

FINAL REPORT

EFFECTIVENESS OF INCENTIVE/DISINCENTIVE CONTRACT PROVISIONS

Project ID-H1, FY 93

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CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION

Incentive provisions are used in construction contracts to reduce contract cost, to minimize contract duration, and to maximize technical objectives such as safety, productivity, technological progress, innovation, management, and quality. Incentive contracts, in a way, transfer to the contractor some of the risk traditionally associated with the owner, in return for a reward in case the contractor is able to achieve the target set. Incentives are also used along with disincentives to promote efficient contract management, and reward only efficient contractors with high performance standards who are able to meet the owner's objectives.

Contract incentive plans are considered by many owners and contractors to be valuable mechanisms for enhancing project success. Their application is recommended by the Business Roundtable's Construction Industry Cost-Effectiveness Project and the Construction Industry Institute. Contracts with incentive provisions are frequently used by private owners. A survey of 94 owners and contractors conducted by the Cost Estimating Budgeting and Control Accounting Team of the Business Roundtable's Construction Industry Cost-Effectiveness Project in 1985 found that incentives were used in 12% of the contracts. Another survey of 26 owners and contractors conducted by the Construction Industry Institute in 1988 came up with recommendations regarding the successful implementation of incentive/disincentive contracts.

Some of the issues associated with the use of I/D provisions in construction contracts are listed below not in a particular order of importance:

Setting the target:

1. Definition of design objectives: identification of the issues that deserve special attention in the design phase of the project;
2. Definition of project objectives: identification of the issues that deserve special attention in project implementation;
3. Selection of features to be targeted in I/D contracts such as cost, schedule, quality, safety, technology, management, etc;

4. Including in the contract only incentive, only disincentive, or a combination of incentive and disincentive provisions;
5. Defining fair and equitable I/D targets to both parties;
6. Selecting the size of the incentives and the disincentives; what percentages of project cost constitute enough motivation to both parties;
7. Selecting the proportion of incentive target to disincentive target;
8. Extent of contractor involvement in defining I/D targets;
9. Extent of design completion that allows defining realizable I/D targets;
10. Selecting targets that are end-of-project oriented or intermediate subgoal oriented;

Implementing I/D Contracts:

11. Offering the I/D provisions after the award is made to the contractor, or at the time bidding takes place, or during prequalification;
12. Frequency with which incentives are awarded as opposed to disincentives being implemented;
13. Formal and informal, written and oral, lines of communication between owner and contractor;
14. Impact of contractors sharing incentives with their key project personnel; owner imposing such an arrangement on the contractor in the contract;
15. Impact of contract changes during construction on I/D targets;

Evaluating the contractor's performance against target:

16. Objectivity of I/D performance evaluation by the owner's team;
17. Using only site personnel in the owner's team that evaluates the contractor's performance; using off-site personnel in the owner's team; using an outside consultant;
18. Evaluating the qualitative aspects related to I/D provisions;
19. Impact of I/D provisions that address performance that is beyond the contractor's control;

Owner's and contractor's perceptions of attitudes towards I/D provisions:

20. Extent of owner's commitment to the success of the I/D contract;
21. Extent of owner's up-front efforts to enhance I/D contract's success;
22. Contractor's perception of the owner's view of the I/D contract in terms of fairness, commitment, and even handedness;
23. Owner attitude as perceived by the contractor regarding whether owner wants the contractor to earn as much incentive as possible or the opposite;
24. Perceived amount of added administrative effort on the owner's and the contractor's existing workload as a direct result of implementing an I/D contract;
25. Perceived relationship that exists between the owner and the contractor in terms of trust and integrity;

Incentive/disincentive provisions are not used extensively in public projects. The Illinois Department of Transportation (IDOT), however has used incentive/disincentive provisions in numerous contracts to encourage early completion on projects where large volumes of traffic are inconvenienced by ongoing construction and where major river structures must be closed which

results in considerable adverse travel distance. In these contracts, the incentive and disincentive amounts were based on the sum of road user delay cost and liquidated damages, and did not exceed the total of road user delay costs and liquidated damages. Most contractors realized incentive payments near the maximum limit. To date, for such contracts, the incentives have exceeded the assessed disincentives by over 30 to 1.

There is therefore a need to examine the I/D concept along with the policies and procedures to determine:

- a) If an additional premium is being paid for I/D provisions in the form of higher bid costs;
- b) If the public would benefit more if the monies paid as incentives were used to fund additional improvements; and
- c) If it would be more cost effective to eliminate incentives, specify an acceptable opening date, and provide an appropriate margin between the liquidated damages rate and the estimated daily cost to expedite.

1.2. RESEARCH OBJECTIVES

The *objectives* of this study are to evaluate the current I/D contract provisions with regard to the effectiveness of these procedures in meeting the goals as set forth in IDOT Design Memorandum No. 90-53 and the cost effectiveness of the existing I/D provisions as compared to other alternatives.

The objectives include:

- a) To review advantages, disadvantages, and implementation problems of I/D provisions generally used in the construction industry, under different contracting environments, and for different types of I/D plans;
- b) To evaluate completed IDOT projects by comparing contracts with I/D provisions against contracts without I/D provisions, with regard to the effectiveness of these procedures in meeting the goals as set forth in IDOT Design Memorandum No. 90-53.
- c) To assess the measures taken by contractors to achieve the targets set in contracts with I/D provisions and to establish whether IDOT (and therefore the public) would benefit from different practices than those set forth in IDOT Design Memorandum No. 90-53;
- d) To review I/D practices in DOTs of other states in order to explore the possibilities of including other proven alternatives into IDOT's practices.
- e) To compare the advantages and disadvantages of I/D provisions against setting a completion date and ordering the contractor to accelerate the project whenever the owner deems it necessary.

CHAPTER 2

LITERATURE REVIEW

2.1. I/D PROVISIONS: A GENERAL OVERVIEW

2.1.1 Introduction

Evolving from the idea that a "good job" must be rewarded, and a "poor job" must be penalized, - especially when there exists a lot of constraints on the task to be accomplished such as cost, schedule, quality, safety, technology and management - the incentive/disincentive clauses have been utilized in various areas including construction contracting.

An incentive, most simplistically defined, is an impetus or a catalyst toward actualization of an intention. The basic drive underlying usage of an incentive to attain any goal is to realize some form of profit or gain.

A construction contract, on the other hand, is a binding agreement between an owner and a contractor in which the contractor accepts to undertake a specific project in return for a profit from the owner who finances the project. The process of constructing is full of ambiguities and contingencies. Thus, the owner may choose to decrease his/her risk and secure the project goals by making the contractor assume a certain percentage of the risk. For this to be acceptable by the contractor, a surplus may be offered by the owner in addition to the contractor's fee. This application is basically known as incentive contracting.

Incentive contracts have been long in use, yet pertinent literature is scarce and inadequate. An example of incentive contracting usage in history is the "*Monitor of the Civil War*" which was floated, checked to attain a certain speed and upon winning its first battle, its contractor was rewarded. Another example would be the Wright brothers' "*Heavier-than-air-machine*", which received a \$5,000 bonus in addition to the \$25,000 contract, when the machine exceeded its target speed by 2 miles an hour (Demong, 1978).

The defense industry undertook extensive research projects regarding incentives and their application in various kinds of contracts, starting in the 60's. The Department of Defense and N.A.S.A. published a guideline under the name of "Incentive Contracting Guide" in 1962, which was revised later on.

Contractual incentives stem from the emphasized *objectives* of a project, which are:

Cost

Schedule

Performance: Quality

Safety

Technology

Management

An owner would like a project to be completed at minimum cost, in minimum time with an acceptable quality and safety in finished product, and acceptable technology and management in the construction process. To attain all of these goals is not realistic in the construction industry, due to the risks involved. This causes a trade-off to take place among the owner's objectives. Depending on the requirements of a project, certain objectives are emphasized and the contractor is expected to take the necessary action to maintain them. If more than one project objective is emphasized in a project, this is known as "Combined Incentive" application (Ibbs and Abu Hijleh, 1988).

As mentioned by Stukhart (1984), contractual incentives are used to:

- 1) reduce overall contract costs,
- 2) reduce total project duration,
- 3) promote superior performance in productivity, safety, quality, technological progress, management and innovation.

The idea behind incentives is to make the contractor accept the objectives of the owner and to make him/her take necessary actions to attain them. In addition to the encouragement introduced by positive incentives, sometimes, threat is used on the contractor for failure to meet the project objectives. In such cases, the contractor's fee is reduced. Ashley and Workman (1985) point out that these "negative" incentives impede project performance to even lower levels than that would be attained with non-incentive/disincentive (non-I/D) contracts. It has been noted in literature that negative incentives, also known as penalties or disincentives, create adversarial relations between parties (BR Report, 1982). The overall experience of the construction industry suggests that usage of only disincentives is far from providing above-standard performance and contractors are turned off by them. Therefore disincentives should accompany incentives and counterbalance each other. The traditional form of disincentives in contracting history is the liquidated damages clause that compensates for owner's loss in the case, if the contractor fails to

meet the project schedule. However, they are not as effective as disincentives clauses in I/D application. Ibbs and Ashley (1987) believe that the use of disincentives alone does not enhance project goals and unless used by the public sector, they are not fit for modern contracting strategies.

Expediting the construction of a project is a complex issue with many unknowns and ambiguities to be clarified. I/D provisions, being one of the effective ways of expediting projects, need to be analyzed in terms of advantages and disadvantages. The following is a summary of advantages and disadvantages related to expedited projects (Gendell, 1986):

Advantages

- ▶ Decreases the time to complete the project,
- ▶ Decreases traffic congestion, delays and inconveniences to the travelling public,
- ▶ Decreases road user's delay costs,
- ▶ Improves public relations and image,
- ▶ Reduces inflated costs,
- ▶ Increases profit for successful contractor.

Disadvantages

- ▶ Increases contractual costs, number of crews, personnel, recruitment problems,
- ▶ Increases material inventory and equipment storage problems,
- ▶ Increases the need for special equipment,
- ▶ May hamper quality, increasing inspection costs,
- ▶ Increases work load of state agency,
- ▶ May increase claims and change orders to maintain schedule,
- ▶ May cause environmental problems such as nighttime noise, lighting problems.

2.1.2. Selection of Contract Types

The contract types used in the construction industry fall mainly under two categories: Fixed Price Contracts and Cost Reimbursable Contracts. They differ in to whom they allocate the project risks and the contractor's fee determination (Ibbs and Abu-Hijleh, 1988). Incentive contracts are an intermediate application that lie between these two extremes (DOD & NASA, 1969). The following "Comparison of Fixed-Price and Cost-Reimbursable Contracts" is excerpted from The Business Roundtable's Report A-7, *Contractual Arrangements*, published in October 1982:

A. Fixed-Price: Arrangement to perform work at fixed-price regardless of cost to contractor

Basic Conditions

Fair reasonable price can be established at inception.

Detailed scope, design, and specifications are available before work starts. Adequate professional inspection and supervision will be provided by owner.

Applicability

Major public works

Commercial and residential construction

Heavy engineering construction

Smaller industrial and power projects

Variations

Lump Sum: Single fixed-price entire contract.

Unit Price: Unit costs and estimated quantities with payment on basis of units of work actually done.

Fixed-Price with Escalation: Price adjustments on cost of certain materials, labor or other factors beyond contractor's control.

Multiple Contracts: Series of fixed-price contracts on same project.

Guaranteed maximum: Price ceiling; bonus/penalty for cost overruns/underruns.

Fixed-Price with Bonus/Penalty for Completion Schedule: Specified amount per day of early or late completion.

Selection and Award

Prequalification of bidders preferable. Usually competitively bid and awarded to lowest bidder.

Risk

Lump Sum: 100% by contractor

Unit Price: Prices - 100% by contractor; owner assumes risk on quantity variation. Owner frequently permits contract modification for significant variation in quantities.

Fixed Price with Escalation: Contractor assumes 100% of base costs and nonescalatable prices. Owner assumes most of escalation.

Advantages

Minimum risk of foreseen conditions.

Well established administrative, legal and contractual precedents.

Overall cost determined before contract is awarded (except for variations in quantities and price as applicable).

Minimum owner involvement in construction process.

Owner benefits from price competition.
Innovative contractor can improve profits through productivity.
Significant contractor incentive to reduce costs and meet schedule.

Disadvantages

Design-construct time is longest of all methods.
Owner/engineer and contractor are usually in adversary role.
Contractor bears economic risk of many factors not under his control.
Changes and unforeseen difficulties frequently result in disputes and extra costs to owner and contractor.
Contractor has minimum contribution to design or constructability process. Contractor financial difficulties can cause serious problems.
Contractor has no financial motivation to improve quality above minimum required to meet specifications.

B. Cost-Reimbursable: Agreement to perform work and be reimbursed on the basis of actual cost plus a fee for contractor.

Basic Conditions

Scope/cost of work not sufficiently defined to permit use of fixed price contract.
Qualified contractors unwilling to accept risk of fixed price.
Owner wishes to minimize overall design-construction time period.
Sophistication required in contractor selection. Owner must have ability to closely monitor costs.

Applicability

Industrial construction.
Heavy construction (high risk).
Research, exploratory, or "one of a kind" work.

Variations

Percent Fee: Contractor reimbursed for all costs plus a percentage of cost.
Fixed Fee: Fee covers profit and general administrative costs. All other allowable costs are reimbursable.
Incentive Fee: Some or all fee is dependent upon achieving certain cost or schedule goals.
Performance Fee: Fee varies according to certain agreed criteria on which contractor is rated for performance.
Conversion: Any type of reimbursable contract converted to fixed fee or guaranteed maximum.

Selection and Award

There are various methods used to evaluate the contractor's ability to meet the owner's project

objectives. The contract is usually negotiated with the contractor who is judged to be the best qualified and submits a competitive fee and cost proposal.

Risk

Cost Plus Fixed or Percentage Fee: 100% by owner.

Cost Plus Incentive Fee: Contractor assumes risk to profit only according to sharing formula.

Cost Plus Performance Award Fee: Contractor assumes risk to profit only according to performance criteria.

Conversions: Contractor assumes percentage of risk for exceeding maximum cost according to formula for sharing overruns of negotiated Fixed-Price contract

Advantages

Construction can start before plans are complete.

There is flexibility to make changes at actual audited cost.

It can be used where contractors are unwilling to accept high risks.

It is adaptable for phased construction.

It reduces adversary role between the owner and the contractor.

Disadvantages

It is generally less economical than fixed price.

Increased owner involvement in construction process is necessary.

The final cost is not guaranteed.

It involves more detailed negotiation and selection process.

It is stated in the DOD & NASA, Incentive Contracting Guide (1969), that the selection of contract type from Firm Fixed Price, with maximum contractor risk and maximum profit incentive, shifts toward Cost Plus Fixed Fee, with minimum contractor risk and no incentive for cost control, as the uncertainties in the costs increase. Some of the guidelines regarding selection of contract types are specified in this guide as follows:

Cost-Plus-Fixed-Fee: Appropriate where "level of effort" is required or where high technical and cost uncertainty exists.

Cost-Plus-Award-Fee: Appropriate where conditions for use of a CPFF are present but where improved performance is also desired and where performance can not be measured objectively.

Cost-Plus-Incentive-Fee (Cost incentive only): Appropriate when a given level of performance is desired and confidence in achieving that performance level is reasonably good but where technical and cost uncertainty is excessive for use of a fixed-price incentive.

Cost-Plus-Incentive-Fee (Multiple incentives): Appropriate where expectations of achieving an

acceptable performance is good but improvement over that level is desired and where technical and cost uncertainties are excessive for use of FPI.

Fixed-Price-Incentive (Cost incentive only): Appropriate where confidence in achieving performance is high but cost and technical uncertainty can be reasonably identified.

Fixed-Price-Incentive (Multiple incentives): Appropriate where improved performance is desired and technical and cost uncertainties reasonably identifiable.

Firm-Fixed-Price: Appropriate where performance has already been demonstrated and technical and cost uncertainty is low.

Firm-Fixed-Price (With incentives added): Appropriate where improved performance or schedule is desired and technical and cost uncertainty is low.

2.1.3. Incentive Models

The traditional and ordinary formulation of incentive contracting is as follows (Scherer, 1964):

$$F_c = F_t + k(C_t - C_a) \quad (1)$$

where:

F_c : contractor's realized contract profit (fee)

F_t : negotiated target profit (fee) amount

C_t : negotiated target contract cost

C_a : actual contract cost

k : sharing ratio

$$0 < k < 1$$

As clearly seen, in incentive contracts the amount that the contractor saves on contract is shared by a certain proportion by both parties. The two extremes on the values of k , 0 and 1, reflect the Cost-Plus-Fixed-Fee and Firm-Fixed-Price contracts respectively. Any other value of k in between would mean that incentive contracting is being utilized.

Also letting $X = C_t - C_a$ the above formula can be rewritten as:

$$F_c = F_t + kX \quad (2)$$

where:

X : cost outcome

$$X > 0$$

cost underrun

$X < 0$ cost overrun

The first term in Eqn.2, F_1 , is the negotiated fee which is constant. The objective is therefore to maximize the value of the cost outcome. However exploring the incentive part in this equation, the following have to be noted:

(1) If actual contract cost, C_a , is reduced, in order to increase X , this indicates the contractor's efficiency in cost reduction. On the other hand, if the target contract cost, C_t , is inflated in order to increase X , then this would imply a cost underrun where it actually is not a cost saving on owner's part and should be avoided. The means of setting a realistic target in incentive contract is an issue that should be further explored.

(2) The actual contract cost, C_a , also depends on the degree of uncertainty present in the construction process, which means that it should be analyzed in some statistical perspective with expected values.

Scherer (1964) deals with the maximization of contractor's profit and minimization of the owner's outlay as a buyer in defense industry. He introduces the following model on contractor's behavior:

$$E(F_c) = F_1 + kE(X)$$

where:

$E(F_c)$: expected value of contractor's profit
 $E(X)$: expected value of cost outcome

Assuming higher risk should be accompanied by higher target profit to the contractor:

$$F_1 = F_1(k) = j + hk + mk^2$$

$$\text{MAX } E(F_c) = j + hk + mk^2 + kE(X)$$

where j , h , and m are constants, and k is the sharing ratio.

$E(X)$ is also expected to be dependent on k . The higher the value of k , the stronger the cost reduction incentive, and higher the value of X .

Scherer (1969) also introduces the following model on owner's behavior:

$$\text{MIN } E(G) = C_t + F_1 - E(X) + kE(X)$$

where:

- E(G) : expected value of government's outlay
- C_t : target cost to be paid
- F_t : target fee to be paid
- E(X) : expected value of cost outcome
- kE(X): amount to be paid to the contractor

In order to gain a better insight on Scherer's models and interpret his results additional analysis regarding following topics is necessary:

- a. User Cost Concept related to sales in year t
- b. Normal Probability Distribution
- c. Managerial Utility Function and Indifference Curves
- d. Profit Possibility Function

Fisher (1969) has analyzed on defense contracts and questioned the extent of cost savings claimed in these contracts. He points out that incentive contracts do motivate the contractor to reduce the actual costs, but they also encourage them to inflate target cost estimates.

He introduces the following relationship between sharing rate and cost overruns/underruns:

$$(C_a - C_t)/C_a = a_0 + a_1 k$$

where:

- C_a: actual contract cost
- C_t: adjusted target cost (initial target plus supplemental changes)
- k : sharing ratio
- a₀, a₁: are unknown coefficients to be estimated

This formula depicts the traditional belief that low sharing rates should be associated with cost overruns, while larger sharing rates should be associated with cost underruns. Performing some regression analysis, Fisher (1969) concludes that sharing rate has no effect on underruns. The conclusion that sharing rate has no effect on underruns seems to be contradicting Scherer's expectation that F(X) should be dependent on k.

He enhances this formula to include the final cost as a factor in the following form:

$$(C_a - C_t)/C_a = a_0 + a_1 k + a_2 C'_f$$

where C'_f is log of the final cost, and a₂ is a coefficient. Upon his analysis, he concludes that contract cost has no effect on underruns.

Another factor Fisher (1969) analyzed in terms of its effect on underruns is the supplemental changes which is demonstrated by the following formula:

$$(C_1 - C_2)/C_2 = a_0 + a_1(C_1 - C_2)/C_2$$

where C_1 is the initial negotiated target cost. His analysis concludes that supplemental changes and underruns are not related.

Based on these findings, Fisher (1969) notes that, although underruns are more common with fixed price contracts, they are not related to pricing provisions of the contract. He adds that realistic and tighter target costs should be established for incentive contracts to be motivational. This can be achieved by establishing the target cost on a competitive basis. When this is not possible, the key to successful incentive contracting becomes accurate cost estimation. Scherer's data needs to be analyzed with a greater insight and interpretation of his statistical solution.

The gambling aspect of incentive contracting is introduced by Bradley & McCuiston (1972). Upon negotiating the target fee, target cost, fee swing (the range of acceptable costs) and sharing ratio the choices of the gambler, who is the contractor in this case, are:

- (1) win an extra amount on contract fee with a probability of "p"
- (2) loose an extra amount on contract fee with a probability of "1-p"
- (3) not play at all

He states that the contractor will operate in accordance with the Bayes Decision Principle and explains contractor behavior by a concave utility function. He demonstrates that whenever C_1 is greater than $E(X)$ there is a non-zero value of k which maximizes expected utility. His model is as follows:

Density function	$f(C_2) = 1/(b-a)$	$a < C_2 < b$
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Fee function	$F(C_2; k) = f + k(C_1 - C_2)$	$0 < C_2 < \infty$ $0 < k < 1$
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Assuming $f = 0$;
Bernouillian Utility Function:

$$U [F(C_2; k)] = U [k(C_1 - C_2)] \quad a < C_2 < b$$

With the help of the above functions, he presents the proof for every C_1 greater than $E(X)$ there is a non-zero value of k which will maximize the expected utility of some positive value.

Bradley and McCuiston (1972) conclude that the incentive fee arrangement provides the

contractor with the mechanism for optimization of a fee outcome given the target cost. According to these authors, this is the reason for transition from Cost-Plus-Fixed-Fee contract to the incentive form of contracting.

"The early incentive-contracting research studies were on a theoretical level or, because of limited data, exploratory." (Demong, 1978). As the experience with I/D applications increased, more data became available for empirical analysis. In recent years, the construction industry has started diverting some of its research interest into the study of incentives while analyzing contracting techniques and developing more efficient and effective project management methods. The following are examples of such studies carried out in different states: Ashley and Mathews (1985), Ashley and Workman (1985), Ibbs et.al. (1986), Ibbs and Abu Hijleh (1988).

In addition to these, economists and accountants performed in-depth analyses of incentive contracting using statistical methods and differential calculus. They tried to determine the micro and macro economical effects of incentives, to analyze the utility curves and opportunity costs associated with them, to simulate bidding models, and to show the usage of agency theory in designing incentive contracts (Bernhard, 1988; Cohen and Loeb, 1990; Androkovich 1990; Brumm 1992; Reichelstein, 1992).

The overall literature on incentive contracting encourages its application, provided that it is not redundant for the related project and that an accurate analysis of associated costs and durations is performed. It is important for the success of I/D contracts, that the objectives and risks of both owner and contractor be fully explored. Yet one common aspect of incentive contracting, which is the benefit of early completion due to the fast-track nature of these contracts, was considered by Rosenfeld and Geltner (1991) to be overstated. They mainly addressed two problems. First, they argued that the benefits of early completion are less than the cost associated with the shift in the timing of construction expenditures in these contracts arising from the interest rates and rate of payback to the owner. Second, they mentioned that "at the macro level of the construction industry as a whole, the widespread use of incentive ... contracting tends ... to contribute to an adverse selection [of contractors] phenomenon" (Rosenfeld and Geltner, 1991). They argued that incentive contracts will select inefficient contractors due to the implications of asymmetrical information. Rosenfeld and Geltner stated that the environment of imperfect information and uncertainty in the construction industry, affect prices and reduce market efficiency. In a competitive bidding environment, the profit expectancy of a high-cost, low efficiency firm will be less than the profit expectancy of a low-cost, high efficiency firm. Therefore, even though assuming full responsibility for its high construction costs, the inefficient firm may be able to submit lower bids on incentive contracts, as its opportunity profit is less than the efficient firm's.

2.1.4. Other I/D Applications

The major objective featured in the profit sharing formulas mentioned till now, has been the cost. Depending on the level and scope of risks accompanying a certain project, other contract types stimulating different motives need to be introduced. Selection of the incentive(s) depends on the extent of the work to be completed. In transportation projects any delay is reflected to the travelling public as costs, therefore timely completion is the principal concern of authorities as it is the major element to the success of the project.

Schedule incentives in fixed-price contracts are in the form of bonus/penalty for completion schedule. The application is very simple involving an addition per each day of early completion and a deduction per each day of late completion (Stukhart, 1984). The incentive/disincentive (I/D) amount mentioned here should be realistic and attainable to motivate the contractor.

It is stated in the DOD & NASA guideline, that there is a motivation on the contractor's side "...to fulfill his responsibilities on time..." as he/she does not want to be recorded for lateness. Also, delays usually increase costs causing overruns, and early completions tend to decrease costs, resulting in underruns (Demong, 1978). Therefore, the project management team should identify the projects that will contain schedule incentives with utmost care. A schedule incentive should only be introduced if delays may jeopardize the project objectives or may increase costs. "If the planned project is one for which early completion produces a sizeable and early return on investment, the owner can afford to share a portion of the expected benefits and create an incentive for the contractor" (Abu Hijleh and Ibbs, 1989).

Abu Hijleh and Ibbs (1989), describe four applications of schedule incentives:

1. Final completion date
2. Intermediate milestone periods (maximizes performance during certain time segments)
3. Intermediate physical completion milestones (targets completion of certain physical systems by specified dates)
4. A combination of final and milestone arrangements.

These writers state that incentive applications that depend on only timely completion of a project are easy to administer and apply. One disadvantage associated with this application is the potential loss of viability of project objectives. As the project develops, circumstances may change the attainability of project goals. Milestone incentive plans, on the other hand, can guarantee the incentive plan's viability by reflecting the changes in the circumstances into the incentive scheme. Milestone incentive plans are also flexible in their application. For instance, a number of schedule targets can be specified in a milestone plan, that allow the contractor to receive certain bonuses upon completion of specified tasks during the project. Another example is that, some schedule targets are set for early phases of construction and the rest of the targets

depend on the project's performance (Abu Hijleh and Ibbs, 1989). It is advised that the bonuses assigned to earlier targets of the project have smaller percentage weight, and the later milestone targets be assigned higher percentage weights, depending on the effect of that milestone on the overall project success. This process is called value weighing (Ibbs and Abu Hijleh, 1988). Ibbs and Abu Hijleh, emphasize the increased administrative effort necessary for the success of projects using milestone incentives and list the following factors for the selection of project completion or intermediate milestone schedule incentives (Abu Hijleh and Ibbs, 1989):

1. Project duration,
2. The owner's project management philosophy,
3. Technical and managerial sophistication of the owner and the contractor
4. The characteristics of the project at hand,
5. The owner-contractor relationship.

Disincentive clauses are not the liquidated damages clauses which are a basic tool of current construction contracting practice. The enforcement and threat induced by liquidated damages is very subtle when compared to that of disincentives. Disincentives are larger in amount and accompany incentives whereas liquidated damages are mere penalties to collect the losses incurred by the owner in case of delays.

In cost reimbursable contracts, the same bonus/penalty scheme for completion of project ahead of or behind schedule can be used. Even though simple to administer, the owner should check the costs as the contractor may use excessive resources to achieve the schedule targets in cost reimbursable contracts.

Another application mentioned by Stukhart (1984), is a **combination of cost and schedule incentives**. This pattern includes a bonus/penalty scheme for underrun/overrun of target dates and another for underrun/overrun of project duration. The purpose of these combined contract incentives "...is to motivate the contractor to produce a system that will meet or surpass performance goals, on or before a target date, and within or at a target cost" (Finchum, 1969). When using combined incentives, care should be given not to overemphasize a particular incentive, as this might cause an imbalance in the contractor's priorities and therefore harm the owner's interests.

The **performance incentives** are used to reward or penalize contractors depending on the attainment of other targets such as quality, safety, management and technology (Ibbs and Abu-Hijleh, 1988). Performance parameters are the ones that have the most significant impact on the construction cost and schedule. Examples of most widely used performance parameters as incentives include safety, quality of construction, responsiveness, technical management, business management and utilization of resources (Stukhart, 1984). Their application is more

effective if used as a reward, not a penalty.

2.2. A REVIEW OF THE DEVELOPMENT OF I/D PROVISIONS IN IDOT

2.2.1. Introduction

The regulation on bonus payments contained in 23 CFR Part 635 was first published in June 28, 1968 (Federal Register, 1968), FHWA Policy and Procedures Memorandum 21-6.3. FHWA believed that bonus payments were doubtful and susceptible to abuse, therefore they did not allow any bonus payment to the contractor.

Afterwards, FHWA initiated the NEEP Project No.24 to evaluate the use of I/D provisions in hastening the completion of Federal-aid highway construction projects on July 15, 1977 (Federal Register, 1977). This study concluded that I/D provisions were effective both in completion time and cost reduction.

Following this, on June 13, 1984 (Federal Register, 1984), FHWA, DOT issued a Federal Register notice - 23 CFR Part 635, "Contract Procedures: Bonus Payments: Rescission of Regulation", rescinding the previous FHWA policy which prohibited bonus payments.

In this notice, the first I/D definition was made as follows:

"The I/D concept is a predetermined method of scheduling payments that compensate the contractor a certain amount of money for each day the work is completed ahead of schedule and makes a deduction for each day the contractor overruns the completion date."

Although contract costs may seem to be increased upon usage of I/D provisions, this cost is abundantly compensated for by the benefits it brings such as:

1. Reducing inflationary costs, i.e., costs that would be inflated by the contractor,
2. Minimizing delays that disturb the road users,
3. Increasing the safety through the construction zone,
4. Reducing the traffic maintenance costs, i.e., the costs necessary to keep the traffic flowing,
5. Reducing the costs of project administration and inspection.

In the notice, it was also mentioned that the field offices would be advised on the application of

the I/D provisions by FHWA, but they aimed at providing a detailed direction on the issue after gaining experience.

2.2.2. Initiation of I/D clauses in IDOT

Following the notice, on July 14, 1984 (Memorandum, 1984), the Associate Administrator for Engineering and Operations sent out a memorandum to Regional FHWA's, Regions 1-10, announcing that I/D provisions could be used from then on whenever they were considered to be cost-effective and beneficial to the travelling public. However, according to the Construction Operations Section of the Bureau of Construction at IDOT, I/D clauses were first used on an experimental basis on the Edens Expressway project in 1980-81 with FHWA approval. The memorandum dated 1984, also mentioned basic directions on the issue such as:

- I/D amount should be estimated with respect to engineering costs, traffic control costs, delays to the motorists, etc.
- Previous I/D applications paid approximately 5% of the total construction cost.
- 6 or 7 work days with multiple shifts should be maintained with increased labor forces and equipment.
- I/D should be used when it is believed that benefits in terms of cost savings and/or increased safety would outweigh the cost of incentive payments.

On May 30, 1985 (Memorandum, 1985), another memorandum was distributed to Regions 1-10, including the following:

- i) The Special Notes on Incentive Pay and Liquidated Damages used on the legislated demonstration project in Kentucky for determination of low bidder.
- ii) The Texas State Department of Highways and Public Transportation Special Provisions for accelerating project completion .
These attachments were sent out as a guide to examine I/D project proposals.

Determination of Low Bidder with Kentucky Project

The bids are to be evaluated on a combination of two parameters:

- (A) The dollar amount for all work to be performed under contract
- (B) The total number of calendar days required to complete the work

The lowest bid will then be determined by the Department as the lowest combination of (A) and (B) according to the following formula:

$$(A) + (B) * \$5,000.00$$

where \$5,000.00 per calendar day is the stipulated adjustment for road user benefit. Here, it should be noted that mobilization and demobilization durations should be omitted from project duration. Also, the maximum amount of bonus is equal to 5% of the awarded contract price. If contractor fails to complete contract on time he will be subject to paying liquidated damages. This process is currently known as competitive bidding of contract time or "(A) + (B) Bidding", and is carried out on an experimental basis.

Texas Special Provisions For Accelerating Project Completion

The provisions include the following parts:

1. "Definition of Terms"
Provides for calendar-day definition of working day and adds a definition for average daily road-user cost.
2. "Instructions to Bidders"
Deletes showing working time by Department, i.e., bidders have to estimate and submit their own working time.
3. "Award and Execution of Contract"
Adds the road-user cost to the bid by the method explained above.
4. "Prosecution and Progress"
Shows the progress of the work in terms of remaining days to complete and specifies road-user cost as an I/D amount.
5. "Measurement and Payment"
Specifies that no other payment can be made except the specified I/D amount plus contract amount to the bidder.

In the meanwhile, around 1986, District 1 of Illinois prepared a document called "Incentive and Disincentive Clauses". The issues specified in the document are as follows:

- I. Project Selection Criteria
- II. Disincentive Criteria
- III. Incentive Criteria
- IV. Format for I/D Project Implementation

Then, on August 20, 1987 (Federal Register, 1987), FHWA issued a revised regulation, 23 CFR Part 630, "Agreement Provisions Regarding Overruns in Contract Time" as a final rule revising the assessment of liquidated damages on projects where a contractor overruns the contract time. The following are the major issues dealt with in the notice:

- 1) "Liquidated Damages" means the daily amount set forth in the contract to be deducted from the contract price to cover additional costs incurred by a State Highway Agency (SHA) because of the contractor's failure to complete the work on time. Public inconvenience costs such as traffic maintenance and road user delay costs in addition to construction engineering (CE) costs

are a justification for establishing the liquidated damage amount.

2) Each SHA should keep liquidated damages provisions current so that they will cover SHA's daily CE cost due to the overrun. If a SHA prefers using the liquidated damages rates provided in AASHTO tables, it should verify to FHWA that the amounts are current. The standard liquidated damages are updated every two years by the Construction Operations Sections.

3) In addition to liquidated damages, SHA may also include I/D for early completion in a project. So, liquidated damages and I/D are separate provisions, where liquidated damages apply to all projects and I/D provision is an application to expedite some critical projects.

It should be noted for item 3 that care should be shown when calculating liquidated damages and I/D provisions so as not to include road user delay costs in both of them as a double penalty for the contractor.

2.2.3. Incentive/Disincentive Early Contract Completion

Within the frame that has been drawn up to now, the Office of Program Review, FHWA, commenced a study to evaluate the effectiveness of the I/D program, and a report called "Incentive/Disincentive Early Contract Completion" was published on January 4, 1988 (OPR Report, 1988). This report was mainly based on the definitions and assumptions of the Federal Register notices published until then. It concentrated on 57 projects with I/D provisions. The report showed that contractors of I/D projects were generally ahead of their schedules with 50% earning maximum incentive, 35% earning partial incentive and the rest ending up in disincentive situation which were still being negotiated.

The following is a brief summary on the observations of this report.

I/D Project Selection Criteria

- I/D provisions are to be considered only for **MOST CRITICAL PROJECTS** and the projects that are decidedly in public interest.

(Writer's Note): This selection criteria is extremely vague and should be dealt with more precisely.

- One of the states considered in the report established the following policy for selection:
 - * Major bridge out of service
 - * Lengthy detour
 - * Excessive disruption of traffic
 - * A significant impact on public safety

- * Link projects that complete a segment of a highway
- Also, 4R and bridge reconstruction projects benefit a lot from I/D.
- SHA is the legal authority to decide on the utilization of I/D provisions.

I/D Daily Amount Criteria

- The most important concept to be improved is whether the early completion payment for a project is beneficial to the travelling public.
- The following costs are incurred in I/D amount:
 - * established construction engineering inspection costs
 - * state related traffic control and maintenance costs
 - * detour costs
 - * road user costs (costs of delays, added energy costs, accident costs, etc.)
- The amount should be adjusted downwards considering:
 - * Favorable benefit/cost ratio where cost is the final daily I/D amount and, benefit is the calculated daily savings in road user and SHA costs.
 - * Sufficient amount to motivate the contractor.

If these two factors can not be met, then I/D provisions should not be included in the project.
- States which did not calculate I/D amount, used a rule of thumb, taking the 5% of the contract price as an I/D amount.

I/D Times Criteria

- I/D times are of crucial importance to the acceleration of a project, and yet, the most inexact aspects of I/D provisions.
 - After the specification of conventional contract time, an accelerated time should be estimated, showing the completion date of the project. Then the maximum incentive time should be discussed considering the situation.
- (Writer's Note): A common error in establishing the I/D times and amounts, is the misuse of the stated "5% of the contract amount" phrase as a back door approach. This 5% is only an insurance on the owners side and does not involve any I/D analysis in it.
- Usage of calendar days instead of working days, or direct specification of completion date is beneficial.
 - "A + B Bidding" has merit and eliminates many engineering judgement in establishing contract times.

Contract Special Provisions

- The confusion that can arise from the language of State's standard specifications should be cleared, otherwise unintended time extensions may occur.

- The bid items to be completed within the scope of I/D contracts should be made as clear as possible.
- A good approach to adjustments in contract time is to specify how overruns, underruns, change in conditions or strikes will be handled in the special provisions part of the contract.

Liquidated Damages vs. I/D

- Liquidated damages provide recovery to public losses from contractor's failure to meet specified completion date, whereas I/D provisions provide motivation to the contractor for early completion.
- Overlapping of liquidated damages and I/D disincentives should be prevented by clarification of the costs included in both.

Documentation

- The calculations of I/D amounts and times should be clearly documented.
- States are not accurate with time acceleration computations.

Recommendations

The following recommendations were made at the end of this study:

- A. A Technical Advisory (TA) should be issued for guidance on I/D projects to:
 - encourage SHA to use I/D for most critical projects.
 - establish a procedure for I/D daily amounts based on a cost-effectiveness analysis and the determination of SHA and user costs. (Daily incentive and disincentive amounts should be equal.)
 - explain how SHA should arrive at accelerated time and incentive time. (A maximum disincentive amount is not specified whereas a maximum incentive of 5% of contract amount is acceptable.)
 - encourage division offices to be more aware of contractor's progress and effort to provide comparison between precontract analysis of contract times, i.e., obtain time information.
 - discuss the language of I/D provisions to avoid pitfalls and conflicts.
 - clarify the use of liquidated damages.
- B. The "A + B Bidding" should be reiterated.
- C. The documentation of the development of I/D time and daily amounts should be required by SHA.

D. A separate division office approval should be required for contracts with I/D provisions.

Following the recommendations of the Office of Program Review's report, a draft technical advisory was prepared and sent to Division Administrators in Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin for their review and possible comments on March 25, 1988 (Memorandum, 1988).

In response, IDOT started the preparation of "Guidelines: Use of I/D Clauses in Illinois" searching for I/D applications within its body, the process of applying I/D clauses, project selection criteria, etc., on April 1, 1988 (IDOT Guidelines, 1988). Also, IDOT supplied FHWA Division Administrators by a review and comments on the draft TA on April 5, 1988 (IDOT Review, 1988).

2.2.4. Use of I/D Clauses in Illinois

After a couple of revisions on May 26, 1988 and June 20, 1988, the final report called "Use of I/D Clauses in Illinois" was handed out on July 29, 1988 (IDOT Report, 1988). The purpose of the report was to identify the procedures and practices used by IDOT and to determine if I/D clauses were used in a warranted and cost-effective manner. Also, these procedures and practices were evaluated for conformity with appropriate policies and objectives of Title 23 and the recommendations contained in the Office of Program Review Report. Major observations of IDOT's report is mentioned below.

IDOT: "Use of I/D in Illinois"

- IDOT has been using I/D clauses since prohibition of their usage has been lifted, with each of its districts using their own provisions under the guidance of Central Office and IDOT Chief Counsel. This fact has caused inconsistencies in the application of I/D clause in Illinois.
- IDOT and Bureau of Local Roads Projects were examined at IDOT central office. In 1986-1987 only 24 out of 2400 contracts were awarded with I/D. 18 of these projects formed the data base for this research. Of these 18 projects 7 received maximum incentive and 3 received partial incentive.
- Only 5 projects located in District 1 was provided with computational documents on the calculation of I/D amounts. 2 out of these 5 projects paid excessive incentive amounts. Only 1 project included liquidated damages in I/D amount. Only 7 projects contained documents on computation of I/D times.

IDOT Procedures for I/D Clauses:

"Prior to November 30, 1987 I/D clauses were routinely approved by the Central Office Bureau of Design as a part of their approval of the PS&E package. District offices were responsible for determining which projects were to include an Incentive Payment Plan, the payment rate, and the maximum amount payable. The Districts were required to verbally support the I/D amounts by the Central Office. On November 30, 1987 the Engineer of Road Plans and Contracts issued a memorandum instructing the reviewers to discuss four items with him prior to approval. These items include:

1. estimated contract amount,
2. reasons for including the incentive payment plan,
3. the incentive payment rate,
4. the maximum amount payable.

This memorandum was issued due to some inconsistencies in the payment rate based on the size of the project" (IDOT Report, 1988).

Therefore, IDOT was trying to establish statewide guidelines for both the application of I/D clauses and the payment rate. It should also be noted here that District 1, Illinois had issued its own clauses for I/D in approximately 1986.

IDOT Recommendations:

- 1) Statewide procedures for using I/D are necessary to create a uniform system.
- 2) The following items have to be searched further on:

- * computation of I/D amounts and times
- * separation of CE costs from road user costs in I/D amount
- * the impact of early awards on contract incentive payments without reducing the traffic exposure
- * use of I/D clauses which do not benefit the public directly
- * treatment of standard liquidated damages
- * consistency of hourly costs

3) For interstate system projects, IDOT should submit I/D clauses to FHWA for approval prior to incorporating them into projects. All other projects are under Certification Acceptance and no FHWA approval is required for advertising the projects.

