FINAL REPORT

EVALUATION OF ALTERNATIVE CONTRACTING TECHNIQUES ON FDOT CONSTRUCTION PROJECTS

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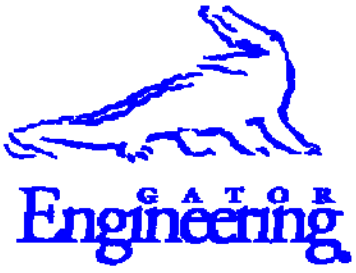

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Table of Contents

Executive Summary 3
Need to Improve Construction Project Performance 3
FDOT's Alternative Contracting Experience 3
Need for Performance Evaluation 4
Research Approach 4
Findings 5
Implementation of Results 6
Chapter One: Introduction 7
Background 7
Objective 9
Chapter Two: Methodology 11
Research Procedures 11
Literature Review 11
Survey of Other DOTs 11
Collection of FDOT Project Data 17
Scope of the Data Collected 17
Data Sources 17
Obtaining Input from Project Participants 23
Chapter Three: Findings 24
Project Performance Measures 24
Measures of Effectiveness 24
Project Work Mix Types 24
Performance Evaluations with Regard to Cost 27
Measures of Cost Performance 27
Cost Performance Results by Contracting Method 28
Cost Performance Results by Contracting Method and Work Category 31
Comparison of Cost Performance Measures 33
Performance Evaluations with Regard to Time 36
Measures of Time Performance 36
Time Performance Results by Contracting Method 37
Time Performance Results by Contracting Method and Work Category 37
Comparison of Time Performance Measures 43
Incentive or Disincentive Achieved 45
Performance Evaluations with Regard to Contractor Performance 47
Measures of Contractor Performance 47
Contractor Performance Results by Contracting Method 47
Contractor Performance Results by Contracting Method and Project Type 47
Value Contributed by Alternative Contracting 49
Measures of Value Performance 49
Time Value Evaluations 49
Cost Value Evaluations 52
Value Evaluation of Design–Build Projects 55
Chapter Four: Input from Project Participants 62

Information Gathering 62
A+B Contracts 62
Incentive/Disincentive 63
Design-Build 64
No Excuse Bonuses 65
Lump Sum 67
Summary 67
Chapter Five: Discussion of Research Results 69
The Affect of the Contracting Method on Project Performance 69
Recommendations 69
Implementation of Results 70
References 72
Appendix A: Summary of the Performance and Value Findings 74
Definition of Time and Cost Measurements 74
Appendix B: Description of FDOT Alternative Contracting Methods 84
Alternative Contract Types Used in Florida 84
Description of Alternative Contracts 85
Application of Alternative Contracts 86
Time Adjustment for Incentives 86
Appendix C: Alternative Contracting Evaluation Survey 88
Appendix D: Boxplot Comparisons 90
Selected Projects for Design-Build Effectiveness Study 90
Selected FDOT Design-Build and Traditional Design-Bid-Build Projects 92
Appendix E: FDOT Contractor's Past Performance Report 94
Appendix F: Survey on Project Participants 99
FDOT Engineer and Construction Engineer Inpections 99
Contractors 108

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16. Abstract

An investigation of the project performance of Florida Department of Transportation projects delivered with alternative contracting techniques. Project performance data was obtained for projects completed from January 1998 to March 2006. Project performance was evaluated with regard to Time, Cost, Contractor Performance and Value.

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Executive Summary

Need to Improve Construction Project Performance

Highway traffic volumes continue to increase and there is an ongoing need for transportation infrastructure improvements. Consequently, the Florida Department of Transportation (FDOT) maintains an aggressive highway work program. However, construction often requires some reduction in capacity during construction activity, as motorists and adjacent businesses must endure the delays and inconveniences associated with transportation construction. Recognizing the problems that construction can produce, FDOT has continually sought ways to minimize the negative impact from its construction operations. One key aspect of this continuous improvement effort has been to seek improvements in construction project performance, and more specifically to accelerate project delivery where possible, to improve project quality, and to save taxpayers' money. Alternative contracting techniques have played an important role in this effort to improve project performance.

FDOT's Alternative Contracting Experience

FDOT has been a leader in implementing alternative contracting methods. It was one of the first DOTs to begin a design-build (DB) contracting program in 1987. Since then the FDOT has sought to improve project performance with the implementation of alternative contracting techniques. The following innovative contracting practices have been used:

- A + B
- Incentive/Disincentive (I/D)
- Design-build (DB)
- No Excuse Bonus (Bonus)
- CM (construction management) at Risk
- Lump Sum
- Liquidated Savings
- Lane Rental
- Bid Averaging Method
- Warranties

An alternative contracting program evaluation was conducted in 1999 and design-build program evaluations were performed in 1991, 1999, 2004, and 2005.

Need for Performance Evaluation

Since the results of changes in business practices must be measured and evaluated, the need for evaluation is clear. Without measurement, there is no way to know if the change has produced improvement. FDOT has continuously reported the time and cost savings of the alternative contracting program in its *Construction Cost and Time Report*. However, a more comprehensive and systematic evaluation and analysis may also lead to refinement and improvement of the changes. Thus, the objective of this research was to develop a comprehensive evaluation of the FDOT's alternative contracting efforts.

Research Approach

Project performance data was obtained on all FDOT construction projects completed from January 1998 to March 2006. The project database included a total of 3130 projects, of which 1160 were delivered by alternative contracting methods. Project data was obtained from several different information sources within the FDOT. The performance of each alternative contracting technique was compared to traditional design-bid-build (DBB) contracting performance.

Project performance was evaluated in four key areas:

- Cost
- Time
- Contractor Performance
- Value Contribution

Cost Performance Evaluation

Cost measurements included three components:

1. Comparison of original awarded cost to the FDOT official estimated cost
2. Comparison of actual cost to original awarded cost
3. Comparison of actual cost to the FDOT official estimated cost

Time Performance Evaluation

Time measurements also included three components:

1. Comparison of original awarded time to the FDOT official time estimate
2. Comparison of actual time to original awarded time
3. Comparison of actual time to the FDOT official time estimate

Contractor Performance Evaluation

Contractor performance was evaluated based on the contractor's performance score. FDOT maintains a performance evaluation for each of its contractors on a project-by-project basis. The FDOT contractor rating system is called the *Contractor Past Performance Rating*.

Value Contributions

Project value contributions were based upon both time and cost savings. Project cost savings included savings in direct costs and savings in time-related costs. Alternative contracting project results were compared to estimated project results calculated using traditional design-bid-build contracting methods.

The research objectives were met through an evaluation of project performance data obtained from the FDOT project information systems and from onsite interviews conducted with both FDOT and contractor managers who are experienced in alternative contracting. The specific tasks are briefly summarized here and are discussed in detail in the Technical Plan.

Findings

A detailed summary of the performance and value findings are presented in Appendix A. The most significant findings are presented here.

Cost

- The alternative contracting projects had lower total cost growth during construction than the traditional DBB projects. The average cost growth for alternative contracting projects was 8.04%. The average cost growth for traditional DBB projects was 9.36%. Note that incentive costs are included in this calculation.
- Lump sum projects had the lowest average cost growth at 1.54%.
- DB had a cost growth of 4.45%.

Time

- The alternative contracting projects had a lower total time growth during construction than the traditional DBB projects. The average time growth for alternative contracting projects was 4.13%. The average time growth for traditional DBB projects was 16.47%.

Contractor Performance

- Contractor performance of alternative contracting and traditional DBB contracting were essentially the same. The choice of contracting method does not appear to affect project contractor performance.

Value Contributions

- Alternative contracting methods, excluding design-build, saved an estimated 31,645 project days, which is an average of 38 days per project.
- A+B, A+B with bonus, and Bonus contracting produced the highest time savings during construction.
- Alternative contracting methods, excluding design-build, contributed an estimated $289,639,935 in savings, which is an average of approximately $347,000 savings per project.
- Alternative contracting design-build projects saved an estimated 54,455 project days.

Other Findings

- Contractors achieved incentives or bonuses more than 50% of the time.
- Contractors achieved incentives on 60% of the alternative contracting projects with incentives.
- Contractors achieved bonuses on 86.7% of the A+B with bonus contracts and 68.3% of the Bonus contracts.

Implementation of Results

The primary product of this study is a comprehensive report containing all data and analysis. The performance results should provide essential benchmarking information for FDOT managers. Additionally, information obtained from the project participants suggested the best practices for applying alternative contracting techniques. This input from experienced project managers should prove valuable to FDOT program managers when considering improvements to its alternative contracting program. The performance evaluation summaries developed in this study are also appropriate for inclusion on the FDOT's website for greater distribution to interested parties.

Chapter One: Introduction

Background

The traditional design-bid-build (DBB) contracting method for transportation construction is a competitive bid solicitation in which pre-qualified contractors submit unit price bids. The traditional DBB's intent is to award the contract to the lowest bidder. FDOT has a history of seeking to improve project performance through the introduction of alternative contracting methods within its work program. For example, FDOT began using design-build contracting in 1987 and as new contracting methods have evolved, FDOT has incorporated the most promising alternative methods.

Along with testing new methods, FDOT has consistently pursued evaluations of new methods to determine their affect on project performance. The pilot design-build program was evaluated as a research project in 1991 (Ellis 1991). More recently, FDOT conducted an evaluation of its alternative contracting program in 1999 (FDOT 1999). Additionally, FDOT evaluated its design-build program in 2004 (FDOT 2004).

During the interim since the last comprehensive evaluation performed in 1999, FDOT has completed a substantial number of projects using alternative contracting methods. Consequently, an updated evaluation of the project performance of alternative contracting techniques is needed.

FDOT has included within its work program a variety of alternative contracting methods. These non-traditional approaches have utilized different methods for selecting the contractor and for rewarding and penalizing performance. The key features of each of these techniques are briefly summarized as follows. A more detailed description of each of the methods is provided in Appendix B.

A + B

The cost and time method of bidding enables the contractor to establish a reasonable contract duration. Contractors bid both the pay item prices and a time required to complete the project. A dollar value for each contract day is established by FDOT. The contractor's time bid is multiplied by the daily dollar value. The total time value is added to the total price bid to arrive at the A + B bid for award purposes. The contract is awarded to the lowest A + B bidder. The contract amount is the price bid and the contract duration is the time bid.

Additionally, the daily time value can be utilized as an incentive/disincentive provision.

Incentive/Disincentive

Incentive/disincentive (I/D) is an alternative contracting technique that provides for incentive payments to the contractor for earlier completion than required by the contract and for disincentive amounts to be deducted from the contractor's payment for late completion. I/D is applied on a daily basis and may be applied to intermediate schedule milestones, to the final project completion, or both.

Design-Build

Design-build (DB) combines both design and construction responsibility into a single contract. FDOT rates the contractor's submitted proposals on factors such as design quality, timeliness, management capability, and environmental sensitivity to decide a winning bidder.

No Excuse Bonus

The no excuse bonus technique provides a bonus payment for obtaining a specified completion milestone date, project completion date, or both. Bonus time days are normally extended for catastrophic events. Ordinary time extensions such as weather or unforeseen conditions typically do not result in a change in the bonus performance time. However, under certain circumstances the FDOT may modify the bonus completion date.[1]

CM at Risk

In the CM at risk approach, a construction manager works in a consultant role during design development and assumes contractor responsibility during project construction.

Lump Sum

In the lump sum approach, the contractor bids a single lump sum price for the project rather than providing bid item prices.

Lane Rental

[1] See FDOT Special Provision 8-13.1, "Bonus" Payment and Waiver of Contractor Claims. (REV 7-27-04) (FA 7-28-04) (1-05)
< http://www.dot.state.fl.us/specificationsoffice/2007BK/Julyworkbook2007/SP0081300B.pdf >

The lane rental technique is like A+B (i.e., cost-plus-time) technique in that the contractors bidding on a lane rental project will determine the number of days that a lane will be closed during work and use this determination in their bid process. The total lane rental bid will be added to the standard bid to decide award. Contractors using more lane rental days than which they bid will be charged lane rental fees.

Liquidated Savings

In the liquidated savings approach, the contractor is encouraged to complete a project early and is rewarded for each calendar day completed early. This approach is the opposite of the existing liquidated damages.

Objective

When management institutes change in any organization, there is a need to measure and evaluate the results of those changes because without measurement, there is no way to know if the change has produced improvement. FDOT has continuously reported the time and cost savings of the alternative contracting program in construction time and cost quarterly reports. However, a more comprehensive and systematic evaluation and analysis can also lead to refinement and improvement. The primary objective of this study is to produce a comprehensive and reliable evaluation of the project performance results achieved by FDOT in its application of alternative contracting techniques. The desired outcome of this research is a definitive statement on the applicability of alternative contracting techniques used in FDOT construction projects.

Additionally, this research evaluates the strategies intended to standardize alternative contracting techniques, including training opportunities. Alternatives to the traditional design-bid-build techniques of interest to this study include the following basic approaches:

- A + B[2]
- Incentive/Disincentive
- Design-build
- No Excuse Bonus
- Lane Rental

[2] This technique includes an incentive/disincentive clause at all times in Florida to encourage the contractor to further reduce the time to complete a project.

- Liquidated Savings
- Lump Sum
- CM at Risk

Projects completed between January 1998 and March 2006 are included in this study.

Chapter Two: Methodology

Research Procedures

The research effort was organized into five major tasks:

1. Obtain information on evaluations of alternative contracting techniques from other DOT organizations
2. Collection of FDOT project data
3. Obtain input from project participants
4. Analysis and evaluation
5. Preparation of research report

Task 1 is discussed in the next section and the procedures used in performing tasks 2, 3, and 4 are discussed in the following sections.

Literature Review

Survey of Other DOTs

The alternative contracting evaluation results reported from three literature sources can be synthesized as follows:

- Minnesota DOT (MnDOT) reported 15% time savings measured by low bid days versus the MnDOT maximum number of days and an additional 11% time savings measured by actual construction time versus bid days plus extensions (17% time savings on projects with incentives and 6% time savings on projects without incentives) for A+B bidding evaluation. Cost analysis results comparing the awarded bid to the MnDOT official estimate prepared at letting did not suggest that A+B bidding increased the bid cost of the project significantly.
- In California, the average time savings percentage on the evaluated A+B jobs was 27%. The average cost growth on the A+B projects ($4.6M) was greater than non-A+B projects ($3.8M), however the average cost growth percentage on A+B projects (23.7%) was less than non-A+B projects (26.4%). In addition, it is reported that the average claim amounts

of the A+B projects ($0.85M) were approximately half that of the representative non-A+B projects ($1.72M).

- The FHWA reports on the results of SEP-14 projects. Using 14 available samples from the completed SEP-14 projects, the mean duration for design-build is 583 days and the mean duration for design-bid-build is 1215 days. Six available observations determined the average cost for design-build projects as $18.4 million and the cost for design-bid-build projects as $18.9 million. To compare the additional project cost per change order, 10 available samples were used. The difference for design-build projects was 0.6% of the project costs and 6.0% for design-bid-build projects. The reported statistical analysis results showed significant differences in the additional project cost per change order.

Many DOTs and transportation agencies have used alternative contracting techniques in their work programs and some have conducted formal or informal evaluations of the alternative contracting results. The research team contacted each DOT and other significant organizations with construction programs. Up-to-date information on their alternative contracting experience and evaluations was obtained. Initial contacts were made by telephone with email follow-ups. In addition, copies of published evaluations and informal (in-house) evaluations were obtained.

The results of the survey with regard to DOT evaluations of alternative contracting initiatives are provided in Appendix B. Thirteen states were reported to have conducted some type of evaluation effort. Several referred to the reporting requirements associated with special experimental projects no. 14 (SEP-14 projects). A few states have included their evaluation information on their websites. A summary of the most significant evaluation efforts is included in the following discussion. Among the collected documents, three reports proved most useful for this study.

A comprehensive evaluation of innovative contracting practices in Minnesota between 2000 and 2005 was performed by the Minnesota Department of Transportation (MnDOT). This report detailed the performance results of innovative contracting techniques, such as A+B, incentives/disincentives, liquidated savings, lane rental, and warranties. MnDOT performed case studies for each innovative contracting method and concluded that A+B, lane rental and incentives, and improving quality through warranties were effective in reducing construction

completion time and the impact of construction on motorists . A total of 15 projects were used for A+B bidding evaluations. Various project types were used for A+B bidding, from small rehabilitation projects to major reconstruction and expansion projects. Project contract amounts ranged from $600,000 to $15.6 million. The incentive amounts paid totaled $671,300. MnDOT reported 15% time savings measured by low bid days versus the MnDOT maximum number of days and 11% additional time savings measured by actual construction time versus bid days plus extensions (17% time savings on projects with incentives and 6% time savings on projects without incentives). As an example of the evaluation process for A+B contracting, a total of fifteen projects using A+B in five districts of MnDOT were selected for the evaluation. The selected projects for A+B bidding had major impacts on the traveling public. Cost analysis was performed comparing the awarded bid versus the engineer's estimate prepared at letting. The results of the comparison between the engineer's estimate and the awarded bid and the highest bid from their cost analysis are shown in Figure 2-1.

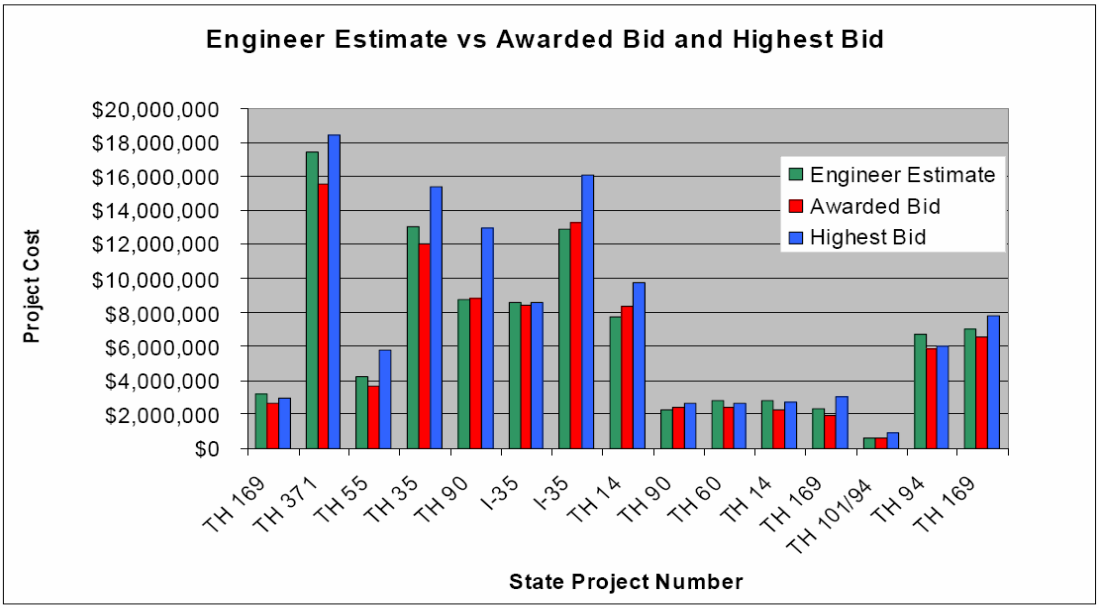


Figure 2-1. Engineer's Estimate Versus Awarded Amount on A+B Projects (MnDOT 2006)

In addition, the MnDOT resident or project engineers' perspective on how the A+B technique affected their projects was summarized as follows:

"The A+B process is a great tool to use on projects with anticipated high road user delays. Many resident engineers felt that this process could be applied to a wide variety of projects and not necessarily rehabilitation projects." (MnDOT 2006)

Some resident engineers recommended that A+B should not be used in the following four areas: 1) areas with a high potential for poor soil overruns, 2) areas with poor design plans where negotiating additional time may become an issue, 3) areas with utility conflicts or relocations that may impact schedule, and 4) areas with MnDOT staffing limitations that could jeopardize safety and quality of work. Finally, this report concluded that A+B has been an effective tool for reducing contract time and recommended that the MnDOT should develop more guidelines and provide state-wide training on A+B projects. Other innovative contract techniques were also evaluated and summarized in this report.

The California Department of Transportation (Caltrans) also evaluated A+B bidding practices. An in-house report titled *Summary Level Study of A+B Bidding* was provided by the Office of Engineering Management, Caltrans. The evaluation was performed by a private consultant using two types of evaluations:

1. Quantitative analysis: comparative statistical data analysis of Caltrans's A+B projects and non A+B projects.
2. Qualitative evaluation: interview evaluation of project personnel who previously worked on A+B projects as identified by Caltrans.

For statistical analyses, Caltrans developed the following statistics to evaluate their projects:

1) Number of A+B contracts awarded
2) Number of A+B contracts awarded with incentive/disincentive provisions
3) Number of A+B contracts completed
4) Average number of working days reduced from engineer's estimate via A+B bidding (separate I/D vs. non-I/D projects)
5) Average percentage of working days reduced from engineer's estimate via A+B bidding (separate I/D vs. non-I/D projects)
6) Number and percentage of time extension days on A+B contracts vs. non-A+B contracts
7) Estimated final savings in contract time on A+B contacts (compare original contract WDs + time extensions for A+B vs. non-A+B contracts)
8) Final estimate amounts vs. bid amounts on A+B vs. non-A+B contracts
9) Average number of claims on A+B vs. non-A+B contacts
10) Average dollar amounts of claims on A+B vs. non-A+B contacts
11) Cost of overhead claims on A+B vs. non-A+B contracts (Caltrans)

Caltrans chose 28 completed and closed-out A+B projects among a total of 67 A+B projects and 28 representative non-A+B projects with comparable contract costs from various districts throughout the state. This report concluded that A+B shows positive impacts on time savings at the beginning of the projects with no significant time or cost overruns after construction began. The reported average time saving percentage on the evaluated jobs was 27% as shown in Figure 2-2. The average cost growth amount on the A+B projects ($4.6M) was greater than non-A+B projects ($3.8M), however the average cost growth percentage on A+B projects (23.7%) was less than non-A+B projects (26.4%). This is because the average original project size of A+B projects ($19.4M) was considerably larger than the non-A+B projects ($14.4M). In addition, it is reported that the average claim amounts of the A+B projects ($0.85M) were approximately half that of the representative non-A+B projects ($1.72M).

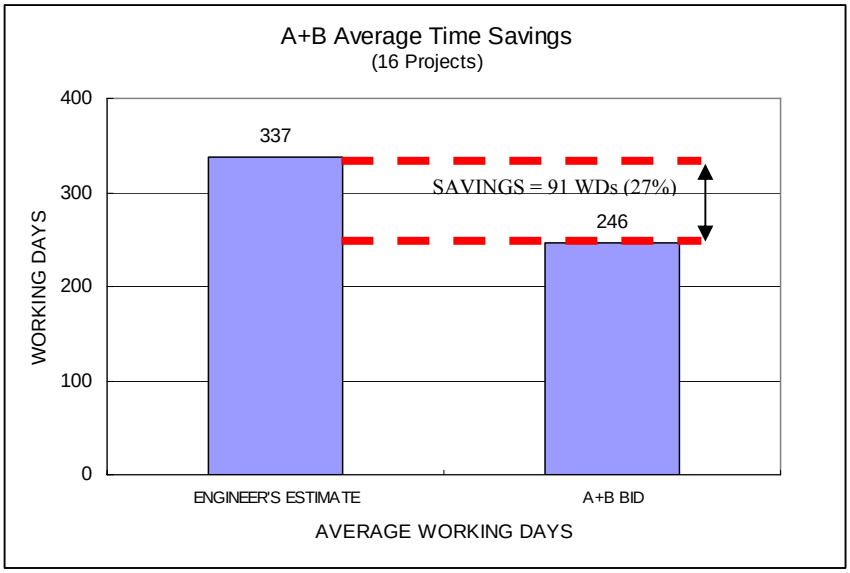


Figure 2-2. A+B Average Time Savings (PinnacleOne 2004)

The third study was a comprehensive evaluation of design-build contracting to determine the effectiveness of design-build contracting procedures in the federal aid highway program prepared for USDOT and the Federal Highway Administration (FHWA). This report contained an evaluation of the effect of design-build methods on project time, cost, and quality. Using 14 available samples from the completed SEP-14 projects, the statistical analysis results in this

report showed that there was a significant difference in the mean project duration between design-build and design-bid-build projects.

Boxplots, which graphically depict the summary of datasets used for this study, are used as descriptive statistics and are shown in Appendix D. The mean duration for design-build is 583 days and the mean duration for design-bid-build is 1215 days. Using six available observations, the average project cost for design-build projects was $18.4 million and $18.9 million for design-bid-build projects. The statistical analysis of cost showed no significant difference in the mean cost between design-build and design-bid-build projects. Ten available samples were used to compare the additional project cost per change order. The difference for design-build projects was 0.6% of the project costs and 6.0% of the project costs for design-bid-build projects. The reported statistical analysis results showed that there were significant differences in the additional project cost per change order.

In addition, survey results reported that design-build program managers rated resurfacing as the least suitable project type for design-build. On the other hand, rehabilitation/reconstruction, new/widening, and bridge/tunnel project types were rated the most suitable for design-build project delivery as shown in Figure 2-3.

