

ACKNOWLEDGMENT

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the valuable reference the National Academy of Sciences has provided through the report, Better Contracting for Underground Construction. Complete provisions on the contract for the second bore of the Eisenhower Memorial Tunnel can be obtained from my office.

Minimizing Adversary Contractual Relationships for the Eisenhower Memorial Tunnel, Second Bore

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The Colorado Division of Highways awarded the contract for the Eisenhower Memorial Tunnel, second bore, in August 1975, and the project was completed on schedule in June 1979. This difficult underground construction project was built without major claims or delays. The contract included the changed-condition clause and other provisions for cancellation, quantity variation, and time extension. The contract included new provisions for this state government agency, including a provision for the establishment of a review board for settlement of claims and disputes. A second provision was the requirement that contractor's bid documents be presented with the bid and held in escrow for use in determining adjustments. The division's design for the tunnel was well done and the division maintained responsibility for the design. The contract kept contractual adversary relations to a minimum. It was well administered by the division and the work was well managed by the contractor. Reasonable people, working under this contract, successfully accomplished a difficult project.

Construction contracting is a service profession; it is one of the few businesses that, by and large, functions on a directly competitive basis. When a contractor signs and seals the bid, he or she is committed to perform a service for a specified amount. In this act, he or she wagers (a) that his or her appraisal of the conditions and requirements is sufficiently accurate, (b) that his or her judgment of the cost of accomplishing the work is sufficiently correct, (c) that his or her organization and resources are sufficiently strong, and (d) that his or her physical and mental health are adequate to accomplish the work on time and at a cost that results in a reasonable profit.

The contractor must assess the risks involved in the work for each bid and prepare a proposal that includes a profit margin that is consistent with such risk. This is difficult to do and varies with every job. The degree of variance in the work and the amount of risk is greater in underground construction than in general construction or building construction. A contractor must, therefore, include substantially more markup on underground or tunneling bids than on building bids.

Due to the higher risks in underground work and the resulting higher markups, owners have realized that fair contract provisions that minimize some of the risks can result in lower bids and savings in project costs. The Colorado Division of Highways devised such a contract for the Eisenhower Memorial Tunnel, second bore.

Contractual relationships become people relationships; an adversary relationship, in my opinion, is one that exists between opponents. We certainly endeavor to maintain relations that will not hinder our performance. Yet, our human nature leads us to

assume the adverse or opposing view when we expect that another person's position may harm us.

When a potentially harmful situation develops, we react to protect ourselves. One immediate reaction is to watch what we say. This is often done by lessening the pressure to coordinate fully, or worse yet, by avoiding full, free discussion and review of our problems with the opponent. The result, of course, is inadequate communication. Communication is probably the most important part of any relationship. A decrease in communication, the exchange of information, has an immediate effect on a construction job--requirements are misunderstood, work may have to be removed and rebuilt, and delays occur while clarifications are obtained. Costs go up, production and level of quality go down, and time goes on. All of these results are bad for both the contractor and the owner. It is then apparent to me that we should remove as many potentially harmful provisions from our contracts as possible. At the same time, we should maintain and add provisions for the reasonable protection of the parties in an equitable manner.

The contract for the second bore included provisions for price and time adjustment for delays, adjustment of alteration of character or quantities of work (including changed-conditions clause), and a review board. The review board consisted of three experts in the field organized to hear and decide on claims for adjustment and disputes in a nonbinding arbitration procedure. The contract provided for payment adjustments for escalated costs of labor (partial), energy, and specific major materials. The division accepted the responsibility for its design. These provisions (and several additional equitable provisions) removed many of the problem areas that precipitate adverse relations during the performance of the contract.

The following comments are offered regarding some of the provisions included in the division's contract that do significantly minimize contractual adversary relationships. The last paragraphs of this text offer suggestions on items of lesser magnitude that could further improve contractual relationships on similar projects.

