“Time is money” is the fundamental premise underlying disputes regarding delays to construction projects. A project that has experienced a delay in its expected completion date, from whatever cause, incurs added costs as a result. A significant portion of the costs of the management and support of an ongoing construction project are directly tied to the overall duration of the construction work. The longer the work goes on, the higher the costs. Because of this direct relationship, disputes regarding the delayed completion of construction work are one of the most common types of construction disputes. When the construction has taken longer to complete than planned or than contractually required, the issue quickly becomes which party—the contractor or the owner (or the subcontractor or the prime contractor) -- must bear the added costs that are the inevitable result.  

1 This paper is adapted from previously published work of the author, specifically, Chapter 19, “Delay, Suspension of Work, Acceleration and Disruption,” appearing in FEDERAL GOVERNMENT CONSTRUCTION CONTRACTS, Second Edition (ABA Forum on the Construction Industry 2010). Citations to state and federal court decisions involving non-government projects have been added where available. However, it must be recognized that much of the law on these subjects has been developed in the context of federal contracts, and decisions from government contract disputes are frequently found persuasive and relied upon by state and federal courts across the country when dealing with these issues. The able assistance of Christian Henel, Associate at Howrey LLP, in the preparation of this paper is most appreciated.
overall construction contract completion that is being referenced, and not delay to just a single activity or part of the construction process. Delays to individual work activities typically have relatively little or no distinguishable cost. The damages due to delays are primarily incurred when the overall project duration is extended. So when assessing the costs and consequences of a particular event that delays some aspects of the construction work, the first step is to assess that event’s effect on the project’s overall completion schedule.

There are some situations in which the overall delaying effect of a particular delay event is obvious, such as where the owner is preventing any construction progress due to a failure to provide access to the work site. Beyond such patent delay situations, however, the basic technique utilized for assessing the effect of individual delaying events on the overall project duration is network analysis, also known as Critical Path Method analysis or CPM. The longest sequence of required construction activities to complete the project is its critical path. By definition, delay to any of the critical path activities will extend the overall project duration, unless remedial steps can be taken such as resequencing activities or reducing other critical path activity durations. Other, noncritical activities can be delayed to some extent without affecting the overall project duration, and as such are said to contain “float” or “slack” to that extent. A delaying event that solely utilizes available float does not affect the critical path, does not delay the project, and so is not the basis for possible claim for time extension or delay damages.\(^2\) On the other hand, an event that causes an activity to be delayed by more than the available float time affects the critical path once the float has been exhausted, and so becomes a critical path delay to that extent.

As the U.S. Claims Court (as it was then called) stated in 1992: “Essential to a determination that an activity belongs on the Critical Path of a project is an understanding of how that activity affects other activities.”\(^3\) Determining what activities constitute the critical path on a particular project, how much float is associated with the noncritical activities, and what, if any, effect on the critical path resulted from a particular delay event are most typically the subject of detailed expert witness testimony in construction delay litigation, a subject discussed further in Section VI. below.

\section{II. CATEGORIES OF DELAYS}

Not all delays that affect the critical path are grounds for a time extension or added compensation for the contractor, of course. Whether the contractor will be entitled to additional time or compensation for a critical path delay depends on which party is responsible for creating the delaying event, or has otherwise taken responsibility for it under the terms of the contract. In simplest terms, the contractor is not entitled to a time extension for delays it has caused itself, but will have a basis to obtain relief to some degree for delays caused by the owner or delays caused by events entirely beyond the contractor’s control.

In this respect, delay events can be divided into three basic categories: excusable, compensable, and unexcused. An \textit{excusable} delay is a delay for which the contractor is entitled to an extension to the contract time for completion. In other words, the contractor’s late completion is excused. \textit{Compensable} delays are a subset of excusable delays for which the contractor is entitled not only to a time extension, but also to compensation. The compensation takes the form of an adjustment to the contract price for any added costs that flowed directly from the delay (that is, delay damages). \textit{Unexcused} delays are those for which the contractor has responsibility, and which entitle the contractor to neither a time extension nor any added compensation. If the contractor has not completed the work when required and the delay is unexcused, the owner will be entitled to its delay damages for the contractor’s failure to

complete on time. On many projects (and most public projects), these damages take the form of daily liquidated damages. The owner may also be entitled to terminate the contract for default for failure to timely complete.

A. Excusable Delay

The terms of the construction contract, which set out the risk allocation between the contractor and the owner, normally define the categories of delays. The most frequently used form of fixed-price construction contract conditions is the AIA form A201 “General Conditions” (2007), and is typical in this regard. A201 lists in Section 8.3.1 the grounds on which the contractor can be entitled to a time extension. This Section thus effectively serves as the applicable definition of what constitutes excusable delay. It provides as follows (emphasis added):

If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavailable casualties or other causes beyond the Contractor’s control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

Note that the common element of all these possible causes of delay is that the delay arises from “causes beyond the Contractor’s control.” As the examples make clear, excusable delays include both delays caused by the actions or inactions (“neglect”) of the owner or its agents, as well as by other events not controlled by either party, such as fires and labor disputes. In addition to lack of control, the common law adds an additional element, which is that the cause of delay must be unforeseeable as well.4 Thus, while general economic strikes are excusable

4 Sauer Inc. v. Danzig, 224 F.3d 1340, 1345 (Fed. Cir. 2000); FAR 52.249-10(b)(1); Mundy v. New York, L.E. & W.R. Co., 27 N.Y.S. 469 (Gen. Term 1894) (flood delay was inexcusable because similar flooding had occurred previously and “within the memory of people then living”).
delays\textsuperscript{5}, strikes that are the result of poor employee treatment and mismanagement by the contractor are not.\textsuperscript{6} Similarly, a nationwide steel strike that began several months before submission of bids was not an excusable delay, because this cause of delay was not “unforeseeable.”\textsuperscript{7}

While not mentioned specifically in Section 8.3.1, abnormal weather conditions are an excusable delay, as they are unforeseeable events beyond the control of the contractor. As provided in A201 Section 15.1.5.2, however, normal weather delays, such as a rainstorm that halts earth-moving work, are not considered excusable—only delays caused by abnormal or unusually severe weather (since normal weather conditions are foreseeable). Section 15.1.5.2 provides:

> If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for that period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

As stated in \textit{Allied Contractors, Inc.}:

> the term “unusually severe weather” does not include any and all weather which prevents work under the contract. The phrase means only that weather surpassing in severity the weather usually encountered or reasonably to be expected in the particular locality during the time of year involved.\textsuperscript{8}

While not directly applicable unless specifically referenced, the U.S. Army Corps of Engineers has developed standards for when weather delays can be classified as unusually severe, along


\textsuperscript{6} \textit{Reading Clothing Mfg. Corp.}, ASBCA No. 3912, 57-1 BCA Par. 1290.

\textsuperscript{7} \textit{Allied Contractors, Inc.}, IBCA No. 265, 1962 BCA Par. 3,501.

\textsuperscript{8} \textit{Id.}
with guidelines for how to assess claims of abnormal weather. These are sometimes utilized in non-government settings in addition to government projects. Where the parties’ contract does not contain an agreed-upon standard for what constitutes abnormal weather entitling the contractor to an excusable delay, the relative “normality” of the weather event may become the subject of competing expert opinions. Of course, catastrophic weather events such as hurricanes will generally be considered excusable without much issue.

Another specific rule relates to bankruptcies of subcontractors and suppliers, where the argument that bankruptcy or financial inability of a sub or supplier to perform was beyond the contractor’s control has been consistently rejected. There is a quite limited exception where the bankruptcy was directly caused by the owner’s improper action (such as a chronic failure to pay for that subcontractor’s work that causes the financial distress).

Entitlement to a time extension for an excusable delay also does not arise merely because of the occurrence of the delay event, as typically the contract requires that the contractor must still provide written notice to the owner of the cause of delay. It also remains the contractor’s burden to demonstrate the actual delaying effect of the event on the work and the project.


10 McDevitt & Street Co. v. Marriott Corp., 713 F. Supp. 906 (E.D.Va. 1989) (denying time extension where expert testimony showed weather was foreseeable based on weather data averages); Handex of Carolinas, Inc. v. County of Haywood, 168 N.C. App. 1, 607 S.E.2d 25, 34-35 (2005) (competing evidence of weather conditions as compared to NOAA 30 year average).


duration. For instance, in *Sauer, Inc. v. Danzig*, the contractor argued that the owner’s presence at the site and interference with the construction work prevented the contractor from being able to complete the contract on time. The Federal Circuit rejected the contractor’s claim on the basis that although there was a “potential for delaying interference” from the owner’s actions, “Sauer did not meet its burden of showing such delay actually occurred in this case.”

**B. Compensable Delay**

*Compensable* delays are generally limited to those situations where the delay flows directly from the actions or inactions of the owner, as opposed to delays that are not within the control of either party. Again, however, whether a particular delay can be categorized as compensable is determined by the terms of the contract. The AIA A201 General Conditions include several provisions that indicate when delays are compensable. For example, when the owner issues a Construction Change Directive under Section 7.3, that Section specifically provides that both “the Contract Sum and the Contract Time” will be “adjusted accordingly” for the ordered change. Since the amount payable to the contractor for a change is intended to reimburse the contractor for all reasonable expenditures relating to the change (plus profit) (Section 7.3.7), this includes costs associated with extended time spent on contract performance where the change delays contract completion – i.e., delay costs.

Similarly, under Section 3.7.4, when the contractor encounters concealed or unknown conditions (otherwise known as differing site conditions), then if the conditions in fact “differ materially and cause an increase or decrease in the Contractor’s cost of, or time required for, performance of any part of the Work,” the Architect is required to “recommend an equitable

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15 *Id.* at 1346. *Accord, Morrison Knudsen Corp. v. Firemans Fund Ins. Co.*, 175 F.3d 1221 (10th Cir. 1999) (contractor had burden of proving not only delay, but that delays impacted completion of the work).

adjustment in the Contract Sum or the Contract Time, or both.” Again, if the completion date must be extended due to the differing site condition, compensation for the added time is part of this equitable adjustment. While a delay due to the discovery of a differing site condition is not a delay directly stemming from the owner’s actions or inactions, it nevertheless is made a compensable delay by the terms of this Section.\(^\text{17}\)

Differing site conditions are a situation where the owner, for reasons of overall cost efficiency, has allocated to itself the risk of site conditions being materially different than represented, or than reasonably expected in the locality.\(^\text{18}\) On the list below, delays due to the special circumstances set out in Sections 3.75 and 10.3.2 are similar special risk allocations to the owner.

