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Prospective and *Retrospective* Time Impact Analysis

By Evans M. Barba, P.E.

The vast majority of construction contracts for major construction programs today contain Critical Path Method (CPM) scheduling specifications that include Time Impact Analysis ("TIA") requirements relative to evaluating the time-related effect of changes and delays in the work on a project's schedule and the contract time. These requirements typically require a contractor to prepare schedule *"fragnets"* (fragmentary networks) and *"utilize the schedule update in effect at the time a change is issued or a delay occurs"* for purposes of substantiating, prospectively, a contractor's entitlement to an extension of the contract time.

Time impact analysis procedures have been in use since the mid 1960's. While in concept these procedures are logical and appear to be rather straightforward in terms of their use, the application of these procedures during construction are fraught with problems arising from (i) scheduling specifications that fail to differentiate between and define the steps to be taken in evaluating the time impact associated with changes and delays on a *prospective* (in advance of performance) versus a *retrospective* (after-the-fact) basis; (ii) misunderstanding with respect to the differences between the preparation of a TIA for a change or delay in the work on a *prospective* versus a *retrospective* basis; (iii) disagreements between owners and contractors over the durations and logic in contractor schedule fragnets; and (iv) disagreements with respect to the manner in which contractors propose to incorporate fragnets into the project schedule.

These problems are significant because they often lead to a breakdown in the time impact analysis process, which results in contractors and owners failing to reach agreement on the effect changes or delays may have had on the project schedule. When this happens, the parties are left to deal with the myriad of problems created by the failure to timely and accurately update and adjust project schedules to reflect appropriate extensions of time for delays that may have impacted project completion.

The failure to properly utilize time impact analysis procedures undermines the effective utilization of a schedule as a forward looking management tool, and can likewise render the schedule ineffective for purposes of contemporaneously evaluating the effects of changes and delays in the work. In such a situation, a project schedule can become nothing more than a mere progress payment tool that is submitted to an owner on a monthly basis in support of a contractor's progress payment request.

In terms of the actual scheduling of the work, in the absence of a viable CPM schedule, contractors typically default to the use of two to three-week look ahead bar charts in an effort to manage their projects; albeit on a short-term, rolling basis, with no clear long term picture as to what work is actually critical as of any point in time, or when the project will be completed. Under such circumstances, contractors resort to reserving their rights to claim with respect to every problem, change, and perceived delay that occurs. And, everyone prepares for the inevitable dispute at the end of the job.

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How, if at all, can this be avoided? The answer lies in (1) gaining a more thorough understanding of the time impact analysis process and the steps involved in preparing *prospective* and *retrospective* time impact analyses, and (2) increasing one's insight into how and why the process often fails. In this manner, you will be better prepared to deal with the challenges associated with implementing procedures, thereby increasing the likelihood of their successful application on your projects.

The purpose of this CONSTRUCTION BRIEFING is to provide you, the construction professional, with an overview of the time impact analysis process both *during* and *after* construction. Specifically, this BRIEFING (a) examines TIA requirements and provisions within those requirements that can undermine their successful application, (b) suggests contractual language relative to the preparation of both *prospective* and *retrospective* TIAs, (c) reviews the steps required to prepare *prospective* and *retrospective* TIAs, and (d) discusses the application of retrospective time impact analysis procedures in post-construction disputes.

Overview

The concept of "equitable adjustment" is fundamental to an understanding of the principles, procedures, and recommendations discussed in this BRIEFING. The typical changes clause, such as that used in the United States Government Standard Form 23A, requires an *"equitable adjustment"* in the contract sum and performance time when the government issues or causes changes or delays in the work.

In Bruce Construction,[1] the Court of Claims stated that the basic purpose of an equitable adjustment is "to leave the contractor whole when the Government modifies a contract." This statement has been widely quoted as stating the basic theory of equitable adjustment. The author of a law review article most aptly described the theory of equitable adjustment as the "leave them where you found them" theory,[2] meaning

that the purpose of an equitable adjustment: "is to leave the parties in the same position cost-wise and profit-wise as they would have occupied had there been no change, preserving them each as nearly as possible the advantages and disadvantages of their bargain."

Consistent with the theory of equitable adjustment, where the price of a change order is negotiated *prior* to performance of the changed work, the rule consistently followed by courts and boards recognizes that *estimated costs* are properly useable, provided that they constitute the most accurate cost information available at the time of the pricing. Where changed work is performed *prior* to negotiating a price, however, the *actual costs* incurred are available and are presumed reasonable.[3]

The concept of equitable adjustment is equally applicable with respect to evaluation of the time-related effect of changes or delays in the work. Thus, where the effect of a change on a project schedule is evaluated *in advance of performance* of the changed work, it is appropriate to *estimate* or *predict* the impact of the change prospectively. The utilization of prospective time impact analysis procedures, such as those included in the Army Corps of Engineers Modification Impact Evaluation Guide[4] and Veteran's Administration's VACPM Handbook,[5] are rooted in the desire of owners to protect their financial interests. Owners want to identify and resolve all issues related to cost and time associated with the performance of changed work in advance of performance, such that the owner can shift the risk associated with the performance of changed work to the contractor, thus limiting its (the owner's) exposure to requests for additional time and compensation after the changed work has been performed. At the same time, owners are concerned with maintaining the forward-looking viability of the project schedule and its utility in performing future prospective time impact analyses. While the desire to achieve these objectives is certainly understandable, as a matter of practical reality, they are often difficult, and sometimes, given project conditions, impossible to achieve.

In the real world of construction, the vast majority of changed work is performed and delays occur *prior to the time* contractors meet with an owner to discuss their entitlement to an extension of the contract time. As is discussed in more detail later in this BRIEFING, the problem presented by this situation is that while the vast majority of Time Impact Analysis requirements include provisions relative to the performance of *prospective* time impact analyses, the majority of them do *not* include requirements for performing *retrospective* analyses. As a result, in situations where changed work is performed or a delay occurs *prior to the time* the parties attempt to negotiate a time extension related to same, the parties—in the absence of a contractually-specified means for analyzing these situations—are left to their own devices in attempting to resolve the responsibility for and amount of the time extension to which a contractor may be entitled.

Where the owner directs the performance of changed work in advance of determining the time impact associated with the change, or a delay occurs, a *retrospective time impact analysis* will enable the parties to determine and negotiate the *actual* extent of schedule impact attributable to the change or delay in question. In recognition of these realities, Time Impact Analysis requirements should provide for both *prospective* and *retrospective* analysis of changes and delays in the work.

Understanding Float

Whether you are preparing a time impact analysis on a prospective or retrospective basis, it is important to understand schedule float in terms of what it is, and "who owns it." The difference between the maximum time available within which to perform an activity and the duration of an activity is known as total float.

Float exists by virtue of a contractor's planned approach to the performance of its work. It is as a result of the contractor's activity definition, logic development, and duration establishment, that activity event times

are established, and both the critical path and float in a schedule are determined.

Float is contingency time associated with a path or chain of activities, and represents the amount of time by which the early finish date of an activity may be delayed without impacting upon the critical path and thereby delaying overall completion of a project.