CANCELLATION OF CONTRACT (Subsection 108.09)

This provision reads as follows:

The division reserves the right to cancel this contract or any part thereof if it is determined

to be in the best interests of the state. Should the chief engineer find that it would be in the best interest of the state to terminate the contract, written notice to that effect will be issued to the contractor 30 days prior to cancellation. Such termination shall be subject to the following:

Where units of work have been completed, they may be paid for at the unit bid price or the contractor may be paid on a force-account basis. On lump sum bid items that are only partially completed, payment may be made in the proportion that the completed work bears to the total bid price; however, where the work performed by the contractor is of such a nature that some units of work have been completed and other units have not been completed and it is impossible to separate the costs between the completed units and uncompleted work, the contractor will be paid for the necessary preparatory and other work accomplished on the force-account basis.

The division will reimburse the contractor on an actual cost basis for acceptable materials obtained for the project but not incorporated in the work.

The intent of this provision is to provide a method of equitable settlement with the contractor. Loss of anticipated profits shall not be considered.

It is also the intent of this provision that a settlement for the work performed shall not relieve the contractor or his surety from responsibility for defective work and/or materials on the completed portion of work nor for labor and materials as expressed in the surety bond.

The title to all property accruing to the division by reason of termination of this contract shall immediately vest in the division, and the contractor shall execute and deliver to the chief engineer, or his representative, all papers necessary to transfer title.

The chief engineer or his representative shall be given full access to all books, correspondence, and papers of the contractor relating to this contract in order to determine amounts to be paid on account of the termination of work.

The complexity of our society with regard to politics, the economy, energy, and ecology can be cause for cancellation of a contract. The above provision removed the risk as to how a cancellation would be handled and how the partial performance would be paid for.

PRICE AND TIME ADJUSTMENT FOR DELAYS (Subsection 108.10)

This provision reads as follows:

(a) If at any time during the performance of this contract evidence develops that there will be delays due to reasons unknown to and beyond the control of the contractor, the contractor shall notify the division in writing within 20 days of such development.

(b) In addition, if the delay persists and causes an increase in the cost of, or the time required for, the performance of any part of the work under this contract, the contractor shall notify

the division in writing of such increase. Such notice should include the contractor's proposal for an adjustment in the contract price, time, or both.

(c) Upon receipt of the contractor's proposal the parties shall negotiate an adjustment in price, time, or both if the division determines such increase is justified.

(d) Such increases in time if allowed shall be in addition to that authorized pursuant to subsection 108.06.

This provision offers relief to the contractor for a variety of possible high-risk situations. The provision is considerably broader than the typical force majeure clauses of other contracts. Subsection 108.06 deals with determination and extension of contract time.

ALTERATION OF CHARACTER OR QUANTITIES OF WORK (Subsection 104.02)

This provision reads as follows:

(a) At any time during the progress of the work, the division may make such increases or decreases in quantities and such alterations in the work within the general scope of the contract, including alterations in the grade or alignment of the road or structure or both, as may be found to be necessary or desirable. Such increases or decreases and alterations shall not invalidate the contract nor release the surety. The contractor shall accept the work as altered, the same as if it had been a part of the original contract.

(b) Alterations of plans or of the nature of the work will not involve or require work beyond the termini of the original proposed construction until a covering supplemental agreement acceptable to both parties has been executed.

(c) Unless increases or decreases in quantities and alterations in plans materially change the character of the work to be performed or the cost thereof, the altered work shall be performed as a part of the contract and will be paid for at the same contract prices as for other parts of the work. Adjustment other than provided below will not be made in the contract unit price for any item that has materially changed if neither party requests an adjustment in the contract unit price for that item. The term materially change (herein) for purposes of intent under the contract shall be construed to apply only to the following circumstances and corresponding adjustments:

1. When the character of the work, as altered, materially differs in kind or nature from that involved or encountered in the original proposed construction, adjustments to contract unit bid prices may be made to compensate for either increased or decreased direct costs of performing the work.

2. When the total amount of increase or decrease in quantity of a major contract bid item affected by the work as altered varies from the total for those same individual items in the contract bid schedule by more than 20 percent, the contract unit bid price will be adjusted as provided for in [subsection] 109.03.

3. When a minor contract item is increased to an amount exceeding 6 percent of the cost of the contract, computed from the original contract

price and estimated quantity, the contract unit bid price will be adjusted as provided for in [subsection] 109.03. A minor contract item may be decreased by any amount without affecting the contract.

4. A change order may be requested by either the division or the contractor for an alteration involving an increase or decrease of more than 25 percent of the total cost of any individual contract item.