Other compensable delays identified in the A201 General Conditions include:

- discovery of human remains, burial markers, archeological sites or wetlands not indicated in the contract documents (Section 3.7.5);
- delays due to the Owner’s action in awarding contracts to others for construction or operations at the site (Sections 6.1.1, 6.2.3);
- delays due to work stoppage by the contractor, as a result of non-payment by the owner (Section 9.7);
- delays due to the contractor encountering hazardous materials or substances (Section 10.3.2);
- delays due to emergencies affecting the safety of persons or property (not due to the contractor) (Section 10.4);
- delays caused by the owner that lead to termination of the contract by the contractor (Section 14.1.3); and


\(^\text{18}\) Id.
• delays due to suspension of the Work in whole or in part by the owner for its convenience (Section 14.3.1).

Additionally, delays due to the owner’s breach of an express or implied obligation under the contract will be treated as compensable delays, such as a breach of the duty to cooperate with the contractor, or not to hinder or interfere with the contractor’s work. In *SIPCO Services & Marine, Inc. v. United States*, 19 owner orders to adhere to more stringent containment requirements than required by the contract, as well as a pattern of overregulation and excessive supervision, were found to constitute a breach of the implied duty to cooperate. The owner was accordingly held to be liable for the delays and added costs that resulted. 20

**C. Unexcused Delay**

*Unexcused* delays, those that do not entitle the contractor to either a time extension or added compensation, are generally not specified in the contract as such. The contractor in a fixed-price construction contract takes responsibility for many types of risks, such as the availability and quality of labor; the availability, delivery, and quality of materials; submission of adequate shop drawings and submittals; the performance of subcontractors and suppliers; site conditions and work restrictions identified in the contract; and safety. To the extent that delays arise out of any of these risks that have been assumed by the contractor, those delays will be considered unexcused. In fact, one can go so far as to say that delays that cannot be brought within the definition of excusable delays or that constitute a breach of an owner duty or obligation, are by definition unexcused. 21

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For instance, if the contractor experiences delays because of difficulties in obtaining the permits and certifications that were contractually required to construct the work, the contractor will not be entitled to a time extension or compensation:

. . . the responsibility for acquiring the state certification for the facility was [the contractor’s] and as the conditions imposed by the state for its granting of the certification were normal and to be expected, [contractor’s] Appeal requesting a time extension for meeting those conditions is denied.22

Similarly, delay to the project resulting from the owner’s delay in holding the preconstruction conference has also been found to be an unexcused delay. In *Program & Construction Management Group, Inc. v. General Services Administration*,23 the contractor asserted that the owner’s failure to schedule a preconstruction conference forced the contractor to delay beginning work on the contract. Despite evidence showing preconstruction conferences were standard within the industry, the board stated:

. . . regardless of whether there is an industry custom to hold a meeting shortly after issuance of the notice to proceed . . . a preconstruction meeting is not a prerequisite to the start of work . . . the lapse of time between the issuance of the notice to proceed and the convening of a preconstruction conference does not establish a compensable delay to the contractor.24

Since the preconstruction conference was not contractually made a precondition to starting work, the delay in holding it did not cause delay to the contractor; the contractor was free to proceed in the meantime. Thus, the resulting delay was unexcused.

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24 *Id.*
When delays to contract completion are unexcused, the owner has the right to recover its own delay damages, often measured by liquidated damages. In an owner claim for liquidated delay damages, the owner has the overall burden of proof to demonstrate that the contractor is in default, and that the contractor was the cause of the delay. To defeat the claim, the contractor must come forward with evidence to show that the owner prevented performance or contributed to the delay or that the delay was otherwise excusable. Under North Carolina law, if the responsibility for days of delay is unclear, or if both parties contributed to the delay, courts will not apportion liquidated damages between the owner and the contractor, but instead will strike the liquidated damages clause entirely. The majority of jurisdictions, however, hold instead that where the owner contributed to the contractor’s delay, the owner still may recover liquidated damages, but the owner must prove a clear apportionment of the delay attributable to each party to recover, in accordance with the general rule regarding concurrent delay.

Generally, a liquidated damages provision will be invalidated if the contractor can show that the liquidated damage rate is an unreasonable penalty, meaning that the liquidated damages bear no reasonable relationship to the actual damages the owner could have foreseen suffering at the


26 *Id.*


28 *Sunshine Constr. & Engin., Inc. v. United States*, 64 Fed. Cl. 346, 371-73 (Ct. Fed. Cl. 2005); *Sauer, Inc. v. Danzig*, 224 F.3d 1340, 1347 (Fed. Cir. 2000). In reaching its holding, *Sunshine* described the law on apportionment of liquidated damages as still being “unsettled,” a residual effect of two conflicting U.S. Supreme Court decisions from 1914 and 1923. The alternative rule, however, that the existence of some degree of government delay annuls the liquidated damages provision entirely, should no longer be considered good law in light of the these cases. An extended discussion of both rules, citing numerous cases, is found in *PCL Construction Services, Inc. v. United States*, 53 Fed. Cl. 479 (Ct. Fed. Cl. 2002). See also discussion of the concurrent delay problem in Section V. B below.
time the contract was made. North Carolina courts have determined that a liquidated damage clause is invalid as a penalty if "the disproportion [is] such as to shock the judicial conscience . . . .” Ledbetter Bros. v. North Carolina Dept. of Transp., 68 N.C. App. 97, 107, 314 S.E.2d 761 (1984). In Brickwood Contractors, Inc. v. City of Durham, the U.S. District Court for the Middle District of North Carolina struck a liquidated damages provision where the contractor proved that the liquidated damages amount grossly exceeded what actual damages were reasonably foreseeable by the parties at the time of contracting.

Absent a particular clause that defines the delay period differently, the relevant delay period in claims for liquidated delay damages extends from the contractually required completion date until the work is “substantially complete.” Substantial completion is achieved when the completed work is capable of being utilized for its intended purpose. The distinction between items required for substantial completion and those not so required is well illustrated by Batson-Cook, Inc., where the owner withheld liquidated damages for late completion of a building until both fire doors and office doors were installed. The board held that the absence of the fire-rated doors precluded substantial completion because they were a fundamental safety feature of the building, but that the absence of the office doors was a mere inconvenience that did not prevent beneficial use of the building. Accordingly, withholding of liquidated damages was not appropriate once the fire doors were installed, since at that point the work was substantially complete.


30 Blinderman Constr. Co. v. United States, 39 Fed. Cl. 529, 573 (1997); Biemann & Rowell v. Donohoe Cos., 2000 NCBC LEXIS 10 at **13 (N.C. Super. 2000) (building was substantially complete when owner could take beneficial occupancy); All Seasons Const., Inc. v. Mansfield Housing Auth., 920 So.2d 413 (La. Ct. App. 2nd Cir. 2006) (defective building was substantially complete where, among other things, it could be used for the benefit of the owner).

31 Batson-Cook, Inc., ASBCA No. 44902, 97-1 BCA Par. 28,754.

32 Id. Substantial completion also may be defined in the contract, such as where the parties agree that a project is substantially complete when certified substantially complete by the architect, or when the architect or the local
III. ADDITIONAL DELAY CONCEPTS AND ISSUES

There are several specific recurring issues that arise frequently enough in delay disputes that substantial case law has developed regarding them. These recurring issues include situations in which the contractor is arguing that it was deprived of the ability to finish the contract earlier than required, the problem of sorting out concurrent delays, and situations where multiple delays lay claim to the use of the available float time.

A. The Right to Finish Early

The right-to-finish-early scenario involves a contractor who is planning and expecting to complete the contract early, which is to say, prior to the completion date required by the contract. However, an owner-caused delay is encountered that would, in other circumstances, qualify as a compensable delay, in that it extends the contract’s critical path and delays the contract completion from when it otherwise would have occurred. Because the contractor had been working toward an early completion, however, the contractor still completes the contract on or before the original contract completion date. Can the contractor validly claim that it has been delayed and is entitled to a price adjustment for the owner-caused, critical path delay, even though its performance has not extended beyond the contract completion date?

The general answer under the common law is “yes,” the contractor can recover in this situation, even though the contract completion date was met or beaten. The contractor’s right to finish early, unless specifically precluded by contract, is recognized as a right flowing from the owner’s obligation to avoid hindering the contractor’s progress. In Metropolitan Paving Co. v. United States, the court noted that although “there is not an ‘obligation’ or ‘duty’ of [the


owner] to aid a contractor to complete prior to completion date, from this it does not follow that [the owner] may hinder and prevent a contractor’s early completion without incurring liability.”

The contractor who actually plans to complete early saves on fixed costs due to the shorter performance period, and achieves other benefits such as improved cash flow and the opportunity to redeploy its resources on other contracts. Presumably some or all of the contractor’s anticipated savings were passed along to the owner, because that contractor was able to offer a lower bid price than its competitors. Accordingly, when the contractor is deprived of the ability to complete early, it suffers a real loss. The owner, having obtained the benefit of the early completion date via the competitive bidding process, should fairly pay for that loss by way of a price adjustment for the compensable delay it caused.

Because of the potential for abuse inherent in this rule, however, a number of cases impose special requirements before allowing the contractor to recover for delay to a claimed early completion date. However, the boards and courts have not been entirely consistent in stating these added requirements.

At the least, the contractor is required to demonstrate not only that it actually planned an early completion but also that its early completion schedule was realistic and achievable under the circumstances. The mere fact that the owner did not object to the early finish schedule, acquiesced in that schedule, or even specifically approved that schedule is by itself not enough to demonstrate reasonableness. Accordingly, in Emerald Maintenance, Inc., the contractor’s early finish claim was denied because the contractor’s schedule showing early completion was patently unrealistic (although it had been approved by the owner), and the board was not convinced that contractor would have completed the project by the claimed date even in the absence of owner-caused delay.

34 E.g., Interstate Gen. Gov’t Contractors, Inc. v. West, 12 F.3d 1053, 1060 (Fed. Cir. 1993); Preventive Maint. Servs., Inc., ASBCA No 44661, 94-3 BCA Par. 27,115.

35 Emerald Maint., Inc., ASBCA No. 43929, 98-2 BCA Par. 29,903.

36 Id.
Beyond the hurdle of demonstrating the reasonableness of the contractor’s early completion schedule and its ability to meet its early completion goal, some recent decisions have imposed one additional requirement: that the contractor demonstrates that from the outset it intended to finish early. The rationale for this added requirement is that otherwise the owner is subject to contractors taking advantage of owner delays to obtain a price adjustment when they really had no intention to finish early, and were not in reality kept on the project for longer than anticipated.

The Federal Circuit has accordingly settled on a three-part test that requires the contractor to demonstrate “that from the outset of the contract it: (1) intended to complete the contract early; (2) had the capability to do so; and (3) actually would have completed early, but for the [owner’s] actions.” In *Blinderman Construction Co. v. United States*, the Court of Federal Claims went even further, utilizing a four-part test that added the further requirement that the contractor provide notice to the owner of its intention to finish early. However, later cases have clarified that such notice is not required, but may provide sufficient evidence of the intent requirement.