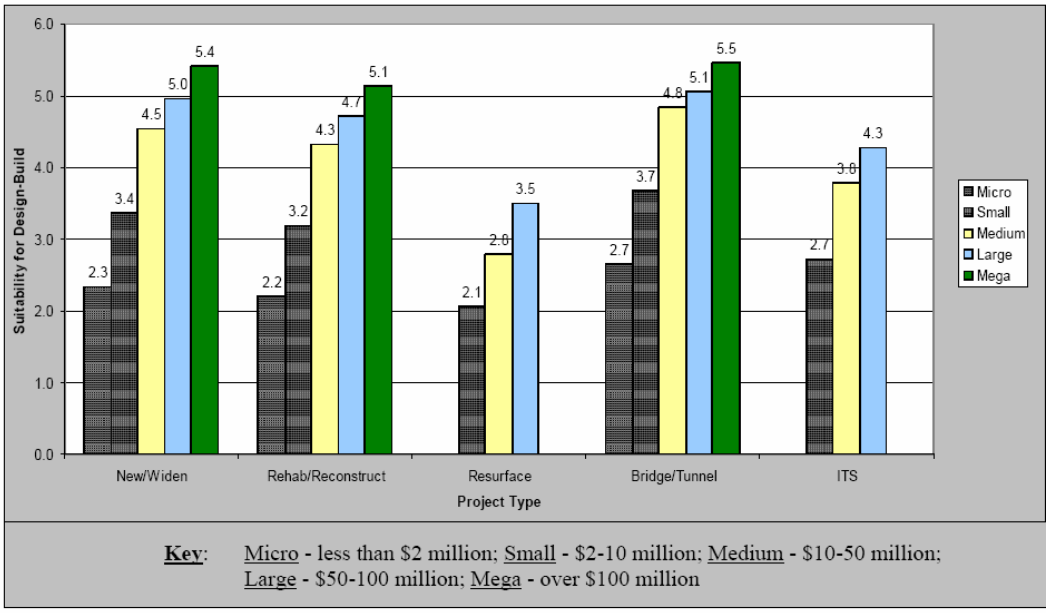


Figure 2-3. Perceived Suitability of Design-build Project Delivery, Scale: 1 – Not Suitable; 6 – Highly Suitable (FHWA 2006)

Collection of FDOT Project Data

Scope of the Data Collected

The research strategy was to compare alternative contracting project performance with the project performance of traditional DBB contracting methods. The following performance measures were used:

- Cost
- Time
- Contractor Performance
- Value

Project data was collected to permit evaluation of these performance measures. Data collection was arguably the most challenging aspect of this research study. The required project information was located in several different systems within FDOT; no single database contains the required data. Data was obtained and compared from multiple databases, some of which included scanned project documents. All completed projects from January 1998 to March 2006 were included in the search, which totaled 3130 projects. Of this total, 1160 projects were alternative contracting projects. The collected project data was initially reviewed to identify any obviously erroneous data. After the data cleaning process, a total of 3040 FDOT construction project data were used for analysis. The final dataset consisted of 1132 projects using alternative contracting methods and 1908 projects using traditional design-bid-build contracting methods. Data was compiled in Excel files for transformation and analysis. Table 2-1 provides a summary of the project data collected and Table 2-2 presents a list of the data items and the data sources within the FDOT information system.

Data Sources

Transportation construction project data used in this study were obtained from several FDOT sources, including in-house documents, intranet, and databases called *Hummingbird* and *WebFocus*. FDOT operates an Internet website available to public users and an intranet website, called *DOT Infonet*, available to department personnel and approved users. The *DOT Infonet* includes more detailed and extensive construction project data. In addition, all district offices are

linked in the *DOT Infonet*. Most project data used in this study were obtained using *WebFocus* and *Financial Project Search* through the *DOT Infonet*.

FDOT *Infonet Financial Project Search*

FDOT maintains an intranet information system named *Infonet Financial Project Search.* This is an internal information system available to approved users. The system provides financial project information and other basic descriptive project information, as well as search capabilities. Figure 2-4 is a sample output from the *Financial Project Search*.

FDOT *WebFocus*

The FDOT *WebFocus* is an information system permitting approved users to query FDOT databases for detailed project information. Most but not all project information is obtainable from the *WebFocus* system. Figure 2-5 is a sample of the input screen for a *WebFocus* search.

Bid Solicitation Notices

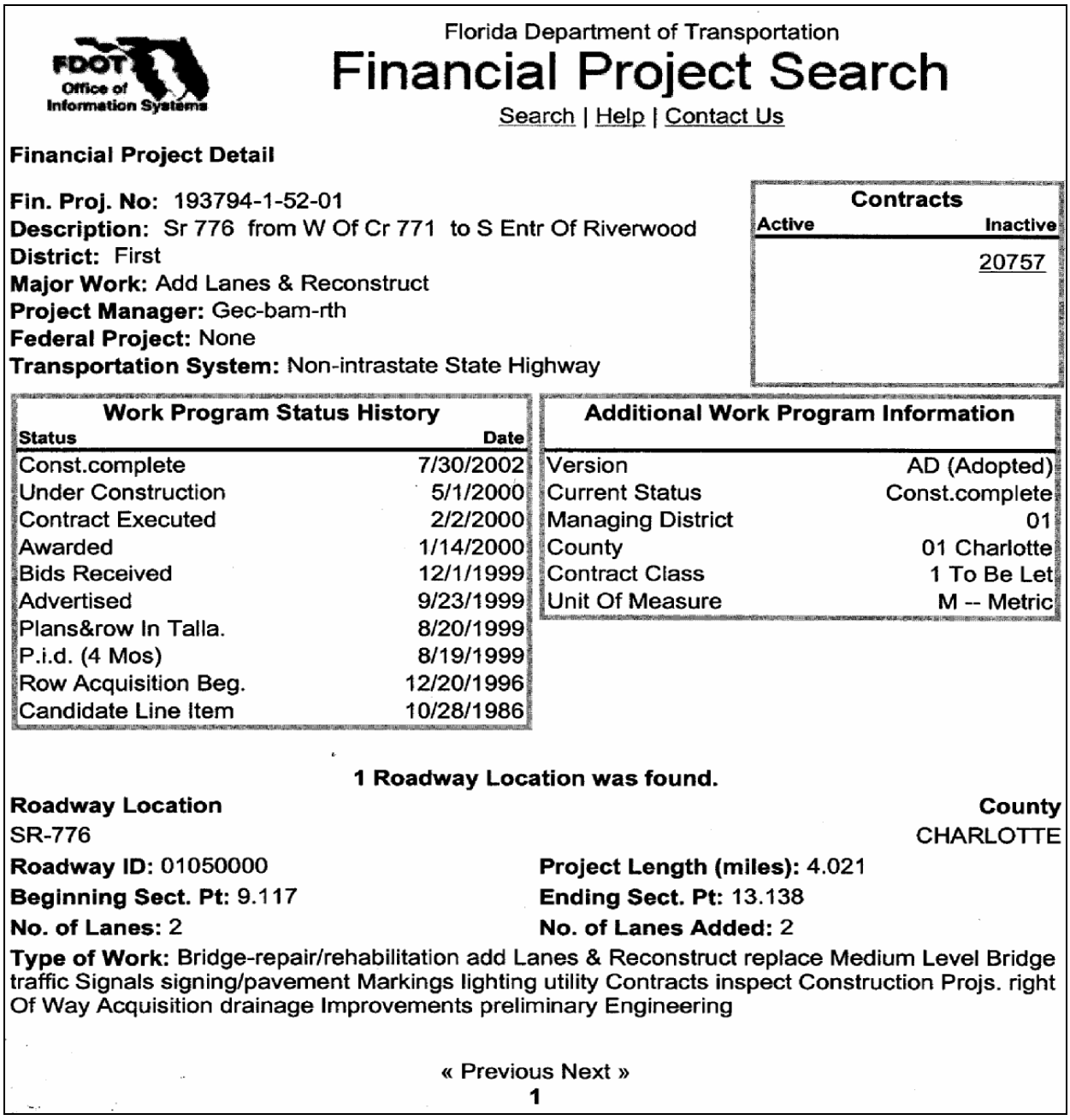
Bid solicitation notices are published on the FDOT website to provide basic advertisements of upcoming bids. These notices contain the FDOT official original time and cost estimates. This information was obtained from the FDOT contract administration office. The recent notices were available on the FDOT public website, but most notices of completed projects were only available in printed form. The research team manually entered data from the printed forms into an electronic database. Figure 2-6 is an example of an FDOT bid solicitation notice.

Table 2-1. Summary of Projects Included in Study

Contract Type Category	Innovative Contract Type	Number of Projects	Total
A+B	A+B	82	$957,751,676
	A+B Lump Sum	4	$14,435,404
A+B Total		86	**$972,187,080**
A+B Bonus	A+B Bonus	30	$567,567,884
A+B Bonus Total		30	**$567,567,884**
Bonus	Bonus	113	$949,817,085
	Bonus I/D	2	$9,860,416
	Bonus Lump Sum	26	$72,311,145
	Lane Rental Bonus	1	$1,032,980
Bonus Total		142	**$1,033,021,626**
DB	DB (Major)	38	$784,708,719
	DB (Major) I/D	1	$3,070,000
	DB (Minor)	29	$104,053,501
DB Total		68	**$891,832,220**
I/D	I/D	129	$670,078,625
	I/D Lump Sum	15	$31,217,760
I/D Total		144	**$701,296,385**
Lane Rental	Lane Rental	22	$76,781,755
	Lane Rental Lump Sum	5	$16,122,201
Lane Rental Total		27	**$92,903,956**
Liquidated Savings	Liq. Savings Lump Sum	4	$7,588,391
	Liquidated Savings	82	$477,559,613
Liquidated Savings Total		86	**$485,148,004**
Lump Sum	Lump Sum	549	$692,656,615
Lump Sum Total		549	**$692,656,615**
Traditional	Traditional	1,908	$5,482,591,523
Alternative Total		1,132	**$5,436,613,770**
Traditional Total		1,908	**$5,482,591,523**
Grand Total		3,040	**$10,919,205,293**

Table 2-2. Data and Source Listing

Data Label or Name	FDOT Source
Financial Project No.	DOT WebFocus
District	DOT WebFocus
Work Mix	DOT WebFocus
Type Of Work	DOT Infonet Financial Project Search
Location	DOT Web Focus
Project Manager	DOT Infonet Financial Project Search
Roadway ID	DOT Infonet Financial Project Search
Transportation System	DOT Infonet Financial Project Search
Project Length	DOT Infonet Financial Project Search
Number Of Lanes	DOT Infonet Financial Project Search
County	DOT WebFocus
Contract Type	DOT WebFocus
Original Contract Days	DOT WebFocus
Present Contract Days	DOT WebFocus
Days Used	DOT WebFocus
Days Suspended	DOT WebFocus
Weather Days	DOT WebFocus
Total Work Order TE	DOT WebFocus
Total SA Days	DOT WebFocus
Original Contract Amount	DOT WebFocus
Present Contract Amount	DOT WebFocus
Total Amount Paid	DOT WebFocus
Actual Expenditure	DOT WebFocus
Actual Incentive Paid	DOT WebFocus
Contractor	DOT WebFocus
Design Consultant Cost	DOT Infonet Financial Project Search
Consultant CEI	DOT WebFocus
Let Date	DOT WebFocus
Award Date	DOT WebFocus
Execution Date	DOT WebFocus
Notice To Proceed	DOT WebFocus
Work Begin Date	DOT WebFocus
Final Acceptance Date	DOT WebFocus
DOT Original Estimate	Bid Solicitation Notices
FDOT Engineer's Official Cost Estimate	Bid Solicitation Notices and Web Focus
Daily Incentive/Disincentive Amounts	Direct Survey to FDOT District Offices
Daily Lane Rental Value	DOT WebFocus
Max. Incentive Proposed	Direct Survey to FDOT District Offices
Standard Bid (A)	DOT WebFocus
Time Bid (B)	DOT WebFocus
Contractor Past Performance Rating	DOT WebFocus



Florida Department of Transportation

Financial Project Search

Search | Help | Contact Us

Financial Project Detail

Fin. Proj. No: 193794-1-52-01
Description: Sr 776 from W Of Cr 771 to S Entr Of Riverwood
District: First
Major Work: Add Lanes & Reconstruct
Project Manager: Gec-bam-rth
Federal Project: None
Transportation System: Non-intrastate State Highway

Contracts	
Active	**Inactive**
	20757

Work Program Status History	
Status	**Date**
Const.complete	7/30/2002
Under Construction	5/1/2000
Contract Executed	2/2/2000
Awarded	1/14/2000
Bids Received	12/1/1999
Advertised	9/23/1999
Plans&row In Talla.	8/20/1999
P.i.d. (4 Mos)	8/19/1999
Row Acquisition Beg.	12/20/1996
Candidate Line Item	10/28/1986

Additional Work Program Information	
Version	AD (Adopted)
Current Status	Const.complete
Managing District	01
County	01 Charlotte
Contract Class	1 To Be Let
Unit Of Measure	M -- Metric

1 Roadway Location was found.

Roadway Location	**County**
SR-776	CHARLOTTE

Roadway ID: 01050000 **Project Length (miles):** 4.021
Beginning Sect. Pt: 9.117 **Ending Sect. Pt:** 13.138
No. of Lanes: 2 **No. of Lanes Added:** 2

Type of Work: Bridge-repair/rehabilitation add Lanes & Reconstruct replace Medium Level Bridge traffic Signals signing/pavement Markings lighting utility Contracts inspect Construction Projs. right Of Way Acquisition drainage Improvements preliminary Engineering

« Previous Next »
1

Figure 2-4. Output from Financial Project Search

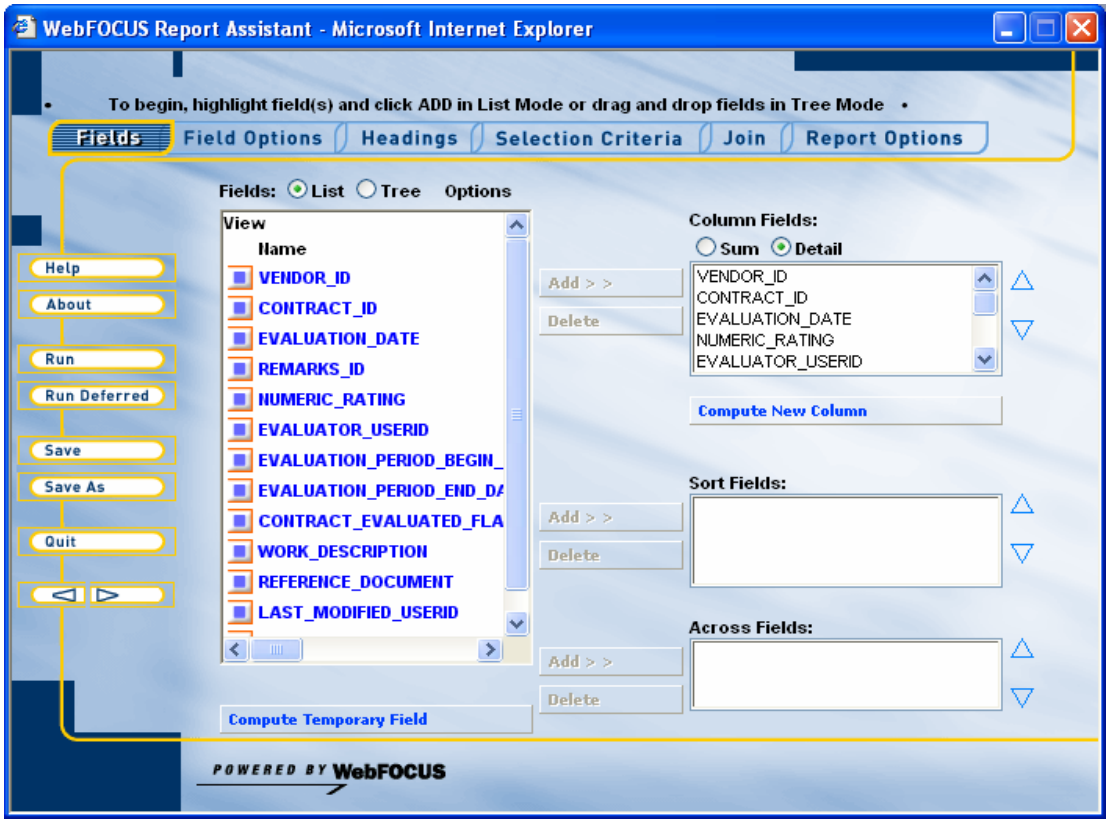


Figure 2-5. FDOT Web Focus Search Template

```
                              FLORIDA DEPARTMENT OF TRANSPORTATION
LNTCIQA                                                                        PAGE: 6
                          BID SOLICITATION NOTICE AND APPROX. QUANTITIES
                                    (NOT FOR BIDDING PURPOSES)

LETTING ID: CT030226      CALL ORDER: 003       PROPOSAL ID: T1015          DISTRICT: 01
COUNTIES  : MANATEE ,         ,         ,

ROAD NAME     : SR 45 (US 41)
LIMITS        : FROM SARASOTA CO LINE TO BOWLES CREEK

FINPROJ NO(S): 19589325201 (*)   FEDERAL AID NO: 3013052P     WORK MIX: RESURFACING

TOTAL ROADWAY  LENGTH: 2.090          MILES         CALENDAR DAYS: 145
TOTAL BRIDGE   LENGTH: 0.000          MILES         LETTING DATE: 02/26/03
TOTAL PROPOSAL LENGTH: 2.090          MILES         ACQUIS. TIME: 150

PROPOSAL BUDGET ESTIMATE: $ 2,065,000.00

PROPOSAL PACKAGE FEE: $40.00        PLANS ONLY FEE: $31.00         SPECS ONLY FEE: $9.00
 (PLANS + PROPOSAL)

DESCRIPTION: A+B Bidding/Lump Sum

             The improvements under this contract consist of milling,
             resurfacing, signalization and drainage improvements on
             SR 45 (US 41).
```

Figure 2-6. FDOT Bid Solicitation Notice

Obtaining Input from Project Participants

The research team interviewed project personnel who were experienced participants in alternative contracting projects. Input was sought from FDOT construction personnel from six FDOT districts, construction engineer and inspection (CEI) consultants from most of the same districts, and contractor personnel. All of those interviewed had been a project manager on at least one but no more than 6 projects using an innovative contracting method. In general, the respondents had overseen an average of 3–4 projects with innovative contracting. Many of the projects used more than one innovative contracting method (e.g., A+B and I/D, DB, and no-excuse-bonuses, etc.). Contractor interviews were held with representatives of firms who had significant experience with alternative contracting projects. An informal but structured discussion was used to obtain participant input. A synthesis of participant comments is included in Chapter 4 and Appendix F.

Chapter Three: Findings

Project Performance Measures

Measures of Effectiveness

Project performance data was evaluated with regard to project outcomes in four key areas:

- Cost
- Time
- Contractor Performance
- Value

Alternative contracting project performance was compared with traditional DBB contracting project performance. Each alternative contracting technique was evaluated with annual summaries provided. Comparisons were also performed on the projects' major work mix (type of project work). Results of the comparisons are presented in the following sections.

Project Work Mix Types

FDOT classifies projects into work mix categories depending upon the type of work included in the project scope. The research team originally predicted that the project type would be a factor affecting project performance results. Therefore, both traditional DBB and alternative contracting projects were grouped by work mix category. However, given that more than 80 different work mix types exist, it was necessary to combine the work mix types into groups with similar project scopes so that each group in the dataset would contain a sufficient number of projects for analysis. The following project type categories were selected:

- Buildings and Non-road Facilities
- Movable-span Bridges
- High Level Bridges
- All Other Bridges
- Resurfacing and Paving
- Reconstruction
- Technical Projects
- Other Projects

Table 3-1 provides a grouping of projects used in the study by major FDOT work mixes and shows the number of projects in each contract type category. This project type category was used for analysis of the project performance in the following sections.

Table 3-1. Project Type Categories and Number of Projects in Each Contract Type Category

Category	Major Work Type	A + B	Bonus	DB (Major)	DB (Minor)	I/D	Lump Sum	Sum	Total Alternative	Total Traditional
Building & Non-road Facility	Building repair/rehabilitation	0	0	0	0	0	1	**1**	**9**	**50**
	Toll plaza	0	1	0	1	0	0	**2**		
	Rest area	0	0	2	0	0	1	**3**		
	Welcome station	0	0	1	0	0	0	**1**		
	Const/expand admin facility	0	0	1	0	0	0	**1**		
	MCCO weigh station static/wim	0	0	1	0	0	0	**1**		
Movable Span Bridge	Const. bridge - movable span	1	0	0	0	0	0	**1**	**7**	**2**
	Replace movable span bridge	1	3	1	0	1	0	**6**		
High Level Bridge	Construct bridge - high level	1	1	1	0	0	0	**3**	**5**	**6**
	Replace high level bridge	0	1	1	0	0	0	**2**		
All Other Bridges	Replace medium level bridge	5	0	0	0	0	0	**5**	**127**	**317**
	Const. bridge - low level	1	0	0	0	3	0	**4**		
	Replace low level bridge	10	2	0	0	7	4	**23**		
	Widen bridge	2	0	2	0	1	0	**5**		
	Widen bridge and add lanes	0	1	0	0	0	0	**1**		
	Bridge - replace and add lanes	0	0	2	0	0	0	**2**		
	Bridge - rehab and add lanes	0	0	0	0	1	0	**1**		
	Bridge - repair/rehabilitation	1	4	0	2	12	43	**62**		
	Bridge - painting	0	0	0	0	2	8	**10**		
	Bridge operations	0	0	0	0	0	3	**3**		
	Bridge/culvert replacement	2	0	0	0	0	1	**3**		
	Miscellaneous structure	0	1	0	0	0	1	**2**		
	Fixed guideway improvements	0	0	0	0	0	1	**1**		
	Pedestrian overpass	0	0	1	3	0	1	**5**		
Resurfacing and Paving	Resurfacing	11	52	5	6	48	217	**339**	**392**	**617**
	Mill and resurface	0	0	0	0	0	3	**3**		
	Federal aid resurface/repave	1	0	0	0	0	1	**2**		
	State resurface/repave	0	0	0	0	0	1	**1**		
	State pave shoulders & resurf.	0	0	0	0	0	1	**1**		
	Pave shoulders	0	0	0	0	0	5	**5**		
	Skid hazard overlay	0	0	0	0	0	10	**10**		
	Widen/resurface exist lanes	3	2	0	2	1	15	**23**		
	Urban corridor improvements	0	0	2	0	0	0	**2**		
	Access improvement	0	2	1	0	2	1	**6**		

Table 3-1 (continued)

Category	Major Work Type	A + B	Bonus	DB (Major)	DB (Minor)	I/D	Lump Sum	Sum	Total Alternative	Total Traditional
Reconstruction	Add lanes & reconstruct	25	31	2	1	24	2	**85**	**218**	**430**
	Add turn lane(s)	0	2	1	0	8	13	**24**		
	Add right turn lane(s)	0	0	0	0	1	13	**14**		
	Add left turn lane(s)	0	0	0	0	0	23	**23**		
	Add lanes & rehabilitate pvmnt	4	9	3	1	4	0	**21**		
	Flexible pavement reconstruct.	2	5	0	0	1	0	**8**		
	Rigid pavement reconstruction	1	1	0	0	1	0	**3**		
	Rigid pavement rehabilitation	1	2	0	0	0	0	**3**		
	Intersection (major)	0	3	0	0	0	0	**3**		
	Interchange (minor)	2	4	1	0	0	1	**8**		
	Intersection (minor)	0	2	0	0	4	11	**17**		
	New road construction	2	6	0	0	1	0	**9**		
Technical Projects	Traffic signals	0	0	0	0	3	30	**33**	**67**	**56**
	Traffic signal update	0	0	0	1	0	8	**9**		
	Traffic control devices/system	0	0	1	0	0	2	**3**		
	Its communication system	0	0	1	0	0	14	**15**		
	Its freeway management	0	0	1	0	0	1	**2**		
	Its surveillance system	0	0	2	0	0	0	**2**		
	Adv traveler information systm	0	0	0	1	0	1	**2**		
Others	Mmiscellaneous construction	2	0	0	3	1	8	**14**	**209**	**608**
	Safety project	0	5	3	0	6	15	**29**		
	Landscaping	0	0	0	1	1	28	**30**		
	Drainage improvements	0	1	1	1	0	15	**18**		
	Sidewalk	0	0	0	1	1	53	**55**		
	Bike path/trail	0	0	0	2	0	10	**12**		
	Guardrail	0	0	0	0	5	7	**12**		
	Fender work	0	0	0	0	1	5	**6**		
	Interconnection	0	0	0	0	0	4	**4**		
	Const./reconstruct median	0	0	0	0	1	2	**3**		
	Hwy - enhancement	0	0	0	0	0	2	**2**		
	Signing/pavement markings	0	0	0	0	0	2	**2**		
	Overhead signing	0	0	0	0	0	1	**1**		
	Lighting	0	1	1	0	0	14	**16**		
	Critical habitats	0	0	0	1	0	0	**1**		
	Rail improvement	0	0	0	0	0	1	**1**		
	Environmental action	0	1	0	0	0	0	**1**		
	Wetlands involvement	0	0	0	0	0	1	**1**		
	Special surveys	0	0	0	0	0	1	**1**		
Total		**78**	**143**	**38**	**27**	**141**	**606**	**1033**	**1034**	**2086**

Performance Evaluations with Regard to Cost

Measures of Cost Performance

The difference between project award cost (original contact amount) and the FDOT official estimate cost provides a relative measure of initial bid cost. FDOT uses standard procedures and consistent pricing methods for developing FDOT official estimates. Therefore, the FDOT official estimate provides a useful baseline for comparing initial bid cost between different project categories. The following calculation was used for cost performance evaluations with regard to initial bid costs.

