subjects of the study included workshop participants, non-workshop participants and a control group. The subjects worked on one of seven
construction projects. Six of the projects were Partnering projects and one non-Partnering project served as the control.

The dependent variables were assessed through a number of questionnaires and a close-out data collection form. The questionnaires included either 41-items or 20-items. These questionnaires were designed by the author to assess the subjects' perceptions and attitudes related to problem solving, teamwork, communication, trust, respect and workmanship on the construction projects. The 41-item questionnaires were used for a pre-treatment assessment and for two post-treatment assessments. The pre-questionnaire assessed the subjects' perceptions, on the six variables under study, of past non-Partnering projects. These questionnaires were administered to 146 subjects. The administration of the pre-questionnaire resulted in 141 (97%) returned and completed questionnaires. The follow-up and close-out questionnaires assessed the subjects' perceptions, on the six variables under study, of the Partnering project they were currently working on. The administration of the two post-treatment questionnaires resulted in 65 (45%) follow-up responses and 64 (44%) close-out responses.

The 20-item questionnaire was administered to ninety subjects who did not participate in the treatment but who worked with the treatment group on a given construction project. This questionnaire assessed the subjects' attitudes and perceptions, on the six variables under study, of the Partnering project they were currently working on. The response rate for these subjects was 24% with 22 questionnaires being returned.

The control group did not participate in the treatment. Twenty-five subjects were administered the pre, follow-up and close-out 41-item
questionnaires. The response rates for the control group were exceptionally small, a 36% for the pre-treatment question (9 responses), and a 16% response rate for the two post-treatment questionnaires (4 responses). Because of these very small sample sizes no statistical analysis could be conducted for this group.

The close-out data gathering report was completed by each of the six project Resident Engineers and provided data on quality, profitability and productivity. To analyze this data additional data was collected through the Iowa DOT on 15 non-Partnering projects. These 15 projects became the control which was used to compared the Partnering projects with for hypothesis 1.1, 1.2, and 1.3.

A review of the literature revealed a lack of empirical analysis on the effects of Partnering on heavy highway construction projects. The literature did suggest that the dependent variables being assessed in this study were positively effected by Partnering. The conclusions made in the Partnering literature coupled with the lack of quantifiable results to support these conclusions were the impetus for this study.

This study was based on two assumptions: 1) there is an adversarial relationship between the Iowa DOT personnel and the independent contractors they work with on heavy highway construction projects, and 2) educational intervention through a Partnering workshop can significantly reduce the typical negative perceptions, attitudes and beliefs while in turn increasing quality, profitability and productivity. These assumptions led to the following four conjectures: 1) if there are low levels of trust, respect, teamwork and communication among co-workers on a heavy highway construction project the quality, profitability and productivity of the work will suffer; 2) if Partnering is implemented the participants' perceptions of teamwork and performance on the
project will improve; 3) if a Partnering workshop is conducted, participants will report a more favorable perception after the workshop, towards the project and their co-workers; and 4) if workshop participants' attitudes and perceptions regarding the Partnering project they are working on are favorable, these positive attitudes and perceptions will be transferred to those project personnel who did not participate in the Partnering workshop.

Discussion of the Findings

Hypothesis 1.1

It was hypothesized that the quality of the Partnering projects would be greater than the quality of non-Partnering projects. Although the literature on Partnering supports this hypothesis (CII, 1991), the results of this study do not.

Data was gathered to measure the occurrence of monetary incentives based on product smoothness, pavement thickness, the avoidance of air content or slump penalties, whether or not there was rain damage to the pavement, and whether any items on the project required removal or replacement. Because of the small number of Partnering projects included in this study and their diverse nature the only data that was statistically analyzed was whether any items of work required removal or replacement.

The Iowa DOT expects 2% of its projects to require some work which must be removed or replaced. Two of the six Partnering projects in this study required a part of the project to be replaced or removed. One of these instances included the replacement of some pipe apron due to damage caused by the contractor's equipment. The other instance was a result of fuel spills at two locations by an unknown source.
The results of these findings should not suggest that the quality of the Partnering projects was less than non-Partnering projects. The Iowa DOT quality specifications are quite high and all project results are thoroughly inspected. Many of the Partnering projects received monetary incentives as a result of surpassing these high quality specifications.

All of the Partnering projects that were eligible for a pavement smoothness incentive received one, and all of the Partnering projects that were eligible for a cement thickness incentive received one. This implies that the quality of the roads being built on the Partnering projects exceeded the smoothness and cement thickness specifications set forth by the Iowa DOT. Only one of the projects experienced rain damage on the project which would result in rework or modifications, even though there was record rainfall during the 1993 construction season.

There was some concern, expressed through written comments and personal interviews that the quality of the Partnering projects may actually suffer because the personnel did not want to 'rock the boat'. The subjects indicated that they tried hard to negate disagreements and disputes, occasionally at the expense of quality. A specific quote from one of the Iowa DOT subjects summarizes this feeling best, "Old tendencies were visible but the overall Partnering concept was evident--down side was some phases of work may have been substandard due to trying extra hard to promote Partnering atmosphere."

Other subjects reported that quality did improve because communication was better and problem solving processes were easier to work within. The Iowa DOT Resident Engineer of Project 2 reported that "the greatest success of the project was the excellent quality of the finished product, considering the
extremely adverse weather conditions encountered." These comments suggest that some subjects were still skeptical of the Partnering process, perceiving that somewhere along the line something would have to be sacrificed for improved relations; that something being quality. Some subjects, on the other hand, perceived quality to naturally improve because communication was more frequent and open and problem solving was more efficient which resulted in more win-win decisions.

It seems as if some subjects anticipated Partnering to produce a higher quality product and some expected quality to suffer. The findings of this study are rather inconclusive. The instances of items of work which required removal or replacement was greater on Partnering projects than on non-Partnering projects but the Partnering projects were awarded numerous monetary incentives for exceeding Iowa DOT quality specifications.

**Hypothesis 1.2**

The hypothesis that profitability, as measured by value engineering proposals, cost control data and litigation claims filed, would be higher on Partnering projects than on non-Partnering projects was not supported.

No value engineering proposals were submitted on any of the projects included in this study. Because no value engineering proposals were submitted there were no opportunities for value added savings on the projects. The Arizona DOT reports that on their Partnering projects value engineering proposals increased and resulted in substantial savings to the Arizona DOT and its contractors (Williams, 1992). The data from this study does not support the conjecture that value engineering proposals are more frequent on Partnering projects than on non-Partnering projects.
The Iowa DOT expects there to be work that needs to be replaced or removed following inspection on 20% of their projects (Smythe, personal communication, March 3, 1994). On the Partnering projects included in this study two projects reported an occurrence in which work needed to be removed or replaced. On one of the projects some of this rework was due to the fact that a public vehicle drove into the fresh concrete and required removal of the vehicle and repouring of the concrete. In addition, on this project a number of guardrails had to be replaced because of improper installation by a subcontractor, and some compression seal joints had to be replaced for not meeting the proper depth specifications. Total additional costs incurred by these reworks was $1199.12 On the other project 60 feet of curbing had to be repoured due to poor workmanship and a pipe apron had to be replaced when the contractor's equipment damaged it. No additional costs were incurred as a result of these reworks.

No litigation claims were filed on any of the Partnering projects. In some state DOT's litigation claims are frequent but within Iowa litigation claims on heavy highway construction projects are relatively rare (Smythe, personal communication, March 3, 1994). While it is positive that no litigation claims were filed on the projects involved in this study, this was the anticipated result.

While it can not be said that Partnering has a negative effect on profitability, results from this study do not support the conclusion that Partnering actually enhances profitability either.
Hypothesis 1.3

It was hypothesized that productivity, as measured by delayed project completion, lost work days, formal and informal plan changes and accident reports, would be significantly higher on Partnering projects than on non-Partnering projects. This hypothesis was supported.

All of the Partnering projects were completed on or before the agreed upon completion date. Many of the subjects commented either on the questionnaires or during the interviews that this was one of the greatest achievements of the project given the adverse weather conditions during the 1993 construction season. One project (#4) received a monetary incentive for completing the project early.

Based on Iowa DOT projections and estimates (Smythe, personal communication, March 3, 1994) the Partnering projects did not experience any greater number of formal or informal plan changes. One subject's comment from the questionnaire may help to explain why, "Change orders have been easily negotiated because communications have been kept on a personal and friendly basis. The Iowa DOT has listened and respected my ideas." The previous comment was made by a prime contractor on the project, an Iowa DOT personnel expressed similar thoughts, "I don't know if contractors are unusually friendly or whether all should be attributed to Partnering but it has been enjoyable working on this project. Resolutions to problems are approached as "our" problem. Hats off to attitudes of the Contractors!" There were many comments made on the questionnaires and in the interviews regarding this "team" approach to problem solving (for additional comments see Chapter IV).
No work days were lost on any of the projects due to plan changes, disputes or accidents. The Iowa DOT estimates that on 25% of their projects there is an accident or personal injury which interrupts the work schedule (Smythe, personal communication, March 3, 1994). One of the Partnering projects included in this study reported a personal injury accident. This accident occurred when a contractor employee was injured as a result of being hit by a vehicle during the profilograph run upon completion of the project.

As previously stated, the Iowa DOT is well respected for the quality of its roads and the productivity of its personnel. The fact that Partnering did not have a negative effect on the productivity of the projects is important to note. It is apparent from the data collected and comments made by subjects that productivity was greater on Partnering projects than on non-Partnering projects. In addition, many subjects reported that the Partnering project they worked on was one of the most enjoyable.

Hypothesis 2.1

Hypothesis 2.1 stated that teamwork, as measured by perceived levels of trust, respect, teamwork and communication would be statistically more positive on the follow-up and close-out questionnaires than on the pre-questionnaire. This hypothesis was supported through statistical analysis.