Finally, it is important to note that the owner can, by a proper contract clause, likely immunize itself from early finish claims. Such a provision would be appropriate, for example, where the owner had no use for the project if it was finished early. In *Maron Construction Co. v.*

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37 *J.A. Jones Constr. Co.*, ENG BCA No. 6348 et al., 00-2 BCA Par. 31,000 (early completion schedule must be reasonable).


however, it was held that a contract provision stating that the owner would be responsible only for delays that exceed total float did not preclude the contractor from asserting an early finish claim for delay damages. The board found that the clause relied upon was not specific enough, and stated that a clause precluding early completion delay damages must specifically and expressly state that such damages are not recoverable.

**B. Concurrent Delays**

In performing a complex construction contract, there are often many activities on the project schedule that are not completed when planned, and just as many reasons why. As a result, it is by no means unusual to encounter situations where the overall project has unquestionably been delayed, but there are two or more possible explanations of the underlying cause of the delay: one being actions or inactions by the owner (compensable delays), and the other being actions or inactions by the contractor (unexcused delays). How are the effects of these different possible sources of project delay to be sorted out? This, in essence, is the problem of concurrent delay.

The basic rules applicable to concurrent delay situations are readily stated, but the reality is that the rules are extremely fact-specific and often difficult to apply in real-world circumstances. Where a contractor is seeking recovery on the basis of a compensable delay, but it is clear that the contractor also caused delay, “there can be no recovery where the [owner’s] delay is concurrent or intertwined with other delays.” The same is true in reverse. Where the owner is claiming liquidated delay damages, it is the owner’s burden to demonstrate the relative

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effects of its delays as compared to the contractor’s. If the delays are inextricably intertwined, the owner cannot recover.\textsuperscript{44} Since neither party can recover damages in such an “inextricably intertwined” situation, the net effect is that the period of concurrent delay is effectively treated as if it was excusable but non-compensable delay. That is, the contractor is effectively given a non-compensable time extension because the owner is precluded from recovering liquidated damages for the concurrent period.\textsuperscript{45}

Most early cases held that the court would not get involved in attempting to apportion delays among the various competing causes,\textsuperscript{46} but this is no longer the law. The rule today is that the party claiming delay damages has the burden to segregate or apportion the delays attributable to each party, and recovery will be denied only if there is a failure to do so.\textsuperscript{47} As such, in \textit{Blinderman Construction Co. v. United States},\textsuperscript{48} the Federal Circuit stated where both parties contribute to the delay, “neither can recover damage, unless there is in the proof a clear apportionment of the delay and the expense attributable to each party.”

Generally, courts will deny recovery where the delays are “concurrent or intertwined” and the contractor has not met its burden of separating its delays from those chargeable to the


\textsuperscript{45} Id. See also Morganti Nat’l, Inc. v. United States, 49 Fed. Cl. 110, 132 (Ct. Fed. Cl. 2001).

\textsuperscript{46} E.g., United States v. United Eng’g & Constr. Co., 234 U.S. 236, 244 (1914).

\textsuperscript{47} Masterclean, Inc. v. Ohio Dep’t of Admin. Servs., 1999 Ohio App. LEXIS 2188 at *37 (Ohio App. 1999); Structural Sales, Inc. v. Vavrus, 132 Ill. App. 3d 718, 748 (Ill. App. 1985); Calumet v. Metropolitan Sanitary Dist. of Greater Chicago, 178 Ill. App. 3d 415, 533 N.E.2d 453 (Ill. App. 1998) (“This trend in favor of apportionment is similar in nature to the trend in the courts to apply a comparative negligence standard in tort cases, i.e., recovery based on apportionment of the responsibility of the parties”). Modestly extending this principle, in \textit{George Sollitt Constr. Co. v. United States}, 64 Fed. Cl. 229, 239-40 (Ct. Fed. Cl. 2005), it was held that where concurrent delays can be apportioned, the additional costs of working in winter weather that stems from those concurrent delays can also be apportioned, based on the amount of delay attributed to each party. \textit{But see}, Brashear v. Richardson Constr., 10 P.3d 1115, 1118 (Wyo. 2000) (“Unless the contract contains such a provision the delay due to each party will not generally be apportioned”).

\textsuperscript{48} \textit{Blinderman Constr. Co. v. United States}, 695 F.2d 552, 559 (Fed. Cir. 1982).
While in theory, modern techniques of network analysis such as “windows” or “time impact” analysis (discussed below in Section V.) can be used in the vast majority of instances to achieve such apportionment, there are many examples of recent cases where recovery has been denied for failure to meet this burden of proof, or where the court was convinced that the contractor’s concurrent delay would have delayed the contractor in any event.

Beyond these key principles, there are a number of additional rules that are of assistance in resolving multiple-delay situations. For example, in *Fischbach & Moore International Corp.*, the owner’s delay due to placing a “hold” on proceeding with a substantial part of the work clearly affected the critical path, whereas the contractor’s delays mainly affected only work that was not on the critical path. To the extent that the contractor’s delays affected only float, the board clarified that these were not “delays” at all within the meaning of the concurrent delay rule. Thus, if the contractor can demonstrate that its delays were not on the critical path, there is no concurrent delay. The owner’s delay to the critical path is then the sole cause of the project delay, and thus compensable. The converse should also be true, in situations where the owner is claiming liquidated delay damages.

Another important distinction that helps resolve many apparent concurrent delay situations is the difference between two independent causes of delay and an alleged “concurrent delay” that is really just a secondary effect of the primary delay. The leading case on this point

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52 *Fischbach & Moore International Corp.*, ASBCA No. 18146, 77-1 BCA Par. 12,300.
is *John Driggs Co.*,\(^{53}\) in which the contractor claimed an 88-day critical path delay in its ability to drive piles, due to an owner-caused problem with providing access to the location where the piles were to be driven. In response, the owner alleged that the contractor was in no position to begin pile-driving when the owner’s access delay started, pointing to the lack of approval of the contractor’s shop drawings, incomplete negotiations with the pile-driving contractor, and the fact that the contractor had not yet procured the piles themselves. The board disagreed, referencing these alleged concurrent delays as “speculative or theoretical,” and noting that (emphasis added):

> When a significant owner-caused, construction delay . . . 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.\(^{54}\)

A failure to proceed with the other construction activities as planned, once the owner has caused a critical path delay, is not treated as a concurrent delay unless there is an independent cause of delay on the part of the contractor that would have prevented its timely performance even if the owner delay did not occur. Once a critical delay has occurred, it is recognized that the contractor’s plans and priorities often change in response, and the contractor is not required to “hurry up and wait.”\(^{55}\)

With respect to which party bears the burden of proof in concurrent delay situations, the case law is somewhat confusing. The quote from *John Driggs Co.*\(^{56}\) reproduced above, plus

\(^{53}\) *John Driggs Co.*, ENG BCA No. 4926 et al., 87-2 BCA Par. 19,833.

\(^{54}\) Id. at 122.


\(^{56}\) *John Driggs Co.*, ENG BCA No. 4926 et al., 87-2 BCA Par. 19,833.
MCI Constructors, Inc.\textsuperscript{57} and Bechtel Environmental, Inc.\textsuperscript{58} all indicate that the contractor does not need to affirmatively disprove all possible causes of concurrent delay, and that the owner has the burden to demonstrate that the contractor could not have avoided the delay and would necessarily have been delayed by the concurrent delay to the same extent, even if the owner delay had not occurred.

On the other hand, \textit{PCL Construction Services, Inc. v. United States}\textsuperscript{59} can be read to imply otherwise, in that it states that among the elements the contractor needed to demonstrate to recover for an alleged compensable delay, “the contractor must show that the [owner] was the ‘sole proximate cause’ of the delay and that no concurrent cause would have equally delayed the contract, regardless of the [owner’s] action or inaction.”\textsuperscript{60} However, the context of this quote is that the contractor in \textit{PCL Construction Services} was attempting to assert a “total time” claim, where it simply attributed all delay to the owner. In that context, to make it the owner’s burden to prove concurrent delays would have been to place an effectively impossible burden on the owner, since the contractor had never provided a network schedule analysis or otherwise demonstrated the delaying effect caused by the owner’s actions in the first place. Where the contractor has directly proven the compensable delay by a network analysis, however, it is fair and reasonable to require the owner (as in the three cases cited above) to raise and prove the existence of alleged concurrent delays, rather than require the contractor to explain the lack of significance to each and every activity that was not completed as scheduled.

\textsuperscript{57} MCI Constructors, DCCAB No. D-924, 1996 WL 331,212 (1996).

\textsuperscript{58} Bechtel Envtl., Inc., ENG BCA No. 6137 et al., 97-1 BCA Par. 28,640.


\textsuperscript{60} Id. at 801.
In *L.A. Reynolds Co.*,\(^{61}\) the Supreme Court of North Carolina declined to decide which party has the burden of proving the presence or absence of owner-caused delay. “[I]t is not necessary for us to pass upon the correctness or not of the challenged portion of Judge Bone's conclusion of law . . . , reading as follows: ‘(T)he burden of proof is on the defendant to show that delay on the part of plaintiff has caused some actual damage to defendant, or the public, and failing so to show, defendant is not entitled to withhold any sum of money as liquidated damages.’”

Finally, it is clear that in some fact situations, the effects of multiple causes of delay may be considered by the court as “inherently apportionable.” *Essex Electro Engineers, Inc. v. Danzig*\(^{62}\) involved a series of delays due to multiple submissions, rejections, resubmissions, and further rejections of Engineering Change Proposals documenting necessary changes to the drawings, and a similar multiple submission and rejection process regarding the prototype inspection procedure. The Federal Circuit found that both Essex and the owner had in part caused the delays in obtaining final approval of these submissions, but that: “The sequential nature of Essex’s submissions and the [owner’s] responses renders each party’s delays inherently apportionable.”\(^{63}\) In other words, the linear nature of the process (submission, rejection, preparation of the resubmission, and so on) was inherently such that at any particular time it could be clearly determined which party was causing the delay, and so the court could and would undertake this assessment. Clearly not all concurrent delay situations involve such linear delays, but this is a frequently seen scenario in the case of delays to shop drawing submittals and approvals, answers to requests for information, and similar delays.

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\(^{63}\) *Id.* at 1292.
B. Apportionment of Project Float (Who Owns the Float?)

Float, in the context of construction scheduling, is “the amount of time any given activity or path of activities may be delayed before it will affect the project completion time.”