Initial Award Performance

$$Average Official\ Award\ Cost\ \Delta = \frac{\sum Award\ Cost - \sum FDOT\ Official\ Estimate Cost}{Number\ of\ \text{Pr}ojects} \quad (1)$$

$$Official\ Award\ Cost\ \Delta\% = \frac{\sum Award\ Cost - \sum FDOT\ Official\ Estimate Cost}{\sum FDOT\ Official\ Estimate Cost} \times 100 \quad (2)$$

Cost growth during project delivery was also selected as an important cost performance measure. The following calculation was used for cost performance evaluations with regard to cost growth during project delivery.

Cost Growth Performance

$$Actual Cost = Actual\ Expenditure + Innovative Contracting\ Adjustments \quad (3)$$

$$Average\ Award\ Actual Cost\ \Delta = \frac{\sum Actual\ Cost - \sum Award\ Cost}{Number\ of\ \text{Pr}ojects} \quad (4)$$

$$Award\ Actual Cost\ \Delta\% = \frac{\sum Actual\ Cost - \sum Award\ Cost}{\sum Award\ Cost} \times 100 \quad (5)$$

In addition, cost performance evaluations with regard to the difference between project actual cost (final cost) and the FDOT official estimate cost was measured using the following calculation.

Actual Cost Performance

$$Average\,Official\ Actual\ Cost\,\Delta = \frac{\sum Actual\,Cost - \sum FDOT\ Official\ Estimate\,Cost}{Number\ of\ \Pr ojects} \quad (6)$$

$$Official\ Actual\,Cost\,\Delta\,\% = \frac{\sum Actual\,Cost - \sum FDOT\ Official\ Estimate\,Cost}{\sum FDOT\ Official\ Estimate\,Cost} \times 100 \quad (7)$$

Cost Performance Results by Contracting Method

The awarded contract cost was compared to the FDOT official estimate for projects in the study database. The results are presented in Table 3-2. Overall, the initial cost performance of traditional DBB contracting is better than that of alternative contracting. The award cost of the traditional DBB projects was 13.40% less than the FDOT official estimate. The award cost of the alternative contracting projects was 11.84% less than the FDOT official estimate. However, there are significant performance differences among the different alternative contracting methods. The performance results of A+B and A+B with bonus categories were 20.12% and 22.02% less than the FDOT official estimate, respectively. Design-build projects were awarded at 3.72% more than the FDOT official estimate. I/D projects were awarded at 3.11% less than the FDOT official estimate.

Project cost growth during construction was also measured and compared. The results are presented in Table 3-3. The cost growth on traditional DBB projects was 9.36%. **The cost growth on alternative contracting projects was lower at 8.04%.** Among alternative contracting methods, lump sum had the lowest cost growth at 1.54% and DB had a cost growth of 4.45%. It is, however, interesting to note that some of the alternative contracting methods had cost growths somewhat larger than the traditional DBB. For example, I/D had a cost growth of 12.46%, liquidated savings had a cost growth of 12.19%, and A+B had a cost growth of 11.95%. It is important to note that incentive and bonus costs are included in the measurements, as it is reasonable to expect that when incentives are applied to improve time performance, corresponding increases in cost may occur. Another interesting performance result is that the

bonus project category had a cost growth of 7.99%. Although bonus costs are included in the measurements, the cost growth of the bonus contracting method was somewhat smaller than the traditional DBB.

The actual cost was compared to the FDOT official estimate for projects in the study database. The results are presented in Table 3-4. **Overall, the cost performance of traditional DBB and alternative contracting were very close.** The actual cost of the traditional DBB projects was 5.23% less than the FDOT official estimate. The actual cost of the alternative contracting projects was 4.73% less than the FDOT official estimate. However, there were significant performance differences among the different alternative contracting methods. For example, lane rental project performance results were -13.26%. Performance results for A+B and A+B with bonus categories were -12.73% and -12.70% respectively. On the other hand, I/D projects were completed at 8.96% more than the FDOT official estimate. Design-build projects were completed at 8.50% more than the FDOT official estimate and liquidated savings projects were completed at 2.44% more than the FDOT official estimate.

Table 3-2. Comparison of Award Cost to FDOT Official Cost Estimate by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average Official Award Cost Δ*	Official Award Cost Δ %**
Alternative	A+B	86	-$2,605,801	-20.12%
	A+B Bonus	30	-$4,772,883	-22.02%
	Bonus	140	-$1,272,927	-15.74%
	DB	66	$432,141	3.72%
	I/D	144	-$138,890	-3.11%
	Lane Rental	25	-$761,070	-19.07%
	Liq. Savings	81	-$451,611	-8.27%
	Lump Sum	539	-$129,960	-9.35%
Alternative Contracting Total		1111	-$596,426	-11.84%
Traditional Design-bid-build Total		1847	-$412,392	-13.40%
Grand Total		2958	-$481,514	-12.63%

* $Average Official\ Award\ Cost\ \Delta = \frac{\sum Award\ Cost - \sum FDOT\ Official\ Estimate Cost}{Number\ of\ Projects}$

** $Official\ Award\ Cost\ \Delta\ \% = \frac{\sum Award\ Cost - \sum FDOT\ Official\ Estimate\ Cost}{\sum FDOT\ Official\ Estimate Cost} \times 100$

Table 3-3. Comparison of Cost Growth during Construction by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average Award Actual Cost Δ*	Award Actual Cost Δ %**
Alternative	A+B	86	$956,942	9.25%
	A+B Bonus	30	$2,020,098	11.95%
	Bonus	142	$538,085	7.99%
	DB	68	$558,552	4.45%
	I/D	144	$539,430	12.46%
	Lane Rental	27	$231,098	7.20%
	Liq. Savings	86	$613,146	12.19%
	Lump Sum	549	$19,142	1.54%
Alternative Contracting Total		1132	$357,285	8.04%
Traditional Design-bid-build Total		1908	$246,025	9.36%
Grand Total		3040	$287,454	8.70%

* $$Average\ Award\ Actual\ Cost\ \Delta = \frac{\sum Actual\ Cost - \sum Award\ Cost}{Number\ of\ \text{Pr}ojects}$$

** $$Award\ Actual\ Cost\ \Delta\ \% = \frac{\sum Actual\ Cost - \sum Award\ Cost}{\sum Award\ Cost} \times 100$$

Table 3-4. Comparison of Actual Cost to FDOT Official Estimate by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average Official Actual Cost Δ*	Official Actual Cost Δ %**
Alternative	A+B	86	-$1,648,859	-12.73%
	A+B Bonus	30	-$2,752,784	-12.70%
	Bonus	140	-$728,648	-9.01%
	DB	66	$986,445	8.50%
	I/D	144	$400,540	8.96%
	Lane Rental	25	-$529,161	-13.26%
	Liq. Savings	81	$133,343	2.44%
	Lump Sum	539	-$109,339	-7.86%
Alternative Contracting Total		1111	-$238,501	-4.73%
Traditional Design-bid-build Total		1847	-$161,038	-5.23%
Grand Total		2958	-$190,133	-4.99%

* $$Average\ Official\ Actual\ Cost\ \Delta = \frac{\sum Actual\ Cost - \sum FDOT\ Official\ Estimate\ Cost}{Number\ of\ \text{Pr}ojects}$$

** $$Official\ Actual\ Cost\ \Delta\ \% = \frac{\sum Actual\ Cost - \sum FDOT\ Official\ Estimate\ Cost}{\sum FDOT\ Official\ Estimate\ Cost} \times 100$$

Cost Performance Results by Contracting Method and Work Category

A comparison of award cost (original contract amount) to the FDOT official estimate by project type is presented in Table 3-5. **As expected, differences in cost performance occurred between project type categories.** Note that the number of projects for high-level bridges and movable bridges is relatively small. Consequently, the reported cost performance results are more easily influenced by a single project outlier.

The award cost of resurfacing and paving projects with alternative contracting was 8.65% less than the FDOT official estimate as compared to 10.16% for traditional DBB contracting. The award cost of all other bridge projects with alternative contracting was 2.88% less than the FDOT official estimate as compared to 15.01% for traditional DBB contracting, and the award cost of high-level bridge projects with alternative contracting was 12.74% less than the FDOT official estimate as compared to 39.03% for traditional DBB contracting.

An analysis of cost growth performance by project type category produced interesting results. A comparison of cost growth after award by project type is presented in Table 3-6. The cost growth on high-level bridge projects with alternative contracting was 12.28% as compared to 15.71% for traditional DBB contracting. However, for all other bridges the cost growth was 5.73% for alternative contracting as compared to 5.48% for traditional DBB contracting. Additionally, alternative contracting produced superior cost growth performance with buildings and non-road facilities and technical projects.

A comparison of actual cost (final cost) to the FDOT official estimate by project type is presented in Table 3-7. As expected, differences in cost performance occurred between project type categories. The actual cost of resurfacing and paving projects with alternative contracting was 4.84% less than the FDOT official estimate as compared to 6.26% for traditional DBB contracting. The actual cost of all other bridge projects with alternative contracting was 2.70% less than the FDOT official estimate as compared to 10.73% less than the FDOT official estimate for traditional DBB contracting. The actual cost of high-level bridge projects with alternative contracting was 2.02% less than the FDOT official estimate as compared to 29.46% for traditional DBB contracting.

Table 3-5. Comparison of Award Cost to FDOT Official Estimate by Contracting Method and Project Type

Project Type Category	Alternative Contracting		Traditional Design-bid-build	
	Number of Projects	Official Award Cost Δ %*	Number of Projects	Official Award Cost Δ %*
All Other Bridges	135	-2.88%	287	-15.01%
Building and Non-road Facility	9	-5.27%	43	-9.66%
High-level Bridge	5	-12.74%	5	-39.03%
Movable-span Bridge	6	-20.98%	2	4.77%
Others	208	-1.03%	521	-7.01%
Reconstruction	249	-15.75%	381	-13.92%
Resurfacing and Paving	436	-8.65%	543	-10.16%
Technical Projects	63	-7.28%	65	-10.50%
Totals	1111	-11.84%	1847	-13.40%

* $$Official\ Award\ Cost\ \Delta\ \% = \frac{\sum Award\ Cost - \sum FDOT\ Official\ Estimate\ Cost}{\sum FDOT\ Official\ Estimate\ Cost} \times 100$$

Table 3-6. Comparison of Cost Growth during Construction by Contracting Method and Project Type

Project Type Category	Alternative Contracting		Traditional Design-bid-build	
	Number of Projects	Award Actual Cost Δ %*	Number of Projects	Award Actual Cost Δ %*
All Other Bridges	139	5.73%	299	5.48%
Building and Non-road Facility	9	6.09%	44	10.29%
High-level Bridge	5	12.28%	5	15.71%
Movable-span Bridge	7	17.64%	2	12.70%
Others	212	5.73%	543	0.03%
Reconstruction	253	9.48%	385	13.60%
Resurfacing and Paving	441	4.17%	562	4.43%
Technical Projects	66	5.94%	68	7.03%
Totals	1132	8.04%	1908	9.36%

* $$Award\ Actual\ Cost\ \Delta\ \% = \frac{\sum Actual\ Cost - \sum Award\ Cost}{\sum Award\ Cost} \times 100$$

Table 3-7. Comparison of Actual Cost to FDOT Official Estimate by Contracting Method and Project Type

Project Type Category	Alternative Contracting		Traditional Design-bid-build	
	Number of Projects	Official Actual Cost Δ %*	Number of Projects	Official Actual Cost Δ %*
All Other Bridges	135	2.70%	287	-10.73%
Building and Non-road Facility	9	0.50%	43	-0.38%
High-level Bridge	5	-2.02%	5	-29.46%
Movable-span Bridge	6	-4.29%	2	18.07%
Others	208	4.38%	521	-6.35%
Reconstruction	249	-7.83%	381	-2.20%
Resurfacing and Paving	436	-4.84%	543	-6.26%
Technical Projects	63	-1.61%	65	-4.36%
Totals	1111	-4.73%	1847	-5.23%

* $$Official\ Actual\ Cost\ \Delta\% = \frac{\sum Actual\ Cost - \sum FDOT\ Official\ Estimate\ Cost}{\sum FDOT\ Official\ Estimate\ Cost} \times 100$$

Comparison of Cost Performance Measures

Quarterly cost performance measures performed by the FDOT construction office used "% cost increase over original amount" as a metric. This is the increase in cost based on actual expenditures (actual cost not including innovative contracting adjustments) over the award cost (original contract amount) expressed as a percentage of the award cost. In this metric, however, the incentives and disincentives amount was not considered for calculation. Thus, the following calculation was used for FDOT construction office cost performance measures with regard to cost growth during project delivery:

$$\%\ Cost\ Increase\ over\ Original\ Amount = \frac{\sum Actual\ Expenditure - \sum Award\ Cost}{\sum Award\ Cost} \times 100 \quad (8)$$

In this study, the researchers used the difference between project award cost and actual cost including the incentives and disincentives amount to provide cost growth during project delivery.

The following calculation was used for cost performance evaluations with regard to cost growth during project delivery in this study:

$$Award\ Actual\ Cost\ \Delta\ \% = \frac{\sum(Actual\ Expenditure + Innovative\ Contracting\ Adjustments) - \sum Award\ Cost}{\sum Award\ Cost} \times 100 \quad (9)$$

Cost growth of the "Award Actual Cost Δ %" column is approximately 1.5% lower than the "% Cost Increase over Original Amount" column although the "Award Actual Cost Δ %" metric includes the incentives and disincentives amount as shown in Table 3-8. The reason being is that the FDOT construction office's evaluation used the number of contracts but the number of projects was not used for this study, although the same fiscal years were used for the comparison. Sometimes, one contract can include several projects. In other words, the project database used for the calculation in this study is different from the project database used in the FDOT construction office cost performance report. Accordingly, we expect the results to be similar but not identical.

Table 3-8. Cost Performance Measures Comparison: FDOT Versus Alternative Contracting Evaluation Study

Fiscal Year Passed	District	**Cost Performance Measures from FDOT Construction Office**			**Cost Performance Measures from Alternative Contracting Evaluation Study**			
		Number of Contracts	Total Original Contract Amount	% Cost Increase over Original Amount	Number of Projects	Total Original Contract Amount	Actual Cost Including Incentives	Actual Award Cost Δ %
2001 /2002	1	52	$132,410,552	18.2%	67	$136,221,640	$159,001,860	16.3%
	2	66	$236,886,559	10.9%	81	$212,854,395	$236,507,996	10.0%
	3	54	$147,056,310	5.1%	68	$123,978,142	$128,403,979	3.5%
	4	39	$110,351,781	18.1%	39	$111,270,480	$131,823,951	17.1%
	5	50	$181,808,951	11.2%	63	$186,508,010	$206,865,669	10.1%
	6	24	$94,132,332	0.7%	27	$95,820,632	$99,114,885	-0.4%
	7	28	$100,073,470	18.0%	35	$103,488,910	$120,880,186	16.4%
	8	10	$101,610,774	19.1%	16	$105,045,438	$124,187,118	18.2%
	Totals	323	$1,104,330,729	12.3%	396	$1,075,187,647	$1,206,785,644	11.3%
2002 /2003	1	38	$126,278,052	9.4%	61	$153,007,818	$162,900,892	5.1%
	2	62	$224,866,549	13.1%	91	$238,654,685	$267,587,494	11.4%
	3	87	$236,697,472	5.5%	106	$236,857,417	$245,813,856	3.7%
	4	30	$103,354,659	11.3%	45	$114,440,679	$124,168,146	7.3%
	5	46	$124,312,166	8.1%	60	$137,142,422	$147,469,395	6.8%
	6	20	$128,927,079	3.1%	38	$144,382,288	$152,686,273	0.2%
	7	42	$232,835,903	11.0%	50	$236,715,823	$260,149,045	9.9%
	8	11	$142,843,018	10.5%	23	$151,687,274	$167,170,535	9.5%
	Totals	336	$1,320,114,898	9.1%	474	$1,412,888,406	$1,527,945,636	7.0%
2003 /2004	1	49	$157,867,997	1.2%	55	$172,259,476	$174,125,991	0.4%
	2	78	$186,545,681	15.9%	80	$192,517,201	$220,986,753	13.7%
	3	79	$231,738,212	7.3%	83	$244,124,976	$257,980,139	5.6%
	4	64	$255,946,466	18.4%	57	$249,850,452	$295,036,722	17.1%
	5	51	$129,084,692	3.6%	50	$133,590,241	$136,570,163	1.9%
	6	40	$136,941,019	1.4%	42	$145,913,794	$149,035,008	-3.7%
	7	40	$101,764,318	3.9%	41	$105,473,201	$109,950,954	3.1%
	8	25	$187,084,035	4.0%	26	$189,029,595	$196,888,091	3.2%
	Totals	426	$1,386,972,420	8.2%	434	$1,432,758,936	$1,540,573,821	6.3%
2004 /2005	1	32	$77,147,320	-0.4%	39	$80,440,883	$78,610,903	-2.2%
	2	57	$199,713,260	5.5%	64	$149,075,237	$154,864,808	3.7%
	3	47	$179,335,845	4.3%	47	$179,157,026	$184,955,916	3.5%
	4	36	$258,240,060	16.6%	42	$261,589,728	$301,987,542	14.7%
	5	34	$155,982,304	7.5%	35	$156,183,884	$167,363,088	6.5%
	6	27	$73,583,329	8.9%	32	$79,097,998	$84,172,635	2.1%
	7	39	$119,232,955	4.5%	38	$118,910,667	$123,840,130	3.3%
	8	24	$99,178,359	5.2%	33	$103,825,967	$109,102,225	3.7%
	Totals	296	$1,162,413,432	7.8%	330	$1,128,281,390	$1,204,897,247	6.0%

Performance Evaluations with Regard to Time

Measures of Time Performance

The difference between project award time (original contract time) and the FDOT official time estimate provides a relative measure of initial project time requirement. The following calculation was used for time performance evaluations with regard to initial time requirements.

Initial Award Performance

$$Average Official\ Award\ Time\ \Delta = \frac{\sum Award\ Time - \sum FDOT\ Official\ Estimate Time}{Number\ of\ \text{Pr}ojects} \quad (10)$$

$$Official\ Award\ Time\ \Delta\ \% = \frac{\sum Award\ Time - \sum FDOT\ Official\ Estimate Time}{\sum FDOT\ Official\ Estimate Time} \times 100 \quad (11)$$

Time growth during project delivery was also selected as an important time performance measure. The following calculation was used for time performance evaluations with regard to time growth during project delivery.

Time Growth Performance

$$Actual Time = Days Used - Weather\ Days \quad (12)$$

$$Average\ Award\ Actual Time\ \Delta = \frac{\sum Actual Time - \sum Award\ Time}{Number\ of\ \text{Pr}ojects} \quad (13)$$

$$Award\ Actual Time\ \Delta\ \% = \frac{\sum Actual Time - \sum Award\ Time}{\sum Award\ Time} \times 100 \quad (14)$$

In addition, time performance evaluations with regard to the difference between project actual time and the FDOT official time estimate were measured using the following calculation.

Actual Time Performance

$$Average Official\ Actual Time\ \Delta = \frac{\sum Actual Time - \sum FDOT\ Official\ Estimate Time}{Number\ of\ \text{Pr}ojects} \quad (15)$$

$$Official\ Actual\ Time\ \Delta\% = \frac{\sum Actual\ Time - \sum FDOT\ Official\ Estimate\ Time}{\sum FDOT\ Official\ Estimate\ Time} \times 100 \qquad (16)$$

Time Performance Results by Contracting Method

The awarded contract time (original contract time) was compared to the FDOT official time estimate for A+B bidding projects such as A+B and A+B with bonus projects in the study database. The results are presented in Table 3-9. **The use of A+B alternative contracting produced significant improvements in initial time performance.** The award time of the A+B type alternative contracting projects was 21.85% less than the FDOT official time estimate. A+B and A+B with bonus resulted in an award time 20.67% and 25.19% less than the FDOT official time estimate, respectively.

Perhaps a more important time performance measure is time growth after contract award. Project time growth during construction was also measured and compared. The results are presented in Table 3-10. The time growth on traditional DBB projects was 16.47%. The time growth on alternative contracting projects was 4.13%. The Bonus, I/D, and liquidated savings contracting methods produced the smallest time growth.

The actual contract time (days used) was also compared to the FDOT official time estimate for projects in the study database. The results are presented in Table 3-11. The use of alternative contracting produced significant improvements in initial time performance. The actual time of the traditional DBB projects was 17.30% more than the FDOT official time estimate. The actual time of the alternative contracting projects was 2.47% less than the FDOT official time estimate. All alternative contracting methods except lane rental resulted in improved time performance. The A+B with bonus method resulted in an actual time that was 22.21% less than the FDOT official time estimate. In addition, A+B resulted in an actual time that was 10.07% less than the FDOT official time estimate.

Time Performance Results by Contracting Method and Work Category

A comparison of award time to the FDOT official time estimate by project type is presented in Table 3-12. Alternative contracting projects in bridge project categories, reconstruction, and

resurfacing and paving categories had an initial time performance superior to traditional DBB contracting.

A comparison of time growth during construction by contracting method and project type is presented in Table 3-13. With the exception of the movable-span bridge category, all alternative contracting projects had a time performance superior to traditional DBB contracting. The other bridges, buildings and non-roads, reconstruction, and technical project types had a cost growth that was approximately 13% less than the traditional DBB contracting projects in their categories.

A comparison of actual time to the FDOT official time estimate by project type is presented in Table 3-14. The traditional DBB contracting project's actual time was 17.30% greater than the engineer estimate. With the exception of the movable-span bridge category, all alternative contracting projects had a time performance superior to traditional DBB contracting.

In addition, for A+B and A+B with bonus contract types, the project type category rankings for initial bid time savings by contract type category is presented in Table 3-15. For all alternative contracting methods, the contract type category rankings for construction time savings by project type category are presented in Table 3-16.