The findings reveal that the subjects' perceptions of teamwork on the Partnering projects were significantly more positive as reported on both the follow-up and the close-out questionnaires than their perceptions of teamwork on past, non-Partnering projects. This suggests that as the projects progressed the perception of teamwork continued to improve.
Project by project analysis indicate that the subjects in each of the six projects perceived teamwork to be in greater evidence on the Partnering projects than on prior non-Partnering projects they had worked on. For five of the six projects additional improvements in teamwork as the project progressed were reported. However, statistical analysis suggests that only the improvements perceived by the subjects in Project 2 were statistically significant \((p < .05)\). It is not clear what distinguishes this project from the others or what specifically constituted their greater perceived improvements of teamwork.

The subjects in Project 4 perceived a slight decrease in teamwork from the time the follow-up questionnaire was administered and the close-out questionnaire was administered but this difference in mean scores was not statistically significant \((p \leq .05)\).

When the subjects were categorized into organizational groups the findings indicate that both the Iowa DOT personnel and the contractors reported decreasing mean scores indicating that they perceived teamwork on the Partnering projects to be better than on previous non-Partnered projects. However, only the subjects from the contractors' organizations reported statistically significant improvements from the pre to the close-out questionnaires. This suggests that the Iowa DOT personnel did not perceive as positive of improvements. This raises some concern as to why these two groups differed.

However, as with this hypothesis and the following hypotheses, no control data was analyzed and therefore, it is impossible to conclude that the positive results of the analyses were due to the treatment. Some of these results or all of these results may simply be due to the Hawthorne effect. However, interviews conducted with the subjects suggest that this is not true and that
indeed, Partnering did contribute to the positive results reported. Some comments include: "I feel that there is a camaraderie among all players including higher-ups on both sides. I have never seen an atmosphere of friendship like this on any other job", "I enjoy working with the "team" concept, I try not to let my ego get in the way" and, "...trust level is very high, people tell it like it is."

Hypothesis 2.2

It was hypothesized that performance, as measured by the variables workmanship and problem solving through the 41-item questionnaires would be more positive on the follow-up and close-out questionnaires than on the pre-questionnaire. This suggests that the subject's perceptions of performance on the Partnering projects would be more positive than their perceptions of performance on previous non-Partnering projects they had worked on. This hypothesis was supported. The findings reveal that the subjects did perceive performance to be more positive on the Partnering projects than on non-Partnering projects they had worked on. In addition, perceptions regarding teamwork continued to improve throughout the duration of the project.

A number of specific comments regarding problem solving and workmanship were either written on the questionnaires or made by the subjects during interviews. These comments included: "Even though weather has been bad, cooperation has been very good. The forum (weekly meetings) has been beneficial in presenting all sides of a problem so the resolution can be more understandable", "Traffic control problems were minimized by team effort", "Partnering enabled many of the decisions to be made at project level", and "I think all parties have Partnered extremely well to work through the obstacles and achieve the progress and quality of product we have to date."
The mean scores for the subjects in each of the six projects decreased from the pre-questionnaire to the follow-up questionnaire and the mean scores for the subjects in five of the six projects continued to decrease (show improvement) from the follow-up to the close-out questionnaires. This suggests that following the treatment perceptions regarding performance improved and continued to improve throughout the duration of the projects. However, when statistical analyses were conducted only the perceived improvements from the subjects in project 2 were statistically significant (p ≤ .05).

The subjects in Project 4 reported a mean score on the close-out questionnaire which was higher than the mean score on the follow-up questionnaire indicating that during the time elapsed between the administration of these two questionnaires the subjects' perceptions of performance decreased. However, statistical analysis indicate that this increase in mean score was not significant.

The findings from the analysis of the two organizational groups of subjects indicate that only the subjects from the contractor group perceived performance to be significantly greater on the Partnering projects than on non-Partnering projects. The subjects in the Iowa DOT group actually reported that they perceived performance to decreased between the time the follow-up questionnaire and the close-out questionnaire were administered. This is similar to what was found from the analysis of hypothesis 2.1. Again, it raises concerns as to why the perceptions of these two groups differed.

In general the implications of the analyses conducted to test hypothesis 2.2 suggest that the subjects did perceive performance to be better on Partnering
projects than on non-Partnering projects. But again, no control data was analyzed and therefore, whether these perceived positive improvements were a result of Partnering cannot be conclusively stated.

**Hypothesis 3**

Hypothesis 3 states that attitudes and perceptions of Partnering participants will be more positive following the treatment than prior to the treatment. This suggests that the subjects will perceive Partnering projects more favorably than past non-Partnering projects. This hypothesis was supported.

Findings already revealed, from hypotheses 2.1 and 2.2 that the subjects perceived teamwork and performance to be more positive on the Partnering projects than on previous non-Partnering projects they had worked on. For hypothesis 3 all of the subjects' responses from each of the questions on the 41-item questionnaires were combined into one overall mean score for each questionnaire. The analysis of the overall mean scores indicate that the subjects' perceptions were statistically more positive on Partnering projects than on non-Partnering projects. These positive perceptions were maintained throughout the duration of the project.

Each of the variables under study: problem solving, teamwork, communication, trust, respect and workmanship showed a significantly positive improvement from the pre-questionnaire to the follow-up questionnaire and from the pre-questionnaire to the close-out questionnaire. The variables of problem solving, teamwork, and communication showed additional statistically significant positive improvements from the follow-up questionnaire to the close-out questionnaire indicating that as the projects progressed perceptions continued to improve.
When analyses were conducted based on individual projects only the subjects on Project 2 indicated statistically significant overall improvement following the treatment. This is consistent with the findings for hypothesis 2.1 and 2.2. The six dependent variables being assessed through the questionnaires were also examined for each of the six projects. The subjects in Project 4 reported that they perceived teamwork, trust, respect and workmanship to actually decrease from the time the follow-up questionnaire was administered and the time the close-out questionnaire was administered. However, statistical analysis indicates that these differences between the two questionnaires was not statistically significant (p < .05). Project 6 also reported the slightest decrease in perceived levels of teamwork between the follow-up questionnaire and the close-out questionnaire. Project 1 reported more negative perceptions immediately following the treatment on the variables communication, respect and workmanship, however, on the close-out questionnaire more positive perceptions were reported. Projects 2, 3, and 5 reported that their perceptions of the variables improved throughout the duration of the projects.

Both the Iowa DOT personnel and the contractors reported more positive attitudes and perceptions on the Partnering projects than on prior non-Partnering projects they had worked on. Perceptions reported by the Iowa DOT personnel significantly improved following the treatment and continued to significantly improve throughout the duration of the project, while the perceptions reported by the contractors did not suggest significant improvement until the close-out questionnaire was administered. This suggests that for the Iowa DOT subjects overall perceptions continued to improve as the project
progressed. However, the contractors did not perceive significant improvements until well in to the construction of the projects.

Hypothesis 4

It was hypothesized that the responses from the non-participants would be significantly different from the responses from the participants on the pre-questionnaire and would not be significantly different from the responses of the participants on the follow-up questionnaire. This hypothesis was not supported.

It was assumed that the non-participants, after working with the participants would perceive the Partnering projects similarly to the participants. This part of the hypothesis was supported through the findings of the statistical analysis. However, it was also assumed that the non-participants' perceptions of the Partnering projects would be more positive than the participants' perceptions of non-Partnersing projects, this part of the hypothesis was not supported. The non-participants' overall mean score was not significantly different from the participants' overall mean scores on any of the questionnaires.

This could be interpreted as a positive conclusion and suggest that the effects of the Partnering workshop were transferred to the non-participants and that is why no differences were found between the two groups. However, the fact that the non-participants' mean score was similar to the participants' mean score prior to the treatment, implies that the previous positive interpretation is suspect. Rather, it is more probable that the non-participants did not perceive improvements between the non-Partnersing projects and the Partnering projects.

A number of the comments made during interviews with these subjects help to add further insight into the findings of this hypothesis, (for a review of the comments see Chapter IV). One of the most important outcomes of the
Partnering workshop is the development of a Partnering charter. This charter acts as a blueprint as to how the parties are going to work with one another and it includes a mission statement for the project. When the non-participants were asked whether they had seen this charter many said they had not. When the non-participants were asked whether they knew about anything that occurred during the Partnering workshop most said they did not. Also during the workshop the participants developed a project logo. These logos were made into small stickers and many of the project personnel stuck these logos on their hard hats, trucks, and folders. The non-participants were given these logos and many made reference to them during the interviews. The non-participants were not involved in the logo development process and, not surprisingly, did not show as much pride in the logo or as much commitment to the Partnering process.

The findings of the analysis conducted for this hypothesis are inconclusive and do not help to answer the question of whether the effects of Partnering are transferred to personnel who have not participated in the Partnering workshop.

Limitations of the Study

The literature review (Chapter II) revealed many limitations in the Partnering studies already completed. Many efforts were made to diminish these limitations in this study, however, the nature of Partnering make research somewhat cumbersome.

The primary limitation of this study is that the response rates from the control group were not large enough to conduct statistical analysis on. This limitation was also found in the majority of previous research conducted. Therefore, although many conclusions can still be made from the statistical
analyses conducted for this study, they must be interpreted with some amount of skepticism as to whether the results found were a direct result of Partnering or were more simply a result of the Hawthorne effect.

Another limitation is the fact that all of the Partnering workshops were conducted by one facilitator. The use of one facilitator was purposefully designed into this study to enhance the consistency of the experiences the treatment participants had during the workshop. However, the results may be very different if another facilitator was used.

A third limitation is that the weather conditions during the time the Partnering projects were being constructed were exceptionally wet and resulted in what has been classified as a 500-year flood. It is extremely positive to note that, even with these adverse conditions, the findings of this study suggest that the quality and productivity of the Partnering projects were significantly higher than non-Partnering projects. However, the results of this study related to quality, profitability and productivity may not be comparable to other construction seasons.