2.2.5. FHWA Technical Advisory

Finally, after considering all these feedbacks from states, on February 8, 1989, FHWA Technical Advisory T 5080.10 "I/D for Early Contract Completion" was prepared. The TA exactly conforms with the Office of Program Review Report conceptually, but it includes some more detail and brings some additional ideas which clarify some vague points. The following are such examples on the issue :

Project Selection

- I/D phases should be limited to be completed in one construction season at the most.

Project Development

- Accurate specifications and plans of project should be established prior to construction, to clear out contractor's task.
- Preconstruction meetings should be held between parties including police, local officers, traffic engineers and contractor.
- Predesign field reviews may improve I/D application.

I/D Amount

- A daily I/D amount is calculated on a project by project basis using the following costs:
 - * established construction engineering inspection cost
 - * state related traffic control and maintenance cost
 - * detour costs
 - * road user cost

The adjustment of calculated daily amount is done the same way as described by Office of Program Reviews Report.

- For estimating Road User Costs use either accepted SHA procedures or one of the following:
 - * "User Benefit Analysis of Highways and Bus -- Transit Improvements" Manual by AASHTO, Washington D.C.
 - * "Traffic Control for Streets and Highway Construction and Maintenance Operations" Participant Notebook by FHWA, 1978.
 - * "Planning and Scheduling Work Zone Traffic Control" Report #FHWA IP-81-6 by FHWA, October, 1981.
- For estimating Vehicle Operating Costs use the FHWA study "Vehicle Operating Costs, Fuel Consumption and Pavement Type and Condition Factors" (NTS-PB 82-238676)

- Generally incentive amount per day is set equal to disincentive amount per day. If these are to be different incentive per day has to be smaller than or equal to disincentive per day. Maximum incentive amount is recommended to be 5% of total contract amount.

I/D Time Determination

- The primal question to be answered is: "To what extent and at what cost can construction be compressed from a normal construction time to an accelerated time?"
- If I/D time is to be determined by past performance a good engineering judgement is a must.
- If I/D time is to be determined using CPM methods a good work breakdown structure, identification of separate tasks is necessary.
- Use calendar days or completion time instead of working days.
- Take seasonal effects and holidays into consideration.

Contract Administration

- Cooperation and coordination between contractor and SHA is essential for expediting the decision making and approval process.
 - Contractor should submit a CPM schedule prior to the commencement of work as a basic document to show the contractor's progress and present a comparison parameter. Regular meetings should be hold to update the schedule.
 - No extension on I/D date should be given unless extraordinary circumstances occur:
- (Writer's note: However, extensions on I/D dates were granted on several occasions when work was added to the contract or when the start of the work was delayed due to unforeseen conditions. After these cases, a memorandum dated June 25, 1991 was sent out by the Chief Council prohibiting this application.)
- I/D time adjustments should be limited to only major work items on the critical path, and be applied only when no other choice is left.
 - Flow charts showing the flow of information and establishing the lines of communication among parties are proven to be beneficial.

Low Bid Determination

- Road user costs in low bid determination ("A + B Bidding") is allowed to be used on an experimental basis by FHWA memorandum May 20, 1985.
- An interim report and a final report on the bid should be submitted to the Washington Headquarters Contract Administration Branch (HHO-32).

The TA also provides two attachments of which the first one is a checklist of items to be considered when preparing contract special provisions called "Incentives/Disincentives (I/D)

Checklist Items", and the second one is "Suggested State Highway Administration Scheduling Specification" used for planning and scheduling of I/D contracts.

2.2.6. IDOT Design Memorandum No. 90-53

As a result of all these developments about I/D provisions, on March 1, 1990, IDOT issued the Design Memorandum No. 90-53 in order to establish a policy to ensure appropriate projects are being selected for inclusion of I/D clauses and the I/D clauses are developed in a uniform manner. The memorandum is conceptually the same as TA, using the same terminology and definitions. It is a brief and more descriptive version of the FHWA's Technical Advisory. The basic estimates, formulations and calculations are based on "Incentive and Disincentive Clauses" supplied by District 1, Illinois. The following are the major topics mentioned in the IDOT Design Memorandum No. 90-53.

Guidelines for Project selection

Use of I/D clauses should be limited to the following:

1. High volume roads, high volume truck traffic and/or structures involving high road user cost increases, extended inconveniences and hazards to the motoring public or severe disruption on adjacent businesses. Lower volume roads and river structures involving long adverse travel and area economic impact may be considered.
2. Projects (such as utility relocations) with direct effect on the start and/or interruption of progress on major freeways, arterials or structures. When late completion is more critical with respect to early completion, use higher liquidated damages based on other Department costs per Code of Federal Regulations - Title 23 rather than I/D.
3. River structures in or adjacent to central business districts.
4. Night time construction (rehabilitation and/or resurfacing) on major urban freeways.

Application

1. Single projects with I/D applied to all or part of the project
 - a) I/D applied to entire project
All work must be completed before I/D application

b) I/D applied to a portion of project

A completion date is set for the specific portion of the project, others are left to liquidated damages.

2. Combined projects (two or more)

Cooperative I/D clauses, which require the completion of all projects before I/D application, are utilized. The contractor gets 50% of the available incentive upon early completion, and receives the other 50% proportional to the early completion of adjunct projects.

Determination of Amount of I/D

The I/D amount is based on the sum of the road user delay cost and liquidated damages and should generally be adjusted downwards for fiscal responsibility.

On single projects with I/D applied to a portion of the project, only road user delay costs are used in the I/D amount. The completion of the entire project is subject to normal liquidated damages. On single projects where I/D applies to the entire project, road user delay cost and liquidated damages are used together.

Road User Delay Cost is based on the following:

- a. Change in travel time is determined by comparing the travel time in normal conditions vs. the estimated travel time during the project or the designated detour during construction.
- b. Number of passengers per vehicle will be set at 1.25, based on a current research by the Chicago Area Transportation Study.
- c. The hourly cost per passenger is \$10.00/hour, based on average earnings issued by the Department of Employment Security.

Liquidated Damages are based on construction engineering costs. Section 108 of the Standard and Supplemental Specifications for Road and Bridge Construction contains a table specifying the rates of liquidated damages.

Final I/D Amount must provide a favorable cost/benefit ratio where cost is the final daily I/D amount and the benefit is the calculated daily savings in road user and construction engineering costs. This amount should also be selected large enough to motivate the contractor.

I/D Scheduled Completion Date

The completion date must be based on a realistic and completely expedited work schedule. Expedited work schedules should involve one of the following schemes:

1. Seven day work week, double shift with night illumination.
2. Extended work hours with 12 - 24 hours per day.
3. Expedited work schedule with 228 working days per calendar year.

Limits of I/D

The maximum incentive amount limited to 5% of the total construction cost. Common practice is to limit the incentive payment days to a maximum 30 days, whereas no such limit is used for disincentives.

Extension Of Contract Time

According to Section 108 of Standard and Supplemental Specifications for Road and Bridge construction extension of time applies to only disincentives not incentives. Extension of completion date for incentives can be considered only under unforeseen extraordinary circumstances which bring additional work to the contractor.

Project Development

In I/D project greater attention to the plans, specifications and schedules is necessary in order to avoid future disputes on completion date with the contractor. Prebid meetings to cover special features of I/D project and contacts with parties involved in contract prior to construction may facilitate the application of I/D clauses.

Examples

The two examples given in Design Memorandum are solved according to the formulations given by District 1, Illinois "Incentive and Disincentive Clauses".

Also, there exists two attachments, first is a sample special provision for an I/D contract where I/D applies to completion of all work, and the second is a sample special provision where I/D applies to a portion of the contract.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. RESEARCH TASKS

The tasks to achieve the objectives of this study as specified in the introduction chapter of this study may be listed as follows:

TASK A: Define I/D contracts. Differentiate between I/D provisions related to cost, schedule, quality, safety, technology, or a combination. Identify implementation problems associated with them. Explore the advantages and disadvantages of using I/D contracts. Investigate the applicability of I/D provisions in different type contracts such as fixed price, reimbursable cost, etc. Study IDOT Design Memorandum No. 90-53 in the context of the findings above.

TASK B: Compare completed IDOT contracts with I/D provisions against completed IDOT contracts without I/D provisions. Comparison is to be made on factors identified in TASK A including but not limited to type of contract, project completion dates, liquidated damages, engineers' estimates, type of project, number of claims, legal disputes if any, change orders, owner-contractor relationship, quality of work, reputation of contractor, and contractor's managerial practices.

TASK C: Establish how contractors achieve targets in IDOT contracts with I/D provisions. This includes:

1. How targets are established by the owner in the first place, such as based on similar past projects, based on an analytical model developed for this purpose, with informal input from contractor, after formal negotiation with the contractor.
2. How I/D provisions are implemented, including time in the contract cycle when I/D provisions are negotiated with the contractor, impact on I/D provisions of changes during construction, lines of communication between the owner and the contractor, frequency of incentive awards as opposed to disincentive awards, whether the contractor shares incentives (or disincentives) with key personnel.

3. How the contractor's performance in his efforts to reach the target are evaluated: by quantitative methods, by qualitative assessment, or a combination; by owner's on-site personnel, by owner's team that includes off-site personnel too, by outside consultant.
4. What the perceived and real attitudes of the owner and the contractor towards I/D provisions are: owner's commitment, fairness, and support, added administrative effort, lines of communication, smoothness of relationship between the parties, impact of changes, and impact of incentives being shared by contractor's key project personnel.
5. Contractor work practices such as optimum crew sizes, scheduled overtime, double shifts, improved labor relations.
6. Technological improvements adopted by the contractor, such as advanced construction methods, advanced equipment, advanced materials.
7. Managerial practices used by the contractor, such as repetitive scheduling, CPM with time-cost trade-off analysis, computerized material inventory and flow control.
8. Personnel and manpower policy adopted by the contractor, such as special considerations in selecting subcontractors, special attention paid to appointing senior project personnel, using outside consultants.

TASK D: Explore implementation of I/D contracts in Departments of Transportation in other states. This includes not only I/D provisions related to schedule control, but any other I/D provisions that are applicable, particularly I/D provisions related to a combination of Schedule/Cost targets.

TASK E: Investigate the reasons and consequences of delays and cost overruns in IDOT projects. Study the principles, current practices, costs, and consequences of owner-directed project acceleration. Compare advantages and disadvantages of I/D provisions against owner-directed project acceleration.

TASK F: The final report will contain:

1. An evaluation of I/D provisions that can be used in different types of construction contracts. Their advantages, disadvantages, implementation problems, applicability in different contract environments, and frequency of use.
2. A summary of the specific differences between IDOT contracts with I/D provisions and IDOT contracts without I/D provisions.
3. An evaluation of how incentives have been achieved by contractors in the majority of IDOT projects with I/D provisions.
4. A survey summary of I/D contract practices collected from DOTs of other states.
5. Summary, conclusions, and recommendations regarding the utilization of I/D contracts in IDOT.

3.2. PRELIMINARY REVIEW

The initial step of this research was a thorough study of the history of the Incentive/Disincentive provisions, beginning from 1927 until the issuing of the IDOT Design Memorandum No. 90-53, which is the most up-to-date and currently valid document on I/D applications in IDOT as a part of Task A. The documents provided by IDOT were a series of memorandums and reports prepared by Departments of Transportation, State Highway Agencies and the Federal Highway Administration. These documents preceded the preparation of an FHWA Technical Advisory To "I/D for Early Completion" which formed the basis of the IDOT Design Memorandum No. 90-53. The results of the review of this documentation are presented in Chapter 2.

Beyond the review of the I/D applications in IDOT, a thorough literature review was also carried out, involving I/D applications in general and the related models developed over the years. This review provided a deeper insight into the structure of I/D applications and was used to highlight the historical background of the subject. Based on this literature survey, possible problems and points of special interest in I/D applications were identified.

3.3. CHECKLIST SURVEY OF I/D VS. NON-I/D CONTRACTS

Upon completion of the literature review, a "preliminary checklist" was originated as specified to be the initial step of Task B. The "preliminary checklist" consisted of a listing of the data sought in the surveys that were later conducted and are described in the following sections. The list of the data sought were based on the factors identified throughout the literature survey that were thought to have an impact on the usage of I/D provisions. The items in the preliminary checklist were used as performance measures in order to compare completed IDOT contracts with I/D provisions against completed IDOT contracts without I/D provisions.

Early in November 1993, the Springfield office was visited to conduct a pilot study on two projects selected by IDOT, one being a pavement and the other a bridge contract. The I/D documentation on these contracts and the accompanying documents were reviewed to gain an insight into the availability of the data in IDOT offices and archives. Also, professionals experienced in I/D contract applications in IDOT were consulted regarding the use of I/D clauses and the current practices in IDOT projects. The contents of the checklist were modified, based on the information available in IDOT offices. Later, in the same month, a list of contracts with I/D clauses undertaken in the period 1988-1993 was obtained from IDOT. This list consisted of a total of 75 projects, of which 7 were in District 8, 1 in District 7, 5 in District 4, 9 in District 3, leaving 53 projects in District 1. Therefore, District 1 was selected and approved by the Technical Research Panel as the target district.

Meanwhile, the preliminary checklist was sent to the members of the Technical Review Panel for their comments. A meeting of the Technical Review Panel was held in Springfield in December 1993, to discuss the progress of the research, to identify the projects to be surveyed in the

research and to review the contents of the checklist and to discuss the first draft of a questionnaire to be used in the later phases of the project. Modifications were made to the preliminary checklist based on the recommendations of the Technical Review Panel.

By the end of December, the District 1 office was notified by the Springfield office about the research. The study in District 1 began with a preliminary investigation to see whether the project files at IDOT contained the data sought in the checklist. Some of the items in the checklist included the fundamental facts about a contract such as the name of the contractor, type of project, contract duration, actual duration, project start, completion and essential completion dates. Items regarding the contract amount, the amount and frequency of change orders and the final cost were also included. For I/D contracts, some items were designed to find out the incentive/disincentive amounts per contract and whether the contractor had received/paid any. For non-I/D contracts only one item that inquired about liquidated damages was applicable. The checklist also sought the engineer's estimate and the next lowest bid offered. Of these two, the former was recorded whenever observed, but the next lowest bid was never found in any record in district offices and therefore was taken out of the checklist. The idea behind recording the engineer's estimate was to be able to measure the ratio of the contract value to the engineer's estimate and the ratio of the final value to the engineer's estimate, and then compare the differences in ratios between I/D and non-I/D contracts. The Annual Daily Traffic (ADT) in the work zone gave an idea of the importance of the roadways in I/D and non-I/D contracts comparatively; ADT was a data item that was hard to find. Information regarding the cost breakdown of the contracts and occupational deaths, injuries and accidents was not present in IDOT documents. Therefore, these items were excluded from the checklist. After the completion of the preliminary research in District 1, the "final checklist" was formed and used for the rest of the research. A copy of the "final checklist" is presented in Appendix A.

Out of the 53 projects undertaken in District 1 in the five-year period 1988-1993, 31 project files were located in the offices and the archives. The rest were either discarded or undergoing federal investigation or they were still active and were being worked on by District 1 staff. All of the 31 available projects were reviewed, and finally 20 were selected having the most complete data.

In the meantime, a list of contracts that did not contain I/D provisions was obtained from IDOT. The list included contracts in about the same type and size range as the I/D contracts. Out of the listed 86 non-I/D contracts, 23 were in District 3, and 63 in District 1. Taking into account the availability and completeness of the data, 20 projects were selected from District 1 for the analysis.

The items in the checklist were filled out by the writer by consulting both the Bureau of Design and the Bureau of Construction. The information not found in the office files were tracked down to the archives. Attempts were made to contact the resident engineer and/or the supervisor of the project to obtain the data that could not be located in the archives. The input of the resident engineer and/or supervisor was used to resolve conflicts that sometimes existed in the documentation.

Upon completing the collection of data in District 1, District 3 was visited. The 9 I/D contracts that were completed in District 3 in the last five years and a group of 10 non-I/D contracts carrying similar characteristics to the I/D contracts were located. The data was collected in the same fashion as in District 1. However, the contract no. 42926 in District 3 was an I/D contract implemented without a cap on the incentive duration. The contractor was given an extension of I/D time for 4 days, because the specified enamel top coat was incompatible with the base coat. This specific contract was awarded \$8,000 incentive per day and the contractor completed the job receiving a \$1,200,000 incentive that was more than 50% of the contract amount. Although initially intended to be included in the study sample, the analysis required this project to be omitted to be consistent with other projects that had caps. Therefore, 8 contracts from District 3 was included in the study.

During the checklist survey, one main subject of special interest had been the determination of contract durations for I/D and non I/D contracts. For each project, a rough estimate of duration was made by the bureau of design based on the daily production rates. Therefore, it was thought to be worthwhile to conduct a research on the Construction Daily Production Table and its evolutionary history. To that end, a personal interview was conducted with Ms. Karen Konior (District 1 engineer), who was a member of the committee that revised the Construction Daily Production Table in the Design Manual, in the period May 1992 to February 1994. Also, a telephone interview was conducted with Mr. David Johnson, who was the chairman of this committee. The findings of these interviews are reported in later sections.

To summarize, out of the 53 I/D projects implemented in District 1, 31 were located and reviewed and 20 of these 31 projects with the most complete data were selected. Of the 63 non-I/D projects specified by IDOT in the same district, 19 were selected with the most complete data and similar scope and amount of work. In District 3, of the 9 I/D projects implemented and located, 8 were included in the study; and of the 23 non-I/D projects specified by IDOT, 10 were selected with the most complete data and similar scope and amount of work. The characteristics of the study sample, 28 I/D contracts and 29 non-I/D contracts are shown in Tables 3.1, 3.2 and 3.3.

3.4. QUESTIONNAIRE SURVEY OF RESIDENT ENGINEERS AND CONTRACTORS' SUPERINTENDENTS

Task C required the preparation of a questionnaire to explore the ways targets were set, the ways I/D provisions were implemented, the ways the contractor's performance was evaluated, perceived or real attitudes of contractors and owners toward I/D provisions, and the contractor's work, managerial, and technological practices. The questionnaire was submitted to the Technical Review Panel for their constructive criticism. A copy of the "questionnaire" is presented in Appendix A.

TABLE 3.1. CHARACTERISTICS OF THE I/D CONTRACTS USED IN THE SAMPLE

Characteristics	Minimum	Maximum	Average	Total
Contract Amount	\$116,621.00	\$17,146,177.00	\$6,037,821.35	\$169,058,997.76
I/D Amount Allowed/Day	\$1,500/day	\$20,000/day	\$7,810.71/day	\$218,700/day
I/D Duration Allowed/Cont.	4 days	30 days	24.68 days	691 days
Contract Duration (I/D days of project)*	12 days	402 days	194.61 days	5449 days
ADT (veh)	1,200	150,200	60,024.33	1,620,657

* Calendar Days

TABLE 3.2 CHARACTERISTICS OF NON-I/D CONTRACTS USED IN THE SAMPLE

Characteristics	Minimum	Maximum	Average	Total
Contract Amount	\$172,140.00	\$17,107,052.00	\$6,909,118.14	\$200,264,425.98
Contract Duration*	88 days	705 days	278.03 days	8,063 days
ADT(veh)	4,750	113,200	35,526	746,050

*: Working Days

TABLE 3.3. CLASSIFICATION OF SAMPLE CONTRACTS

CLASS	I/D	NON-I/D
DISTRICT 1	20	19
DISTRICT 3	8	10
PAVEMENT	14	15
BRIDGE	14	14

The main idea behind the questionnaire survey was to identify the owner's (IDOT) and the contractors' perceptions towards I/D provisions and to reveal the managerial and technical practices of both parties to achieve the goal of early project completion. Therefore the questionnaire, had a two fold utility, of which the first one was to understand IDOT's perception of I/D applications, and the second was to comprehend the contractors' expectations of the I/D clauses in a contract.

Between March 1 and March 15, several lists were received from IDOT of on-going and recently completed projects. These lists included the names and telephone numbers of the resident engineers and contractor's superintendents involved in these projects. They also included information about a total of 13 completed projects (8 in District 1, 1 in District 3, and 4 in District 8) and 8 on-going projects (6 in District 1, 1 in District 3, 1 in District 4).

The resident engineers and contractor firms were notified about the questionnaire survey by a memorandum sent to them by IDOT. Telephone calls were made to obtain the cooperation of all parties involved.

Following this, the resident engineers and contractor's superintendents were contacted by the writer. The questionnaires were filled out either by personal interviews or via mailings or sometimes telephone interviews according to the preference of the individuals and their geographic locations. The sites of the ongoing projects were visited and most of the resident engineers and contractors' superintendents were interviewed on site. For the completed projects, the same procedure was followed. Finally out of the 21 mentioned projects, 18 resident engineers and 11 superintendents were interviewed. The rest had either left their position in their firms or could not be located at the addresses or phone numbers supplied. A list of the districts, projects and persons consulted is given in Appendix C, Table 1.

3.5. QUESTIONNAIRE SURVEY OF DOTs THAT USE I/D PROVISIONS

Task D required the preparation of a questionnaire to explore I/D contract practices in DOTs of other states. The questionnaire was basically a rephrasing of the original questionnaire edited to reflect I/D implementation in general in that state. An additional question was placed inquiring whether any other incentive schemes other than schedule incentives, such as cost, quality, safety, technology, management or a combination of thereof, had been used in the associated state. The questionnaire was again submitted to the Technical Review Panel for their constructive criticism. An E-mail message was sent from the Bureau of Construction in Springfield to all the states to identify which states were using or had used I/D provisions in their contracts, and in reply four states stated they had used I/D contracts. The survey of these DOTs that used I/D provisions were conducted by mail. A list of the persons consulted is given in Appendix C, Table 2.

3.6. THE IMPACT OF OWNER-DIRECTED PROJECT ACCELERATION

The impact of owner directed project acceleration on project duration and total project cost were to be assessed in Task E by using an acceleration model developed by Riad, Arditi and Mohammadi (1993). The outcome would be compared against the outcome of I/D provisions. However, the necessary data was not available in IDOT records for implementation of this analysis.

CHAPTER 4

DISCUSSION OF RESULTS

4.1. INTRODUCTION

As has been mentioned in Chapter 3, this study basically consists of two surveys: a checklist survey and a questionnaire survey. In the checklist study, a total of 57 projects were examined of which 28 were expedited I/D projects and 29 were regular completion date projects. The bar-charts that tabulate the results of the checklist study are presented at the end of section 4.2. - Checklist Survey Results are in the same order used in the original checklist. The questionnaire study targeted 21 projects. In each project selected for the questionnaire survey, both the owner's (IDOT) and contractor's opinions were sought. In the end, 18 questionnaires answered by IDOT's resident engineers and 11 questionnaires by contractors' superintendents were obtained. The bar-charts that tabulate the results of the questionnaire surveys are presented at the end of the section 4.3. - Questionnaire Survey Results, in the same order as the questions in the original questionnaires.

All IDOT contracts that included I/D provisions aimed at "schedule incentive" only. These schedule incentives were to be paid at the end of the project.

4.2. CHECKLIST SURVEY RESULTS

The "essential completion" of a project, as referred to in this study, is defined as the completion of all work specified as "essential" in the description of the project in an IDOT contract. The project duration in I/D contracts is generally expressed as "essential completion" and this constitutes a benchmark for calculating incentive payments or disincentive charges as the case may be. Additional time to essential completion for "non-essential" activities such as clean-up is granted whenever deemed necessary. Sometimes, items such as planting, seeding and painting are excluded from the description of completion in I/D projects which is then referred to as "essential completion". In other words, a project is accepted as having reached "essential

completion" when traffic can flow safely and efficiently on the part of the roadway that was under construction. In the analysis, the date the roadway was opened to traffic was taken as the "essential completion" date. Studies showed that this date coincided with 99% completion date of the project as noted in weekly reports 95% of the time. Therefore, in cases where the date the roadway opened to traffic was not recorded in the documents, the date that corresponded to 99% completion was extracted from the weekly reports as the "essential completion" date.

The "final completion" of a project is the date when all of the work included in the contract is finished by the contractor including punch list items, seasonal seedings, plantings, paintings and general cleanup. The project duration in non-I/D contracts is always expressed as "final completion" and this constitutes a benchmark for calculating liquidated damages.

The time extensions indicated for the sampled contracts applied to the final completion time for non-I/D projects and to the essential completion time for I/D projects. Time extension in an I/D project could only be granted by IDOT if a significant amount of extra work was added to the project or to the part of the project where I/D provisions were being used. A time extension could also be granted by IDOT in case of force majeure. However, these time extensions did not apply to the incentive payment dates. In other words, if, due to some inevitable factor, the I/D projects were to last longer than the original contract duration, an adjustment in contract date, not necessarily in the I/D payment date was made. This protected the contractor from being penalized for failing to meet a completion date due to factors beyond his control, and relieved the owner from paying extra monies when it had not received the benefit of early opening to traffic. This is also a policy stated in the Design Memorandum 90-53. Yet, 3 contracts in this study sample were awarded an extension of I/D time (Contract no.s 80718, 80719 and 80820). The I/D completion date was extended in each by 8 days, 7 days of which were for a potential railroad strike and 1 day for Labor Day, because the start of the work was delayed. Suspensions that took place after "essential completion" were not considered by IDOT as time extensions, rather they were recorded in the documentation with corresponding suspension and resumption dates. In order to differentiate between the time extensions on contract date and extension of I/D date, the extensions mentioned hereon will refer to time extensions in contract date. This assumption will also aid in constructing a fair enough basis to compare the time extensions granted to non-I/D contracts with those in I/D contracts.

Considering the overall analysis of all contracts as shown in Fig 4.2.1., I/D contracts received an average of 4.21% extension whereas non-I/D contracts received 24.01% extension on the original contract duration for the final completion of the project. This may suggest that I/D contracts were better defined in scope than non-I/D contracts and normally necessitated few if any major extra work. However, the relatively larger frequency and magnitude of change orders in I/D contracts (analyzed in detail later on in the text), does not support this view.

I/D contracts achieved "essential" and "final" completion faster than similar non-I/D contracts. Looking at Fig. 4.2.1, again, even though an average of 4.21% extension was awarded in I/D contracts, the proportion of "essential duration" to "contract duration" was 34.96% smaller in I/D projects than the same ratio in non-I/D projects with similar scope and amount of work (Table

4.1). On the other hand, the "final completion" of the job took on the average 49.31% and 75.81% longer than the contract duration in I/D and non-I/D contracts respectively. Also from Fig. 4.2.1., it can be seen that for non-I/D projects, the extensions given approximately corresponded to delays in essential completions. However, the delays in final completions of these non I/D projects were at least three times larger than the extensions awarded. Common reasons for this difference included suspension of work by IDOT or disputes in the approval of extensions. Suspensions and resumptions affected mainly the portion of the project subsequent to essential completion. It should be noted here that, after essential completion, the roadway was open to traffic and only minor adjustments such as seeding, landscaping, cleaning and punch list items were made thereafter.

TABLE 4.1. DIFFERENCES IN DURATION RATIOS

	RATIO (R) DUR. ESSENTIAL/CONTRACT DUR.			RATIO (R) DUR. ACTUAL/CONTRACT DUR.		
	R(I/D)	R(NON-I/D)	Δ(%)	R(I/D)	R(NON-I/D)	Δ(%)
ALL	0.8349	1.2837	34.69	1.4931	1.7581	15.07
DIST. 1	0.8383	1.2368	32.22	1.4572	1.8279	20.28
DIST. 3	0.8263	1.4109	41.44	1.5905	1.6255	2.15
PAVEMENT	0.8553	1.4375	40.50	1.4460	1.9491	25.81
BRIDGE	0.8160	1.1299	27.78	1.5402	1.5534	0.09

Δ= The % change in the ratio of essential or actual duration to contract duration between I/D and non-I/D contracts

$$\Delta = \{ [R(\text{non-i/d}) - R(\text{i/d})] / R(\text{non-i/d}) \} * 100$$

When I/D projects are sorted by districts, it appears that all the projects that received time extensions were in District 1(Figs.4.2.4.,4.2.7). This may suggest that District 3 has performed better on I/D contracts, as they granted no extensions of time and accomplished a ratio of essential duration to contract duration which was 43.8% (Table 4.1) smaller than the same ratio for non-I/D contracts. The ratio of 0.79 for District 3 projects was also the minimum in all categories with an average value for all contracts 0.82. This acceleration has also decreased the ratio of actual duration to contract duration in District 3 projects to 1.63 whereas the average for all contracts was 1.76. At this point, the Annual Daily Traffic (ADT) in the construction zones should be mentioned:

In District 1	avg. ADT	I/D projects	=	78,370
	avg. ADT	non-I/D projects	=	53,027
	weighted avg	(all projects)	=	66,023 veh

In District 3	avg. ADT	I/D projects	=	7,607
	avg. ADT	non-I/D projects	=	16,275
	weighted avg. (all projects)		=	12,676 veh

$$\text{ADT (D1)} / \text{ADT (D3)} = 5.2083$$

As seen from the above calculation, ADT on a typical construction route in District 1 was more than 5 times more crowded than construction sites in District 3. The larger essential completion durations in District 1 can therefore be attributed to the high volume and visibility of the roadways and the more urban location of the district. The main factor in using I/D provisions in District 3 contracts was that these contracts involved primarily the construction of new decks on bridges over the Illinois river which resulted in extreme adverse travel to the public, and therefore could not tolerate time extensions. Also, being a more rural district and due to the smaller contract amounts, the I/D projects in District 3 may have been defined relatively better in scope, not necessitating major changes in the amount of work, and consequently resulting in no extensions of time.

When sorted by project type, it can be seen that pavement projects received 8.14% extension, whereas few, if any, of the other projects including major bridge work were granted any extensions. It is difficult to explain why bridge related works did not receive any time extensions. The delays in essential completion and final completion of non-I/D bridge projects have been the smallest among other categories. The ratios of essential duration to contract duration and the ratio of actual duration to contract duration in non-I/D bridge projects were 1.13 and 1.55, respectively; whereas the corresponding averages of the sample were 1.28 and 1.76 indicating earlier completion of bridge projects. A similar trend was observed in the ratio of essential duration to contract duration for I/D contracts in the bridge related works category (Figs. 4.3.1.,4.3.10,4.3.13).

In the beginning of this study, it was expected that due to the critical nature of the projects, I/D contracts would have a clearer definition of the scope of work, resulting in lesser magnitude in dollar value and frequency of change orders. However, in the overall analysis the opposite trend was seen. According to Fig. 4.2.3, the frequency of change orders was 0.13/day in non-I/D contracts and 0.19/day in I/D contracts. The magnitudes of these change orders were 6.47% in non-I/D contracts and 11.22% in I/D contracts. It should also be noted that expressway reconstruction projects were usually "rushed" and the design consultants were given an expedient time frame to prepare a complete set of plans. These consultant contracts were set up with tight deadlines in their contracts and it was known by the consultants that overtime would be needed. It appears, therefore, that accelerating a project increases the number and amount of change orders. Also, some interesting interpretations can be made regarding the District 3 data. In District 3, the amount of change orders were the largest percentage of the contract amount both in I/D and non-I/D contracts. Furthermore, against the overall trend, the frequency of change orders is less than in non-I/D contracts, and the minimum in all categories with an average of 0.16 per day (Figs. 4.2.3., 4.2.6., 4.2.9, 4.2.12, 4.2.15).

I/D contracts were always more over budget than non-I/D contracts, presumably because of higher frequency and magnitude of change orders. Taking a look at Fig. 4.2.2., I/D contracts cost 11.22% more than the contract amount whereas non-I/D contracts' budget overflow was 6.47%. So, while the ratio of essential duration to contract duration in I/D contracts was 34.69% smaller than the same ratio for non-I/D contracts; the budget over flow in I/D contracts was 4.27% more than the budget overflow in non-I/D contracts (Table 4.2). When sorted by districts (Figs. 4.2.5 and 4.2.8) and by types of projects (Figs. 4.2.11 and 4.2.14) the same trend is seen for I/D contracts over non-I/D contracts. However, considering the time savings in the speedy opening of the highway to traffic in I/D contracts, it is not surprising to see this difference in I/D and non-I/D contracts' actual costs.

Of the 75 I/D contracts that IDOT completed in the period 1988-1993, only 5 were charged liquidated damages (disincentives). Four of them were in District 1 (Contract no s 80267, 80953, 80954 and 80955) and 1 in District 8 (Contract no. 42345). Contracts in District 8 were not included in the study, but the four contracts in District 1 were investigated. Unfortunately, at the time of investigation, those contracts had not been finalized and there were disagreements regarding the amount of these disincentives. Seventy out of 75 projects, i.e. 93.3% were completed on time or sooner.

TABLE 4.2. DIFFERENCES IN BUDGET OVERFLOWS

CATEGORIES	RATIO(R) FINAL AMOUNT/CONTRACT AMOUNT		
	R(I/D)	R(NON-I/D)	Δ(%)
ALL	1.1122	1.0647	4.27
DISTRICT 1	1.1072	1.0481	5.34
DISTRICT 3	1.1249	1.0963	2.54
PAVEMENT	1.1211	1.0534	6.04
BRIDGE	1.1034	1.0769	2.40

Δ = the % decrease in the budget overflow between I/D and non-I/D contracts

In the I/D contracts that were investigated in this study, contractors received on the average 4.71% of the contract amount as incentive payments. This number is in compliance with the 5% cap requirement in IDOT Design Memorandum 90-53. However the study shows that the average actual amount of incentive allowed in a project was 5.13% of the contract amount (Appendix A, Table 1). The 5% cap was placed as a cushion to limit the incentive payments in

case there was an error in the establishment of the contract duration. (FHWA Technical Advisory, 1989). The maximum and minimum percentages paid to the contractor as incentive were 21.66% and 0.26%, respectively.

It was interesting to note that 8 out of 28 contracts allowed incentives that were more than 5% of the contract amount. This explains why the average incentive allowed (5.13%) exceeded the cap of 5%. The incentives that were larger than the 5% cap specified in Design Memorandum 90-53 were justified by IDOT personnel by the fact that the projects in question were small in size and that adherence to the 5% cap would result in very small incentives that would not serve the purpose. Of the 8 projects that allowed incentives of more than the 5% cap, 4 were in District 3 corresponding to 50% of this district's sample, and the remaining 4 in District 1, constituting 20% of the district sample. It should be noted here that there were no I/D calculations encountered in 50% of District 3 data. The incentive payments have exceeded the 5% cap because the low bid was lower than the program cost that the I/D calculation was based upon.

The ratio of the total incentive amount received by contractors to maximum allowable incentive amount was $4.71/5.13 = 91.81\%$, i.e., the contractors succeeded in earning 91.81% of the available incentive amount. Another approach in measuring the success of the contractors was to establish an average of the ratios of the incentive days earned per project to the maximum allowable incentive days per project which was calculated to be 87.90% (Appendix A, Table 1). The difference in these two percentages, 91.81% and 87.90%, stemmed from the utilization of cooperative incentive payments in IDOT contracts. In those contracts that incentive I/D provisions were used, the allowable incentive duration was kept constant, but if all the cooperative contracts succeeded in attaining the schedule target established, the incentive amount per day was doubled for each of them.

The benefit/cost ratio averaged 2.46 (Appendix A, Table 1) where benefit was the cost savings to the public in terms of road user delay costs and cost was the money paid as incentive to the contractor. The averages of other B/C cost ratios with respect to district and type of work categories were found to be:

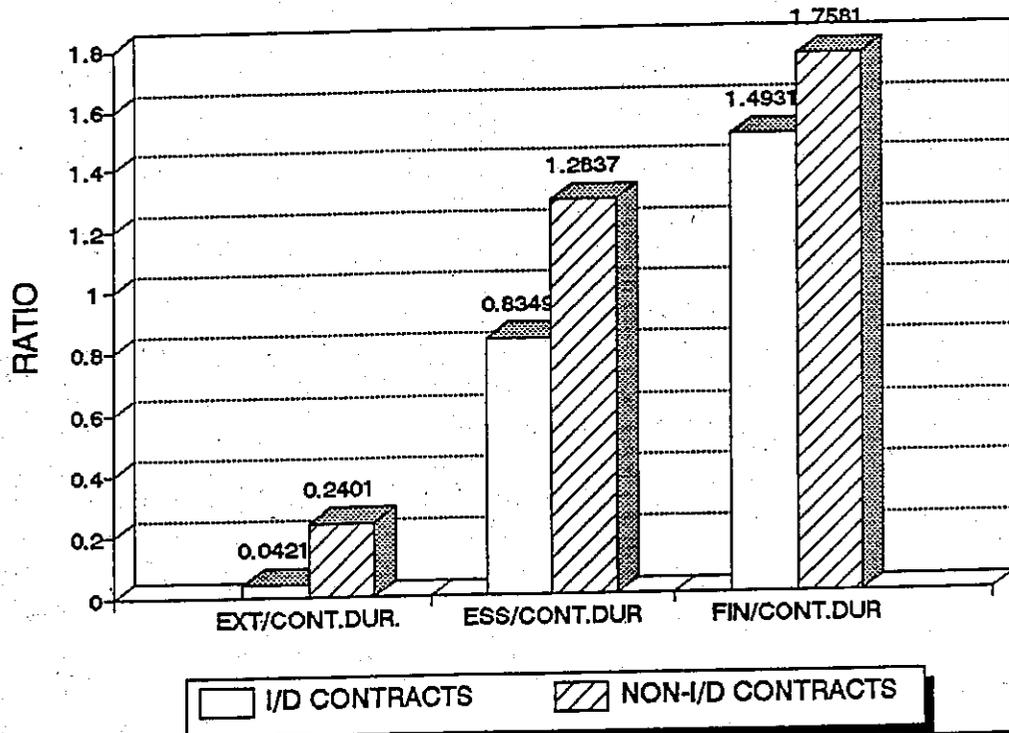
DISTRICT 1	2.57
DISTRICT 3	1.92
PAVEMENT	2.97
BRIDGE	1.89

It has been suggested in the IDOT experimental feature final report (for project BHF-10(46) at FA Route 10, Section 86 BR, Cass and Schuyler Counties, IL) that I/D clauses may be expected to result in lower bids. The reason for this anticipation was attributed to the savings in manpower and equipment that were achieved because of the early completion of such projects. Yet, it can also be argued that when the project duration was to be reduced, more resources in terms of manpower and equipment had to be utilized in an average I/D project to meet the early completion target. The research shows that I/D contracts received higher bids than similar non-

I/D contracts with an average of 96.30% and 91.33% of the estimate for I/D and non-I/D contracts respectively (Fig. 4.2.3). The overall analysis with respect to districts and types of projects also agree with the finding that bids received for I/D contracts were larger than for non-I/D contracts of similar scope and amount of work (Figs. 4.2.6., 4.2.9., 4.2.12, 4.2.15). The same trend is observed in the actual costs of projects with respect to engineers' estimates. As seen in Fig. 4.2.3, the ratio of actual cost/engineer's estimate in I/D contracts is 10% [$(1.0789 - 0.9723)/1.0789 = 0.0988$] larger than the same ratio for non-I/D contracts. One explanation may be that IDOT's estimates for I/D projects were on the conservative side.

One result that deserves emphasis here is that, in all the classifications, except for the District 3 category, the amount of bids received for both types of contracts were lower than the estimates. Conversely, in District 3, the I/D projects were awarded to bids 1.08 times more than the estimate. Following this, the actual costs of District 3 I/D projects exceeded the estimates by 24.05%, and the contract amount by 12.49%, standing out as the most expensive contracts. This increase in cost, of course has shown its merit in the reduction of the ratio essential duration to contract duration for I/D contracts.

Fig. 4.2.1. DURATION COMPARISON
All Contracts

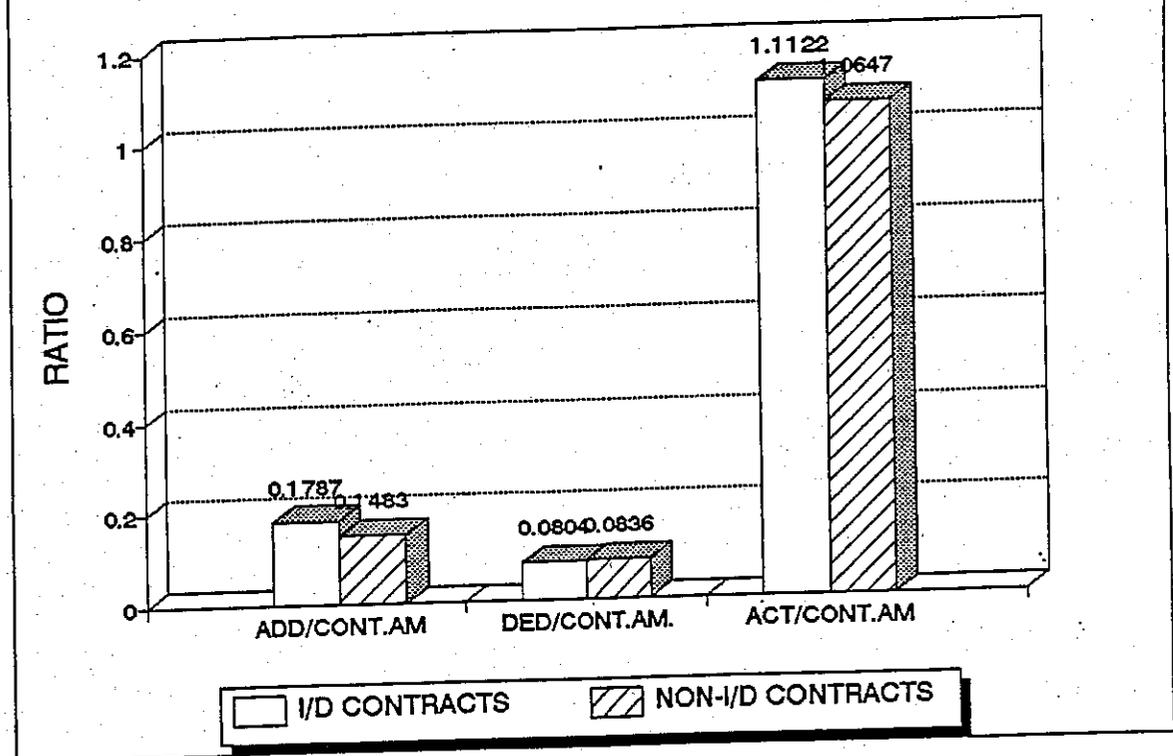


EXT/CONT.DUR. : TIME EXTENSION/CONTRACT DURATION

ESS/CONT.DUR. : ESSENTIAL DURATION/CONTRACT DURATION.