Table 3-9. Comparison of Award Time to FDOT Official Time Estimate by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average Official Award Time Δ* (days)	Official Award Time Δ %**
Alternative	A+B	85	-110.2	-20.67%
	A+B Bonus	30	-165.9	-25.19%
Alternative Contracting Total		115	-124.7	-21.85%

$$^{*}\,Average\,Official\,Award\,Time\,\Delta = \frac{\sum Award\,Time - \sum FDOT\,Official\,Estimate\,Time}{Number\,of\,\mathrm{Pr}ojects}$$

$$^{**}\,Official\,Award\,Time\,\Delta\,\% = \frac{\sum Award\,Time - \sum FDOT\,Official\,Estimate\,Time}{\sum FDOT\,Official\,Estimate\,Time} \times 100$$

Table 3-10. Comparison of Time Growth during Construction by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average Award Actual Time Δ* (days)	Award Actual Time Δ %**
Alternative	A+B	86	56	13.21%
	A+B Bonus	30	20	3.98%
	Bonus	142	-11	-3.02%
	DB	68	30	7.08%
	I/D	144	-1	-0.32%
	Lane Rental	27	52	23.69%
	Liq. Savings	86	-6	-1.75%
	Lump Sum	548	8	6.89%
Alternative Contracting Total		1131	10	4.13%
Traditional Design-bid-build Total		1907	35	16.47%
Grand Total		3038	25	11.51%

* $$Average\ Award\ Actual\ Time\ \Delta = \frac{\sum Actual\ Time - \sum Award\ Time}{Number\ of\ \text{Pr}ojects}$$

** $$Award\ Actual\ Time\ \Delta\% = \frac{\sum Actual\ Time - \sum Award\ Time}{\sum Award\ Time} \times 100$$

Table 3-11. Comparison of Actual Time to FDOT Official Time Estimate by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average Official Actual Time Δ* (days)	Official Actual Time Δ %**
Alternative	A+B	85	-54	-10.07%
	A+B Bonus	30	-146	-22.21%
	Bonus	128	-16	-4.14%
	DB	5	61	11.76%
	I/D	121	1	0.49%
	Lane Rental	25	49	22.29%
	Liq. Savings	83	-6	-1.88%
	Lump Sum	372	11	8.19%
Alternative Contracting Total		849	-7	-2.47%
Traditional Design-bid-build Total		1561	37	17.30%
Grand Total		2410	21	9.11%

* $$Average Official\ Actual\ Time\ \Delta = \frac{\sum Actual\ Time - \sum FDOT\ Official\ Estimate Time}{Number\ of\ \text{Pr}ojects}$$

** $$Official\ Actual\ Time\ \Delta\% = \frac{\sum Actual\ Time - \sum FDOT\ Official\ Estimate Time}{\sum FDOT\ Official\ Estimate Time} \times 100$$

Table 3-12. Comparison of Award Time to FDOT Official Time Estimate by Contracting Method and Project Type

Project Type Category	Alternative Contracting		Traditional Design-bid-build	
	Number of Projects	Official Award Time Δ %*	Number of Projects	Official Award Time Δ %*
All Other Bridges	66	-11.29%	198	-0.23%
Building and Non-road Facility	5	0.00%	38	-0.01%
High-level Bridge	4	-6.44%	2	0.00%
Movable-span Bridge	6	-11.40%	1	0.00%
Others	156	-1.63%	415	-0.22%
Reconstruction	207	-7.87%	327	-0.37%
Resurfacing and Paving	366	-3.36%	530	-0.03%
Technical Projects	39	0.02%	49	-0.05%
Totals	849	-6.13%	1560	-0.20%

* $$Official\ Award\ Time\ \Delta\% = \frac{\sum Award\ Time - \sum FDOT\ Official\ Estimate Time}{\sum FDOT\ Official\ Estimate Time} \times 100$$

Table 3-13. Comparison of Time Growth during Construction by Contracting Method and Project Type

Project Type Category	Alternative Contracting		Traditional Design-bid-build	
	Number of Projects	Award Actual Time Δ %*	Number of Projects	Award Actual Time Δ %*
All Other Bridges	139	0.20%	299	10.48%
Building and Non-road Facility	9	13.64%	44	29.50%
High-level Bridge	5	9.52%	5	-2.04%
Movable-span Bridge	7	19.46%	2	16.61%
Others	211	2.01%	543	8.54%
Reconstruction	253	6.07%	385	19.79%
Resurfacing and Paving	441	1.78%	561	17.89%
Technical Projects	66	7.04%	68	42.00%
Totals	1131	4.13%	1907	16.47%

* $$Award\ Actual\ Time\ \Delta\% = \frac{\sum Actual\ Time - \sum Award\ Time}{\sum Award\ Time} \times 100$$

Table 3-14. Comparison of Actual Time to FDOT Official Time Estimate by Contracting Method and Project Type

Project Type Category	Alternative Contracting		Traditional Design-bid-build	
	Number of Projects	Official Actual Time Δ %*	Number of Projects	Official Actual Time Δ %*
All Other Bridges	66	-11.57%	198	13.59%
Building and Non-road Facility	5	2.61%	38	26.09%
High-level Bridge	4	-0.62%	2	5.16%
Movable-span Bridge	6	12.81%	1	-1.53%
Others	156	-2.84%	415	12.88%
Reconstruction	207	-2.04%	327	17.90%
Resurfacing and Paving	366	-1.79%	531	17.61%
Technical Projects	39	3.05%	49	41.91%
Totals	849	-2.47%	1561	17.30%

* $$Official\ Actual\ Time\ \Delta\% = \frac{\sum Actual\ Time - \sum FDOT\ Official\ Estimate\ Time}{\sum FDOT\ Official\ Estimate\ Time} \times 100$$

Table 3-15. Project Type Category Rankings for Initial Bid Time Savings by Contract Type Category

Contract Type Category	Ranking	Project Type Category	Number of Projects	Official Actual Time Δ %	% Increase over Traditional Projects in the Same Project Category
A+B	1	Others	2	-42.7%	-42.48%
	2	High-level Bridge	1	-33.3%	-33.33%
	3	Resurfacing and Paving	19	-26.3%	-26.28%
	4	All Other Bridges	20	-19.7%	-19.48%
	5	Reconstruction	41	-18.8%	-18.44%
	6	Movable-span Bridge	2	-15.3%	-15.25%
A+B Bonus	1	All Other Bridges	3	-36.2%	-36.00%
	2	Resurfacing and Paving	9	-25.9%	-25.90%
	3	Reconstruction	16	-23.8%	-23.47%
	4	Movable-span Bridge	2	-19.5%	-19.53%

Table 3-16. Contract Type Category Rankings for Construction Time Savings by Project Type Category

Project Type Category	Ranking	Contract Type Category	Number of Projects	Award Actual Time Δ %	% Increase over Traditional Projects in the Same Project Category
All Other Bridges	1	I/D	26	-11.5%	-22.0%
	2	Lump Sum	59	-5.8%	-16.2%
	3	DB	12	2.5%	-8.0%
	4	Bonus	7	5.2%	-5.3%
	5	A+B	21	5.3%	-5.2%
	6	LQSAV	7	6.5%	-4.0%
	7	A+B Bonus	3	13.8%	3.3%
	8	Lane Rental	4	17.6%	7.1%
Building and Non-road Facility	1	Lump Sum	2	-7.8%	-37.3%
	2	Bonus	1	1.2%	-28.3%
	3	DB	6	23.2%	-6.3%
High-level Bridge	1	A+B	1	-4.4%	-2.4%
	2	Bonus	2	1.1%	3.2%
	3	DB	2	17.4%	19.4%
Movable-span Bridge	1	DB	1	-27.0%	-43.6%
	2	I/D	1	0.6%	-16.0%
	3	Bonus	1	4.5%	-12.2%
	4	A+B Bonus	2	26.8%	10.2%
	5	A+B	2	65.7%	49.1%
Others	1	Lane Rental	2	-46.0%	-54.5%
	2	LQSAV	4	-32.8%	-41.3%
	3	A+B	2	-25.8%	-34.3%
	4	I/D	17	-15.7%	-24.2%
	5	Bonus	8	-13.6%	-22.1%
	6	Lump Sum	164	8.4%	-0.2%
	7	DB	14	10.9%	2.4%
Reconstruction	1	DB	10	-0.8%	-20.5%
	2	LQSAV	32	-0.1%	-19.9%
	3	A+B Bonus	16	0.4%	-19.3%
	4	Bonus	49	2.1%	-17.7%
	5	Lump Sum	59	5.9%	-13.9%
	6	I/D	41	6.4%	-13.4%
	7	A+B	41	14.2%	-5.6%
	8	Lane Rental	5	58.1%	38.3%
Resurfacing and Paving	1	Bonus	73	-11.3%	-29.1%
	2	A+B Bonus	9	-5.1%	-23.0%
	3	LQSAV	43	-5.0%	-22.9%
	4	Lane Rental	16	2.7%	-15.2%
	5	I/D	54	3.2%	-14.7%
	6	DB	16	5.5%	-12.4%
	7	Lump Sum	211	8.4%	-9.5%
	8	A+B	19	15.7%	-2.2%
Technical Projects	1	I/D	5	-26.5%	-68.5%
	2	Bonus	1	-24.8%	-66.8%
	3	Lump Sum	53	9.1%	-32.9%
	4	DB	7	14.3%	-27.7%

Comparison of Time Performance Measures

Quarterly time performance measures performed by the FDOT construction office used "% Time Increase of Original Days" as a metric. This is the increase in time based on actual time over the award time (original contract days) expressed as a percentage of the award time. In this metric, the weather days were not included in the actual time calculation. Thus, the following calculation was used for the FDOT construction office's time performance measures with regard to time growth during project delivery:

$$\%\ Time\ Increase\ of\ Original\ Days = \frac{\sum(Day\ Used - Weather\ Days) - \sum Original\ Contract\ Days}{\sum Original\ Contract\ Days} \times 100 \quad (17)$$

In this study, the researchers used the same metric above to measure the difference between project award time and actual time to provide time growth during project delivery. The following calculation was used for time performance evaluations with regard to time growth during project delivery in this study:

$$Award\ Actual\ Time\ \Delta\ \% = \frac{\sum(Days\ Used - Weather\ Days) - \sum Award\ Time}{\sum Award\ Time} \times 100 \quad (18)$$

The average "% Weather Days of Original Contract Days" was approximately 12% between the fiscal years of 2001 and 2005. The results shown in the "% Time Increase of Original Days" column were similar to those in the "Award Actual Time Δ %" column in Table 3-17. The project database used for the calculation in this study is different from the project database used in the FDOT construction office time performance report. Accordingly, we expect the results to be similar but not identical.

Table 3-17. Time Performance Measures Comparison: FDOT Versus Alternative Contracting Evaluation Study

Fiscal Year Passed	District	**Time Performance Measures from FDOT Construction Office**			**Time Performance Measures from Alternative Contracting Evaluation Study**			
		Number of Contracts	Total Original Contract Amount	% Time Increase of Original Days	Number of Projects	Total Original Contract Amount	% Weather Days of Original Days	Actual Award Time Δ %
2001 /2002	1	52	$132,410,552	16.8%	67	$136,221,640	8.9%	12.1%
	2	66	$236,886,559	17.9%	81	$212,854,395	10.4%	17.6%
	3	54	$147,056,310	15.3%	68	$123,978,142	17.8%	8.7%
	4	39	$110,351,781	17.8%	39	$111,270,480	5.8%	17.8%
	5	50	$181,808,951	10.2%	63	$186,508,010	11.2%	11.0%
	6	24	$94,132,332	2.6%	27	$95,820,632	7.1%	2.4%
	7	28	$100,073,470	31.1%	35	$103,488,910	7.8%	30.8%
	8	10	$101,610,774	29.6%	16	$105,045,438	2.2%	25.9%
	Totals	323	$1,104,330,729	17.1%	396	$1,075,187,647	9.6%	15.2%
2002 /2003	1	38	$126,278,052	13.1%	61	$153,007,818	6.7%	2.9%
	2	62	$224,866,549	14.6%	91	$238,654,685	12.8%	13.2%
	3	87	$236,697,472	15.7%	106	$236,857,417	17.2%	13.6%
	4	30	$103,354,659	19.3%	45	$114,440,679	6.7%	16.9%
	5	46	$124,312,166	9.6%	60	$137,142,422	15.8%	9.9%
	6	20	$128,927,079	-12.6%	38	$144,382,288	3.0%	-11.5%
	7	42	$232,835,903	30.0%	50	$236,715,823	11.2%	28.3%
	8	11	$142,843,018	9.4%	23	$151,687,274	4.5%	8.1%
	Totals	336	$1,320,114,898	14.0%	474	$1,412,888,406	11.0%	10.8%
2003 /2004	1	49	$157,867,997	-5.5%	55	$172,259,476	6.0%	-6.6%
	2	78	$186,545,681	13.2%	80	$192,517,201	12.5%	12.4%
	3	79	$231,738,212	16.8%	83	$244,124,976	29.0%	16.2%
	4	64	$255,946,466	16.4%	57	$249,850,452	5.6%	12.0%
	5	51	$129,084,692	4.4%	50	$133,590,241	11.2%	4.3%
	6	40	$136,941,019	-16.7%	42	$145,913,794	3.4%	-13.0%
	7	40	$101,764,318	17.5%	41	$105,473,201	9.3%	20.7%
	8	25	$187,084,035	12.0%	26	$189,029,595	7.0%	11.6%
	Totals	426	$1,386,972,420	8.6%	434	$1,432,758,936	11.7%	7.5%
2004 /2005	1	32	$77,147,320	15.6%	39	$80,440,883	8.4%	-0.9%
	2	57	$199,713,260	13.8%	64	$149,075,237	16.0%	13.6%
	3	47	$179,335,845	21.3%	47	$179,157,026	19.8%	21.4%
	4	36	$258,240,060	12.3%	42	$261,589,728	7.1%	6.7%
	5	34	$155,982,304	8.4%	35	$156,183,884	15.7%	8.9%
	6	27	$73,583,329	-6.9%	32	$79,097,998	5.5%	-2.3%
	7	39	$119,232,955	6.4%	38	$118,910,667	14.7%	6.5%
	8	24	$99,178,359	-2.1%	33	$103,825,967	8.9%	5.5%
	Totals	296	$1,162,413,432	9.8%	330	$1,128,281,390	11.9%	8.0%

Incentive or Disincentive Achieved

Table 3-18 shows the number of projects and percentages achieved for incentive or disincentive by contract type category. Among 515 incentive projects, contractors achieved incentives from 307 projects and the overall incentive achievement rate was approximately 60%. The total amount paid for incentives was approximately $92 million and the average incentive amount achieved was approximately $300,000.

In A+B with bonus contracts, contractors achieved incentives approximately 87% of the time with only about 13% of contractors unable to receive incentives. The average incentive amount that the contractors received in this category was approximately $750,000 per project. The maximum project incentive achieved with A+B with bonus contracts was $2.5 million. The no-excuse bonus contract type also showed a high percentage rate (approximately 67%) on incentive achievement.

Liquidated savings (approximately 72%), lane rental (approximately 59%), and I/D (approximately 51%) contracts showed that contractors achieved full or partial incentives more than 50% of the time. Only for the A+B contract were contractors able to achieve incentives less than 50%of the time. Since contractors already bid their construction time much lower than the FDOT official time estimate, there is a higher probability that the contractor's incentive achievement rate is lower than other contracts. Considering this reality, incentive performance on A+B with bonus was substantial.

Table 3-18. Incentive or Disincentive Achieved

Contract Type Category	Charged / Achieved	Number of Projects	Percentage Achieved	Total Amount Incentive / Disincentive	Average Amount Incentive / Disincentive	Maximum Amount Incentive / Disincentive	Minimum Amount Incentive / Disincentive
A+B	Disincentive	8	9.3%	-$1,577,708	-$197,214	-$800,000	-$4,212
	Incentive	32	37.2%	$8,306,186	$259,568	$900,000	$23,104
	None	46	53.5%	$0	$0	$0	$0
A+B Bonus	Incentive	26	86.7%	$19,677,500	$756,827	$2,500,000	$70,000
	None	4	13.3%	$0	$0	$0	$0
Bonus	Incentive	97	68.3%	$28,533,504	$294,160	$1,500,000	$9,000
	None	45	31.7%	$0	$0	$0	$0
I/D	Disincentive	13	9.0%	-$417,400	-$32,108	-$100,000	-$2,500
	Incentive	74	51.4%	$19,646,284	$265,490	$2,643,559	$3,000
	None	57	39.6%	$0	$0	$0	$0
Lane Rental	Disincentive	4	14.8%	-$104,500	-$26,125	-$60,000	-$4,000
	Incentive	16	59.3%	$1,544,591	$96,537	$307,500	$11,250
	None	7	25.9%	$0	$0	$0	$0
Liq. Savings	Incentive	62	72.1%	$14,491,712	$233,737	$1,736,390	$2,000
	None	24	27.9%	$0	$0	$0	$0
Grand Total	Disincentive	25	4.9%	-$2,099,608	-$83,984	-$800,000	-$2,500
	Incentive	307	59.6%	$92,199,777	$300,325	$2,643,559	$2,000
	None	183	35.5%	$0	$0	$0	$0

Performance Evaluations with Regard to Contractor Performance

Measures of Contractor Performance

Measuring project quality performance is somewhat challenging. The reality is that essentially all completed FDOT projects comply with specified contractual quality criteria. This is a requirement for acceptance. Therefore, an analysis of material testing results across projects may show some variation in quality but would undoubtedly show that in the end all projects meet requirements. However, the real difference lies in the difficulty in achieving the required quality level. Thus, the research team has used the contractor past performance ratings (CPPR) as an indicator of contractor performance as a partial measure of project quality. Although not yet verified by research, the research team believes that contractor performance is likely to be highly coordinated with the quality of the constructed project. A copy of the evaluation criteria for the CPPR is included in Appendix E.

Contractor Performance Results by Contracting Method

A comparison of the contractor performance of alternative contracting projects to traditional DBB projects is presented in Table 3-19. The average alternative contracting CPPR score was 93.6 as compared to 93.5 for the traditional DBB contacting projects. The choice of contracting method does not appear to affect project contractor performance.

Contractor Performance Results by Contracting Method and Project Type

Further analysis of contractor performance by contracting method and project type is presented in Table 3-20. The average performance values remain comparable within project type categories.

Table 3-19. Comparison of Contractor Performance (CPPR) by Contracting Method

Contract Type	Contract Type Category	Number of Projects	Average CPPR Score
Alternative	A+B	17	91.9
	A+B Bonus	6	100.5
	Bonus	66	94.8
	DB	48	95.3
	I/D	77	94.5
	Lane Rental	6	86.0
	LQSAV	19	97.4
	Lump Sum	351	92.8
Alternative Total		590	93.6
Traditional Total		507	93.5
Grand Total		1097	93.6

Table 3-20. Comparison of Contractor Performance (CPPR) by Contracting Method

	Alternative Contracting		Traditional DBB	
Project Type Category	**Number of Projects**	**Performance Value (CPPR)**	**Number of Projects**	**Performance Value (CPPR)**
All Other Bridges	69	97	114	96
Building and Non-road Facility	4	97	10	97
High-level Bridge	N/A	N/A	N/A	N/A
Movable-span Bridge	1	100	N/A	N/A
Others	129	94	144	94
Reconstruction	104	93	84	92
Resurfacing and Paving	235	92	127	91
Technical Projects	48	93	28	95
Totals	590	94	507	94

Value Contributed by Alternative Contracting

Measures of Value Performance

Value was measured in terms of project delivery time and project cost. Cost and time value determinations were based upon a comparison of the actual alternative contracting project performance to the expected performance had the projects been delivered by the traditional DBB method. Design-build projects were evaluated separately because the project scope includes both design and construction.

Time Value Evaluations

Time is an important project performance measure. In general, transportation projects are implemented because they provide needed benefits: safety improvements, transportation capacity and efficiency, environmental improvements, economic benefits, and others. Completing projects in less time provides the benefits of the project sooner. Construction may contribute to congestion and other inconveniences for motorists, adjacent businesses, and adjacent residents. Consequently, reducing construction time directly reduces the negative affects of the project construction phase.

The time performance on each alternative contracting project was calculated as the difference between the FDOT official time estimate and the final project time. For comparison purposes the average percent of difference between the FDOT official time estimate and the traditional DBB project final time was calculated for each project type category.

The traditional DBB average time performance percentage was applied to each design-build project to calculate the estimated time performance had the project been delivered with the traditional DBB method. The difference between the actual alternative contracting time and the estimated traditional DBB time represents the estimated value contribution in days.

The following calculation was used for time performance evaluations with regard to time value contributions:

$$Official\ Actual\ Time\ \Delta\ \% = \frac{\sum Actual\ Time - \sum FDOT\ Official\ Estimate\ Time}{\sum FDOT\ Official\ Estimate\ Time} \times 100 \qquad (16)$$

Table 3-21 provides the calculated average time growth percentages for each work type category performed by traditional DBB contracting. Table 3-22 presents the time value contributions of the alternative contracting methods. **Using alternative contracting methods is estimated to have saved a total of 31,645 project days for the 833 projects included in the study.** This is an average of 38 days per project. Note that design-build projects are not included because they have been evaluated separately.

Table 3-21. Time Performance of Traditional DBB Projects by Project Type Category

Project Type Category	Number of Projects	∑ (Actual Time) (Days)	∑ (Official Est.) (Days)	∑ (Official Actual Time Δ) (Days)	Official Actual Time Δ %
All Other Bridges	198	58,451	51,457	6,994	13.59%
Building and Non-road Facility	38	16,047	12,727	3,320	26.09%
High-level Bridge	2	1,998	1,900	98	5.16%
Movable-span Bridge	1	709	720	-11	-1.53%
Others	415	57,964	51,351	6,613	12.88%
Reconstruction	327	132,177	112,110	20,067	17.90%
Resurfacing and Paving	531	107,504	91,407	16,097	17.61%
Technical Projects	49	14,303	10,079	4,224	41.91%
Totals	1,561	389,153	331,751	57,402	17.30%

Table 3-22. Estimated Time Value Contribution of Alternative Contracting Projects

Project Type Category	Contract Type Category	Number of Projects	∑ (Official Time Est.)	Alternative ∑ (Actual Time)	Traditional DBB Time Growth (%)	Estimated Traditional Time ∑ (Estimated Actual Time)	Estimated Total Time Savings (Days)
All Other Bridges	A+B	20	9,909	8,664	13.59%	11,256	-2,592
	A+B Bonus	3	2,360	1,803	13.59%	2,681	-878
	Bonus	4	1,225	1,227	13.59%	1,392	-165
	I/D	18	5,690	6,094	13.59%	6,463	-369
	Lane Rental	2	650	663	13.59%	738	-75
	Liq. Savings	6	2,490	2,949	13.59%	2,828	121
	Lump Sum	13	2,545	2,638	13.59%	2,891	-253
Building and Non-road Facility	Bonus	1	1,369	1,431	26.09%	1,726	-295
	Lump Sum	2	360	332	26.09%	454	-122
High-level Bridge	A+B	1	750	500	5.16%	789	-289
	Bonus	2	1,830	1,943	5.16%	1,924	19
Movable-span Bridge	A+B	2	1,600	2,255	-1.53%	1,576	679
	A+B Bonus	2	2,150	1,882	-1.53%	2,117	-235
	Bonus	1	1,100	1,149	-1.53%	1,083	66
	I/D	1	975	981	-1.53%	960	21
Others	A+B	2	1,220	704	12.88%	1,377	-673
	Bonus	6	1,795	1,794	12.88%	2,026	-232
	I/D	15	3,106	3,145	12.88%	3,506	-361
	Lane Rental	2	200	140	12.88%	226	-86
	Liq. Savings	2	300	365	12.88%	339	26
	Lump Sum	126	12,280	13,814	12.88%	13,861	-47
Reconstruction	A+B	41	26,335	24,263	17.90%	31,049	-6,786
	A+B Bonus	16	12,000	9,802	17.90%	14,148	-4,346
	Bonus	49	26,940	27,740	17.90%	31,762	-4,022
	I/D	39	15,764	17,708	17.90%	18,586	-878
	Lane Rental	4	1,736	2,315	17.90%	2,047	268
	Liq. Savings	30	13,525	15,649	17.90%	15,946	-297
	Lump Sum	25	3,288	3,793	17.90%	3,877	-84
Resurfacing and Paving	A+B	19	5,500	4,975	17.61%	6,469	-1,494
	A+B Bonus	9	3,248	2,475	17.61%	3,820	-1,345
	Bonus	63	15,109	15,600	17.61%	17,770	-2,170
	I/D	43	9,657	10,847	17.61%	11,358	-511
	Lane Rental	15	2,400	2,534	17.61%	2,823	-289
	Liq. Savings	40	8,145	9,175	17.61%	9,579	-404
	Lump Sum	173	26,075	28,901	17.61%	30,667	-1,766
Technical Projects	Bonus	1	500	471	41.91%	710	-239
	I/D	5	520	550	41.91%	738	-188
	Lump Sum	30	4,295	4,738	41.91%	6,095	-1,357
Grand Total		**833**	**228,941**	**236,009**	**17.30%**	**267,654**	**-31,645**

Cost Value Evaluations

Cost value consists of savings in direct and indirect costs. Direct cost savings include differences in final project costs as compared to the FDOT official estimate. This includes any savings acquired with the original award cost and savings relating to cost growth during construction. Project time also contributes to indirect project costs. Time related to indirect costs include:

- Project field administration cost
- Road user cost
- DOT general and administrative cost

Each day of a project's duration contributes to these indirect cost categories. Thus, savings in project time provide real cost benefits.

Most DOTs use a specified liquidated damage rate in lieu of calculating the actual cost of the above items. The FDOT has established a standard for applying liquidated damages to its projects. The liquidated damage rate is a function of the project contract amount. Figure 3-1 provides the FDOT liquidated damage application rates.

Original Contract Amount	Daily Charge Per Calendar Day
$50,000 and under	$313
Over $50,000 but less than $250,000	$580
$250,000 but less than $500,000	$715
$500,000 but less than $2,500,000	$1,423
$2,500,000 but less than $5,000,000	$2,121
$5,000,000 but less than $10,000,000	$3,057
$10,000,000 but less than $15,000,000	$3,598
$15,000,000 but less than $20,000,000	$4,544
$20,000,000 and over	$8,537 plus
	0.00027 of any amount over $20 million

Figure 3-1. FDOT Liquidated Damages Rates (FDOT 2007)

FDOT general administrative costs and road user cost data were not available for the projects in this study. The FDOT consultant cost for outsourcing construction project administration (CEI) was only available for a limited number of the projects. Given this, the research team has used the FDOT established liquidated damage rates to estimate the daily cost of each project day. The appropriate liquidated damage rate was applied to the estimated time savings to calculate an estimated cost savings value on a project-by-project basis. The estimated indirect cost value contributed by the alternative contracting projects is given in Table 3-23.

Additionally, the direct cost savings value was estimated by applying the appropriate traditional DBB project cost growth rate to the alternative project performance. This calculation provides an estimated project cost growth for each alternative contracting project if delivered by traditional DBB contracting. The cost savings value was estimated as the difference between the alternative contracting cost performance and the estimate traditional DBB project performance. Table 3-23 also includes the direct cost savings results. **Using alternative contracting methods is estimated to have saved a total of $289,639,935 for the 833 projects included in the study.** Note that design-build projects are not included because they have been evaluated separately.