Change orders for increased work shall apply only to the quantity of work performed in excess of 125 percent of the original proposal quantity.

Change orders for decreased work shall apply to the quantity of work actually performed. The adjusted cost for decreased work shall not be greater than 75 percent of the contract bid cost for the work or item.

(d) If the character of the work or the unit costs thereof are materially changed, as above defined, and if written requests for adjustment are received within a reasonable period of time after the qualifying condition can be determined, an appropriate adjustment will be made in the order authorizing the work. Any adjustment will be as provided for under subsection 109.04, which allows for payment either at an agreed unit price or on a force-account basis.

(e) Claim made by the contractor for any loss of anticipated profits because of any such alteration, or by reason of any variation between the approximate quantities and the quantities of work done, will not be accepted.

(f) Payment for work occasioned by changes or alterations will be made in accordance with the provisions set forth in subsection 109.03 of these special provisions. If the altered or added work is of sufficient magnitude as to require additional time in which to complete the project, such time adjustment will be made in accordance with the provisions of subsection 108.06.

(g) Changed-condition clause: should the contractor encounter or the division discover during the progress of the work subsurface or latent physical conditions at the site differing materially from those indicated in this contract, or unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract, the engineer shall be promptly notified in writing of such conditions before they are disturbed. The engineer will thereupon promptly investigate the conditions and if he finds they do so materially differ and cause an increase or decrease in the cost of, or the time required for, performance of the contract, an equitable adjustment will be made and the contract modified in writing accordingly.

This provision sets out a settlement or adjustment procedure necessary to reduce risks of losses due to quantity variations. It also provides the owner with procedure for changes that may be necessary to handle unforeseen problems. The changed-conditions clause is similar to that of the standard federal contract--it is certainly one of the most effective provisions yet in reducing contingency costs in bids for underground work. Subsection 109.03 deals with compensation for altered quantities and subsection 109.04 deals with extra and force-account work.

CLAIMS FOR ADJUSTMENT AND DISPUTES (Subsection 105.17)

This provision reads as follows:

Claims for adjustments and disputes shall be handled according to the following procedures:

(a) Notification of dispute: If the contractor objects to any decision or order of the engineer, the contractor shall ask, in writing, for written instructions from the engineer. While waiting for the written instructions, the contractor shall proceed without delay to perform the work or to conform to the decision or order. Cost records of the work shall be kept in accordance with subsection 109.04. Within 10 days after receipt of the written instructions, the contractor shall file a written protest with the engineer, stating clearly and in detail the basis of the objection.

(b) Determination of dispute: The engineer will consider any written protest and make his decision. The decision, in writing, shall be furnished to the contractor. This decision shall be final and conclusive subject to written appeal by the contractor requesting a review board. The appeal must be instituted within 30 days of the date of receipt of the engineer's decision. Pending final decision of a dispute, the contractor shall diligently proceed with the work as directed.

Should the contractor appeal the engineer's decision, the matter will be referred to a review board consisting of one member selected by the division and one by the contractor, the two to select a third member. The contractor and the engineer shall each be afforded an opportunity to be heard by the review board and to offer evidence. All matters brought before the review board will be reported to the chief engineer.

The decision of the review board shall govern unless the chief engineer shall determine that such decision is not in the best interest of the state, in such instance he may override the board's decision. The division and the contractor shall each be responsible for one-half the review board's fees and reasonable expenses.

This provision as written in the specifications prompted a question from the prospective bidders at a prebid conference held by the division approximately three weeks prior to the bid date. The question and answer, as set out in a letter from the division to the planholders, reads as follows:

Q. Under subsection 105.17 appeals can be taken to a review board from any decision of the engineer involving contract questions and controversies. The decision of the board will be final and conclusive; except, the engineer can overturn or reverse any such decisions upon his determination that such decision would not be in the best interest of the state. The best interest of the state is a nebulous and uncertain standard for the exercise of authority of such potential. Preferably the review board decisions should be final and conclusive. However, if the engineer is to be given authority to overrule

or reverse any such decisions, the grounds for doing so should be specific.

What are the specific standards by which the engineer will base his decision to overrule the board?