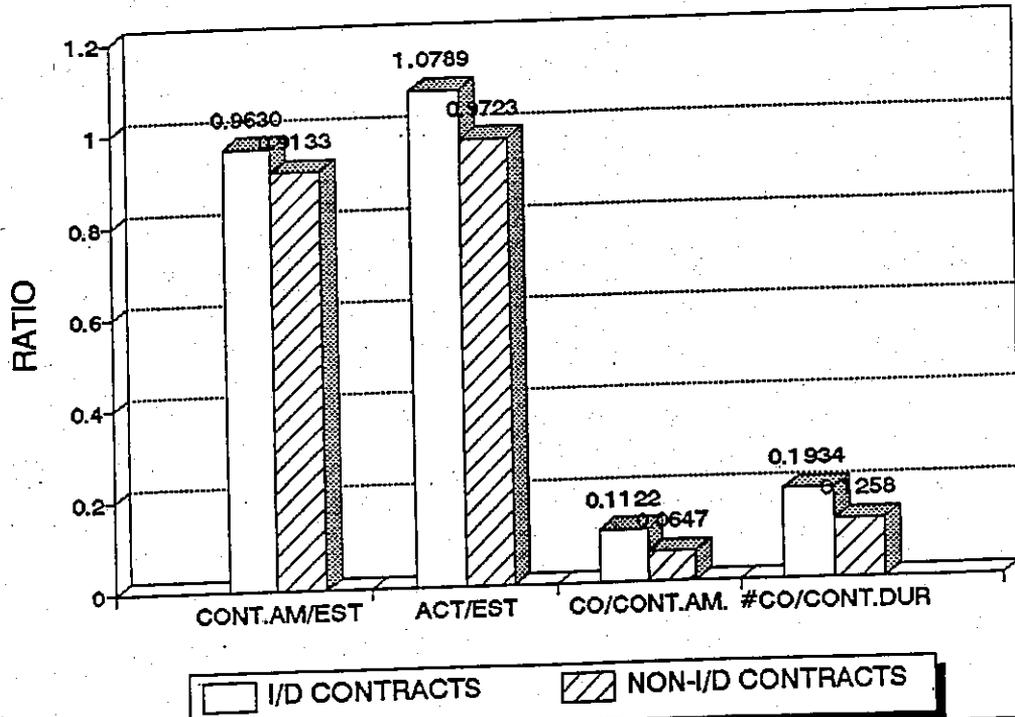
FIN/CONT.DUR. : FINAL DURATION/CONTRACT DURATION

Fig. 4.2.2. CONTRACT AMOUNT COMPARISON
All Contracts



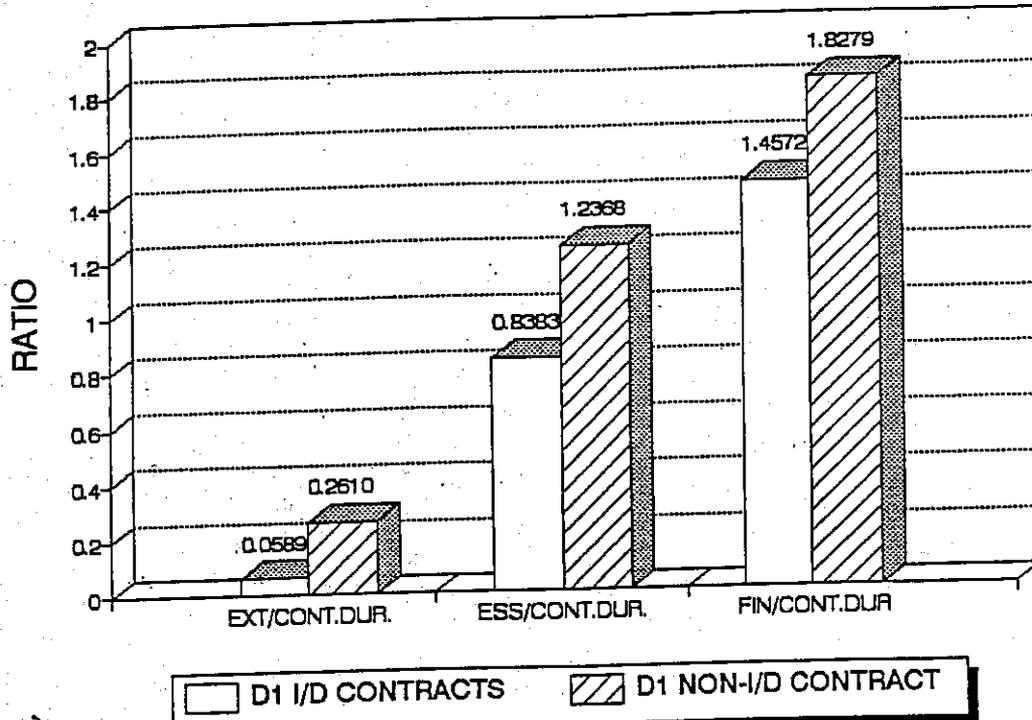
ADD/CONT.AM. : ADDITIONS/CONTRACT AMOUNT
 DED/CONT.AM. : DEDUCTIONS/CONTRACT AMOUNT
 ACT/CONT.AM. : ACTUAL AMOUNT/CONTRACT AMOUNT

Fig. 4.2.3. ESTIMATE & CHANGE ORDER COMP.
All Contracts



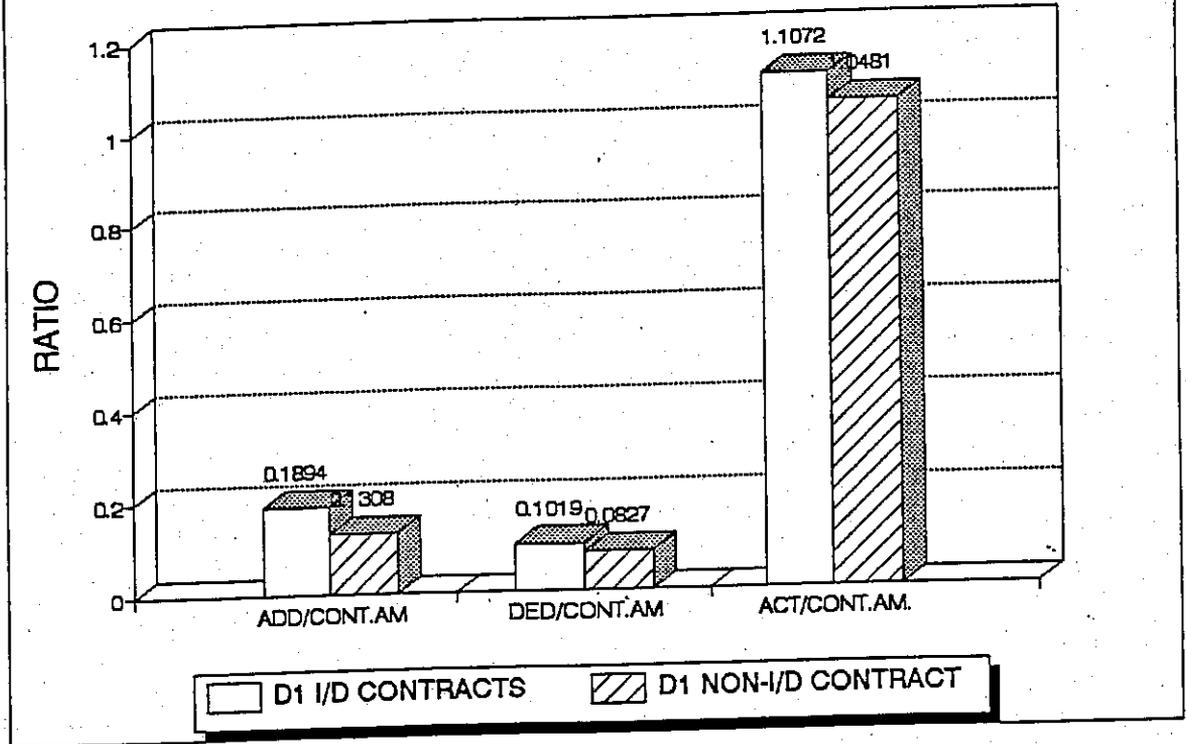
CONT.AM/EST. : CONTRACT AMOUNT/ENGINEER'S ESTIMATE
 ACT/EST. : ACTUAL AMOUNT/ ENGINEER'S ESTIMATE
 CO/CONT.AM. : DOLLAR AMOUNT OF CHANGE ORDERS/CONTRACT AMOUNT
 #CO/CONT.DUR. : NUMBER OF CHANGE ORDERS/CONTRACT DURATION
 (FREQUENCY OF CHANGE ORDERS)

Fig. 4.2.4. DURATION COMPARISON
District-1 Contracts



EXT/CONT.DUR. : TIME EXTENSION/CONTRACT DURATION
 ESS/CONT.DUR. : ESSENTIAL DURATION/CONTRACT DURATION
 FIN/CONT.DUR. : FINAL DURATION/CONTRACT DURATION

Fig. 4.2.5. AMOUNT COMPARISON
District-1 Contracts

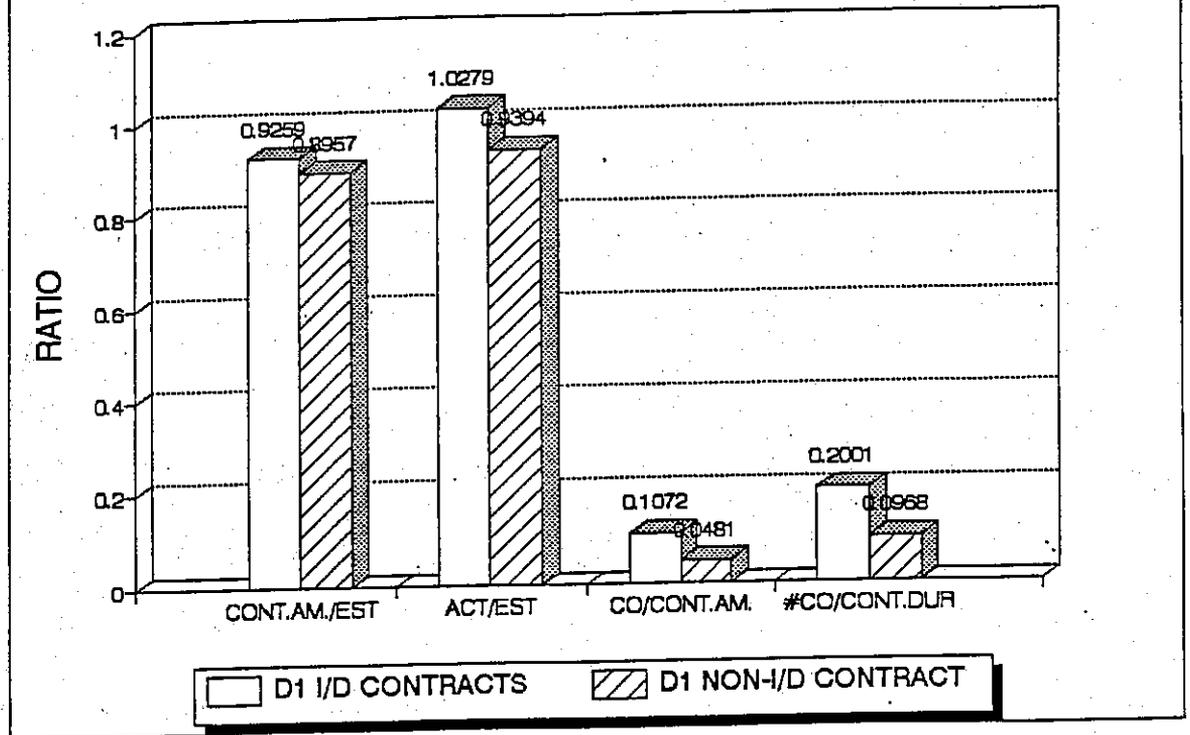


ADD/CONT.AM. : ADDITIONS/CONTRACT AMOUNT

DED/CONT.AM. : DEDUCTIONS/CONTRACT AMOUNT

ACT/CONT.AM. : ACTUAL AMOUNT/CONTRACT AMOUNT

FIG. 4.2.6. ESTIMATE&CHANGE ORDER COMP.
District-1 Contracts



CONT.AM./EST. : CONTRACT AMOUNT/ENGINEER'S ESTIMATE

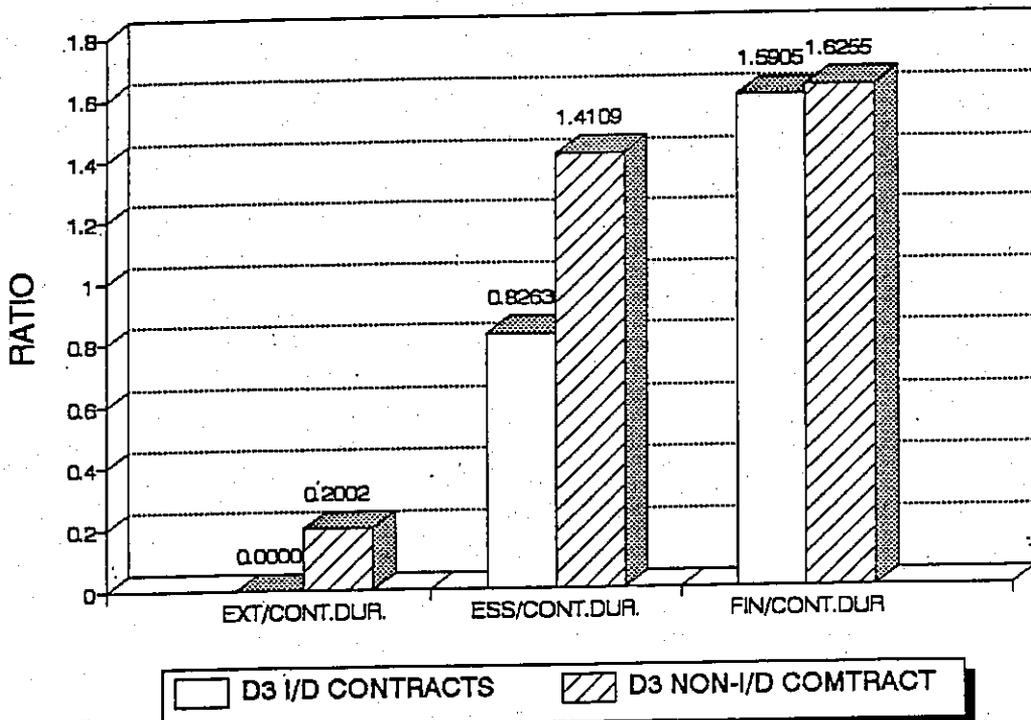
ACT/EST. : ACTUAL AMOUNT/ ENGINEER'S ESTIMATE

CO/CONT.AM. : DOLLAR AMOUNT OF CHANGE ORDERS/CONTRACT AMOUNT

#CO/CONT.DUR. : NUMBER OF CHANGE ORDERS/CONTRACT DURATION

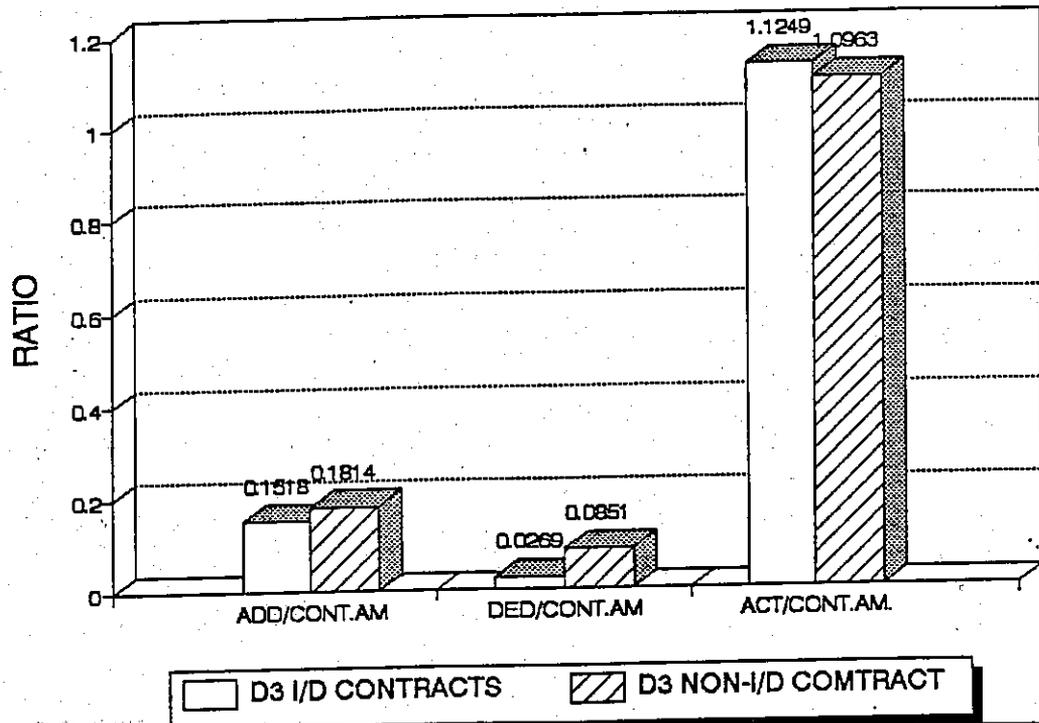
(FREQUENCY OF CHANGE ORDERS)

**Fig. 4.2.7. DURATION COMPARISON
District-3 Contracts**



EXT/CONT.DUR. : TIME EXTENSION/CONTRACT DURATION
 ESS/CONT.DUR. : ESSENTIAL DURATION/CONTRACT DURATION
 FIN/CONT.DUR. : FINAL DURATION/CONTRACT DURATION

**Fig. 4.2.8. AMOUNT COMPARISON
District-3 Contracts**

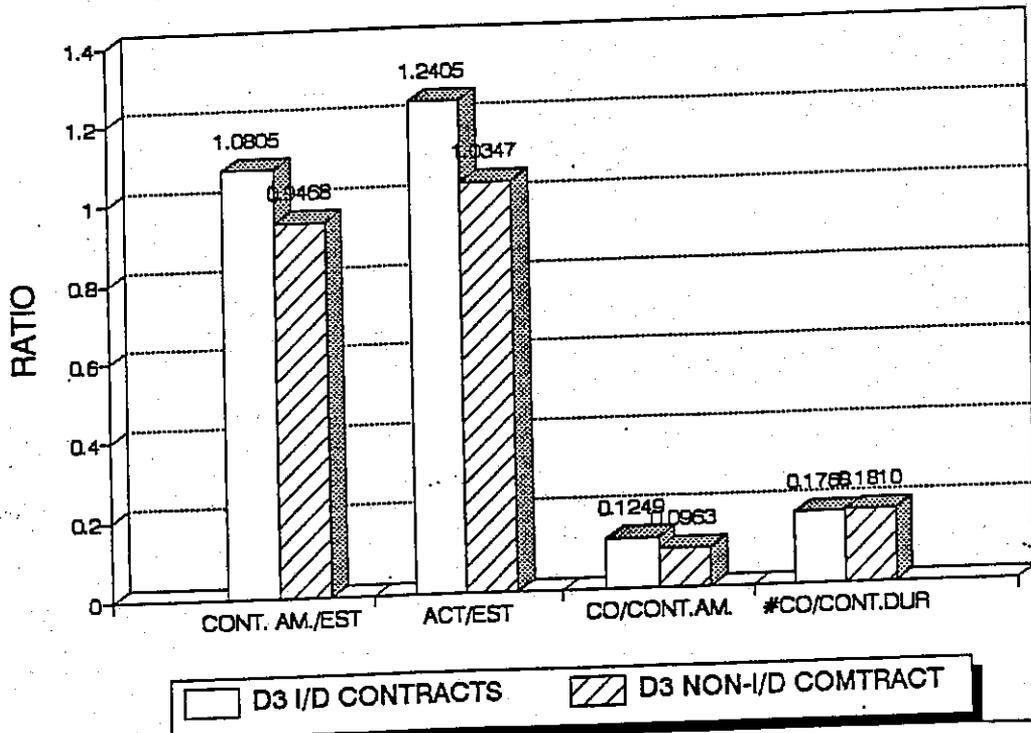


ADD/CONT.AM. : ADDITIONS/CONTRACT AMOUNT

DED/CONT.AM. : DEDUCTIONS/CONTRACT AMOUNT

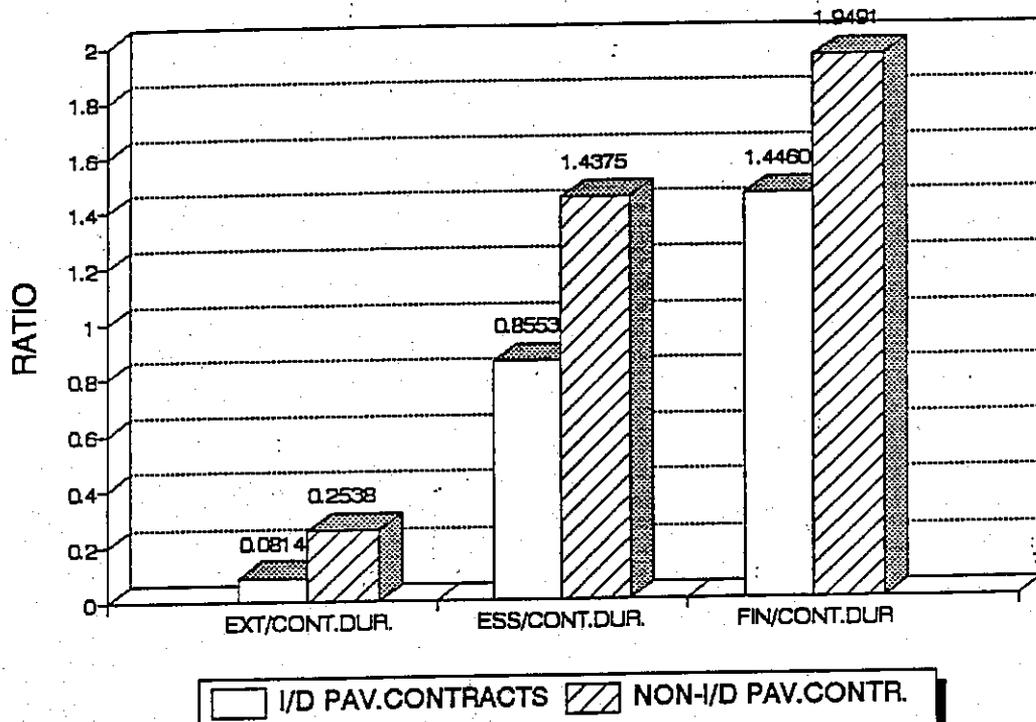
ACT/CONT.AM. : ACTUAL AMOUNT/CONTRACT AMOUNT

Fig. 4.2.9. ESTIMATE & CHANGE ORDER COMP.
District-3 Contracts



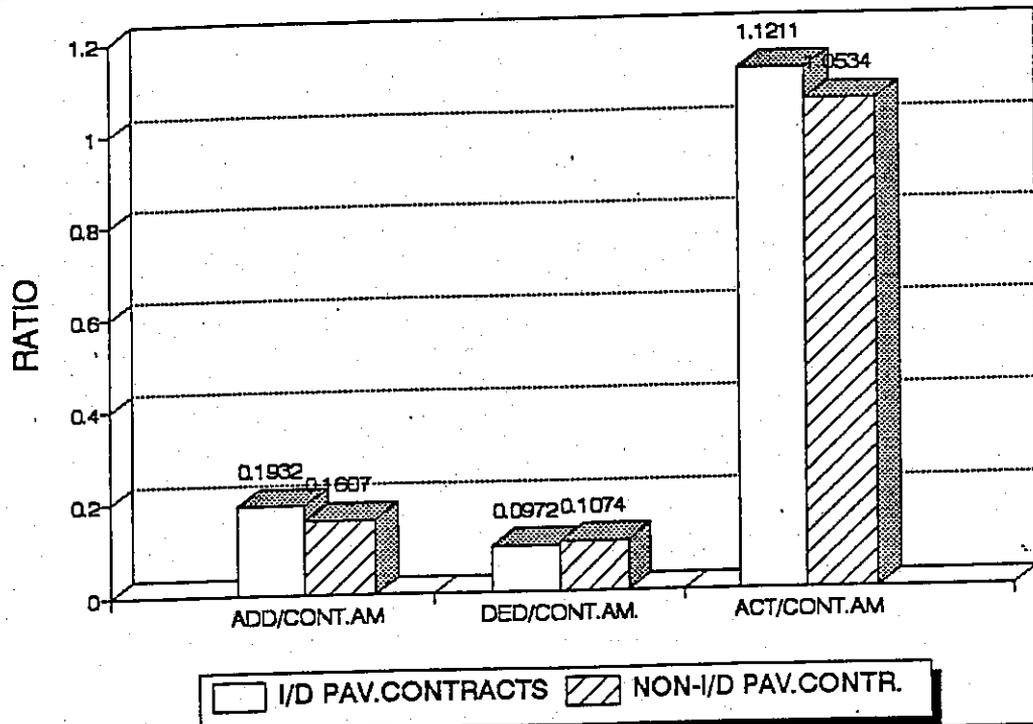
CONT. AM./EST. : CONTRACT AMOUNT/ENGINEER'S ESTIMATE
 ACT/EST. : ACTUAL AMOUNT/ ENGINEER'S ESTIMATE
 CO/CONT. AM. : DOLLAR AMOUNT OF CHANGE ORDERS/CONTRACT AMOUNT
 #CO/CONT. DUR. : NUMBER OF CHANGE ORDERS/CONTRACT DURATION
 (FREQUENCY OF CHANGE ORDERS)

**Fig. 4.2.10. DURATION COMPARISON
Pavement Contracts**



EXT/CONT.DUR. : TIME EXTENSION/CONTRACT DURATION
 ESS/CONT.DUR. : ESSENTIAL DURATION/CONTRACT DURATION
 FIN/CONT.DUR. : FINAL DURATION/CONTRACT DURATION

**Fig. 4.2.11. AMOUNT COMPARISON
Pavement Contracts**

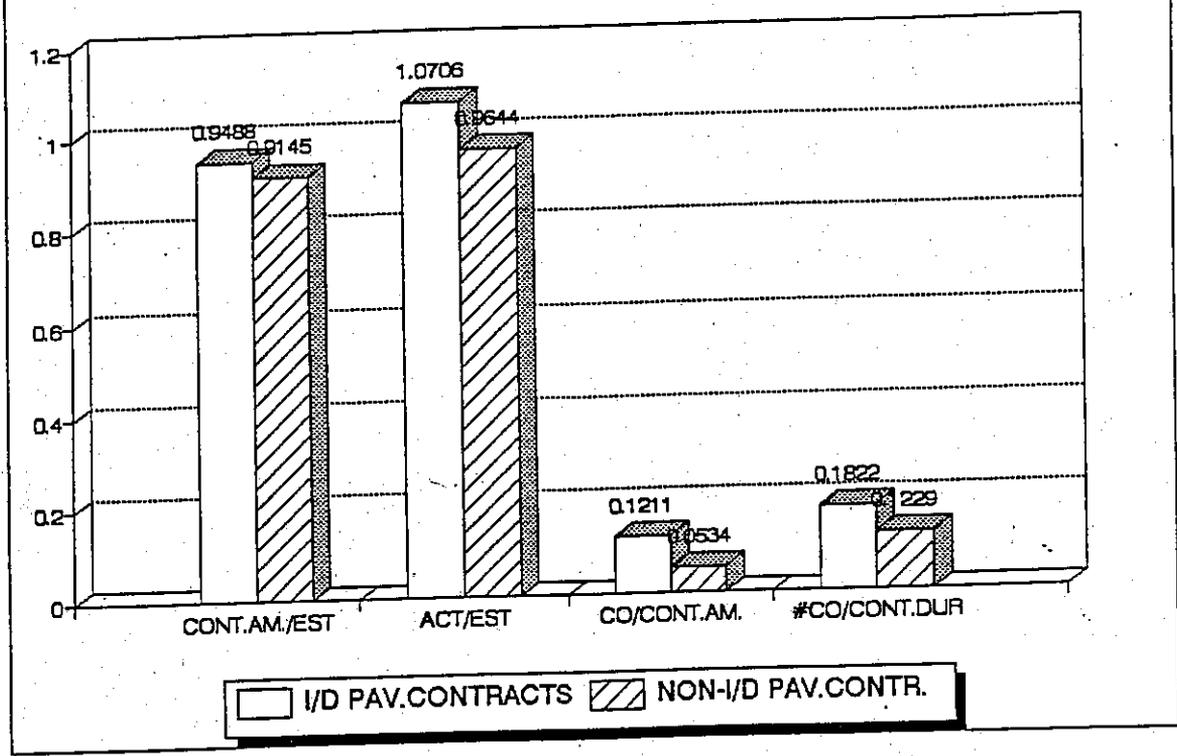


ADD/CONT.AM. : ADDITIONS/CONTRACT AMOUNT

DED/CONT.AM. : DEDUCTIONS/CONTRACT AMOUNT

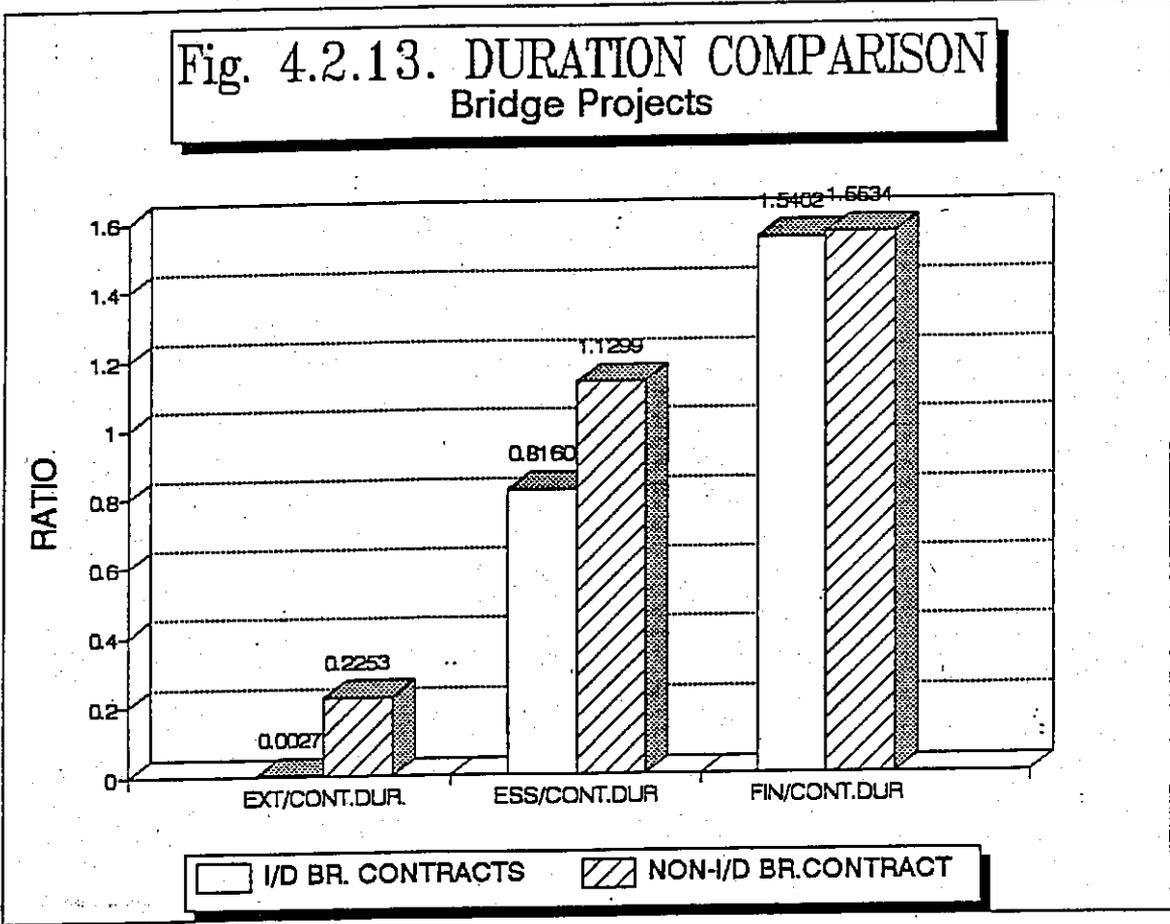
ACT/CONT.AM. : ACTUAL AMOUNT/CONTRACT AMOUNT

**Fig. 4.2.12. ESTIMATE & CHANGE ORDER COMP.
Pavement Contracts**



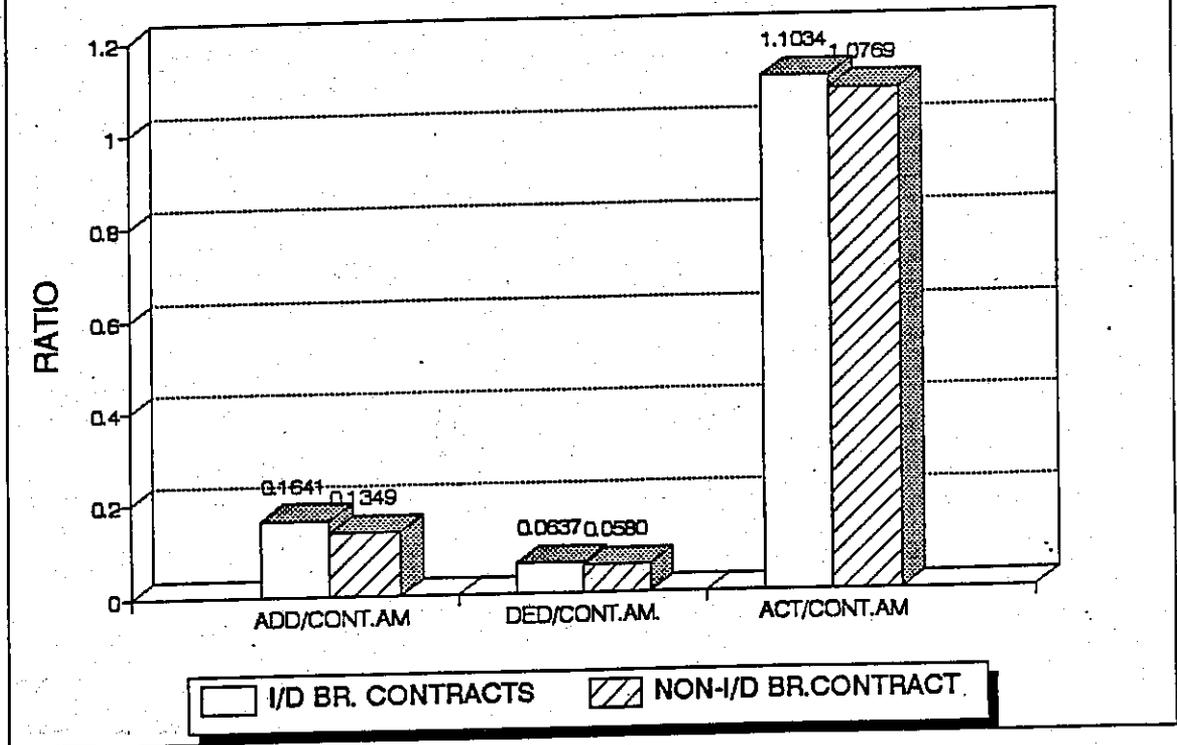
CONT.AM./EST. : CONTRACT AMOUNT/ENGINEER'S ESTIMATE
 ACT/EST. : ACTUAL AMOUNT/ ENGINEER'S ESTIMATE
 CO/CONT.AM. : DOLLAR AMOUNT OF CHANGE ORDERS/CONTRACT AMOUNT
 #CO/CONT.DUR. : NUMBER OF CHANGE ORDERS/CONTRACT DURATION
 (FREQUENCY OF CHANGE ORDERS)

Fig. 4.2.13. DURATION COMPARISON
Bridge Projects



EXT/CONT.DUR. : TIME EXTENSION/CONTRACT DURATION
 ESS/CONT.DUR. : ESSENTIAL DURATION/CONTRACT DURATION
 FIN/CONT.DUR. : FINAL DURATION/CONTRACT DURATION

**Fig. 4.2.14. AMOUNT COMPARISON
Bridge Projects**

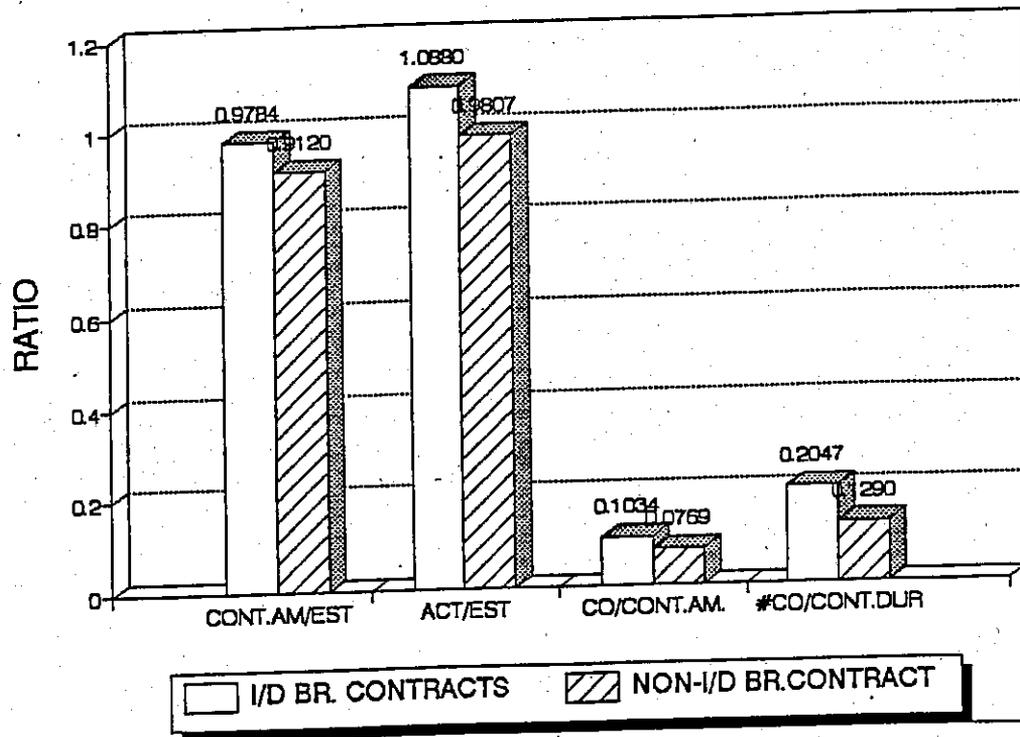


ADD/CONT.AM. : ADDITIONS/CONTRACT AMOUNT

DED/CONT.AM. : DEDUCTIONS/CONTRACT AMOUNT

ACT/CONT.AM. : ACTUAL AMOUNT/CONTRACT AMOUNT

**Fig. 4.2.15. ESTIMATE & CHANGE ORDER COMP.
Bridge Projects**



CONT.AM./EST. : CONTRACT AMOUNT/ENGINEER'S ESTIMATE

ACT/EST. : ACTUAL AMOUNT/ ENGINEER'S ESTIMATE

CO/CONT.AM. : DOLLAR AMOUNT OF CHANGE ORDERS/CONTRACT AMOUNT

#CO/CONT.DUR. : NUMBER OF CHANGE ORDERS/CONTRACT DURATION
(FREQUENCY OF CHANGE ORDERS)

4.3. QUESTIONNAIRE SURVEY RESULTS

As mentioned earlier, the main idea of the questionnaire survey was to reveal the perceptions of both parties, IDOT and contractor, on the implementation of I/D clauses in contracts. The interpretation of the questionnaire results provided a clear insight of the perceptions of both parties on the issue. To achieve this insight, the same questionnaire was administered to each party in order to observe the similarities and discrepancies in their expectations of I/D usage. The rate of return of the questionnaires was 11/21 in contractors and 18/21 in IDOT's resident engineers.

In the analysis, for some questions, the answers given to the same question by IDOT and contractor tended to deviate considerably from each other, indicating a significant discrepancy in perceptions. In some other cases, the answers were in agreement. These cases will be highlighted in the following discussion.

4.3.1. Project Duration for I/D Contracts

The most critical problem in a "schedule-incited" project is the accurate determination of the contract duration by IDOT prior to construction, even bidding. This determination is crucial as all of the incentive payments or disincentive charges will be made by using the contract duration as a benchmark. If the required contract duration is underestimated, the project will lose its incentive characteristic. On the other hand, if the required contract duration is overestimated, then there will not be real savings for the owner. Therefore, contract completion date should be set with utmost care and should reflect the optimal completion time that is attainable for the contractor and economical for the owner.