Another aspect of the general problem of assessing the effect of multiple delays involves the problem of apportioning entitlement to the available float time when there are multiple delays, some by each party, that in total exceed the available float time. This issue generally goes by the question, “Who owns the float?” A simple example illustrating this issue is when a given series of activities starts with (for example) 30 days of float, but a 30-day owner delay (such as a change directive) utilizes that float, making the subsequent activities critical. Subsequently, the contractor experiences an unexcused delay (such as a poorly performing subcontractor) that further delays the same--now critical--activities by another 30 days. Each party caused a separate 30-day delay, but which party is responsible for the overall 30-day delay in contract completion?

Three potential outcomes are possible in this situation, depending upon whether the contractor is entitled to (“owns”) the available float, the owner does, or neither does and the float is shared in some manner. If, for example, the contractor is entitled to the benefits of the float in its schedule, then if the owner deprives the contractor of that float, and the contractor needs it later, then the owner should compensate the contractor for the delay.

64 Maron Constr. Co. v. Gen. Servs. Admin., GSBCA No. 13625, 98-1 BCA Par. 29,685. More technically, this is “total float,” specifically defined as the “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 [given] schedule.” Galaxy Builders, Inc., ASBCA No. 50018 et al., 00-2 BCA Par. 31,040. An activity that is on the critical path is said to have no float. Utley-James, Inc., GSBCA No. 5370, 85-1 BCA Par. 17,816. See generally, Williams Enterprises, Inc. v. Strait Mfg. & Welding, Inc., 728 F. Supp. 12, 15-16 (D.D.C. 1990), aff’d in part, remanded in part on other grounds, 938 F.2d 230 (D.C. Cir. 1991); Quinn Constr., Inc. v. Skanska USA Bldg. Inc., 2010 U.S. Dist. LEXIS 78164 at *16 (subcontractor cannot be liable for delays that occurred after subcontractor’s completion of its critical path activities); Morrison Knudsen Corp. v. Fireman’s Ins. Co., 175 F.3d 1221, 1233 (10th Cir. 1999) (same); Biemann & Rowell Co. v. Donohoe Cos., 2000 NCBC 8 at **28 (N.C. Super. 2000) (delay involving work not on the critical path generally has no impact on the eventual completion of the project).

65 See generally, 5 Bruner & O’Connor on Construction Law §15.125; Person, Who Owns the Float?, Construction Briefings No. 91-7 (June 1991).
When early cases on this issue proved unclear and inconsistent, the owner response was to develop several variants of contract clauses to address the point. One commonly used provision regarding ownership of float provides: “Float is not time for the exclusive use or benefit of either the [Owner] or the Contractor, but must be used in the best interest of completing the project on time.” This provision adopts the neutral position that the schedule float is a shared resource, and not the property of either contractor or owner, so when one party causes a delay and needs to utilize the available float to keep the project on schedule, that party is entitled to use it without compensating the other. If the other party then causes another delay to that activity (or chain of activities), the float is already gone, and the second party must bear the consequences of extending the project duration due to its critical path delay. Put another way, the party that uses the float first gets the benefit of it.

An alternative formulation used in one decision is that the float should belong to the party performing the schedule activity having the float, which of course will usually (but not always) be the contractor. In Turner Construction Co., decided in 1990, the Armed Services Board of Contract Appeals accepted the proposition that “general industry practice dictates that the contractor responsible for performance of [the] activity ‘owns’ that float and is entitled to consume or use the float as he sees fit or necessary.”

Overall, however, the position of most commentators who have addressed the subject is to embrace the “shared resource” approach mentioned previously: “Unless specifically defined in the contract specifications, float is a resource that belongs to the project and is available for all

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66 E.g., Titan Pac. Constr. Corp. v. United States, 17 Cl. Ct. 630 (Cl. Ct. 1989); Maron Constr., 98-1 BCA Par. 29,685; The Gassman Corp., ASBCA No. 44975, 00-1 BCA Par. 30,720; Galaxy Builders, Inc., 00-2 BCA Par. 31,040; J.A. Jones Constr. Co., ENG BCA No. 6348, 00-2 BCA Par. 31,000.

67 Turner Construction Co., ASBCA No. 25447 et al., 90-2 BCA Par. 22,649.
parties to use.”\textsuperscript{68} This position is also consistent with the above-quoted contract clause in most frequent use on this issue.

**IV. PROVING DELAYS**

To recover on a delay claim, the contractor is required to prove with “reasonable certainty” that its operations have been delayed.\textsuperscript{69} The required elements of liability, causation and resultant injury must each be proven. More specifically, “the contractor has the burden of showing the extent of the delay, that the delay was proximately caused by [owner] action, and that the delay caused damages to the contractor.”\textsuperscript{70} Even more specifically, demonstrating damages for delays requires proving: “(1) the number of days of delay attributable to the defendant’s wrongful actions; and (2) that these delays were on the project’s critical path” (that is, they extended the critical path and delayed completion of the overall project).\textsuperscript{71} This last step normally requires utilizing the techniques of network analysis (typically CPM), which is well recognized as the most reliable and trustworthy tool for analyzing delay.\textsuperscript{72}

**A. Need for Realistic and Accurate CPM Analysis**

Use of a CPM schedule analysis to prove a construction delay claim is not always required, but obtaining a recovery in the absence of a CPM analysis has become quite rare, and

\textsuperscript{68} Wickwire, et al., Construction Disputes: Representing the Contractor 519, 538 (3d ed. 2001); 5 Bruner & O’Connor on Construction Law §15.125 (“It is now well settled that, unless otherwise provided in the contract, float is not owned by any party”).

\textsuperscript{69} G.M. Shupe, Inc. v. United States, 5 Cl. Ct. 662, 737 (Cl. Ct. 1984); Wunderlich Contracting Co. v. United States, 351 F.2d 956, 968 (Cl. Ct. 1965).


\textsuperscript{72} Haney v. United States, 676 F.2d 584, 595 (Cl. Ct. 1982).
essentially limited to situations where the impact of the delay is readily apparent or can be determined as a matter of common sense.\textsuperscript{73} However, such situations are few, and certainly this will not be possible in most construction delay claims.\textsuperscript{74} North Carolina courts have accepted CPM analysis as a reasonable and reliable method of proving construction delays.\textsuperscript{75} Additionally, where the contract specifically requires use of a CPM schedule to establish the claimed delay, that requirement will be enforced.\textsuperscript{76}

The practical imperative to utilize CPM analysis was well stated in \textit{Hoffman Construction Co. v. United States},\textsuperscript{77} where the court noted:

Even if a critical path analysis per se is unnecessary, a contractor must supply some form of “specific proof that [its] performance was affected by the [Owner’s] undue delays.” . . . The mere identification of five potential causes of delay and extended performance time does not establish that the former caused the latter. It is immaterial that some particular event came along which disrupted certain work or delayed its start or completion. It may well have been that that item was not one which would delay the project completion or have any effect on it. We

\textsuperscript{73} \textit{Ventas De Equipo, S.A.}, ENG BCA No. PCC-135 et al., 2000-1 BCA Par. 30,913.


\textsuperscript{76} \textit{Galaxy Builders, Inc. ASBCA No. 50018 et al., 2000-2 BCA Par. 31,040.} The standard schedule specification of the Army Corps of Engineers, for example, specifically requires both use of a CPM schedule, and that the approved project schedule be utilized for assessing any time extension requests. Unified Facilities Guide Specification FGS-01 32 01.00 10 (August 2008) “Project Schedule.” But see \textit{Howard Contracting, Inc. v. G.A. MacDonald Constr. Co.}, 71 Cal. App. 4th 38 (Cal. App. 1990) (where bar chart was used to schedule the project, bar chart showing the critical path was sufficient to prove delays at trial); \textit{Helena Assocs., LLC v. EFCO Corp.}, 2008 WL 2117621 (S.D.N.Y. 2008) (contractor may satisfy its burden by putting on evidence and testimony which together accomplish the same task as CPM analysis).

cannot presume that, merely because some extra work was ordered and compensation paid by the [Owner], there would have been a delay to the completion of the project.\(^7^8\)

In recent years the boards of contract appeals and the Court of Federal Claims (but not, for the most part, state and federal courts) have become quite sophisticated in assessing the adequacy and usefulness of proffered CPM analyses in delay situations. Not infrequently, they will reject inadequate or incomplete efforts. For instance, in *Blinderman Construction Co. v. United States*,\(^7^9\) the CPM schedule was deemed “utterly useless,” as the contractor presented only the first of several pages of the schedule, thereby preventing the court from tracing the critical path through the project. Indeed, the contractor had never designed the schedule so that the critical path could be discerned. Further, although the schedule had been updated on several occasions, the revisions were “indiscernible and [were] unaccompanied by explanatory text.”\(^8^0\)

In general, any schedule analysis that fails to clearly identify the critical path of the project is highly likely to be rejected.\(^8^1\) Additionally, schedules that have never, or only rarely, been updated during the course of the project, particularly where there were changes in circumstances normally significant enough to require such changes, may preclude the schedule from serving as an acceptable basis for measuring delays.\(^8^2\)

Similarly, significant variations from the schedule that was utilized contemporaneously on the project require adequate explanation and justification. Otherwise, they will be looked


\(^8^0\) *Id.* at 585. *But see Tenn. Gas Pipeline Co. v. Technip U.S. Corp.*, 2008 Tex. App. LEXIS 6419 (Tex. Ct. App. 2008) (denying motion for JNOV where experts performed no CPM analysis but otherwise gave expert testimony which exceeded a “mere scintilla.”).


\(^8^2\) *Fortec Constructors v. United States*, 8 Cl. Ct. 490, 504 (Cl. Ct. 1985); *Coffey Constr. Co.*, VABCA No. 3361 et al., 93-2 BCA Par. 125,788 (refusing to rely on CPM schedule that had not been updated throughout the contract).
upon with a great deal of skepticism, or may lead to outright rejection of the schedule analysis. In *J.A. Jones Construction Co.*, the contractor’s claim was rejected because it had not shown the work at issue on the original critical path, nor had it been critical on any subsequent revision of the project schedule. Not until the contractor prepared its claim in litigation did the activity appear on the critical path. In general, CPM schedules created only after the fact are generally subject to attack and often to rejection. For example, in *Blinderman Construction Co. v. United States*, the Court of Federal Claims noted that a schedule generated seventeen months after project completion “warrants a skeptical reception on the part of the court, because the required nexus between the [Owner] delay and a contractor’s performance at some unspecified earlier date cannot be shown merely by hypothetical, after-the-fact projection.”

A schedule may also be rejected because the scheduled activities could not reasonably be performed in the manner depicted. In other words, a CPM schedule must be realistic and achievable to be utilized as the basis for a delay analysis. For instance, in *Neal & Co. v. United States*, the CPM schedule presented as the reasonable as-planned schedule depicted simultaneous completion of all of the 30 housing units to be built under the contract. To accomplish this required 30 work crews, one working on each unit, and thus compressed the critical path work at the end of the project. As this was clearly unrealistic, the contractor’s schedule analysis was rejected in favor of the owner’s analysis that included reasonable resource constraints.