Table 3-23. Estimated Cost Savings Value of Alternative Contracting Project

Project Type Category	Contract Type Category	Number of Projects	Estimated Total Time Savings (Days)	Estimated Total Time Cost Savings ($)	Estimated Total Cost Growth Savings ($)	Estimated Total Cost Savings ($)
All Other Bridges	A+B	20	-2,592	-$7,732,928	$1,583,164	-$6,149,764
	A+B Bonus	3	-878	-$7,016,773	-$3,288,931	-$10,305,704
	Bonus	4	-165	-$362,899	$2,208,453	$1,845,555
	I/D	18	-369	-$1,536,772	$11,639,677	$10,102,905
	Lane Rental	2	-75	-$159,399	-$533,042	-$692,441
	Liq. Savings	6	121	$204,145	$3,805,726	$4,009,871
	Lump Sum	13	-253	-$392,791	-$1,732,124	-$2,124,914
Building and Non-road Facility	Bonus	1	-295	-$2,519,449	-$1,613,946	-$4,133,395
	Lump Sum	2	-122	-$128,250	-$26,498	-$154,749
High-level Bridge	A+B	1	-289	-$1,311,781	$4,175,240	$2,863,459
	Bonus	2	19	$158,878	$12,087,753	$12,246,631
Movable-span Bridge	A+B	2	679	$6,321,307	-$5,385,544	$935,763
	A+B Bonus	2	-235	-$3,148,322	-$26,687,335	-$29,835,657
	Bonus	1	66	$902,758	-$27,316,435	-$26,413,677
	I/D	1	21	$178,388	-$10,089,214	-$9,910,826
Others	A+B	2	-673	-$1,368,435	-$3,296,663	-$4,665,097
	Bonus	6	-232	-$476,201	$594,619	$118,418
	I/D	15	-361	-$767,478	$21,447,012	$20,679,534
	Lane Rental	2	-86	-$59,925	$83,233	$23,308
	Liq. Savings	2	26	$37,519	$1,327,650	$1,365,168
	Lump Sum	126	-47	$323,044	-$3,860,766	-$3,537,723
Reconstruction	A+B	41	-6,786	-$35,603,864	-$98,046,774	-$133,650,638
	A+B Bonus	16	-4,346	-$20,479,407	-$51,720,833	-$72,200,240
	Bonus	49	-4,022	-$15,009,220	-$57,301,874	-$72,311,094
	I/D	39	-878	-$5,122,694	$37,471,544	$32,348,850
	Lane Rental	4	268	$907,415	-$971,430	-$64,014
	Liq. Savings	30	-297	-$1,091,253	$10,090,184	$8,998,931
	Lump Sum	25	-84	-$411,063	-$778,476	-$1,189,539
Resurfacing and Paving	A+B	19	-1,494	-$2,869,922	-$7,703,483	-$10,573,405
	A+B Bonus	9	-1,345	-$3,121,256	-$2,541,915	-$5,663,171
	Bonus	63	-2,170	-$4,812,646	$13,644,297	$8,831,651
	I/D	43	-511	-$1,008,728	$12,871,678	$11,862,950
	Lane Rental	15	-289	-$534,156	-$7,172,553	-$7,706,709
	Liq. Savings	40	-404	-$844,179	$9,923,301	$9,079,123
	Lump Sum	173	-1,766	-$3,266,282	-$8,062,677	-$11,328,960
Technical Projects	Bonus	1	-239	-$729,231	-$1,351,820	-$2,081,051
	I/D	5	-188	-$126,253	$187,135	$60,882
	Lump Sum	30	-1,357	-$2,499,531	$2,179,366	-$320,166
Grand Total		**833**	**-31,645**	**-$115,477,633**	**-$174,162,302**	**-$289,639,935**

Value Evaluation of Design–Build Projects

The DB contract duration includes both the design and the construction duration; therefore, the total design and construction duration for traditional DBB contracting projects must be determined to correctly compare the total project delivery duration. Design durations for non-DB projects were partially available. A total of 1361 project design durations were collected. The collected projects consisted of 589 alternative and 772 traditional DBB contracts.

The comparison strategy was to compare a representative sample of the DB projects with a matching sample of the traditional DBB projects. Sixty-eight DB projects of various sizes and types were collected from FDOT. The traditional DBB project database was reviewed to identify projects that matched the DB projects in terms of size and work-mix type. Matches for 34 of the DB projects were identified.

The research team performed this sample development on the condition that it was "within the same work mix" and "within a similar project size" based on the original contract amount. First, the project selection process was performed. Based on DB project work mixes, the corresponding traditional DBB projects in the same work mix as the DB project were selected. If the same work mix was not found in the traditional DBB projects, then the DB projects in this work mix were not selected for evaluation. While considering the similarity of project costs, the same number of projects in the same work mix were chosen for the next step. When there were more traditional DBB projects in a work mix than the DB projects, the project with the closest original contract cost to a DB project was selected. When a similar project size within the same work mix was not available, then no projects in the work mix were selected.

A total of 34 projects with 16 different work mixes were selected from each DB and traditional DBB contract category. The sample size of each work mix was between one and 10 projects. Work mix resurfacing was the most frequent project type. Basic project information is shown in Table 3-24 for the DB projects and in Table 3-25 for the traditional DBB projects.

Project award costs ranged from $371,000 to $33,592,677 for the DB projects and from $412,775 to $31,303,338 for the traditional DBB projects. Boxplots, used for the descriptive statistics, as shown in Appendix D, graphically depict the summary of the data set. Project award duration ranged from 75 days to 794 days for the DB projects and from 45 days to 883 days for the traditional DBB projects. Total project delivery duration including design and construction ranged from 75 days to 794 days for the DB projects and from 211 days to 2167 days for the traditional DBB projects.

The average original contract amount was $4,830,495 for the DB projects and $4,684,128 for the traditional DBB projects. A two-sample *t*-test was performed to test if the two groups were representative of the same population with regard to project cost. There was no statistically significant difference in mean project cost between the DB and traditional DBB projects at the 0.05 level. The average original contract duration was 294 days for the DB projects and 284 days for the traditional DBB projects. The two-sample *t*-test was performed to test if the two groups were representative of the same population with regard to project duration. There was no statistically significant difference in mean project duration between the DB and traditional DBB projects at the 0.05 level. Conclusively, these results indicate that the project size for the two samples are not different.

The average project delivery duration including design and construction was 360 days for the DB projects and 932 days for the traditional DBB projects. The two-sample *t*-test was performed to test if there was a statistically significant difference between the means of the two groups. There was a significant difference in mean project delivery duration between the DB and traditional DBB projects at the 0.05 level. A comparison of the two selected project groups indicated that the use of DB contracting resulted in a total savings of 19,444 project days for the 34 selected DB projects.

In addition, 34 other DB projects were not included in this evaluation. Table 3-26 provides basic information on the other DB projects. Their average project delivery duration was 649 days and their average original contract cost was $20,282,761. Traditional DBB projects, however, were not available in the same work mix or for a similar project cost. Therefore, the research

team estimated the average project delivery time savings of these other DB projects as the same as the previously selected DB projects. The research team calculated an estimated project delivery duration including design and construction for the traditional DBB contracting. The other DB projects are estimated to have saved 35,011 project days. The total time savings contribution for the 68 DB projects in the study was 54,455 project days. In this evaluation, project days included both design and construction time. Table 3-27 provides a summary of the estimated time savings value contribution of the DB projects.

It is reasonable to believe that this significant project delivery time savings has also contributed to significant cost savings. However, the available data does not permit a determination of the division of time savings between design and construction time. Additionally, FDOT official estimates are not available for the DB projects. Therefore, it is not possible to quantify the cost savings provided by the DB projects.

Table 3-24. Selected Design-Build Projects

No.	Work Mix	Original Contract Amount	Original Contract Days	Equivalent Average Design and Construction Duration per $1M (Days)	Total Design and Construction Duration (Days)
1	Access Improvement	$4,925,280	240	106	524
2	Add Lanes and Reconstruct	$9,043,000	794	77	692
3	Add Lanes and Reconstruct	$12,703,271	780	69	875
4	Add Lanes and Rehabilitate Pavement	$33,592,677	440	25	847
5	Add Turn Lane(s)	$5,442,344	225	58	314
6	Bike Path/Trail	$4,582,173	350	47	215
7	Bridge Repair/Rehabilitation	$1,494,000	86	39	58
8	Bridge Repair/Rehabilitation	$2,145,000	410	73	157
9	Bridge Repair/Rehabilitation	$2,735,000	137	35	96
10	Bridge Repair/Rehabilitation	$8,849,000	410	73	643
11	Interchange (Minor)	$2,179,967	365	235	512
12	Lighting	$1,579,350	200	128	202
13	Miscellaneous Construction	$646,247	280	571	369
14	Miscellaneous Construction	$3,564,060	500	188	671
15	Pedestrian Overpass	$1,426,000	360	276	394
16	Pedestrian Overpass	$2,627,227	340	172	451
17	Rest Area	$9,289,000	320	59	545
18	Resurfacing	$371,000	75	218	81
19	Resurfacing	$729,000	98	134	98
20	Resurfacing	$2,737,214	89	35	97
21	Resurfacing	$3,666,667	235	79	288
22	Resurfacing	$3,682,564	365	111	408
23	Resurfacing	$3,949,000	365	110	436
24	Resurfacing	$4,871,000	295	71	344
25	Resurfacing	$5,101,697	97	47	242
26	Resurfacing	$9,144,400	410	48	437
27	Resurfacing	$11,546,802	190	26	302
28	Safety Project	$423,000	135	355	150
29	Safety Project	$770,118	270	527	406
30	Safety Project	$2,162,387	230	170	367
31	Sidewalk	$898,650	180	246	221
32	Toll Plaza	$4,234,300	300	76	320
33	Widen/Resurface Existing Lanes	$998,999	180	215	215
34	Widen/Resurface Existing Lanes	$2,126,447	240	129	275
Average		**$4,830,495**	**294**	**142**	**360**

Table 3-25. Selected Traditional Design-Bid-Build Projects

No.	Work Mix	Original Contract Amount	Original Contract Days	Design Duration (Days)	Equivalent Average Design and Construction Duration per $1M (Days)	Total Design and Construction Duration (Days)
1	Access Improvement	$3,462,851	150	651	256	888
2	Add Lanes and Reconstruct	$8,966,667	465	785	162	1449
3	Add Lanes and Reconstruct	$13,308,082	720	476	112	1486
4	Add Lanes and Rehab. Pavement	$31,303,338	883	817	69	2167
5	Add Turn Lane(s)	$7,083,783	250	532	108	762
6	Bike Path/Trail	$3,108,695	270	477	284	883
7	Bridge Repair/Rehabilitation	$1,482,588	125	140	142	211
8	Bridge Repair/Rehabilitation	$2,051,400	400	308	374	768
9	Bridge Repair/Rehabilitation	$2,765,162	250	824	453	1252
10	Bridge Repair/Rehabilitation	$7,880,148	770	420	135	1062
11	Interchange (Minor)	$1,488,140	180	746	661	983
12	Lighting	$1,375,838	270	292	443	609
13	Miscellaneous Construction	$891,760	270	214	543	484
14	Miscellaneous Construction	$3,673,258	460	612	309	1134
15	Pedestrian Overpass	$1,852,310	210	265	286	529
16	Pedestrian Overpass	$2,283,379	255	752	447	1020
17	Rest Area	$8,295,738	420	796	164	1358
18	Resurfacing	$412,775	45	277	673	278
19	Resurfacing	$811,235	80	304	512	415
20	Resurfacing	$2,747,697	215	819	381	1048
21	Resurfacing	$3,639,384	140	889	288	1047
22	Resurfacing	$3,689,333	370	476	210	775
23	Resurfacing	$3,961,454	235	990	329	1302
24	Resurfacing	$4,816,274	210	806	235	1131
25	Resurfacing	$5,198,975	320	262	120	624
26	Resurfacing	$9,048,694	210	427	87	784
27	Resurfacing	$12,122,751	335	864	119	1448
28	Safety Project	$543,381	60	299	805	430
29	Safety Project	$1,036,990	90	306	415	430
30	Safety Project	$2,097,818	140	499	351	737
31	Sidewalk	$717,803	100	1101	1725	1238
32	Toll Plaza	$3,598,000	397	579	354	1274
33	Widen/Resurface Existing Lanes	$1,001,430	190	907	1137	1139
34	Widen/Resurface Existing Lanes	$2,552,208	180	353	216	551
Average		**$4,684,128**	**284**	**567**	**379**	**932**

Table 3-26. Other Design-Build Projects

No.	Work Mix	Original Contract Amount	Original Contract Days	Equivalent Average Design and Construction Duration per $1M (Days)	Total Design and Construction Duration (Days)
1	Add Lanes and Reconstruct	$72,755,000	900	13	936
2	Add Lanes and Rehab. Pavement	$13,960,000	400	36	501
3	Add Lanes and Rehab. Pavement	$16,900,000	420	33	558
4	Add Lanes and Rehab. Pavement	$4,469,600	424	3	14
5	Add Thru Lane(s)	$57,700,000	825	17	978
6	Adv Traveler Info. System	$1,016,599	280	404	411
7	Bike Path/Trail	$6,962,971	570	106	741
8	Bridge Replace and Add Lanes	$81,520,000	1065	18	1444
9	Bridge Replace and Add Lanes	$101,930,000	1090	15	1528
10	Const/Expand Admin Facility	$2,795,095	540	223	623
11	Construct High-level Bridge	$25,546,600	1299	62	1585
12	Critical Habitats	$1,749,000	345	199	348
13	Drainage Improvements	$10,977,000	260	23	250
14	Drainage Improvements	$3,883,346	280	134	519
15	Its Communication System	$4,843,470	365	81	392
16	Its Freeway Management	$1,345,600	400	323	435
17	Its Surveillance System	$3,500,000	385	115	402
18	Its Surveillance System	$5,999,926	585	142	852
19	Landscaping	$1,305,899	290	242	316
20	MCCO Weigh Station Static/WIM	$2,906,170	421	255	742
21	Miscellaneous Construction	$4,160,892	340	82	343
22	Pedestrian Overpass	$1,220,544	180	230	281
23	Pedestrian Overpass	$14,811,268	641	45	670
24	Replace High-level Bridge	$71,675,000	1547	25	1814
25	Replace Movable-span Bridge	$56,295,000	873	11	637
26	Rest Area	$13,167,000	460	47	614
27	Resurfacing	$15,130,390	540	43	657
28	Traffic Control Devices/System	$667,677	375	813	543
29	Traffic Signal Update	$6,470,000	515	90	584
30	Urban Corridor Improvements	$2,834,000	300	63	179
31	Urban Corridor Improvements	$2,990,013	310	117	349
32	Welcome Station	$5,865,805	542	94	551
33	Widen Bridge	$19,277,000	600	29	555
34	Widen Bridge	$52,983,000	891	13	709
Average		**$20,282,761**	**566**	**122**	**649**

Table 3-27. Estimated Time Value Contribution of Design-Build Projects

		Total Design and Construction Duration (Days)				**Estimated Time Savings (Days)**	
		Design-Build		**Traditional DBB**			
Projects	Number	Average	Total	Average	Total	Average	Total
Selected Projects for Evaluation	34	360	12,252	932	31,696	-572	-19,444
Other Projects	34	649	22,061	1,679	57,072	-1,030	-35,011
Total	68	504	34,313	1,306	88,768	-801	-54,455

Chapter Four: Input from Project Participants

Information Gathering

Interviews were conducted with FDOT construction personnel from six FDOT districts. CEI consultants from most of the same districts as well as contractor personnel were also interviewed. All of those interviewed had been a project manager on at least one but no more than six projects and had used an innovative contracting method. In general, the respondents had overseen an average of 3-4 projects each, most of which used more than one innovative contracting method (i.e. A+B, I/D, DB, and no excuse bonuses). In general, interviewees were asked what they liked or did not like about the various alternative contracting methods. Additionally, they were asked to offer suggestions for improvement. A list of the comments received is provided in Appendix F.

A+B Contracts

The districts have had substantial experience with A+B contracts and, in terms of effectiveness of the method, the reviews are mixed and almost split evenly. Personnel interviewed from three districts were concerned that "games are being played" with the "B" (time) part of the equation. It seems that, in the opinion of these interviewees, not much time is saved when using this method because contractors bid the "A" part as they always would, and they bid the "B" part low to get the job. Personnel from other districts report positive experiences using A+B contracts. One engineer said that if the "B" component (as bid) was less than the FDOT official estimate and the contractor met this contract time amount, the A+B contract was successful – even if the time savings was only one day. Personnel at another district who liked the concept said that A+B contracts work best in conjunction with I/D clauses.[3] Personnel at another district who liked A+B contracts said they work great when used in conjunction with a bonus (this district reported a 30% cost savings and an 8% time savings when A+B contracts and bonuses were combined). In fact, a large proportion of A+B projects discussed also included other innovative contracting measures. Most of those interviewed agreed that project type, project cost, project duration, project location, and time of year were important factors when considering the use of A+B

[3] I/D provisions are required and always included for all A+B projects in Florida.

contracts. Numerous project managers noted that hurricane season can impact an A+B contract.[4] More specific comments are provided in Appendix F.

Incentive/Disincentive

As with A+B contracts, there was substantial interviewee experience with I/D contracts. While most of this experience involved the use of I/D clauses in conjunction with other innovative methods, I/D contracts were also used alone. Most of those interviewed agreed that project type, project cost, project duration, project location, and time of year were important factors when considering the use of I/D contracts. Recommendations were made for projects over $10 million, projects of longer duration, and interstate projects. Rural projects were only recommended if they had a high traffic volume. A number of project managers recommended caution when using I/D contracts near hurricane season.[5] For similar reasons to A+B contracting, I/D clauses seemed to work best when used on large, interstate, or high-volume rural projects.

The interviewees strongly cautioned that the administration of both I/D and A+B contracts were adversely and severely impacted by delays of any sort that were out of the contractor's control. When the contractor strives to create the highest production possible to meet the "B" requirement of the A+B contract, or earn the incentive on an I/D project, any delay could put a strain on the contractor/owner relationship.

The proximity of alternative routes should be considered when deciding whether to use I/D contracts. One interviewee reported that the roadway being constructed, while busy, was not as crucial as first thought due to the proximity of a great alternative route. Motorists simply selected the other route and the contractor had few maintenance of traffic (MOT) problems. Almost all interviewed personnel agreed that I/D clauses did not save effort or cost in CEI when

[4] Hurricane season occurs annually making it impossible to avoid for projects with a year or longer duration. However, approximately 60% of FDOT construction projects have less than 6 months of original contract duration and approximately 73% of FDOT construction projects have less than 9 months of original contract duration. Particularly, approximately 15% of A+B projects have less than 6 months of original contract duration and approximately 33% of A+B projects have less than 9 months of original contract duration.

[5] Approximately 46% of I/D projects have less than 6 months of original contract duration and approximately 65% of I/D projects have less than 9 months of original contract duration.

compared to the traditional DBB system.[6] Some contractors objected to the FDOT policy of not applying excusable time delays to incentive milestone dates.[7] Additionally, some contractors felt that incentives did not work well on paving projects. Paving projects were particularly vulnerable to weather delays including rain and seasonal low temperatures. The current incentive policy provides almost no relief for these delays.

Design-Build

The DB, or design-construct, construction project delivery system has been used by FDOT for longer than any other innovative contracting method, with the exception of I/D clauses. Nonetheless, experiences with DB projects among the districts vary greatly. Some districts have had little to no experience with the system and some districts have had extensive experience executing DB contracts. All but one of the interviewees had participated in one or more DB projects.

There was a wide range of opinions about what projects were best suited for DB perhaps due to how FDOT uses DB on a wide range of projects. A number of successful large and high-profile DB projects prompted the interviewees to state that DB is appropriate for large projects. A few engineers, however, stated that it performs best on smaller projects – especially small bridges. There was a general consensus that DB performs well for bridges, and several interviewees mentioned success with vertical construction.

This delivery system was very sensitive to potential delays, as any "fast-track" system would be. Most respondents warned against the use of DB contracts for projects that may run up against right-of-way or utilities problems. Contractors also objected to being responsible for utility relocation in DB projects. Contractors felt that they have little control over utility pricing or timing. Additionally, some DB contractors expressed concern about disputes with FDOT over design acceptability even after a review of the design by FDOT.

It was a near-unanimous opinion that, when compared to the traditional DBB delivery system, DB projects offered the benefit of a better relationship between the contractor and FDOT. Some pointed out that the relationship between FDOT and the design professional was not as good

[6] The project performance evaluation of this study does not support this opinion.
[7] Even with the possibility of delays, contractors achieved incentives more than 50% of the time.

under a DB contract as under a DBB contract.[8] Most, though not all, of those interviewed said they believed that the administration of a DB project is the same as for a DBB contract. One noted advantage of DB over DBB is that it is much easier to close out a project with an accurate and complete set of "as-built" drawings because the designer is part of the process up until the end of construction. A disadvantage of DB, as pointed out by several interviewees, is that the DB firm (or team), which includes both the designer and the constructor, can "sit" on problems while they try to solve them internally, leaving FDOT in the unenviable position of not knowing the details or activities of their own project. In summary, the interviewees were positive about DB projects. But at least one contractor expressed concern over the potential cost of warranties that are often included in the DB projects.

No Excuse Bonuses

Most districts have experience with no excuse bonuses (Bonus), but opinions about them varied substantially. Personnel from one district reported encountering bad experiences with this method while personnel from other districts thought them affective if administered properly. Most interviewees believed that the Bonus method should only be used when there is a definite and tangible reason to have a "drop-dead" date by which the project should be finished. Interviewees indicated that several factors should be considered when using no excuse bonuses. These factors are the size of the bonus, the type of bonus (all or nothing versus graduated), and the project type.

The large majority of interviewees stated that the bonus works only when the bonus is high enough to give the contractor sufficient incentive to expend the resources to finish early enough to earn the bonus. Contractors also felt that high bonuses made dealing with FDOT project engineers difficult with regard to time issues. Several felt that time extension decisions were no longer being made at the project level.[9]

[8] DB projects produced superior time performance. The performance data does not suggest relationship issues.
[9] Normally time issues are negotiated at the project level with approval being made at the district level. The inference is that I/D pressure may be an obstacle to project level discussions of time issues.

The majority of those interviewed preferred a graduated bonus over an all-or-nothing bonus. The proponents of the graduated bonus (the majority of those interviewed) have all experienced a project in which a contractor missed or appeared to have little chance of achieving the bonus and ceased to expend the extra resources required to finish the project ahead of schedule. A graduated incentive, they argued, continues to offer the contractor hope and usually the contractor will continue to strive to finish the project early in order to earn any portion of the bonus. Those opposed to the graduated (or daily) bonus contended that the daily bonuses were not of sufficient size to entice the contractor to expend the resources necessary to earn them.

In addition, the engineers in one district all agreed that perhaps it would be a good idea to have an I/D clause for the contract time after the date of the bonus to keep the contractor motivated throughout the contract in case he didn't get the bonus, but this method has not been employed. Most managers felt that all-or-nothing bonuses should be used only to meet specific event dates such as the Super Bowl.

The type of project (i.e., bridge, roadway, vertical) does not seem to be an issue with no excuse bonuses. However, all of those interviewed agreed that bonuses work best on projects with the following characteristics:

- large budgets
- long duration
- emergencies, high visibility, or high traffic volume
- can be built predominately outside the hurricane season (at a minimum, the part of the project for which the bonus is offered should be built outside of the hurricane season if possible. For a multi-year project, an attempt should be made to span as few hurricane seasons as possible).[10]

Two engineers noted that they were involved with no excuse bonus projects that were successful in terms of the innovative contracting mechanisms, but were poor choices of projects

[10] Hurricane season occurs annually making it impossible to avoid for projects with a year or longer duration. However, approximately 30% of bonus projects have less than 6 months of original contract duration and approximately 44% of bonus projects have less than 9 months of original contact duration.

due to low traffic volumes. Contractors suggested that incentives and bonuses be used on bridge projects rather than paving projects.

Lump Sum

Lump sum contracting use was the most divisive issue discussed with district construction personnel. We found viewpoints from both extremes. Engineers from one district preferred it to all other construction project delivery systems, while engineers from another district thought it should be banned from transportation construction projects.

Most agree that the system works well on projects for which risks are well defined, such as vertical construction, signalization, landscaping, and most projects with minimal earthwork. Furthermore, contract administration is much easier on a lump sum contract when compared to the traditional DBB unit price contract as long as the plans are good and the right sort of project is chosen for its use.

There was also consensus that a lump sum contract has no real affect on the relationships between the project entities. However, some said that if an appropriate project is not selected, the lump sum contract is difficult to administer because "it is so hard to pay for changes." Contractors suggested adding some pay items to lump sum jobs for any work for which quantity may be difficult to determine or for which there may be quantity changes during construction. Additionally, contractors stressed the importance of having a complete, high-quality design for lump sum projects.

Summary

The opinions of project personnel concerning alternative contracting are based on personal experience. Projects are unique and the success or failure of a contracting method is influenced by individual project characteristics and contractor performance. Additionally, a project manager may have limited experience with innovative contracting methods because projects take months or years to complete and innovative methods are not used on every project. **Their opinions are based upon their individual experience which is not always representative of the overall program.** For example, several engineers believed that A+B contracting was not successful yet

the quantitative analysis reported in this study found that the use of A+B contracting saved 11,154 project days. Furthermore, several contractors believed that bonuses were rarely achieved because of weather and other unavoidable risks; however, analysis of our project data indicated that contactors achieved bonuses 86.7% of the time on A+B with bonus contracts and 68.3% of the time on bonus contracts. Nevertheless, the opinions and experiences of project participants, whether they are with FDOT/CEI or they are contractors, are important. These participants can contribute valuable information that is essential to the management of any alternative contracting program.

Chapter Five: Discussion of Research Results

The Affect of the Contracting Method on Project Performance

Individual project outcomes are influenced by many factors making it difficult to make project-to-project comparisons. Among the most significant we found were: project type, project size, location, contractor, and project team. Essentially, each project is unique; however, with a sufficient number of projects the affect of one factor can be determined. Fortunately, in this case, we were able to obtain data on a large population of projects.

The results of this study clearly demonstrate that the choice of project delivery method affects project performance. Significant differences in project performance were found between alternative contracting methods and traditional DBB contracting methods. **For example, the time growth during construction for alternative contacting was approximately 25% of the time growth of traditional DBB contracting projects.** With lump sum contracting, cost growth during construction was 1.54%, approximately 16% of the cost growth of traditional DBB contracting projects.

Individual project factors, however, can have a dominant affect on project outcome. This study found that project results for high-level bridges and movable-span bridges were highly variable. The project sample size was very small compared to other groups. Additionally, further investigation into the project histories indicated that the outcomes were strongly influenced by the unique situations on each project rather than the choice of project contracting type.

With regard to improving project time performance, DB clearly produced the most time savings. A+B, A+B with bonus, and Bonus contracting produced the greatest time savings during construction.

Recommendations

The research team offers the following recommendations based on what has been learned in this study.