In Fig. 4.3.1, the results of the question on how the project duration is established by IDOT is shown. The large majority of the contractors, about 67.7%, did not know the answer to the question. Interestingly, 30% of IDOT's resident engineers did not know the answer to this question either. Another 50% of IDOT's resident engineers responded to this question saying that it was based on similar projects. Twentyfive percent of the contractors also thought the same. Determination of project duration based on similar projects meant that, the quantity take off of the project was done by the design bureau and the activity durations were determined by using the Daily Production Table in the Design Manual. Then, the critical or controlling items were selected which controlled the pace of the project progress. These items were then plotted on a barchart forming the initial progress schedule of the project. This progress schedule was updated as the project developed.

Within the framework described above regarding the establishment of I/D project duration, the production rates specified in the Design Manual were of prime importance. Taking this into account, two interviews were carried out, one with Ms. Karen Konior, a construction engineer from District 1 who had been involved in the committee that revised the numbers in the Daily Production Table that is part of the Design Manual and the other with Mr. David Johnson who was the chairman of the committee. The reason behind starting this committee was that the daily

production rates specified in the Design Manual were quite old and out of date. Those numbers had not been revised in over ten years. Considering the current technology and equipment, the numbers did not reflect reality. In May 1992, IDOT started this committee and the meetings continued through 1993. The committee was composed of representatives from all districts in Illinois. They basically reviewed the numbers in the Daily Production Table by using input from design and construction engineers in their respective districts sharing their experience and expertise. The high and low margins were set to allow for differences in districts, in weather conditions, locations (urban or rural), high volume roads, ...etc. There were no specific methods regarding the selection of appropriate production rates from within the available ranges. Rather this decision was left to the expertise and intuition of the person in charge of the project at this stage. This method of project duration determination is referred to as "determination of I/D time using past performance" in the FHWA Technical Advisory T5080.10. Another method that was recommended in this technical advisory is the use of CPM methods.

When using past performance in estimating project duration, two schedules were made: normal and expedited. The "normal schedule" was based on a 5-day week and 8-hour day work schedule. This schedule was then compressed into a 6 or 7-day week, - preferably 6 because 7-day work weeks seemed to have adversely affected the personnel - with extended working hours (FHWA Technical Advisory, 1989). Another alternative at this point would be to increase the daily production rates while calculating the duration. It was anticipated that extensive manpower and equipment be utilized to realize the project target of "early completion", so it would as well be expected that there will be an increase in the daily production rates of the project items. The project duration would be more realistically calculated if the increases in the daily production rates were taken into account in addition to the increases in the working hours per day, and working days per week.

Even though mentioned in the Technical Advisory, IDOT did not perform any computerized analysis such as CPM in the determination of project durations, even for I/D projects which are of major importance to the state and the public. The possible ways of determining project duration using CPM methods and evaluating the effects of further expediting the project can be achieved by performing project compression (Antill and Woodhead, 1990). Also, there was no formal or informal input from the contractor regarding the issue. Being more familiar with computerized project scheduling and duration estimation, the contractor's additional comments might assist in achieving more realistic completion times. One of the methods that integrates the contractor's duration estimate to the contract duration is a bidding method called "A + B Bidding", as described in Chapter 2.

Returning to the questionnaire, all the contractors questioned in the survey were satisfied with their schedule performance claiming they had expedited the projects to their fullest extend possible under the given circumstances. An interesting finding of the questionnaire was that 100% of the contractors agreed that the associated I/D projects would last longer by an average of 21% per project, had they not included I/D provisions (Fig. 4.3.20). IDOT representatives agree with the contractors partially, at a level of 55%. However, they expected that these projects would last 44% longer if they were non-I/D projects. Only 5% of IDOT's resident

engineers thought that the project would not last longer even if it were non-I/D, implying that there were rare cases where the inclusion of I/D provisions were thought to be redundant.

Assuming the daily I/D amount to be constant, it was questioned whether it would be possible to complete an I/D project sooner than the specified target, i.e., beyond the time saving that corresponded to maximum incentive (Fig. 4.3.21). When analyzed according to involved parties, 55% of the contractor as opposed to 19% of the resident engineers expected time savings that could exceed the allowable cap specified in I/D contracts by an average of 15 days (contractors) and 4 days (resident engineers). Contractors, therefore tended to think that there was a possibility to complete I/D projects faster than the maximum allowed incentive period specified in the contract whereas the resident engineers were more conservative on the issue. This potential could be used to realize even earlier project completion in I/D contracts.

4.3.2. Implementation of I/D Provisions

Incentive contracts are basically fast track projects that have been accelerated to establish the earliest possible completion of a specific project. When doing this, as in all construction contracts, the cost is meant to be kept within a reasonable range but a contractor that achieves the time savings specified and performs a safe and acceptable task is given the opportunity to earn a bonus.

The need for such an objective may result from a variety of causes. The following list of causes was compiled after a thorough study of the scope of the I/D projects undertaken by IDOT. Design Memorandum 90-53 has also been used as a major source. In addition to those, three brainstorming sessions were held by the research team, to come up with a thorough list of reasons why I/D provisions should be used in contracts.

As the analysis shows in Fig. 4.3.2, out of these possible reasons, taking a weighted average of the answers given by both the contractors and IDOT's resident engineers, six of them were the most frequently selected ones as shown in Table 4.3.

These six reasons can be used as a checklist to determine whether the inclusion of I/D provisions is appropriate for a project. The remaining ten reasons that constitute 21.93% of the total seem to be more specific and appear to have been selected by the respondents because of the unique nature of the associated projects.

There seems to be a large disagreement in the perception of the stage at which I/D provisions were included in the contract (Fig. 4.3.3.). More than 75% of IDOT's resident engineers claimed that these provisions were included in the planning or design stage, whereas less than 10% of the contractors believed the same. The majority of the contractors, more than 50%, thought that these provisions were included at a later stage such as the bidding or construction stages. The research showed that I/D provisions were always introduced at the early stages of a

contract. It appears therefore that contractors are not well informed of the way I/D provisions are set, decided, and included in a contract.

TABLE 4.3. TOP SIX REASONS FOR INCLUDING I/D PROVISIONS IN CONTRACTS

REASONS	WEIGHTED AVG. (11 Contractors & 18 REs)
High visibility project	18.74%
High volume road	17.95%
High road user delay cost	16.98%
Project involved with major reconstruction of an existing highway	8.93%
Project benefits, in terms of cost savings and/or safety, that outweigh the cost of incentive payments and additional construction costs	7.78%
Project involved in the prolonged closure of one or more highway lanes	7.69%
TOTAL	78.07%

I/D provisions in contracts, can be used in a variety of ways. The usage of I/D in IDOT contracts has been limited to "schedule incentives in unit price contracts" only. When respondents were asked to rank the objectives in an I/D contract (Fig. 4.3.6.), resident engineers ranked schedule as the first target and cost as the fourth, whereas contractors ranked cost as the first target and schedule as the fourth. It was surprising to see that in a schedule-incited project, contractors had ranked schedule as the fourth target. It seems that, I/D implementation was perceived as only a profit tool for contractors and therefore they concentrated more on reducing their construction costs. The idea behind using ID provisions should be better conveyed to the contractors in order to obtain contract goals which will be profitable for each party. The rest of the ranking with respect to parties, and their weighted averages are shown in Table 4.4.

Initially it was commonly believed that non-I/D contracts would receive lower bids. It was indeed proved in the checklist analysis (Fig. 4.3.3) that non-I/D contracts were bid on the average, lower than the I/D contracts with similar amount and scope of work. Eighteen percent of the contractors and 44% of IDOT's resident engineers agreed with this fact that project bids would be lower if it were a non -I/D project. In contrast, 82% of the contractors and 6% of the resident engineers tended not to expect lower bids, had this been the case (Fig. 4.3.10). Apparently, the contractors did not tend to accept the fact that they would have bid lower if the

project did not include I/D provisions. It clearly stood out that the high risk transfer associated with the I/D contracts was inflating the bids, as a cushion on the contractor's side against the possibility of losses that could be incurred due to the acceleration involved in such projects.

The perceptions of the parties on the frequency and magnitude of change orders were in agreement. Almost 50% of contractors and IDOT resident engineers stated that the frequency and magnitude of change orders for I/D contracts were the same for non-I/D contracts (Figs. 4.2.4, 4.3.5). However, the checklist survey showed that the frequency and magnitude of change orders in I/D contracts were in fact larger than the ones in non-I/D contracts.

One of the important aspects in I/D provisions is the definition of project completion. The parties seem to agree on the general definition of project completion as "*unrestricted traffic is permitted (cleanup and demobilization not included)*" with a majority of almost 50% percent (Fig.4.3.11). Twenty-five percent of the time substantial completion was considered to indicate project completion. It is believed that substantial completion was considered by most respondents as corresponding to the time when unrestricted traffic is permitted. There seems to be reasonable consensus among the parties regarding the criterion of project completion.

TABLE 4.4. I/D OBJECTIVE RANKING

CONTRACTOR		IDOT	
OBJECTIVE	RANKING	OBJECTIVE	RANKING
Cost	2.11	Schedule	2.14
Safety	2.44	Quality	2.36
Quality	2.67	Safety	3.07
Schedule	2.73	Cost	3.64
Management	4.33	Management	4.86
Technology	4.44	Technology	4.93

4.3.3. IDOT and Contractor Communications

One of the effects of including I/D provisions in a contract, is to transfer risk from the owner to the contractor, accompanied by a compensatory bonus scheme. Bearing in mind one of the conclusions of the Business Roundtable's reports (BR Report A-7, 1982) a disadvantage of fixed price contracts [of which, unit price contracts are a variation and the most commonly utilized contract type by IDOT] is that it puts the owner and the contractor in adversary roles. With the

addition of I/D provisions and the consequent risk transfer to this scenario, the hostility between the parties is likely to increase. One solution to this problem would be to maintain good lines of communication between the parties and share the same objectives to guarantee that all parties involved benefit the most from the contract.

According to Figure 4.3.7, the most common ways to establish lines of communication were preconstruction meetings followed by regular construction meetings and informal communications between the owner and the contractor. However, there was almost no predesign communication between the parties. The researchers believe that the development of early communications, even at predesign or design stages could help attain schedule targets because of the unique nature of I/D contracts.

The study shows a large discrepancy in the perceptions of parties when it comes to the negotiation of I/D provisions in IDOT-contractor communications. Seventy-five percent of IDOT representatives claimed that I/D provisions were negotiated in preconstruction or construction meetings, whereas 72% of contractors indicated that I/D provisions had not been discussed in these meetings (Fig.4.3.8). Yet, there were not many disputes caused by contractors' objections to I/D clauses (Fig.4.3.9). The discrepancy between the perceptions regarding I/D negotiations deserves further consideration.

4.3.4. Contractor's Performance

It was expected of a contractor undertaking an I/D contract, to work longer hours with increased manpower and equipment utilization in order to achieve the early completion target. Out of the many schemes that IDOT's contractors used to attain this target, a 6-day work week, extended work hours with 12-14 hours per day, and multiple work crews in multiple areas were the most frequently used expedited work schedules (Fig. 4.3.12).

It was also anticipated that the contractors would experience some difficulties in implementing these expedited work schedules in the field due to labor agreements. As reported by the contractors in Fig. 4.3.13, the most problematic areas were adjusting scheduled overtime and increasing labor productivity, each pointed out by 40% of the respondents.

The contractors tried to achieve project goals by extreme compression of activities towards the end of the project in addition to the planned technological/managerial practices. Ad hoc measures were used when deemed necessary. The owner seemed to agree with these measures taken by the contractor to fulfill the I/D targets (Fig. 4.3.14). The technological/managerial improvements introduced into the I/D contract implementations were mostly in the form of advanced construction methods and equipment usage, more than 60% of the time. Advanced construction management techniques were used at a level of 17% of the time (Fig. 4.3.15).

The owner expected the contractor to be using CPM methods for project management at a level

of 48% (Fig. 4.3.16). However, the contractors declared using barcharts most frequently with 39%. This might imply a tendency on the contractor's part to conform to the owner's method for project management in IDOT contracts. The other managerial practices that were rather infrequently used are also shown Figure 4.3.16.

The results indicate that contractors adopted special considerations in selecting subcontractors and field personnel to fulfill the I/D targets (Fig. 4.3.17). In contrast, fewer adopted special consideration in selecting senior project personnel and fewer than 10% used outside consultants. Once the contractor earned the incentive, the payment was made in full upon completion of all the work at the end of the project (Fig.4.3.18). The incentive payment received was passed down to the middle and/or upper management level 78% of the time (Fig.4.3.19). The workers did not directly receive a share from the incentive, rather they benefitted from the bonus in terms of overtime payments.

4.3.5. I/D Implementation Problems

At the end of the questionnaire, there was a section, requesting the respondents to note the most critical problems encountered in the related I/D project, that would normally not be seen in a non-I/D contract, and to add their comments on I/D provisions. The following is a list of these problems and comments regarding I/D contracts' usage:

- ▶ Crew redundancy affecting productivity,
- ▶ Working in adverse weather conditions for maintaining the schedule (some unforeseen events, such as flooding of rivers for bridge projects more than estimates, increased project duration),
- ▶ Scheduling and coordinating subcontractors,
- ▶ Scheduling shifts,
- ▶ Patching on bridges,
- ▶ Compression of bridge, drainage and paving being performed all at the same time,
- ▶ Dispute over what constituted clean-up and punch-list items (contractor believed that landscaping and fence installation were part of this, and that he deserved more I/D pay than that would be paid by IDOT),
- ▶ Loose schedules,
- ▶ The push-push-push by the contractor to complete and receive maximum incentive,

- ▶ Traffic staging, in particular, ramp closures and opening,
- ▶ Extreme volume of work to finish in the last month prior to full bonus (electrical, lighting, surveillance, pavement marking, signing, landscaping),
- ▶ Timely review of shop drawings,
- ▶ Change order approval to proceed with other scheduled work,
- ▶ Vague contract language in I/D clauses; the special provisions is misleading and has several interpretations,
- ▶ Scheduling problems from condensing large amounts of work into a short time frame,
- ▶ Shorter decision-making process; time frame for this process is generally reduced and is made more difficult by related shorter list of alternatives to choose from,
- ▶ Sacrificing quality for speed.

4.4. QUESTIONNAIRE SURVEY RESULTS OF OTHER DOTs

Of the four states that had notified having used I/D provisions in their contracts (Missouri, Nebraska, New Jersey, Oregon), all but Oregon, returned the completed questionnaires. The size of the sample restricted the researchers to perform any kind of statistical analysis, however some inferences have been drawn with the available data.

An additional question was placed at the beginning of the questionnaire to investigate whether different incentive schemes other than schedule-incentives were being used in different states. All respondents stated that they had used combined incentive clauses in their contracts, including cost, quality, safety and technology in addition to schedule incentives. The ranking of the project targets are shown in Table 4.5.

As seen in the table, the ranking of I/D targets in other states is almost the same as in IDOT. In addition to the different incentive schemes, these states have implemented various payment methods of the incentive amount as well.

The determination of the duration of an I/D project was based on similar projects by plotting a barchart of the program schedule.

The other DOTs seem to agree that the projects would last longer had they not included I/D provisions.

TABLE 4.5. I/D OBJECTIVE RANKING IN OTHER DOTs

OBJECTIVE	RANKING
Schedule	1.67
Safety	2.33
Quality	2.67
Cost	3.33
Management	5.33
Technology	5.67

The most common reasons for including I/D provisions in these states were a subset of the most common reasons why IDOT included I/D provisions in their contracts (Table 4.3).

These states confirmed the finding of the IDOT questionnaire survey that I/D provisions are included at the design stage of a project.

There was no significant data to support the expectation of lower bids in I/D contracts from these states. However, these states expected the frequency and magnitude of change orders to be the same as in non-I/D projects, which did not agree with the findings of the IDOT study.

In contrast to the agreement of IDOT resident engineers on the general definition of I/D contract completion, the responding states put forward a variety of criteria for project completion.

The DOTs that responded did not have any predesign communication and did not negotiate I/D provisions in their meetings with contractors. Therefore no objections on contractors' side were brought up.

Contractors of other DOTs seemed to have taken up similar schedules with 6- or 7-day work weeks, extended working hours and multiple work crews in multiple areas. The DOTs' perceptions of the contractors' performance were vague as they were asked to answer the questionnaire for I/D contracts in general and not for a particular contract. Of the measures mentioned to fulfill I/D targets, ad hoc measures as necessary, and advanced construction methods were marked. Barcharts and CPM seemed to be the most common managerial tool in I/D project implementation.

The pertinent literature indicates that I/D provisions have been used in DOTs other than the states' that responded to this questionnaire survey. For instance, the contractors were encouraged to submit proposals that altered project duration, design, work method or sequencing provided

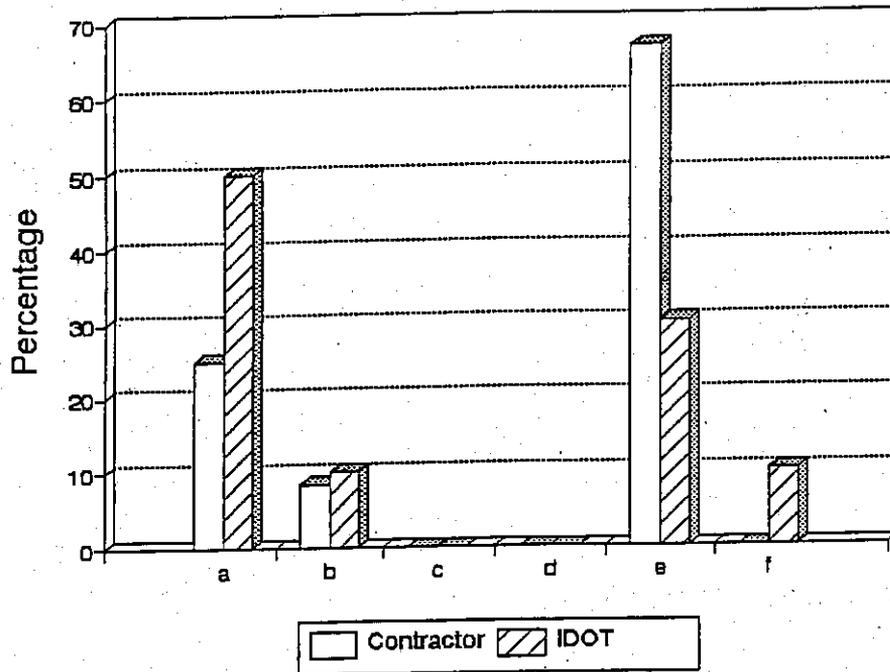
that resulted in cost savings while maintaining the scope and function of the project in Washington State DOT's \$1.5 billion I-90 project which has been going on and off since the mid-1950s (Rice, 1992). Also, Texas DOT has made studies regarding the determination of contract durations and used these in their I/D contracts. They have developed a Contract Time Determination System, also known as CTDS, which consists of these six steps:

1. Collect project data
2. Determine standard classification
3. Review and assign work activities
4. Identify and adjust production rates
5. Develop project schedule either manually or by using computers (depending on the scope and magnitude of the work)
6. Convert the schedule to calendar dates

This method is used in all contracts implemented by the state to reduce time-related disputes. It is reported that TxDOT uses CPM programs in large-scale and complex projects (TTR, 1993).

Determination of Project Duration

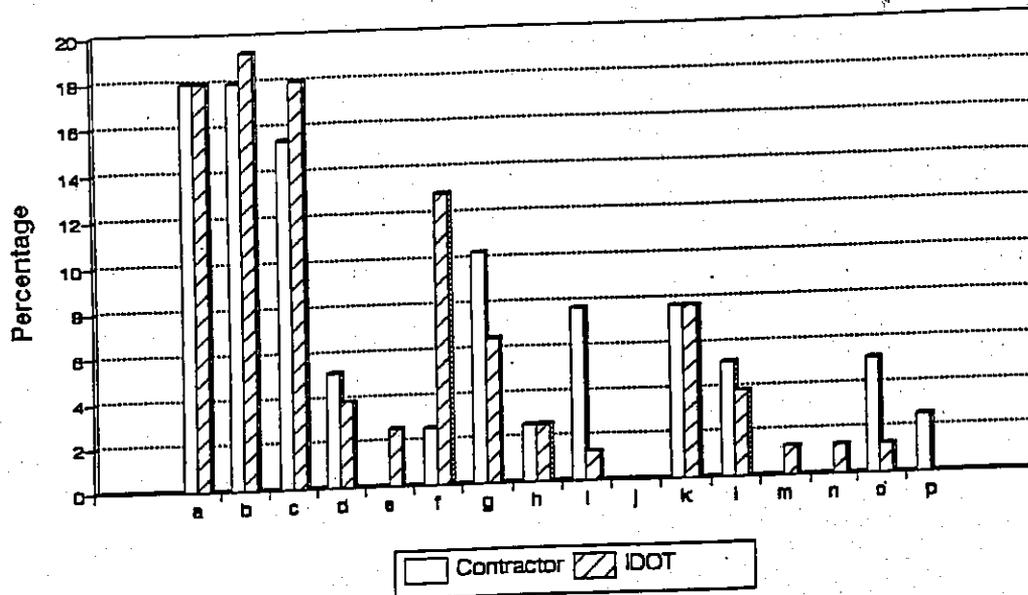
Fig. 4.3.1



Q1. How is project duration established by IDOT prior to the commencement of the I/D project?

- (a) Based on similar projects
- (b) Based on an analytical model developed for this purpose
- (c) With informal input from contractor
- (d) After formal negotiation with the contractor
- (e) Don't know
- (f) Other (please specify)

Reason for I/D Contract Choice
Fig. 4.3.2



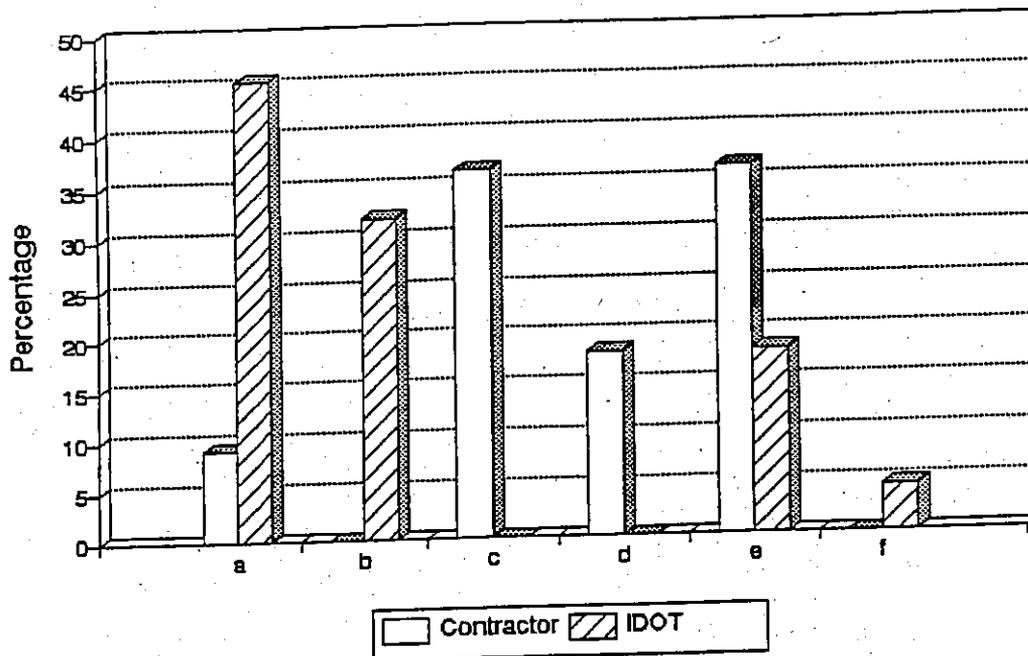
Q2. Why was this project chosen as an I/D project? Please mark as many as appropriate.

- (a) High visibility project
- (b) High volume road
- (c) High road user delay cost
- (d) Severe disruption on adjacent businesses
- (e) Project with direct bearing on project start and/or interruption of progress on major freeways, arterials or structure
- (f) Project involved with major reconstruction of an existing highway
- (g) Project with benefits, in terms of cost savings and/or safety, that outweigh the cost of incentive payments and additional construction costs.
- (h) A part of a contract that can be done well before the rest of the work, and is of significant benefit to the public (eg.:early use of a highway lane)

- (i) Project was a prerequisite to the use of some other projects (eg.: filling a gap or removing a serious bottleneck)
- (j) Project was needed by a specific date to provide service to some other traffic generator (eg.: a new school)
- (k) Project involved the prolonged closure of one or more highway lanes
- (l) River Structure in or adjacent to central business district
- (m) Night time construction on major urban freeway
- (n) Part of a cooperative I/D project application
- (o) Don't know
- (p) Other (please specify)

I/D Clauses Introduction Stage

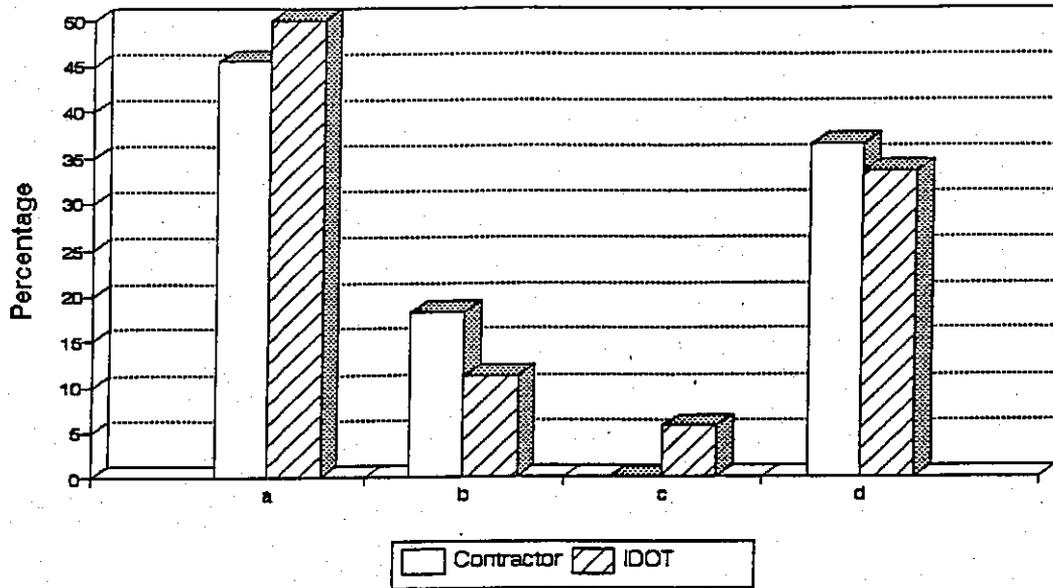
Fig. 4.3.3



Q3. At what stage were I/D provisions included in the contract?

- (a) At the planning stage
- (b) At the design stage
- (c) At the bidding stage
- (d) At the construction stage
- (e) Don't know
- (f) Other (please specify)

Frequency of Change Orders
Fig. 4.3.4

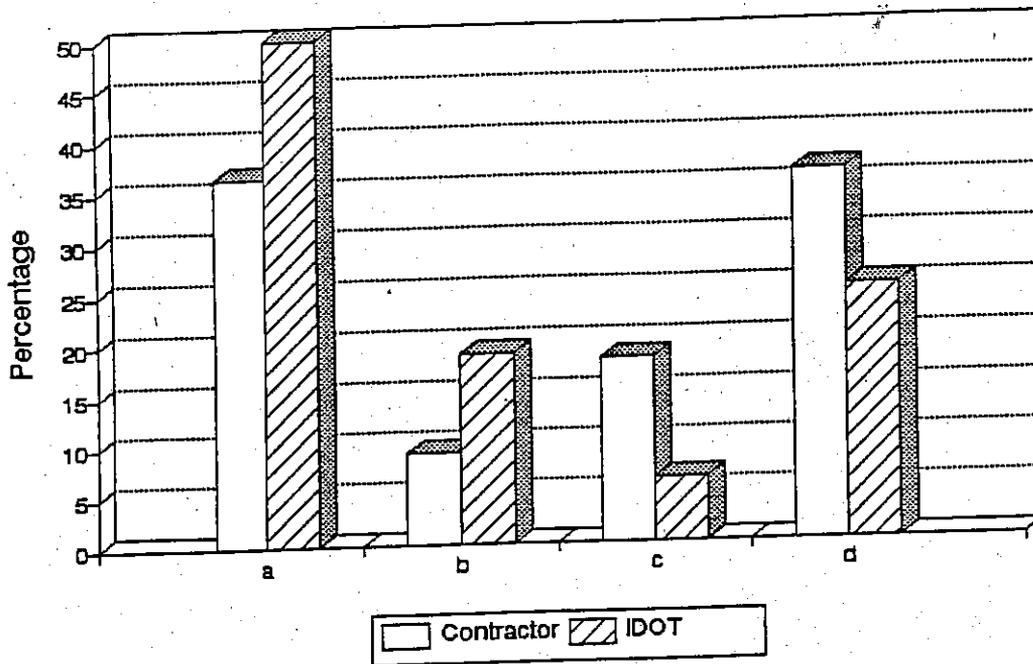


Q4. What was the frequency of change orders in this project compared to an average non-I/D project?

- (a) As frequent as in an average non-I/D project
- (b) More frequent than in an average non-I/D project
- (c) Less frequent than in an average non-I/D project
- (d) Don't know

Magnitude of Change Orders

Fig. 4.3.5

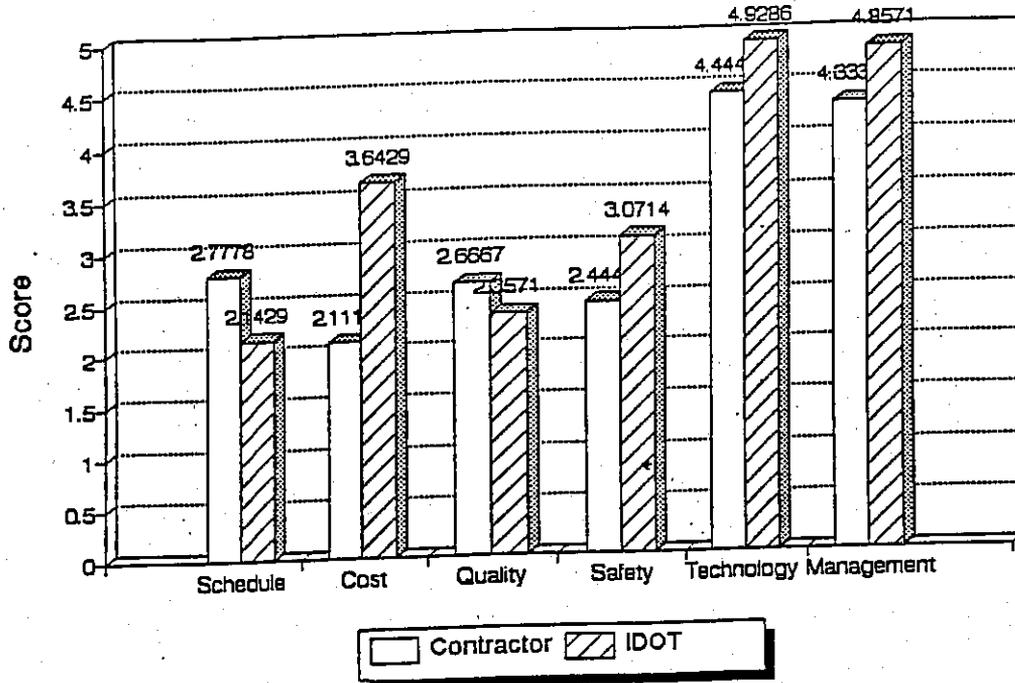


Q5. What was the magnitude of change orders compared to an average non-I/D project?

- (a) As big as in an average non-I/D project
- (b) Bigger than in an average non-I/D project
- (c) Less than in an average non-I/D project
- (d) Don't know

I/D Objective Ranking

Fig.4.3.6

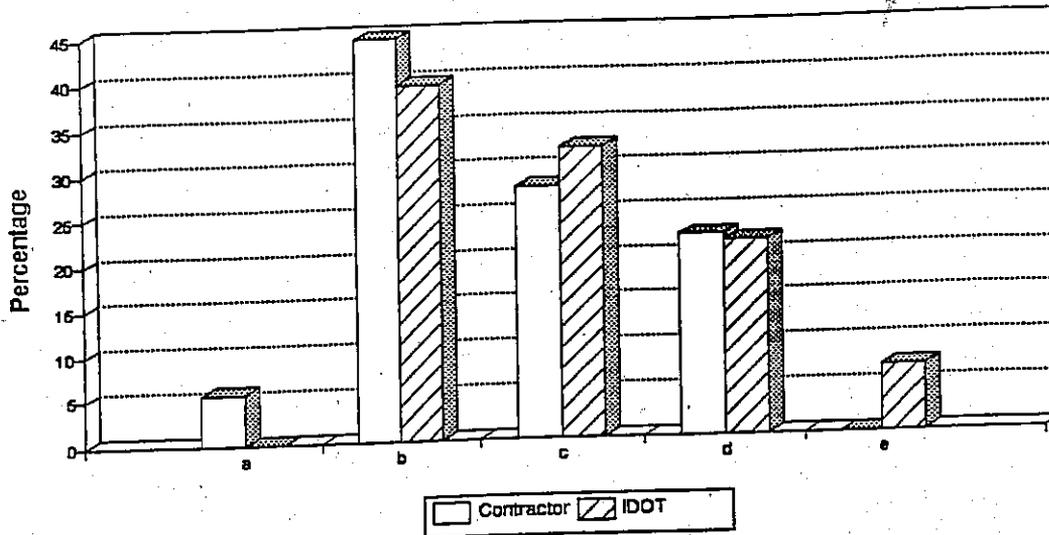


6. Rank the following objectives targeted in this contract in order of importance (1 for most important, 6 for least important).

- () Schedule
- () Cost
- () Quality
- () Safety
- () Technology
- () Management

IDOT & Contractor Communications

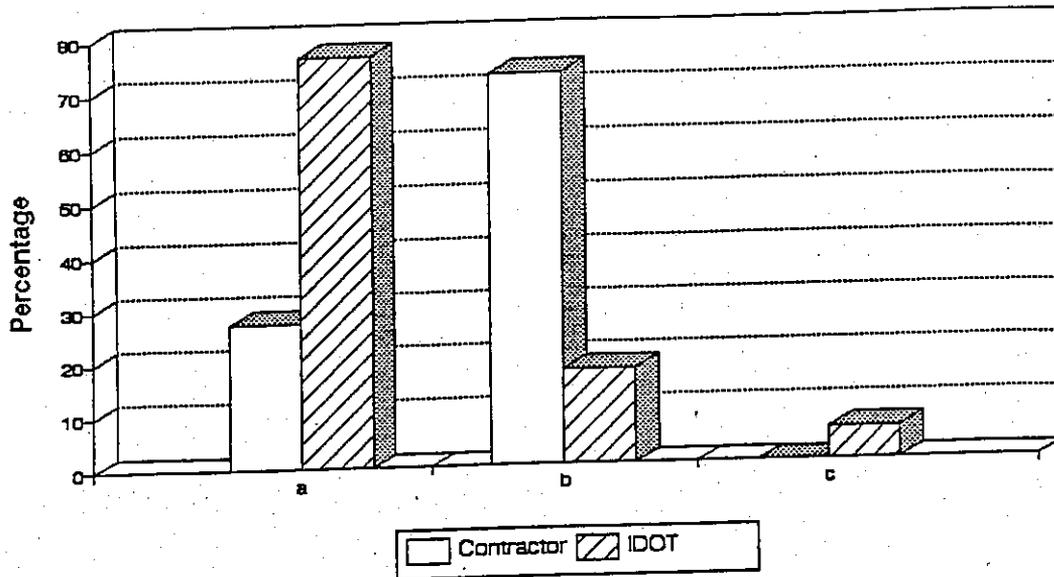
Fig. 4.3.7



Q7. How are the lines of communication between IDOT and the contractor developed?

- (a) By predesign field reviews
- (b) By preconstruction meetings
- (c) By regular construction meetings
- (d) Informal communications
- (e) Other (please specify)

Negotiation of I/D Clauses
Fig. 4.3.8

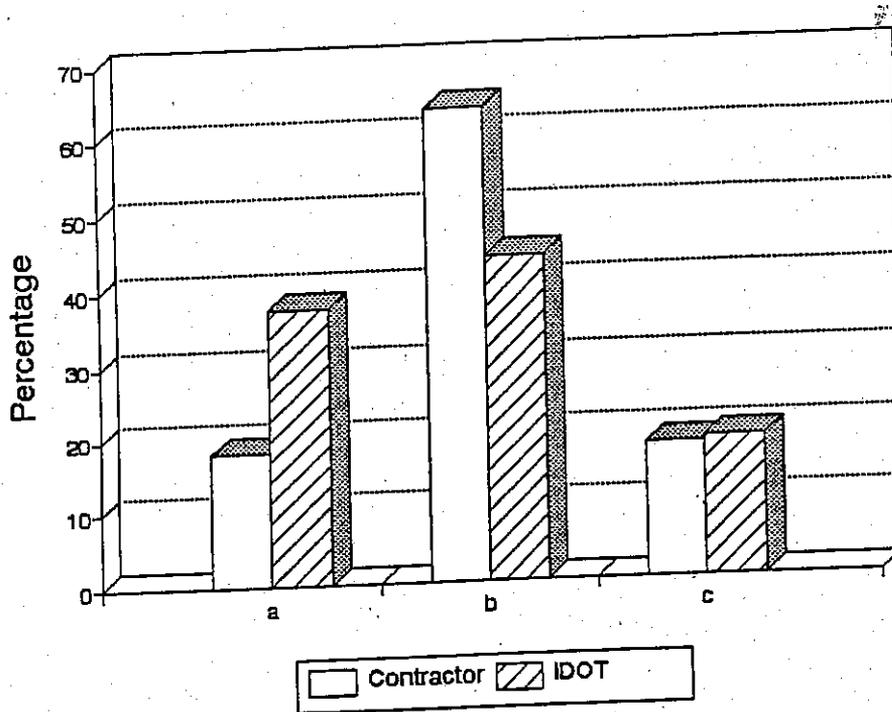


Q8. Were the I/D provisions negotiated in these meetings and/or communications?

- (a) Yes
- (b) No
- (c) Don't know

Contractor's Objections

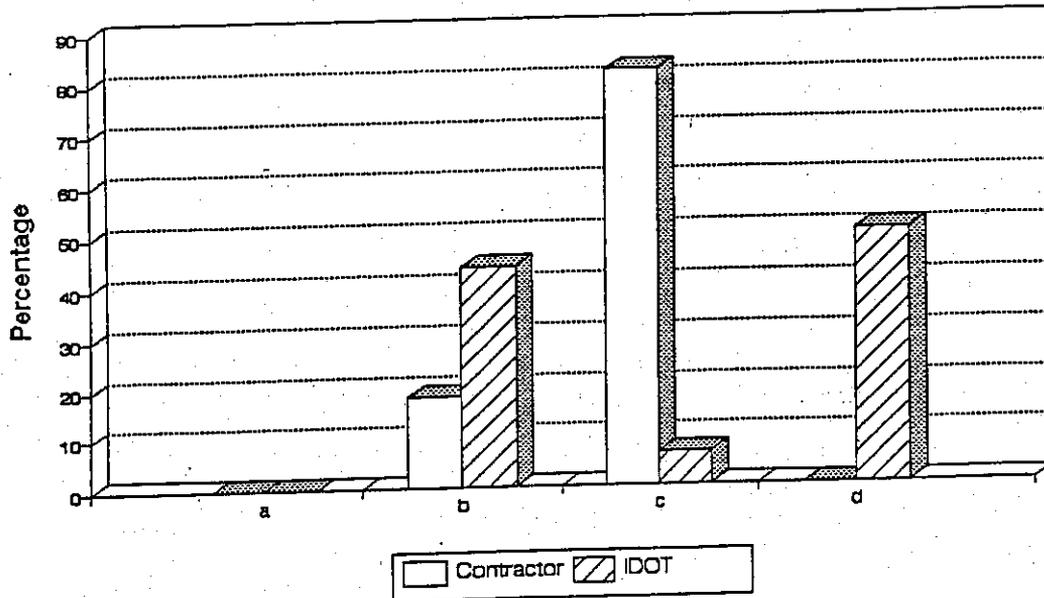
Fig. 4.3.9



9. Were any disputes caused by objections raised by the contractor to I/D provisions?

- (a) Yes
- (b) No
- (c) Don't know

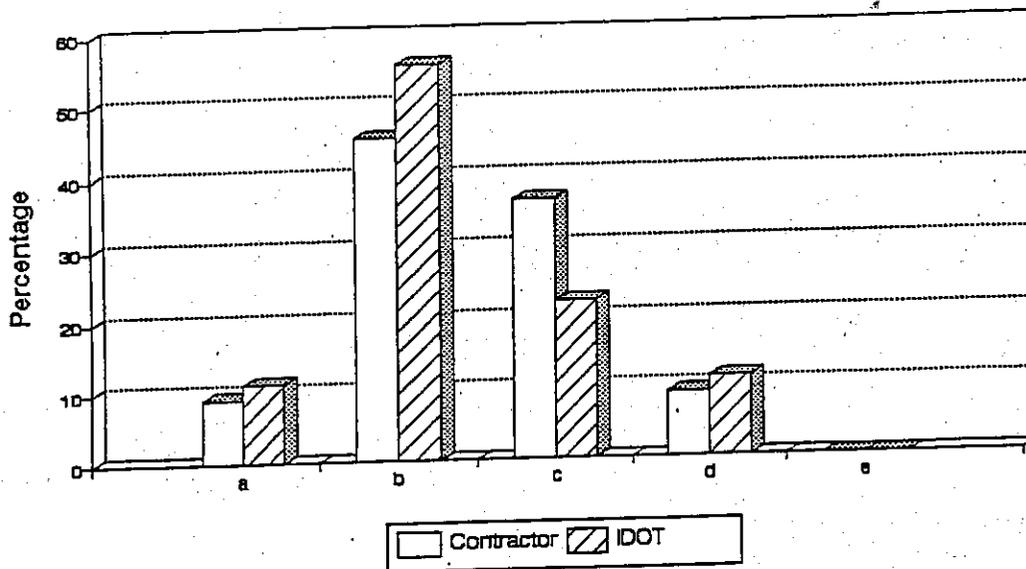
Lower Bids
Fig. 4.3.10



Q10. Would bids in this project be uniformly lower if the project were a non-I/D project?