Similarly, this study was designed to assess the subjects' perceptions of problem solving, teamwork, communication, trust, respect and workmanship. No study has been conducted to examine actual overt behaviors of the individuals participating in a Partnering project. Therefore, no conclusions can be made regarding the actual behaviors of the subjects related to these variables. The findings simply suggest that perceptions and attitudes related to these variables were more positive for Partnering projects than for non-Partnering projects.
The Iowa DOT estimates that by the end of the 1994 construction season every construction district in Iowa will have participated in at least one Partnering project. Because this study was designed to assess subjects' perceptions and attitudes regarding past non-Partnering projects it was crucial that the data be collected before the subjects were "contaminated" through prior Partnering exposure. Therefore, there was no opportunity to conduct validity or reliability assessments on the questionnaires prior to administration.

Validity and reliability tests were conducted on the 41-item and 20-item questionnaires at a later date and unfortunately, the findings were not very positive. The factor analysis conducted on the questionnaires suggests that additional modifications and refinements should be made regarding the questionnaires used to collect the data for this study (see chapter 3 for specific data). The 41-item questionnaire resulted in 11 factors instead of the anticipated six and a number of the items did not significantly correlate with one another within a given factor. In addition, statistical analysis conducted on this questionnaire indicate that the reliability was not significant, in fact it was very weak.

Therefore, questions arise as to what exactly was being measured. It could be conjectured that the six variables are too broad and need to be reclassified or redefined. The validity and reliability analysis conducted on the 20-item questionnaire were more positive. The findings suggested perfect reliability (1.0) at the .05 confidence level.

Recommendations as to how to minimize these limitations in future studies are presented in a following section of this chapter.
Implications for Partnering

This study was designed to assess whether Partnering had a positive effect on subjects' perceptions of problem solving, teamwork, communication, trust, respect, and workmanship on heavy highway construction projects in Iowa. The subjects were asked to assess these variables on prior non-Partnering projects they had worked on and, following a Partnering workshop, they were asked again to assess these variables for the Partnering projects. The results of the data analysis indicate that Partnering did positively effect the subjects' perceptions of these six variables.

The subjects' perceptions of Partnering projects were significantly more positive than their perceptions of non-Partnering projects. They perceived greater teamwork, more efficient communication and problem solving, and higher levels of trust, respect and workmanship.

The variables of quality, profitability and productivity were also examined in this research. These variables were assessed based on objective, quantifiable data collected at the conclusion of the Partnering projects. The findings from this study suggest that the productivity of the Partnering projects was higher than on non-Partnering projects.

Some of the contractors received monetary incentives for exceeding quality standards suggesting that the quality of the Partnering projects exceeded Iowa DOT specifications. These monetary awards also suggest that the contractor's profit-ratios were enhanced. However, no significant ($p < .05$) increases in quality or profitability on Partnering projects was found. Individuals involved in a Partnering project must make a financial and/or time commitment to the process. All participants in this study did make this
commitment voluntarily and at no time in this study did any participant comment that this commitment was unnecessary or too costly. In addition, no participants reported that Partnering had a negative effect upon profitability. The fact that many of the contractors, who themselves helped pay for the workshop and paid staff to attend, would be willing to participate in another Partnering workshop and project indicates that they believe that the potential for increased profitability is not the only reason to Partner.

As stated earlier in this chapter, some subjects expressed concern about how Partnering would effect the quality, profitability and productivity of the construction projects. These concerns have also been expressed by others in the industry. The findings of this study should help to alleviate these concerns and suppress some of the opposition to Partnering.

It was encouraging to find that both the Iowa DOT personnel and the contractors perceived significant improvement, as measured by overall mean scores, on Partnering projects as compared with non-Partnering projects. This implies that Partnering should be perceived as a benefit to all parties involved on a construction project and not just a benefit to one group. However, it was discouraging to find that only the subjects within the contractors' organizations perceived significant improvements in teamwork or performance following the Partnering workshop. This may imply that more emphasis in these two areas should be incorporated into the Partnering process, and/or that additional efforts need to be made with regards to the Iowa DOT organization.

It is extremely interesting to note that while the Iowa DOT was the organization to introduce Partnering to the contractors, and it was the Iowa DOT who asked for the participation and allocation of additional resources from the
contractors to help pay for the workshop it was the contractors who perceived the greatest benefits from the experience. The concern that the contractors and the Iowa DOT personnel have inconsistent perceptions about their relations with one another and the results of their work are heightened by the findings of this study.

The literature clearly states that both the owners and the contractors of a project be included in the Partnering workshop (AGC, 1991; Edelman, et al., 1991). Findings from this study may support the need to revise the current Partnering workshop agendas to include break-off sessions where the individual needs and differences of each group are focused on and worked with. It is crucial that both groups participate as a single "project" group during the workshop, in order to create the charter and create the atmosphere of Partnering. However, it may not be necessary, indeed it may be detrimental, to assume that they have the same concerns or needs.

The results of this study also support Geary's (1991) statement that as many project personnel as possible should be included in the Partnering workshop to enhance the benefits of Partnering. While the findings from hypothesis 4 indicate that no differences in perceptions were found between the participants and the non-participants it is quite evident from the other hypotheses that the participants perceived significantly better relations and working environments on the Partnering projects than on non-Partnering projects. It was conjectured that the effects or benefits of the Partnering workshop would be transferred from the participants to the non-participants. This may have occurred, however, the findings from this study were inconclusive. No pre-treatment or control data was collected from the non-participants and therefore
no conclusions can be made regarding what their perceptions would have been had the treatment not been conducted.

It could be suggested that had the non-participants participated in the workshop, their perceptions of the project and personnel relations would have significantly improved similar to the findings from the participants. It may also be suggested that the lack of participation by the field personnel, who primarily are employed with the contractors, in the Partnering workshop contributed to the findings that the subjects from the Iowa DOT did not perceive significant improvements regarding teamwork on the Partnering projects. Similarly, the field personnel are responsible for the majority of the actual work on the construction projects and their absence from the workshop may help to explain why the Iowa DOT personnel did not perceive performance to be greater on the Partnering projects than on the non-Partnering projects.

There was quite a diversity in projects included in this study. The budgets of the projects ranged from $1,230,000 to $12,515,000 and the physical length of the projects ranged from 0.5 miles to 17.6 miles. The projects took anywhere from 65 days to 215 days to complete. Even with all of these differences the subjects, when analyzed as an entire group, perceived positive improvements following the Partnering workshop.

However, while overall perceptions were significantly positive, when the projects were analyzed individually only the subjects on Project 2 perceived significant improvements, and the subjects in Project 4 reported more negative perceptions toward the end of the project. It would be interesting to try to ascertain why this occurred. Some extraneous variables may include cost of
project, length of project, number of personnel, type of personnel, type of project or location of project.

This study was an attempt to begin to statistically examine some of the claims being made in the literature regarding the benefits of Partnering. In general the results of this study support these claims. The findings revealed in this study should assist Partnering advocates in their attempts to persuade Partnering skeptics to implement Partnering on construction projects. Comments from the subjects suggest that the Partnering workshop was well received and worth the initial expenses of time and money.

The findings of this research strongly suggest that Partnering does positively effect working relations in an industry where adversarial relations and mistrust are still frequently the norm. Additional research and analysis, however, is necessary. Recommendations for additional research are included in the next section of this chapter.

Recommendations for Future Research

A review of the Partnering literature indicated that Partnering offers many benefits. These benefits include increased quality, profitability and productivity, enhanced teamwork, more effective communication, increased trust and respect, and more effective and equitable problem solving (AGC, 1991; CII 1991). This study was an attempt to examine these claims through empirical research. Many of the claims made about Partnering were supported by the findings of this study, but many questions are still unanswered.

One of the questions posed in this study was, "Can educational intervention have a positive effect on adversarial relations within the heavy
highway construction industry, and in turn enhance trust, respect, teamwork, problem solving, communication and workmanship among the project personnel?" The findings of this research suggest that it can and that Partnering did. A similar question may be asked of other types of educational intervention. Is Partnering the only program or process which would produce these results or would other programs work as well?

As previously stated, individuals involved in Partnering must make a financial and/or time commitment. The Partnering workshops conducted for this study were two days in length. Would a one day program be as effective? Many subjects commented that what they liked most about the workshops was that they could meet the people they would be working with. They developed friendly relations as well as professional relations. Would a pre-project picnic be just as effective? Additional research examining the types of Partnering workshops being conducted and the effectiveness of different agendas, length and facilitators could provide some answers to these questions.

In addition, the findings of this study suggest that the subjects who participated in the workshop reported more positive or favorable perceptions of the Partnering projects than of non-Partnering projects. However, no conclusive data was gathered to suggest whether these positive perceptions were transferred to the non-participants working on the projects.

Additional research is necessary to further examine any differences in perceptions between the participants and the non-participants and what this might suggest. Did the fact that no field personnel participated in the workshop influence the participants' perceptions of the Partnering experience? Is that why the subjects from the Iowa DOT did not perceive teamwork or performance to
significantly improve? Should all project personnel participate in the workshops? Research designed to gather more in-depth data regarding the perceptions and attitudes of non-participants towards Partnering is warranted.

It was conjectured that if Partnering were implemented the participants would report more positive perceptions and attitudes toward Partnering projects than non-Partnering projects. The findings of this study support this conjecture. The participants did perceive problem solving, teamwork, communication, trust, respect and workmanship to be more positive, however, no data was collected on actual behaviors related to these variables. It would be interesting to examine whether subjects' perceptions are consistent with observable or measurable behaviors. Did teamwork actually improve or did participants just expect it to and therefore perceive it to improve?

A related question has to do with the way these perceptions and attitudes were assessed. The questionnaires used in this study did not have very strong validity or reliability. The findings from the factor analysis conducted on the participant questionnaire suggest that more than the six variables defined for this study were being assessed. What were these other variables (factors) and should they be included in a Partnering assessment instrument? The reliability analysis conducted on the participant questionnaire indicated that the questionnaire had a very weak reliability. It is questionable whether the same results would be found if this study were repeated. Additional research regarding how to examine the effects of Partnering is necessary.