- A. The last paragraph of subsection 105.17 is clear in providing that the chief engineer is the only person who can override the decision of the review board. It should be noted that the review board's findings are not binding upon the chief engineer or the state of Colorado. However, the findings of the review board will be very persuasive and accorded great weight.

In my opinion, this answer confirms that the Colorado Division of Highways intended that the maximum authority permitted by law be vested in the review board. In the event of an override by the chief engineer that could not be accepted by the contractor, legal action in the courts would be undertaken. In that event, the decision of this board of reputable experts in the industry would have to be accorded considerable weight by the court. Irrespective of the decision, the court time and costs should be reduced by the advance preparation.

Members of the review board were selected and contracts for their services were executed soon after award of the prime contract. It was agreed that the board would meet at the job site approximately quarter-annually to maintain a thorough knowledge of the project status and be apprised of any potential problems. I think that the frequency of meeting could be reduced on less-complicated contracts but seemed about right at Eisenhower. The board provided prompt decisions on the few disputes presented to it. These prompt decisions saved time and money for both contractor and owner.

The existence of a functioning review board could lead to wasted efforts in settling minor differences. The board's time should be allocated to major disputes. The contractor and owner should work diligently to settle routine minor disputes between themselves at the lowest possible level.

The board did minimize contractual adversary relationships on this project. The success was enhanced by a general desire by all the participants to make it work. I believe that nonbinding arbitration provisions such as this can become a major improvement in similar large, high-risk contracts throughout our industry. These provisions are not desirable in routine contracts for low-risk work because I doubt that they would reduce significantly the time or cost for settlement of claims or disputes in that work.

ESCROW DOCUMENTS (Subsection 102.07)

This provision reads as follows:

Each bidder shall submit with his proposal complete documentation clearly itemizing and separating costs for each contract item, except the contract item "fixed fee", contained in the proposal. Costs used to determine each unit price shall be separated and identified as costs of: labor, equipment, materials, fixed costs--on project site, fixed costs--off project site, and any other costs included must be specifically identified.

- (a) The documentation shall include copies of all quotes, memoranda, narratives, or any other in-

formation used to arrive at the bid prices contained in the bid schedule and shall be clearly marked with the appropriate bid schedule item reference number. For purposes of identification all such supporting documentation will be known as the escrow documents.

(b) The escrow documents shall be submitted in a sealed container along with the sealed envelope containing the proposal and will be clearly marked with the bidder's name, date of submittal, and project number and titled escrow documents. The escrow documents shall be accompanied with an affidavit signed by the bidder, stating that he has personally examined the contents of the escrow document container and has found that the documents are in the container and are correct and complete. Escrow documents of the apparent successful bidder shall be examined in his presence for adequacy and accuracy prior to award. After award of the contract, the escrow documents of all other bidders will be returned unopened.

(c) The escrow documents of the successful bidder will be returned at such time that the contract is completed and final settlement has been achieved.

(d) Escrow documents shall be stored at a location and in a manner agreeable to the division and the contractor.

Escrow documents may be examined any time deemed necessary by the chief engineer to determine the contractor's bid concept. This examination may be required for payment purposes for any and all contract items, subject to the following requirements:

1. Examination of documents shall be made by those specifically delegated by the chief engineer and a contractor representative.
2. These documents are considered proprietary and confidential in nature and shall be treated as such by those designated to review them. These documents, or any of the contents thereof, shall not be made available to any person or persons not herein designated without the specific consent of the contractor.

This provision requires disclosure of the bidder's confidential estimation procedures. Most contractors consider the procedures and information used in an estimate to be a closely guarded secret. Is it possible for a public agency to ensure that the information in the documents will not be disclosed? Also, the preparation of the documents in the form requested and in the limited time available prior to bid increases bidding costs for each bidder.

The documents were used during this project primarily to confirm the basis for adjustments claimed by the contractor. The documents did provide security for the division and were a factor in minimizing contractual adversary relationships in this instance.

In my opinion, a provision for escrow documents as above should rarely be included in a construction contract. The provision may cause a decrease in the number of bidders because of the concern for disclosure. Disclosure of the documents or improper use of the documents could result in an adverse effect on contractual relationships.