Courts and boards of contract appeals have typically equated "float" with "total float." The General Services Administration Board of Contract Appeals[6] has defined "float time" as follows:

> Those paths which do not lie on the critical path have certain flexibility in that there is a difference between the earliest and latest expected times for a particular event. This difference, called "total float" in CPM, allows the manager latitude in the scheduling of non-critical activities that originate or terminate at that event, and to affect tradeoffs of resources to shorten or control his project. Total float is the time any given activity may be delayed before it will affect the project completion time. It is the difference between the latest start time and earliest start time. It is also the difference between the latest finish and the earliest finish.

The above definition of float is consistent with the view other courts and boards have taken in which they have viewed "float" to mean "total float."

Early decisions held that the contractor, not the owner, owned schedule float.[7] As critical path method delay analysis began to grow in terms of its acceptance by courts and boards, however, these tribunals departed from their traditional view and approach to float ownership issues, focusing not on "who owned the float" per se but on whether the delay(s) in question affected the project's critical path. Two cases, which were decided by the General Services Board of Contract Appeals, marked the shift in focus from "float ownership" to whether delay impacted the project's critical path.

In the first case,[8] the Board defined the issue to be whether the delay alleged by the contractor "caused any delay in project completion." On reconsideration, the Board affirmed its decision stating that although Government delay did exist, it was of no consequence since that delay did not affect the project's critical path.[9]

In the second case,[10] the Board denied the contractor a time extension in a situation where the Government had caused delays to certain activities on the project. In this case, the Board found that the contractor was not entitled to a time extension for alleged Government delay because there was no showing that the project's critical path was actually affected by the alleged delay, or that any project delay was actually caused by the alleged Government conduct.

These cases and numerous others confirm the court's and board's current approach to dealing with delay and time extension analysis, which is, in essence, that "the project owns the float."

In order to clarify the owner's position with respect to the manner in which float is to be used in managing a project and evaluating time extensions, owners often include float-sharing clauses in their time impact analysis requirements that address "float ownership" and provide, in essence, that "the project owns the float." An example of such a clause is as follows:

> Activity delays shall not automatically mean that an extension of the Contract Completion Date is warranted or due the Contractor. A Contract Modification or delay may not affect existing critical activities or cause non-critical activities to become critical. A Contract Modification or delay may result in only absorbing a part of the available total float that may exist within an activity chain on the network, thereby not causing any effect on any interim milestone date or the Contract Completion Date. Total float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, for each and every activity in the schedule. Float is not for the exclusive use or benefit of either the Owner or the Contractor. Extensions of time to interim milestone dates or the Contract Completion Date under the Contract will be granted only to the extent that the equitable time adjustments to the activity or activities affected

> by the Contract Modification or delay exceeds the total float of the affected activity or subsequent paths and extends any interim milestone date or the Contract Completion Date.

Such clauses are frequently used in Federal, State, and County government contracts, as well as in private sector contracts. Cases that have interpreted float-sharing clauses have applied these clauses consistent with their plain meaning.[11]

The test employed by courts and boards with respect to a contractor's right to a time extensions for delays is the traditional test of causation of delay. Under this test, a contractor is only entitled to an extension of time to the extent that an owner-caused or excusable delay exceeds available float and actually impacts the project completion date.

Understanding Concurrent Delay

It is also important when performing a time impact analysis, to understand concurrent delay and its impact upon a contractor's entitlement to an extension of time. Although it is not the purpose of this CONSTRUCTION BRIEFING to thoroughly treat this topic, for purposes of discussion the following basic principles are noted.

Concurrent delay exists when two or more separate delay events occur during the same time period. The traditional view of the courts and boards has been that when Government delay is concurrent or intertwined with contractor or excusable delays, neither party should be able to recover from the other for that period of delay. Thus, the owner cannot recover liquidated damages and the contractor cannot recover costs of delay.[12]

With respect to the apportionment of time and damages, the courts have adopted the view that when both parties to a contract breach their contractual obligations by delaying performance, a court must assess the delays attributable to each party and apportion damages accordingly.[13]

In order to apportion damages a court or board must be in the position to apportion delays between the parties. This point is made taking into account the possible outcomes when it is impossible to apportion delays; namely: where contractor-caused delay is concurrent with owner-caused delay, the contractor may not recover its increased costs resulting from delay;[14] where non-compensable delays are concurrent with Government-caused delays, a contractor may not recover its increased costs resulting from the delay;[15] and, where the owner has contributed to project delay and such contribution cannot be separated from other causes of delay, liquidated damages may not be enforced by the owner.[16]

A party asserting entitlement to a delay-based claim must offer proof reflecting a clear apportionment of the delay. In this regard, there are numerous decisions which address the proof required to establish entitlement to an extension of time and that required to establish a claim for delay costs.

In an Armed Services Board of Contract Appeals case,[17] the Board, in discussing the effect of concurrent delays, noted that concurrent delay does not bar extensions of time, but it does bar monetary compensation for daily fixed overhead costs because such costs would be incurred on account of the concurrent delay even if the Government-responsible delay had not occurred.

In a Claims Court case,[18] the Court, in evaluating the record regarding various delays, indicated that although its findings established that the contractor had incurred many delays through its own fault and that of its subcontractors that prevented it from timely completing its work under the contract, the record also established that the Government had contributed to the delays by issuing change orders. Under the circumstances, the Court determined that the delays were not compensable and thus did not entitle the contractor to delay damages; although the Government's actions relieved the contractor from liability for liquidated damages.

Likewise, in a General Services Board of Contact Appeals case,[19] in which the Board addressed the issue of concurrent delay, the Board stated:

> A delay for which the Government is responsible is excusable by definition, and it may also be compensable. The rule is that for a delay to be compensable under either the Changes clause or the Suspension of Work clause, it must result solely from the Government's action... If a period of delay can be attributed simultaneously to the actions of both the Government and the contractor, there are said to be concurrent delays, and the result is an excusable but not a compensable delay...

In Freeman-Darling, Inc.,[20] the General Services Board of Contract Appeals addressed the issues of a contractor's compensable delay claim, the owner's assessment of liquidated damages, and the effect of apportionment of delay. In this regard, in denying the contractor's entitlement to the recovery of delay costs, while at the same time finding that the contractor should not be assessed liquidated damages, the Board stated:

> That delay was concurrent with delays due to changes and strikes. The law is well settled that where both parties contribute to the delay neither can recover damages, unless there is clear evidence by which we can apportion the delay and the expense attributable to each part.[21] Since no method is apparent for apportioning the delays, appellant may not recover increased costs for the period of June 25 to August 2, 1982. Correspondingly, for purposes of liquidated damages, appellant must be credited with an extension equal to the delay that occurred during that period.

In terms of the application of critical path method scheduling techniques to the apportionment of concurrent delays, a number of cases provide insight as to how courts and boards view and utilize CPM techniques and principles. The following cases are instructive.