The non-participant questionnaire on the other hand reported a very strong reliability even though this questionnaire contained identical items as the participant questionnaire. Would this strong of a reliability be found if the
participants would have completed the non-participant questionnaires instead of the participant questionnaire? Additional research might include a more thorough analysis of the reliability and validity of these questionnaires and the development of a new instrument.

The Partnering literature suggests that the variables included in this study are effected by Partnering and supports the inclusion of them in future studies. However, most of the claims made in the Partnering literature are not statistically supported and therefore, are suspect themselves. It may be that other variables should be examined, such as leadership, management practices, creativity or analytical skills. Another approach might be to examine the effect of Partnering through a qualitative research effort.

Similarly, further work in the areas of defining quality, profitability and productivity is needed. The DOT's and contractors may have very different definitions and standards for these variables and their measurement is very difficult at present.

The interviews conducted for this study revealed that the subjects were very outspoken regarding Partnering. These subjects were very knowledgeable about their industry and the personnel within it. They had strong opinions about the benefits and pitfalls of Partnering. A qualitative research project designed to examine their comments, concerns and suggestions would be of interest and presumably assist in the understanding of the Partnering process.

Any future research conducted in the area of Partnering should include a sizable control group. This study attempted to gather control data but the subjects' response rates were too small to conduct statistical analysis. As a result,
it can not be conclusively stated that the findings revealed in this study were a result of Partnering.

The findings do reveal however, that the subjects' perceptions continued to change throughout the duration of the projects. This suggests that additional research efforts should avoid collecting data at only one time and rather, data should be collected at numerous times during the construction project.

Conclusions

This study was an effort to empirically examine the claims made regarding the benefits of Partnering on construction projects presented in the Partnering literature. The research was designed to assess heavy highway construction personnel's attitudes and perceptions of problem solving, teamwork, communication, trust, respect and workmanship on six different construction projects in Iowa. The quality, profitability and productivity of the projects were also examined.

It was conjectured that by participating in a Partnering workshop the subjects' perceptions and attitudes towards the construction project would be more positive than those perceptions and attitudes reported for past non-Partnering projects. It was also conjectured that Partnering projects would result in higher quality, profitability and productivity than non-Partnering projects. The findings of this research support some of these conjectures and many of the claims made in the Partnering literature. However, a multitude of questions are still unanswered.

This study has emphasized the need for and possible directions of future research in the area of Partnering. Partnering is still a relatively new concept and
many questions remain unanswered. The findings of this research help to solidify the foundations of Partnering and should assist others in creating the structure for its growth.
BIBLIOGRAPHY


Williams, Ron (Nov. 1992). Talk given at Wisconsin Department of Transportation Contractors meeting.
ACKNOWLEDGMENTS

It seems somewhat ironic that as I conclude this research it is now that I find it difficult to express myself in words. How do you convey in a few sentences the gratitude you feel towards those individuals who have helped you reach a goal you have worked so long and hard to achieve. I guess you start with a thank you.

I wish to thank Dr. John P. Wilson who is more than my major professor. He has served as a role model, a motivator, a counselor and advisor, a devil's advocate, a friend and an invaluable resource of knowledge and guidance. As an adult educator he has facilitated my growth as an adult learner. I must also thank the members of my committee, Dr. Patricia Keith, Dr. Terry Pickett, Dr. James Rowings and Dr. Roger Berger.

A special thank you to Dr. Roy Park for introducing me to Partnering and allowing me to learn from him. I thank him for his patience during the last year and for the shoulder that was always there when I needed it. I would also like to acknowledge Tom Cackler and John Smythe from the Iowa DOT for their assistance and dedication to Partnering and this research effort. I must also thank all of the personnel working on the projects I studied. Without their commitment to completing the questionnaires and speaking with me about their experiences this research could not have been conducted.

A special acknowledgment and sense of appreciation goes to Thomas Billings who helped me to find the courage and strength to proceed when I needed it most. He was unselfish in his support even as he strived to reach his own goals.
I express an even deeper sense of gratitude and admiration to my family, Beverly, Dennis and Erin Northouse. Their unconditional love and faith in me were daily inspirations. I thank them for forcing me to take a break when necessary and for motivating me to continue when it seemed impossible.
APPENDIX A.

HUMAN SUBJECTS REVIEW APPROVAL
Information for Review of Research Involving Human Subjects
Iowa State University
(Please type and use the attached instructions for completing this form)

1. Title of Project:

2. I agree to provide proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

3. Signatures of other investigators

4. Principal Investigator(s) (check all that apply)

5. Project (check all that apply)

6. Number of subjects (complete all that apply)

7. Brief description of proposed research involving human subjects:

A) The issue I will be studying is:

B) The nature of this study will be to assess the attitudes of the parties involved in state transportation construction projects prior participating in a Partnering Workshop (Appendix I), 6 weeks after the Partnering Workshop, and 10 weeks after the Partnering Workshop (Appendix II).

A representative sample of the project personnel will participate the 2-day Partnering Workshop and the data collected by the attitude questionnaires will make up the bulk of this study's data. In addition

8. Informed Consent:

(continued)
9. Confidentiality of Data: Describe below the methods to be used to ensure the confidentiality of data obtained. (See instructions, item 9.)

Personal identifiers will be used on those questionnaires which need to be mailed out to the subjects (specifically some of the follow-up questionnaires). A number will be affixed to the questionnaires and will correspond to a list of the subjects. Upon receiving the questionnaires back from the subjects the identifying code number will be removed and the list of subject names destroyed. The final page of the questionnaires request some general demographic information from the subjects but this information is generic enough that it would be impossible to single out any one subject from the group.

10. What risks or discomfort will be part of the study? Will subjects in the research be placed at risk or incur discomfort? Describe any risks to the subjects and precautions that will be taken to minimize them. (The concept of risk goes beyond physical risk and includes risks to subjects' dignity and self-respect as well as psychological or emotional risk. See instructions, item 10.)

There is no risk or discomfort involved in completing the questionnaires and all subjects are free to complete or not complete the questionnaires without fear of any repercussions for their actions.

11. CHECK ALL of the following that apply to your research:

☐ A. Medical clearance necessary before subjects can participate
☐ B. Samples (Blood, tissue, etc.) from subjects
☐ C. Administration of substances (foods, drugs, etc.) to subjects
☐ D. Physical exercise or conditioning for subjects
☐ E. Deception of subjects
☐ F. Subjects under 14 years of age and/or ☐ Subjects 14 - 17 years of age
☐ G. Subjects in institutions (nursing homes, prisons, etc.)
☐ H. Research must be approved by another institution or agency (Attach letters of approval)

If you checked any of the items in 11, please complete the following in the space below (include any attachments):

Items A - D Describe the procedures and note the safety precautions being taken.

Item E Describe how subjects will be deceived; justify the deception; indicate the debriefing procedure, including the timing and information to be presented to subjects.

Item F For subjects under the age of 14, indicate how informed consent from parents or legally authorized representatives as well as from subjects will be obtained.

Items G & H Specify the agency or institution that must approve the project. If subjects in any outside agency or institution are involved, approval must be obtained prior to beginning the research, and the letter of approval should be filed.
Checklist for Attachments and Time Schedule

The following are attached (please check):

12. ☑ Letter or written statement to subjects indicating clearly:
   a) purpose of the research
   b) the use of any identifier codes (names, #’s), how they will be used, and when they will be removed (see Item 17)
   c) an estimate of time needed for participation in the research and the place
   d) if applicable, location of the research activity
   e) how you will ensure confidentiality
   f) in a longitudinal study, note when and how you will contact subjects later
   g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. □ Consent form (if applicable)

14. □ Letter of approval for research from cooperating organizations or institutions (if applicable)

15. ☑ Data-gathering instruments

16. Anticipated dates for contact with subjects:
   First Contact: August 1997 (date to be arranged)
   Last Contact: December 1992

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:
   December 1992

18. Signature of Departmental Executive Officer: Patricia M. Keith
    Date: 8/11/92
    Department or Administrative Unit:

19. Decision of the University Human Subjects Review Committee:
    ☑ Project Approved
    □ Project Not Approved
    □ No Action Required

   Name of Committee Chairperson: Patricia M. Keith
   Date: 8/11/92
   Signature of Committee Chairperson: Patricia M. Keith
B) The subjects involved in this project will be: Iowa Department of Transportation personnel which include Construction Engineer, Resident Construction Engineer, Assistant Resident Engineer, Construction Tech III, Inspectors, Project Engineer, Materials Engineer, and Assistant Construction Engineer; Federal Highway Administration Engineers; Prime Contractor; Sub-Contractors; Suppliers; Laborers and Craftsmen; and City Manager. All subjects are over the age of 18 and reside in Iowa. Subjects will include both males and females.

Those subjects which participate in the Partnering Workshop represent the 'management' or decision makers within the Iowa DOT, the Contractor's organization, the Sub-Contractor's organization and the Supplier's organization. All subjects will be made aware of the purpose of the questionnaires (to supply data for a Ph.D. dissertation). The instructions on the top of the questionnaire clearly state the assurance of confidentiality and anonymity of their responses. No incentives or compensation will be given for completing the questionnaire and all participants are free to complete or not complete the questionnaire, however, it will be requested that they return the questionnaire to the researcher, completed or not.

If it is necessary to mail out the follow-up questionnaires (Appendix II and III) an appropriate cover letter will be attached (Appendix IV).
APPENDIX B.

RESEARCH INSTRUMENTS AND EXAMPLE OF COVER LETTER
PARTNERING QUESTIONNAIRE

INSTRUCTIONS
Please circle the number that most accurately reflects your opinion for each set of responses. Your honest answers are important, therefore, you do not need to sign your name to this form. It would be helpful if you would jot down a few words in the 'comment' sections to elaborate on your responses.

• On the majority of the projects I have worked on...