- (a) Yes, substantially
- (b) Yes, marginally
- (c) No
- (d) Don't know

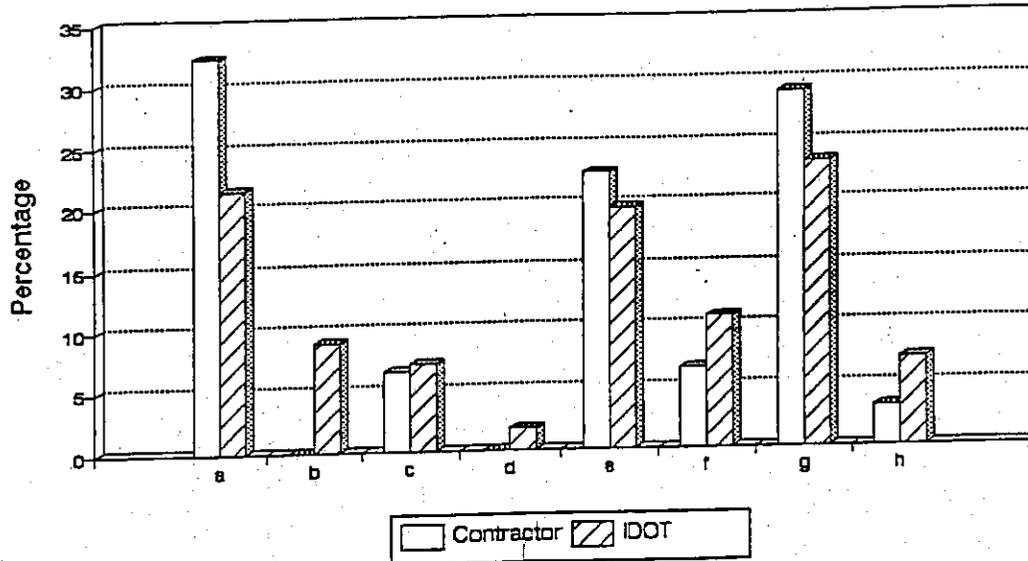
Project Completion Criterion
Fig. 4.3.11



Q11. What was the criterion used to define the completion of the project?

- (a) Unrestricted traffic is permitted (clean-up and demobilization included)
- (b) Unrestricted traffic is permitted (clean-up and demobilization not included)
- (c) Substantial completion (inconsequential portions missing or minor repairs necessary)
- (d) Don't know
- (e) Other (please specify)

Contractor's Work Schedule
 Fig. 4.3.12

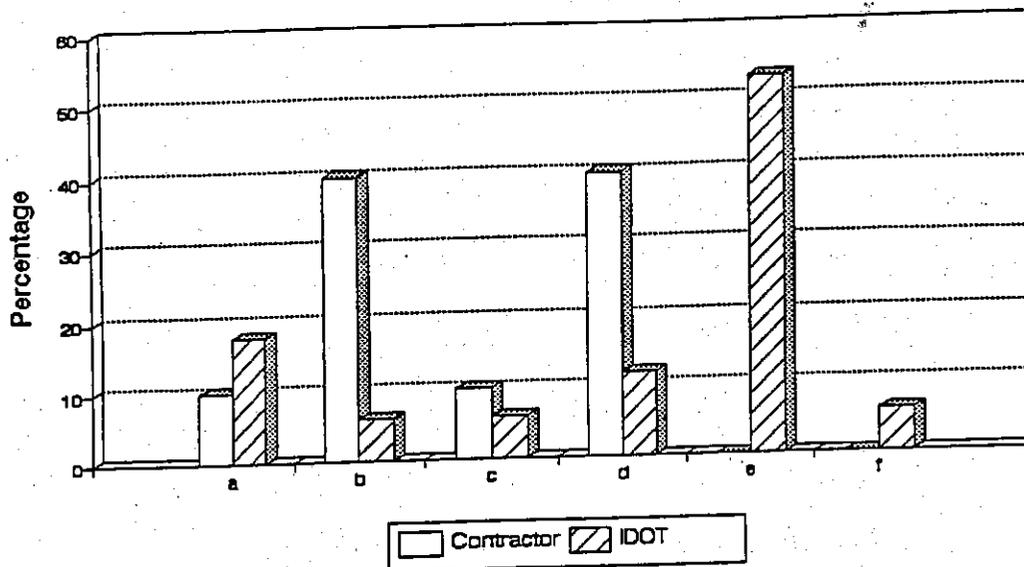


Q12. Did the contractor's expedited work schedule involve one of the following schemes? Please mark as many as appropriate.

- (a) Six day work week
- (b) Seven day work week
- (c) Double shift
- (d) Triple shift
- (e) Extended work hours with 12-14 hours per day
- (f) Expedited work schedule with 228 working days per calendar year
- (g) Multiple work crews in multiple areas
- (h) Other (please specify)

Difficulty with Labor Agreements

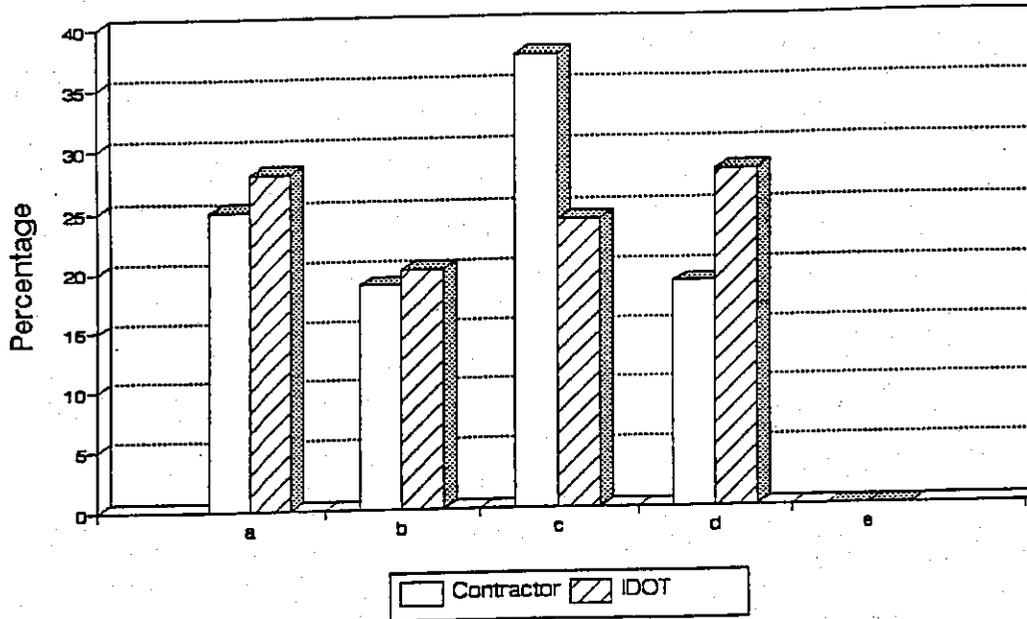
Fig. 4.3.13



Q13. Did the contractor experience difficulties in the following due to labor agreements?

- a) Optimizing crew sizes
- b) Adjusting scheduled overtime
- c) Setting wages in second or third shifts
- d) Increasing labor productivity
- e) Don't know
- f) Other (please specify)

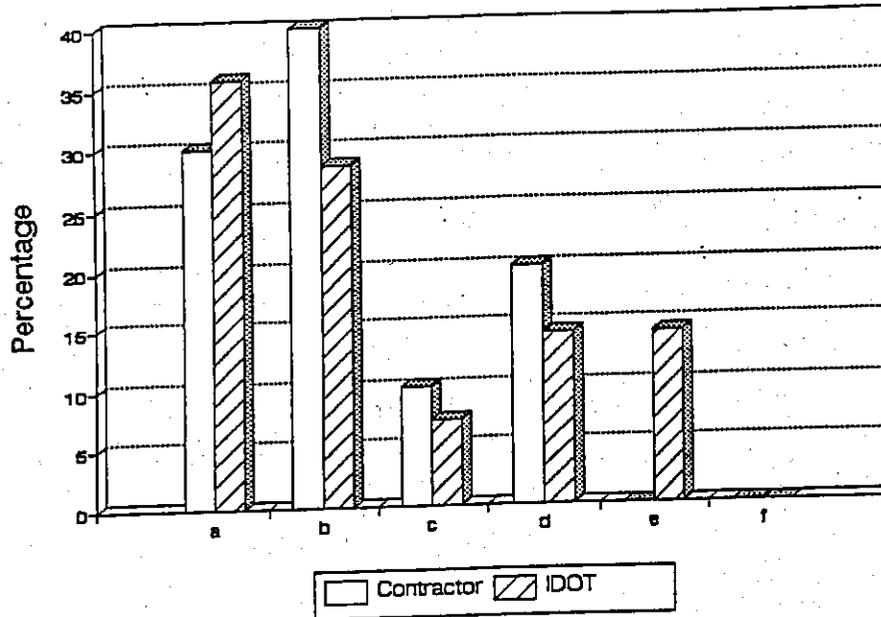
Contractor's Measures for I/D
Fig. 4.3.14



Q14. What measures did the contractor take to fulfill the I/D targets?

- (a) Planned technological/managerial novelties
- (b) Ad hoc measures as necessary
- (c) Extreme compression of activities towards the end of the project
- (d) Don't know
- (e) Other (please specify)

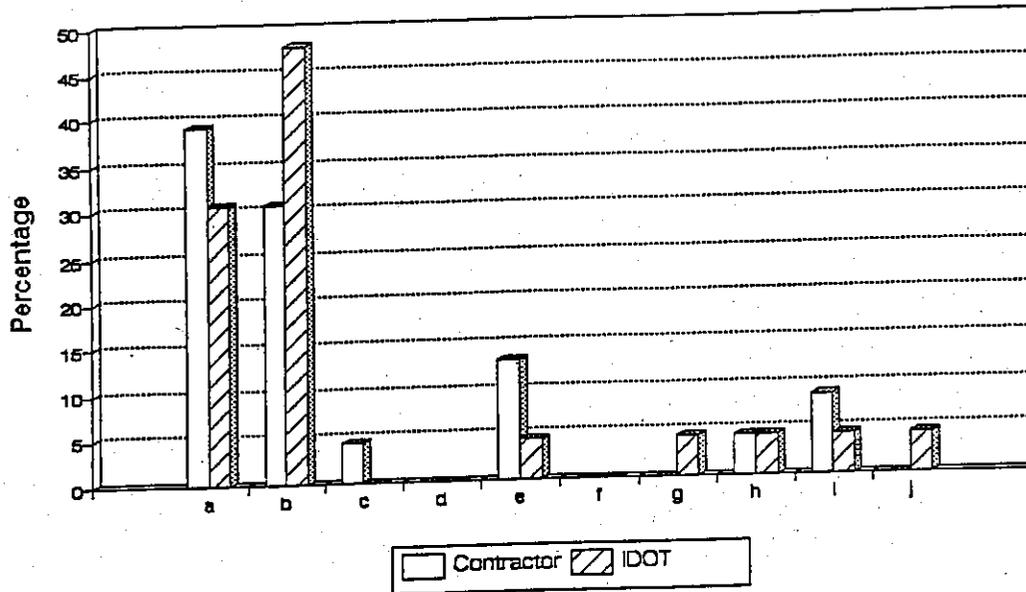
Improvement Categories in I/D
 Fig. 4.3.15



Q15. If technological/managerial improvements were introduced, which category do they belong to?

- (a) Advanced construction methods
- (b) Advanced equipment
- (c) Advanced materials
- (d) Advanced construction management techniques
- (e) Don't know
- (f) Other (please specify)

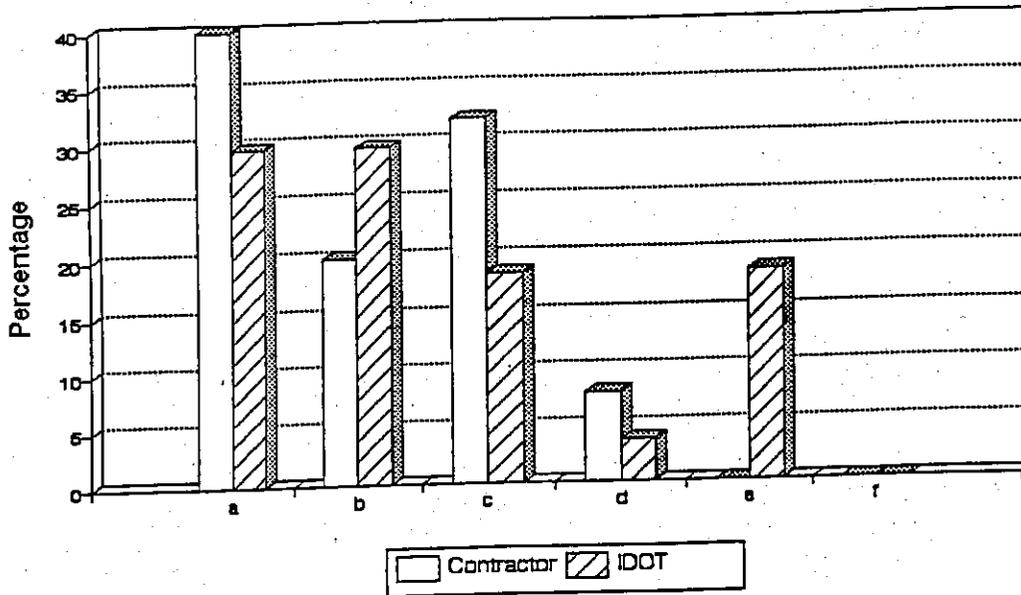
Contractor's Managerial Practices
 Fig. 4.3.16



Q16. What managerial practices were used by the contractor to fulfill the I/D targets? Please mark as many as appropriate.

- (a) Bar charts
- (b) CPM
- (c) CPM with time-cost trade-off analysis
- (d) CPM with resource allocation
- (e) Repetitive scheduling technique
- (f) Computerized material inventory and flow control
- (g) Computerized equipment management
- (h) Computerized information flow and feedback system
- (i) Don't know
- (j) Other (please specify)

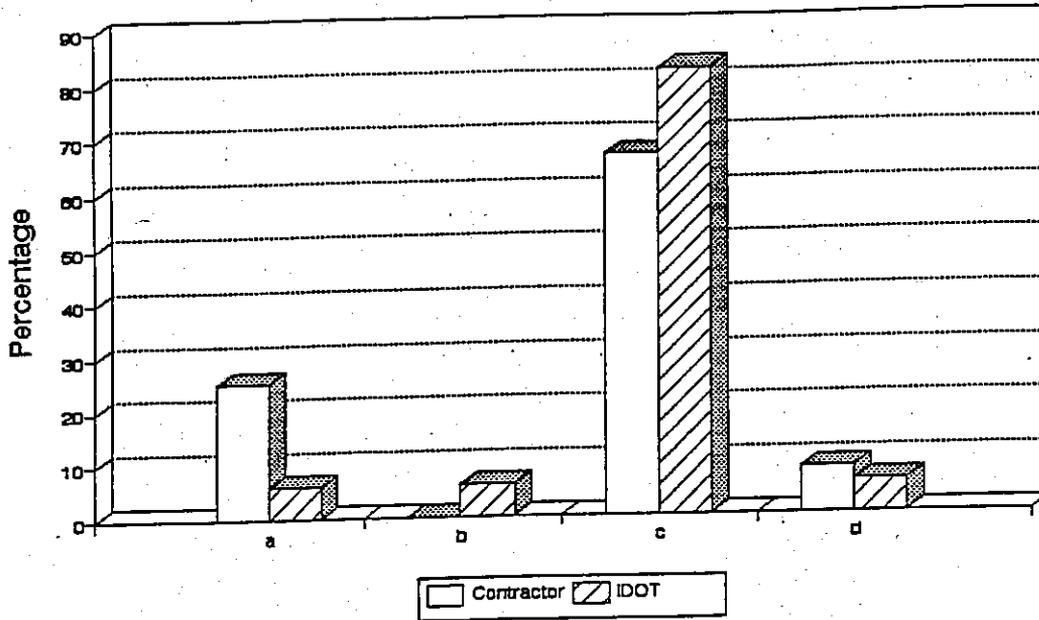
Contractor's Personnel Policy
 Fig. 4.3.17



Q17. What special personnel and manpower policy was adopted by the contractor to fulfill the I/D targets?

- (a) Special considerations in selecting subcontractors
- (b) Special considerations in appointing senior project personnel
- (c) Special considerations in selecting field personnel
- (d) Using outside consultants
- (e) Don't know
- (f) Other

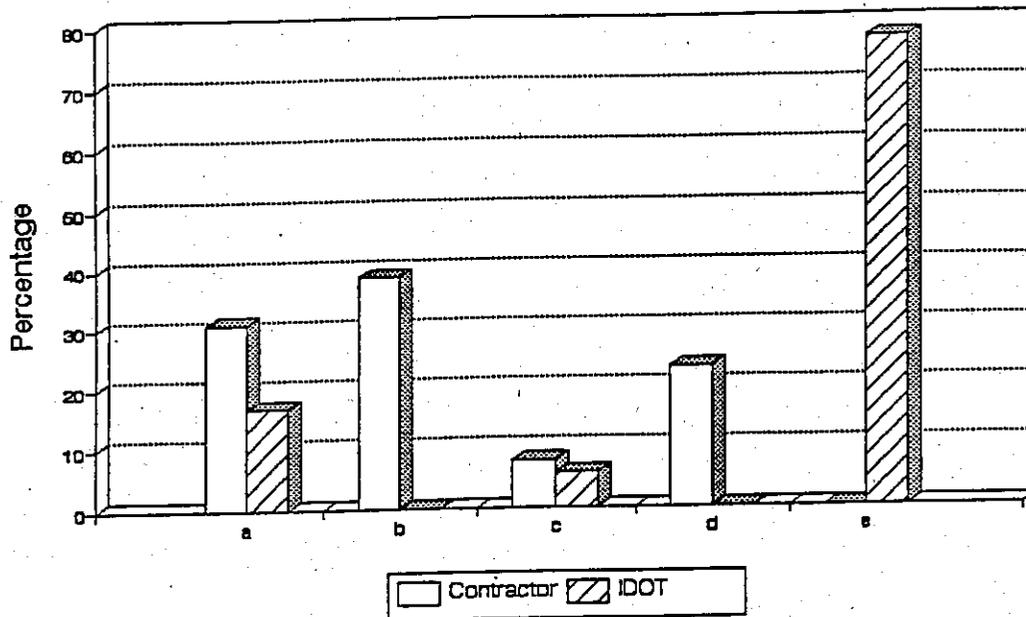
Payment of Incentive Amount Fig. 4.3.18



Q18. How is the incentive amount paid to the contractor?

- (a) In full upon completion of some milestone activities
- (b) Partially upon completion of some milestone activities
- (c) In full upon completion of the project
- (d) Other (please specify)

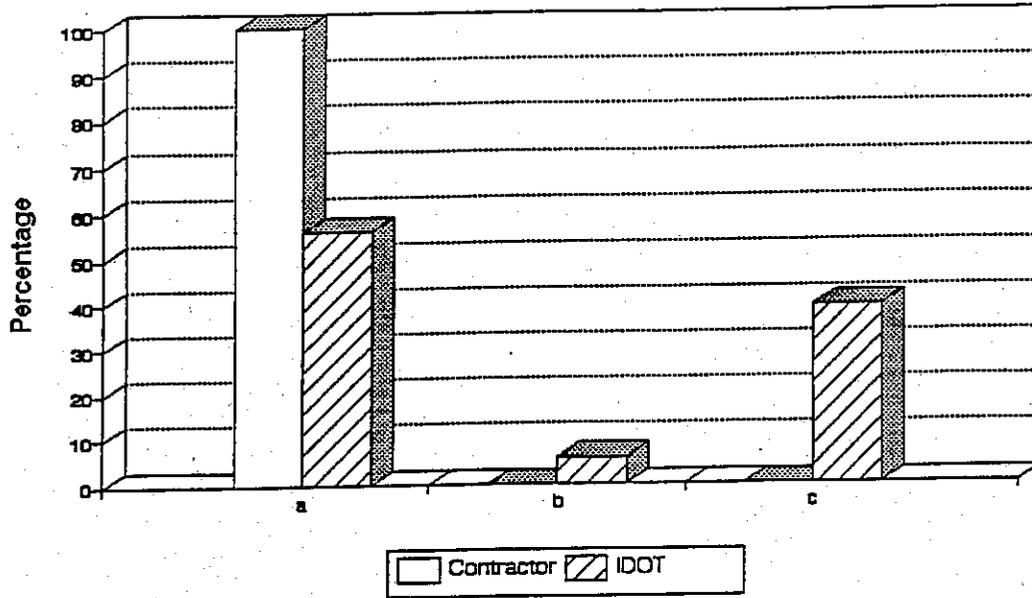
Level of Incentive Payment
 Fig. 4.3.19



Q19. Does the contractor pass the incentive down to its personnel?
 If yes, down to what level?

- (a) Yes, down to upper management
- (b) Yes, down to middle management
- (c) Yes, down to workers
- (d) No
- (e) Don't know

Longer Project if Non-I/D
Fig. 4.3.20

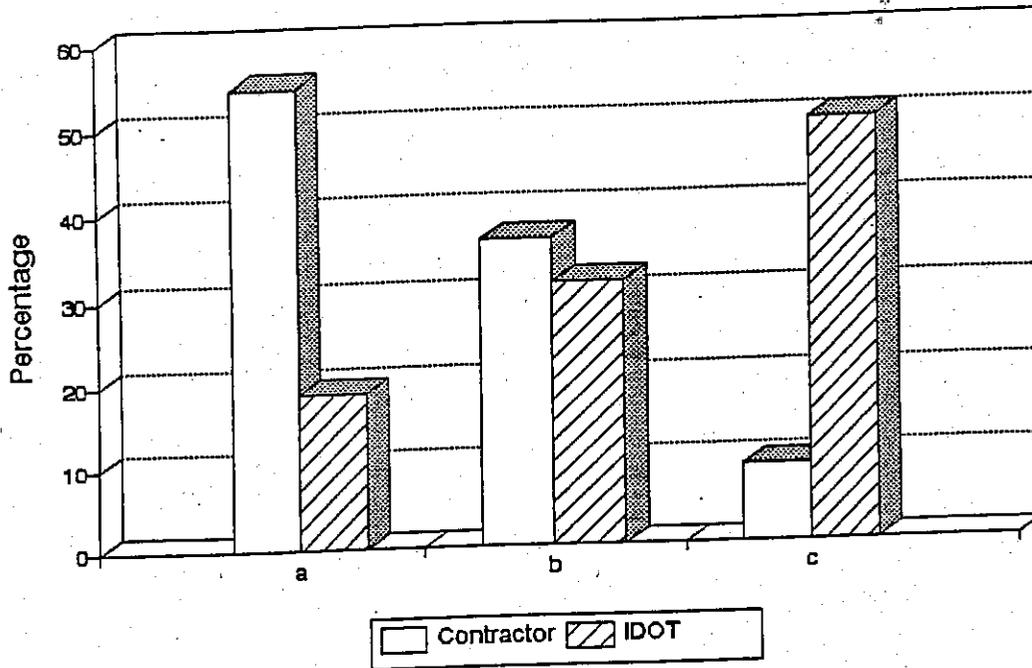


Q20. Would the project last longer if it were a non-I/D project?

- (a) Yes, by _____ %
- (b) No
- (c) Don't know

Earlier Completion Possible

Fig. 4.3.21



Q21. The daily I/D amount remaining constant, if the maximum incentive period were relaxed, would it be possible to complete the project sooner?

- (a) Yes, by ___ days
- (b) No
- (c) Don't know

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The objective of this study was to investigate the effectiveness of current I/D contract provisions as set forth in IDOT Design Memorandum No. 90-53. It was intended to identify the consequences of using I/D provisions in IDOT contracts to date, compare the findings with those of non-I/D contracts with similar scope, relate these findings to the perceptions of the owner, "IDOT" and the contractors, and determine the implementation methods of I/D provisions in other states.

The following are the results of the study:

- More than 93% of the I/D contracts were completed on time or sooner. 21 out of 28 I/D projects received total incentive amount, 7 out of 28 projects received partial incentives.
- I/D contracts received less time extension on contract completion than non-I/D contracts. The time extensions mentioned here do not incorporate extensions of I/D completion dates. To extend the I/D completion dates under any circumstances is against the general policy of IDOT. However, in order not to penalize contractors for delay factors that are beyond their control, disincentive dates may be adjusted.
- I/D contracts achieved essential and final completion faster than non-I/D projects. The average of the ratio of the essential duration to contract duration was 0.82, implying nearly 18% saving in the opening of the roadway to traffic for I/D contracts. Similar non-I/D contracts lasted 28% longer than the estimated contract duration for essential completion.
- The frequency and magnitude of change orders were larger in I/D contracts than in non-I/D contracts. This finding was in conflict with the anticipation that, due to the special nature of I/D projects (high visibility, high traffic volume, high road user delay costs), they would be better defined in scope and therefore require fewer changes.

- Budget overflows were larger in I/D contracts compared to non-I/D contracts. The time savings in I/D contracts appeared to be accompanied by cost overruns.
- The average of maximum incentive amount allowed per project was 5.13% of the contract amount. The average of incentive amount paid per project was 4.71%, which equaled 92% of the maximum incentive amount allowed. The maximum and minimum amounts paid were 21.66% and 0.26% of the contract amount, respectively.
- I/D contracts received higher bids than non-I/D contracts whereas more than 80% of the contractors claimed that they would have bid the same amount, even if the project was a non-I/D contract. IDOT's resident engineers, on the other hand, mostly believed that the bids would be lower if they had been non-I/D contracts. The discrepancy between the findings and the perceptions of the parties may be attributed to the high risk transfer (from owner to contractor) associated with I/D contracts. Although not stated, contractors tend to minimize the risks in I/D contracts by increasing their bids by a factor. As a matter of fact, the ratio of contract amount to the engineer's estimate for I/D contracts was 5% more than the same ratio for non-I/D projects.
- There seems to be some confusion regarding the determination of project duration by IDOT. Many IDOT resident engineers (30%) and contractors' superintendents (68%) were not aware of the method by which the contract duration was determined by IDOT. IDOT did not use computerized methods when determining project duration. This confusion is a crucial hindrance for I/D provisions' usage as the success of this application depends on establishing an accurate estimate of the duration to complete the expedited project.
- Both parties involved in this study mainly agree that I/D projects would have taken longer, had they been non-I/D contracts. Yet, the contractors saw a potential for even earlier completion of the I/D contracts included in the study, provided that the daily incentive amount was maintained.
- The most common reasons for including I/D provisions in contracts were:
 - High visibility
 - High volume
 - High road user delay cost
- A major discrepancy between the two parties was regarding the ranking of I/D project objectives. IDOT's first objective was SCHEDULE whereas contractors considered COST as the first objective.
- The most frequently used methods for expediting work schedules by contractors were:
 - Six-day work week
 - Extended work hours
 - Multiple work crews

- The biggest labor related problems encountered in expediting work schedules by contractors were:
 - Adjusting scheduled overtime
 - Increasing labor productivity
- The contractors achieved project goals mostly by extreme compression of activities toward the end of the project. The technological and/or managerial improvements introduced into I/D contracts were in the form of advanced construction methods and equipment usage in general.
- The most frequently employed project management tool for monitoring project progress by contractors was barcharts, followed by CPM.
- In more than 70% of the cases, the contractors passed the incentive amount down to their middle and/or upper management.

5.2 RECOMMENDATIONS

Schedule incentives are effective and efficient contract management tools, unless they have been applied redundantly. It is crucial to make sure that the project will absolutely benefit from I/D in terms of both time and cost. The following measures are recommended to make I/D contracts more cost-effective (in order of importance):

- The usage of "A+B Bidding" in association with I/D contracts should be explored further. "A+B Bidding" is an effective method in selecting the contractor. As project durations are proposed by the bidders on a competitive basis, it is likely that the contract duration set by the winning bidder will be more realistic compared to the contract duration set by IDOT in regular I/D contracts. "A+B Bidding" is expected to eliminate the adverse selection of inefficient contractors. Further research is recommended to lay down the principles of implementing "A+B Biding" in I/D contracts and to evaluate the likely impacts of such implementation on contract efficiency.
- A critical issue in successfully applying schedule incentives is the accurate determination of project duration by the owner. Unless the schedule target is realistically established, incentives will not result in savings. Therefore, at least in I/D contracts, IDOT should establish a standard computerized CPM procedure to determine the project duration. This will eliminate the risks of paying extra monies for a contract that has a loose schedule in the first place. This will also enhance the owner's project control. IDOT's traditional methods, i.e., barcharts drawn using standard daily production rates, past experience on similar projects and rules of thumb, do not hold up against sophisticated

project management techniques that may be used by most contractors.

- The increased frequency and magnitude of change orders in I/D contracts cost time and money. Plans should be developed to identify the change orders as early as possible and minimize their occurrence and impact in project duration and cost. These plans could include better definition of scope of work, better coordination between the owner and the contractor, and decrease in the processing time of change orders.
- Keeping the 5% I/D cap on the contract amount the number of incentive days can be calculated in a reverse fashion by dividing the total available incentive amount ($0.05 \times$ Contract Amount) by the road user delay cost. The contractors surveyed in the study have stated that the I/D projects they undertook could have been further expedited, had the incentive duration been longer. Increasing the number of incentive days, without exceeding the 5% percent limit might shorten project duration without increasing total incentive.
- Combined incentives of cost and schedule can be used on an experimental basis to achieve cost-effectiveness in a project. The contractor is always interested in increased profit, so the profit sharing formulas provided in the text can be used depending on the scope of the work. It should be reminded that early completion is not necessarily accompanied by construction cost savings, so additional incentives might be necessary to achieve construction cost effectiveness.

The rate of success if any of these recommendations are adopted, depends largely on IDOT's willingness to move from simple bar charts based on existing daily production rates, to a computerized system that provides a better estimation of project duration and an effective control of project progress.

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APPENDIX A. CHECKLIST AND QUESTIONNAIRE

ILLINOIS INSTITUTE OF TECHNOLOGY

CIVIL ENGINEERING DEPARTMENT

"INCENTIVE/DISINCENTIVE PROVISIONS:

CHECKLIST ON I/D PROVISIONS AND THEIR IMPLEMENTATION"

ABOUT THE PROJECT

Name of Contractor:

Type of Contract:

Contract Duration/Date:

Construction Start Date:

Actual Duration/Date:

Essential Completion Date:

Final Completion Date:

Contract Amount:

Additions:

Deductions:

Actual Amount:

Incentive Amount per day:

Disincentive/Liquidated Damages per day:

Total Incentive Received:

Total Liquidated Damages Paid:

Maximum Incentive Duration:

B/C Ratio:

Engineer's Estimate:

Type of Project (Pavement, Bridge ...etc.):

Number, and Dollar Amount of Change Orders:

ADV of Traffic on Work Zone:

ILLINOIS INSTITUTE OF TECHNOLOGY

CIVIL ENGINEERING DEPARTMENT

"INCENTIVE/DISINCENTIVE PROVISIONS:

QUESTIONNAIRE ON I/D PROVISIONS AND THEIR IMPLEMENTATION"

NAME:

FIRM:

POSITION IN FIRM:

POSITION IN THE PROJECT:

DATE:

Please answer the following questions, and add any additional information you think might be helpful in analyzing I/D contracts. The aim of the questionnaire is to form a basis for comparison of I/D contracts to non-I/D contracts, including the advantages and disadvantages of both types of contracts.

1. How is project duration established by IDOT prior to the commencement of the I/D project?
 - (a) Based on similar projects
 - (b) Based on an analytical model developed for this purpose
 - (c) With informal input from contractor
 - (d) After formal negotiation with the contractor
 - (e) Don't know
 - (f) Other (please specify)

2. Why was this project chosen as an I/D project? Please mark as many as appropriate.

- (a) High visibility project
- (b) High volume road
- (c) High road user delay cost
- (d) Severe disruption on adjacent businesses
- (e) Project with direct bearing on project start and/or interruption of progress on major freeways, arterials or structure
- (f) Project involved with major reconstruction of an existing highway
- (g) Project with benefits, in terms of cost savings and/or safety, that outweigh the cost of incentive payments and additional construction costs.
- (h) A part of a contract that can be done well before the rest of the work, and is of significant benefit to the public (eg.: early use of a highway lane)
- (i) Project was a prerequisite to the use of some other projects (eg.: filling a gap or removing a serious bottleneck)
- (j) Project was needed by a specific date to provide service to some other traffic generator (eg.: a new school)
- (k) Project involved the prolonged closure of one or more highway lanes
- (l) River Structure in or adjacent to central business district
- (m) Night time construction on major urban freeway
- (n) Part of a cooperative I/D project application
- (o) Don't know
- (p) Other (please specify)

3. At what stage were I/D provisions included in the contract?

- (a) At the planning stage
- (b) At the design stage
- (c) At the bidding stage
- (d) At the construction stage
- (e) Don't know
- (f) Other (please specify)

4. What was the frequency of change orders in this project compared to an average non-I/D project?

- (a) As frequent as in an average non-I/D project
- (b) More frequent than in an average non-I/D project
- (c) Less frequent than in an average non-I/D project
- (d) Don't know

5. What was the magnitude of change orders compared to an average non-I/D project?

- (a) As big as in an average non-I/D project
- (b) Bigger than in an average non-I/D project
- (c) Less than in an average non-I/D project
- (d) Don't know

6. Rank the following objectives targeted in this contract in order of importance (1 for most important, 6 for least important).

- () Schedule
- () Cost
- () Quality
- () Safety
- () Technology
- () Management

7. How are the lines of communication between IDOT and the contractor developed?

- (a) By predesign field reviews
- (b) By preconstruction meetings
- (c) By regular construction meetings
- (d) Informal communications
- (e) Other (please specify)

8. Were the I/D provisions negotiated in these meetings and/or communications?

- (a) Yes
- (b) No
- (c) Don't know

9. Were any disputes caused by objections raised by the contractor to I/D provisions?

- (a) Yes
- (b) No
- (c) Don't know

10. Would bids in this project be uniformly lower if the project were a non-I/D project?

- (a) Yes, substantially
- (b) Yes, marginally
- (c) No

(d) Don't know

11. What was the criterion used to define the completion of the project?

- (a) Unrestricted traffic is permitted (clean-up and demobilization included)
- (b) Unrestricted traffic is permitted (clean-up and demobilization not included)
- (c) Substantial completion (inconsequential portions missing or minor repairs necessary)
- (d) Don't know
- (e) Other (please specify)

12. Did the contractor's expedited work schedule involve one of the following schemes?
Please mark as many as appropriate.

- (a) Six day work week
- (b) Seven day work week
- (c) Double shift
- (d) Triple shift
- (e) Extended work hours with 12-14 hours per day
- (f) Expedited work schedule with 228 working days per calendar year
- (g) Multiple work crews in multiple areas
- (h) Other (please specify)

13. Did the contractor experience difficulties in the following due to labor agreements?

- (a) Optimizing crew sizes
- (b) Adjusting scheduled overtime
- (c) Setting wages in second or third shifts
- (d) Increasing labor productivity
- (e) Don't know
- (f) Other (please specify)

14. What measures did the contractor take to fulfill the I/D targets?

- (a) Planned technological/managerial novelties
- (b) Ad hoc measures as necessary
- (c) Extreme compression of activities towards the end of the project
- (d) Don't know

(e) Other (please specify)

15. If technological/managerial improvements were introduced, which category do they belong to?

- (a) Advanced construction methods
- (b) Advanced equipment
- (c) Advanced materials
- (d) Advanced construction management techniques
- (e) Don't know
- (f) Other (please specify)

16. What managerial practices were used by the contractor to fulfill the I/D targets? Please mark as many as appropriate.

- (a) Bar charts
- (b) CPM
- (c) CPM with time-cost trade-off analysis
- (d) CPM with resource allocation
- (e) Repetitive scheduling technique
- (f) Computerized material inventory and flow control
- (g) Computerized equipment management
- (h) Computerized information flow and feedback system
- (i) Don't know
- (j) Other (please specify)

17. What special personnel and manpower policy was adopted by the contractor to fulfill the I/D targets?

- (a) Special considerations in selecting subcontractors
- (b) Special considerations in appointing senior project personnel
- (c) Special considerations in selecting field personnel
- (d) Using outside consultants
- (e) Don't know
- (f) Other

18. How is the incentive amount paid to the contractor?

- (a) In full upon completion of some milestone activities
- (b) Partially upon completion of some milestone activities
- (c) In full upon completion of the project

(d) Other (please specify)

19. Does the contractor pass the incentive down to its personnel? If yes, down to what level?

- (a) Yes, down to upper management
- (b) Yes, down to middle management
- (c) Yes, down to workers
- (d) No
- (e) Don't know

20. Would the project last longer if it were a non-I/D project?

- (a) Yes, by ___ %
- (b) No
- (c) Don't know

21. The daily I/D amount remaining constant, if the maximum incentive period were relaxed, would it be possible to complete the project sooner?

- (a) Yes, by ___ days
- (b) No
- (c) Don't know

22. What were the critical problems encountered in this project that would not be seen in an average non-I/D project?

Thank you for spending the time to fill in this questionnaire. Any additional comment that you think might be helpful in this research on I/D contracts would be appreciated. Please use the space provided below for your comments.