The decision in Utley-James[22] reflects the willingness of Boards to apportion concurrent delays, noting at page 89,109:

> When venturing into this area, we must be wary of deciding too readily that there was a concurrent delay. We considered this issue in Warwick Construction, Inc.[23] and concluded that, at the very least, we would not require a contractor claiming a compensable delay to prove that in the absence of the Government's delaying actions it would have completed the job on schedule. However, we also adverted in Warwick to the basic principle of Wunderlich Contracting Co. v. United States,[24] which requires that a contractor seeking compensation establish 'the fundamental facts of liability, causation, and resulting injury.' That, we said, 'has always been the law,' and we adhere to it in this appeal as we have in the past.
>
> The lesson of Warwick is that certain kinds of second-guessing are proscribed. To take an easy example, if the job schedule was originally such that the contractor needed certain widgets on hand by January 1, but because of a six-month delay attributable to the Government, the contractor rescheduled the delivery for July 1, the Government cannot be heard to say the delays were concurrent because the contractor would have had to wait six months for the widgets anyway. In such a situation there is no reason to doubt that the contractor could have had the widgets on January 1 and proceeded on schedule absent the Government-caused delay. Such a simplistic example poses no problem at all. The problem lies not in reaching the right conclusion, given such an example, but in determining whether a given fact situation is an example of such an occurrence or is instead an example of a true concurrent delay.

In an Engineering Board of Contract Appeals case,[25] the contractor established delays attributable to defective specifications relative to the construction of a subway station in the median strip of a major highway, I-66 (the RW 11 construction). Upon concluding that the contract drawings and specifications were defective with respect to the RW 11 construction, the Board turned its attention to the owners' argument that concurrent delays precluded the contractor's recovery of delay damages. In this regard, the Board noted:

> A common thread running through all of these alleged "delays" is that Driggs did not complete these particular tasks on the originally-planned and scheduled date. From this, [the owner] concludes that they represent concurrent, contractor-caused delays insulating [the owner] from liability for the

> RW 11 design conflict. We disagree. More proof is required to establish [the owner's] defense of concurrent delay. When a significant owner-caused construction delay such as the RW 11 design conflict occurs, the contractor is not necessarily required to conduct all of his other construction activities exactly according to his pre delay schedule, and without regard to the changed circumstances resulting from the delay.
>
> The occurrence of a significant delay generally will affect related work, as the contractor's attention turns to overcoming the delay rather than slavishly following its now meaningless schedule. [The owner] is required to demonstrate that, but for the delay caused by [the owner], the contractor could not have performed the project in less time, and would necessarily have been delayed to the same extent in any case. Respondent has failed to meet this burden. Merely speculative or theoretical contractor-caused delays are not adequate to establish a concurrent delay defense.[26]

Thus, the Board shifted the burden to the owner, once a prima facie case for delay was presented, to prove that the contractor could not have otherwise avoided the alleged concurrent delay had the owner delay not occurred.

There are innumerable concurrent delay scenarios that one may encounter on a construction project. Generally speaking, however, they can be grouped into three categories.

The first is when two separate delays, for example, one caused by the owner and one caused by the contractor, cause a delay to a single work activity. In this situation, if the owner and contractor delays occur on parallel activity paths and one path is critical and the other has float in excess of the delay period, the party responsible for the critical path delay will be charged with responsibility for the delay, even though the delays may be equal in duration.

A second type of concurrent delay scenario is when two separate delays, one caused by the owner and the second caused by a contractor, delay activities on parallel critical paths, and thus impact project completion. To the extent these delays occur at the same time and are equal in duration for all or a part of the delay period being evaluated, the contractor is entitled to a time extension but not to any additional compensation. In like fashion, in this situation the owner is not entitled to liquidated damages.

A third category of concurrent delay is when three or more parties cause delays at the same time, with each delay having some impact on the projected project completion date. In this situation, prior to applying the rules discussed above, a detailed evaluation of the facts must be undertaken in order to sort out the issues of time of occurrence, criticality, period of overlap, and contribution of each delay in terms of its impact on project completion.

TIA Contract Requirements

• *Prospective and Retrospective Provisions*

The Time Impact Analysis provisions included in contracts vary significantly from contract to contract. As previously discussed, while the vast majority of these requirements include provisions relative to the performance of *prospective* time impact analyses, the majority of them do not include requirements for performing *retrospective* analyses. As a result, in situations where changed work is performed or a delay occurs prior to the time the parties attempt to negotiate a time extension related to same, or where the sheer number of changes and delays overwhelm the ability of the parties to evaluate these issues on a prospective basis, the parties—in the absence of a contractually-specified means for analyzing these situations—are left to their own devices in attempting to resolve the responsibility for and amount of the time extension to which a contractor may be entitled. Unfortunately, many of these situations end up being "worked out" in a courtroom.

When owners and contractors do end up in court, the lack of a retrospective time impact analysis provision in a contract, which defines the manner in which changes and delays are to be evaluated on a retrospective basis, can come

back to haunt the parties because battles can be fought over the *method* of analysis to be used to evaluate the delay in completion of the work.

On some occasions, owners and their counsel argue that the prospective time impact analysis procedures in the contract should be utilized for purposes of determining the extent to which a contractor is entitled to an extension of the contract time, and contractors and their counsel argue that retrospective analytic techniques must be used to analyze the actual delay that occurred in the work. On other occasions, contractors and their counsel take the position that the prospective TIA procedures in the contract should be utilized for purposes of analyzing delay, and owners and their counsel argue that retrospective techniques must be used to evaluate the delay in the work.These situations are all too common.

An analysis of the respective positions of the parties under either of these scenarios requires a careful examination of the contract to determine precisely what the contract specifies with respect to the evaluation of schedule impacts associated with changes and delays in the work. For example, does the contract require that a prospective time impact analysis is the *only* method to be utilized in evaluating the effect of changes or delays in the work; regardless of whether the changes or delays are evaluated *prior to*, or *after*, the changed work has been performed or the delay occurred? Or, does the contract require that prospective time impact analyses are to be used in *"forward pricing"* and evaluating changes and delays, and *is silent* with respect to how changes and delays are to be evaluated in an after-the-fact situation?

In addition, it is important to examine the facts and circumstances in a given situation and evaluate the manner in which the parties conducted themselves. Moreover, it is essential to determine whether the schedules on the project were accurately updated to reflect progress achieved, delays experienced, and the time extensions due a contractor. To the extent the project schedule was not properly updated it may be distorted and unreliable as a basis for determining time extensions. In this situation, it could be argued that the prospective time impact analysis procedures in the contract cannot (and should not) be utilized for purposes of performing an after-the-fact schedule delay analysis.[27]

At best, what a court or board may decide in a given situation is *uncertain*. Such uncertainty can be avoided by including both prospective and retrospective time impact analysis requirements in contracts.

TIA REQUIREMENT

The following is an example of a Time Impact Analysis requirement that provides for both *prospective* and *retrospective* analysis of changes and delays in the work. The inclusion of such a provision in a contract provides a *contractually-prescribed mechanism* for evaluating the effects of changes and delays on both a *prospective* and *retrospective* basis.