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83 *J.A. Jones Construction Co.*, ENG BCA No. 6252, 97-1 BCA Par. 28,918.

84 *Pathman Constr. Co.*, ASBCA No. 23392, 85-2 BCA Par. 18,096; *Indiana & Michigan Elec. Co. v. Terre Haute Indus., Inc.*, 507 N.E.2d 588, 594-95 (Ind. App. 1987) (CPM analysis created after completion of the project but not used during project, and where project personnel did not understand CPM, was not given substantial weight); *Edwin J. Dobson, Jr. Inc. v. Rutgers Univ.*, 157 N.J. Super 357, 393 (N.J. App. 1978) (post-project CPM analysis was insufficient evidence to establish responsibility for and extent of delay).


86 *Neal & Co. v. United States*, 36 Fed. Cl. 600, aff’d. 121 F.3d 683 (Fed. Cir. 1997).
The “total time approach” to proving delay is comparable to the “total cost” method of proving damages, in that it attributes all project delay experienced to the actions of the owner, without demonstrating cause and effect specifically. Predictably, this method is, like the total cost method, not well received by the courts and boards. Notably, in Morganti National, Inc. v. United States, the Court of Federal Claims found the total time approach to be of “virtually no value” in meeting the contractor’s burden of proof, and as generally unsatisfactory and subject to the same inherent flaws as the total cost method of proving damages. As stated in Jackson Constr. Co. v. United States, “the contractor must do more than allege its work was delayed by the [Owner’s] disruptions or changes – it must present specific evidence of which activities were delayed and how those delays extended the duration of the contract.”

Several different varieties of CPM analysis have been utilized in the years since network analysis techniques were first introduced in litigated cases. With accumulated experience in the technique, the courts and boards have also become more discriminating over time as to the specific methodology utilized. The four basic varieties of CPM analysis addressed in most reported construction delay claim decisions are the impacted as-planned method, the collapsed as-built method (also sometimes called the “but for” analysis), the time impact analysis method and the windows analysis. However, the nomenclature used by the courts and boards, and by the schedule experts themselves, has by no means been close to consistent, so different courts can mean different things when referring to these techniques, plus each has several possible variants.

In June 2007, the first attempt at a formal protocol and standard nomenclature for forensic

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89 Id. See also Biemann & Rowell Co. v. Donohoe Cos. 2000 NCBC 8 at *29 ("Biemann and Rowell failed to sufficiently establish how delays solely attributable to Donohoe impacted the critical path."); Indiana & Michigan Elec. Co. v. Terre Haute Indus., Inc., 507 N.E.2d 588, 594-95 (Ind. App. 1987) (CPM analysis that does not identify causes of delay not given substantial weight).
schedule analysis was published. This effort, among other advances, identifies and categorizes specifically some eight distinct methods of schedule analysis, while noting the high degree of overlap in common names applied to these techniques. Beyond a brief description of their relative advantages and disadvantages, this protocol does not address the judicial acceptability of any these methods, but it at least represents a major step forward in providing common terms of reference when discussing schedule analysis techniques in future cases.

B. Impacted As-Planned Method

Classic impacted as-planned analysis is identified as Method 3.6 in the AACE Recommended Practice. The starting point for the impacted as-planned method is the as-planned (or baseline) schedule. The as-planned schedule is a representation of the contractor’s intended work schedule as of the outset of the work. Among other things, it indicates the contractor’s pre-dispute intended plan for executing and timely completing the contract, including the intended critical path. Using the impacted as-planned method, the delays to the work are depicted by inserting the owner-caused delays into the as-planned schedule, generating the impacted as-planned schedule that is supposed to indicate the net effect of the owner’s delays. The claimed delay period is thus the difference between the adjusted completion date in the impacted as-planned schedule and the completion date in the baseline schedule.

The inherent flaws in the impacted as-planned method are well-known, and generally a delay analysis premised on this method will not be accepted. First, the as-planned schedule, on which the method is entirely premised, often does not reflect the actual course of events on the project. A construction project is by its nature dynamic. Contractors quite typically and properly will adjust their plans after construction begins, and follow a somewhat different schedule that better reflects the realities the contractor encounters and facts the contractor learns.

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90 AACE International Recommended Practice No. 29R-03, Forensic Schedule Analysis (June 28, 2007) (hereinafter “AACE Recommended Practice”).

91 AACE Recommended Practice, Section 3.6, at 58.
once construction is under way. As a result, an original baseline schedule often bears no resemblance to the actual construction schedule (even excluding the claimed delay events), and thus does not provide a reasonable foundation for the delay analysis. This was the case in *Chaney & James Construction Co.*, where the contractor’s CPM analysis was rejected because it was neither a representation of the schedule that the contractor intended when it bid the project, nor was it a representation of the actual sequence of construction. Similarly, in *Kaco Contracting Co.*, the contractor revised its activities sequencing prior to encountering the delay, but never submitted a revised schedule reflecting these changes. The board noted, in rejecting the claim, that “the record does not contain a schedule which we can use to measure delay as the re-sequencing makes the [prior] schedules not credible for delay analysis.”

A second major flaw in the impacted as-planned method is that it fails to consider delays other than those being claimed as caused by the owner, namely “excusable delays and delays [caused] by the contractor.” For example, in *Galaxy Builders, Inc.*, the contractor’s delay analysis was found not to be credible because it failed to take into account all of the delays that had occurred prior to the delay for which the contractor was seeking compensation. The board noted that if the contractor was not required to account for all changes to the planned schedule, the contractor could potentially recover compensation and receive time extensions for which it

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92 *Chaney & James Construction Co.*, FAACAP No. 67-18, 66-2 BCA Par. 6066.


94 *Kaco Contracting Co.*, ASBCA No. 44937, 2001-2 BCA Par. 31,584.

95 *Id.*


97 *Galaxy Builders, Inc.*, ASBCA No. 50018, 00-2 BCA Par. 31,040.
was not entitled. These weaknesses have led to a general discrediting of the impacted as-planned method.  

It is, of course, possible to modify the impacted as-planned analysis to first insert all delays encountered, other than those caused by the owner, in an initial impacted as-planned, and then to generate a second impacted as-planned that also includes the owner-caused delays. In theory, the difference should be the net effect of the owner-caused delays. However, this variation still suffers from the fundamental shortcoming of the impacted as-planned method, which is that it treats the contractor’s planned schedule as essentially fixed and unchangeable. In reality, the contractor’s schedule is intended to be a living and flexible management tool, and changes as the project progresses to reflect changed circumstances and new events. For example, when delays occur, whether excused, compensable, or unexcused, the contractor will typically revise its schedule to mitigate the effects of the delays and work around them to the extent possible. Ultimately, its failure to take the natural evolution of the contractor’s plan into account is the most significant weakness of the impacted as-planned method of analysis.

C. Collapsed As-Built Method

The collapsed as-built method of delay analysis (Method 3.8 in the AACE Recommended Practice) is essentially the opposite of the impacted as-planned method. Instead of focusing on the as-planned schedule as the foundation for the analysis, this method utilizes the as-built schedule for this purpose. The as-built schedule simply depicts the actual sequence of construction as it actually occurred, complete with all delays from all causes. As such it is simply a historical record, created either by utilizing the project schedule as updated during the

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99 See also, Wayne Knorr, Inc. v. Penn DOT, 973 A.2d 1061, 1083 (Pa. App. 2009) (contractor compared as-built to as-planned).

100 Smith et al., Construction Law Handbook 805, 851 (Aspen 1999).

101 AACE Recommended Practices, Section 3.8, at 68.
course of the project, or as reconstructed from the contemporaneous records. The identified owner-caused delays are then removed from this schedule, allowing the delayed activities to move back to the earlier date when they would have been completed but for the owner’s delay. This process creates a “collapsed” as-built schedule that, in theory, depicts when the project could have been completed but for the owner-caused delays.

The collapsed as-built method has been frequently accepted as an appropriate means of delay analysis, though it is not the preferred method today. While accepted, the collapsed as-built method is nevertheless frequently criticized for its potential inaccuracies and the opportunity for abuse of the method. One such weakness is its potential for disguising possible concurrent delays by the contractor – when activities are “pulled back” after removing an owner-caused delay, it is assumed that no other delay was operating that also would have prevented that activity from occurring earlier, which may not be accurate. Another weakness is that it does not take into account ways the contractor would have proceeded differently in the absence of the owner’s delay. A third criticism is that it fails to consider the as-planned schedule upon which the contractor based its estimate for the project. Finally, limitations in the available as-built information generally require the analyst to make numerous assumptions regarding what the relationships between activities would have been absent the owner-caused delays. These assumptions are difficult if not impossible to verify (since they involve inferring relationships in a set of circumstances that did not actually occur), and the outcome of the analysis is usually quite sensitive to the specific assumptions that have been made.

102 E.g., Fischbach & Moore Int’l Corp., ASBCA No. 18146, 77-1 BCA Par. 12,200; John Murphy Constr. Co., AGBCA No. 418, 79-1 BCA Par. 13,836.

D. Time Impact Analysis and Windows Analysis

Schedule analysis methods described as either time impact analysis or windows analysis are the most commonly seen methods today when demonstrating the effect of individual delays on the project as a whole. The problem is that these terms are applied to a wide variety of schedule analysis techniques, making use of either term problematic, at least if the intended reference is to one specific technique. The AACE Recommended Practice notes that the name “time impact analysis” has been applied to six of the eight distinct methods it identifies (Methods 3.3 through 3.8). The term “windows analysis” has been applied to Methods 3.2, 3.3, 3.4, 3.5 and 3.7, with all but Method 3.2 also sometimes called “time impact analysis,” among other common names.104 This variation is indicative of the nomenclature confusion that was one of the driving forces in development of the AACE Recommended Practice.

Notwithstanding the confusion in terminology, the underlying concept of the state-of-the-art methods of schedule analysis is to utilize the schedule in effect just prior to a delay as the basis for assessing the impact of the delay. In concept, if the schedule has been carefully and accurately updated, the schedule used as the basis for measuring delay then should already reflect (to the extent practicable) all prior events, problems, and delays that preceded the delay under analysis. The effect of the delay is thus measured by the contractor’s current plan for performance, rather than its original plan, as in the impacted as-planned method. This technique is particularly useful for complex projects that have encountered a series of multiple or overlapping changes or other delays. However, its assumption that the schedule has been accurately maintained and updated prior to the delay in question is by no means accurate in all instances, since many times contractors may not invest the time and effort required to do this.