1. FDOT should publish and disseminate the results of this research. As has been noted, individual opinions are limited by individual experience. All participants must become aware of the objective performance evaluation results contained in this report. The

research team recommends that FDOT prepare a 2 to 3 page document summarizing the key findings of this study. This type of document should be distributed to district and project personnel throughout the FDOT work program. Additionally, a similar presentation should be added to the FDOT website.

2. Although the FDOT provides more detailed construction time and cost reports on its website than many other DOTs, a significant portion of the project performance data used in this study was difficult to obtain. FDOT should review and improve its information management systems to permit periodic updating of project performance information across the entire work program. More specifically, the following action items are suggested:

    a. FDOT management should determine the appropriate project performance information and the reporting format;
    b. FDOT Office of Information Systems should review current information systems and determine what modifications are required;
    c. Required modifications should be implemented.

3. The choice of an alternative contracting approach should be aligned with the project objectives. No excuse bonuses, milestone bonuses, or incentives are appropriate when a critical date exists. On the other hand, when early completion is desired and each day saved contributes value, a graduated bonus makes sense.

4. Lump sum projects place a higher demand on project design quality. FDOT should review its design development and procedures to determine if adjustments should be made for lump sum projects.

5. Clearly, alternative contracting has saved both time and money, allowing FDOT to do more with less. Alternative contracting should continue to play an important role in the FDOT work program.

6. FDOT should continue to seek input from project participants and give consideration to suggestions for improvement. FDOT routinely holds meetings with contractors and consultants at the district level. The subject of alternative contracting should be placed on the agenda. Input should be requested. Alternative contracting should also be a discussion item at the district construction engineers meetings.

Implementation of Results

The primary product of this study is a comprehensive report containing all data and analysis. The performance results should provide essential benchmarking information for FDOT managers. Additionally, information was gained from the project participants who suggested best practices for applying alternative contracting techniques. This input from experienced project managers

should prove valuable to FDOT program managers when considering improvements to its Alternative Contracting Program.

The performance evaluation summaries developed in this study would also appear to be appropriate for inclusion on the FDOT's Web site for greater distribution to interested parties.

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Appendix A: Summary of the Performance and Value Findings

Definition of Time and Cost Measurements

Cost Measurements

Difference between project award cost and FDOT official estimate cost:

$$Official\ Award\ Cost\ \Delta\% = \frac{\sum Award\ Cost - \sum FDOT\ Official\ Estimate\ Cost}{\sum FDOT\ Official\ Estimate\ Cost} \times 100 \quad (2)$$

Difference between project actual cost and project award cost:

$$Actual\ Cost = Actual\ Expenditure + Innovative\ Contracting\ Adjustments \quad (3)$$

$$Award\ Actual\ Cost\ \Delta\% = \frac{\sum Actual\ Cost - \sum Award\ Cost}{\sum Award\ Cost} \times 100 \quad (5)$$

Time Measurements

Difference between project award time and FDOT official estimate time:

$$Official\ Award\ Time\ \Delta\% = \frac{\sum Award\ Time - \sum FDOT\ Official\ Estimate\ Time}{\sum FDOT\ Official\ Estimate\ Time} \times 100 \quad (11)$$

Difference between project actual time and project award time:

$$Actual\ Time = Days\ Used - Weather\ Days \quad (12)$$

$$Award\ Actual\ Time\ \Delta\% = \frac{\sum Actual\ Time - \sum Award\ Time}{\sum Award\ Time} \times 100 \quad (14)$$

Table A-1. Yearly Alternative Contracting Performance Evaluation Summary

Yearly Alternative Contracting Performance Evaluation (Jan. 1998 - Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Year	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
1998	Alternative	25	-11.25%	26	-1.85%	26	-21.85%	26	9.97%
	Traditional	211	-0.02%	252	21.07%	249	-25.79%	252	13.79%
1999	Alternative	51	-4.34%	51	-8.30%	49	-18.85%	51	10.48%
	Traditional	276	-0.16%	286	17.66%	280	-17.43%	286	12.72%
2000	Alternative	70	-5.95%	71	-2.33%	66	-22.18%	71	15.18%
	Traditional	303	0.16%	309	18.79%	290	-13.93%	310	10.29%
2001	Alternative	108	-7.73%	137	7.84%	135	-14.62%	137	8.33%
	Traditional	209	-1.39%	256	22.50%	245	-9.31%	256	10.52%
2002	Alternative	157	-8.15%	209	4.19%	206	-13.73%	210	8.42%
	Traditional	200	0.06%	268	12.87%	265	-7.76%	268	5.15%
2003	Alternative	137	-6.45%	209	3.21%	206	-12.93%	209	8.22%
	Traditional	135	0.11%	193	9.75%	185	-7.13%	193	7.57%
2004	Alternative	125	-4.72%	183	7.41%	181	-6.27%	183	6.43%
	Traditional	106	0.00%	149	12.04%	143	-8.09%	149	8.51%
2005	Alternative	146	-3.98%	196	6.92%	194	-7.54%	196	7.25%
	Traditional	95	-0.79%	159	11.94%	156	-7.89%	159	4.20%
2006 (Jan. - Mar.)	Alternative	30	-3.04%	49	3.07%	48	-4.83%	49	1.89%
	Traditional	25	2.35%	35	18.17%	34	0.61%	35	2.05%
Totals	Alternative	849	-6.13%	1131	4.13%	1111	-11.84%	1132	8.04%
	Traditional	1560	-0.20%	1907	16.47%	1847	-13.40%	1908	9.36%

Note: A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-2. A+B Alternative Contracting Performance Evaluation Summary

A+B Alternative Contracting Performance Evaluation (Jan. 1998 – Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	A+B	20	-19.71%	21	5.32%	21	-15.97%	21	6.85%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
High-level Bridge	A+B	1	-33.33%	1	-4.40%	1	-10.16%	1	1.11%
	Traditional	2	0.00%	5	-2.04%	5	-39.03%	5	15.71%
Movable-span Bridge	A+B	2	-15.25%	2	65.71%	2	-24.82%	2	47.82%
	Traditional	1	0.00%	2	16.61%	2	4.77%	2	12.70%
Others	A+B	2	-42.70%	2	-25.75%	2	-38.23%	2	10.53%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	A+B	41	-18.80%	41	14.19%	41	-20.48%	41	6.61%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	A+B	19	-26.31%	19	15.72%	19	-20.20%	19	6.31%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Totals	A+B	85	-20.67%	86	13.21%	86	-20.12%	86	9.25%
	Traditional	1473	-0.22%	1795	15.14%	1739	-13.59%	1796	9.37%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	20	-2,592	-$7,732,928	$1,583,164	-$6,149,764
High-level Bridge	1	-289	-$1,311,781	$4,175,240	$2,863,459
Movable-span Bridge	2	679	$6,321,307	-$5,385,544	$935,763
Others	2	-673	-$1,368,435	-$3,296,663	-$4,665,097
Reconstruction	41	-6,786	-$35,603,864	-$98,046,774	-$133,650,638
Resurfacing and Paving	19	-1,494	-$2,869,922	-$7,703,483	-$10,573,405
Total	85	-11,154	-$42,565,623	-$108,674,059	-$151,239,682

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-3. A+B Bonus Alternative Contracting Performance Evaluation Summary

A+B Bonus Alternative Contracting Performance Evaluation (Jan. 1998 – Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	A+B Bonus	3	-36.23%	3	13.75%	3	-20.91%	3	8.49%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Movable Span Bridge	A+B Bonus	2	-19.53%	2	26.82%	2	-17.21%	2	17.17%
	Traditional	1	0.00%	2	16.61%	2	4.77%	2	12.70%
Reconstruction	A+B Bonus	16	-23.83%	16	0.44%	16	-24.39%	16	11.74%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	A+B Bonus	9	-25.92%	9	-5.07%	9	-16.94%	9	5.18%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Totals	A+B Bonus	30	-25.19%	30	3.98%	30	-22.02%	30	11.95%
	Traditional	1056	-0.22%	1247	17.09%	1213	-12.83%	1248	9.85%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	3	-878	-$7,016,773	-$3,288,931	-$10,305,704
Movable Span Bridge	2	-235	-$3,148,322	-$26,687,335	-$29,835,657
Reconstruction	16	-4,346	-$20,479,407	-$51,720,833	-$72,200,240
Resurfacing and Paving	9	-1,345	-$3,121,256	-$2,541,915	-$5,663,171
Total	30	-6,804	-$33,765,758	-$84,239,014	-$118,004,772

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-4. Bonus Alternative Contracting Performance Evaluation Summary

Bonus Alternative Contracting Performance Evaluation (Jan. 1998 - Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	Bonus	4	0.00%	7	5.19%	7	-1.32%	7	11.24%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Building and Non-road Facility	Bonus	1	0.00%	1	1.17%	1	-12.16%	1	7.39%
	Traditional	38	-0.01%	44	29.50%	43	-9.66%	44	10.29%
High-level Bridge	Bonus	2	0.00%	2	1.15%	2	-27.84%	2	17.36%
	Traditional	2	0.00%	5	-2.04%	5	-39.03%	5	15.71%
Movable-span Bridge	Bonus	1	0.00%	1	4.45%	1	-27.04%	1	8.06%
	Traditional	1	0.00%	2	16.61%	2	4.77%	2	12.70%
Others	Bonus	7	-0.05%	8	-13.57%	7	-6.52%	8	5.18%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	Bonus	49	-0.73%	49	2.09%	49	-17.40%	49	8.01%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	Bonus	63	-0.15%	73	-11.25%	72	-4.82%	73	5.12%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Technical Projects	Bonus	1	-5.80%	1	-24.84%	1	-35.70%	1	22.46%
	Traditional	49	-0.05%	68	42.00%	65	-10.50%	68	7.03%
Totals	Bonus	128	-0.49%	142	-3.02%	140	-15.74%	142	7.99%
	Traditional	1560	-0.20%	1907	16.47%	1847	-13.40%	1908	9.36%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	4	-165	-$362,899	$2,208,453	$1,845,555
Building & Non-road Facility	1	-295	-$2,519,449	-$1,613,946	-$4,133,395
High -level Bridge	2	19	$158,878	$12,087,753	$12,246,631
Movable-span Bridge	1	66	$902,758	-$27,316,435	-$26,413,677
Others	6	-232	-$476,201	$594,619	$118,418
Reconstruction	49	-4,022	-$15,009,220	-$57,301,874	-$72,311,094
Resurfacing and Paving	63	-2,170	-$4,812,646	$13,644,297	$8,831,651
Technical Projects	1	-239	-$729,231	-$1,351,820	-$2,081,051
Total	127	-7,038	-$22,848,008	-$59,048,954	-$81,896,962

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-5. Incentive/Disincentive Alternative Contracting Performance Evaluation Summary

Incentive/Disincentive Alternative Contracting Performance Evaluation (Jan. 1998 - Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	I/D	18	0.00%	26	-11.51%	26	0.23%	26	5.84%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Movable-span Bridge	I/D	1	0.00%	1	0.62%	1	-14.37%	1	5.86%
	Traditional	1	0.00%	2	16.61%	2	4.77%	2	12.70%
Others	I/D	15	-0.03%	17	-15.66%	17	18.92%	17	14.80%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	I/D	39	0.25%	41	6.38%	41	-5.70%	41	16.66%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	I/D	43	-0.52%	54	3.16%	54	-4.57%	54	9.04%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Technical Projects	I/D	5	5.77%	5	-26.55%	5	9.49%	5	-0.91%
	Traditional	49	-0.05%	68	42.00%	65	-10.50%	68	7.03%
Totals	I/D	121	0.05%	144	-0.32%	144	-3.11%	144	12.46%
	Traditional	1520	-0.21%	1858	16.22%	1799	-12.44%	1859	9.14%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	18	-369	-$1,536,772	$11,639,677	$10,102,905
Movable-span Bridge	1	21	$178,388	-$10,089,214	-$9,910,826
Others	15	-361	-$767,478	$21,447,012	$20,679,534
Reconstruction	39	-878	-$5,122,694	$37,471,544	$32,348,850
Resurfacing and Paving	43	-511	-$1,008,728	$12,871,678	$11,862,950
Technical Projects	5	-188	-$126,253	$187,135	$60,882
Total	121	-2,286	-$8,383,538	$73,527,832	$65,144,295

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-6. Lane Rental Alternative Contracting Performance Evaluation Summary

Lane Rental Alternative Contracting Performance Evaluation (Jan. 1998 – Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	Lane Rental	2	0.00%	4	17.62%	4	-14.42%	4	4.38%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Others	Lane Rental	2	0.00%	2	-46.00%	2	-1.70%	2	8.08%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	Lane Rental	5	0.00%	5	58.09%	4	-23.09%	5	21.39%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	Lane Rental	16	0.00%	16	2.74%	15	-17.24%	16	-3.83%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Totals	Lane Rental	25	0.00%	27	23.69%	25	-19.07%	27	7.20%
	Traditional	1470	-0.22%	1788	15.38%	1732	-12.61%	1789	9.14%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	2	-75	-$159,399	-$533,042	-$692,441
Others	2	-86	-$59,925	$83,233	$23,308
Reconstruction	4	268	$907,415	-$971,430	-$64,014
Resurfacing and Paving	15	-289	-$534,156	-$7,172,553	-$7,706,709
Total	23	-181	$153,935	-$8,593,792	-$8,439,856

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-7. Liquidated Savings Alternative Contracting Performance Evaluation Summary

Liquidated Savings Alternative Contracting Performance Evaluation (Jan. 1998 - Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	Liq. Savings	6	0.00%	7	6.46%	7	1.62%	7	8.48%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Others	Liq. Savings	3	0.00%	4	-32.76%	3	15.64%	4	29.50%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	Liq. Savings	32	0.00%	32	-0.14%	30	-11.62%	32	15.19%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	Liq. Savings	42	-0.02%	43	-5.03%	41	-4.24%	43	6.30%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Totals	Liq. Savings	83	-0.01%	86	-1.75%	81	-8.27%	86	12.19%
	Traditional	1470	-0.22%	1788	15.38%	1732	-12.61%	1789	9.14%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	6	121	$204,145	$3,805,726	$4,009,871
Others	2	26	$37,519	$1,327,650	$1,365,168
Reconstruction	30	-297	-$1,091,253	$10,090,184	$8,998,931
Resurfacing and Paving	40	-404	-$844,179	$9,923,301	$9,079,123
Total	78	-554	-$1,693,768	$25,146,861	$23,453,093

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-8. Lump Sum Alternative Contracting Performance Evaluation Summary

Lump Sum Alternative Contracting Performance Evaluation (Jan. 1998 - Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	Lump Sum	13	0.00%	59	-5.76%	55	-10.99%	59	-2.90%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Building and Non-road Facility	Lump Sum	2	0.00%	2	-7.78%	2	-5.99%	2	2.71%
	Traditional	38	-0.01%	44	29.50%	43	-9.66%	44	10.29%
Others	Lump Sum	127	1.67%	164	8.38%	163	-11.53%	165	-0.46%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	Lump Sum	25	0.00%	59	5.87%	58	-5.64%	59	2.95%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	Lump Sum	173	-0.05%	211	8.40%	211	-9.56%	211	1.81%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Technical Projects	Lump Sum	32	0.00%	53	9.14%	50	-5.17%	53	4.30%
	Traditional	49	-0.05%	68	42.00%	65	-10.50%	68	7.03%
Totals	Lump Sum	372	0.39%	548	6.89%	539	-9.35%	549	1.54%
	Traditional	1557	-0.20%	1900	16.71%	1840	-12.46%	1901	9.15%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	13	-253	-$392,791	-$1,732,124	-$2,124,914
Building and Non-road Facility	2	-122	-$128,250	-$26,498	-$154,749
Others	126	-47	$323,044	-$3,860,766	-$3,537,723
Reconstruction	25	-84	-$411,063	-$778,476	-$1,189,539
Resurfacing and Paving	173	-1,766	-$3,266,282	-$8,062,677	-$11,328,960
Technical Projects	30	-1,357	-$2,499,531	$2,179,366	-$320,166
Total	369	-3,629	-$6,374,874	-$12,281,176	-$18,656,050

*Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Table A-9. Design-Build Alternative Contracting Performance Evaluation Summary

Design-Build Alternative Contracting Performance Evaluation (Jan. 1998 - Mar. 2006)									
		Time				**Cost**			
		Award Time vs. Official Est. Time		**Actual Time vs. Award Time**		**Award Cost vs. Official Est. Cost**		**Actual Cost vs. Award Cost**	
Project Type Category	**Contract Type Category**	**Number of Projects**	**Official Award Time Δ %**	**Number of Projects**	**Award Actual Time Δ %**	**Number of Projects**	**Official Award Cost Δ %**	**Number of Projects**	**Award Actual Time Δ %**
All Other Bridges	D/B	N/A	N/A	12	2.51%	12	11.63%	12	4.76%
	Traditional	198	-0.23%	299	10.48%	287	-15.01%	299	5.48%
Building and Non-road Facility	D/B	2	0.00%	6	23.23%	6	0.26%	6	5.24%
	Traditional	38	-0.01%	44	29.50%	43	-9.66%	44	10.29%
High-level Bridge	D/B	1	0.00%	2	17.36%	2	0.00%	2	11.19%
	Traditional	2	0.00%	5	-2.04%	5	-39.03%	5	15.71%
Movable-span Bridge	D/B	N/A	N/A	1	-27.03%	N/A	N/A	1	2.48%
	Traditional	1	0.00%	2	16.61%	2	4.77%	2	12.70%
Others	D/B	N/A	N/A	14	10.95%	14	13.60%	14	2.22%
	Traditional	415	-0.22%	543	8.54%	521	-7.01%	543	0.03%
Reconstruction	D/B	N/A	N/A	10	-0.75%	10	-0.57%	10	1.76%
	Traditional	327	-0.37%	385	19.79%	381	-13.92%	385	13.60%
Resurfacing and Paving	D/B	1	0.00%	16	5.46%	15	-6.83%	16	4.77%
	Traditional	530	-0.03%	561	17.89%	543	-10.16%	562	4.43%
Technical Projects	D/B	1	0.00%	7	14.29%	7	-2.27%	7	5.39%
	Traditional	49	-0.05%	68	42.00%	65	-10.50%	68	7.03%
Totals	D/B	5	0.00%	68	7.08%	66	3.72%	68	4.45%
	Traditional	1560	-0.20%	1907	16.47%	1847	-13.40%	1908	9.36%

		Estimated Value Contribution			
		Time		**Cost**	**Total**
Project Type Category	**Number of Projects**	**Estimated Total Saving Time Difference (Days)**	**Estimated Total Saving Cost by Time Difference ($)**	**Estimated Total Saving Cost Difference ($)**	**Estimated Total Savings ($)**
All Other Bridges	6	-3,526	-$7,825,192	N/A	-$7,825,192
Building and Non-road Facility	2	-1,695	-$4,595,779	N/A	-$4,595,779
Others	8	-5,098	-$8,258,364	N/A	-$8,258,364
Reconstruction	5	-6,350	-$28,683,576	N/A	-$28,683,576
Resurfacing and Paving	13	-7,344	-$16,669,163	N/A	-$16,669,163
Total	34	-24,014	-$66,032,073	N/A	-$66,032,073

* Savings achieved with alternative contracting rather than the traditional DBB method. A negative number indicates "*savings*" and a positive number indicates "*overruns*."

Appendix B: Description of FDOT Alternative Contracting Methods

Alternative Contract Types Used in Florida

The *Alternative Contracting User's Guide* (1997), which is used by FDOT, states that incentives may be paid for the following contracting practices: no excuse bonuses, A+B, I/D, liquidated savings, DB, lane rental, or any combination of these practices. The characteristics of various alternative contracts can be divided into two groups, incentive proposed and no incentive proposed. Figure A-1 shows all FDOT construction contract types collected in this study.

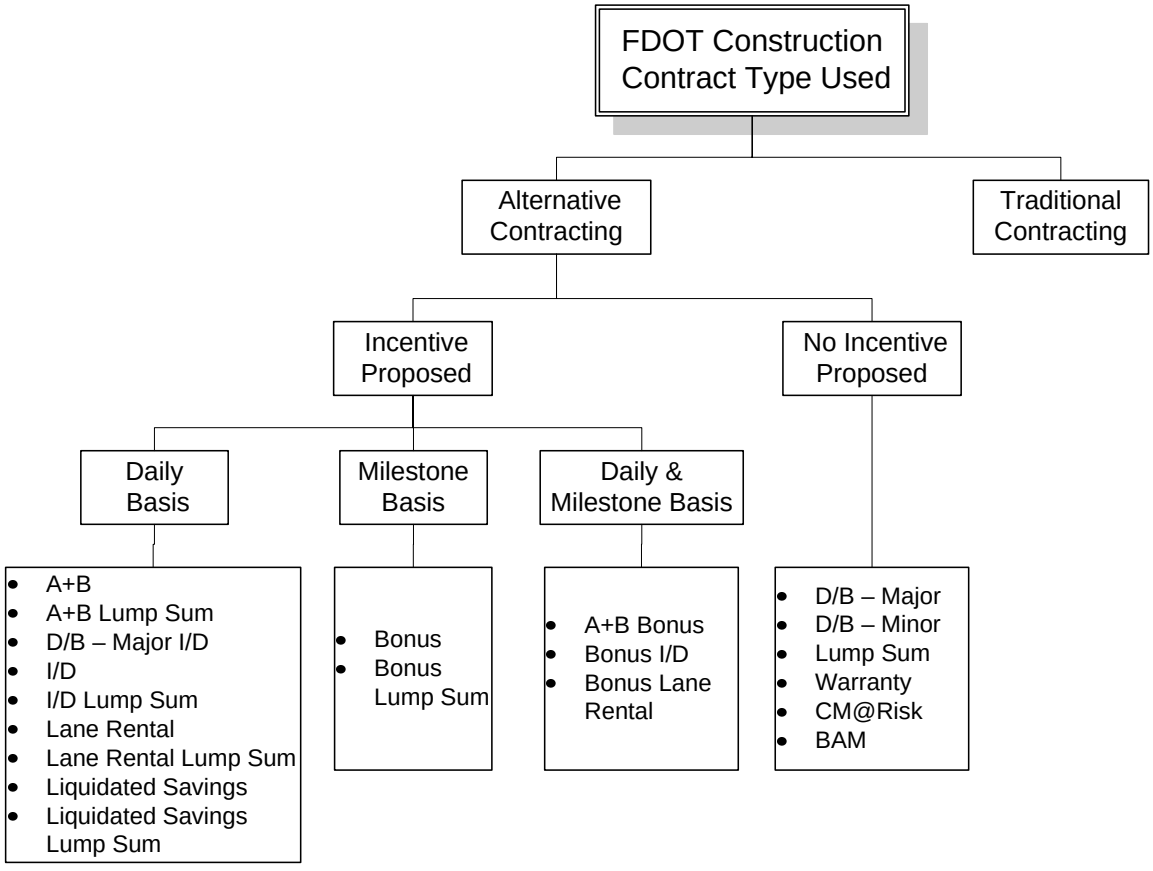

Figure B-1. Diagram of FDOT Construction Contract Types Used

Description of Alternative Contracts

The *Alternative Contracting User's Guide* (1997) describes incentive contracting methods as follows:

- **A + B**: The A + B bidding concept is designed to shorten the total contract time by allowing each contractor to bid the number of days in which the work can be accomplished. The A+B specifications includes an I/D clause, with the amount being equal to the time bid amount, to encourage the contractor to further reduce the time to complete a project. The contractor will receive an incentive for each day work that the project is completed ahead of the contractor's adjusted contract time. Conversely, if the contractor completes the project late, the disincentive as well as liquidated damages will be assessed per the contract.

- **Incentive/Disincentive (I/D)**: The I/D concept is designed to reduce the overall contract time by giving the contractor a financial reward for every day the contract is completed early. The I/D technique can also be used to accomplish milestones within the project.

- **Bonus**: The bonus concept is designed to provide the contractor with a substantial incentive to complete a project within a specified time frame regardless of any problems or unforeseen conditions that might arise. It is intended to shorten the construction time that would normally be required to perform the work. The contract may include two dates, the bonus date and the normal contract time date. If the bonus date is not met, the contractor will not receive the bonus; however, the contractor will be granted weather days and time extensions as per our normal processes.

- **Liquidated Savings**: The liquidated savings concept is the opposite of the existing liquidated damages. The intent of liquidated savings is to encourage the contractor to finish a project early. The contractor will be rewarded for each calendar day the contract is completed and accepted before the allowable contract time expires. The amount of incentive of reward will be based on the direct savings to the Department (and thus the public) in terms of the construction engineering inspection and contract administration costs.

- **Lane Rental**: The lane rental concept involves the contractor being assessed a fee for each time period in which a lane is closed to traffic. Like cost-plus-time bidding, the goal of the lane rental concept is to encourage contractors to minimize road-user impacts during construction.

- **Design-Build (DB)**: The DB concept is designed to combine the design and construction phases of a project. The result is a greatly reduced time frame from "concept to concrete," fewer claims, and significant reduction in overruns. The DB can also include other techniques such as A+B bidding, no excuse bonuses, and/or I/D.

- **Lump Sum**: The lump sum bidding technique is designed to reduce quantity overruns as well as the costs associated with contract administration. It allows construction personnel to spend more time on inspection and less time on paperwork.

Application of Alternative Contracts

The *Alternative Contracting User's Guide* (1997) recommends applying incentive contracts as follows:

- **A + B**: This technique is best used on projects for which a shortened contract time is important but not necessarily critical. Urban reconstruction and bridge projects are generally good candidates. A + B bidding focuses the contractor on completing the whole project in a timely manner.