• *Prospective and Retrospective Provision*

Time Impact Analysis

A. Requirements: When Change Orders are ordered, delays are experienced, or the contractor believes it is entitled to an extension of time, the Contractor shall submit to the Owner a written Time Impact Analysis illustrating the influence of each Change Order or delay on the Contract Time, as follows:

   1. In situations where the Owner elects to review a Proposal from the Contractor *prior to* directing the Contractor to proceed with the work related to given Change Order, or a delay initiates, the Contractor shall submit a written Time Impact Analysis, including a narrative and Fragmentary

CPM Network (Schedule Fragnet), demonstrating how the Contractor proposes to incorporate the Change Order or delay into the Project Schedule and the time impact, if any, on the Project Schedule Milestone Dates set forth under Section __.___of the Contract Documents.

The Time Impact Analysis shall demonstrate the anticipated time impact to the Project Schedule Milestone Dates based upon the date the Change Order is issued to the Contractor, or the date the delay initiated; the status of construction at that point in time; and the event time computations of all affected activities. The event times used in the Time Impact Analysis shall be those set forth in the most current, accepted *(mutually agreed-to)* update of the Project Schedule in effect at the time the Change Order is issued, or the delay initiated.

2. In situations where (i) the Owner has directed the performance of work related to a Change Order in advance of determining the time impact associated with the performance of the changed work; or (ii) the Contractor and Owner have not agreed on an adjustment to the Contract Sum and/or Contract Time prior to the Owner directing the Contractor to proceed with the work related to a Change Order; or (iii) the Contractor has provided notice of an alleged delay in the work and incurred a delay, the Contractor shall submit a written Time Impact Analysis, including a narrative and Fragmentary CPM Network (Schedule Fragnet) demonstrating the *actual* effect of the Change Order or delay on the Project Schedule Milestone Dates.

The Time Impact Analysis shall demonstrate the time impact to the Project Schedule Milestone Dates based on an "as-planned" to "as-built" comparison of (i) the event times according to the most current, accepted *(mutually agreed-to)* update of the Project Schedule in effect at the time the Change Order was issued or the alleged delay initiated, to (ii) a Project *as-built schedule* which covers the period of time during which the changed work was performed or delay was incurred.

In developing the *as-built* schedule the Contractor shall utilize activity "actual start" and "actual finish" date information included in the Project Schedule Update(s), in conjunction with as-built schedule activity information obtained from the Contractor's Daily Construction Reports and other available sources, to graphically depict the sequence and manner in which the Contractor actually performed the work under the Contract during the time the changed work was performed or the delay occurred.

Thereafter, the Contractor shall (1) identify the as-built critical path to completion through the period of time during which the subject Change Order work was performed or alleged delay occurred; (2) prepare a Fragmentary CPM Network (Schedule Fragnet) which graphically depicts the manner in which the Change Order work was performed or the delay occurred; and (3) incorporate the Schedule Fragnet into the as-built schedule demonstrating how the changed work or delay affected the as-built critical path.

B. Time Extensions: Activity delays shall not automatically mean that an extension of the Contract Time is warranted or due the Contractor. It is possible that a modification, change or delay will not affect projected or as-built critical activities or cause non-critical activities to become critical. A Change Order or delay may result in only absorbing a portion of the available total float that may exist within an activity chain of the Project Schedule, thereby not causing any effect on the Project Schedule Milestone Dates. Float is not for the exclusive use or benefit of the Owner or the Contractor. Extensions of time to the Project Schedule Milestone Dates under the Contract will be granted only to the extent that the time adjustments to the activity or activities affected by a change order or delay extends any interim Milestone Date or the date of Substantial Completion as set forth under Section __.__ of the Contract Documents.

C. Procedure:

1. Each Time Impact Analysis shall be submitted as follows:

   a. For Change Orders and delays, the analysis discussed above under Subparagraph A.1 shall be submitted within fourteen (14) calendar days following the Owner's issuance of the Change Order, or initiation of the delay, as a part of the Contractor's proposal for the Work or delay contemplated by the proposed Change Order.

   b. For Change Orders or delays, the analysis discussed above under Subparagraph A.2 shall be submitted within fourteen (14) calendar days following completion of the Work related to the Change Order, or conclusion of the delay.

• *Sharing the Float*

As previously discussed, the current view held by courts and boards is that "the project owns the float." Consistent with this view, most time impact analysis provisions provide that extensions of time will be granted only to the extent the time adjustments to the activity or activities affected by a change or delay exceeds the total float available at the time the change is issued or the delay occurs. This notwithstanding, there are owners who seek to exercise control over schedule float and do so by incorporating requirements in their time impact analysis provisions which can undermine the application of these requirements. An example of such a provision is as follows:

> It is specifically pointed out that the use of available float time in the CPM schedule may be used by the Owner as defined by the Engineer, as well as by the Contractor. Float time is defined as the amount of time between the early start date, and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule.
>
> The Owner controls and owns the float time in the CPM network and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates set out in the CPM network, the Owner may initiate changes to the contract work that absorb float time only. Owner-initiated changes that affect the critical path on the CPM network shall be the sole grounds for extending said completion dates. Contractor-initiated changes that encroach on the float time identified in the CPM network may be accomplished with the Owner's concurrence. Such changes, however, shall give way to Owner-initiated changes competing for the same float.

To the extent you are considering entering into a contract that includes a float provision similar to that above, you may wish to attempt to negotiate the provision out of the contract and replace it with an appropriate "project owns the float" provision. If you are working on a project that includes such a float provision, you may already have experienced the problems that such a provision can present.

• *Concurrent Delay*

The current view held by courts and boards is that a contractor is entitled to an extension of the contract time in situations where a concurrent delay occurs. This notwithstanding, some owners include provisions in their contracts which provide that to the extent a contractor incurs a critical delay in the work that runs concurrent with an owner-caused critical delay in the work, the contractor will *not* be entitled to an extension of the contract time. An example of such a provision is as follows:

> No time extension will be allowed if other activities under the contractor's control caused an earlier or concurrent critical delay. No event or circumstance shall be the basis of a time extension or defense to assessment of delay damages suffered by owner (including liquidated damages for loss of use) to the extent contractor's own prior, concurrent or subsequent actions or inactions would have delayed Substantial Completion of the Project even if such event or circumstance had not existed.

To the extent that you are considering entering into a contract that includes a provision similar to the above, you may wish to negotiate the provision out of the contract. If you are already working on a project that includes such a provision, or are involved in a litigation involving a contract that includes such a provision, you may already have experienced the problems and legal challenges a provision of this type can present.

Prospective TIAs: A Definition

A prospective time impact analysis is a "forward looking," time estimating procedure that utilizes Critical Path Method (CPM) networking techniques in conjunction with an analysis of the facts related to a change or delay in the work, to illustrate and forecast ("estimate" or "predict") the changes' or delays' effect on the projected critical path to project completion and the contract time as a result of the change or anticipated delay.