Considering the wide range of techniques these terms have been applied to, it is perhaps unwise to venture too far in generally characterizing the differences between the windows and time impact approaches. Some general differences in the common understanding of these terms

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104 AACE Recommended Practice, Table 1, at 11.
do exist, however. Time impact analysis considers the state of the schedule both just before the start of and just after the conclusion of each delay encountered, typically relying on monthly schedule updates. The window method can do the same, but is more likely to utilize somewhat longer intervals or “windows” of time, correlating to important interim milestones in the life of the project, as the basic time unit for analysis. By “statusing” the project schedule at each of these interim points, it is possible to identify any gains or losses of time on the critical path activities during the interim period or window. The analyst then must assess the causes of the gain or loss along the critical path during that period, and determine whether each cause of delay was unexcused, excused, or compensable. The revised schedule as of the end of each period is then used as the baseline schedule for measuring gain or loss on the critical path during the next period.⁠¹⁰⁵

Again, time impact analysis may effectively amount to the same thing, but many times a time impact analysis will instead insert a mini-network of new activities (a “fragnet”) into the schedule in effect as of the start of a particular delay. The inserted fragnet activities are those associated with the compensable event—such as (classically) the addition of extra work to the project. The effect of the added fragnet on the project completion date then represents the delay due to that compensable event. In this version, a time impact analysis is much like an impacted as-planned analysis, but avoids the problem of relying on one static plan for the project generated at its beginning, by instead utilizing the current schedule at the time of the compensable event as the baseline for the analysis.⁠¹⁰⁶

A good example of the successful use of the windows method of analysis is SAE/American Mid Atlantic, Inc.,⁠¹⁰⁷ in which the board explained the technique as follows:

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¹⁰⁵ This description of windows analysis corresponds to AACE Recommended Practice Methods 3.3 and 3.4.

¹⁰⁶ This description of time impact analysis corresponds to AACE Recommended Practice Method 3.7.

¹⁰⁷ SAE/American Mid Atlantic, Inc., GSCA No. 12294 et al., 98-2 BCA Par. 30,084.
The methodology used “marches through the project [and] measures where the project stood during certain milestones.” Some of the milestones used included completion of caissons, completion of critical concrete work, completion of structural steel, and various milestones applicable to installation of exterior skin. [The expert witness] undertook to determine where the project was both prior to and after an alleged delay or change, and to measure the effect on the project completion date.

As a practical matter, accurate and realistic application of the time impact or windows method generally requires a project schedule that utilizes sound logic and which has been regularly updated. As noted in Blinderman Construction Co. v. United States, “the only way to accurately assess the effect of the delays alleged in [the contractor’s claim] is to contrast updated CPM schedules prepared before and immediately after each purported delay . . . the CPM mathematical analyses in evidence are not contemporaneous with the alleged delay.” However, it is possible in some instances to perform a limited form of windows analysis using just the as-built information in project historical records, without regular schedule updates, or to recreate the schedule updates after the fact.

Bell BCI Co. v. United States is a recent case accepting use of a time impact analysis consistent with Method 3.7 of the AACE Recommended Practice. The expert there identified some 184 extra work orders that were not in dispute, and after inserting fragnets representing the added work associated with 49 of them, found he had accounted for the entire 9 month period of delay, so went no further. The court accepted this method as reasonable and noted that its use was required by the contract terms when the contractor was requesting a time extension.

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108 Smith et al., supra note 106, at 854–55; Cogefar-Impresit U.S.A., Inc., DOTBCA No. 2721, 97-2 BCA Par. 29,188.


110 The AACE Recommended Practice identifies this as Method 3.5, and notes that it is usually adopted when contemporaneous updates are not available or never existed. AACE Recommended Practice, Section 3.5, at 55.

111 Bell BCI Co. v. United States, 81 Fed. Cl. 617, 640 (Ct. Fed. Cl. 2008), rev’d in part on other grounds, 570 F.3d 1337 (Fed. Cir. 2009).
Sunshine Construction & Engineering, Inc. v. United States,\textsuperscript{112} by contrast, illustrates the potential for confusion due to varying terminology. In this case the contractor’s delay analysis, described as a “time entitlement analysis,” was rejected in favor of the owner expert’s analysis that instead compared the as-planned critical path with the as-built critical path, and identified and analyzed the individual work activities causing the differences. The “time entitlement analysis,” by contrast, utilized the monthly schedule updates to assess gain or loss on the critical path each month, plus broke the project into fragnets. The court concluded that the contractor failed to demonstrate that the “time entitlement analysis” was a recognized method of CPM analysis, but found the owner’s method of analysis clear, comprehensive and reliable. Unfortunately, neither of these methods was really described in sufficient detail to provide much guidance for future claims, however.

Overall, the time impact and windows techniques of CPM analysis are finding widespread acceptance when appropriately utilized.\textsuperscript{113}

V. ACCELERATION

The term “acceleration” refers to an increased pace of construction by the contractor, which may be accomplished by any combination of several means, including increasing the number of workers on the project; working overtime; working a second shift; or adding construction equipment such as more cranes, scaffolding, concrete forms, and the like. Accelerating the work almost always involves incurring additional costs, as added workers, overtime with existing staff, or added equipment all cost money and may well also reduce the contractor’s efficiency overall due to factors like overcrowding, dilution of supervision, and fatigue.

\textsuperscript{112} Sunshine Constr. & Eng., Inc. v. United States, 64 Fed. Cl. 346, 368-69 (Ct. Fed. Cl. 2005).

\textsuperscript{113} E.g., Donohoe Constr. Co., ASBCA No. 47310 et al., 98-2 BCA Par. 30,076; John T. Jones Constr. Co., ASBCA No. 48303 et al., 98-2 BCA Par. 29,892; Cogefar-Impresit U.S.A., DOTBCA No. 2721, 97-2 BCA Par. 29,188; Gulf Contracting, Inc., ASBCA No. 30195 et al., 89-2 BCA Par. 21,812.
A contractor may accelerate its construction efforts to make up for its own delays, to make up for owner (compensable) or excusable delays, or simply to achieve an earlier completion date. Where the contractor is behind schedule due to unexcused delays, the owner is often entitled by contract to require acceleration without incurring any corresponding obligation to reimburse the contractor for its acceleration efforts. However, the contractor may be able to recover its acceleration costs in situations where it has been either directed to achieve an earlier completion date than provided by the contract (directed acceleration), or constructively accelerated by a combination of excusable delays and failure to grant an appropriate time extension.

A. Directed Acceleration

Directed acceleration occurs as the result of an express order to accelerate, in situations where the owner determines that it needs the completed work earlier than the contractual completion date, and accordingly issues a change directive to speed the pace and complete early. An acceleration directive is considered a change “within the general scope of the Contract” that the owner can direct by change directive issued per Section 7.3.1 of the A201 General Conditions. Additionally, where the contractor is ordered to increase its pace of work without using the word “accelerate” or other language typifying acceleration, and the contractor is not...

114 A specific provision to this effect is fairly common, although not included in the AIA A201 General Conditions in express terms. Nevertheless, A201 implies an obligation to accelerate when behind for unexcused causes in Section 3.10.1 (contractor’s schedule “shall not exceed time limits current under the contract documents”) and 8.2.3 (contractor shall proceed expeditiously, and “shall achieve Substantial Completion within the Contract Time”).


116 Cf., Mobil Chemical Co. v. Blount Bros. Corp., 809 F.2d 1175, 1183 (5th Cir. 1987) (citing cases).
behind schedule, such an order has “uniformly been considered an acceleration order entitling the contractor to compensation.” 117

Under the typical Changes provision, the compensable costs of directed acceleration would be all costs reasonably incurred in complying with the directive, including both direct costs such as overtime premiums, and (subject to the problems of proof discussed in Section VII) any resulting labor inefficiency due to the acceleration efforts. For example, a program of extended overtime implemented as part of an acceleration effort has been expressly recognized as an accepted cause of reduced labor productivity. 118

B. Constructive Acceleration

The great majority of acceleration disputes involve not directed acceleration, but rather claims of constructive acceleration. In concept, if the contractor is entitled to a time extension until a later completion date due to an excusable delay, but the owner refuses to grant the time extension and instead makes it clear that the contractor is still required to meet the original completion date, the contractor’s performance is almost as surely being accelerated by the owner’s actions (or inactions) as if the contractor had received a direct order to accelerate.

Accordingly, it is recognized that in this situation the contractor has been constructively ordered to accelerate. Of course, the contractor in this situation also has the option, at least in theory, not to accelerate, to finish by the properly adjusted completion date, and to dispute the assessment of liquidated damages for its “late” completion until it obtains the time extension to which it is justly entitled. In many instances, however, this option is not practically available.

117 Donald M. Drake Co., ENG BCA No. 1634, 1960 WL 223 (1960); Bat Masonry Co. v. Pike-Paschen J.V. III, 842 F.Supp. 174, 180 (D. Md. 1993) (letter directing an increase in manpower and equipment but not specifically mentioning acceleration was held an enforceable request to accelerate); Contracting & Material Co. v. City of Chicago, 20 Ill. App. 3d 684, 314 N.E.2d 598 (Ill. App. 1974), rev’d on other grounds, 64 Ill.2d 21, 349 N.E.2d 389 (1976) (pressure to accelerate caused by owner’s refusal to grant time extension for excusable delays was found to be an implied directive to accelerate); Acton Constr. Co. v. Minnesota, 383 N.W.2d 416 (Minn. App. 1986) (indifference to contractor’s excusable delay and ignorance of requests for time extension was an implied acceleration directive).

Among other problems, it also will expose the contractor to the risk of a default termination because of what the owner perceives as its “late” completion. The doctrine of constructive acceleration gives the contractor in this situation another option, in that the contractor can avoid liquidated damages by accelerating to complete on the original completion date, and recover its acceleration costs incurred in doing so.

There are several elements of proof required to recover on a claim for constructive acceleration, which makes the claim a substantial challenge to prove. First, the contractor must demonstrate the existence of a given period of excusable delay. The contractor must then show that it provided notice of the excusable delay along with an appropriately substantiated request for an extension of time, which the owner failed to grant within a reasonable period. The owner must then, either expressly or implicitly, require the contractor to take steps to overcome the excusable delay, such as by insisting that the contractor still complete by

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119 P.J. Dick Inc., VABCA No. 5597 et al., 2001-2 BCA Par. 31,647; Donald R. Stewart & Assocs., AGBCA No. 84-226-1 et al., 92-1 BCA Par. 24,705. In ACE Constructors, Inc. v. United States, 70 Fed. Cl. 253, 280 (Cl. Fed. Cl. 2006), it was held that the same standards applied where the source of the delay was extra work due to a differing site condition. Accord, Fra-Con Corp. v. Illinois, 50 Ill. Ct. Cl. 50 (Ill. App. 1996) (unforeseen scour condition at riverbed site).