APPENDIX B. CALCULATION TABLES

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	TYPE	LOCATION	CONTRACTOR	START
(I/D Contracts)				
80137	embank.& substr.wid.	FA 431	Kenny Const. Co.	08/01/88
80178	pavement	FA 431 (Ill 53)	Harry Kuhn & Traylor Bros	02/01/89
80265	bridge widening	FA 94(Calumet Expy)	E. A. Cox Co.	04/22/91
80312	bridge reconstruction	FA 567	Brandenburg Ind. Serv.	02/14/91
80448	pavement	FA 90/94 (Dan Ryan Expy)	K-FIVE Const. Co.	07/29/90
80522	pavement& br. rep.	FA 90/94 (Dan Ryan Expy)	Palumbo-Herlihy-Lorig	02/11/91
80604	pavement& br. rep.	FA 342 (Ill 53)	Palumbo Bros.	04/01/91
80654	pavement	FA 345	T. J. Lambert	03/04/91
80717	pavement	U.S. Rte.20(Lake Ave.)	R. W. Dunteman Co.	03/19/91
80718	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/24/91
80719	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/21/91
80720	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/21/91
80797	pavement& br. rep.	FA 342 (Ill 53)	Palumbo Bros.	04/11/91
80811	pavement	FAU 2691	Plote-Milborn-J.V.Allied	11/11/91
80840	pavement	Lake Shore Dr.	Central Blacktop Co.	04/09/91
80844	pavement	FA 345 (F.A.I.Route 290)	Palumbo Bros.	05/02/92
80942	pavement& shoulder	FAI Route 291	Palumbo Bros.	05/27/91
80944	bridge reconstruction	FA 347	Brandenburg Ind. Serv.	12/04/91
80958	pavement& br. rep.	FAI Route 55	P. T. Ferro Const. Co.	06/10/92
82167	pavement	FAI 94	Curran Cont. Co.	08/02/93
86038	bridge rehabilitation	FAS 256 (Ill 178)	Shappert Eng. Co.	04/07/89
86039	bridge repair	FA 698 (Ill 89)	Halverson & Midwest	04/03/89
86112	bridge repair	FA 649 (Ill 17)	Halverson & Midwest	03/01/90
86160	bridge repair	FA 649 (Ill 17)	Otto Baum & Sons	10/18/90
86289	bridge repair	FA 46 (Ill 251)	Halverson & Midwest	02/03/92
86301	pavement	FA 322	Illinois Valley Paving Co.	03/23/92
86311	bridge	FA 681 (Ill 116)	Tobey's Const. J.V.	05/11/92
86399	pavement	FAI 80	James Cope & Sons	03/01/93
SUM				
AVE				
(Non-I/D Contracts)				
80000	pavement	FAU 2831	Ganna Const. Co.	05/04/87
80111	pavement& widening	FA 872	Peter Baker&Sons Co.	04/08/91
80130	pavement& widening	FA 872	K-FIVE & Lorig	10/27/88
80173	pavement& brid.rep.	FAP 432	Plate & Milburn Bros.	01/25/89
80192	pavement	FA 437	American Env. Const.	08/31/89
80223	pavement&ret.walls	FA 437	Eric Bolander Co.	09/30/89
80224	pavement&r.w.&br.rep.	FAU 3565	Thomas M. Madden Co.	04/22/91
80229	bridge reconst.	FA 9	Ill.Contrs&T.M.Madden	03/20/89
80277	pavement&bridge	FA 128	K-FIVE & Lorig	03/05/90
80289	str. replacement	FAI 94	Callagher/Swenson J.V.	12/12/90
80356	interchange const.	FAI 55	Harry W. Kuhn	10/04/89
80653	pregrading	FA 345	T.J.Lambrech	03/19/92
80757	tree trimming	FAI 90	Mc Ginty Bros.,Inc.	11/06/90
80677	pavement	FAU 170,FAP 104&864	Eric Bolander	08/07/90
80732	pavement & bridge	FA 128	JH Pameray&F.H.Pasche	03/18/91
80742	pavement	FAP 870	Harry W. Kuhn	09/17/90
80779	bridge widening	FAI 90/94	Palumbo&Herlihy&Lorig	02/07/91
80814	pavement	FAU 1297	Dipauilo Co.&Allred Co.	04/22/91
80866	pavement	FAI 90/94	Abari Const. Co.	04/04/91
86005	pregrading	FA 412	Strunk Bros. Co.	10/11/88
86014	bridge costruction	FA 412	Central Ill. Contracting Co	04/11/89
86018	pregrading&bridge	FA 412	Strunk Bros. Co.	01/09/89
86029	bridge replacement	FAI 55& FAI 74	Midwest Foundation Co.	08/21/89
86031	pavement	FA 412	Freesen Inc.	06/01/89
86034	pavement	FA 704	Rowe Const. Co.	05/02/89
86074	pavement	FA 412	Mc Carthy Improv. Co.	04/04/90
86103	pavement	FAI 55 & FA 412	Rowe Const. Co.	06/19/90
86154	pavement resurfacing	FAI 55 & FAI 74	Rowe Const. Co.	09/03/91
86184	pavement	FA 412	Freesen & Ill.Valley	07/17/90
SUM				
AVE				

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	ESS.COMP.	END	CONT.DATE	EXT.1	EXT.2	LENGTH	EXT1.DUR.
(I/D Contracts)							
80137	12/31/88	12/31/88	01/31/89	NO	NO	7,528.00	0
80178	10/27/89	08/08/90	10/31/89	12/31/89	08/08/90	14,255.00	61
80265	07/26/91	08/24/91	08/16/91	NO	NO	9,630.00	0
80312	09/30/91	10/29/91	10/31/91	NO	NO	1,550.00	0
80448	09/30/90	11/02/90	10/15/90	NO	NO	23,135.32	0
80522	10/19/91	07/02/92	10/31/91	11/10/91	NO	4,751.60	10
80604	09/15/91	09/15/91	10/15/91	NO	NO	13,243.00	0
80654	10/25/91	11/25/91	11/25/91	NO	NO	18,115.91	0
80717	10/28/91	10/28/91	11/25/91	NO	NO	9,806.30	0
80718	09/06/91	09/07/91	10/06/91	NO	NO	14,467.20	0
80719	09/08/91	08/20/92	10/06/91	10/15/91	NO	4,650.00	9
80720	09/08/91	08/21/92	10/06/91	10/15/91	NO	8,635.68	9
80797	09/15/91	09/15/91	10/15/91	NO	NO	15,102.00	0
80811	07/31/92	11/15/92	08/31/92	NO	NO	7,629.00	0
80840	05/22/91	07/15/91	06/13/91	NO	NO	15,227.17	0
80844	07/28/92		08/31/92			14,836.80	
80942	06/26/92	06/26/92	07/02/92	NO	NO	15,625.00	0
80944	10/31/92	08/09/93	11/30/92	NO	NO	1,221.00	0
80958	07/10/92	10/24/92	07/31/92	NO	NO	10,024.00	0
82167	09/24/93	10/29/93	10/09/93				0
86038	10/30/89	10/30/89	12/15/89	NO	NO	555.00	0
86039	10/31/89	06/06/90	12/01/89	NO	NO	1,775.79	0
86112	08/31/90	08/31/90	10/01/90	NO	NO	2,647.00	0
86160	10/26/90	05/03/91	10/30/90	NO	NO	600.00	0
86289	10/08/92	10/08/92	11/15/92	NO	NO	12,436.00	0
86301	10/31/92	12/01/92	12/01/92	NO	NO	49,517.41	0
86311	05/19/92	07/08/92	05/23/92	NO	NO	500.00	0
86399	10/27/93	10/27/93	10/30/93	NO	NO	33,283.25	0
SUM						310,747.43	89
AVE						11,098.12	3.30
(Non-I/D Contracts)							
80000	07/07/89	07/14/90	12/14/87	05/24/88	NO	10,964.00	162
80111	10/04/91	10/04/91	10/04/91				
80130	03/28/90	07/19/90	10/31/89	04/30/90	NO	12,209.00	181
80173	10/13/89	10/13/89	10/15/89	NO	NO	4,225.83	0
80192	12/07/90	05/02/91	10/31/90	05/02/91	NO	5,024.60	183
80223	05/31/91	05/31/91	10/30/90	06/04/91	NO	4,286.00	217
80224	11/22/91	05/15/92	11/01/91	11/24/91	NO	700.00	23
80229	05/31/90	10/15/90	10/31/89	05/24/90	NO	2,585.00	205
80277	10/12/91	07/21/92	10/01/91	NO	NO	8,160.00	0
80289	11/25/91	08/03/92	10/31/91	11/15/91	NO	3,856.66	15
80356	10/25/90	07/12/91	11/01/90	04/30/91	NO	4,191.00	180
80653	06/29/92	10/19/92	06/30/92	07/09/92	NO	5,000.00	9
80757	03/11/91	03/11/91	03/31/91	NO	NO	0.00	0
80677	10/05/91	05/11/92	10/04/91	NO	NO	31,439.00	0
80732	06/26/92	12/01/92	07/31/92	NO	NO	1,432.00	0
80742	01/11/92	12/17/92	06/30/92	NO	NO	11,910.00	0
80779	11/30/91	08/10/92	10/31/91	05/15/92	NO	17,788.00	197
80814	12/03/91	11/21/92	11/01/91	12/03/91	NO	14,464.00	32
80866	07/01/91	07/22/91	07/01/91	07/22/91	NO	2,350.00	21
86005	05/25/91	08/02/91	03/04/89	04/02/90	NO	31,994.00	15
86014		11/19/92				3,635.00	5
86018	09/09/91	09/09/91	06/14/89	08/02/89	NO	30,071.45	48
86029	07/31/90	06/18/91	11/01/90	NO	NO	18,638.40	0
86031	12/11/89	06/28/90	11/01/89	NO	NO	18,257.52	0
86034	10/12/89	10/12/89		NO	NO	1,696.00	0
86074	06/22/91	07/01/91	10/26/90	04/01/91	07/01/91	62,064.51	157
86103		11/17/92		NO	NO	25,525.14	0
86154		10/30/92	10/31/92	NO	NO	51186.34	0
86184	05/29/92	06/21/92	06/21/92	NO	NO	23069.74	0
SUM						406,723.19	1,650.00
AVE						14,525.83	58.93

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	EXT2.DUR	EXT3.DUR.	ESS.DUR.	ACT.DUR.	CONT.DUR	EARLY FIN.	CONTRACT \$
(I/D Contracts)							
80137	0	0	152	152	183	31	\$5,123,081.00
80178	220	0	268	553	272	4	\$16,915,987.76
80265	0	0	95	124	116	21	\$3,644,887.00
80312	0	0	228	257	259	31	\$2,776,187.16
80448	0	0	63	96	78	15	\$3,937,051.45
80522	0	0	250	507	262	12	\$10,981,585.48
80604	0	0	167	167	197	30	\$10,631,000.77
80654	0	0	235	266	266	31	\$16,620,797.94
80717	0	0	223	223	251	28	\$7,182,971.63
80718	0	0	135	136	165	30	\$8,854,103.04
80719	0	0	140	487	168	28	\$3,583,599.82
80720	0	0	140	488	168	28	\$4,712,188.16
80797	0	0	157	157	187	30	\$17,146,177.00
80811	0	0	263	370	294	31	\$4,914,177.91
80840	0	0	43	97	65	22	\$1,271,491.56
80844	0	0	87	121	121	34	\$4,764,053.00
80942	0	0	396	396	402	6	\$1,194,000.00
80944	0	0	332	614	362	30	\$3,249,350.22
80958	0	0	30	136	51	21	\$517,637.67
82167	0	0	53	88	68	15	\$640,612.83
86038	0	0	206	206	252	46	\$1,038,990.95
86039	0	0	211	429	242	31	\$3,782,629.00
86112	0	0	183	183	214	31	\$3,438,111.68
86160	0	0	8	197	12	4	\$116,621.00
86289	0	0	248	248	286	38	\$6,754,987.99
86301	0	0	222	253	253	31	\$14,301,461.27
86311	0	0	8	58	12	4	\$371,787.25
86399	0	0	240	240	243	3	\$10,593,467.22
SUM	220	0	4783	7128	5449	666	\$169,058,997.76
AVE	8.15	0.00	170.82	264.00	194.61	23.79	\$6,037,821.35
(Non-I/D Contracts)							
80000	0	0	795.00	1167.00	224.00	-571.00	\$4,697,190.46
80111	0	0	179.00	179.00	179.00	0.00	\$1,361,155.27
80130	0	0	517.00	630.00	369.00	-148.00	\$11,416,195.00
80173	0	0	261.00	261.00	263.00	2.00	\$5,887,810.21
80192	0	0	463.00	609.00	426.00	-37.00	\$8,635,808.40
80223	0	0	608.00	608.00	395.00	-213.00	\$11,349,317.01
80224	0	0	214.00	389.00	193.00	-21.00	\$1,964,141.55
80229	0	0	437.00	574.00	225.00	-212.00	\$6,035,160.65
80277	0	0	586.00	869.00	575.00	-11.00	\$9,062,040.70
80289	0	0	348.00	600.00	323.00	-25.00	\$8,271,724.08
80356	0	0	386.00	646.00	393.00	7.00	\$6,801,793.16
80653	0	0	102.00	214.00	103.00	1.00	\$6,397,146.25
80757	0	0	125.00	125.00	145.00	20.00	\$172,140.00
80677	0	0	424.00	643.00	423.00	-1.00	\$10,233,122.08
80732	0	0	466.00	624.00	501.00	35.00	\$2,789,800.50
80742	0	0	481.00	822.00	652.00	171.00	\$5,909,555.60
80779	0	0	296.00	550.00	266.00	-30.00	\$10,628,297.43
80814	0	0	225.00	579.00	193.00	-32.00	\$5,957,172.55
80866	0	0	88.00	109.00	88.00	0.00	\$482,229.50
86005	20	15	160.00	160.00	110.00	-812.00	\$3,536,361.59
86014	0	0	225.50	225.50	180.00	0.00	\$6,008,757.23
86018	0	0	203.00	203.00	155.00	-817.00	\$6,258,065.43
86029	0	0	140.50	140.50	155.00	93.00	\$6,200,862.25
86031	0	0	193.00	392.00	153.00	-40.00	\$4,930,692.28
86034	0	0	163.00	163.00	90.00	0.00	\$536,579.91
86074	91	0	444.00	453.00	205.00	-239.00	\$13,369,187.08
86103	0	0	208.00	208.00	224.00	0.00	\$17,109,052.53
86154	0	0	423.00	423.00	150.00	0.00	\$12,224,379.06
86184	0	0	682.00	705.00	705.00	23.00	\$12,138,688.22
SUM	111.00	15.00	8,986.50	13,271.00	8,063.00	(2,857.00)	\$200,364,425.98
AVE	3.96	0.52	345.63	457.62	278.03	(105.81)	\$6,909,118.14

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	ADDITIONS	DEDUCTIONS	FINAL COST	ENG. EST.	INC/DAY
(I/D Contracts)					
80137	\$757,936.54	\$430,039.53	\$5,450,978.01	\$5,803,000.00	\$6,000.00
80178	\$2,890,361.47	\$941,507.10	\$18,864,842.13	\$18,777,000.00	\$11,000.00
80265	\$513,341.88	\$213,368.91	\$3,944,859.97	\$3,176,000.00	\$7,200.00
80312	\$631,442.47	\$72,822.52	\$3,334,807.11	\$3,585,000.00	\$5,000.00
80448	\$1,309,902.98	\$571,510.76	\$4,675,443.67	\$4,871,000.00	\$10,000.00
80522	\$1,311,673.08	\$1,074,710.74	\$11,218,547.82	\$12,294,000.00	\$8,500.00
80604	\$2,239,262.51	\$1,329,403.40	\$11,540,859.88	\$11,540,859.88	\$7,000.00
80654			\$18,685,577.50	\$23,290,000.00	\$5,000.00
80717	\$1,240,018.92	\$936,467.78	\$7,486,522.77	\$7,913,000.00	\$10,000.00
80718	\$8,251,186.62	\$6,008,291.49	\$11,096,998.17	\$8,412,000.00	\$4,000.00
80719	\$1,148,025.65	\$104,750.87	\$4,626,874.60	\$4,148,000.00	\$2,500.00
80720	\$991,261.66	\$106,235.38	\$5,597,214.44	\$3,986,000.00	\$2,500.00
80797	\$3,370,390.29	\$2,479,892.63	\$18,036,674.66	\$19,075,000.00	\$10,000.00
80811	\$302,889.35	\$21,196.34	\$5,195,870.92	\$4,501,000.00	\$5,000.00
80840	\$211,912.19	\$132,771.14	\$1,350,632.61	\$1,648,000.00	\$8,000.00
80844			\$5,320,712.40	\$5,310,000.00	\$8,000.00
80942	\$193,466.34	\$123,684.56	\$1,263,781.78	\$1,364,000.00	\$14,000.00
80944			\$3,383,186.51	\$3,793,000.00	\$5,000.00
80958	\$112,246.06	\$117,744.69	\$512,139.04	\$611,000.00	\$2,500.00
82167			\$710,888.23	\$630,000.00	\$2,000.00
86038	\$313,879.61	\$17,904.99	\$1,334,965.57	\$891,000.00	\$7,500.00
86039	\$623,213.89	\$91,757.10	\$4,314,085.79	\$3,060,000.00	\$15,000.00
86112	\$712,278.96	\$73,022.93	\$4,077,367.71	\$3,466,000.00	\$15,000.00
86160	\$18,686.60	\$3,013.20	\$132,294.40	\$97,100.00	\$1,500.00
86289	\$611,236.17	\$95,204.85	\$7,271,019.31	\$8,000,000.00	\$10,000.00
86301	\$1,225,920.50	\$627,491.15	\$14,899,890.62	\$13,703,000.00	\$20,000.00
86311	\$42,115.64	\$9,478.65	\$404,424.24		\$1,500.00
86399	\$959,831.14	\$453,201.00	\$11,100,097.36		\$15,000.00
SUM	\$29,982,480.52	\$16,035,471.71	\$185,831,557.22	\$161,404,100.00	\$218,700.00
AVE	\$1,249,270.02	\$668,144.65	\$6,636,841.33	\$6,456,164.00	\$7,810.71
(Non-I/D Contracts)					
80000	\$1,638,946.50	\$71,734.45	\$6,264,402.51	\$5,583,000.00	
80111	\$146,468.89	\$263,926.39	\$1,243,697.77	\$1,572,000.00	
80130	\$0.00	\$113,945.17	\$11,302,249.83	\$14,285,000.00	
80173	\$1,182,877.41	\$217,896.83	\$6,852,790.79	\$7,651,000.00	
80192	\$274,239.30	\$132,257.50	\$8,777,790.20	\$8,511,000.00	
80223	\$1,212,523.16	\$625,272.09	\$11,936,568.08	\$11,778,000.00	
80224	\$236,240.69	\$39,101.81	\$2,161,280.43	\$2,064,000.00	
80229	\$1,262,531.79	\$368,615.94	\$6,929,076.50	\$6,209,000.00	
80277	\$1,667,617.62	\$1,252,318.63	\$9,477,339.69	\$8,261,000.00	
80289	\$1,029,682.20	\$403,575.85	\$8,897,830.43	\$8,799,000.00	
80356	\$402,925.26	\$0.00	\$7,204,718.42	\$9,043,000.00	
80653	\$1,017,351.16	\$1,099,390.50	\$6,315,106.91	\$8,850,000.00	
80757			\$172,140.00	\$221,000.00	
80677	\$891,993.62	\$1,010,182.82	\$10,114,932.88	\$12,260,000.00	
80732	\$260,262.60	\$253,694.00	\$2,796,369.10	\$2,996,000.00	
80742	\$1,250,242.56	\$877,336.52	\$6,282,461.64	\$7,871,000.00	
80779	\$419,707.84	\$213,410.20	\$10,834,595.07	\$10,162,000.00	
80814	\$992,251.44	\$2,344,267.81	\$4,605,156.18	\$6,461,000.00	
80866	\$113,548.99	\$25,987.83	\$569,790.66	\$453,000.00	
86005	\$970,401.83	\$43,393.76	\$4,463,369.66	\$3,839,000.00	
86014	\$552,837.12	\$636,005.92	\$5,925,588.43	\$5,829,269.41	
86018	\$1,590,681.54	\$339,167.45	\$7,509,579.52	\$7,748,000.00	
86029	\$488,266.17	\$324,273.91	\$6,364,854.51	\$5,918,000.00	
86031	\$509,560.34	\$178,111.48	\$5,262,141.14	\$7,200,191.00	
86034	\$142,213.27	\$71,849.04	\$606,944.14	\$575,000.00	
86074	\$3,770,998.05	\$2,785,160.86	\$14,355,024.27	\$15,473,000.00	
86103	\$2,856,266.23	\$1,511,102.59	\$18,454,216.17	\$15,723,000.00	
86154	\$2,634,935.64	\$1,499,096.50	\$13,360,218.20	\$11,646,000.00	
86184	\$994,971.80	\$449,671.38	\$12,683,988.64	\$11,659,000.00	
SUM	\$28,510,543.02	\$17,150,747.23	\$211,724,221.77	\$218,640,460.41	
AVE	\$1,018,233.68	\$612,526.69	\$7,300,835.23	\$7,539,326.22	

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	COOP.INC.	INC.DUR.	MAX.DAYS	TOTAL INC.	LIQ.DAM.	L.D.DAYS
(I/D Contracts)						
80137	\$0.00	30	30	\$180,000.00	\$6,000.00	
80178	\$0.00	4	30	\$44,000.00	\$11,000.00	
80265	\$0.00	20	20	\$144,000.00	\$7,200.00	
80312	\$0.00	30	30	\$150,000.00	\$5,000.00	
80448	\$0.00	15	15	\$150,000.00	\$10,000.00	
80522	\$0.00	12	30	\$102,000.00	\$8,500.00	
80604	\$0.00	30	30	\$210,000.00	\$7,000.00	
80654	\$0.00	30	30	\$150,000.00	\$5,000.00	
80717	\$0.00	24	30	\$240,000.00	\$10,000.00	
80718	\$4,000.00	30	30	\$224,000.00	\$4,000.00	
80719	\$2,500.00	28	30	\$140,000.00	\$2,500.00	
80720	\$2,500.00	28	30	\$140,000.00	\$2,500.00	
80797	\$0.00	29	30	\$290,000.00	\$10,000.00	
80811	\$0.00	30	30	\$150,000.00	\$5,000.00	
80840	\$0.00	10	10	\$80,000.00	\$8,000.00	
80844	\$0.00	30	30	\$240,000.00	\$8,000.00	
80942	\$0.00	5	5	\$70,000.00	\$14,000.00	
80944	\$0.00	30	30	\$150,000.00	\$5,000.00	
80958	\$0.00	10	10	\$25,000.00	\$2,500.00	
82167	\$0.00	15	15	\$30,000.00	\$2,000.00	
86038	\$0.00	30	30	\$225,000.00	\$7,500.00	
86039	\$0.00	30	30	\$450,000.00	\$15,000.00	
86112	\$0.00	30	30	\$450,000.00	\$15,000.00	
86160	\$0.00	4	4	\$6,000.00	\$1,500.00	
86289	\$0.00	30	30	\$300,000.00	\$10,000.00	
86301	\$0.00	30	30	\$600,000.00	\$20,000.00	
86311	\$0.00	4	12	\$6,000.00	\$1,500.00	
86399	\$0.00	3	30	\$45,000.00	\$15,000.00	
SUM	\$9,000.00	601	691	\$4,991,000.00	\$218,700.00	
AVE	\$321.43	21.46	24.68	\$178,250.00	\$7,810.71	
(Non-I/D Contracts)						
80000				\$1,300.00	0	
80111				\$500.00	0	
80130				\$1,925.00	0	
80173				\$1,195.00	0	
80192				\$1,000.00	0	
80223				\$1,925.00	0	
80224				\$735.00	0	
80229				\$5,000.00	34	
80277				\$1,425.00	0	
80289				\$1,425.00	0	
80356				\$1,195.00	0	
80653				\$3,425.00	0	
80757				\$370.00	0	
80677				\$1,925.00	0	
80732				\$1,895.00	0	
80742				\$1,285.00	0	
80779				\$1,925.00	0	
80814				\$1,215.00	0	
80866				\$370.00	0	
86005				\$1,300.00	0	
86014				\$1,650.00	40.5	
86018				\$1,395.00	0	
86029				\$1,395.00	0	
86031				\$1,395.00	4	
86034				\$712.50	0	
86074				\$2,700.00	0	
86103				\$3,400.00	0	
86154				\$2,700.00	0	
86184				\$2,700.00	0	
SUM				\$49,382.50	78.50	
AVE				\$1,702.84	2.71	

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	TOTAL L.D.	B/C	NO.C.O	AM.C.O.	ADT	EXT/CONT.	ESS/CONT.
(I/D Contracts)							
80137		1.0890	31	\$327,897.01	15,200	0.0000	0.8306
80178		1.0800	88	\$1,948,854.37	36,025	1.0331	0.9853
80265		3.2200	28	\$299,972.97	98,100	0.0000	0.8190
80312		1.1475	22	\$558,619.95	34,041	0.0000	0.8803
80448		1.9166	8	\$738,392.22	90,000	0.0000	0.8077
80522		1.2900	67	\$236,962.34	40,600	0.0382	0.9542
80604		1.0104	39	\$909,859.11	93,128	0.0000	0.8477
80654		1.6250	62	\$2,064,779.56	26,000	0.0000	0.8835
80717		2.0100	36	\$303,551.14	41,500	0.0000	0.8884
80718		8.7000	60	\$2,242,895.13	121,200	0.0000	0.8182
80719		3.3000	20	\$1,043,274.78	121,200	0.0536	0.8333
80720		5.8000	36	\$885,026.28	121,200	0.0536	0.8333
80797		1.0748	51	\$890,497.66	123,963	0.0000	0.8396
80811		2.6032	24	\$281,693.01	78,300	0.0000	0.8946
80840		6.2000	20	\$79,141.05	121,200	0.0000	0.6615
80844		0.9995	29	\$556,659.40	160,150	0.0000	0.7190
80942		1.6561	7	\$69,781.78	150,200	0.0000	0.9851
80944		1.0550	29	\$133,836.29	27,400	0.0000	0.9171
80958		3.9400	20	(\$5,498.63)	27,000	0.0000	0.5882
82167		1.5935	11	\$70,275.40	41,000	0.0000	0.7794
86038			10	\$295,974.62	1,200	0.0000	0.8175
86039		2.4267	18	\$531,456.79	5,600	0.0000	0.8719
86112		1.4300	19	\$639,256.03	5,450	0.0000	0.8551
86160		2.7220	3	\$15,673.40	1,400	0.0000	0.6667
86289			15	\$516,031.32	10,500	0.0000	0.8671
86301		1.1156	28	\$598,429.35	9,500	0.0000	0.8775
86311			8	\$32,636.99		0.0000	0.6667
86399			32	\$506,630.14	19,600	0.0000	0.9877
SUM		59.00	821	\$16,772,559.46	1,620,657	1.1784	23.3761
AVE		2.46	29.32	\$599,019.98	60,024.33	0.0421	0.8349
(Non-I/D Contracts)							
80000	\$0.00			\$1,567,212.05	23,000	0.7232	3.5491
80111	\$0.00		21	(\$117,457.50)		0.0000	1.0000
80130	\$0.00		28	(\$113,945.17)		0.4905	1.4011
80173	\$0.00		24	\$964,980.58	60,000	0.0000	0.9924
80192	\$0.00		32	\$141,981.80	27,000	0.4296	1.0869
80223	\$0.00		17	\$587,251.07	61,000	0.5494	1.5392
80224	\$0.00		44	\$197,138.88	29,000	0.1192	1.1088
80229	\$170,000.00		29	\$893,915.85		0.9111	1.9422
80277	\$0.00		102	\$415,298.99	50,000	0.0000	1.0191
80289	\$0.00		51	\$626,106.35		0.0464	1.0774
80356	\$0.00		38	\$402,925.26		0.4580	0.9822
80653	\$0.00			(\$82,039.34)	55,100	0.0874	0.9903
80757	\$0.00		0		116,000	0.0000	0.8621
80677	\$0.00		18	(\$118,189.20)		0.0000	1.0024
80732	\$0.00		13	\$6,568.60		0.0000	0.9301
80742	\$0.00		40	\$372,906.04	29,000	0.0000	0.7377
80779	\$0.00		45	\$206,297.64	113,200	0.7406	1.1128
80814	\$0.00		54	(\$1,352,016.37)	20,000	0.1658	1.1658
80866	\$0.00		6	\$87,561.16		0.2386	1.0000
86005	\$0.00		24	\$927,008.07	10,400	0.4545	1.4545
86014	\$66,825.00		19	(\$83,168.80)	4,750	0.0278	
86018	\$0.00		40	\$1,251,514.09	10,550	0.3097	1.3097
86029	\$0.00		23	\$163,992.26	30,000	0.0000	0.9065
86031	\$5,580.00		22	\$331,448.86	30,700	0.0000	1.2614
86034	\$0.00		20	\$70,364.23	14,100	0.0000	1.8111
86074	\$0.00		24	\$985,837.19	10,400	1.2098	2.1659
86103	\$0.00		72	\$1,345,163.64	12,300	0.0000	
86154	\$0.00		33	\$1,135,839.14	30,000	0.0000	
86184	\$0.00		39	\$545,300.42	9,550	0.0000	0.9674
SUM	242,405.00		878.00	11,359,795.79	746,050.00	6.9616	33.3761
AVE	8,358.79		32.52	405,706.99	35,526.19	0.2401	1.2837

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	FIN/CONT.	ESS/ACT	INC.D/EARLY	ADD/CONT.AM	DED/CONT.AM	ACT/CONT.AM
(I/D Contracts)						
80137	0.8306	1.0000	0.9677	0.1479	0.0839	1.0640
80178	2.0331	0.4846	1.0000	0.1709	0.0557	1.1152
80265	1.0690	0.7661	0.9524	0.1408	0.0585	1.0823
80312	0.9923	0.8872	0.9677	0.2274	0.0262	1.2012
80448	1.2308	0.6563	1.0000	0.3327	0.1452	1.1875
80522	1.9351	0.4931	1.0000	0.1194	0.0979	1.0216
80604	0.8477	1.0000	1.0000	0.2106	0.1250	1.0856
80654	1.0000	0.8835	0.9677	0.0000	0.0000	1.1242
80717	0.8884	1.0000	0.8571	0.1726	0.1304	1.0423
80718	0.8242	0.9926	1.0000	0.9319	0.6786	1.2533
80719	2.8988	0.2875	1.0000	0.3204	0.0292	1.2911
80720	2.9048	0.2869	1.0000	0.2104	0.0225	1.1878
80797	0.8396	1.0000	0.9667	0.1966	0.1446	1.0519
80811	1.2585	0.7108	0.9677	0.0616	0.0043	1.0573
80840	1.4923	0.4433	0.4545	0.1667	0.1044	1.0622
80844			0.8824	0.0000	0.0000	1.1168
80942	0.9851	1.0000	0.8333	0.1620	0.1036	1.0584
80944	1.6961	0.5407	1.0000	0.0000	0.0000	1.0412
80958	2.6667	0.2206	0.4762	0.2168	0.2275	0.9894
82167	1.2941	0.6023	1.0000	0.0000	0.0000	1.1097
86038	0.8175	1.0000	0.6522	0.3021	0.0172	1.2849
86039	1.7727	0.4918	0.9677	0.1648	0.0243	1.1405
86112	0.8551	1.0000	0.9677	0.2072	0.0212	1.1859
86160		0.0406	1.0000	0.1602	0.0258	1.1344
86289	0.8671	1.0000	0.7895	0.0905	0.0141	1.0764
86301	1.0000	0.8775	0.9677	0.0857	0.0439	1.0418
86311	4.8333	0.1379	1.0000	0.1133	0.0255	1.0878
86399	0.9877	1.0000	1.0000	0.0906	0.0428	1.0478
SUM	38.8206	18.8033	25.6385	5.0032	2.2524	31.1428
AVE	1.4931	0.6964	0.9157	0.1787	0.0804	1.1122
(Non-I/D Contracts)						
80000	5.2098	0.6812		0.3489	0.0153	1.3336
80111	1.0000	1.0000		0.1076	0.1939	0.9137
80130	1.7073	0.8206		0.0000	0.0100	0.9900
80173	0.9924	1.0000		0.2009	0.0370	1.1639
80192	1.4296	0.7603		0.0318	0.0153	1.0164
80223	1.5392	1.0000		0.1068	0.0551	1.0517
80224	2.0155	0.5501		0.1203	0.0199	1.1004
80229	2.5511	0.7613		0.2092	0.0611	1.1481
80277	1.5113	0.6743		0.1840	0.1382	1.0458
80289	1.8576	0.5800		0.1245	0.0488	1.0757
80356	1.6438	0.5975		0.0592	0.0000	1.0592
80653	2.0777	0.4766		0.1590	0.1719	0.9872
80757	0.8621	1.0000		0.0000	0.0000	1.0000
80677	1.5201	0.6594		0.0872	0.0987	0.9885
80732	1.2455	0.7468		0.0933	0.0909	1.0024
80742	1.2607	0.5852		0.2116	0.1485	1.0631
80779	2.0677	0.5382		0.0395	0.0201	1.0194
80814	3.0000	0.3886		0.1666	0.3935	0.7730
80866	1.2386	0.8073		0.2355	0.0539	1.1816
86005	1.4545	1.0000		0.2744	0.0123	1.2621
86014	1.2528			0.0920	0.1058	0.9862
86018	1.3097	1.0000		0.2542	0.0542	1.2000
86029	0.9065	1.0000		0.0787	0.0523	1.0264
86031	2.5621	0.4923		0.1033	0.0361	1.0672
86034	1.8111	1.0000		0.2650	0.1339	1.1311
86074	2.2098	0.9801		0.2821	0.2083	1.0737
86103	0.9286			0.1669	0.0883	1.0786
86154	2.8200			0.2155	0.1226	1.0929
86184	1.0000	0.9674		0.0820	0.0370	1.0449
SUM	50.9850	20.0674		4.3001	2.4230	30.8771
AVE	1.7581	0.7718		0.1483	0.0836	1.0647

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	CONT.AM/EST	ACT/EST	CO/CONT.AM.	#CO/CONT.DUR	INC/CONT.AM	MAX.INC/C.A
(I/D Contracts)						
80137	0.8828	0.9393	0.0640	0.1694	0.0351	0.0351
80178	0.9009	1.0047	0.1152	0.3235	0.0026	0.0195
80265	1.1476	1.2421	0.0823	0.2414	0.0395	0.0395
80312	0.7744	0.9302	0.2012	0.0849	0.0540	0.0540
80448	1.0171	1.2078	0.1875	0.1026	0.0381	0.0381
80522	0.8932	0.9125	0.0216	0.2557	0.0093	0.0232
80604			0.0856	0.1980	0.0198	0.0198
80654	0.7136	0.8023	0.1242	0.2331	0.0090	0.0090
80717	0.9077	0.9461	0.0423	0.1434	0.0334	0.0418
80718	1.0526	1.3192	0.2533	0.3636	0.0253	0.0271
80719	0.8639	1.1154	0.2911	0.1190	0.0391	0.0419
80720	1.1822	1.4042	0.1878	0.2143	0.0297	0.0318
80797	0.8989	0.9456	0.0519	0.2727	0.0169	0.0175
80811	1.0918	1.1544	0.0573	0.0816	0.0305	0.0305
80840	0.7715	0.8196	0.0622	0.3077	0.0629	0.0629
80844	0.8972	1.0020	0.1168	0.2397	0.0504	0.0504
80942	0.8754	0.9265	0.0584	0.0174	0.0586	0.0586
80944	0.8567	0.8920	0.0412	0.0801	0.0462	0.0462
80958	0.8472	0.8382	-0.0106	0.3922	0.0483	0.0483
82167	1.0168	1.1284	0.1097	0.1618	0.0468	0.0468
86038	1.1661	1.4983	0.2849	0.0397	0.2166	0.2166
86039	1.2362	1.4098	0.1405	0.0744	0.1190	0.1190
86112	0.9920	1.1764	0.1859	0.0888	0.1309	0.1309
86160	1.2010	1.3625	0.1344	0.2500	0.0514	0.0514
86289	0.8444	0.9089	0.0764	0.0524	0.0444	0.0444
86301	1.0437	1.0873	0.0418	0.1107	0.0420	0.0420
86311			0.0878	0.6667	0.0161	0.0484
86399			0.0478	0.1317	0.0042	0.0425
SUM	24.0749	26.9737	3.1428	5.4165	1.3202	1.4372
AVE	0.9630	1.0789	0.1122	0.1934	0.0471	0.0513
(Non-I/D Contracts)						
80000	0.8413	1.1220	0.3336	0.0000		
80111	0.8659	0.7912	-0.0863	0.1173		
80130	0.7992	0.7912	-0.0100	0.0759		
80173	0.7695	0.8957	0.1639	0.0913		
80192	1.0147	1.0313	0.0164	0.0751		
80223	0.9636	1.0135	0.0517	0.0430		
80224	0.9516	1.0471	0.1004	0.2280		
80229	0.9720	1.1160	0.1481	0.1289		
80277	1.0970	1.1472	0.0458	0.1774		
80289	0.9401	1.0112	0.0757	0.1579		
80356	0.7522	0.7967	0.0592	0.0967		
80653	0.7228	0.7136	-0.0128	0.0000		
80757	0.7789	0.7789	0.0000	0.0000		
80677	0.8347	0.8250	-0.0115	0.0426		
80732	0.9312	0.9334	0.0024	0.0259		
80742	0.7508	0.7982	0.0631	0.0613		
80779	1.0459	1.0662	0.0194	0.1692		
80814	0.9220	0.7128	-0.2270	0.2798		
80866	1.0645	1.2578	0.1816	0.0682		
86005	0.9212	1.1626	0.2621	0.2182		
86014	1.0308	1.0165	-0.0138	0.1056		
86018	0.8077	0.9692	0.2000	0.2581		
86029	1.0478	1.0755	0.0264	0.1484		
86031	0.6848	0.7308	0.0672	0.1438		
86034	0.9332	1.0556	0.1311	0.2222		
86074	0.8640	0.9277	0.0737	0.1171		
86103	1.0882	1.1737	0.0786	0.3214		
86154	1.0497	1.1472	0.0929	0.2200		
86184	1.0411	1.0879	0.0449	0.0553		
SUM	26.4863	28.1959	1.8771	3.6485		
AVE	0.9133	0.9723	0.0647	0.1258		

Table B.1. Total I/D & Non-I/D Contracts

CONTRACTS	INC.AM/CONT.DUR	INC.DUR/MAX.D	MAX.AM/CONT.DUR
(I/D Contracts)			
80137	\$983.61	1.0000	\$983.61
80178	\$161.76	0.1333	\$1,213.24
80265	\$1,241.38	1.0000	\$1,241.38
80312	\$579.15	1.0000	\$579.15
80448	\$1,923.08	1.0000	\$1,923.08
80522	\$389.31	0.4000	\$973.28
80604	\$1,065.99	1.0000	\$1,065.99
80654	\$563.91	1.0000	\$563.91
80717	\$956.18	0.8000	\$1,195.22
80718	\$1,357.58	1.0000	\$727.27
80719	\$833.33	0.9333	\$446.43
80720	\$833.33	0.9333	\$446.43
80797	\$1,550.80	0.9667	\$1,604.28
80811	\$510.20	1.0000	\$510.20
80840	\$1,230.77	1.0000	\$1,230.77
80844	\$1,983.47	1.0000	\$1,983.47
80942	\$174.13	1.0000	\$174.13
80944	\$414.36	1.0000	\$414.36
80958	\$490.20	1.0000	\$490.20
82167	\$441.18	1.0000	\$441.18
86038	\$892.86	1.0000	\$892.86
86039	\$1,859.50	1.0000	\$1,859.50
86112	\$2,102.80	1.0000	\$2,102.80
86160	\$500.00	1.0000	\$500.00
86289	\$1,048.95	1.0000	\$1,048.95
86301	\$2,371.54	1.0000	\$2,371.54
86311	\$500.00	0.3333	\$1,500.00
86399	\$185.19	0.1000	\$1,851.85
SUM	\$27,144.56	24.600	\$30,335.08
AVE	\$969.45	0.879	\$1,083.40
(Non-I/D Contracts)			
80000			
80111			
80130			
80173			
80192			
80223			
80224			
80229			
80277			
80289			
80356			
80653			
80757			
80677			
80732			
80742			
80779			
80814			
80866			
86005			
86014			
86018			
86029			
86031			
86034			
86074			
86103			
86154			
86184			
SUM			
AVE			

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	TYPE	LOCATION	CONTRACTOR	START
(I/D Contracts)				
80137	embankment& substr.	FA 431	Kenny Const. Co.	08/01/88
80178	pavement	FA 431 (Ill 53)	Harry Kuhn & Traylor Bro	02/01/89
80265	bridge widening	FA 94 (Calumet Expy)	E. A. Cox Co.	04/22/91
80312	bridge reconstruction	FA 567	Brandenburg Ind. Serv.	02/14/91
80448	pavement	FA 90/94 (Dan Ryan Expy	K-FIVE Const. Co.	07/29/90
80522	pavement& br. rep.	FA 90/94 (Dan Ryan Expy	Palumbo-Herlihy-Lorig	02/11/91
80604	pavement& br. rep.	FA 342 (Ill 53)	Palumbo Bros.	04/01/91
80654	pavement	FA 345	T. J. Lambert	03/04/91
80717	pavement	U.S. Rte.20(Lake Ave.)	R. W. Dunteman Co.	03/19/91
80718	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/24/91
80719	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/21/91
80720	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/21/91
80797	pavement& br. rep.	FA 342 (Ill 53)	Palumbo Bros.	04/11/91
80811	pavement	FAU 2691	Plote-Milborn-J.V.Allied	11/11/91
80840	pavement	Lake Shore Dr.	Central Blacktop Co.	04/09/91
80844	pavement	FA 345 (F.A.I.Route 290)	Palumbo Bros.	05/02/92
80942	pavement& shoulder	FAI Route 291	Palumbo Bros.	05/27/91
80944	bridge reconstruction	FA 347	Brandenburg Ind. Serv.	12/04/91
80958	pavement& br. rep.	FAI Route 55	P. T. Ferro Const. Co.	06/10/92
82167	pavement	FAI 94	Curran Cont. Co.	08/02/93
SUM				
AVG.				
(Non-I/D Contracts)				
80000	pavement	FAU 2831	Ganna Const. Co.	05/04/87
80111	pavement& widening	FA 872	Peter Baker&Sons Co.	04/08/91
80130	pavement& widening	FA 872	K-FIVE & Lorig	10/27/88
80173	pavement& brid.rep.	FAP 432	Plate & Milburn Bros.	01/25/89
80192	pavement	FA 437	American Env. Const.	08/31/89
80223	pavement&ret.walls	FA 437	Eric Bolander Co.	09/30/89
80224	pavement&r.w.&br.rep.	FAU 3565	Thomas M. Madden Co.	04/22/91
80229	bridge reconst.	FA 9	Ill.Contrs&T.M.Madden	03/20/89
80277	pavement&bridge	FA 128	K-FIVE & Lorig	03/05/90
80289	str. replacement	FAI 94	Callagher/Swenson J.V.	12/12/90
80356	interchange const.	FAI 55	Harry W. Kuhn	10/04/89
80653	pregrading	FA 345	T.J.Lambrecht	03/19/92
80757	tree trimming	FAI 90	Mc Ginty Bros.,Inc.	11/06/90
80677	pavement	FAU 170,FAP 104&864	Eric Bolander	08/07/90
80732	pavement & bridge	FA 128	JH Pameray&F.H.Pasche	03/18/91
80742	pavement	FAP 870	Harry W. Kuhn	09/17/90
80779	bridge widening	FAI 90/94	Palumbo&Herlihy&Lorig	02/07/91
80814	pavement	FAU 1297	Dipaulo Co.&Allred Co.	04/22/91
80866	pavement	FAI 90/94	Abari Const. Co.	04/04/91
SUM				
AVE.				