<table>
<thead>
<tr>
<th>disputes are resolved easily</th>
<th>disputes are usually resolved through legal action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
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<td>3</td>
<td>4</td>
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<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>working relationships are friendly and cooperative</th>
<th>working relationships are tense and uncooperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>5</td>
<td>6</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>people are tight lipped and rarely share information</th>
<th>communication is frequent and effective between all parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>my superiors &quot;watch me like a hawk&quot;</th>
<th>I have a high degree of freedom to do my work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
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<td>3</td>
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<td>5</td>
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<table>
<thead>
<tr>
<th>people are committed to working together</th>
<th>people just do their work with no thought to the other guy</th>
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<tbody>
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<td>1</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>all parties are considerate of one another</th>
<th>there is little consideration of one another</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
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<tr>
<td>5</td>
<td>6</td>
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</tbody>
</table>

Can you think of any specific examples or comments related to the above responses?
• Typically, when decisions are made on projects...

<table>
<thead>
<tr>
<th>When decisions are made on projects, which I feel are inappropriate</th>
<th>I have to live with them even if they are inappropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>I express my concerns and they are taken into consideration</td>
<td></td>
</tr>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>When I am informed of the decision in a timely and clear manner</th>
<th>I am not aware of the decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
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</table>

<table>
<thead>
<tr>
<th>When I feel a part of the process and am encouraged to share my ideas</th>
<th>I feel left out of the process and my ideas are ignored</th>
</tr>
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<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
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</table>

• Day to day communications (updates, job feedback, status reports, schedule changes, etc.)...

<table>
<thead>
<tr>
<th>Day to day communications (updates, job feedback, status reports, schedule changes, etc.)...</th>
<th>occur infrequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>occur frequently</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>are not shared with everyone</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day to day communications (updates, job feedback, status reports, schedule changes, etc.)...</th>
<th>are shared up and down the 'totem pole'</th>
</tr>
</thead>
<tbody>
<tr>
<td>are limited to only the information that I have to know to do my job</td>
<td>5 6</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Day to day communications (updates, job feedback, status reports, schedule changes, etc.)...</th>
<th>are limited to written notices</th>
</tr>
</thead>
<tbody>
<tr>
<td>are communicated verbally</td>
<td>5 6</td>
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Can you think of any specific examples or comments related to the above responses?
- **Negotiations over informal changes or plan clarifications...**

  are very time consuming

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  result in solutions that are not fair to all sides

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<th>6</th>
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</table>
  are easily resolved

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<th>5</th>
<th>6</th>
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  interrupt the work schedule

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</table>

- **Negotiations over formal changes or plan clarifications...**

  (those resulting in contract change orders)

  are easily resolved

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<th>2</th>
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<th>6</th>
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  take a great deal of time

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<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
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</table>
  result in solutions that are fair to all parties

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<th>6</th>
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</table>
  do not interrupt the work schedule

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<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>

Can you think of any specific examples or comments related to the above responses?
Based on my experience on past projects, conflict and disagreements...

<table>
<thead>
<tr>
<th>Experience</th>
<th>Fair Solutions</th>
<th>Quick Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflict and disagreements happen daily and often</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Cause a lot of tension between all parties</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Result in solutions which are fair to all parties</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>are quickly resolved and do not affect my work schedule</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>are solved and forgotten about--no hard feelings</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>result in solutions which are unfair to some parties</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Based on past projects I have worked on, I would say...

<table>
<thead>
<tr>
<th>Trust</th>
<th>Respect Work</th>
<th>Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I trust only those people from my own organization</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>I trust many people on the project, regardless of which organization they are with</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>I respect the work and decisions of all the people on the project</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I have very little respect for the work or decisions of the people on the project</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>people tell me one thing and then do another</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>people are true to their word</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>people are out for themselves</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>people cooperate for the good of the project</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Can you think of any specific comments or examples related to the above responses?
- My experience on past projects leads me to believe that...

<table>
<thead>
<tr>
<th>People give an extra effort</th>
<th>People never give their all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People are suspicious of each other's motives</th>
<th>People clearly understand the goals and objectives of each organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People care about one another on a personal level</th>
<th>People do not think of one another as friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People care about constructing a high quality project</th>
<th>People only care about getting their work done 'quick and cheap'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

- On past projects I have felt that...

<table>
<thead>
<tr>
<th>I was a part of a larger team</th>
<th>It was 'We' versus 'Them'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I was left alone to do my job</th>
<th>I was constantly watched and second guessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There was a high degree of cooperation between the parties</th>
<th>There was little cooperation between the parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People respected one another</th>
<th>There was little respect for one another</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

Can you think of any specific comments or examples related to the above responses?
• On past projects I have worked on...

people's safety was a high priority
1 2 3 4

I found my work enjoyable
1 2 3 4

the IDOT personnel were fair to all parties
1 2 3 4

the quality of the final product was not as high as I would like
1 2 3 4

the Contractors were fair to all parties
1 2 3 4

people's safety was not a high priority
5 6

I did not enjoy my work
5 6

the IDOT were not fair to all parties
5 6

I have been proud of the quality of the final product
5 6

the Contractors were not fair to all parties
5 6

Can you think of any specific comments or examples related to the above responses?

PLEASE PLACE AN _X_ ON THE APPROPRIATE LINES.

I am employed with: I am: ____Male ____Female

____IDOT

____Resident Office

____Resident Construction Engineer/Assistant Resident Engineer/Construction Technician III

____Inspector/Project Engineer

____Office Staff

____District

____Construction Engineer/Assistant Construction Engineer

____Materials Engineer

____Headquarters

____FEDERAL HIGHWAY ADMINISTRATION

____PRIME CONTRACTOR

____Project Staff

____Home Office Staff

____SUB-CONTRACTOR

____Project Staff

____Home Office Staff

____SUPPLIER

____OTHER _______________________

(explain)

THANK YOU
**PARTNERING QUESTIONNAIRE**
**FOLLOW-UP**

**INSTRUCTIONS**

Please circle the number that most accurately reflects your opinion for each set of responses. Your honest answers are important and I want to ensure you of confidentiality, therefore, do not sign your name to this form. It would be helpful if you would jot down a few words in the 'comment' sections to elaborate on your responses.

• In my opinion, on this partnering project...

<table>
<thead>
<tr>
<th>Dispute Resolution</th>
<th>Working Relationships</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>disputes are resolved easily</td>
<td>working relationships are friendly and cooperative</td>
<td>communication is frequent and effective between all parties</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>6</td>
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<tr>
<td>3</td>
<td>3</td>
<td></td>
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<tr>
<td>4</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

| Information Sharing                                     | | Freedom to Work                                      |
|---------------------------------------------------------||------------------------------------------------------|
| people are tight lipped and rarely share information    | | I have a high degree of freedom to do my work        |
| 1                                                        | | 5                                                    |
| 2                                                        | | 6                                                    |
| 3                                                        | |                     |
| 4                                                        | |                     |

| Supervisory Concerns                                     | | Teamwork Consideration                                |
|---------------------------------------------------------||------------------------------------------------------|
| my superiors "watch me like a hawk"                     | | there is little consideration of one another         |
| 1                                                        | | 5                                                    |
| 2                                                        | | 6                                                    |
| 3                                                        | |                     |
| 4                                                        | |                     |

| Teamwork Commitment                                      | | | |
|---------------------------------------------------------||------------------------------------------------------|
| people are committed to working together                 | | people just do their work with no thought of others |
| 1                                                        | | 5                                                    |
| 2                                                        | | 6                                                    |
| 3                                                        | |                     |
| 4                                                        | |                     |

| Consideration Among Parties                              | | |
|---------------------------------------------------------||------------------------------------------------------|
| all parties are considerate of one another               | | | |
| 1                                                        | | | |
| 2                                                        | | | |
| 3                                                        | | | |
| 4                                                        | | | |

Can you think of any specific examples or comments related to the above responses?

__________________________________________________________

__________________________________________________________

__________________________________________________________
• When decisions are made during this project...

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>which I feel are inappropriate I express my concerns and they are taken into consideration</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>I am informed of the decision in a timely and clear manner</td>
<td></td>
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<tr>
<td>I feel a part of the process and am encouraged to share my ideas</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

I have to live with them even if they are inappropriate

• Day to day communications (updates, job feedback, status reports, schedule changes, etc.)...

<table>
<thead>
<tr>
<th>Statement</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>occur frequently</td>
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<tr>
<td>are not shared with everyone</td>
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<tr>
<td>keep me informed of everyone's progress on the project</td>
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<tr>
<td>are communicated verbally</td>
<td></td>
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</tr>
</tbody>
</table>

occur infrequently

are shared up and down the 'totem pole'

are limited to only the information that I have to know to do my job

are limited to written notices

Can you think of any specific examples or comments related to the above responses?
- Negotiations over informal changes or plan clarifications... produce quick decisions
  
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>
  | are very time consuming | result in solutions that result in solutions that are not fair to all sides are fair to all sides are easily resolved are difficult to resolve interrupt the work schedule keep the work moving are easily resolved are difficult to resolve take a great deal of time solved quickly result in solutions that result in solutions that are fair to all parties are fair to all parties do not interrupt the work schedule interrupt the work schedule

Can you think of any specific examples or comments related to the above responses?
• **On this partnering project conflict and disagreements...**

<table>
<thead>
<tr>
<th>Conflict and Disagreements</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>happen daily and often</td>
<td></td>
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<tr>
<td>interrupt my work schedule</td>
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<tr>
<td>cause a lot of tension</td>
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<tr>
<td>between all parties</td>
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<tr>
<td>result in solutions which</td>
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<tr>
<td>are fair to all parties</td>
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<tr>
<td>are quickly resolved and</td>
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<tr>
<td>do not affect my work</td>
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<tr>
<td>schedule</td>
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<tr>
<td>are solved and forgotten</td>
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<tr>
<td>about—no hard feelings</td>
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<tr>
<td>result in solutions which</td>
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<tr>
<td>are unfair to some parties</td>
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</tbody>
</table>

• **On this project I would say that...**

<table>
<thead>
<tr>
<th>Trust and Respect</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>I trust only those</td>
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<tr>
<td>people from my own</td>
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<tr>
<td>organization</td>
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<tr>
<td>I respect the work</td>
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<tr>
<td>and decisions of</td>
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<tr>
<td>all the people</td>
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<tr>
<td>on the project</td>
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<tr>
<td>people tell me one</td>
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<tr>
<td>thing and then do</td>
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<tr>
<td>another</td>
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<tr>
<td>people are out for</td>
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<tr>
<td>themselves</td>
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<tr>
<td>I trust many people</td>
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<tr>
<td>on the project,</td>
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<td>regardless of which</td>
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<td>organization they</td>
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<td>are with</td>
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<td>I have very little</td>
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<td>respect for the</td>
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<tr>
<td>work or decisions</td>
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<td>of the people on</td>
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<td>the project</td>
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<tr>
<td>people are true to</td>
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<tr>
<td>their word</td>
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<tr>
<td>people cooperate</td>
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<td>for the good of</td>
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<tr>
<td>the project</td>
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</tbody>
</table>

Can you think of any specific comments or examples related to the above responses?
- My experience on this project leads me to believe that...