Retrospective TIAs: A Definition

A retrospective time impact analysis is a real-time, after-the-fact schedule impact analysis procedure that utilizes Critical Path Method (CPM) networking techniques, in conjunction with an analysis of the as-built facts related to a change or delay in the work, to determine the actual number of days of impact to the as-built critical path associated with the change or delay, taking into account the changes' or delays' time relationship to past and any other current delays.

Objective

The objective in performing a time impact analysis is to determine the impact to the critical path and the project completion date resulting from a given event, and to achieve timely, bilateral resolution of time and compensability issues associated with such events that occur in the work; thus enabling the parties to maintain (i) accurate, properly adjusted schedule updates reflective of progress achieved and delays experienced, and (ii) a current, mutually agreed-to projected plan for achieving completion of the work in accordance with a properly adjusted contract completion date.

Preparation of Prospective TIAs

When changes are issued or delays are anticipated to occur, the contractor should prepare a prospective time impact analysis in order to document the facts and circumstances related to the change or anticipated delay, and evaluate the anticipated effect of the change or delay on the projected critical path and the contract time. A step-by-step procedure relative to the preparation of a *prospective time impact analysis* should include the following key considerations:

1. Establish the point in time (the date) on which the change directive (oral or written) was issued or delay initiated.

2. Utilize the project schedule in effect as of the time the change was directed (adjusted as may be necessary and appropriate) or the delay initiated as the "baseline" schedule in evaluating the effect the change or anticipated delay may have on the projected critical path and the contract time. Confirm that the schedule selected is a current, mutually agreed-to schedule that has been statused and updated to include progress achieved, delays experienced, and all time extensions granted as of the data date of the schedule.

3. Status and update the schedule as of the date of issuance of the change or initiation of the delay. Identify the projected critical path to project completion and float remaining along the various activity paths in the schedule.

4. Prepare a fragnet that graphically depicts the complete sequence of events related to the issuance and performance of the changed work or occurrence of the anticipated delay. Identify all activities and aspects of performance related to the changed work, commencing with the date of initiation of the change, running through the sequence of activities necessary to coordinate the performance of the changed work with subcontractors and vendors affected by the change, and all activities necessary to prepare for and perform the work associated with the change. For delays, identify all activities and aspects of performance which may be affected by the anticipated delay.

5. Incorporate the fragnet into the schedule, relating it to the base contract activities affected by the change or anticipated delay. In this regard, it may be necessary to further refine the activities in the schedule in order to logically tie the changed work activities or delay to the appropriate base contract work activities. Changes to other activities not directly affected by the changed or delayed work may also be required. Care should be taken to establish realistic relationships between the changed work or anticipated delay and the base contract activities affected by the change or anticipated delay.

6. Upon incorporating the fragnet into the schedule, "run" the schedule. This schedule becomes the "impacted schedule." Determine the extent to which the critical path and/or the projected project completion date in the impacted schedule have been affected and evaluate float consumption on non-critical paths. Compare the projected project completion date in the impacted schedule to the projected project completion date in the schedule prior to inclusion of the fragnet.

7. Determine the extent to which any further adjustments need to be made to the impacted schedule in order to reflect the effect of the changed work or anticipated delay on the "unchanged" portion of the contract work. To the extent additional adjustments are required, the adjustments should be made and the rationale and justification for the adjustments carefully and completely documented. Thereafter, the schedule should be run again and the results re-evaluated.

8. Determine the extent to which the projected critical path may have been further impacted as a result of the effect of the changed work or anticipated delay on the unchanged portion of the work, float may have been further consumed, and/or any contract milestone(s) or the projected project completion date may have been further impacted.

9. Recognize that if a contract milestone date and/or the projected project completion date have been shifted in

time, you (the contractor) may be entitled to an extension of time.

10. Review relevant contract references and requirements, including plans and specifications, sketches, vendor data, regulatory requirements, daily field reports, etc., and calculate the duration of excusable, compensable, and excusable, non-compensable delay and related time extension to which you (the conrtractor) are entitled. Thereafter, prepare a change order request for submission to the owner. The time extension portion of your request should include a narrative that describes and illustrates the overall schedule analysis and sets forth your position with respect to the duration of the time extension requested and the basis upon which it should be granted (i.e. compensable, non-compensable, or some combination of the two). The request should be submitted to the owner.

11. Thereafter, negotiations with the owner should commence. Upon the conclusion of negotiations and assuming the parties are able to reach agreement with respect to the time extension requested, the change order should be bilaterally executed and the owner should incorporate the fragnet that was agreed-to between the parties and the time extension related thereto into the project schedule in effect at the time the change was issued or the anticipated delay initiated.

Preparation of Retrospective TIAs

When (i) an owner directs the performance of changed work in advance of determining the time impact associated with performing the changed work; (ii) the parties fail to reach agreement with respect to a prospective time impact analysis previously submitted, and the owner has directed performance of the changed work in any event; or (iii) a delay has occurred, the *actual* number of days of impact to the *as-built critical path* associated with the change or delay can only be determined by performing a retrospective time impact analysis. A step-by-step procedure relative to the preparation of a *retrospective time impact analysis* should include the following key considerations:

1. Establish the point in time (the date) on which the change directive (oral or written) was issued or the delay initiated.

2. Establish the point in time at which the performance of the work related to the change was completed, or the delay concluded such that follow-on work could commence.

3. Utilize the project schedule in effect at the time the change was issued or the delay initiated (adjusted as may be appropriate and necessary), as the "baseline" schedule against which the performance of the changed or delayed work will be evaluated. Confirm that the schedule selected is a current, mutually agreed-to schedule that has been properly statused and updated to accurately reflect progress achieved, delays experienced, and all time extensions granted as of the data date of the schedule.

4. Status and update the schedule as of the date of issuance of the change or initiation of the delay. Identify the projected critical path to completion and float remaining along the various activity paths in the schedule.

5. Determine the status of the work (i.e., the number of days the project was *ahead of* or *behind* schedule) as of both the "initiation" and "completion" dates of the changed work or delay, and calculate the overall delay in the work that occurred during the period ("window") of

time between the initiation date of the changed work or delay in question, and the point in time the changed work was completed, or the delay concluded.

6. Develop an as-built schedule of performance that spans the period of time during which the changed work was performed, or the delay occurred. The as-built schedule should be prepared utilizing activity *actual start* and *actual finish* dates included in the project schedule(s) related to the period of time in question, in conjunction with as-built schedule activity information obtained from the contractor's daily construction reports and other available sources. This schedule should graphically depict the sequence and manner (logic and durations) in which the work was actually performed during the subject period of time.

7. Prepare a fragnet that graphically depicts the sequence and manner in which the changed work was performed, or the delay occurred, and incorporate the fragnet into the as-built schedule in order to determine how the changed work or delay affected the base contract activities in the as-built schedule. In the alternative, a detailed narrative with supporting documentation should be prepared that establishes the relationship between the performance of the changed work, or occurrence of the delay in question, and the base contract activities in the as-built schedule.