120 The request for an extension of time must be supported by “information sufficient to allow the [owner] to make a reasonable determination.” Fermont Div., Dynamics Corp. of Am., ASBCA No. 15806, 75-1 BCA Par. 11,139, aff’d, 216 Cl. Ct. 448 (Cl. Ct. 1978).

121 Donald R. Stewart & Assocs., AGBCA No. 84-226-1 et al., 92-1 BCA Par. 24,705. The owner must “be afforded an opportunity to grant or deny a time extension on account of the delay.” Greulich, Inc., 78-2 BCA Par. 13,417, at 65,588. “[I]t is not unusual for parties to negotiate after the fact as to the number of days that are justified under a contract and to incorporate the extensions in contract modifications issued weeks after the fact.” Accord, Fraser Const. Co. v. United States, 384 F.3d 1354, 1363 (Fed. Cir. 2004) (citing cases).

122 An express or implied order may take the form of coercive acts having the effect of an order, such as the threat of default, Lewis Constr. Co., ASBCA No. 5509, 60-2 BCA Par. 2732, or threat of assessment of liquidated damages for failure to meet the government’s completion date. Unarco Material Handling, PSBCA No. 4100, 00-1 BCA Par. 30,682; Pathman Constr. Co., ASBCA No. 14285, 71-1 BCA Par. 8905. Accord., Bat Masonry Co. v. Pike-Paschen J.V. III, 842 F. Supp. 174, 180 (D. Md. 1993) (letter directing an increase in manpower and equipment but not specifically mentioning acceleration was held an enforceable request to accelerate); Contracting & Material Co. v. City of Chicago, 20 Ill. App. 3d 684, 314 N.E.2d 598 (Ill. App. 1974), rev’d on other grounds, 64 Ill.2d 21, 349 N.E.2d 389 (1976) (pressure to accelerate caused by owner’s refusal to grant time extension for excusable delays was an implied directive to accelerate); Acton Constr. Co. v. Minnesota, 383 N.W.2d 416 (Minn. App. 1986) (indifference to contractor’s excusable delay and ignorance of requests for time extension was an implied acceleration directive).
the unadjusted completion date or will be assessed liquidated damages if it fails to do so.\footnote{See cases, supra note 119; Fermont Div., 75-1 BCA Par. 11,139.}

Additionally, the contractor must have made reasonable efforts to accelerate its work as a result of these circumstances that resulted in actual and identifiable increased costs.\footnote{Id. Typical acceleration-related costs include increased manpower and overtime, additional shifts, double shifts and night work, working during adverse weather, increasing amount of crews and equipment on site, more costly resequencing of work. Bat Masonry, 842 F. Supp. at 181. Typical acceleration losses include lost productivity, lost efficiency, overtime premiums, increased equipment rental, equipment and material escalation costs and increased administrative and overhead costs. See S. Leo Harmony, Inc. v. Binks Mfg. Co., 597 F. Supp. 1014, 1029-1037 (S.D.N.Y. 1984), aff’d, 762 F.2d 990 (2nd Cir. 1985); Gilbane Bldg. Co. v. Two Turners Elec. Co., 2007 WL 582252 (Tex. App. 2007) (additional labor costs for added manpower and overtime).}

Since a constructive acceleration claim is a claim falling within the notice requirements of most contracts,\footnote{E.g., AIA A201 General Conditions, Section 15.1.2. Johnson Controls, Inc. v. National Valve & Mfg. Co., 569 F. Supp. 758, 761 (E.D. Okla. 1983) (subcontractor that voluntarily undertook substantial acceleration efforts had claim barred for failing to provide written notice per the contract).} timely notice to the owner of the intended claim for acceleration is another element, although not separately mentioned in most cases listing the elements of constructive acceleration.\footnote{Norair Eng’g Corp. v. United States, 666 F.2d 546 (1981), is undoubtedly the most frequently cited source for the required elements of a constructive acceleration claim. In Fraser Const. Co. v. United States, 384 F.2d 1354, 1361 (Fed. Cir. 2004), the Federal Circuit stated the test as comprising five elements, noting that Norair compressed them into just three, but indicated no intent to make any substantive change.}

Finally, some courts have held that there is a certain degree of “normal” or “expected” acceleration on all construction jobs, and a contractor may only recover for that acceleration which was “abnormal” or “unexpected.”\footnote{Bat Masonry Co. v. Pike-Paschen J.V. III, 842 F. Supp. 174, 182 (D. Md. 1993) (subcontractor could recover for only such acceleration as was caused by the contractor’s “lack of diligence” as a general contractor).}

An example of how proving these elements can be difficult in practice is Intermax, Ltd.,\footnote{Intermax, Ltd., ASBCA No. 41828, 93-2 BCA Par. 25,699.} where it was held that the owner did not accelerate performance where it neither granted nor affirmatively denied the time extension requested by the contractor. The contractor failed to submit the required justification with its time extension request, the owner had promptly requested the missing documentation, and the contractor did not supply it in time for evaluation.
and action by the owner before the work was substantially completed. As such, the requirement that the owner has failed to grant the time extension due within a reasonable time was not met, so there was no recovery. However, certainly contractors can succeed in demonstrating all the required elements to recover.129

A number of cases have addressed the issue of just what constitutes an implied order by the owner to accelerate. While a clear threat of assessing liquidated damages or issuing a default termination will generally suffice, it is also clear that there must be something more than mere “impressions, understandings, and desires” on the part of the contractor and owner.130 Quite simply, “[t]here must be something tantamount to [an Owner] order that deprives the contractor of the extended delivery date to which it is entitled.”131 A coupling of an owner expectation along with coercive conduct is also sufficient.132 On the other hand, constructive acceleration requires more than the owner merely informing the contractor of the owner’s right to default,133 or the owner putting reasonable pressure on the contractor to complete work in accordance with the project schedule.134 Nor is the mere refusal to grant a time extension for a perceived excusable delay, in and of itself, grounds for finding constructive acceleration.135

129 ACE Constructors, Inc. v. United States, 70 Fed. Cl. 253, 280-81 (Ct. Fed. Cl. 2006), is a well-reasoned recent example.


131 Id.

132 Fermont Div., 75-1 BCA Par. 11,139; Contracting & Material Co. v. City of Chicago, 20 Ill. App. 3d 684, 314 N.E.2d 598 (Ill. App. 1974), rev’d on other grounds, 64 Ill.2d 21, 349 N.E.2d 389 (1976) (pressure to accelerate caused by owner’s refusal to grant time extension for excusable delays was found to be an implied directive to accelerate); Acton Constr. Co. v. Minnesota, 383 N.W.2d 416 (Minn. App. 1986) (indifference to contractor’s excusable delay and ignorance of requests for time extension was an implied acceleration directive).

133 Donald R. Stewart & Assocs., 92-1 BCA Par. 24,705.

134 Fermont Div., 75-1 BCA Par. 11,139; Bat Masonry Co. v. Pike-Paschen J.V. III, 842 F. Supp. 174, 182 (D. Md. 1993) (subcontractor could recover for only such acceleration that was caused by the contractor’s “lack of diligence” as a general contractor).

135 Fraser Const. Co. v. United States, 384 F.2d 1354, 1363 (Fed. Cir. 2004); Siefford v. Housing Auth. of City of Humboldt, 192 Neb. 643, 223 N.W.2d 816, 820 (1974) (owner’s reasonable belief that contractor caused its own delay and was not entitled to time extension precluded contractor’s acceleration claim).
The sequence in which the key events occurred is also important in proving constructive acceleration. In *Solar Foam Insulation*, the contractor’s constructive acceleration claim was rejected because there was no evidence that the contractor actually accelerated work as a result of the owner’s letter requesting speedier progress. The contractor had increased its crew size before receiving that letter, but no further acceleration actions were taken in response to that letter. Accordingly, the requirement that the contractor have actually accelerated due to the owner’s actions was missing.

Subsequently executed change orders providing for time extensions may also frustrate the contractor’s recovery of acceleration costs. In *Bart Associates, Inc.*, the contractor was precluded from asserting a constructive acceleration claim where, following an owner delay, a bilateral modification was executed extending the completion date into the winter season. In that modification, the contractor accepted the new completion date without negotiating any further adjustment due to the winter working conditions it would now have to contend with. By contrast, in *Algernon Blair, Inc.*, a claim of constructive acceleration was allowed, notwithstanding bilateral modifications for individual changes that stated they were full and complete equitable adjustments for the change. Prior to executing the modifications, the contractor had made clear that the modifications were not to be construed to preclude an acceleration claim. Additionally, the board reasoned that the claim for constructive acceleration was not associated with the specific changes, “but rather with the procedure by or manner in which the [Owner] recognized appropriate time extensions for performance as a result of the changes,” and so was not foreclosed by the bilateral modifications.

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136 *Solar Foam Insulation*, ASBCA No. 46278, 94-1 BCA Par. 26,288.

137 Cf., Allen L. Bender, Inc., PSBCA No. 2322, et al., 91-2 BCA Par. 23,828 (no constructive acceleration where owner exhortations to get moving and maintain the schedule preceded any excusable delays).


139 *Algernon Blair, Inc.*, ASBCA No. 45369, 94-2 BCA Par. 26,638.
VI. DISRUPTION: LOSS OF LABOR EFFICIENCY

The term “disruption” refers to an interruption, change in the manner of performance, or change in the planned sequence of work. The characteristic, if not defining effect, of disruption is loss of labor efficiency from that anticipated by the contractor. Because labor costs are generally a substantial fraction of overall construction cost, a decrease in labor efficiency can lead to significant financial losses for the contractor. When the loss of efficiency is a result of owner actions or inactions addressable as changes, it is properly the subject of a price adjustment. The possible causes of loss of labor efficiency are legion; among other causes disruption can be the result of more difficult or crowded working conditions, extended overtime or second shift work (the worker fatigue factor)\textsuperscript{140}, working out of sequence or with frequent interruptions, access problems, and working in less favorable weather or temperature conditions. All of these can be compensable when they are the result of disrupting actions or inactions of the owner that entitle the contractor to a price adjustment.

However, there are just as many possible non-compensable causes of lower-than-anticipated labor efficiency, including such factors as high labor turnover, poor supervision or planning, inadequate coordination of subcontractors, or simply an overoptimistic estimate. Additionally, all of the previously mentioned causes of inefficiency that may result from compensable actions can just as easily be the result of non-compensable root causes.\textsuperscript{141} This overlap and the possibility that an observed manifestation of inefficiency may be due to multiple root causes are two reasons why proving compensable loss of efficiency is particularly challenging.