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>people give an extra effort</td>
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<td>people are suspicious of</td>
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<tr>
<td>each other's motives</td>
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<tr>
<td>people care about one</td>
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<tr>
<td>another on a personal level</td>
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<tr>
<td>people care about constructing</td>
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<tr>
<td>a high quality project</td>
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<tr>
<td>people never give their all</td>
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<tr>
<td>people clearly understand the</td>
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<tr>
<td>goals and objectives of each</td>
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<tr>
<td>organization</td>
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<td>people do not think of one</td>
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<tr>
<td>another as friends</td>
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<tr>
<td>people only care about getting</td>
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<tr>
<td>their work done 'quick and</td>
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<tr>
<td>cheap'</td>
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</tbody>
</table>

- During my work on this project I have felt that...

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am a part of a larger team</td>
<td></td>
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<tr>
<td>I am left alone to do my job</td>
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<tr>
<td>there is a high degree of</td>
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<tr>
<td>cooperation between the parties</td>
<td></td>
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<td></td>
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<tr>
<td>people respect one another</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>it is 'We' versus 'Them'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am constantly watched and</td>
<td></td>
<td></td>
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<tr>
<td>second guessed</td>
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<tr>
<td>there is little cooperation</td>
<td></td>
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<tr>
<td>between the parties</td>
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<td></td>
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<tr>
<td>there is little respect for</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>for one another</td>
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</tr>
</tbody>
</table>

Can you think of any specific comments or examples related to the above responses?
• On this project...

people's safety is a high priority
1 2 3 4
I find my work enjoyable
1 2 3 4
the Iowa DOT personnel are fair to all parties
1 2 3 4
the quality of the work is not as high as I would like
1 2 3 4
the Contractors are fair to all parties
1 2 3 4

people's safety is not a high priority
5 6
I do not enjoy my work
5 6
the Iowa DOT are not fair to all parties
5 6
I have been proud of the quality of the work completed
5 6
the Contractors are not fair to all parties
5 6

Can you think of any specific comments or examples related to the above responses?

Please place an X on the appropriate lines.

I am employed with: I am: Male Female
---Iowa DOT
---Resident Office
---Resident Construction Engineer/Assistant Resident Engineer/Construction Technician III
---Inspector/Project Engineer
---Office Staff
---District
---Construction Engineer/Assistant Construction Engineer
---Materials Engineer
---Headquarters

---FEDERAL HIGHWAY ADMINISTRATION

---PRIME CONTRACTOR
---Project Staff
---Home Office Staff

---SUB-CONTRACTOR
---Project Staff
---Home Office Staff

---SUPPLIER
---OTHER (explain)

THANK YOU
PARTNERING QUESTIONNAIRE
CLOSE-OUT

INSTRUCTIONS
Please circle the number that most accurately reflects your opinion for each set of responses (that number closest to the statement that you most agree with. Your honest answers are important and I want to ensure you of confidentiality, therefore, do **not** sign your name to this form. It would be helpful if you would jot down a few words in the 'comment' sections to elaborate on your responses.

- **In my opinion, on this partnering project...**

<table>
<thead>
<tr>
<th></th>
<th>Disputes were resolved easily</th>
<th>Disputes will probably need to be resolved through legal action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
<tr>
<td>Working relationships were friendly and cooperative</td>
<td>1 2 3 4</td>
<td>Working relationships were tense and uncooperative</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
<tr>
<td>People were tight lipped and rarely share information</td>
<td>1 2 3 4</td>
<td>Communication was frequent and effective between all parties</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
<tr>
<td>My superiors &quot;watched me like a hawk&quot;</td>
<td>1 2 3 4</td>
<td>I had a high degree of freedom to do my work</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
<tr>
<td>People were committed to working together</td>
<td>1 2 3 4</td>
<td>People just did their work with no thought of others</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
<tr>
<td>All parties were considerate of one another</td>
<td>1 2 3 4</td>
<td>There was little consideration of one another</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>5 6</td>
</tr>
</tbody>
</table>

Can you think of any specific examples or comments related to the above responses?
---------------------------------------------------------------

---------------------------------------------------------------

---------------------------------------------------------------
When decisions were made during this partnering project...

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I had to live with them</td>
<td>even if they were inappropriate</td>
</tr>
<tr>
<td></td>
<td>I was not aware of the decisions</td>
<td></td>
</tr>
<tr>
<td>I felt a part of the process and was encouraged to share my ideas</td>
<td></td>
<td>I felt left out of the process and my ideas were ignored</td>
</tr>
</tbody>
</table>

Day to day communications (updates, job feedback, status reports, schedule changes, etc.)...

|                                |                         |                         |
|                                | occurred frequently     | occurred infrequently   |
|                                | 1 2 3 4                 | 5 6                     |
| were not shared with everyone  |                         | were shared up and down the 'totem pole' |
| 1 2 3 4                       |                         | 5 6                     |
| kept me informed of everyone's progress on the project |                         | were limited to only the information that I had to know to do my job |
| 1 2 3 4                       |                         | 5 6                     |
| were communicated verbally     |                         | were limited to written notices |
| 1 2 3 4                       |                         | 5 6                     |

Can you think of any specific examples or comments related to the above responses?
• Negotiations over **informal** changes or plan clarifications...

were very time consuming

1 2 3 4

produced quick decisions

5 6

resulted in solutions that were not fair to all sides

1 2 3 4

resulted in solutions that were fair to all sides

5 6

were easily resolved

1 2 3 4

were difficult to resolve

5 6

interrupted the work schedule

1 2 3 4

kept the work moving

5 6

• Negotiations over **formal** changes or plan clarifications...

(those resulting in contract change orders)

were easily resolved

1 2 3 4

were difficult to resolve

5 6

took a great deal of time

1 2 3 4

were solved quickly

5 6

resulted in solutions that were fair to all parties

1 2 3 4

resulted in solutions that were favorable to only one side

5 6

did not interrupt the work schedule

1 2 3 4

interrupted the work schedule

5 6

Can you think of any specific examples or comments related to the above responses?
- **On this partnering project conflict and disagreements...**

  happened daily and often interrupted my work schedule
  
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>
  causeed a lot of tension between all parties
  
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>
  resulted in solutions which were fair to all parties
  
  | 1 | 2 | 3 | 4 | 5 | 6 |

- **On this partnering project I would say that...**

  I trusted only those people from my own organization
  
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>
  I respected the work and decisions of all the people on the project
  
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>
  people told me one thing and then do another
  
<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
</table>
  people were out for themselves
  
  | 1 | 2 | 3 | 4 | 5 | 6 |

Can you think of any specific comments or examples related to the above responses?

---

---

---

---

---
• My experience on this partnering project leads me to believe that...

<table>
<thead>
<tr>
<th>People gave an extra effort</th>
<th>People never gave their all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People were suspicious of each other's motives</th>
<th>People clearly understood the goals and objectives of each organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People cared about one another on a personal level</th>
<th>People did not think of one another as friends</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People cared about constructing a high quality project</th>
<th>People only cared about getting their work done 'quick and cheap'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

• During my work on this partnering project I felt that...

<table>
<thead>
<tr>
<th>I was a part of a larger team</th>
<th>It was 'We' versus 'Them'</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I was left alone to do my job</th>
<th>I was constantly watched and second guessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There was a high degree of cooperation between the parties</th>
<th>There was little cooperation between the parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>People respected one another</th>
<th>There was little respect for one another</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

Can you think of any specific comments or examples related to the above responses?
• On this partnering project...

people's safety was a high priority
1  2  3  4

I found my work enjoyable
1  2  3  4

the Iowa DOT personnel were fair to all parties
1  2  3  4

the quality of the work was not as high as I would like
1  2  3  4

the Contractors were fair to all parties
1  2  3  4

people's safety was not a high priority
5  6

I did not enjoy my work
5  6

the Iowa DOT were not fair to all parties
5  6

I am proud of the quality of the work completed
5  6

the Contractors were not fair to all parties
5  6

Can you think of any specific comments or examples related to the above responses?

________________________________________________________________________

________________________________________________________________________

PLEASE PLACE AN _X_ ON THE APPROPRIATE LINES.

• I am employed with: I am: _____Male _____Female
  ___ Iowa DOT
     _____ Resident Office
          _____ Resident Construction Engineer/Assistant Resident Engineer/Construction Technician III
          _____ Inspector/Project Engineer
          _____ Office Staff
  _____ District
          _____ Construction Engineer/Assistant Construction Engineer
          _____ Materials Engineer
  _____ Headquarters

___ PRIME CONTRACTOR
     _____ Project Staff
     _____ Home Office Staff

___ SUB-CONTRACTOR
     _____ Project Staff
     _____ Home Office Staff

___ SUPPLIER

___ OTHER
(explain)

THANK YOU
INSTRUCTIONS
Please circle the number that most accurately reflects your opinion for each set of responses. Your honest answers are important and I want to ensure you of confidentiality, therefore, do not sign your name to this form. It would be helpful if you would jot down a few words in the 'comment' sections to elaborate on your responses.