8. Identify the as-built critical path to completion through the period of time in question and determine the duration of time (if any) during which the performance of the changed or delayed work (Reference Step 7 above) was on the as-built critical path. In this regard, it is important to determine whether any other excusable, compensable, or inexcusable delay, has overtaken the delay in question on the as-built critical path. It is also important to determine whether there is any concurrent delay which may impact upon compensability.

9. Upon completion of Steps 1-8, if the period of time under analysis spans various activities of work and delays that may have been caused by different parties, the period of time should be broken down into various sub-periods, or *"windows"* of time. Thereafter, a detailed analysis of each of the delays occurring in each of the windows of time should be performed and the responsibility for same apportioned between the parties. In this regard, the analysis should commence at the beginning of the first window of time and be carried forward chronologically, evaluating progress achieved and delays incurred in the first window of time. Once this analysis is performed and any "loss" or "gain" occurring in the first window of time is determined, the analysis should be carried forward and the next sequential window analyzed. Ultimately, the analysis should be carried forward through the final "window" of time in the overall period of time being evaluated. The objective of this analysis is to chronologically and cumulatively quantify the delay in the work by assessing the "losses" and "gains" in performance on the as-built critical path over time.

10. Review relevant contract references and requirements, including plans and specifications, sketches, vendor data, regulatory requirements, daily field reports, etc., and calculate the duration of excusable, compensable, and excusable, non-compensable delay and related time extension to which you (the contractor) are entitled. Thereafter, prepare a change

order request for submission to the owner. The time extension portion of your request should include a narrative that describes and illustrates the overall schedule analysis and sets forth your position with respect to the duration of the time extension requested and the basis upon which it should be granted (i.e. compensable, non-compensable, or some combination of the two). The request should be submitted to the owner.

11. Thereafter, negotiations with the owner should commence. Upon the conclusion of negotiations and assuming the parties are able to reach agreement with respect to the time extension requested, the change order should be bilaterally executed and the owner should incorporate the fragnet that was agreed-to between the parties and the time extension related thereto into the project schedule in effect at the time the changed work was completed or the delay concluded.

Post-Construction Time Impact Analysis

Retrospective Time Impact Analysis procedures can be employed in post-construction disputes resolution in a manner consistent with that utilized *during* construction. In this regard, as an initial matter it is necessary to identify the various schedules produced during the course of the work that can be utilized as "baseline schedules" for purposes of performing an after-the-fact delay analysis.

Ideally, during the performance of the work the owner approved the "Baseline Schedule" submitted by the contractor. To the extent this is the case, post-construction analysis should commence utilizing the approved baseline schedule (adjusted as may be appropriate and necessary) as the projected plan to completion for purposes of evaluating progress achieved and delays incurred during the first "window" of time under analysis. To the extent the owner did *not* approve the contractor's as-planned schedule, a review of the contract scheduling requirements, correspondence between the parties, the various schedules submitted to the owner during the course of performance of the work, etc., will need to be undertaken in order to establish a reasonable as-planned schedule for use as a "baseline" in performing your delay analysis. Thereafter, in terms of carrying the analysis forward, either the reasonable as-planned schedule or a schedule update (adjusted as may be appropriate and necessary) should serve as the baseline for purposes of evaluating delays in subsequent windows of time.

The extent to which schedule updates prepared during construction will be useful in the performance of an after-the-fact analysis depends upon the particular facts and circumstances and the manner in which the project schedule was updated.

If, during the performance of the work, the project schedule was not updated timely with progress achieved, delays experienced, and the time extensions due a contractor, the updates may not be suitable for purposes of retrospective analysis. Courts and boards are fully aware that to the extent an owner denies a contractor the ability to "look forward" and plan its work so as to achieve a properly projected contract completion date, the project schedule so produced will be distorted and unreliable as a basis for determining time extensions. In the landmark decision, Fortec Constructors v. United States,[28] the Board recognized that the control of a project along with the ability to accurately evaluate time extensions is lost if the parties do not properly update the schedule to reflect delays and time extensions due a contractor.

Likewise in Continental Consolidated Corp.,[29] the Army Corps of Engineers Board of Contracts Appeals noted that to the extent a CPM schedule is to be used to evaluate requests for time extensions it must reflect actual project

conditions. In this regard, the Board noted, in pertinent part:

> It is essential that any changes in the work and time extensions due to the contractor be incorporated into the progress analysis *concurrently* with the performance of the changes or immediately after the delay and thus integrated into the periodic computer runs to reflect the effect on the critical path. Otherwise, the critical path chart produced by the computer will not reflect the current status of the work performed or the actual progress being attained.

While there have been numerous cases that have discussed the utilization of retrospective time impact analysis principles, the writer has selected two cases for discussion that are illustrative of the principles discussed herein.

• *Case Review No. 1*

In the first case,[30] the Board was presented with an appeal by the general contractor on a federal detention center construction project that included numerous and complex issues of delay. The project had become so delayed that the owner, the Federal Bureau of Prisons, had terminated the contractor for default. Both parties presented CPM-based arguments which were supported by the testimony of scheduling experts. The scheduling experts relied upon different CPM methodologies and reached diametrically opposite conclusions.

The contract required the general contractor to employ CPM analysis in planning, scheduling, and reporting the progress of the work to the owner. The contract also provided that, in the event of changes, delays or contractor requests for additional time, the contractor was to submit a CPM fragnet as part of a time impact analysis showing how the schedule was affected.

The project experienced many difficulties which, the parties agreed, caused substantial delays. The contractor submitted a proposed revised schedule (apparently at the owner's request) but, because of alleged deficiencies in the schedule, it was not accepted by the owner. The contractor proceeded to use the revised schedule to carry out the work but the owner used the earlier schedule to track the progress of the work.

The parties were also at odds with respect to the time impact analyses submitted by the contractor for various changes and delays that had occurred. The contractor failed to submit the contractually provided-for fragnets with its time impact analyses, thus those analyses were rejected by the owner. The contractor's position at trial was that, due to the number of delays, it was impossible to provide fragnets with the time impact analyses. In any event, the parties had no agreement as to the effect upon the schedule of the various changes and delays.

With the lack of an agreed-upon schedule, and the lack of any agreement as to time impact analyses, the delay issues were contested at trial by the parties' respective scheduling experts, each of whom performed a schedule delay analysis. The methodology employed by the contractor's consultant in performing its analysis involved a review of the job on a daily basis using as-built performance information to determine when activities of work started and stopped. In this regard, the consultant reconstructed the project from its inception in February 1992 until termination in October 1993.

After determining the as-built critical path of the project, the consultant compared the contractor's actual performance with how the job was originally planned, to determine whether the problems during construction impacted the completion date. When it was determined that there was a delay, the length of the delay was determined by looking at an activity on the as-built critical path and comparing the dates on which the activity was actually performed to the dates the activity was planned to start and finish.

The government also retained a consultant to perform a delay analysis. The government's consultant employed a "contemporaneous time frame analysis" to analyze the delay in the work.

Under this method the delay was evaluated using the information available at the time of the delaying event, and the delay in any given month was evaluated based on that month's updated CPM schedule. The analysis was based on looking back in a window, which was defined by two successive schedule updates, and then looking at the critical path and who caused any delays.