SUGGESTIONS FOR IMPROVEMENT

Time is of the essence. Typically, the Eisenhower contract provides that the contractor pay liquidated damages in the event of late completion. This provision is reasonable to maintain an emphasis for timely completion by the contractor. A similar emphasis for timely settlement and payment by owner should be included in future contracts. This provision could be written in various ways. One alternative would be a provision for the owner to pay interest on the amount due from the time the cost was incurred until it is paid to the contractor. Such provision would encourage prompt payments and reduce the contractor's financing costs. The long-term results from such a provision should be lower bid prices.

Mobilization items generally reduce the contractor's financing cost and increase the owner's financing costs. Mobilization items encourage bids from firms that are inadequately financed and have insufficient in-house depth of supervision to undertake a project of this nature (the strict prequalification requirement eliminated this concern at Eisenhower). The Eisenhower mobilization item was good in that the amount was not preset by the division. The savings in cost were diminished, however, by the inclusion of demobilization and the payment schedule. The schedule provided that 10 percent of the mobilization item amount would be paid with the final payment. I suggest that demobilization be eliminated from the item in future contracts.

Force-account items were planned by the division in the Eisenhower contract. The items provided an estimated dollar amount to be spent for erosion control, avalanche control, and trial testing for rock enforcement. Provision for these highly variable items on a force-account basis reduced the risk for the contractor and created a lower price by eliminating contingency cost in the bid. The force-account approach gave full flexibility and control for this work to the division, which is good. Payments to the contractor for force-account work in this contract and, in general, in the industry are not good. The schedule interference of force account and bid item work and the general supervision efforts are significant costs that

force-account markups did not cover adequately. Also, equipment rental and operating costs in this contract and in the industry, in general, are not adequately paid. A joint effort by the owner and contractors to establish force-account rates and markup prior to bid could produce a more satisfactory basis.

SUMMARY AND CONCLUSIONS

This major underground construction project was completed on time at a price less than the owner's original estimate. The contractor's cost was reasonably close to the estimate. Total claims processed on this contract were less than one percent of bid amount. The claims were settled within 14 months after completion of the field work.

The following are my conclusions:

1. The changed-condition clause included in the contract is a cornerstone in minimizing contingency costs in bid prices. The alteration, cancellation, and delay provisions also reduce these costs.
2. The nonbinding arbitration or review board provision for claims and disputes was very successful. Similar provisions should be considered for large, high-risk jobs. The provision should not be provided for routine, average-risk work.
3. The escrow-documents provision in the contract gave owner confirmation of contractor's bid pricing. This confirmation aided in the settlement and adjustments for quantity variations. The escrow documents cost bidders extra and the possibility of disclosure is a major concern to contractors. The escrow documents provision would not normally minimize contractual adversary relationships.
4. Further improvements in similar contracts could be made with provisions for faster payment and improved mobilization and force-account specifications.

The Colorado Division of Highways contract for the Eisenhower Memorial Tunnel, second bore, was more desirable to bid than most. The contract provisions were more equitable than most. The contract minimized adversary contractual relationships.

Minimizing Potential for Adversary Contractual Relationships During Construction of Eisenhower Memorial Tunnel

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Some hold the viewpoint that the engineer, especially in public construction, must be ever alert to attempts by the contractor to seize on some advantage in the execution of contracts to the detriment of the public. Certainly, the engineer's first loyalty in the preparation of plans and specifications and the administration of the contract is to the public. However, the referenced viewpoint leads to a basic distrust between the contract parties and creates an adversary relationship during execution of the contract, which serves neither party and may lead to unnecessary and bitter litigation to settle disputes. The contract needs to be fair to both parties: the engineer should recognize that the contractor properly seeks to make a reasonable profit, and the contractor

should acknowledge that the work should meet owner expectations of value and be a good-specification product. Underground construction holds special potential for generating adversary relations because the risks are generally greater than those that arise from other highway construction. Attention is needed in the preparation of such contracts to ensure an equitable sharing of risks without vitiating the basic premise of the competitive bidding process. Several innovations were built into the construction contract for the eastbound bore of the Eisenhower Memorial Tunnel, including among other features the inclusion of an impartial review board into the administrative process for settling differences, special prebid qualifications for the contractors, the require-