

# The Estimation of Construction Contract Liquidated Damages

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*Determining the actual cost of the late completion of a construction project to an owner is key to reducing or avoiding disputes between the owner and contractor.*

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**T**here are few businesses for which the saying "time is money" is more appropriate than the construction industry. Construction contracting is an extremely time sensitive activity. An owner can lose opportunity and profits waiting for the completion of a late project. Similarly, when a project extends beyond its scheduled completion date, contractors often carry the financial burden of maintaining field and office personnel longer than anticipated. In today's competitive marketplace, few owners or contractors can afford the cost of a late project.

For many projects, owners shift at least part of the risk of late completion onto contractors. The most common form of risk shifting is the inclusion of a liquidated damages provision in the construction agreement. Liquidated dam-

ages are defined in the construction contract and are chargeable against funds due to the contractor for each day the contractor fails to complete the project beyond the contract completion date. Therefore, a liquidated damages provision provides a straightforward way to calculate monies due to an owner if a project takes longer than agreed to complete.

## Contract Completion Date

The original contract completion date is the date specified in the contract when the project is required to be finished. Many contracts simply set a number of days that it will take to perform the task (instead of a specific date) in order to accommodate the uncertainty of when a project may be authorized to proceed.

In certain construction contracts, the owner may not only set a final completion date but also require that portions of the work be finished by interim dates. These interim dates are commonly referred to as *milestones*. A contractor may be required to meet milestones for specified portions of the work. A liquidated damages provision may apply to milestone dates as well as the contract completion date. Under these circumstances, it is possible that the liquidated damages could then accumulate through the succession of more than one missed milestone dates through to completion.

### EQUATION 1

$$\text{Completion Date} = \text{Original Completion Date} + \text{Change Order Time Extensions} + \text{Additional Days of Extension for Constructive Changes}$$

engineering or architectural practice) and to relieve the owner from the obligation to pay for any performance less than perfect is neither fair

Milestone or completion dates can be changed during the course of any contract performance. These changes, when agreed upon between the owner and contractor, usually result in a *change order* to the contract. In addition, contracts can be changed by other means. A *constructive change* is one in which the owner's acts or omissions sufficiently alter the conditions under which the contractor agreed to perform the work so that the contractor is entitled to an equitable adjustment in contract price or time of performance. It is not surprising that owners and contractors differ as to whether a contract has been constructively changed and, if so, what, if anything, is a fair and equitable adjustment for the change.

In sum, the contract milestone and completion dates are the original milestone and completion dates set forth in the contract, as adjusted by change orders and constructive changes (see Equation 1).

### Completion of Performance

Having established the contract milestone and completion dates, the owner and contractor must then determine what constitutes *completion*. For most commercial transactions, completion is easily measured and achieved at some definable moment. Take the example of buying a car. Payment is due when the car is delivered to the purchaser. Under this scenario, performance is viewed as "complete" upon delivery of the car. In construction practice, the point at which a project becomes "complete" is rarely so definable and, again, is subject to disagreement between owner and contractor.

Under the traditional principles of contract law, the obligation to pay for performance arises only when that performance is perfectly complete in every aspect. However, perfection is not a feasible measurement of performance in construction practice (or for that matter in

nor equitable. Consequently, construction law has adopted the concept of *substantial completion*.

Substantial completion is achieved when the owner has beneficial use of the project. In other words, substantial completion is achieved at that point in time when the contractor has completed enough work that the owner can take advantage of the project for its intended use. For example, a building may be substantially complete when it is occupied, a treatment plant when it is started up, or a road or bridge when it is open for traffic. In each of these examples the work may not be 100 percent complete but the project's purpose has been achieved.

Again, owners and contractors frequently have different opinions as to when a project has reached substantial completion. Owners tend to put off declaring that substantial completion has been reached as long as possible to attain more complete performance and to delay the release of retainage and the commencement of the project warranty period that commonly occur upon substantial completion. *Retainage* is a percentage of the value of the work already completed, usually on the order of five to 10 percent, that is withheld by the owner as an incentive for the contractor to reach substantial completion and to cover costs to the owner in the event the contractor fails to complete the project. Most contracts require the release of retainage upon substantial completion.

Contractors seek substantial completion as soon as possible for a different set of financial reasons. Obviously, contractors seek access to their retainage. Additionally, contractors seek to free up bonding capacity for new projects—only when older projects reach substantial completion do the contractors' associated bond obligations expire.

Substantial completion does *not* relieve the contractor of completing the project in its entirety, nor does it obligate the owner to pay the entire contract price. Substantial completion,

however, does entitle the contractor to be paid the contract balance minus the value of the work that remains

to be performed. This "clean-up" work usually is referred to as a *punchlist*. Therefore, in theory, final completion can be defined as set forth in Equation 2.