In performing its analysis the consultant divided the work into seventeen windows and evaluated the critical path at the beginning and end of each window, determining whether there was any delay, including weather delay, during the period of the window being reviewed. Each window compared the completion date of two successive schedule updates and assessed responsibility for the delay identified from one update to the next. The critical path used to perform this analysis was that shown on the contractor's schedule updates. In this regard, the consultant also determined whether the contractor or the government was responsible for the delays.

On cross examination the government's consultant admitted that the logic that had been utilized in performing his analysis was not reflective of the manner in which the work was actually performed. In addition the consultant admitted that, while the contractor had changed the logic in its December 21, 1992 schedule, he did not use this changed logic because it had been rejected by the Government. The consultant further admitted that if this logic was faulty or changed, the critical path would be different than in his analysis. The contractor's consultant testified that the government's consultant had derived the incorrect critical path as a result of using the outdated logic.

The Board ultimately concluded that the testimony of the contractor's expert was more persuasive because it was based upon "actual events" and because the testimony of the owner's expert was not based upon "the actual logic of the job."

The Board found the contractor's consultant's analysis that looked at the actual events to plot the critical path to be more reliable than that of the government who had relied on the contractor's schedule updates, which had not been changed to reflect the actual logic on the job.

This decision is instructive because it highlights the need to base a retrospective schedule delay analysis on as-built events as they actually occurred during the course of performance of the work on a project. In addition, this case highlights the need to establish the as-built critical path to completion. Moreover, this decision makes clear that in terms of performing a chronological and cumulative "windows-type" analysis, the analyst must evaluate critical delay in the work within a given window of time against the as-built critical path to completion. Failure to do so will result in rejection of the analysis.

• *Case Review No. 2*

In the second case,[31] the General Services Board of Contract Appeals recognized the performance of a retrospective time impact analysis as appropriate. This case involved the termination for default of a contractor on a project for the construction of an annex to the existing Trenton Federal Courthouse in Trenton, New Jersey. A schedule analysis was undertaken by the contractor's expert and presented at the hearing in this matter to assist in allocating responsibility for the various delays associated with the project.

The contract called for the development by the contractor of a CPM network plan demonstrating complete fulfillment of all contract requirements. The schedule was to be updated regularly and used in planning, performing, reporting, and coordinating the work. Adjustment to the scheduled times for completion of the work were to be made only in accordance with the CPM clause in the contract. Specifically, each request for a time extension based on claims, delays, or changed work was to be accompanied by a time impact analysis based upon the date or dates

when changes were issued or delays began. In this regard, the contract specifically required:

1. The Time Impact Analysis shall be based upon the date or dates when the change or changes were issued, or the date or dates when alleged delay or delays began, the status of the Construction Project at that time and shall include event time computations for all affected activities.

2. If the Contracting Officer finds that after a review of the Time Impact Analysis that the Contractor is entitled to any extension of time for completing any of the milestone times for completion, the time adjustments will be approved by the contracting officer, whether or not the time for completion of the overall project is extended thereby, and the contractor will then be directed to revise the Project Schedule accordingly.

3. If the contractor does not submit a Time Impact Analysis for a change or alleged delay, or provide such additional supporting information as the Contracting Officer may require within the specified period of time, or within such additional time as may be allowed by the Contracting Officer. [sic] The Contracting Officer will determine the time impact, if any, of the change, alleged delay....If this results in the determination that no adjustments should be made, the Contracting Officer will issue said determination and Time Impact Analysis to the Contractor at the time of directing such adjustment of the time for completion.

The methodology utilized by the contractor's consultant to perform its schedule analysis, (an approach deemed by the consultant to be consistent with the Time Impact Analysis requirements in the contract specification), was a "marches through the project" approach that measured where the project stood during certain milestones. The milestones included completion of caissons, completion of critical concrete work, completion of structural steel, and various milestones applicable to installation of exterior skin. The analysis undertook to determine where the project stood both prior to and after an alleged delay or change, and to measure the effect on the projected project completion date. The method of analysis utilized was an adaptation of the schedule specification in the contract, which, in the consultant's opinion, was not intended for use in the situation that occurred on the project, i.e. where many overlapping events affected contract completion, in contrast to the more typical project experience of several stand alone delays.

The analysis prepared by the contractor's consultant included graphics depicting the overall project's critical path before and after each critical event. The analysis identified the project schedule as it stood prior to the impact of a delaying event and detailed how the impact affected the project schedule. This analysis, which the board referred to as a *time impact analysis*, was then carried forward to become the schedule baseline of the following chart, which showed the cumulative effect of the various impacts. Of note, is the fact that in performing the subject analysis the consultant prepared an as-built record of performance by determining all construction activities performed each day on the project. In addition, because the project never had an approved CPM schedule, the consultant revised the version of the contractor's schedule that had been submitted to the owner during the course of construction, including various comments the owner's consultant had forwarded to the contractor in response to the schedule submission. The Board considered the as-planned ("baseline") schedule established by the contractor's consultant to be reasonable. Thus, this schedule was used as the baseline against which progress achieved and delays experienced throughout the course of performance of the work were evaluated.

Of significance with respect to this case, is that during the course of performance of the work the owner never approved the contractor's as-planned schedule. As a result, it was necessary for the consultant to make adjustments to the contractor's baseline schedule for purposes of utilizing the schedule as the baseline against which progress achieved and delays incurred in the work were evaluated. In addition, it is of import to note that given the overlapping delays that occurred during the course of the performance of the work, the utilization of the prospective Time Impact Analysis provision in the contract, which was geared towards performing "forward-looking," "single event analysis," was not utilized for purposes of performing the "after-the-fact," retrospective evaluation of the multiple, concurrent changes and delays that had occurred in the work. The retrospective time impact analysis performed in this case is consistent with a line of cases in which courts and boards have recognized the propriety of utilizing retrospective schedule analyses that evaluate delays against the as-built critical path in order to apportion responsibility for delays in the work on a project.[32]

Conclusion

Properly developed and incorporated into a construction contract, time impact analysis procedures provide the parties with a valuable tool for evaluating the effect of changes and delays in performance of the work on both a *prospective* and *retrospective* basis. Properly applied, these procedures can facilitate timely, bilateral resolution of time and compensability issues associated with changes and delays; thus enabling the parties to maintain accurate, properly adjusted schedule updates reflective of progress achieved and delays experienced, and a current, mutually agreed-to projected plan for achieving completion of the work in accordance with a properly adjusted contract completion date. Moreover, the inclusion of a retrospective TIA provision in a contract provides a contractually-prescribed mechanism for evaluating the effect of changes and delays in the work, after-the-fact, both *during* and *post-construction*, if necessary. Thus, enabling the parties in a dispute to focus *more* on *facts*, and *less* on "*uncertainty.*"

Guidelines

These *Guidelines* are intended to assist you in preparing for the challenges associated with implementing time impact analysis procedures. They are not, however, a substitute for professional representation in any specific instance.