- **Incentive/Disincentive (I/D)**: This concept can be used on a wide variety of project types and is best applied when the Department is willing to pay the contractor to expedite the work in order to reduce the contract time. It is similar to the A + B contract in that it works well with urban reconstruction and bridge-type projects.

- **Bonus**: This technique can be applied to a wide variety of project types for which completing the project/milestones by a particular date (i.e., a major sporting event) or within a specified time frame (number of calendar days once project begins) is important.

- **Liquidated Savings**: This concept can be used in a variety of project types. It may be best suited for mill and resurface projects since the Department has experienced some problems with contractors moving off projects once the major items of work (i.e. asphalt) are done.

- **Lane Rental**: This technique is best used with projects for which minimizing lane closure time is important. Milling and resurfacing, box culvert extensions, and bridge widening projects make good candidates.

- **Design-Build (DB)**: This concept can be used on a variety of projects ranging from simple box culvert replacement to more complex projects. Right-of-way and permitting needs provide the greatest challenges or barriers to using the DB process.

- **Lump Sum**: It is anticipated that this method will only be used on simple projects such as resurfacing, bike paths, box culvert extensions, and minor bridge widening.

Time Adjustment for Incentives

Alternative contracting user's guide (1997) stated that the time adjustments for incentives are as follows:

- **A+B**: Only chargeable work days are to be counted. For example, rain days and time extensions for unforeseen work will be added on to the contractor's time bid in accordance with standard practices.

- **Incentive/Disincentive (I/D)**: Only chargeable work days are to be counted. For example, rain days and time extensions for unforeseen work will be added on to the original contract time.

- **Bonus**: Bonuses differ from I/D clauses in that bonuses do not allow for any time extensions. They are tied to a drop-dead date (time frame) that is either met or not met. Unforeseen conditions, weather delays, and other such issues, which normally extend the contract time, are not a consideration when granting a bonus. Catastrophic events such as hurricanes allow for time extensions.

- **Liquidated Savings**: The contract time is adjusted for unforeseen conditions, extra work, and weather delays.

Appendix C: Alternative Contracting Evaluation Survey

Table C-1. Survey of DOT Evaluations of Alternative Contracting

No.	States	Evaluation			Comments
		Yes	No	Report	
1	ALABAMA		x		
2	ALASKA		x		
3	ARIZONA	X		Yes	A+B and Design-build time and cost report
4	ARKANSAS		x		
5	CALIFORNIA	X		Yes	Only A+B evaluation report obtained
6	COLORADO	X		Yes	SEP-14 required reports for A+B, design-build, warranty, and lane rental
7	CONNECTICUT		x		
8	DELAWARE		x		
9	GEORGIA		x		
10	HAWAII		x		
11	IDAHO		x		
12	ILLINOIS	X		No	No written documents
13	INDIANA		x		Developing indices for evaluation
14	IOWA		x		
15	KANSAS	X		No	No written documents
16	KENTUCKY		x		
17	LOUISIANA		x		
18	MAINE	X		Yes	SEP-14 required design-build report
19	MARYLAND		x		
20	MASSACHUSETTS		x		
21	MICHIGAN		x		
22	MINNESOTA	X		Yes	Comprehensive evaluation on A+B, incentive, lane rental, etc.
23	MISSISSIPPI		x		
24	MISSOURI	X		Yes	Evaluation report (requested)
25	MONTANA	X		No	No written documents
26	NEBRASKA		x		
27	NEVADA		x		
28	NEW HAMPSHIRE		x		

Table C-1. Continued

No.	States	Evaluation			Comments
		Yes	No	Report	
29	NEW JERSEY		x		
30	NEW MEXICO		x		
31	NEW YORK	x		Yes	A+B project evaluation summary report
32	NORTH CAROLINA		x		
33	NORTH DAKOTA		x		
34	OHIO	x		No	No written documents
35	OKLAHOMA		x		
36	OREGON	x		Yes	Design-build report, research project underway
37	PENNSYLVANIA	x		Yes	SEP-14 required design-build report
38	PUERTO RICO		x		
39	RHODE ISLAND	x		No	
40	SOUTH CAROLINA	x		Yes	SEP-14 required design-build report
41	SOUTH DAKOTA	x		Yes	Report on alternative contracting methods
42	TENNESSEE		x		
43	TEXAS		x		
44	UTAH	x		Yes	Design-build vs. traditional contracting for STIP projects
45	VERMONT		x		
46	VIRGINIA	x		Yes	Report on incentive/disincentive
47	WASHINGTON	x		No	A+B in-house informal evaluation
48	WEST VIRGINIA	x		Yes	Contractor's performance report
49	WISCONSIN		x		
50	WYOMING		x		

Appendix D: Boxplot Comparisons

Selected Projects for Design-Build Effectiveness Study

Boxplots, used for descriptive statistics, are shown in Figures D-1, 2, and 3. They are graphically depicting the five-number summary of a data set consisting of the minimum, the lower quartile (the lowest 25% of the data), the median, the upper quartile (the highest 25% of the data), and the maximum. A line dividing the box indicates the median value and the box contains 50% of the data between the lower and upper quartile. Figure D-1 illustrates that the mean duration for DB is 583 days and the mean duration for DBB is 1215 days. The average project cost for DB projects was $18.4 million and for DBB it was $18.9 million with six available observations as shown in Figure D-2. The statistical analysis on cost showed no significant difference in mean cost between DB and DBB projects. To compare the additional project cost per change order, 10 available samples were used. The difference for DB projects was 0.6% of the project costs and for DBB projects it was 6.0% of the project costs (see Figure D-3). The reported statistical analysis results showed that there were significant differences in the additional project cost per change order.

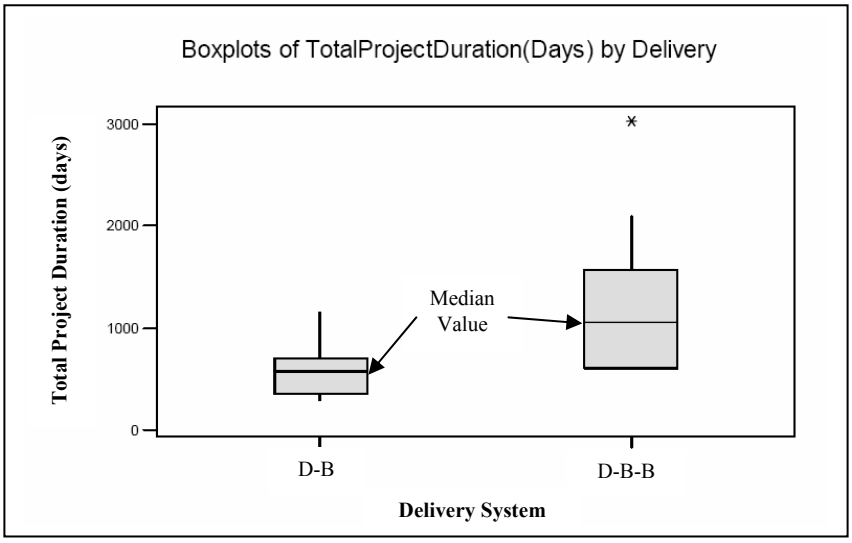

Figure D-1. Boxplots of Total Project Duration (in Days) by Delivery (FHWA 2006)

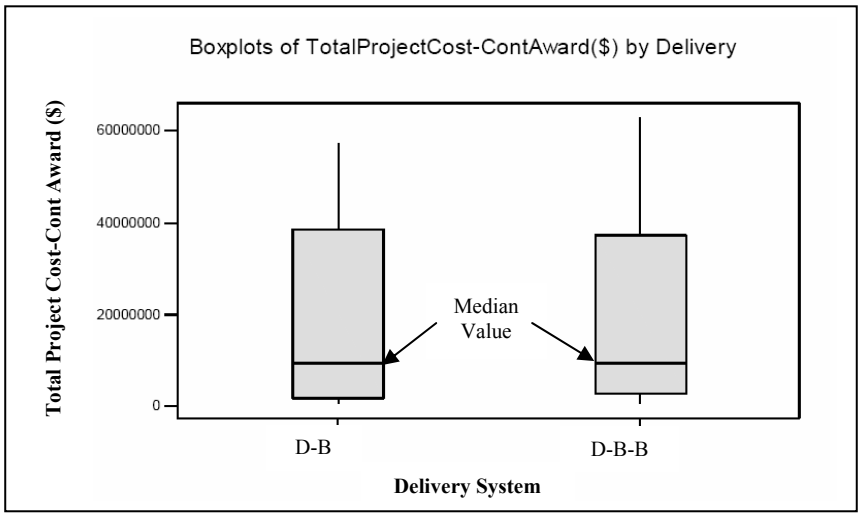

Figure D-2. Boxplots of Total Project Cost (by Contract Award) by Delivery (FHWA 2006)

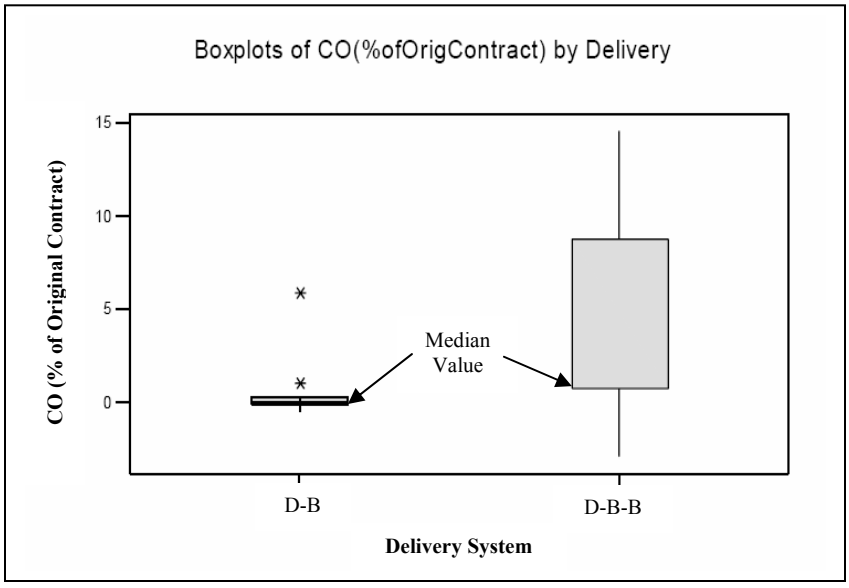

Figure D-3. Boxplots of Change Orders (As Percent of Original Contract Costs) by Delivery. (FHWA 2006)

Selected FDOT Design-Build and Traditional Design-Bid-Build Projects

Boxplots, used for descriptive statistics, are shown in Figures D-4, 5, and 6. They are graphically depicting the five-number summary of a data set consisting of the minimum, the lower quartile (the lowest 25% of the data), the median, the upper quartile (the highest 25% of the data), and the maximum. A line dividing the box indicates the median value and the box contains 50% of the data between the lower and upper quartiles. Boxplots for the original contract amounts for DB and traditional DBB are illustrated in Figure D-4. Project award duration ranged from 75 days to 794 days for DB and from 50 days to 883 days for traditional DBB. Boxplots for the original contract duration for DB and traditional DBB are illustrated in Figure D-5. Total project delivery duration including design and construction ranged from 75 days to 794 days for DB and from 211 days to 2325 days for traditional DBB. Boxplots for total project delivery duration for DB and traditional DBB are illustrated in Figure D-6.

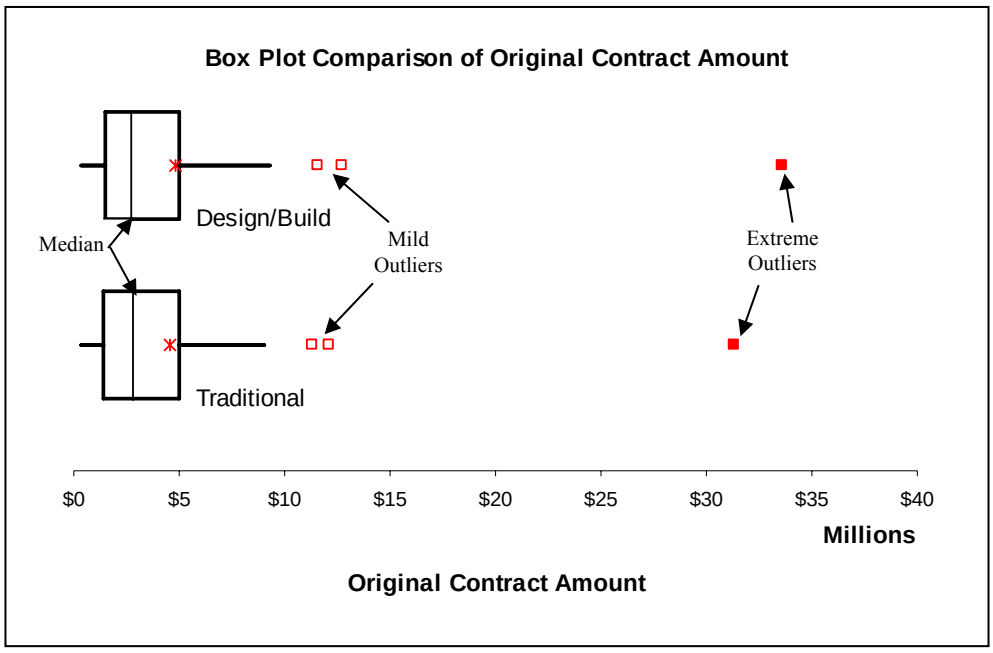

Figure D-4. Boxplots for Original Contract Amount for DB and Traditional DBB

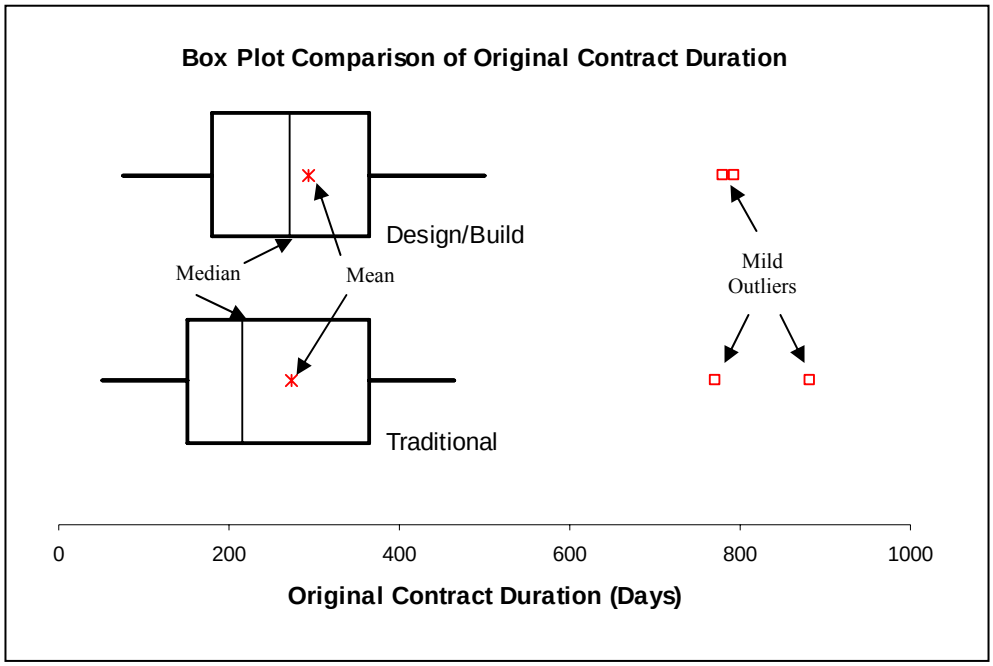

Figure D-5. Boxplots for Original Contract Duration for DB and Traditional DBB

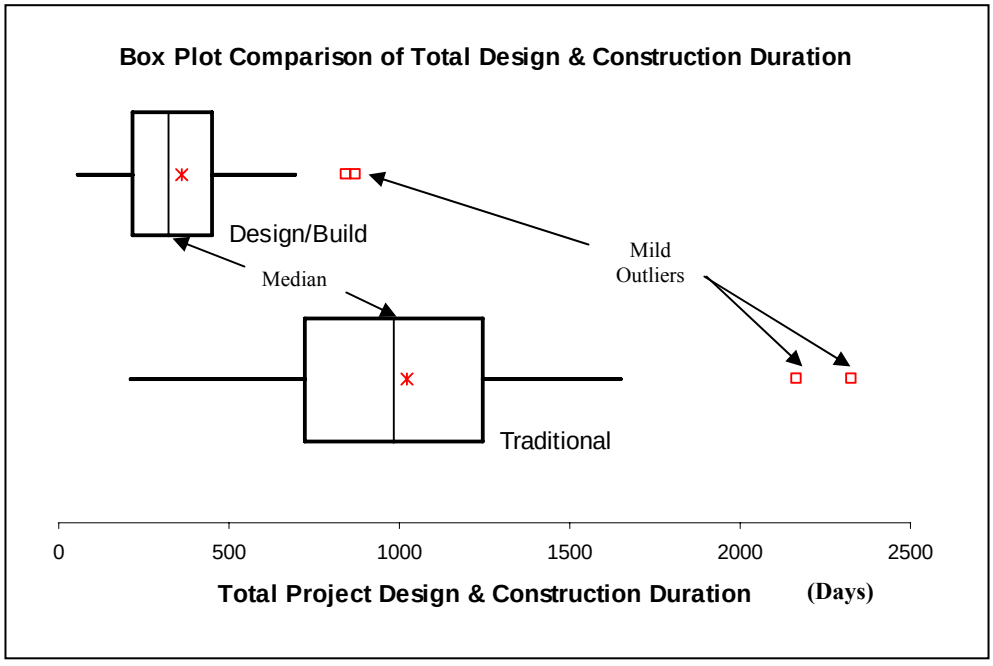

Figure D-6. Boxplots for Total Project Delivery Duration for DB and Traditional DBB

Appendix E: FDOT Contractor's Past Performance Report

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

CONTRACTOR'S PAST PERFORMANCE REPORT

700-010-25
CONSTRUCTION
11/03
Page 1 of 7

_____ (Contractor Name)	_____ (FIN Project No.)
_____ (Address)	_____ (County) _____ (Contract No.)
_____ (Final Contract Amount)	_____ (Type Of Work)
_____ (Proj. Administrator/Firm or Residency)	_____ (Date Final Accepted)

ANSWER ALL QUESTIONS

Performance	Maximum Value	Rated Value
1. Pursuit of the Work.	12	_____
2. Proper MOT and Minimize Impacts to Traveling Public	12	_____
3. Timely and Complete Submittal of Documents.	8	_____
4. Timely Completion of Project.	14/20 note # 4	_____
5. Coordination / Cooperation with CEI Personnel, Property Owners and Utilities Company.	10	_____
6. Mitigate Cost and Time Overruns	12	_____
7. Environmental Compliance	10/12 note # 4	_____
8. Conformance With Contract Documents.	20	_____
9. DBE Utilization	0/2 note # 4	_____
Total Score	98/108	_____

_____ **Project Administrator** (signature)	_____ Date	_____ **Resident Engineer** (signature)	_____ Date

CONTRACTOR PAST PERFORMANCE RATING

1. **Pursuit of The Work** - Contractor diligently and systematically pursues the work with sufficient labor, materials, and equipment at all times. Active progress is made on critical path items each day in accordance with the approved schedule. The contractor schedules the subcontractors so that they are pursuing their work as well. Contractor worked five (5) days a week unless the contract states otherwise, excluding weather days. Percent is based on allowable contract time (minus weather days) and on a five (5) workday week unless otherwise stated in the contract.

   12 The contractor aggressively pursued the work 90% of the days. Documentation in the project files by the CEI reveals that the progress of the work was unsatisfactory no more than 10%.

   9 The contractor aggressively pursued the work 80% of the days. Documentation in the project files by the CEI reveals that the progress of the work was unsatisfactory no more than 20%.

   6 The contractor aggressively pursued the work on at least 70% of the days. Documentation in the project files by the CEI reveals that progress of the work was unsatisfactory no more than 30%.

   3 The contractor aggressively pursued the work on at least 60% of the days. Documentation in the project files by the CEI reveals that progress of the work was unsatisfactory no more than 40%.

   0 The contractor did not aggressively pursue the work on at least 50% of the days. Documentation in the project files by the CEI reveals that progress of the work was unsatisfactory no more than 50%.

   Note: Grades between those shown will be based on an extrapolation of the actual percentage of the days the contractor aggressively pursued the work., i.e., 86% of the days would equate to a grade of 11. The status of performance in this category should be shared with the Contractor on a monthly basis.

2. **Proper MOT and Minimize Impacts to Traveling Public** - Provide maintenance of traffic (MOT) in accordance with all applicable standards. Coordinate construction operations that directly affect the traveling public so as to minimize impacts to the public. Effectively use the worksite Traffic Supervisor to monitor and correct deficiencies. The contractor takes the initiative to identify and fix MOT concerns in a timely manner.

   12 The contractor met all project requirements in all areas considered. The contractor corrected deficiencies promptly (maximum of 24 hours) based on timely internal reviews as well as external feedback. Contractor took immediate action, as appropriate, to minimize impacts to the public and businesses, including adjusting operations as necessary. No deficiency letter to the contractor by the CEI noting MOT deficiencies.

   10 No more than one (1) deficiency letter to the contractor by the CEI noting MOT deficiencies.

   8 No more than two (2) deficiency letters to the contractor by the CEI noting MOT deficiencies.

   6 No more than three (3) deficiency letters to the contractor by the CEI noting MOT deficiencies.

   4 No more than four (4) deficiency letters to the contractor by the CEI noting MOT deficiencies.

   2 No more than five (5) deficiency letters to the contractor by the CEI noting MOT deficiencies.

   0 Six (6) or more deficiency letters to the contractor by the CEI noting MOT deficiencies.

3. **Timely and Complete Submittal of Documents** - Contractor submits all required documents in a timely and accurate manner and with all the required information and detail. Documents include sublet requests, rental agreements, certification of materials, shop drawings, responses to correspondence, monthly certification, time extension requests, project schedules and schedule updates, claims for delay or extra work, quality control plans, test results, work plans, weekly MOT, NPDES reviews, etc. For EEO/DBE submittals, trainee submittals, certified payrolls, and statewide DBE utilization reporting, a deficiency letter will only be issued on these documents when a monthly estimate is actually withheld.

   8 The contractor submitted documents in a complete and accurate manner and in a time frame required in the contract.

   6 No more than one (1) deficiency letter to the contractor by the CEI documenting late or insufficient submittal documentation.

   4 No more than two (2) deficiency letters to the contractor by the CEI documenting late or insufficient submittal documentation.

   2 No more than three (3) deficiency letters to the contractor by the CEI documenting late or insufficient submittal documentation.

   0 Four (4) or more deficiency letters to the contractor by the CEI documenting late or insufficient submittal documentation.

4. **Timely Completion of Project** - The contractor completes the project in a timely manner.

   20 * The contractor finished the project within the original contract time. (no adjustments for weather)

   18 * The contractor finished the project within 90% of allowable contract time.

   16 * The contractor finished the project within 95% of allowable contract time.

   14 * The contractor finished the project within the allowable contract time.

   7 The contractor did not complete the project within the allowable contract time, but did finish the project in less than 10% over the allowable contract time.

   0 The contractor completed the project more than 10% over the allowable contract time.

   * 14 is the normal, expected standard because the vast majority of the projects finish within the allowable time. A score of up to 20 is a bonus, which recognizes that a contractor may have to work thru weather, utilities, added work, or other unforeseen conditions or delays.

5. **Coordination / Cooperation with Construction Engineering Inspection Personnel, Property Owners and Utilities Companies** - The contractor coordinates/cooperates with CEI personnel responsible for administration of the contract requirements and inspection of the work. The contractor coordinates/cooperates well with property owners, utilities companies, and adjacent projects throughout the contract. The contractor responds to third party damages in a timely manner.

   10 The contractor was cooperative and communicated well with the CEI, utility companies, and property owners, with very little direction from the Engineer. The contractor always gave advance notices to the CEI and utility companies (when work was in the vicinity of a utility), of work activities that required inspection. The contractor worked with the property owners to eliminate access problems for businesses and private property. No deficiency letter in the files by the CEI noting contractor's failure to cooperate/coordinate with the CEI, utility companies, and property owners. Contractor identified conflicts in advance, to allow timely resolution.

8 No more than one (1) deficiency letter by the CEI noting contractor's failure to coordinate/cooperate with the CEI, utility companies or property owners.

6 No more than two (2) deficiency letters by the CEI noting contractor's failure to coordinate/cooperate with the CEI, utility companies or property owners.

4 No more than three (3) deficiency letters by the CEI noting contractor's failure to coordinate/cooperate with the CEI, utility companies or property owners

2 No more than four (4) deficiency letters by the CEI noting contractor's failure to coordinate/cooperate with the CEI, utility companies or property owners

0 Five (5) or more deficiency letters by the CEI noting contractor's failure to coordinate/cooperate with the CEI, utility companies or property owners

6. **Mitigate Cost and Time Overruns** - The contractor takes the initiative and works diligently to avoid cost or time increases and to mitigate the effects of changed conditions whenever they do occur. Requests for additional money or time are well documented (complete and accurate), fair, and submitted timely.