In Massachusetts there are certain statutes that further define substantial completion. For example, Section 39G of *Massachusetts General Law Chapter 30* — which applies to public works projects such as highways, bridges, sewers and water mains — provides the following definition:

"Substantial completion, for the purposes of this section, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one per cent of the then adjusted total contract price, or substantially all of the work has been completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract."<sup>1</sup>

Section 39K — which applies to public building projects such as the construction, renovation or repair of any public building — provides the following definition of substantial completion:

"After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one per cent of the original contract price, or (b) the contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the contractor and

## EQUATION 2

$$\text{Final Completion} = \text{Substantial Completion} + \text{Punchlist Completion}$$

of the cost of completing the incomplete and unsatisfactory items of work. . .

"A certificate of the architect to the effect that the contractor has fully or substantially completed the work shall. . . be conclusive. . ."<sup>1</sup>

Whether for a public works or public building project, the statutory definitions of substantial completion incorporate the concept of the *beneficial use* of the project. Under Section 39G, beneficial use is measured by whether the project has been opened for public use — except for minor items that "do not materially impair the *usefulness*" of the project. Under Section 39K, beneficial use is generally agreed to occur when the owner takes over or possesses the project "for occupancy."

Exactly when a project can be beneficially used by the owner is a subjective determination that can be subject to disagreement. Massachusetts statutory law, however, also incorporates an objective standard of measuring substantial completion. For public works projects, substantial completion occurs *no later* than when the project is 99 percent complete based on the original contract price. For public building projects, substantial completion occurs *no later* than when the project is 99 percent complete based on the adjusted contract price. In practice, completion can be determined as part of the process of the contractor submitting and the owner accepting periodic payment requisitions that document a project's progress.

Massachusetts law also recognizes that most projects are monitored by architects or engineers who are called upon and are given the authority by contract to determine project completion as part of the pay requisition review process. Deference is given to an architect's or engineer's decision in this regard. Such a decision is held to be conclusive unless it can be shown that it was arbitrary, or otherwise made in bad faith.<sup>1,2</sup>

Conceptually, when the project reaches substantial completion the owner has enough of

what the owner bargained for to obligate the owner to make payments to the contractor. With regard to milestone dates, if substantial completion falls on or before the contract milestone dates as adjusted by contract changes, then the milestone work can be viewed as having been completed on time. Similarly, if the substantial completion date of the entire project falls on or before the contract completion date as adjusted by contract changes, the project can be considered to have been completed on time.

What happens if the contractor fails to meet a project milestone or contract completion date? Failure to meet a time of performance provision of a contract is a breach of that contract which entitles the owner to its damages. If there is a liquidated damages clause in the contract, then the recourse for this breach of contract is the application of the liquidated damages clause.

### Liquidated Damages

Liquidated damages are specified daily charges that are deducted from monies otherwise payable to the contractor for each day the contractor fails to meet a milestone and/or contract completion date. Another way of looking at liquidated damages is that it is the price the contractor must pay per day for working beyond the required completion dates.

Liquidated damages are a contract-based remedy for the late completion of a contract. The terms of these damages must be agreed to by the parties in the construction contract and normally take the following, or similar, form:

If the contractor fails to complete the work within the contract time or fails to achieve any of the contract milestones, the contractor agrees to pay the owner \$X per day as liquidated damages to cover losses, expenses and damages of the owner for each and every day which the contractor fails to achieve completion of the milestone work or the entire project.

The key then to liquidated damages is the value assigned to the per diem cost "X."

### The Law of Liquidated Damages

It is no surprise that the imposition of liquidated damages fosters disputes between owners

and contractors. These disputes, in turn, can spawn litigation that, in turn, cause courts to write decisions regarding the enforceability of liquidated damages provisions. These decisions then become law that owners and engineers need to bear in mind when drafting liquidated damages clauses.

The basic legal principle of liquidated damages is:

"Damages for breach by either party may be liquidated in the agreement but only at an amount that is reasonable in the light of the anticipated or actual loss caused by the breach and the difficulties of proof of loss. A term fixing unreasonably large liquidated damages is unenforceable on grounds of public policy as a penalty.