1. Owners: Include both *prospective* and *retrospective* time impact analysis provisions in your contract scheduling specifications. These provisions should detail the timing of submission, form, and content of the TIAs to be submitted by a contractor in support of a request for an extension of the contract time.

2. Owners: Ensure that the time impact analysis provisions in your contracts contain a "project owns the float clause." Likewise, ensure that your contracts *do not* include provisions that preclude the granting of a time extension in the event of concurrent delay in the work.

3. Owners and Contractors: Train your project management and scheduling personnel in the preparation of prospective and retrospective time impact analyses. Develop project procedures that detail the steps to be undertaken in preparing prospective and retrospective TIAs. Also, ensure that your project personnel understand how float and concurrent delay factor into the preparation and negotiation of time extension requests.

4. Contractors: Strive to obtain the owner's approval of your as-planned ("baseline") schedule. The absence of an approved baseline schedule often results in the failure of effective management on a project and typically leads to disagreements and disputes between owners and contractors as to the status of completion of the work, the determination of criticality of work

activities, and when the work on a project will be completed. It is also important to recognize that absent an approved baseline schedule, the implementation of time impact analysis procedures during construction are significantly more challenging.

5. Contractors: Document each change order issued and/or delay that occurs on a chronological basis. When preparing schedule fragnets on a prospective basis, keep in mind that you may be required by the owner to justify the reasonableness of the durations in your fragnets. Therefore, maintain records of the quantity, manpower, equipment, and production rate data utilized in developing fragnets.

6. Contractors: When incorporating fragnets into the schedule, utilize logical relationships that accurately depict the relationship between the performance of the changed work and the activities in the baseline schedule. Be prepared to discuss these relationships, in detail, with the owner and to explain the means, methods, and sequencing involved in performing the changed work.

7. Contractors: It is important to recognize that although (with certain exceptions) the selection of the means, methods and sequences of performance are up to you, some contracts provide that: *"to the extent changed work can be (or could have been) performed along with the base contract work without causing necessary delay, no extension of the contract time will be granted."* Such provisions can affect both your scheduling and cost of performance of changed work, and must be carefully considered in preparing TIAs.

8. Owners and Contactors: Following the submission of a TIA, the parties should meet as quickly as possible to negotiate the contractor's request for time extension. Detailed minutes of each meeting should be prepared and maintained in the project files. The parties should *always attempt* to reach agreement on the amount of time impact to the schedule, even if there is a substantial disagreement relative to compensation. Upon reaching agreement, the owner should incorporate the fragnet(s) and time extension agreed-to between the parties into the project schedule update(s) in accordance with the requirements of the TIA provisions in the contract.

9. Owners and Contractors: To the extent time extension negotiations break down, be sure to maintain detailed daily reports that chronicle the performance of the work, on an activity-by-activity basis, for both the base contract and changed work. Ideally, separate daily time sheets and cost records relative to the performance of changed work should be maintained.

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20. Freeman-Darling, Inc., GSBCA No. 7112, 89-2 BCA ¶ 21,882 (1989).

21. Blinderman Const. Co., Inc. v. U.S., [30 COF ¶ 70,619], 695 F.2d 552 (Fed. Cir. 1982); Appeal of Active Fire Sprinkler Corp. Bldg., GSBCA No. 5461, 85-1 B.C.A. (CCH) ¶ 17868, 89,484, 1984 WL 13904 (Gen. Services Admin. B.C.A. 1984), amended on reconsideration, 85-3 B.C.A. (CCH) ¶ 18217, 1985 WL 16747 (Gen. Services Admin. B.C.A. 1985).

22. Appeal of Utley-James, Inc., GSBCA No. 5370, 85-1 B.C.A. (CCH) ¶ 17816, 1984 WL 13874 (Gen. Services Admin. B.C.A. 1984), aff'd, 14 Cl. Ct. 804, 1988 WL 42130 (1988).

23. Appeal of Warwick Const., Inc., GSBCA Nos. 5070, 5387, 5457, 5543, 82-2 B.C.A. (CCH) ¶ 16091, 79854-79855, 1982 WL 7830 (Gen. Services Admin. B.C.A. 1982).

24. Wunderlich Contracting Co. v. U. S., 11 CCF ¶ 80,069, 173 Ct. Cl. 180, 199, 351 F.2d 956, 968-969 (1965).

25. Appeal of John Driggs Co., Inc., ENG BCA No. 4926, et al, 87-2 B.C.A. (CCH) ¶ 19833, 1987 WL 41074 (Corps Eng'rs B.C.A. 1987).

26. J. D. Hedin Const. Co. v. U. S., [10 CCF ¶ 730761], 171 Ct. Cl. 70, 347 F.2d 235 (1965).

27. Fortec Constructors v. U.S., 8 Cl. Ct. 490, 504-508 (1985); Appeal of Continental Consol. Corp., ENGBCA Nos. 2743, 2766, 67-2 B.C.A. (CCH) ¶ 6624, 1967 WL 320 (Corps Eng'rs B.C.A. 1967).

28. Fortec Constructors v. U.S., 8 Cl. Ct. 490 (1985).

29. Appeal of Continental Consol. Corp., ENGBCA Nos. 2743, 2766, 67-2 B.C.A. (CCH) ¶ 6624, 1967 WL 320 (Corps Eng'rs B.C.A. 1967).

30. Appeal of Cogefar-Impresit, U.S.A., Inc., DOTBCA No. 2721, 97-2 B.C.A. (CCH) ¶ 29188, 1997 WL 484585 (D.O.T. Cont. Adj. Bd. 1997).

31. SAE/Americon-Mid Atlantic, Inc. v. General Services Admin., GSBCA No. 12.294 et al., 98-2 B.C.A. (CCH) ¶ 30084, 1998 WL 753312 (Gen. Services Admin. B.C.A. 1998).

32. Appeals of Gulf Contracting, Inc., ASBCA Nos. 30195, et al., 89-2 B.C.A. (CCH) ¶ 21812, 1989 WL 46855 (Armed Serv. B.C.A. 1989); Appeals of Harrison Western Corp., ENG BCA No. 5556, 93-1 B.C.A. (CCH) ¶ 25382, 1992 WL 221976 (Corps Eng'rs B.C.A. 1992); Manuel Bros., Inc. v. U.S., 55 Fed. Cl. 8 (2002); Appeals of John T. Jones Constr. Co., ASBCA No. 48303, 98-2 B.C.A. (CCH) ¶ 29892, 1997 WL 707107 (Armed Serv. B.C.A. 1997); Morganti Nat., Inc. v. U.S., 49 Fed. Cl. 110 (2001); Appeal of Santa Fe, Inc., VABCA No. 2168, 87-3 B.C.A. (CCH) ¶ 20104, 1987 WL 47788 (Veterans Admin. B.C.A. 1987); Appeal of Kora & Williams Corporation and Insurance Company of North America Under Contract No. 0680-AA-02-0-03-KA Union Station Bus/Parking Garage and Rail Access Facilities District of Columbia Contract Appeals Board, CAB No. D-839.