12 The contractor worked diligently to avoid cost and time increases or to mitigate the effects of changed conditions. All requests for additional money or time were in good faith, accurate, timely, and well documented. If additional documentation is requested, it was promptly provided. No more than one (1) deficiency letter by the CEI noting contractor's failure to mitigate cost and time impacts.

9 No more than two (2) deficiency letters by the CEI noting contractor's failure to mitigate cost and time impacts.

6 No more than three (3) deficiency letters by the CEI noting contractor's failure to mitigate cost and time impacts.

4 No more than four (4) deficiency letters by the CEI noting contractor's failure to mitigate cost and time impacts.

0 Five (5) or more deficiency letters by the CEI noting contractor's failure to mitigate cost and time impacts.

7. **Environmental Compliance** - The contractor complied with all federal, state, and local environmental regulations, including permit requirements, National Pollutant Discharge Elimination System (NPDES), and the contract erosion control plan. Contractor takes the initiative to review environmental compliance and corrects deficiencies as necessary to minimize the affects on the environment. (*) Note: On projects over 300 days of allowable contract time, a bonus of 2 points will be given if the contractor did not receive any deficiency letters in this category.

10/12 * The contractor met all contract requirements in all areas considered. The contractor promptly (within 24 hours) identified and corrected all deficiencies. These areas were promptly and appropriately addressed to minimize adverse affects on the environment. No deficiency letter to the contractor by the CEI.

8 No more than one (1) deficiency letter to the contractor by the CEI.

6 No more than two (2) deficiency letters to the contractor by the CEI.

4 No more than three (3) deficiency letters to the contractor by the CEI.

2 No more than four (4) deficiency letters to the contractor by the CEI.

0 Five (5) or more deficiency letters to the contractor by the CEI.

8. **Conformance With Contract Documents** - The contractor ensured conformance to all contract requirements including quality of materials and workmanship of temporary as well as final products and services. Contractor provided sufficient supervision, management, and oversight to ensure quality control at all times. Contractor's efforts are such that the Department's CEI efforts are not essential to ensure quality.

20 Contractor worked diligently throughout the life of the project to provide quality products and services in accordance with the contract documents. Contractor personnel performed all quality controls, management, and oversight necessary to ensure quality. CEI personnel had documented quality control or contract performance concerns on (5% or less) of the chargeable workdays.

16 The CEI personnel had documented quality control or contract performance concerns on 10% of the chargeable workdays.

12 The CEI personnel had documented quality control or contract performance concerns on 15% of the chargeable workdays.

8 The CEI personnel had documented quality control or contract performance concerns on 20% of the chargeable workdays.

4 The CEI personnel had documented quality control or contract performance concerns on 25% of the chargeable workdays.

0 The CEI personnel had documented quality control or contract performance concerns on more than 25% of the chargeable workdays.

NOTES: A) Grades between those shown will be based on an extrapolation of the actual percentage of the days the contractor conformed with contract documents, i.e., 93% of the days would equate to a grade of 18.4 rounded to 18.0.

B) In order to track "conformance with the contracts documents", project personnel should document all deficiencies on the daily diary so as to have one location to find all the information. For instance, if the Department sends a letter to the contractor outlining a number of shortcomings, with shop drawing submitted, the daily should include a note that this letter was sent with documented concerns (i.e., the daily dairy entry could simply state: "Letter date 07/10/01 documents shop drawing deficiencies").

9. **Disadvantaged Business Enterprises (DBE) Utilization** – The contractor will receive 2 bonus points for achieving or exceeding the DBE availability percentage shown in the bid proposal. If no DBE availability percentage is shown in the bid proposal, the contractor will receive 2 bonus points for achieving 8% or more DBE utilization. In order to get credit for DBE utilization, the contractor must enter the information into the Department's Equal Opportunity Reporting tracking system.

Appendix F: Survey on Project Participants

Interviews were not recorded. The following comments were created from notes taken by interviewees and are not necessarily direct quotes.

FDOT Engineer and Construction Engineer Inpections

Comment 1: During the 5-year planning stage, the district construction engineer received data and opinions from the field and recommended which projects would be done using one of the alternative methods. Later, the 5-year plan was updated every year, modified, and changed. The input was based on experience and data from the database on results of past projects using alternative methods. The district tried to make the alternative methods near 5% of the cost in order to encourage the contractor to finish the project ahead of time. It is very difficult to use one system to evaluate the effectiveness of the alternative methods because there are many factors involved. In general, if the project was completed on time or ahead of schedule, it was considered a success.

Comment 2: The most important element for a successful DB project is a good request for proposal.

Comment 3: For A+B bidding, the district has a great amount of experience in the bidding stage. Most of the time, the low bidder for part B (time) came in lower than the FDOT official time estimate when analyzing projects built in 2003 and 2004. The bidder's time was 22% lower than the original estimate and even the cost was less. However, in most cases the contractor had difficulties completing the project. It is recommended that an incentive using the part B value be added.

Comment 4: A+B with bonus is generally a better experience than A+B without bonus when comparing actual time versus official estimated duration. Looking at the 16 projects, there was a savings of 30% on average, with a very small increase in costs. When comparing actual time versus award time, however, the savings only averaged 8 percent. Some specific projects have

shown substantial savings on time (50%). The district engineers emphasized the importance of pre-construction meetings.

Comment 5: The district had limited experience with the Bonus contracting method. The major difficulty was in determining who would deal with changes. If the change was to cost more than 15% of the cost of an activity, and if the activity was on a critical path, then it was appropriate that the extra time (a time extension) be added. Also, major weather delays would be taken into consideration and time would be added accordingly. If the contractor could not finish on time (thus not receive his expected bonus), it was found to be a good idea to add some incentive clause to the time. When the contractor realized he would not receive the expected bonus, a very adversarial relationship developed between FDOT and the contractor. Based on the district engineer's experience, they recommended adding some I/D after the completion day to continue to motivate the contractor.

Comment 6: In general, the district had positive experiences with I/D contracts. The district engineers recommended using I/Ds with the milestone method. The amount of the I/D must be large enough to motivate contractors. The district used some software to obtain a preliminary value for the I/D, but adjusted the final value using previous project experience. The total incentive bonus using the maximum day allowed is recommended to near 5% of the total cost using project data. The result from 8 projects showed an average deduction of 15% for the time with a small increase of 3% between actual cost and the official estimate.

Comment 7: The lump sum contract is geared toward small projects with minimum risk. The cost of this type of project was in the same range of costs for similar projects not using the lump sum.

Comment 8: The CM at risk project is very challenging, so there are no conclusions about using this method. However, some district engineers commented that this project was really not a risk to the CM. In general, there was more administrative effort required in other alternative methods, but not a substantial amount. With the experience of projects using CM at risk, a substantially large administrative effort was needed. When using lump sum contracts, there is theoretically

less administration. However, the limited experience with lump sum contracts does not show a substantial decrease in administrative costs.

Comment 9: There are no general conclusions for the relationship with contractors in most cases because it is dependent on the contractor and its personnel. When using the no excuse bonuses, if the contractor realized that he would not be receiving a big bonus, the relationship became very adversarial. In the case of one CM at risk project, there was a tense relationship almost from the start.

Comment 10: The district construction engineer and his staff compile a list of projects recommended for innovative contracts. The list is submitted to the district director of operations and a decision is made at that level or higher. Metrics used in the decision-making process include the probable contract duration, the impact of the project on the community, and the quantity of utilities. The effectiveness of an innovative contracting method should be measured by: A+B, which was successful if the contractor finished within the allowable contract time; I/D, which was successful if the contractor achieved any of the incentive money.

Comment 11: In a DB project, the project cost, project duration, traffic factors, and time of year are not considered factors that influence the success or failure of the project, but the project type and project location (because of utility issues) are considered important. All district DB projects are district-let like professional service contracts such as a CEI or consultant design contract. DB creates better relationships between the designer and contractor than traditional DBB. However, conversations tend to be more cordial because any contractor–designer conflicts are handled out of FDOT earshot. FDOT may not hear about design problems until they are fixed. Contract administration on all of the innovative contract types is no different for this resident engineer than for a DBB project. Surprisingly, DB projects are controlled the same regardless of contractor quality control.

Comment 12: For an A+B project, the project type, project cost, project location, traffic factors, and time of year are not considered elements that influence the success or failure of the project. However, the project time duration is considered most important. All A+B projects are let in

Tallahassee as part of the statewide bid letting. There is no difference in the relationships between parties in an A+B project as compared to a DBB contract.

Comment 13: For an I/D project, the traffic factors and time of the year are not considered factors that influence the success or failure of the project, but the following are considered important: project type, project cost (bigger is better), project time duration (a huge factor), and project location (best where traffic impact is high). Relationships between the parties in an I/D project are great as long as the project is going well; but if the contractor falls behind, relationships can become very strained. The daily incentive approach is preferable to the all-or-nothing approach because, if the contractor sees that he will not make the bonus, the contractor stops trying. The approach and work on I/D projects are not different from any other kind of project. The only two projects on which milestones have been used are ongoing projects.

Comment 14: No excuse bonus projects have not worked well and some district engineers prefer other alternative contracting techniques because no excuse bonus projects get tense around bonus time.

Comment 15: When preparing the 5-year plans, the district construction engineer (based on input from the resident engineers) decides which projects will be suitable for one of the alternative methods. This input is based on experience and the process is adjusted every year. Sometimes, after the contact is awarded, the contactor asks to add an I/D clause to the contract. In general, there is a little more administrative work required using alternative methods and much more administrative work with DB. The district has not experienced many more adversarial relationships with contractors when using these methods.

Comment 16: The DB method is good for specific types of projects, especially if there is money available on short notice that needs to be spent in a specific fiscal year. Success with the DB is based on a good request for proposal.

Comment 17: Past experiences with A+B projects were positive because contractors tended to bid with a very low time in order to be the lowest bidder.

Comment 18: In general, the district experience with I/D is positive. It is desirable that the maximum incentive nears 5% of the project cost. The district is limited, however, to a 2% maximum overall incentive, which limits the number of potential projects using alternative methods.

Comment 19: The district has had positive experiences with the no excuse bonus method as long as the bonus sum is substantial. A range of 5% of the project cost is recommended. In one project, all the extra work and changes were added as an extra project. If the contractor realized that he could not finish a project on time and would not receive the bonus, the department could expect an adversarial relationship to develop. The supplementary project was based on an I/D system with a lower rate than the original no excuse bonus sum.

Comment 20: The lump sum method saves on administration costs. The district personnel do not think that the contractors raised their prices when using the lump sum.

Comment 21: The director of operations, the district construction engineer, and the assistant district construction engineer have input into whether a project will be handled by an innovative construction contract. The effectiveness of an innovative contracting method should be measured by the following: actual vs. estimated duration, actual vs. award cost, and number of claims.

Comment 22: In a DB project, the traffic factors and time of year are not considered factors that influence the success or failure of the project, but the following are considered important: project type, project cost, project duration, and project location (because of right-of-way issues). DB contracts are best suited for large projects with aggressive schedules. DB projects create better relationships between the designer and contractor than traditional DBB projects. DB projects cause more strained relationships between the designer and FDOT than DBB projects. Administration of a DB project is easier than that of a DBB project.

Comment 23: On a no excuse bonus project, the project type, project cost, and traffic factors (because without a lot of traffic there isn't much use for the bonus) are considered very

important. Project duration, project location, and time of the year (under current setup, weather days kill the bonus and the contractor's motivation) are considered moderately important. No excuse bonus contracts are best suited for large, time-sensitive projects with a high impact on the public. Relationships between the parties in a no excuse bonus are very good as long as the project is going well, but if the contractor falls behind, relationships can become strained. Contract administration in a no excuse bonus is easy as long as the project is going well, but if the contractor falls behind, contract administration can become very difficult.

Comment 24: Lump sum contracts are best suited for straight-forward projects with known quantities such as buildings and resurfacing jobs. The lump sum contract has no effect on the relationships between parties. Contract administration is easier under the lump sum if the plans are good and the right kind of project is chosen (for which the quantities are known).

Comment 25: In the 5-year plan, the construction personnel recommended which projects are suitable for each alternative method. Their recommendations go to the district engineer for a final decision. Every year there is a revision of the data. In special cases, FDOT may decide not to use an alternative method because of too many unforeseen conditions (i.e., hazardous waste). Sometimes, the contractor who was awarded the bid asked to add an incentive clause. The final decision is ultimately made by the district office. A comparison of the FDOT official estimate with the actual contract cost and a comparison of the estimated and actual contract time should be used to measure innovative contracts.

Comment 26: For DB projects, the Department should be sure to allocate resources and time to adequately review design submittals and shop for drawing submittals. The DB method worked well on a simple interstate widening project because the scope was simple. The more details that the district has, the more restrictive they are on the DB teams in terms of allowing them the freedom to truly design and build a project. DB requires much more administrative work than traditional DBB.

Comment 27: The district's A+B experience was positive because the contractor's time bid was substantially lower than FDOT's original time estimate.

Comment 28: The district has had positive experiences with the I/D method; however, sometimes when there is an alternative road very close, it is not the most economic method. For example, in one project the contractor got a $700,000 bonus even though there was a close alternative road. District engineers prefer a daily incentive approach to the all-or-nothing incentive approach because there will be less arguing when the contractor misses the final deadline. However, the all-or-nothing approach is better for a specific event. I/D projects require a little more administrative effort than DBB projects, but not as much as DB projects.

Comment 29: The no excuse bonus is good for projects with a completion date such as the Super Bowl, but the bonus must be substantial. A good bonus amount is 5% of the project cost. The no excuse bonus is an excellent method as long as a project does not require extra time extensions for small or even large changes in design and construction. The best example was the construction of a temporary bridge. The contractor got a bonus even though major changes had been done during the construction. In general, these methods are geared toward projects for which the date of completion is crucial, such as the opening of a bridge before the tourist season. Problems arise when a contractor cannot finish on time. If the contractor realizes that he will not get the bonus, there is a potential for claims and arguments and an adversarial relationship will develop. Following up on a no excuse bonus with an I/D clause is a good idea so that the contractor will be motivated to continue to work quickly on the project.

Comment 30: District engineers recommend using a lump sum contract when risks are well defined such as with minimal earthwork and signalization projects. The estimates section reported that the lump sum project costs 30% more to design and inspect than the DBB project. The lump sum is the easiest for administration.

Comment 31: CM at risk contracts work best with vertical construction. However, the CM at risk is the most difficult for administration.

Comment 32: All innovative systems except the A+B and lump sum contracts make relationships difficult between the parties. There is a great amount of pressure to make decisions and answer requests for information.

Comment 33: The project manager first requests the use of an innovative concept from the resident engineer, who requests it from the district construction engineer. The district construction engineer and his staff compile a list of projects recommended for innovative contracts. The staff submits the list to the district construction engineer and a decision is made at that level or higher. Metrics used during the decision-making process include politics, project location (business impact and traffic impact), and whether the contractor can achieve the goal. The effectiveness of an innovative contracting method should be measured by: original time and cost versus actual and number of complaints from businesses, user cost impact, the responsiveness of the contractor and designer to the problems, whether the contractor is sufficiently challenged, whether the contractor can realistically meet the challenge, and whether the contractor saves time.

Comment 34: In a DB project, a district engineer recommended that the time of year should not be considered a factor that influences the success or failure of the project. The following factors, however, were considered important: project cost (less than $10 million), project type, project time duration (not too long), traffic factors (lighter is better), and project location. Another district engineer also emphasized that the project type (best used when there are many design options, especially when a change could be made to the design after the project starts) and project cost (bigger is better) were more important factors than the project time duration, project location, traffic factors, and time of the year for a DB project. Both district engineers agreed that there is a huge difference in the relationships between parties on a DB job and a DBB job. The contractor or designer tends to sit on problems while they discuss them. FDOT is not directly involved in any contractor complaints with plans. There is no difference in the ease of administration on a DB job and a DBB job. It is easier to get as-builts under a DB job.

Comment 35: Three district engineers' opinions and recommendations on A+B projects were a little different from each other because they experienced different A+B projects within a district. One district engineer recommended that the project time duration (longer is better), project type (avoiding a high utilities area), project cost (tied to time), project location (rural is better because business owners can slow down a project and utilities are worse), and traffic factors (restrictions

hurt) are important factors that influence the success or failure of the A+B projects. Another district engineer recommended that the time of the year (must not be timed so that the contractor can try to lay a friction course in winter) is more important than the project type and project time duration for an A+B project. He also stated that project cost (bigger is better), project location (not needed in rural areas), and traffic factors (more complicated is worse) are also important in a different way. The third district engineer emphasized that the project time duration (longer is better) and project cost (better used with expensive projects) are more important than the project type, project location, traffic factors, and time of year for an A+B project. However, all the district engineers agreed that there is no difference in the relationships between parties in an A+B project as compared to a DBB contract. There is no difference in the ease of contract administration on an A+B job and a DBB job.

Comment 36: For an I/D project, a district engineer stated that the project type (unless it's "something funky") and the time of the year are not considered factors that influence the success or failure of the project, but the following are considered important: project cost (best with more than $10 million projects), project time duration (longer is better), traffic factors, and project location (not needed in rural areas). Another district engineer with a different I/D project experience emphasized only traffic factors (more complicated is worse) as the most important factor. As for the relationships between parties under I/D contracts compared to DBB contracts, the district engineer's answers were divided. Both engineers mentioned that the approach and work on I/D projects are only different from any other kind of project because of the need for a quick reaction time. A daily incentive approach is preferable to an all-or-nothing approach because it balances the risks. Milestones have been used with great success under the auspices of an interim I/D. However, milestones could have been troublesome if they were not well defined. Milestones have worked well when there was no question as to what must be done to achieve the milestone requirement.

Comment 37: For a no excuse bonus project, district engineers recommended that the traffic factors (more complicated MOTs are worse) and project location (MOT and utilities complications are bad) are important factors that influence the success or failure of the project. In addition, a district engineer stated that the project cost (greater is better) and project time

duration (longer is better) are also important for bonus projects. Another district engineer emphasized that the project type (very complex projects are bad) and time of the year (must not be timed so that the contractor can try to lay a friction course in winter) are more important than the project cost and time duration. Both district engineers mentioned that relationships between the parties in a no excuse bonus project are great as long as the project is going well, but if the contractor falls behind, relationships can become very strained. Contract administration on A+B, I/D, and no excuse bonus projects is only different because time is more important, and there is more urgency for fast turnarounds.

Comment 38: In a lump sum project, time of year is not considered to be a factor that influences the success or failure of the project. The following are considered important: project cost (smaller is better), project type (nothing with potential for underground problems), project time duration (shorter is better), traffic factors (better if avoids traffic such as vertical construction and landscaping), and project location (nothing with potential for underground problems). There is no difference in the relationships between parties in a lump sum project compared to a DBB contract.

Comment 39: For liquidated savings, a district engineer cited his experience that a liquidated savings project could be problematic if a contractor was unwilling to do extra work if anything extra was needed or if the contractor needed to redo anything.

Contractors

Comment 1: A+B, DB, and I/D lead to better relationships between the parties than DBB. If there is a big bonus on a no excuse bonus contract, the relationships tend to be worse. There is no difference in the ease of administrating an A+B and I/D project as compared to a traditional DBB project. The only difference in how the contractor works with an innovative contract is that the contractor is more aware of issues that affect time.

Comment 2: For no excuse bonus contracts, an all-or-nothing approach is preferred. Incentive rates are too low if done daily. Milestones have been used for incentives and bonuses in past jobs. When the no excuse bonus didn't work well it was because incentives were too low and the contractor missed the milestones.

Comment 3: Lump sum contracts generally lead to the same relationships between the parties as DBB contracts. If there are any differences, they are because the lump sum sometimes makes it difficult to pay for things. The lump sum is the hardest project type to administer. Project managers reported that the lump sum is not good and should be used for only small bridges and vertical construction.

Comment 4: The following project types are paired with the best innovative contracts: DB for bridges and vertical projects; A+B for major highways and bridges; I/D for major highways or bridges; and no excuse bonuses for emergencies or high profile (extreme need) projects. Project managers reported that the incentives are usually too low to motivate the contractor to achieve them.

Comment 5: At a recent meeting with FDOT, the idea of making most projects greater than $50 million DB projects was discussed. FDOT commented that they have not seen a significant price impact for the DB process. In our opinion, however, contractors are just now finding out what costs might be incurred for warranties offered under DB contracts. FDOT wants to get as much out of these as possible. This will certainly impact future prices on DB projects. DB projects are lump sum projects and we feel that FDOT benefited from contractors not fully understanding everything that needed to be included in these lump sums. FDOT has done a good job of making contractors fully responsible for everything that arises during these projects. We will all be smarter next time. Both contractors and designers only have so much time and money to pursue DB projects each year. I know that we will only bid a certain number of projects because of the time and effort required. By significantly increasing the number of DB projects each year, the FDOT can dilute the pool of competition for each project.

Comment 6: We see the I/D project as a risk. We cannot allow for any incentive in our bid, since they are no excuse bonuses and FDOT can add any amount of work, have design problems, encounter utility conflicts, or similar issues, and we could experience excessive rain, or other weather problems, and lose any possibility of achieving an incentive. The disincentive will be considered in our risk analysis and we will generally add some dollars to our bid. Because of recent problems with labor resources, problems getting a limerock base in sufficient quantities, having to haul embankments further, problems with subcontractors' meeting schedules, and other similar issues, we encounter added risk. Florida already has very large liquidated damages compared to other states and the disincentive is just increasing our exposure.

Comment 7: Liquidated savings contracts seem to be a much fairer way to handle a contractor finishing a project early. We have not had a project with this language, but our understanding is that the savings is based on the allowable contract time, so that even with design issues, utility conflicts, or added work the incentive date will move during the project so the contractor still has an opportunity to achieve some incentive.

Comment 8: One contractor thinks that A+B contracting is not providing the Department the benefit they believe it is. This can be correlated to what FDOT recently experienced with monetary adjustment. In the past few years, prices went through the roof and FDOT was not very quick to recognize this in their engineer's estimates before a bid. We believe an equivalent problem exists with whoever is devising the contract time (not to exceed a number) for these A+B contracts. The Department wishes to have competitive bidding while getting a project at a time savings. They are willing to pay more for this in the form of a bonus. If the bonus is not realistically achievable, it will not benefit FDOT or the taxpayer. The date has to be adjustable. If there is a simple project that has 100 days of contract duration, before a job begins, a contractor thinks that he can be done in 90 days while exerting the extra costs and efforts. So, he is able to realize 10 days of bonus. On contract day 1, it rains and the contractor is prevented from paving. That job start date is in the middle of the rainy season and the first 10 days of the project are rained out. The contractor now has 110 days to complete the job, but only 80 days to meet the bonus proposed. At this point it is likely that the contractor will make the business decision not to pursue the bonus because the extra costs and effort would go to waste for no bonus realization.

In an extreme example similar to the one above, if it rained for 100 consecutive days, there would be no bonus to achieve and the work would not have begun. On one example project, there were close to 200 weather days on a 600-day contract; 33% of the original contract time had to be added to the project. The bonuses set up this way for roadway projects are going to fail. Such a bonus might work in the vertical part of the industry, but not in the horizontal.

Comment 9: Sometimes efforts are made to build liquidated damages money into the bid because we know that the maximum allowable days in the project won't be sufficient, nor would an early completion and bonus be possible. A contractor thinks that a combination of reviewing the maximum number of days and moving the contract completion date needs to be explored with a percentage of the bonus per day being established once the date starts to move from the original date.

Comment 10: One contractor states that if he gets close to a bonus, FDOT/CEI has certain rights to draw out the project length and the final, non-interim bonus is hard to achieve. FDOT may need to look at adding a bonus to the CEI's contract for any job they are on for which the contractor achieves the bonus. It surely would make things interesting.

Comment 11: For A+B projects, a contractor's project manager mentioned that the Department needs to make the bonus more realistically attainable. There should be specific language that allows the bonus date to be adjusted for something more than catastrophic events at the sole discretion of the state construction engineer. Also, in the new A+B I/D project, to even get the incentive bonus we have to submit all claims during the life of the project within 60 days after the effected work ends (the submission time is no longer within 180 days after final acceptance). That means that the entire certified claim package must be submitted within 60 days. We then have to tentatively schedule a Design Review Board hearing in case FDOT does not agree. Then, as if that is not enough, the ruling of the board is final. We find that it is very hard to believe FDOT will ever pay out a bonus under these conditions.

Comment 12: My only experience with DB was as the CEI. My biggest problem was that the design and construction criteria as well as the request for proposal criteria were unclear, incomplete, or ambiguous.

Comment 13: The main issue with the lump sum is a lack of sufficient information to base a proper bid and shortages in the details of the plans to support when an adjustment to payment is justified based on quantity increases.

Comment 14: I did one of the liquidated savings projects when I was in the CEI back in the late 1990s. I thought it was a very fair project and made the bonus realistically achievable. In fact, I believe the contractor received a bonus on that job. The way it works is that a per-day I/D is applied. But the main difference is that all time extensions, including weather days, are taken into consideration. So the date for achieving the bonus is based on an allowable time. However, the per-day amount is considerably less than the per-day amount on A+B I/D jobs, but it is offset by being much more realistically attainable. Perhaps that's why FDOT doesn't use it much.

Comment 15: As it pertains to lump sum bids, our estimating staff had this advice to offer: Often, the lump sum paving projects have designs that are very vague and more effort needs to exerted by the designer before that project is let for bid (i.e., the station and offset of the proposed work such as pipes, MES, and headwalls). There must be a plan view of the project to show where everything is to take place rather than just a quantity. The designer must also give starting and stopping limits for the project.