• Compared to other projects I have worked on, on this partnering project...

  working relationships are
  friendlier and more cooperative
  1       2       3       4
  working relationships are
  tense and uncooperative
  5       6

  people are more committed
  to working together
  1       2       3       4
  people just do their work
  with no thought of others
  5       6

  all parties are more
  considerate of one another
  1       2       3       4
  there is less consideration
  for one another
  5       6

  daily communications and project
  updates occur less frequently and
  are rarely shared with everyone
  1       2       3       4
day to day communications and
  updates are shared more freely
  up and down the 'totem pole'
  5       6

• On this partnering project, when decisions are made...

  I am informed of the decision
  right away
  1       2       3       4
  I am not aware of the decisions
  5       6

  I feel a part of the process
  and am encouraged
  to share my ideas
  1       2       3       4
  I feel left out of the process
  and my ideas are ignored
  5       6

Can you think of any specific examples related to the above responses?
Compared to past projects I have worked on, on this project...

I feel a part of a larger team
1 2 3 4
I am left alone to do my job
1 2 3 4
people's safety is a high priority
1 2 3 4
I enjoy my work more
1 2 3 4
the Iowa DOT personnel are fair to all parties
1 2 3 4
the quality of the the work is not as high as I would like
1 2 3 4
the Contractors are fair to all parties
1 2 3 4
people are giving an extra effort
1 2 3 4
people care about constructing a high quality project
1 2 3 4
it is 'We' versus 'Them'
5 6
I am constantly watched and second guessed
5 6
people's safety is not a high priority
5 6
I do not enjoy my work more
5 6
the Iowa DOT are not fair to all parties
5 6
I have been proud of the quality of the work completed
5 6
the Contractors are not fair to all parties
5 6
people are not giving their all
5 6
people only care about getting their work done 'quick and cheap'
5 6

Can you think of any specific examples related to the above responses?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
• Compared to past projects I have worked on, on this partnering project I would say that...

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>there is a higher level of trust between all parties</td>
<td>people are suspicious of one another and there is little trust between parties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I respect the work and decisions of all the people on the project</td>
<td>I have very little respect for the work or decisions of the people on the project</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• Compared to past projects I have worked on, on this partnering project conflicts and disagreements between parties...

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>happen more frequently and often interrupt my work schedule</td>
<td>happen less often and do not affect my work schedule</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cause a lot of tension between all parties</td>
<td>are solved and forgotten about—no hard feelings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>result in solutions that are fair to all parties</td>
<td>result in solutions that are favorable to only one side</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Please place an X on the appropriate lines.

I am employed with:

- [ ] Iowa Department of Transportation
- [ ] Prime Contractor
  - Project Staff
  - Home Office Staff
- [ ] Sub-Contractor
  - Project Staff
  - Home Office Staff
- [ ] Supplier
- [ ] Other (explain)

I am a:

- [ ] Male
- [ ] Female

Thank you
Close-Out Data Gathering Report

1. Was there pavement grinding associated with this project? ___yes ___no
   Was there a smoothness incentive paid out on this project? ___yes ___no

2. Were pavement thickness incentives paid out on this project? ___yes ___no
   Were there any penalties for failing AC density cores? ___yes ___no

3. Were there any penalties for failing air content or slump tests? ___yes ___no

4. Was there any rain damage to pavement? ___yes ___no

5. Number of working days allowed in contract __________________________
   Number of working days needed to complete project __________________________
   Were there any incentives paid? ___yes ___no
   Were there any liquidated damages incurred? ___yes ___no

6. Were there any Value Engineering proposals submitted? ___yes ___no
   If yes, amount saved $_________________

7. Was there any time lost due to personal injuries? ___yes ___no
   If yes, explain__________________________________________________________

8. Were there any items of work which required removal or replacement? ___yes ___no
   If yes, additional costs to the project $________________________
   If yes, explain situation and number of occurrences __________________________

9. Number of work orders processed __________________________
   How many of these were a result of design changes? __________________________

10. Were there any litigation claims filed? ___yes ___no

Greatest Success of the Project ___________________________________________
    __________________________________________
    __________________________________________
    __________________________________________

Biggest Disappointment of the Project _______________________________________
    __________________________________________
    __________________________________________
    __________________________________________

THANK YOU
Date

Dear (name of subject),

A couple of weeks have now passed since you completed the first questionnaire. Attached is another and I would appreciate it if you would take about 10 minutes to complete and seal this questionnaire in the enclosed envelope. You will be receiving one more questionnaire upon completion of this project—I really appreciate your help!

Just a reminder, your participation in this study is voluntary and completely confidential. If you choose not to complete the questionnaire please return it in the enclosed envelope anyway, this will assist me in my data recording.

If you have any questions regarding these instructions or the research project in general, feel free to give me a call at (xxx) xxx-xxxx. Thank you for your time and assistance.

Sincerely,

Heather A. Northouse

Attachments
APPENDIX C.

DEMOGRAPHIC DATA OF SUBJECTS
Table 24. Frequency of Iowa DOT Personnel

<table>
<thead>
<tr>
<th>RESIDENT OFFICE</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Res Const Eng/Asst Res Eng/ Const Tech III</td>
<td>16</td>
<td>11%</td>
</tr>
<tr>
<td>Inspector/Project Engineer</td>
<td>19</td>
<td>13%</td>
</tr>
<tr>
<td>Office Staff</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>DISTRICT OFFICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Const Eng/Asst Const Eng</td>
<td>6</td>
<td>4%</td>
</tr>
<tr>
<td>Materials Engineer</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>CENTRAL OFFICE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headquarters</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>58</td>
<td>41%</td>
</tr>
</tbody>
</table>

Table 25. Frequency of Contractor Personnel

<table>
<thead>
<tr>
<th>PRIME CONTRACTOR</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Staff</td>
<td>16</td>
<td>11%</td>
</tr>
<tr>
<td>Home Office Staff</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>Responsibilities in Both</td>
<td>8</td>
<td>6%</td>
</tr>
<tr>
<td>SUB CONTRACTOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Staff</td>
<td>17</td>
<td>12%</td>
</tr>
<tr>
<td>Home Office Staff</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>Responsibilities in Both</td>
<td>14</td>
<td>10%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>67</td>
<td>48%</td>
</tr>
</tbody>
</table>
Table 26. Frequency of Other Personnel

<table>
<thead>
<tr>
<th>OTHER</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Highway Administration</td>
<td>6</td>
<td>6%</td>
</tr>
<tr>
<td>Suppliers</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>City, County, Commerce Representatives</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>No report</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16</strong></td>
<td><strong>11%</strong></td>
</tr>
</tbody>
</table>
APPENDIX D.

WORKSHOP AGENDA, PROJECT CHARTERS AND PROJECT LOGOS
Workshop Agenda

Day One
- Introductions
  - Develop Ground Rules
  - Workshop Outline
- Partnering Overview
  - Principles and Process
  - Benefits and Barriers
- Exercise
  - Win as Much as You Can
  - Process Observe Exercise
  - Developing Trust
- Trust and Listening
  - Techniques
  - Skills
  - Communication
- Teamwork
  - What is Teamwork
  - The Value of Teamwork
  - Defining our Team
- Role Clarification
  - Identifying values
  - Defining expectations and past assumptions about each other

Day Two
- Identifying Our Paradigms
  - Discovering The Future (Video)
  - Making Paradigms Work For Us
- Developing Continuing Relationships
  - Mission Statement
  - Communication Objectives
- Conflict Modes
  - Instrument
  - Uses of Conflict Styles
- Partnering Negotiations
  - Conflict Resolution System
  - Performance Objectives
  - Evaluation Process
  - Implementation Plan
- Team Logo
  - Develop and Select
- Closing Ceremony
Partnering Charter

We, as trusting individuals, join together as a team dedicated to proudly improve this section of I-35. This project will be completed safely, efficiently, and with minimum inconvenience to the traveling public in award winning quality.

Communications Objectives

1. We will hold weekly meetings to coordinate scheduling and review progress.
   1a. Minutes will be taken and distributed.
2. We will exchange lab information daily.
3. We will be open and honest in our communication.
4. We will make decisions as quickly as possible at the appropriate level.
5. We will support team decisions.
6. Working as a team, cooperation shall prevail.
7. We encourage ideas from each individual involved in the team effort, toward accomplishing our common goal.
8. We will maintain a positive attitude to make working fun.

Performance Objectives

1. We will produce a 100% quality product.
   1a. Smoothness will be evaluated daily.
   1b. A district materials representative will be on the project the first day and as needed.
2. We will complete the project in a 100% safe manner.
3. We will emphasize traffic control to maximize safety and convenience to the traveling public.
4. The project will be completed in 94% of contract period and present a pleasing appearance.
5. All disputes will be resolved at the project level.
6. We will maintain good public relations.
7. We will perform as a team and keep the Partnering spirit alive.

Issue Resolution System

It is our intent to resolve issues at the level in which they originate.

Step 1: Inspector/Foreman........................................... Immediately
Step 2: Supt./Project Coordinator................................. 1 hour (or as mutually agreed)
Step 4: General Supt./Res. Engr./Proj. Mgr.............. 2 days (or as mutually agreed)
Step 5: General Supt./Dist. Construction Engr........... 2 days (or as mutually agreed)
Step 6: General Supt./Central Office......................... 2 days (or as mutually agreed)

When an issue would involve a work stoppage, a resolution will be expedited by the Partners.

We the undersigned agree to undertake and implement the above as applicable to each of us:
Bridgeport Project Team Partnering Charter

The Bridgeport Project Team of state, county, contractors and industries, pledge to work together to provide a high quality project, safely and economically for the benefit of all.