\textsuperscript{141} *E.g.*, *Bat Masonry, Inc.*, 842 F. Supp. at 182 (subcontractor could not recover for inefficiency within its expectation and control).
Most typically, loss of labor efficiency is asserted as an element of a contractor’s claim for delay or acceleration, but disruption is actually an independent concept from delay or acceleration, and can occur (and be compensable) even in the absence of any compensable delay.142

The basis for entitlement to compensation for loss of labor efficiency, as with compensable delay, stems from either an owner breach of the contract or one of the contract provisions providing for a price adjustment, most commonly the Changes provision. As previously noted, for example, directed acceleration is generally compensable as a change under the Changes provision, so to the extent that the contractor can demonstrate that disruption/loss of labor efficiency resulted from its acceleration efforts, the added costs associated with that loss of efficiency are properly included in a claim for compensable acceleration.143 The elements of loss of efficiency or disruption claims that involve unique problems of proof, however, involve demonstrating that the loss of labor efficiency was indeed caused by the compensable event, and quantifying the amount of disruption so caused.

Some boards and courts have acknowledged that determining the amount compensable for disruption/labor inefficiency with exactitude is “essentially impossible,”144 and that some

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142 Sauer, Inc. v. Danzig, 224 F.3d 1340, 1348 (Fed. Cir. 2000); L &A Contracting Co. v. Southern Concrete Svc., Inc., 17 F.3d 106 (5th Cir. 1994) (contractor’s disruption claim upheld even though contractor did not delay the critical path); U.S. Industries, Inc. v. Blake Constr. Co., 671 F.2d 539 (D.C. Cir. 1982) (disruption damages were distinct from delay damages and were not double recovery). As the Blake Court noted: “Unlike the delay claim, the disruption claim is intended not to redress the [subcontractor’s] loss from not being able to work, but to compensate [the subcontractor] for the damages it suffered . . . that made its work more difficult and expensive than . . . it should have been.”). Accord, Atlantic Coast Mech. v. R.W. Allen Beers Const., 592 S.E.2d 115 (Ga. App. 2003).

Similarly, disruption is distinct from acceleration. For example, in Bat Masonry v. Pike-Paschen J.V. III, the prime contractor directed its masonry subcontractor to “go vertical,” installing block at higher levels of the building to accommodate a delay in pouring the slab-on-grade concrete. The district court held that this directive caused the subcontractor to incur acceleration costs associated with “manning up” and bringing more equipment to the site. But the court further held that the directive disrupted the subcontractor’s work; the masonry work post-directive was more labor intensive, and consequently, less efficient. Thus, the court explained, the subcontractor was entitled to recover both acceleration and disruption damages arising from the contractor’s single work directive.


form of reliable methodology to arrive at an inexact approximation must be utilized, typically based on expert analysis and testimony. The reason is that loss of productivity cannot generally be directly observed, measured, or recorded as it occurs, but can be seen only in the reduced units of completed work installed by the workforce over a period of time.

The method of proof generally recognized as the best available in most instances is the “measured mile,” which involves comparing the contractor’s productivity (efficiency) on the work that was affected by the compensable event with the productivity actually achieved on similar work that was not so affected. Measured-mile analyses have been successfully used in a number of cases.

*P.J. Dick, Inc.* illustrates a successful application of the measured-mile method to recover labor inefficiency caused by acceleration of an electrical subcontractor’s work. The subcontractor had planned to have separate crews do the rough-in, wire-pulling, and installation of switches and devices for the branch circuits, but under the accelerated conditions each crew had to perform all three of these activities, thereby causing a loss of labor efficiency due to loss of the learning-curve effect. Through a qualified expert witness, the subcontractor compared its efficiency on the branch circuit work with its efficiency on the feeder circuit work on the

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147 *P.J. Dick, Inc.*, VABCA No. 5597 et al., 01-2 BCA Par. 31,647, rev’d in part on other grounds, sub nom. *P.J. Dick, Inc. v. Principi*, 324 F.3d 1364 (Fed. Cir. 2003).

148 The learning curve effect, sometimes referred to as the production line effect, is premised on the increased efficiency that a given crew will develop over time when it performs essentially the same task repetitively.
same project. While the branch and feeder circuit work were not identical, the measured-mile analysis was accepted because it compared kinds of electrical work that were reasonably alike. The approximations involved in this comparison were not exact, but nevertheless meaningful, and produced a reliable, though inexact, quantification of the resulting labor inefficiency. This was sufficient to meet the requirement to prove damages with a reasonable degree of certainty.

Considerably more controversial than the measured-mile method of proving loss of labor efficiency is the use of published industry studies containing estimates of productivity loss due to specific causes. The most commonly used of these are studies or guidelines published by the Business Roundtable, the Mechanical Contractors Association of America (MCAA), and the National Electrical Contractors Association (NECA). There are some cases in which the use of such sources has been allowed, when applied with the proper degree of specificity and care.

*Hensel Phelps Construction Co. v. General Services Administration* offers a good example of how to successfully prove disruption using loss of productivity (inefficiency) factors from the MCAA guidelines. In that case, a mechanical subcontractor was found to have incurred labor inefficiencies stemming from three causes that were each the responsibility of the owner: an incomplete design at contract award, a change directive adding vibration dampers late in construction, and a direction to increase the number of workers to accelerate progress. The subcontractor’s expert witness utilized the inefficiency percentages associated with six factors found in the MCAA guidelines as a starting point, and applied them to particular portions of the work effort based on his extensive knowledge of the project gained from extensively reviewing

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150 *Stroh Corp. v. Gen. Servs. Admin.*, GSBCA No. 11029, 96-1 BCA Par. 28,265 (25 percent labor inefficiency allowed based on methodology that included use of MCAA factors); *The Clark Constr. Group, Inc.*, VABCNo. 5674, 00-1 BCA Par. 30,870.

the project records, interviewing the personnel involved, and creating a detailed project as-built schedule. The expert then used his extensive experience in mechanical work and deep knowledge of the project to make his own assessments of the percentage impact of the disruption, which were conservative compared to the MCAA percentages. The board found this approach highly credible and accordingly awarded over $1.5 million for lost labor productivity.

By contrast, other cases have rejected efforts simply to apply loss of productivity factors based on academic studies without first validating the factors through analysis of actual labor costs and production in the field, and relating the loss of productivity to actual project events.\textsuperscript{152} For example, in \textit{Community Heating & Plumbing Co.},\textsuperscript{153} the board rejected the use of loss of efficiency factors taken from published studies that were then applied to all labor costs, stating:

\begin{quote}
The formula presented by appellant and its expert setting forth factors extracted from textual material applicable to general situations are too vague and disconnected from the specifics of the instant situation to permit a determination of the exact amount of increased costs due to loss of productivity resulting from differing site conditions. We conclude that the conversion of factors to a “multiplier,” i.e., an overall factor applicable to appellant’s total labor, has no logical support. The mere invocation of an expert’s general rationale is insufficient.\textsuperscript{154}
\end{quote}

Other cases have been more emphatic in rejecting the use of such loss of efficiency studies.\textsuperscript{155} Similarly, expert testimony regarding loss of productivity will likely be rejected as

\begin{footnote}
\textsuperscript{152} \textit{Fire Security Sys., Inc.}, VABCA 5559-63 \textit{et al.}, 02-2 BCA Par. 31,977 (most asserted inefficiencies not borne out by daily logs, payrolls, and other records); \textit{Cosmic Constr. Co.}, ASBCA No. 24041 \textit{et al.}, 88-2 BCA Par. 20,623; \textit{Luria Bros. & Co. v. United States}, 177 Ct. Cl. 676, 713 (Ct. Cl. 1966); \textit{Tony DePaul & Son v. City of Phila.}, 24 Phila. 405, 411 (Pa. App. 1992) (rejecting measured mile analysis as speculative and imprecise).

\textsuperscript{153} \textit{Community Heating & Plumbing Co.}, ASBCA No. 37981 \textit{et al.}, 92-2 BCA Par. 24,870.

\textsuperscript{154} Id.

\textsuperscript{155} \textit{Sunshine Constr. & Eng’g, Inc. v. United States}, 64 Fed. Cl. 346 (Ct. Fed. Cl. 2005) (attributing delay to MCAA factors rejected as “not an accepted approach by . . . peers or by any trade association”); \textit{Herman B. Taylor Constr. Co. v. Gen. Servs. Admin.}, GSBCA 1542, 03-02 BCA Par. 32,320, at 54-56 (use of MCAA factors was inappropriate because the labor force consisted of laborers, not mechanical workers).
\end{footnote}
intrinsically unpersuasive where the expert has reviewed few of the project records and not talked with project personnel who were on site during the alleged disruption period.\textsuperscript{156}

The least well-accepted method of proving loss of labor efficiency is the “total cost” method, which in this application is actually more accurately referred to as the “total labor” method. In the total labor method, the entire difference in labor costs between the actual labor cost and the estimated labor cost is attributed to the decreased labor productivity sought to be recovered. Because this method makes no attempt to identify and segregate the compensable and non-compensable factors that may have adversely affected productivity, it should be viewed as the method of last resort in determining disruption damages. The four elements generally required for application of the total cost method are also applicable to successful use of the total labor method.\textsuperscript{157} The “modified” total labor method, in which either the actually incurred labor costs or the estimated labor costs (or both) are adjusted to eliminate added costs not caused by the government or to correct bid inaccuracies, is somewhat more easily acceptable but remains a challenging route to recovery.\textsuperscript{158}

On occasion, it is possible to determine by direct evidence an appropriate yardstick for measuring the compensable loss of efficiency, and such opportunities should not be overlooked.

\textsuperscript{156} Hensel Phelps Constr. Co., ASBCA No. 49270, 99-2 BCA Par. 30,351; Dravo Corp., EBCA 3800, 79-1 BCA Par. 13,575; Cont’l Consol. Corp., ASBCA No. 14372, 71-1 BCA Par. 8,742.

\textsuperscript{157} Youngdale & Sons Constr. Co. v. United States, 27 Fed. Cl. 516, 541 (Ct. Fed. Cl. 1993). The four standard elements for use of the total cost method are typically stated as: (1) the nature of the particular losses makes it impossible or highly improbable to determine them with a reasonable degree of accuracy; (2) the contractor’s bid estimate was realistic; (3) the contractor’s actual costs were reasonable; and (4) the contractor was not responsible for the cost overruns. See Servidone Constr. Corp. v. United States, 931 F.2d 860, 861 (Fed. Cir. 1991).

In *Batteast Construction Co.*,\(^{159}\) for example, the contractor’s use of a total labor calculation was rejected in favor of a direct measure of lost productivity derived from the testimony of the contractor’s superintendent. The superintendent testified that before the change to the masonry specifications that allegedly caused disruption, the masons placed about 140 blocks per day on average, and after the change they placed about 75 blocks per day. The board then computed the adjustment in labor costs utilizing this ratio, which in effect was a form of measured-mile analysis established without benefit of expert analysis or testimony.

\(^{159}\) ASBCA No. 35818 *et al.*, 92-1 BCA Par. 24,697.