"Comment a: . . . [T]he parties to a contract are not free to provide a penalty for its breach. The central objective behind the system of contract remedies is compensatory, not punitive. Punishment of a promisor for having broken his promise has no justification on either economic or other grounds and a term providing such penalty is unenforceable on grounds of public policy."<sup>3</sup>

Despite what many owners and engineers may believe, a liquidated damages provision may *not* punish a contractor for late completion. The purpose of the provision must be compensatory only. The per diem liquidated damages may not be set at whatever level the owner or engineer believes is necessary to coerce the contractor to complete a project on time. Instead, the owner and engineer must set the liquidated damages at an estimate of what it costs the owner if the contractor is late in completion. Contract remedies, like liquidated damages, may not punish and Massachusetts courts will not enforce a liquidated damages provision that acts as a penalty.<sup>4-8</sup>

The fact that liquidated damages are considered to be compensatory suits their application to substantial completion rather than final completion. Since liquidated damages are an estimate of the cost to the owner of a project that cannot be used as the owner intended when the owner intended (provided the owner normally would be able to beneficially use the project at

substantial completion), substantial completion ordinarily cuts off the owners' rights to continued assessment of liquidated damages against the contractor. However, there are exceptions to every rule. For example, when a contract *expressly* tied liquidated damages until no further work remained to be performed, the Utah Supreme Court upheld the assessment of liquidated damages beyond the substantial completion phase.<sup>9</sup>

How does an owner or engineer know whether the contract-defined per diem liquidated damages are a penalty? Massachusetts case decisions establish a number of guidelines to address this question. To be enforceable a liquidated damages provision must satisfy:

"[T]he well established principle that the amount of liquidated damages specified in a contract must reasonably relate to the anticipated or actual loss caused by the breach."<sup>6</sup>

Therefore, the liquidated damage amount cannot be arbitrary and must relate to the consequences of late completion. Furthermore:

"[W]here the actual damages are easily ascertainable and the stipulated sum is unreasonably and grossly disproportionate to the real damages from a breach, or is unconscionably excessive, the court will award the aggrieved party no more than [the] actual damages."<sup>4</sup>

If what the owner *actually* incurs for late completion is much less than what is charged against the contractor as liquidated damages, the liquidated damages provision will not be upheld. Massachusetts law thus allows an after-the-fact comparison between what it actually costs the owner for late completion against what the owner has charged the contractor under the liquidated damages provision.

What if the damages are not easily "ascertainable"? The additional cost of engineering as well as the impact on other contractors can usually be determined when a contractor is late. Engineers invoice the owner for extended professional services and other on-site contractors make claims for delay costs. These costs are quantifiable. Inconvenience to the public, lost

opportunity, or an owner's ongoing administrative costs (all caused by late completion), however, may be difficult, if not impossible, to quantify with a reasonable degree of accuracy. Nevertheless, they are real costs to the owner. Under these circumstances, Massachusetts law takes into consideration how the liquidated damages provision was determined *at the time* the contract was prepared. This prospective analysis has been articulated as:

"[W]here actual damages are difficult to ascertain and where the sum agreed upon by the parties at the time of execution of the contract represents a reasonable estimate of the actual damages, such a contract will be enforced."<sup>4</sup>