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	ESS.COMP.	END	CONT.DATE	EXT.1	EXT.2	LENGTH	EXT1.DUR.
(I/D Contracts)							
80137	12/31/88	12/31/88	01/31/89	NO	NO	7,528.00	0
80178	10/27/89	08/08/90	10/31/89	12/31/89	08/08/90	14,255.00	61
80265	07/26/91	08/24/91	08/16/91	NO	NO	9,630.00	0
80312	09/30/91	10/29/91	10/31/91	NO	NO	1,550.00	0
80448	09/30/90	11/02/90	10/15/90	NO	NO	23,135.32	0
80522	10/19/91	07/02/92	10/31/91	11/10/91	NO	4,751.60	10
80604	09/15/91	09/15/91	10/15/91	NO	NO	13,243.00	0
80654	10/25/91	11/25/91	11/25/91	NO	NO	18,115.91	0
80717	10/28/91	10/28/91	11/25/91	NO	NO	9,806.30	0
80718	09/06/91	09/07/91	10/06/91	NO	NO	14,467.20	0
80719	09/08/91	08/20/92	10/06/91	10/15/91	NO	4,650.00	9
80720	09/08/91	08/21/92	10/06/91	10/15/91	NO	8,635.68	9
80797	09/15/91	09/15/91	10/15/91	NO	NO	15,102.00	0
80811	07/31/92	11/15/92	08/31/92	NO	NO	7,629.00	0
80840	05/22/91	07/15/91	06/13/91	NO	NO	15,227.17	0
80844	07/28/92		08/31/92			14,836.80	
80942	06/26/92	06/26/92	07/02/92	NO	NO	15,625.00	0
80944	10/31/92	08/09/93	11/30/92	NO	NO	1,221.00	0
80958	07/10/92	10/24/92	07/31/92	NO	NO	10,024.00	0
82167	09/24/93	10/29/93	10/09/93				0
SUM						209,433	89
AVG.						11,022.79	4.68
(Non-I/D Contracts)							
80000	07/07/89	07/14/90	12/14/87	05/24/88	NO	10,964.00	162
80111	10/04/91	10/04/91	10/04/91				
80130	03/28/90	07/19/90	10/31/89	04/30/90	NO	12,209.00	181
80173	10/13/89	10/13/89	10/15/89	NO	NO	4,225.83	0
80192	12/07/90	05/02/91	10/31/90	05/02/91	NO	5,024.60	183
80223	05/31/91	05/31/91	10/30/90	06/04/91	NO	4,286.00	217
80224	11/22/91	05/15/92	11/01/91	11/24/91	NO	700.00	23
80229	05/31/90	10/15/90	10/31/89	05/24/90	NO	2,585.00	205
80277	10/12/91	07/21/92	10/01/91	NO	NO	8,160.00	0
80289	11/25/91	08/03/92	10/31/91	11/15/91	NO	3,856.66	15
80356	10/25/90	07/12/91	11/01/90	04/30/91	NO	4,191.00	180
80653	06/29/92	10/19/92	06/30/92	07/09/92	NO	5,000.00	9
80757	03/11/91	03/11/91	03/31/91	NO	NO	0.00	0
80677	10/05/91	05/11/92	10/04/91	NO	NO	31,439.00	0
80732	06/26/92	12/01/92	07/31/92	NO	NO	1,432.00	0
80742	01/11/92	12/17/92	06/30/92	NO	NO	11,910.00	0
80779	11/30/91	08/10/92	10/31/91	05/15/92	NO	17,788.00	197
80814	12/03/91	11/21/92	11/01/91	12/03/91	NO	14,464.00	32
80866	07/01/91	07/22/91	07/01/91	07/22/91	NO	2,350.00	21
SUM						140,585.09	1,425
AVE.						7,810.28	79.17

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	EXT2.DUR	ESS.DUR.	ACT.DUR.	CONT.DU	EARLY FIN.	CONTRACT \$
<i>(I/D Contracts)</i>						
80137	0	152	152	183	31	\$5,123,081.00
80178	220	268	553	272	4	\$16,915,987.76
80265	0	95	124	116	21	\$3,644,887.00
80312	0	228	257	259	31	\$2,776,187.16
80448	0	63	96	78	15	\$3,937,051.45
80522	0	250	507	262	12	\$10,981,585.48
80604	0	167	167	197	30	\$10,631,000.77
80654	0	235	266	266	31	\$16,620,797.94
80717	0	223	223	251	28	\$7,182,971.63
80718	0	135	136	165	30	\$8,854,103.04
80719	0	140	487	168	28	\$3,583,599.82
80720	0	140	488	168	28	\$4,712,188.16
80797	0	157	157	187	30	\$17,146,177.00
80811	0	263	370	294	31	\$4,914,177.91
80840	0	43	97	65	22	\$1,271,491.56
80844	0	87		121	34	\$4,764,053.00
80942	0	396	396	402	6	\$1,194,000.00
80944	0	332	614	362	30	\$3,249,350.22
80958	0	30	136	51	21	\$517,637.67
82167	0	53	88	68	15	\$640,612.83
SUM	220	3,457	5,314	3,935	478	\$128,660,941.40
AVG.	11.58	172.85	279.68	196.75	23.90	\$6,433,047.07
<i>(Non-I/D Contracts)</i>						
80000	0	795	1167	224	(571.00)	\$4,697,190.46
80111		179	179	179	0.00	\$1,361,155.27
80130	0	517	630	369	(148.00)	\$11,416,195.00
80173	0	261	261	263	2.00	\$5,887,810.21
80192	0	463	609	426	(37.00)	\$8,635,808.40
80223	0	608	608	395	(213.00)	\$11,349,317.01
80224	0	214	389	193	(21.00)	\$1,964,141.55
80229	0	437	574	225	(212.00)	\$6,035,160.65
80277	0	586	869	575	(11.00)	\$9,062,040.70
80289	0	348	600	323	(25.00)	\$8,271,724.08
80356	0	386	646	393	7.00	\$6,801,793.16
80653	0	102	214	103	1.00	\$6,397,146.25
80757	0	125	125	145	20.00	\$172,140.00
80677	0	424	643	423	(1.00)	\$10,233,122.08
80732	0	466	624	501	35.00	\$2,789,800.50
80742	0	481	822	652	171.00	\$5,909,555.60
80779	0	296	550	266	(30.00)	\$10,628,297.43
80814	0	225	579	193	(32.00)	\$5,957,172.55
80866	0	88	109	88	0.00	\$482,229.50
SUM	0	7,001	10,198	5,936	(1,065.00)	\$118,051,800.40
AVE.	0.00	368.47	536.74	312.42	(56.05)	\$6,213,252.65

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	ADDITIONS	DEDUCTIONS	FINAL COST	ENG. EST.	INC/DAY
(I/D Contracts)					
80137	\$757,936.54	\$430,039.53	\$5,450,978.01	\$5,803,000.00	\$6,000.00
80178	\$2,890,361.47	\$941,507.10	\$18,864,842.13	\$18,777,000.00	\$11,000.00
80265	\$513,341.88	\$213,368.91	\$3,944,859.97	\$3,176,000.00	\$7,200.00
80312	\$631,442.47	\$72,822.52	\$3,334,807.11	\$3,585,000.00	\$5,000.00
80448	\$1,309,902.98	\$571,510.76	\$4,675,443.67	\$3,871,000.00	\$10,000.00
80522	\$1,311,673.08	\$1,074,710.74	\$11,218,547.82	\$12,294,000.00	\$8,500.00
80604	\$2,239,262.51	\$1,329,403.40	\$11,540,859.88		\$7,000.00
80654			\$18,685,577.50	\$23,290,000.00	\$5,000.00
80717	\$1,240,018.92	\$936,467.78	\$7,486,522.77	\$7,913,000.00	\$10,000.00
80718	\$8,251,186.62	\$6,008,291.49	\$11,096,998.17	\$8,412,000.00	\$4,000.00
80719	\$1,148,025.65	\$104,750.87	\$4,626,874.60	\$4,148,000.00	\$2,500.00
80720	\$991,261.66	\$106,235.38	\$5,597,214.44	\$3,986,000.00	\$2,500.00
80797	\$3,370,390.29	\$2,479,892.63	\$18,036,674.66	\$19,075,000.00	\$10,000.00
80811	\$302,889.35	\$21,196.34	\$5,195,870.92	\$4,501,000.00	\$5,000.00
80840	\$211,912.19	\$132,771.14	\$1,350,632.61	\$1,648,000.00	\$8,000.00
80844			\$5,320,712.40	\$5,310,000.00	\$8,000.00
80942	\$193,466.34	\$123,684.56	\$1,263,781.78	\$1,364,000.00	\$14,000.00
80944			\$3,383,186.51	\$3,793,000.00	\$5,000.00
80958	\$112,246.06	\$117,744.69	\$512,139.04	\$611,000.00	\$2,500.00
82167			\$710,888.23	\$630,000.00	\$2,000.00
SUM	\$25,475,318.01	\$14,664,397.84	\$142,297,412.22	\$132,187,000.00	\$133,200.00
AVG.	\$1,592,207.38	\$916,524.87	\$7,114,870.61	\$6,957,210.53	\$6,660.00
(Non-I/D Contracts)					
80000	\$1,638,946.50	\$71,734.45	\$6,264,402.51	\$5,583,000.00	
80111	\$146,468.89	\$263,926.39	\$1,243,697.77	\$1,572,000.00	
80130	\$0.00	\$113,945.17	\$11,302,249.83	\$14,285,000.00	
80173	\$1,182,877.41	\$217,896.83	\$6,852,790.79	\$7,651,000.00	
80192	\$274,239.30	\$132,257.50	\$8,777,790.20	\$8,511,000.00	
80223	\$1,212,523.16	\$625,272.09	\$11,936,568.08	\$11,778,000.00	
80224	\$236,240.69	\$39,101.81	\$2,161,280.43	\$2,064,000.00	
80229	\$1,262,531.79	\$368,615.94	\$6,929,076.50	\$6,209,000.00	
80277	\$1,667,617.62	\$1,252,318.63	\$9,477,339.69	\$8,261,000.00	
80289	\$1,029,682.20	\$403,575.85	\$8,897,830.43	\$8,799,000.00	
80356	\$402,925.26	\$0.00	\$7,204,718.42	\$9,043,000.00	
80653	\$1,017,351.16	\$1,099,390.50	\$6,315,106.91	\$8,850,000.00	
80757	\$0.00	\$0.00	\$172,140.00	\$221,000.00	
80677	\$891,993.62	\$1,010,182.82	\$10,114,932.88	\$12,260,000.00	
80732	\$260,262.60	\$253,694.00	\$2,796,369.10	\$2,996,000.00	
80742	\$1,250,242.56	\$877,336.52	\$6,282,461.64	\$7,871,000.00	
80779	\$419,707.84	\$213,410.20	\$10,834,595.07	\$10,162,000.00	
80814	\$992,251.44	\$2,344,267.81	\$4,605,156.18	\$6,461,000.00	
80866	\$113,548.99	\$25,987.83	\$569,790.66	\$453,000.00	
SUM	\$13,999,411.03	\$9,312,914.34	\$122,738,297.09	\$133,030,000.00	
AVE.	\$736,811.11	\$490,153.39	\$6,459,910.37	\$7,001,578.95	

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	COOP.INC.	INC.DUR.	MAX.DAYS	TOTAL INC.	LIQ.DAM.	L.D. DAY
(I/D Contracts)						
80137	\$0.00	30	30	\$180,000.00	\$6,000.00	
80178	\$0.00	4	30	\$44,000.00	\$11,000.00	
80265	\$0.00	20	20	\$144,000.00	\$7,200.00	
80312	\$0.00	30	30	\$150,000.00	\$5,000.00	
80448	\$0.00	15	15	\$150,000.00	\$10,000.00	
80522	\$0.00	12	30	\$102,000.00	\$8,500.00	
80604	\$0.00	30	30	\$210,000.00	\$7,000.00	
80654	\$0.00	30	30	\$150,000.00	\$5,000.00	
80717	\$0.00	24	30	\$240,000.00	\$10,000.00	
80718	\$4,000.00	30	30	\$224,000.00	\$4,000.00	
80719	\$2,500.00	28	30	\$140,000.00	\$2,500.00	
80720	\$2,500.00	28	30	\$140,000.00	\$2,500.00	
80797	\$0.00	29	30	\$290,000.00	\$10,000.00	
80811	\$0.00	30	30	\$150,000.00	\$5,000.00	
80840	\$0.00	10	10	\$80,000.00	\$8,000.00	
80844	\$0.00	30	30	\$240,000.00	\$8,000.00	
80942	\$0.00	5	5	\$70,000.00	\$14,000.00	
80944	\$0.00	30	30	\$150,000.00	\$5,000.00	
80958	\$0.00	10	10	\$25,000.00	\$2,500.00	
82167	\$0.00	15	15	\$30,000.00	\$2,000.00	
SUM	\$9,000.00	440	495	\$2,909,000.00	\$133,200.00	
AVG.	\$450.00	22.00	24.75	\$145,450.00	\$6,660.00	
(Non-I/D Contracts)						
80000					\$1,300.00	0.00
80111					\$500.00	0.00
80130					\$1,925.00	0.00
80173					\$1,195.00	0.00
80192					\$1,000.00	0.00
80223					\$1,925.00	0.00
80224					\$735.00	0.00
80229					\$5,000.00	34.00
80277					\$1,425.00	0.00
80289					\$1,425.00	0.00
80356					\$1,195.00	0.00
80356					\$3,425.00	0.00
80653					\$370.00	0.00
80757					\$1,925.00	0.00
80677					\$1,895.00	0.00
80732					\$1,285.00	0.00
80742					\$1,925.00	0.00
80779					\$1,215.00	0.00
80814					\$370.00	0.00
80866						
SUM					\$30,035.00	34.00
AVE.					\$1,580.79	1.79

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	TOTALLD.	B/C	NO.C.O.	AM.C.O.	ADT	EXT/CONT	ESS/CONT
(I/D Contracts)							
80137		1.0890	31	\$327,897.01	15,200	0.0000	0.8306
80178		1.0800	88	\$1,948,854.37	36,025	1.0331	0.9853
80265		3.2200	28	\$299,972.97	98,100	0.0000	0.8190
80312		1.1475	22	\$558,619.95	34,041	0.0000	0.8803
80448		1.9166	8	\$738,392.22	90,000	0.0000	0.8077
80522		1.2900	67	\$236,962.34	40,600	0.0382	0.9542
80604		1.0104	39	\$909,859.11	93,128	0.0000	0.8477
80654		1.6250	62	\$2,064,779.56	26,000	0.0000	0.8835
80717		2.0100	36	\$303,551.14	41,500	0.0000	0.8884
80718		8.7000	60	\$2,242,895.13	121,200	0.0000	0.8182
80719		3.3000	20	\$1,043,274.78	121,200	0.0536	0.8333
80720		5.8000	36	\$885,026.28	121,200	0.0536	0.8333
80797		1.0748	51	\$890,497.66	123,963	0.0000	0.8396
80811		2.6032	24	\$281,693.01	78,300	0.0000	0.8946
80840		6.2000	20	\$79,141.05	121,200	0.0000	0.6615
80844		0.9995	29	\$556,659.40	160,150	0.0000	0.7190
80942		1.6561	7	\$69,781.78	150,200	0.0000	0.9851
80944		1.0550	29	\$133,836.29	27,400	0.0000	0.9171
80958		3.9400	20	(\$5,498.63)	27,000	0.0000	0.5882
82167		1.5935	11	\$70,275.40	41,000	0.0000	0.7794
SUM		51.31	688	\$13,636,470.82	1,567,407	1.1784	16.7661
AVG.		2.57	34.40	\$681,823.54	78,370.35	0.0589	0.8383
(Non-I/D Contracts)							
80000	\$0.00			\$1,567,212.05	23,000	0.7232	3.5491
80111	\$0.00		21	(\$117,457.50)		0.0000	1.0000
80130	\$0.00		28	(\$113,945.17)		0.4905	1.4011
80173	\$0.00		24	\$964,980.58	60,000	0.0000	0.9924
80192	\$0.00		32	\$141,981.80	27,000	0.4296	1.0869
80223	\$0.00		17	\$587,251.07	61,000	0.5494	1.5392
80224	\$0.00		44	\$197,138.88	29,000	0.1192	1.1088
80229	\$170,000.00		29	\$893,915.85		0.9111	1.9422
80277	\$0.00		102	\$415,298.99	50,000	0.0000	1.0191
80289	\$0.00		51	\$626,106.35		0.0464	1.0774
80356	\$0.00		38	\$402,925.26		0.4580	0.9822
80653	\$0.00			(\$82,039.34)	55,100	0.0874	0.9903
80757	\$0.00		0	\$0.00	116,000	0.0000	0.8621
80677	\$0.00		18	(\$118,189.20)		0.0000	1.0024
80732	\$0.00		13	\$6,568.60		0.0000	0.9301
80742	\$0.00		40	\$372,906.04	29,000	0.0000	0.7377
80779	\$0.00		45	\$206,297.64	113,200	0.7406	1.1128
80814	\$0.00		54	(\$1,352,016.37)	20,000	0.1658	1.1658
80866	\$0.00		6	\$87,561.16		0.2386	1.0000
SUM	\$170,000.00		562.00	\$4,686,496.69	583,300.00	4.9598	23.4996
AVE.	\$8,947.37		33.06	\$246,657.72	53,027.27	0.2610	1.2368

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	FIN/CONT.	ESS/ACT	INC.D/EARL	ADD/CONT.A	DED/CONT.A	ACT/CONT.A	CONT.AM./ES
(I/D Contracts)							
80137	0.8306	1.0000	0.9677	0.1479	0.0839	1.0640	0.8828
80178	2.0331	0.4846	1.0000	0.1709	0.0557	1.1152	0.9009
80265	1.0690	0.7661	0.9524	0.1408	0.0585	1.0823	1.1476
80312	0.9923	0.8872	0.9677	0.2274	0.0262	1.2012	0.7744
80448	1.2308	0.6563	1.0000	0.3327	0.1452	1.1875	1.0171
80522	1.9351	0.4931	1.0000	0.1194	0.0979	1.0216	0.8932
80604	0.8477	1.0000	1.0000	0.2106	0.1250	1.0856	
80654	1.0000	0.8835	0.9677	0.0000	0.0000	1.1242	0.7136
80717	0.8884	1.0000	0.8571	0.1726	0.1304	1.0423	0.9077
80718	0.8242	0.9926	1.0000	0.9319	0.6786	1.2533	1.0526
80719	2.8988	0.2875	1.0000	0.3204	0.0292	1.2911	0.8639
80720	2.9048	0.2869	1.0000	0.2104	0.0225	1.1878	1.1822
80797	0.8396	1.0000	0.9667	0.1966	0.1446	1.0519	0.8989
80811	1.2585	0.7108	0.9677	0.0616	0.0043	1.0573	1.0918
80840	1.4923	0.4433	0.4545	0.1667	0.1044	1.0622	0.7715
80844			0.8824	0.0000	0.0000	1.1168	0.8972
80942	0.9851	1.0000	0.8333	0.1620	0.1036	1.0584	0.8754
80944	1.6961	0.5407	1.0000	0.0000	0.0000	1.0412	0.8567
80958	2.6667	0.2206	0.4762	0.2168	0.2275	0.9894	0.8472
82167	1.2941	0.6023	1.0000	0.0000	0.0000	1.1097	1.0168
SUM	27.6872	13.2554	18.2936	3.7889	2.0376	22.1432	17.5916
AVG.	1.4572	0.6977	0.9147	0.1894	0.1019	1.1072	0.9259
(Non-I/D Contracts)							
80000	5.2098	0.6812		0.3489	0.0153	1.3336	0.8413
80111	1.0000	1.0000		0.1076	0.1939	0.9137	0.8659
80130	1.7073	0.8206		0.0000	0.0100	0.9900	0.7992
80173	0.9924	1.0000		0.2009	0.0370	1.1639	0.7695
80192	1.4296	0.7603		0.0318	0.0153	1.0164	1.0147
80223	1.5392	1.0000		0.1068	0.0551	1.0517	0.9636
80224	2.0155	0.5501		0.1203	0.0199	1.1004	0.9516
80229	2.5511	0.7613		0.2092	0.0611	1.1481	0.9720
80277	1.5113	0.6743		0.1840	0.1382	1.0458	1.0970
80289	1.8576	0.5800		0.1245	0.0488	1.0757	0.9401
80356	1.6438	0.5975		0.0592	0.0000	1.0592	0.7522
80653	2.0777	0.4766		0.1590	0.1719	0.9872	0.7228
80757	0.8621	1.0000		0.0000	0.0000	1.0000	0.7789
80677	1.5201	0.6594		0.0872	0.0987	0.9885	0.8347
80732	1.2455	0.7468		0.0933	0.0909	1.0024	0.9312
80742	1.2607	0.5852		0.2116	0.1485	1.0631	0.7508
80779	2.0677	0.5382		0.0395	0.0201	1.0194	1.0459
80814	3.0000	0.3886		0.1666	0.3935	0.7730	0.9220
80866	1.2386	0.8073		0.2355	0.0539	1.1816	1.0645
SUM	34.7300	13.6276		2.4858	1.5720	19.9138	17.0179
AVE.	1.8279	0.7172		0.1308	0.0827	1.0481	0.8957

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	ACT/EST	CO/CONT.AM.	#CO/CONT.DU	INC/CONT.AM	MAX.INC/C.A.	INC.AM./CONT.DU
(I/D Contracts)						
80137	0.9393	0.0640	0.1694	0.0351	0.0351	\$983.61
80178	1.0047	0.1152	0.3235	0.0026	0.0195	\$161.76
80265	1.2421	0.0823	0.2414	0.0395	0.0395	\$1,241.38
80312	0.9302	0.2012	0.0849	0.0540	0.0540	\$579.15
80448	1.2078	0.1875	0.1026	0.0381	0.0381	\$1,923.08
80522	0.9125	0.0216	0.2557	0.0093	0.0232	\$389.31
80604		0.0856	0.1980	0.0198	0.0198	\$1,065.99
80654	0.8023	0.1242	0.2331	0.0090	0.0090	\$563.91
80717	0.9461	0.0423	0.1434	0.0334	0.0418	\$956.18
80718	1.3192	0.2533	0.3636	0.0253	0.0271	\$1,357.58
80719	1.1154	0.2911	0.1190	0.0391	0.0419	\$833.33
80720	1.4042	0.1878	0.2143	0.0297	0.0318	\$833.33
80797	0.9456	0.0519	0.2727	0.0169	0.0175	\$1,550.80
80811	1.1544	0.0573	0.0816	0.0305	0.0305	\$510.20
80840	0.8196	0.0622	0.3077	0.0629	0.0629	\$1,230.77
80844	1.0020	0.1168	0.2397	0.0504	0.0504	\$1,983.47
80942	0.9265	0.0584	0.0174	0.0586	0.0586	\$174.13
80944	0.8920	0.0412	0.0801	0.0462	0.0462	\$414.36
80958	0.8382	-0.0106	0.3922	0.0483	0.0483	\$490.20
82167	1.1284	0.1097	0.1618	0.0468	0.0468	\$441.18
SUM	19.5305	2.1432	4.0022	0.6956	0.7421	\$17,683.72
AVG.	1.0279	0.1072	0.2001	0.0348	0.0371	\$884.19
(Non-I/D Contracts)						
80000	1.1220	0.3336	0.0000			
80111	0.7912	-0.0863	0.1173			
80130	0.7912	-0.0100	0.0759			
80173	0.8957	0.1639	0.0913			
80192	1.0313	0.0164	0.0751			
80223	1.0135	0.0517	0.0430			
80224	1.0471	0.1004	0.2280			
80229	1.1160	0.1481	0.1289			
80277	1.1472	0.0458	0.1774			
80289	1.0112	0.0757	0.1579			
80356	0.7967	0.0592	0.0967			
80653	0.7136	-0.0128	0.0000			
80757	0.7789	0.0000	0.0000			
80677	0.8250	-0.0115	0.0426			
80732	0.9334	0.0024	0.0259			
80742	0.7982	0.0631	0.0613			
80779	1.0662	0.0194	0.1692			
80814	0.7128	-0.2270	0.2798			
80866	1.2578	0.1816	0.0682			
SUM	17.8490	0.9138	1.8385			
AVE.	0.9394	0.0481	0.0968			

Table B.2. District-1 I/D & Non-I/D Contracts

CONTRACT	INC.DUR/MAX.D	MAX.AM/CONT.DUR
(I/D Contracts)		
80137	1.0000	\$983.61
80178	0.1333	\$1,213.24
80265	1.0000	\$1,241.38
80312	1.0000	\$579.15
80448	1.0000	\$1,923.08
80522	0.4000	\$973.28
80604	1.0000	\$1,065.99
80654	1.0000	\$563.91
80717	0.8000	\$1,195.22
80718	1.0000	\$727.27
80719	0.9333	\$446.43
80720	0.9333	\$446.43
80797	0.9667	\$1,604.28
80811	1.0000	\$510.20
80840	1.0000	\$1,230.77
80844	1.0000	\$1,983.47
80942	1.0000	\$174.13
80944	1.0000	\$414.36
80958	1.0000	\$490.20
82167	1.0000	\$441.18
SUM	18.1667	\$18,207.57
AVG.	0.9083	\$910.38
(Non-I/D Contracts)		
80000		
80111		
80130		
80173		
80192		
80223		
80224		
80229		
80277		
80289		
80356		
80653		
80757		
80677		
80732		
80742		
80779		
80814		
80866		
SUM		
AVE.		

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	TYPE	LOCATION	CONTRACTOR	START	ESS.COM
(I/D Contracts)					
86038	bridge rehabilitation	FAS 256 (Ill 178)	Shappert Eng. Co.	04/07/89	10/30/89
86039	bridge repair	FA 698 (Ill 89)	Halverson & Midwest	04/03/89	10/31/89
86112	bridge repair	FA 649 (Ill 17)	Halverson & Midwest	03/01/90	08/31/90
86160	bridge repair	FA 649 (Ill 17)	Otto Baum & Sons	10/18/90	10/26/90
86289	bridge repair	FA 46 (Ill 251)	Halverson & Midwest	02/03/92	10/08/92
86301	pavement	FA 322	Illinois Valley Paving Co.	03/23/92	10/31/92
86311	bridge	FA 681 (Ill 116)	Tobey's Const. J.V.	05/11/92	05/19/92
86399	pavement	FAI 80	James Copé & Sons	03/01/93	10/27/93
SUM					
AVE					
(Non-I/D Contracts)					
86005	pregrading	FA 412	Strunk Bros. Co.	10/11/88	05/25/91
86014	bridge costruction	FA 412	Central Ill. Contracting Cor	04/11/89	
86018	pregrading&bridge	FA 412	Strunk Bros. Co.	01/09/89	09/09/91
86029	bridge replacement	FAI 55& FAI 74	Midwest Foundation Co.	08/21/89	07/31/90
86031	pavement	FA 412	Freesen Inc.	06/01/89	12/11/89
86034	pavement	FA 704	Rowe Const. Co.	05/02/89	10/12/89
86074	pavement	FA 412	Mc Carthy Improv. Co.	04/04/90	06/22/91
86103	pavement	FAI 55 & FA 412	Rowe Const. Co.	06/19/90	
86154	pavement resurfacing	FAI 55 & FAI 74	Rowe Const. Co.	09/03/91	
86184	pavement	FA 412	Freesen & Ill.Valley	07/17/90	05/29/92
SUM					
AVE					

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	END	CONT.DATE	EXT.1	EXT.2	LENGTH	EXT1.DUR.
(I/D Contracts)						
86038	10/30/89	12/15/89	NO	NO	555.00	0
86039	06/06/90	12/01/89	NO	NO	1,775.79	0
86112	08/31/90	10/01/90	NO	NO	2,647.00	0
86160	05/03/91	10/30/90	NO	NO	600.00	0
86289	10/08/92	11/15/92	NO	NO	12,436.00	0
86301	12/01/92	12/01/92	NO	NO	49,517.41	0
86311	07/08/92	05/23/92	NO	NO	500.00	0
86399	10/27/93	10/30/93	NO	NO	33,283.25	0
SUM					101,314.45	0.00
AVE					12,664.31	0.00
(Non-I/D Contracts)						
86005	08/02/91	03/04/89	04/02/90	NO	31,994.00	15
86014	11/19/92				3,635.00	5
86018	09/09/91	06/14/89	08/02/89	NO	30,071.45	48
86029	06/18/91	11/01/90	NO	NO	18,638.40	0
86031	06/28/90	11/01/89	NO	NO	18,257.52	0
86034	10/12/89		NO	NO	1,696.00	0
86074	07/01/91	10/26/90	04/01/91	07/01/91	62,064.51	157
86103	11/17/92		NO	NO	25,525.14	0
86154	10/30/92	10/31/92	NO	NO	51186.34	0
86184	06/21/92	06/21/92	NO	NO	23069.74	0
SUM					266,138.10	225.00
AVE					26,613.81	22.50

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	EXT2.DUR	EXT3.DUR.	ESS.DUR.	ACT.DUR.	CONT.DUR.	EARLY FIN.	CONTRACT \$
(I/D Contracts)							
86038	0	0	206	206	252	46.00	\$1,038,990.95
86039	0	0	211	429	242	31.00	\$3,782,629.00
86112	0	0	183	183	214	31.00	\$3,438,111.68
86160	0	0	8	197	12	4.00	\$116,621.00
86289	0	0	248	248	286	38.00	\$6,754,987.99
86301	0	0	222	253	253	31.00	\$14,301,461.27
86311	0	0	8	58	12	4.00	\$371,787.25
86399	0	0	240	240	243	3.00	\$10,593,467.22
SUM	0.00	0.00	1326	1814	1514	188.00	\$40,398,056.36
AVE	0.00	0.00	165.75	226.75	189.25	23.50	\$5,049,757.05
(Non-I/D Contracts)							
86005	20	15	160	160	110	(812.00)	\$3,536,361.59
86014	0	0		225.5	180	0.00	\$6,008,757.23
86018	0	0	203	203	155	(817.00)	\$6,258,065.43
86029	0	0	140.5	140.5	155	93.00	\$6,200,862.25
86031	0	0	193	392	153	(40.00)	\$4,930,692.28
86034	0	0	163	163	90		\$536,579.91
86074	91	0	444	453	205	(239.00)	\$13,369,187.08
86103	0	0		208	224	0.00	\$17,109,052.53
86154	0	0		423	150		\$12,224,379.06
86184	0	0	682	705	705	23.00	\$12,138,688.22
SUM	111.00	15.00	1985.5	3073	2127	(1,792.00)	82,312,625.58
AVE	11.10	1.50	283.6429	307.3	212.7	(224.00)	8,231,262.56

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	ADDITIONS	DEDUCTIONS	FINAL COST	ENG.EST.	INC/DAY
(I/D Contracts)					
86038	\$313,879.61	\$17,904.99	\$1,334,965.57	\$891,000.00	\$7,500.00
86039	\$623,213.89	\$91,757.10	\$4,314,085.79	\$3,060,000.00	\$15,000.00
86112	\$712,278.96	\$73,022.93	\$4,077,367.71	\$3,466,000.00	\$15,000.00
86160	\$18,686.60	\$3,013.20	\$132,294.40	\$97,100.00	\$1,500.00
86289	\$611,236.17	\$95,204.85	\$7,271,019.31	\$8,000,000.00	\$10,000.00
86301	\$1,225,920.50	\$627,491.15	\$14,899,890.62	\$13,703,000.00	\$20,000.00
86311	\$42,115.64	\$9,478.65	\$404,424.24		\$1,500.00
86399	\$959,831.14	\$453,201.00	\$11,100,097.36		\$15,000.00
SUM	\$4,507,162.51	\$1,371,073.87	\$43,534,145.00	\$29,217,100.00	\$85,500.00
AVE	\$563,395.31	\$171,384.23	\$5,441,768.13	\$4,869,516.67	\$10,687.50
(Non-I/D Contracts)					
86005	\$970,401.83	\$43,393.76	\$4,463,369.66	\$3,839,000.00	
86014	\$552,837.12	\$636,005.92	\$5,925,588.43	\$5,829,269.41	
86018	\$1,590,681.54	\$339,167.45	\$7,509,579.52	\$7,748,000.00	
86029	\$488,266.17	\$324,273.91	\$6,364,854.51	\$5,918,000.00	
86031	\$509,560.34	\$178,111.48	\$5,262,141.14	\$7,200,191.00	
86034	\$142,213.27	\$71,849.04	\$606,944.14	\$575,000.00	
86074	\$3,770,998.05	\$2,785,160.86	\$14,355,024.27	\$15,473,000.00	
86103	\$2,856,266.23	\$1,511,102.59	\$18,454,216.17	\$15,723,000.00	
86154	\$2,634,935.64	\$1,499,096.50	\$13,360,218.20	\$11,646,000.00	
86184	\$994,971.80	\$449,671.38	\$12,683,988.64	\$11,659,000.00	
SUM	14,511,131.99	7,837,832.89	88,985,924.68	85,610,460.41	
AVE	1,451,113.20	783,783.29	8,898,592.47	8,561,046.04	

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	COOP.INC	INC.DUR.	MAX.DAYS	TOTAL INC.	LIQ.DAM.	L.D. DAY	TOTAL L.D.
(I/D Contracts)							
86038	\$0.00	30	30	\$225,000.00	\$7,500.00	0	0.00
86039	\$0.00	30	30	\$450,000.00	\$15,000.00	0	0.00
86112	\$0.00	30	30	\$450,000.00	\$15,000.00	0	0.00
86160	\$0.00	4	4	\$6,000.00	\$1,500.00	0	0.00
86289	\$0.00	30	30	\$300,000.00	\$10,000.00	0	0.00
86301	\$0.00	30	30	\$600,000.00	\$20,000.00	0	0.00
86311	\$0.00	4	12	\$6,000.00	\$1,500.00	0	0.00
86399	\$0.00	3	30	\$45,000.00	\$15,000.00	0	0.00
SUM	\$0.00	161	196	\$2,082,000.00	\$85,500.00	0	0.00
AVE	\$0.00	20.13	24.50	\$260,250.00	\$10,687.50	0	0.00
(Non-I/D Contracts)							
86005					\$1,300.00	0	\$0.00
86014					\$1,650.00	40.5	\$66,825.00
86018					\$1,395.00	0	\$0.00
86029					\$1,395.00	0	\$0.00
86029					\$1,395.00	4	\$5,580.00
86031					\$712.50	0	\$0.00
86034					\$2,700.00	0	\$0.00
86074					\$3,400.00	0	\$0.00
86103					\$2,700.00	0	\$0.00
86154					\$2,700.00	0	\$0.00
86184							
SUM					19,347.50	44.50	72,405.00
AVE					1,934.75	4.45	7,240.50

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	B/C	NO.C.O.	AM.C.O.	ADT	EXT/CONT	ESS/CONT	FIN/CONT.
(I/D Contracts)							
86038		10	\$295,974.62	1,200	0.0000	0.8175	0.8175
86039	2.4267	18	\$531,456.79	5,600	0.0000	0.8719	1.7727
86112	1.4300	19	\$639,256.03	5,450	0.0000	0.8551	0.8551
86160	2.7220	3	\$15,673.40	1,400	0.0000	0.6667	
86289		15	\$516,031.32	10,500	0.0000	0.8671	0.8671
86301	1.1156	28	\$598,429.35	9,500	0.0000	0.8775	1.0000
86311		8	\$32,636.99		0.0000	0.6667	4.8333
86399		32	\$506,630.14	19,600	0.0000	0.9877	0.9877
SUM	7.69	133.00	\$3,136,088.64	53,250.00	0.0000	6.6101	11.1334
AVE	1.92	16.63	\$392,011.08	7,607.14	0.0000	0.8263	1.5905
(Non-I/D Contracts)							
86005		24	\$927,008.07	10,400	0.4545	1.4545	1.4545
86014		19	(\$83,168.80)	4,750	0.0278		1.2528
86018		40	\$1,251,514.09	10,550	0.3097	1.3097	1.3097
86029		23	\$163,992.26	30,000	0.0000	0.9065	0.9065
86031		22	\$331,448.86	30,700	0.0000	1.2614	2.5621
86034		20	\$70,364.23	14,100	0.0000	1.8111	1.8111
86074		24	\$985,837.19	10,400	1.2098	2.1659	2.2098
86103		72	\$1,345,163.64	12,300	0.0000		0.9266
86154		33	\$1,135,839.14	30,000	0.0000		2.8200
86184		39	\$545,300.42	9,550	0.0000	0.9674	1.0000
SUM		316.00	6,673,299.10	162,750.00	2.0018	9.8765	16.2550
AVE		31.60	667,329.91	16,275.00	0.2002	1.4109	1.6255

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	ESS/ACT.D	INC.D/EARLY	ADD/CONT.A	DED/CONT.A	ACT/CONT.A	CONT.AM./ES
(I/D Contracts)						
86038	1.0000	0.6522	0.3021	0.0172	1.2849	1.1661
86039	0.4918	0.9677	0.1648	0.0243	1.1405	1.2362
86112	1.0000	0.9677	0.2072	0.0212	1.1859	0.9920
86160	0.0406	1.0000	0.1602	0.0258	1.1344	1.2010
86289	1.0000	0.7895	0.0905	0.0141	1.0764	0.8444
86301	0.8775	0.9677	0.0857	0.0439	1.0418	1.0437
86311	0.1379	1.0000	0.1133	0.0255	1.0878	
86399	1.0000	1.0000	0.0906	0.0428	1.0478	
SUM	5.5479	7.3449	1.2144	0.2148	8.9995	6.4833
AVE	0.6935	0.9181	0.1518	0.0269	1.1249	1.0805
(Non-I/D Contracts)						
86005	1.0000		0.2744	0.0123	1.2621	0.9212
86014			0.0920	0.1058	0.9862	1.0308
86018	1.0000		0.2542	0.0542	1.2000	0.8077
86029	1.0000		0.0787	0.0523	1.0264	1.0478
86031	0.4923		0.1033	0.0361	1.0672	0.6848
86034	1.0000		0.2650	0.1339	1.1311	0.9332
86074	0.9801		0.2821	0.2083	1.0737	0.8640
86103			0.1669	0.0883	1.0786	1.0882
86154			0.2155	0.1226	1.0929	1.0497
86184	0.9674		0.0820	0.0370	1.0449	1.0411
SUM	6.4399		1.8142	0.8510	10.9633	9.4684
AVE	0.9200		0.1814	0.0851	1.0963	0.9468

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	ACT/EST	CO/CONT.AM.	#CO/CONT.DU	INC/CONT.AM	MAX.INC/C.A.	INC.AM./CONT.DU
(I/D Contracts)						
86038	1.4983	0.2849	0.0397	0.2166	0.2166	\$892.86
86039	1.4098	0.1405	0.0744	0.1190	0.1190	\$1,859.50
86112	1.1764	0.1859	0.0888	0.1309	0.1309	\$2,102.80
86160	1.3625	0.1344	0.2500	0.0514	0.0514	\$500.00
86289	0.9089	0.0764	0.0524	0.0444	0.0444	\$1,048.95
86301	1.0873	0.0418	0.1107	0.0420	0.0420	\$2,371.54
86311		0.0878	0.6667	0.0161	0.0484	\$500.00
86399		0.0478	0.1317	0.0042	0.0425	\$185.19
SUM	7.4432	0.9995	1.4143	0.6246	0.6951	\$9,460.84
AVE	1.2405	0.1249	0.1768	0.0781	0.0869	\$1,182.61
(Non-I/D Contracts)						
86005	1.1626	0.2621	0.2182			
86014	1.0165	-0.0138	0.1056			
86018	0.9692	0.2000	0.2581			
86029	1.0755	0.0264	0.1484			
86031	0.7308	0.0672	0.1438			
86034	1.0556	0.1311	0.2222			
86074	0.9277	0.0737	0.1171			
86103	1.1737	0.0786	0.3214			
86154	1.1472	0.0929	0.2200			
86184	1.0879	0.0449	0.0553			
SUM	10.3468	0.9633	1.8100			
AVE	1.0347	0.0963	0.1810			

Table B.3. District-3 I/D & Non-I/D Contracts

CONTRACT	INC.DUR/MAX.DU	MAX.AM/CONT.DUR
(I/D Contracts)		
86038	1.0000	\$892.86
86039	1.0000	\$1,859.50
86112	1.0000	\$2,102.80
86160	1.0000	\$500.00
86289	1.0000	\$1,048.95
86301	1.0000	\$2,371.54
86311	0.3333	\$1,500.00
86399	0.1000	\$1,851.85
SUM	6.4333	\$12,127.51
AVE	0.8042	\$1,515.94
(Non-I/D Contracts)		
86005		
86014		
86018		
86029		
86031		
86034		
86074		
86103		
86154		
86184		
SUM		
AVE		

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	TYPE	LOCATION	CONTRACTOR	START
(I/D Contracts)				
80178	pavement	FA 431 (Ill 53)	Harry Kuhn & Traylor Bros.	02/01/89
80448	pavement	FA 90/94 (Dan Ryan Expy	K-FIVE Const. Co.	07/29/90
80654	pavement	FA 345	T. J. Lambert	03/04/91
80717	pavement	U.S. Rte.20 (Lake Ave.)	R. W. Dunteman Co.	03/19/91
80718	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/24/91
80719	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/21/91
80720	pavement	Lake Shore Dr.	Callaghan-F.H.Paschen	04/21/91
80811	pavement	FAU 2691	Plote-Milborn-J.V.Allied	11/11/91
80840	pavement	Lake Shore Dr.	Central Blacktop Co.	04/09/91
80844	pavement	FA 345 (F.A.I.Route 290)	Palumbo Bros.	05/02/92
80942	pavement & shoulder	FAI Route 291	Palumbo Bros.	05/27/91
82167	pavement	FAI 94	Curran Cont. Co.	08/02/93
86301	pavement	FA 322	Illinois Valley Paving Co.	03/23/92
86399	pavement	FAI 80	James Cope & Sons	03/01/93
SUM				
AVE				
(Non-I/I Contracts)				
80000	pavement	FAU 2831	Ganna Const. Co.	05/04/87
80111	pavement & widening	FA 872	Peter Baker & Sons Co.	04/08/91
80130	pavement & widening	FA 872	K-FIVE & Lorig	10/27/88
80192	pavement	FA 437	American Env. Const.	08/31/89
80223	pavement & ret.walls	FA 437	Eric Bolander Co.	09/30/89
80677	pavement	FAU 170, FAP 104 & 864	Eric Bolander	08/07/90
80742	pavement	FAP 870	Harry W. Kuhn	09/17/90
80814	pavement	FAU 1297	Dipaulilo Co. & Allred Co.	04/22/91
80866	pavement	FAI 90/94	Abari Const. Co.	04/04/91
86031	pavement	FA 412	Freesen Inc.	06/01/89
86034	pavement	FA 704	Rowe Const. Co.	05/02/89
86074	pavement	FA 412	McCarthy Improv. Co.	04/04/90
86103	pavement	FAI 55 & FA 412	Rowe Const. Co.	06/19/90
86154	pavement resurfacing	FAI 55 & FAI 74	Rowe Const. Co.	09/03/91
86184	pavement	FA 412	Freesen & Ill.Valley	07/17/90
SUM				
AVE				