I. Communication Objectives
1. Treat each other with trust, respect and understanding at every level.
2. All communication will be open, honest and timely to avoid problems before they occur.
3. On site project personnel will meet daily to share next day's work activities.
4. Conduct job site meetings each Thursday at 9:30 a.m. Written minutes will be distributed.
5. Keep the public, industries and emergency services informed.
6. Decision making will be done in a timely manner by job site team members when possible.
7. Keep all affected Partners informed.
8. Make the project enjoyable.

II. Performance Objectives
1. Zero accidents.
2. Project qualifies for all incentives.
3. Meet or exceed specification requirements at all times.
4. Minimize inconvenience to all parties involved.
5. Recognize and resolve changes and conflicts to avoid project delay.
6. No unresolved issues.
7. Maximize efficiencies to ensure early completion.
8. Expedite paperwork to ensure final payment within 45 days of paperwork completion.
9. Timely submission, testing and reporting of materials and calibrations.
10. Maximize profitability for all Partners through a cooperative effort.
11. All team members maintain a positive public image.
12. All Partners will work toward achieving no delays due to utility interference.
13. 100% compliance with all regulatory agencies.
14. Have as good a feeling when the job is done as we do going into it.

III. Conflict Resolution System
Our intent is to resolve issues quickly to prevent work stoppage. When issues arise they will be discussed and every effort will be made to resolve them at the project level.

Step 1. Foreman/Inspector...........................................Immediately (or as mutually agreed)
Step 2. Superintendent/Project Inspector.......................2 hour (or as mutually agreed)
Step 3. Project Coordinator/Asst. Res. Const. Engr........4 hours (or as mutually agreed)
Step 4. Project Coordinator/Resident Const. Engr...........1 day (or as mutually agreed)
Step 5. President/District Const. Engr.........................2 days (or as mutually agreed)
Step 6  President/Construction Office.........................2 days (or as mutually agreed)

We the undersigned agree to undertake and implement the above:
Partnering Iowa 92 in '93 Charter

We, the Iowa 92 Partnering Team, are committed to safely constructing a quality project on time, and within budget, with minimum inconvenience to the public.

The foundation of this commitment is trust, cooperation and fun.

I. Communication Objectives
   1. We will meet every Tuesday at 1:00 to discuss project and team issues.
   2. All communications will be based upon openness, honesty, accuracy and mutual respect for team members and the public.
   3. Decisions will be made at the level of origin in a timely manner by informed team members.
   4. We will conduct ourselves in a professional manner, always considerate of each other.
   5. We will keep our communications on such a level so as to promote enjoyment.

II. Performance Objectives
   1. No work comp, lost day injuries and no project related accidents.
   2. Complete project within budget and 95% of contract period.
   3. Maximize incentives through top quality workmanship.
   4. Zero non-compliance or citations.
   5. Zero unresolved conflicts.
   6. Minimize inconvenience to the public throughout the course of the project.
   7. Our access control team will deal with access on a daily basis.
   8. Provide weekly project status press releases to the media.
   9. Win the IDOT/ICPA Quality Award.
10. Win the Marvin M. Black Partnering Award.
11. Have fun daily!

III. Conflict Resolution System
    Our intent is to resolve issues quickly to prevent work stoppage; to determine the magnitude of the problems and set a reasonable timetable for resolution. Any conflict will be discussed and every effort made to resolve at the level which it originates.
    Step 1. Foreman/Inspector - Immediately (or as mutually agreed)
    Step 2. Superintendent/Project Coordinator - 1 hour (or as mutually agreed)
    Step 3. Area Manager/Construction Field Asst, - 2 hours (or as mutually agreed)
    Step 4. Area Manager/Resident Engineer - 1 day (or as mutually agreed)
    Step 5. Area Manager/District Construction Engineer - 2 days (or as mutually agreed)
    Step 6. Main Office/Central Office - 2 days (or as mutually agreed)

If any party is absent, conflict issues should be directed to the next appropriate level within the corresponding time frame.

We the undersigned agree to make a good faith effort to undertake and implement the above as applicable to each of us:
JOHNSON COUNTY INLAY PARTNERING CHARTER

We, the Johnson County Inlay Partnering Team, are dedicated to constructing a safe, cost effective and enjoyable project of excellence through continued education, open and honest communication, participative decision making, trust and cooperation, for the benefit of all.

Communications Objectives

Our team will promote honesty, fairness and open communication, by:
1. Treating all team members with trust and respect while being courteous, flexible and willing to listen.
2. Attending Tuesday meetings that are informative and with positive expectations.
3. Dedication to the Partnering process, for the enjoyment of all.
4. Frequently communicating with team members to make timely, informed decisions, and address public concerns.
5. Making decisions which are competent, decisive, as close to the source of conflict as possible, and in the best interest of the overall project objectives and goals.

Performance Objectives

1. Save money for the public while making money for the contractors.
2. Utilize Value Engineering where possible.
3. Build a high quality project which maximizes incentive payments and produces no non-compliances.
4. Ensure a high degree of worker and public safety—no lost time accidents, no fatalities, serious injuries or property loss, and no OSHA violations.
5. Complete project by November 1, 1993 and out of head-to-head by October 1, 1993.
7. Have a timely project close-out.
8. Earn ICPA/DOT awards.
9. No unresolved conflicts or lawsuits.
10. Maintain good communications with the public.

Issue Resolution System

Step 1: Inspector/Foreman........................................... Immediately
Step 2: Superintendent/Project Inspector..................... 1 hour (or as mutually agreed)
Step 3: General Superintendent/Const. Field Tech.... 4 hours (or as mutually agreed)
Step 4: Project Manager/Resident Const. Eng.......... 1 day (or as mutually agreed)
Step 5: Project Manager/District Const. Eng............ 2 days (or as mutually agreed)
Step 6: President/Central Const. Office............... 2 days (or as mutually agreed)

If any party is absent, conflict issues should be directed to the next appropriate level within the corresponding time frame.

We the undersigned agree to make a good faith effort to undertake and implement the above as applicable to each of us:
TEAM PARTNERING CHARTER

We are dedicated to safely building a high quality, economical project through an atmosphere of commitment, trust, openness and cooperation.

Communications Objectives
1. Weekly meetings to discuss schedule, progress and problems.
2. Treat everyone on the team as very important.
3. Clear, concise, complete and timely communication.
4. Be open, honest, consistent and positive in all that we do.
5. Encourage and promote participation through active learning.
6. Maintain enthusiasm and a sense of humor.
7. Inform team members of decisions.
8. Project decisions are made timely and without interruptions.
9. Emphasize face to face communications.
10. Keep the public advised of activities and progress.

Performance Objectives
1. Ensure an economical project by:
   - reducing contractor claims
   - utilizing value engineering
   - minimizing overtime
   - meeting all cost and performance objectives while producing a quality project within specifications
2. No accidents related to this project.
3. Project open to traffic in less than 85 working days.
4. Minimize inconvenience to the public.
5. Finalize project within two months following completion.
6. Timely estimate process--submit weekly.
7. Verify quantities weekly.
8. No legal claims and no disputes that leave the project.
9. Ensure continuous feedback to evaluate project performance.
10. Make the project enjoyable--celebrate success.

Issue Resolution System
Any conflict will be discussed and every effort made to resolve at the level at which it originates.

Step 1: Inspector/Foreman............................................Immediately
Step 2: Project Engineer/Job Superintendent....................Immediately--1 day (or as mutually agreed)
Step 3: Area Engineer/General Superintendent...............Immediately--1 day (or as mutually agreed)
Step 4: Construction Engineer/General Superintendent......2 days (or as mutually agreed)
Step 5: Central Office/President..................................2 days (or as mutually agreed)

Where issue resolution would involve a work stoppage, a resolution will be expedited by the Partners.

We the undersigned agree to make a good faith effort to undertake and implement the above as applicable to each of us:
We the U. S. 71 Team, will Partner to construct a top quality project for the citizens of Iowa that demonstrates the highest standards of construction and teamwork.

I. Communication Objectives
We will:
1. Cultivate trust and respect while maintaining the Partnering concept.
2. Hold regular meetings to keep team members informed.
3. Communicate in an ongoing, open and honest manner with all points of view considered.
4. Make decisions in a timely manner on the project when possible with all partners informed.
5. Keep the public informed.
6. Treat all team members fairly and as integral components of the project.
7. Make the project enjoyable.

II. Performance Objectives
1. Zero accidents.
2. Exceed standards for materials and workmanship.
3. Achieve pavement smoothness and Partnering awards.
4. 100% compliance with all EPA and DNR regulations.
5. Construct a profitable project within the allowable time constraints.
6. Zero unresolved project related complaints from adjacent landowners and the traveling public.
7. Favorable acceptance by the public.
8. Zero unresolved conflicts between the Partners.
9. Expedite all paperwork to ensure final payment within 90 days of project field work completion.
10. Maintain pride in our work.

III. Conflict Resolution System
Our intent is to resolve issues quickly to prevent work stoppage; to determine the magnitude of the problems and set a reasonable timetable for resolution. Any conflict will be discussed and every effort made to resolve at the level at which it originates.

Step 1. Foreman/Inspector..........................Immediately (or as mutually agreed)
Step 2. Superintendent/Project Coordinator........2 hour (or as mutually agreed)
Step 3. Project Manager/Construction Tech III..............4 hours (or as mutually agreed)
Step 4. Project Manager/Resident Engineer..................1 day (or as mutually agreed)
Step 5. V.P. & Project Mgr./District Const. Engr......2 days (or as mutually agreed)
Step 6 President/Central Office..............................2 days (or as mutually agreed)

If any party is absent, conflict issues should be directed to the next appropriate level within the corresponding time frame.

We the undersigned agree to undertake and implement the above:
Project Logos

171

Pioneers in Partnering

Success

Quality

Profit

TEAM 58

Partners

PARTNERS IN PROGRESS

DOT IFJ