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	ESS.COM	END	CONT.DATE	EXT.1	EXT.2	LENGTH	EXT1.DUR.
(I/D Contracts)							
80178	10/28/89	08/08/90	10/31/89	12/31/89	08/08/90	14,255.00	61
80448	09/30/90	11/02/90	10/15/90	NO	NO	23,135.32	0
80654	10/25/91	11/25/91	11/25/91	NO	NO	18,115.91	0
80717	11/01/91	10/28/91	11/25/91	NO	NO	9,806.30	0
80718	09/06/91	09/07/91	10/06/91	NO	NO	14,467.20	0
80719	09/08/91	08/20/92	10/06/91	10/15/91	NO	4,650.00	9
80720	09/08/91	08/21/92	10/06/91	10/15/91	NO	8,635.68	9
80811	07/31/92	11/15/92	08/31/92	NO	NO	7,629.00	0
80840	05/22/91	07/15/91	06/13/91	NO	NO	15,227.17	0
80844	07/28/92		08/31/92			14,836.80	
80942	06/26/92	06/26/92	07/02/92	NO	NO	15,625.00	0
82167	09/24/93	10/29/93	10/09/93				0
86301	10/31/92	12/01/92	12/01/92	NO	NO	49,517.41	0
86399	10/27/93	10/27/93	10/30/93	NO	NO	33,283.25	0
SUM						229,184.04	79
AVE						17,629.54	6.08
(Non-I/I Contracts)							
80000	07/07/89	07/14/90	12/14/87	05/24/88	NO	10,964.00	162
80111	10/04/91	10/04/91	10/04/91				
80130	03/28/90	07/19/90	10/31/89	04/30/90	NO	12,209.00	181
80192	12/07/90	05/02/91	10/31/90	05/02/91	NO	5,024.60	183
80223	05/31/91	05/31/91	10/30/90	06/04/91	NO	4,286.00	217
80677	10/05/91	05/11/92	10/04/91	NO	NO	31,439.00	0
80742	01/11/92	12/17/92	06/30/92	NO	NO	11,910.00	0
80814	12/03/91	11/21/92	11/01/91	12/03/91	NO	14,464.00	32
80866	07/01/91	07/22/91	07/01/91	07/22/91	NO	2,350.00	21
86031	12/11/89	06/28/90	11/01/89	NO	NO	18,257.52	0
86034	10/12/89	10/12/89		NO	NO	1,696.00	0
86074	06/22/91	07/01/91	10/26/90	04/01/91	07/01/91	62,064.51	157
86103		11/17/92		NO	NO	25,525.14	0
86154		10/30/92	10/31/92	NO	NO	51,186.34	0
86184	05/29/92	06/21/92	06/21/92	NO	NO	23069.74	0
SUM						274,445.85	953
AVE						19,603.28	68.07

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	EXT2.DUR	EXT.3DUR	ESS.DUR.	ACT.DUR.	CONT.DU	EARLY FIN.	CONTRACT \$
(I/D Contracts)							
80178	220	0	269	553	272	3	\$16,915,987.76
80448	0	0	63	96	78	15	\$3,937,051.45
80654	0	0	235	266	266	31	\$16,620,797.94
80717	0	0	227	223	251	24	\$7,182,971.63
80718	0	0	135	136	165	30	\$8,854,103.04
80719	0	0	140	487	168	28	\$3,583,599.82
80720	0	0	140	488	168	28	\$4,712,188.16
80811	0	0	263	370	294	31	\$4,914,177.91
80840	0	0	43	97	65	22	\$1,271,491.56
80844	0	0	87		121	34	\$4,764,053.00
80942	0	0	396	396	402	6	\$1,194,000.00
82167	0	0	53	88	68	15	\$640,612.83
86301	0	0	222	253	253	31	\$14,301,461.27
86399	0	0	240	240	243	3	\$10,593,467.22
SUM	220	0	2513	3693	2814	301	\$99,485,963.59
AVE	16.92	0	179.50	284.08	201.00	21.50	\$7,106,140.26
(Non-I/I Contracts)							
80000	0	0	795.00	1167.00	224.00	(571.00)	\$4,697,190.46
80111	0	0	179.00	179.00	179.00	0.00	\$1,361,155.27
80130	0	0	517.00	630.00	369.00	(148.00)	\$11,416,195.00
80192	0	0	463.00	609.00	426.00	(37.00)	\$8,635,808.40
80223	0	0	608.00	608.00	395.00	(213.00)	\$11,349,317.01
80677	0	0	424.00	643.00	423.00	(1.00)	\$10,233,122.08
80742	0	0	481.00	822.00	652.00	171.00	\$5,909,555.60
80814	0	0	225.00	579.00	193.00	(32.00)	\$5,957,172.55
80866	0	0	88.00	109.00	88.00	0.00	\$482,229.50
86031	0	0	193.00	392.00	153.00	(40.00)	\$4,930,692.28
86034	0	0	163.00	163.00	90.00		\$536,579.91
86074	91	0	444.00	453.00	205.00	(239.00)	\$13,369,187.08
86103	0	0		208.00	224.00	0.00	\$17,109,052.53
86154	0	0		423.00	150.00		\$12,224,379.06
86184	0	0	682.00	705.00	705.00	23.00	\$12,138,688.22
SUM	91	0	5262.00	7690.00	4476.00	(1,087.00)	\$120,350,324.95
AVE	6.5	0	404.77	512.67	298.40	(83.62)	\$8,023,355.00

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	ADDITIONS	DEDUCTIONS	FINAL COST	ENG.EST.	INC/DAY
(I/D Contracts)					
80178	\$2,890,361.47	\$941,507.10	\$18,864,842.13	\$18,777,000.00	\$11,000.00
80448	\$1,309,902.98	\$571,510.76	\$4,675,443.67	\$3,871,000.00	\$10,000.00
80654			\$18,685,577.50	\$23,290,000.00	\$5,000.00
80717	\$1,240,018.92	\$936,467.78	\$7,486,522.77	\$7,913,000.00	\$10,000.00
80718	\$8,251,186.62	\$6,008,291.49	\$11,096,998.17	\$8,412,000.00	\$4,000.00
80719	\$1,148,025.65	\$104,750.87	\$4,626,874.60	\$4,148,000.00	\$2,500.00
80720	\$991,261.66	\$106,235.38	\$5,597,214.44	\$3,986,000.00	\$2,500.00
80811	\$302,889.35	\$21,196.34	\$5,195,870.92	\$4,501,000.00	\$5,000.00
80840	\$211,912.19	\$132,771.14	\$1,350,632.61	\$1,648,000.00	\$8,000.00
80844			\$5,320,712.40	\$5,310,000.00	\$8,000.00
80942	\$193,466.34	\$123,684.56	\$1,263,781.78	\$1,364,000.00	\$14,000.00
82167			\$710,888.23	\$630,000.00	\$2,000.00
86301	\$1,225,920.50	\$627,491.15	\$14,899,890.62	\$13,703,000.00	\$20,000.00
86399	\$959,831.14	\$453,201.00	\$11,100,097.36		\$15,000.00
SUM	\$18,724,776.82	\$10,027,107.57	\$110,875,347.20	\$97,553,000.00	\$117,000.00
AVE	\$1,702,252.44	\$911,555.23	\$7,919,667.66	\$7,504,076.92	\$8,357.14
(Non-I/I Contracts)					
80000	\$1,638,946.50	\$71,734.45	\$6,264,402.51	\$5,583,000.00	
80111	\$146,468.89	\$263,926.39	\$1,243,697.77	\$1,572,000.00	
80130	\$0.00	\$113,945.17	\$11,302,249.83	\$14,285,000.00	
80192	\$274,239.30	\$132,257.50	\$8,777,790.20	\$8,511,000.00	
80223	\$1,212,523.16	\$625,272.09	\$11,936,568.08	\$11,778,000.00	
80677	\$891,993.62	\$1,010,182.82	\$10,114,932.88	\$12,260,000.00	
80742	\$1,250,242.56	\$877,336.52	\$6,282,461.64	\$7,871,000.00	
80814	\$992,251.44	\$2,344,267.81	\$4,605,156.18	\$6,461,000.00	
80866	\$113,548.99	\$25,987.83	\$569,790.66	\$453,000.00	
86031	\$509,560.34	\$178,111.48	\$5,262,141.14	\$7,200,191.00	
86034	\$142,213.27	\$71,849.04	\$606,944.14	\$575,000.00	
86074	\$3,770,998.05	\$2,785,160.86	\$14,355,024.27	\$15,473,000.00	
86103	\$2,856,266.23	\$1,511,102.59	\$18,454,216.17	\$15,723,000.00	
86154	\$2,634,935.64	\$1,499,096.50	\$13,360,218.20	\$11,646,000.00	
86184	\$994,971.80	\$449,671.38	\$12,683,988.64	\$11,659,000.00	
SUM	\$17,429,159.79	\$11,959,902.43	\$125,819,582.31	\$131,050,191.00	
AVE	\$1,161,943.99	\$797,326.83	\$8,387,972.15	\$8,736,679.40	

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	COOP.INC.	INC.DUR.	MAX.DAYS	TOTAL INC.	LIQ.DAM.	L.D. DAYS
(I/D Contracts)						
80178	\$0.00	4	30	\$44,000.00	\$11,000.00	0.00
80448	\$0.00	15	15	\$150,000.00	\$10,000.00	0.00
80654	\$0.00	30	30	\$150,000.00	\$5,000.00	0.00
80717	\$0.00	24	30	\$240,000.00	\$10,000.00	0.00
80718	\$4,000.00	30	30	\$240,000.00	\$4,000.00	0.00
80719	\$2,500.00	28	30	\$140,000.00	\$2,500.00	0.00
80720	\$2,500.00	28	30	\$140,000.00	\$2,500.00	0.00
80811	\$0.00	30	30	\$150,000.00	\$5,000.00	0.00
80840	\$0.00	10	10	\$80,000.00	\$8,000.00	0.00
80844	\$0.00	30	30	\$240,000.00	\$8,000.00	0.00
80942	\$0.00	5	5	\$70,000.00	\$14,000.00	0.00
82167	\$0.00	15	15	\$30,000.00	\$2,000.00	0.00
86301	\$0.00	30	30	\$600,000.00	\$20,000.00	0.00
86399	\$0.00	3	30	\$45,000.00	\$15,000.00	0.00
SUM	\$9,000.00	282.00	345.00	\$2,319,000.00	\$117,000.00	0.00
AVE	\$642.86	20.14	24.64	\$165,642.86	\$8,357.14	0.00
(Non-I/I Contracts)						
80000					\$1,300.00	0
80111					\$500.00	0
80130					\$1,925.00	0
80192					\$1,000.00	0
80223					\$1,925.00	0
80223					\$1,925.00	0
80677					\$1,285.00	0
80742					\$1,215.00	0
80814					\$370.00	0
80866					\$1,395.00	4
86031					\$712.50	0
86034					\$2,700.00	0
86074					\$3,400.00	0
86103					\$2,700.00	0
86154					\$2,700.00	0
86184					\$2,700.00	0
SUM					\$25,052.50	4
AVE					\$1,670.17	0.27

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	TOTAL LD.	B/C	NO.C.O.	AM.C.O.	ADT	EXT/CONT
(I/D Contracts)						
80178	\$0.00	1.0800	88	\$1,948,854.37	36,025	1.0331
80448	\$0.00	1.9166	8	\$738,392.22	90,000	0.0000
80654	\$0.00	1.6250	62	\$2,064,779.56	26,000	0.0000
80717	\$0.00	2.0100	36	\$303,551.14	41,500	0.0000
80718	\$0.00	8.7000	60	\$2,242,895.13	121,200	0.0000
80719	\$0.00	3.3000	20	\$1,043,274.78	121,200	0.0536
80720	\$0.00	5.8000	36	\$885,026.28	121,200	0.0536
80811	\$0.00	2.6032	24	\$281,693.01	78,300	0.0000
80840	\$0.00	6.2000	20	\$79,141.05	121,200	0.0000
80844	\$0.00	0.9995	29	\$556,659.40	160,150	0.0000
80942	\$0.00	1.6561	7	\$69,781.78	150,200	0.0000
82167	\$0.00	1.5935	11	\$70,275.40	41,000	0.0000
86301	\$0.00	1.1156	28	\$598,429.35	9,500	0.0000
86399	\$0.00		32	\$506,630.14	19,600	0.0000
SUM	\$0.00	38.5995	461.00	\$11,389,383.61	1,137,075.00	1.1402
AVE	\$0.00	2.9692	32.93	\$813,527.40	81,219.64	0.0814
(Non-I/I Contracts)						
80000	\$0.00			\$1,567,212.05	23,000	0.7232
80111	\$0.00		21	(\$117,457.50)		0.0000
80130	\$0.00		28	(\$113,945.17)		0.4905
80192	\$0.00		32	\$141,981.80	27,000	0.4296
80223	\$0.00		17	\$587,251.07	61,000	0.5494
80677	\$0.00		18	(\$118,189.20)		0.0000
80742	\$0.00		40	\$372,906.04	29,000	0.0000
80814	\$0.00		54	(\$1,352,016.37)	20,000	0.1658
80866	\$0.00		6	\$87,561.16		0.2386
86031	\$5,580.00		22	\$331,448.86	30,700	0.0000
86034	\$0.00		20	\$70,364.23	14,100	0.0000
86074	\$0.00		24	\$985,837.19	10,400	1.2098
86103	\$0.00		72	\$1,345,163.64	12,300	0.0000
86154	\$0.00		33	\$1,135,839.14	30,000	0.0000
86184	\$0.00		39	\$545,300.42	9,550	0.0000
SUM	\$5,580.00		\$426.00	\$5,469,257.36	267,050.00	3.8069
AVE	\$372.00		\$30.43	\$364,617.16	24,277.27	0.2538

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	ESS/CONT	FIN/CONT.	ESS/ACT	INC.D/EARL	ADD/CONT.A	DED/CONT.A	ACT/CONT.A
(I/D Contracts)							
80178	0.9890	2.0331	0.4864	1.3333	0.1709	0.0557	1.1152
80448	0.8077	1.2308	0.6563	1.0000	0.3327	0.1452	1.1875
80654	0.8835	1.0000	0.8835	0.9677	0.0000	0.0000	1.1242
80717	0.9044	0.8884	1.0179	1.0000	0.1726	0.1304	1.0423
80718	0.8182	0.8242	0.9926	1.0000	0.9319	0.6786	1.2533
80719	0.8333	2.8988	0.2875	1.0000	0.3204	0.0292	1.2911
80720	0.8333	2.9048	0.2869	1.0000	0.2104	0.0225	1.1878
80811	0.8946	1.2585	0.7108	0.9677	0.0616	0.0043	1.0573
80840	0.6615	1.4923	0.4433	0.4545	0.1667	0.1044	1.0622
80844	0.7190			0.8824	0.0000	0.0000	1.1168
80942	0.9851	0.9851	1.0000	0.8333	0.1620	0.1036	1.0584
82167	0.7794	1.2941	0.6023	1.0000	0.0000	0.0000	1.1097
86301	0.8775	1.0000	0.8775	0.9677	0.0857	0.0439	1.0418
86399	0.9877	0.9877	1.0000	1.0000	0.0906	0.0428	1.0478
SUM	11.9741	18.7978	9.2449	13.4068	2.7055	1.3605	15.6957
AVE	0.8553	1.4460	0.7111	0.9576	0.1932	0.0972	1.1211
(Non-I/I Contracts)							
80000	3.5491	5.2098	0.6812		0.3489	0.0153	1.3336
80111	1.0000	1.0000	1.0000		0.1076	0.1939	0.9137
80130	1.4011	1.7073	0.8206		0.0000	0.0100	0.9900
80192	1.0869	1.4296	0.7603		0.0318	0.0153	1.0164
80223	1.5392	1.5392	1.0000		0.1068	0.0551	1.0517
80677	1.0024	1.5201	0.6594		0.0872	0.0987	0.9885
80742	0.7377	1.2607	0.5852		0.2116	0.1485	1.0631
80814	1.1658	3.0000	0.3886		0.1666	0.3935	0.7730
80866	1.0000	1.2386	0.8073		0.2355	0.0539	1.1816
86031	1.2614	2.5621	0.4923		0.1033	0.0361	1.0672
86034	1.8111	1.8111	1.0000		0.2650	0.1339	1.1311
86074	2.1659	2.2098	0.9801		0.2821	0.2083	1.0737
86103		0.9286			0.1669	0.0883	1.0786
86154		2.8200			0.2155	0.1226	1.0929
86184	0.9674	1.0000	0.9674		0.0820	0.0370	1.0449
SUM	18.6880	29.2370	10.1425		2.4108	1.6105	15.8003
AVE	1.4375	1.9491	0.7802		0.1607	0.1074	1.0534

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	CONT.AM./ES	ACT/EST	CO/CONT.AM.	#CO/CONT.DU	INC/CONT.AM	MAX.INC/C.A.
(I/D Contracts)						
80178	0.9009	1.0047	0.1152	0.3235	0.0026	0.0195
80448	1.0171	1.2078	0.1875	0.1026	0.0381	0.0381
80654	0.7136	0.8023	0.1242	0.2331	0.0090	0.0090
80717	0.9077	0.9461	0.0423	0.1434	0.0334	0.0418
80718	1.0526	1.3192	0.2533	0.3636	0.0271	0.0271
80719	0.8639	1.1154	0.2911	0.1190	0.0391	0.0419
80720	1.1822	1.4042	0.1878	0.2143	0.0297	0.0318
80811	1.0918	1.1544	0.0573	0.0816	0.0305	0.0305
80840	0.7715	0.8196	0.0622	0.3077	0.0629	0.0629
80844	0.8972	1.0020	0.1168	0.2397	0.0504	0.0504
80942	0.8754	0.9265	0.0584	0.0174	0.0586	0.0586
82167	1.0168	1.1284	0.1097	0.1618	0.0468	0.0468
86301	1.0437	1.0873	0.0418	0.1107	0.0420	0.0420
86399			0.0478	0.1317	0.0042	0.0425
SUM	12.3344	13.9180	1.6957	2.5501	0.4745	0.5429
AVE	0.9488	1.0706	0.1211	0.1822	0.0339	0.0388
(Non-I/I Contracts)						
80000	0.8413	1.1220	0.3336	0.0000		
80111	0.8659	0.7912	-0.0863	0.1173		
80130	0.7992	0.7912	-0.0100	0.0759		
80192	1.0147	1.0313	0.0164	0.0751		
80223	0.9636	1.0135	0.0517	0.0430		
80677	0.8347	0.8250	-0.0115	0.0426		
80742	0.7508	0.7982	0.0631	0.0613		
80814	0.9220	0.7128	-0.2270	0.2798		
80866	1.0645	1.2578	0.1816	0.0682		
86031	0.6848	0.7308	0.0672	0.1438		
86034	0.9332	1.0556	0.1311	0.2222		
86074	0.8640	0.9277	0.0737	0.1171		
86103	1.0882	1.1737	0.0786	0.3214		
86154	1.0497	1.1472	0.0929	0.2200		
86184	1.0411	1.0879	0.0449	0.0553		
SUM	13.7177	14.4660	0.8003	1.8431		
AVE	0.9145	0.9644	0.0534	0.1229		

Table B.4. Pavement I/D & Non-I/D Contracts

CONTRACT	INC.AM./CONT.DUR	INC.DUR/MAX.DUR	MAX.AM./CONT.DUR
(I/D Contracts)			
80178	\$161.76	0.1333	\$1,213.24
80448	\$1,923.08	1.0000	\$1,923.08
80654	\$563.91	1.0000	\$563.91
80717	\$956.18	0.8000	\$1,195.22
80718	\$1,454.55	1.0000	\$1,454.55
80719	\$833.33	0.9333	\$892.86
80720	\$833.33	0.9333	\$892.86
80811	\$510.20	1.0000	\$510.20
80840	\$1,230.77	1.0000	\$1,230.77
80844	\$1,983.47	1.0000	\$1,983.47
80942	\$174.13	1.0000	\$174.13
82167	\$441.18	1.0000	\$441.18
86301	\$2,371.54	1.0000	\$2,371.54
86399	\$185.19	0.1000	\$1,851.85
SUM	\$13,622.62	11.9000	\$16,698.84
AVE	\$973.04	0.8500	\$1,192.77
(Non-I/I Contracts)			
80000			
80111			
80130			
80192			
80223			
80677			
80742			
80814			
80866			
86031			
86034			
86074			
86103			
86154			
86184			
SUM			
AVE			

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	TYPE	LOCATION	CONTRACTOR	START
(I/D Contracts)				
80137	embank.& substr.wideni	FA 431	Kenny Const. Co.	08/01/88
80265	bridge widening	FA 94(Calumet Expy)	E. A. Cox Co.	04/22/91
80312	bridge reconstruction	FA 567	Brandenburg Ind. Serv.	02/14/91
80522	pavement& br. rep.	FA 90/94(Dan Ryan Expy)	Palumbo-Herlihy-Lorig	02/11/91
80604	pavement& br. rep.	FA 342(III 53)	Palumbo Bros.	04/01/91
80797	pavement& br. rep.	FA 342(III 53)	Palumbo Bros.	04/11/91
80944	bridge reconstruction	FA 347	Brandenburg Ind. Serv.	12/04/91
80958	pavement& br. rep.	FAI Route 55	P. T. Ferro Const. Co.	06/10/92
86038	bridge rehabilitation	FAS 256 (III 178)	Shappert Eng. Co.	04/07/89
86039	bridge repair	FA 698 (III 89)	Halverson & Midwest	04/03/89
86112	bridge repair	FA 649 (III 17)	Halverson & Midwest	03/01/90
86160	bridge repair	FA 649 (III 17)	Otto Baum & Sons	10/18/90
86289	bridge repair	FA 46 (III 251)	Halverson & Midwest	02/03/92
86311	bridge	FA 681 (III 116)	Tobey's Const. J.V.	05/11/92
SUM				
AVE				
(Non-I/D Contracts)				
80173	pavement& brid.rep.	FAP 432	Plate & Milburn Bros.	01/25/89
80224	pavement&r.w.&br.rep.	FAU 3565	Thomas M. Madden Co.	04/22/91
80229	bridge reconstr.	FA 9	Ill.Contrs&T.M.Madden	03/20/89
80277	pavement&bridge	FA 128	K-FIVE & Lorig	03/05/90
80289	str. replacement	FAI 94	Callagher/Swenson J.V.	12/12/90
80356	interchange const.	FAI 55	Harry W. Kuhn	10/04/89
80653	pregrading	FA 345	T.J.Lambrech	03/19/92
80757	tree trimming	FAI 90	Mc Ginty Bros.,Inc.	11/06/90
80732	pavement & bridge	FA 128	JH Pameray&F.H.Pasche	03/18/91
80779	bridge widening	FAI 90/94	Palumbo&Herlihy&Lorig	02/07/91
86005	pregrading	FA 412	Strunk Bros. Co.	10/11/88
86014	bridge costruction	FA 412	Central Ill. Contracting C	04/11/89
86018	pregrading&bridge	FA 412	Strunk Bros. Co.	01/09/89
86029	bridge replacement	FAI 55& FAI 74	Midwest Foundation Co.	08/21/89
SUM				
AVE				

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	ESS.COM	END	CONT.DATE	EXT.1	EXT.2	LENGTH	EXT1.DUR.
(I/D Contracts)							
80137	12/31/88	12/31/88	01/31/89	NO	NO	7,528.00	0
80265	07/26/91	08/24/91	08/16/91	NO	NO	9,630.00	0
80312	09/30/91	10/29/91	10/31/91	NO	NO	1,550.00	0
80522	10/19/91	07/02/92	10/31/91	11/10/91	NO	4,751.60	10
80604	09/15/91	09/15/91	10/15/91	NO	NO	13,243.00	0
80797	09/15/91	09/15/91	10/15/91	NO	NO	15,102.00	0
80944	11/01/92	08/09/93	11/30/92	NO	NO	1,221.00	0
80958	07/10/92	10/24/92	07/31/92	NO	NO	10,024.00	0
86038	10/30/89	10/30/89	12/15/89	NO	NO	555.00	0
86039	10/31/89	06/06/90	12/01/89	NO	NO	1,775.79	0
86112	08/31/90	08/31/90	10/01/90	NO	NO	2,647.00	0
86160	10/26/90	05/03/91	10/30/90	NO	NO	600.00	0
86289	10/08/92	10/08/92	11/15/92	NO	NO	12,436.00	0
86311	05/19/92	07/08/92	05/23/92	NO	NO	500.00	0
SUM						81,563	10
AVE						5,825.96	0.71
(Non-I/D Contracts)							
80173	10/13/89	10/13/89	10/15/89	NO	NO	4,225.83	0
80224	11/22/91	05/15/92	11/01/91	11/24/91	NO	700.00	23
80229	05/31/90	10/15/90	10/31/89	05/24/90	NO	2,585.00	205
80277	10/12/91	07/21/92	10/01/91	NO	NO	8,160.00	0
80289	11/25/91	08/03/92	10/31/91	11/15/91	NO	3,856.66	15
80356	10/25/90	07/12/91	11/01/90	04/30/91	NO	4,191.00	180
80653	06/29/92	10/19/92	06/30/92	07/09/92	NO	5,000.00	9
80757	03/11/91	03/11/91	03/31/91	NO	NO	0.00	0
80732	06/26/92	12/01/92	07/31/92	NO	NO	1,432.00	0
80779	11/30/91	08/10/92	10/31/91	05/15/92	NO	17,788.00	197
86005	05/25/91	08/02/91	03/04/89	04/02/90	NO	31,994.00	15
86014		11/19/92				3,635.00	5
86018	09/09/91	09/09/91	06/14/89	08/02/89	NO	30,071.45	48
86029	07/31/90	06/18/91	11/01/90	NO	NO	18,638.40	0
SUM						132,277.34	697.00
AVE						9,448.38	49.79

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	EXT2.DUR	EXT3.DUR	ESS.DUR.	ACT.DUR.	CONT.DU	EARLY FIN.	CONTRACT \$
(I/D Contracts)							
80137	0		152	152	183	31	\$5,123,081.00
80265	0		95	124	116	21	\$3,644,887.00
80312	0		228	257	259	31	\$2,776,187.16
80522	0		250	507	262	12	\$10,981,585.48
80604	0		167	167	197	30	\$10,631,000.77
80797	0		157	157	187	30	\$17,146,177.00
80944	0		333	614	362	29	\$3,249,350.22
80958	0		30	136	51	21	\$517,637.67
86038	0		206	206	252	46	\$1,038,990.95
86039	0		211	429	242	31	\$3,782,629.00
86112	0		183	183	214	31	\$3,438,111.68
86160	0		8	197	12	4	\$116,621.00
86289	0		248	248	286	38	\$6,754,987.99
86311	0		8	58	12	4	\$371,787.25
SUM	0		2,276	3,435	2,635	359	\$69,573,034.17
AVE	0.00		162.57	245.36	188.21	25.64	\$4,969,502.44
(Non-I/D Contracts)							
80173	0	0	261.00	261.00	263.00	2.00	\$5,887,810.21
80224	0	0	214.00	389.00	193.00	(21.00)	\$1,964,141.55
80229	0	0	437.00	574.00	225.00	(212.00)	\$6,035,160.65
80277	0	0	586.00	869.00	575.00	(11.00)	\$9,062,040.70
80289	0	0	348.00	600.00	323.00	(25.00)	\$8,271,724.08
80356	0	0	386.00	646.00	393.00	7.00	\$6,801,793.16
80653	0	0	102.00	214.00	103.00	1.00	\$6,397,146.25
80757	0	0	125.00	125.00	145.00	20.00	\$172,140.00
80732	0	0	466.00	624.00	501.00	35.00	\$2,789,800.50
80779	0	0	296.00	550.00	266.00	(30.00)	\$10,628,297.43
86005	20	15	160.00	160.00	110.00	(812.00)	\$3,536,361.59
86014	0	0	225.50	180.00	180.00	0.00	\$6,008,757.23
86018	0	0	203.00	203.00	155.00	(817.00)	\$6,258,065.43
86029	0	0	140.50	140.50	155.00	93.00	\$6,200,862.25
SUM	20.00	15.00	3,724.50	5,581.00	3,587.00	(1,770.00)	80,014,101.03
AVE	1.43	1.07	286.50	398.64	256.21	(126.43)	5,715,292.93

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	ADDITIONS	DEDUCTIONS	FINAL COST	ENG.EST.	INC/DAY
(I/D Contracts)					
80137	\$757,936.54	\$430,039.53	\$5,450,978.01	\$5,803,000.00	\$6,000.00
80265	\$513,341.88	\$213,368.91	\$3,944,859.97	\$3,176,000.00	\$7,200.00
80312	\$631,442.47	\$72,822.52	\$3,334,807.11	\$3,585,000.00	\$5,000.00
80522	\$1,311,673.08	\$1,074,710.74	\$11,218,547.82	\$12,294,000.00	\$8,500.00
80604	\$2,239,262.51	\$1,329,403.40	\$11,540,859.88		\$7,000.00
80797	\$3,370,390.29	\$2,479,892.63	\$18,036,674.66	\$19,075,000.00	\$10,000.00
80944			\$3,383,186.51	\$3,793,000.00	\$5,000.00
80958	\$112,246.06	\$117,744.69	\$512,139.04	\$611,000.00	\$2,500.00
86038	\$313,879.61	\$17,904.99	\$1,334,965.57	\$891,000.00	\$7,500.00
86039	\$623,213.89	\$91,757.10	\$4,314,085.79	\$3,060,000.00	\$15,000.00
86112	\$712,278.96	\$73,022.93	\$4,077,367.71	\$3,466,000.00	\$15,000.00
86160	\$18,686.60	\$3,013.20	\$132,294.40	\$97,100.00	\$1,500.00
86289	\$611,236.17	\$95,204.85	\$7,271,019.31	\$8,000,000.00	\$10,000.00
86311	\$42,115.64	\$9,478.65	\$404,424.24		\$1,500.00
SUM	\$11,257,703.70	\$6,008,364.14	\$74,956,210.02	\$63,851,100.00	\$101,700.00
AVE	\$865,977.21	\$462,181.86	\$5,354,015.00	\$5,320,925.00	\$7,264.29
(Non-I/D Contracts)					
80173	\$1,182,877.41	\$217,896.83	\$6,852,790.79	\$7,651,000.00	
80224	\$236,240.69	\$39,101.81	\$2,161,280.43	\$2,064,000.00	
80229	\$1,262,531.79	\$368,615.94	\$6,929,076.50	\$6,209,000.00	
80277	\$1,667,617.62	\$1,252,318.63	\$9,477,339.69	\$8,261,000.00	
80289	\$1,029,682.20	\$403,575.85	\$8,897,830.43	\$8,799,000.00	
80356	\$402,925.26	\$0.00	\$7,204,718.42	\$9,043,000.00	
80653	\$1,017,351.16	\$1,099,390.50	\$6,315,106.91	\$8,850,000.00	
80757			\$172,140.00	\$221,000.00	
80732	\$260,262.60	\$253,694.00	\$2,796,369.10	\$2,996,000.00	
80779	\$419,707.84	\$213,410.20	\$10,834,595.07	\$10,162,000.00	
86005	\$970,401.83	\$43,393.76	\$4,463,369.66	\$3,839,000.00	
86014	\$552,837.12	\$636,005.92	\$5,925,588.43	\$5,829,269.41	
86018	\$1,590,681.54	\$339,167.45	\$7,509,579.52	\$7,748,000.00	
86029	\$488,266.17	\$324,273.91	\$6,364,854.51	\$5,918,000.00	
SUM	11,081,383.23	5,190,844.80	85,904,639.46	87,590,269.41	
AVE	852,414.09	399,295.75	6,136,045.68	6,256,447.82	

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	COOP.INC.	INC.DUR.	MAX.DAY	TOTAL INC.	LIQ.DAM.	L.D. DAY	TOTAL LD.
(I/D Contracts)							
80137	\$0.00	30	30	\$180,000.00	\$6,000.00		
80265	\$0.00	20	20	\$144,000.00	\$7,200.00		
80312	\$0.00	30	30	\$150,000.00	\$5,000.00		
80522	\$0.00	12	30	\$102,000.00	\$8,500.00		
80604	\$0.00	30	30	\$210,000.00	\$7,000.00		
80797	\$0.00	29	30	\$290,000.00	\$10,000.00		
80944	\$0.00	30	30	\$150,000.00	\$5,000.00		
80958	\$0.00	10	10	\$25,000.00	\$2,500.00		
86038	\$0.00	30	30	\$225,000.00	\$7,500.00		
86039	\$0.00	30	30	\$450,000.00	\$15,000.00		
86112	\$0.00	30	30	\$450,000.00	\$15,000.00		
86160	\$0.00	4	4	\$6,000.00	\$1,500.00		
86289	\$0.00	30	30	\$300,000.00	\$10,000.00		
86311	\$0.00	4	12	\$6,000.00	\$1,500.00		
SUM	\$0.00	319	346	\$2,688,000.00	\$101,700.00		
AVE	\$0.00	22.79	24.71	\$192,000.00	\$7,264.29		
(Non-I/D Contracts)							
80173					\$1,195.00	0	\$0.00
80224					\$735.00	0.00	\$0.00
80229					\$5,000.00	34.00	\$170,000.00
80277					\$1,425.00	0.00	\$0.00
80289					\$1,425.00	0.00	\$0.00
80356					\$1,195.00	0.00	\$0.00
80653					\$3,425.00	0.00	\$0.00
80757					\$3,425.00	0.00	\$0.00
80732					\$1,895.00	0.00	\$0.00
80779					\$1,925.00	0.00	\$0.00
86005					\$1,300.00	0.00	\$0.00
86014					\$814.81	40.50	\$33,000.00
86018					\$1,395.00	0.00	\$0.00
86029					\$1,395.00	0.00	\$0.00
SUM					26,549.81	74.50	203,000.00
AVE					1,896.42	5.32	14,500.00

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	B/C	NO.C.O.	AM.C.O.	ADT	EXT/CONT	ESS/CONT	FIN/CONT.
(I/D Contracts)							
80137	1.0890	31	\$327,897.01	15,200	0.0000	0.8306	0.8306
80265	3.2200	28	\$299,972.97	98,100	0.0000	0.8190	1.0690
80312	1.1475	22	\$558,619.95	34,041	0.0000	0.8803	0.9923
80522	1.2900	67	\$236,962.34	40,600	0.0382	0.9542	1.9351
80604	1.0104	39	\$909,859.11	93,128	0.0000	0.8477	0.8477
80797	1.0748	51	\$890,497.66	123,963	0.0000	0.8396	0.8396
80944	1.0550	29	\$133,836.29	27,400	0.0000	0.9199	1.6961
80958	3.9400	20	(\$5,498.63)	27,000	0.0000	0.5882	2.6667
86038		10	\$295,974.62	1,200	0.0000	0.8175	0.8175
86039	2.4267	18	\$531,456.79	5,600	0.0000	0.8719	1.7727
86112	1.4300	19	\$639,256.03	5,450	0.0000	0.8551	0.8551
86160	2.7220	3	\$15,673.40	1,400	0.0000	0.6667	
86289		15	\$516,031.32	10,500	0.0000	0.8671	0.8671
86311		8	\$32,636.99		0.0000	0.6667	4.8333
SUM	20	360	5,383,176	483,582	0.0382	11.4245	20.0228
AVE	1.86	25.71	384,512.56	37,198.62	0.0027	0.8160	1.5402
(Non-I/D Contracts)							
80173		24	\$964,980.58	60,000	0.0000	0.9924	0.9924
80224		44	\$197,138.88	29,000	0.1192	1.1088	2.0155
80229		29	\$893,915.85		0.9111	1.9422	2.5511
80277		102	\$415,298.99	50,000	0.0000	1.0191	1.5113
80289		51	\$626,106.35		0.0464	1.0774	1.8576
80356		38	\$402,925.26		0.4580	0.9822	1.6438
80653			(\$82,039.34)	55,100	0.0874	0.9903	2.0777
80757		0		116,000	0.0000	0.8621	0.8621
80732		13	\$6,568.60		0.0000	0.9301	1.2455
80779		45	\$206,297.64	113,200	0.7406	1.1128	2.0677
86005		24	\$927,008.07	10,400	0.4545	1.4545	1.4545
86014		19	(\$83,168.80)	4,750	0.0278		1.2528
86018		40	\$1,251,514.09	10,550	0.3097	1.3097	1.3097
86029		23	\$163,992.26	30,000	0.0000	0.9065	0.9065
SUM		452.00	5,890,538.43	479,000.00	3.1547	14.6881	21.7481
AVE		34.77	453,118.34	47,900.00	0.2253	1.1299	1.5534

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	CO/CONT.AM.	#CO/CONT.DU	INC/CONT.AM	MAX.INC/C.A.	INC.AM./CONT.DU
(I/D Contracts)					
80137	0.0640	0.1694	0.0351	0.0351	\$983.61
80265	0.0823	0.2414	0.0395	0.0395	\$1,241.38
80312	0.2012	0.0849	0.0540	0.0540	\$579.15
80522	0.0216	0.2557	0.0093	0.0232	\$389.31
80604	0.0856	0.1980	0.0198	0.0198	\$1,065.99
80797	0.0519	0.2727	0.0169	0.0175	\$1,550.80
80944	0.0412	0.0801	0.0462	0.0462	\$414.36
80958	-0.0106	0.3922	0.0483	0.0483	\$490.20
86038	0.2849	0.0397	0.2166	0.2166	\$892.86
86039	0.1405	0.0744	0.1190	0.1190	\$1,859.50
86112	0.1859	0.0888	0.1309	0.1309	\$2,102.80
86160	0.1344	0.2500	0.0514	0.0514	\$500.00
86289	0.0764	0.0524	0.0444	0.0444	\$1,048.95
86311	0.0678	0.6667	0.0161	0.0484	\$500.00
SUM	1.4471	2.8664	0.8475	0.8943	\$13,618.92
AVE	0.1034	0.2047	0.0605	0.0639	\$972.78
(Non-I/D Contracts)					
80173	0.1639	0.0913			
80224	0.1004	0.2280			
80229	0.1481	0.1289			
80277	0.0458	0.1774			
80289	0.0757	0.1579			
80356	0.0592	0.0967			
80653	-0.0128	0.0000			
80757	0.0000	0.0000			
80732	0.0024	0.0259			
80779	0.0194	0.1692			
86005	0.2621	0.2182			
86014	-0.0138	0.1056			
86018	0.2000	0.2581			
86029	0.0264	0.1484			
SUM	1.0768	1.8054			
AVE	0.0769	0.1290			

Table B.5. Bridge I/D & Non-I/D Contracts

CONTRACT	INC.DUR/MAX.DUR	MAX.AM/CONT.DUR
(I/D Contracts)		
80137	1.0000	\$983.61
80265	1.0000	\$1,241.38
80312	1.0000	\$579.15
80522	0.4000	\$973.28
80604	1.0000	\$1,065.99
80797	0.9667	\$1,604.28
80944	1.0000	\$414.36
80958	1.0000	\$490.20
86038	1.0000	\$892.86
86039	1.0000	\$1,859.50
86112	1.0000	\$2,102.80
86160	1.0000	\$500.00
86289	1.0000	\$1,048.95
86311	0.3333	\$1,500.00
SUM	12.7000	\$15,256.36
AVE	0.9071	\$1,089.74
(Non-I/D Contracts)		
80173		
80224		
80229		
80277		
80289		
80356		
80653		
80757		
80732		
80779		
86005		
86014		
86018		
86029		
SUM		
AVE		

APPENDIX C. RESPONDENT TABLES

Table C.1. Sample Data of Questionnaire Survey Respondents

CONTRACT	DISURTS		RESIDENT ENGINEER	CONTRACTOR	SUPERINTENDENT
	D	S			
80718	1	C	Randy Deboer	F. H. Pasche	Doug Nichele
80821	1	C	Juris Velkme	*	Dennis Isenbrann
80944	1	C	Eugene Joynt	Brandenburg	Mike Olha
80194	1	C	Kevin Ahern	Swencon&PTFerro	Jack Pastore
80266	1	C	Cecil Clay	Lorig	Tim Riemersma
80596	1	C	Kevin Ahern	Herlihy	Robert Baker
80981	1	C	Paul Schaudel	Harry Kuhn	Rocco Bobbora
82167	1	C	Catherine Kibble	Curron	Mark Frame
96168	8	C	Dan Abel	Gencon/Kilian	William Webb
96536	8	C	Neil Nothous	*	*
96398	8	C	*	Keeley & Sons	Mark Keeley
96475	8	C	Jack Gammon	Keeley & Sons	Mark Keeley
86301	3	C	Wayne Phillips	IL Valley Paving	*
82135	1	O	Randy Deboer	*	*
82136	1	O	Rene Bermudez	*	*
82137	1	O	Ahmad Karim	Mc Hugh Const.	David Talbot
82138	1	O	Larry Rasbid	Mc Hugh Const.	David Talbot
80455	1	O	M. Brangenburg	Brandenburg In.	Mike Olha
80679	1	O	V. Hernandez	Abari Const.	Miguel DiGloria
86399	3	O	Wayne Phillips	James Cope&Sons	*
88085	4	O	Merle Dickey	Peoria Blacktop	Rodney Soss

*: No response/Respondent not found C: Completed Contract O: On-going Contract

Table C.2. Sample Data of Other Dots Respondents

STATE	ORGANIZATION	RESPONDENT
Missouri	Missouri Highway and Transportation Department	Dan Davidson
Nebraska	Nebraska Department of Roads	A.H. Dederman
New Jersey	New Jersey Department of Transportation	R. Weed/J. Miller
Oregon*	Oregon Department of Transportation	John Scofield

*: No response/Respondent not found

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