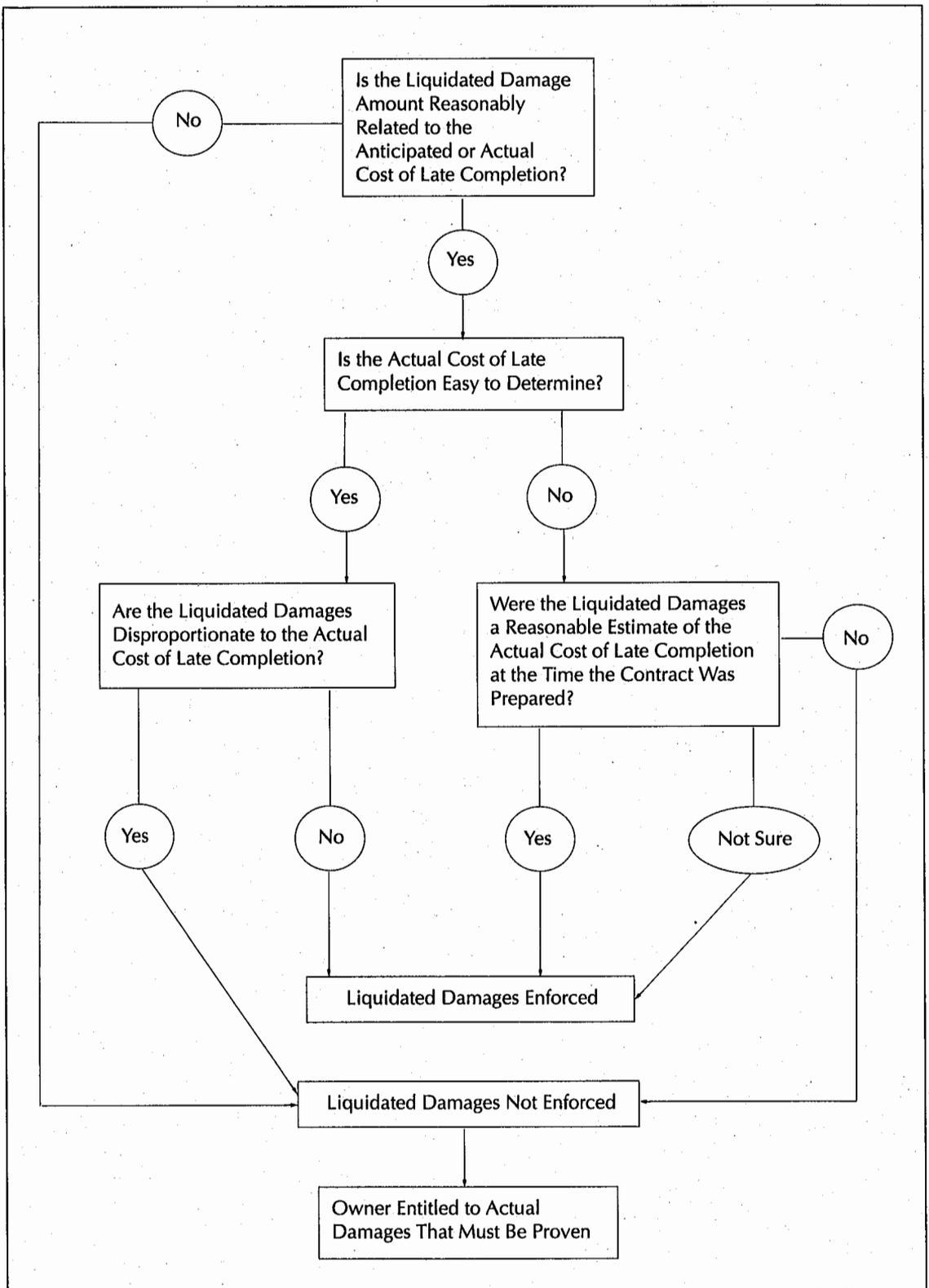
What if there is uncertainty whether the original estimate at the time of execution of the contract was reasonable or not? Massachusetts law then defers to enforcing the liquidated damages clause as a contract term to which the parties agreed. For example:

"We recognize that a liquidated damage provision is appropriate where the harm is incapable or very difficult of accurate estimation. . ."<sup>8</sup>

"When losses are difficult to quantify, considerable deference is due the parties reasonable agreement as to liquidated damages. . ."<sup>7</sup>

If a court can figure out how much an owner has been damaged and if those damages are far less than the liquidated damages charged to the contractor (so that they seem unfair in comparison), then the liquidated damages provision will not be enforced. If a court, however, cannot determine what an owner's actual damages are due to late completion, then the liquidated damages will be upheld as long as the estimate of damages at the time of contract preparation was not unreasonable. Figure 1 illustrates this liquidated damages analysis.

How does all this translate into everyday practice? First and foremost, engineers and owners *must* make a good faith estimate of cost to the owner of late completion at the time the construction contract is prepared.



**FIGURE 1. Liquidated damages matrix.**

Second, engineers and owners must document how that estimate was made. If challenged, the owner must bear the burden of demonstrating that the liquidated

damages provision was based on a reasonable forecast of actual damages.<sup>8</sup> Since owners rely on engineers, the engineer would be asked to identify the impacts of late completion and how the cost of each impact was estimated. As a practical matter, documents showing how the amount for liquidated damages was determined are essential. The absence of any documentation may indicate that the specified liquidated damage amount was arbitrarily determined.

### Project Examples

How the liquidated damage provision was determined for two of Boston's major projects — the Boston Harbor Project of the Massachusetts Water Resources Authority (MWRA) and the Central Artery/Tunnel Project of the Massachusetts Highway Department (MHD) — make for an interesting comparison of approaches and degrees of complexity in estimating liquidated damages.

### Boston Harbor Project

The Boston Harbor Project is a billion dollar plus construction effort to construct wastewater treatment facilities that will ultimately clean up Boston Harbor. This project is court-ordered and must meet certain court-established deadlines for completion. Like any large project, the Boston Harbor Project has numerous construction contractors simultaneously working on the same site. In order to coordinate and complete this complex project on time, each contractor must meet milestone and completion dates set in their respective contracts.

The MWRA, through its construction manager, established liquidated damages provisions for the various Boston Harbor Project construction contracts through straightforward proportioning calculations.<sup>10</sup> These proportioning calculations generally involved assigning the engineer's estimate of cost to each construction contract, and then determining

### EQUATION 3

$$\text{Liquidated Damages} = \frac{\text{Contract Cost} \times \text{Total Extended Cost}}{\text{Total Project Cost} \times \text{Contract Duration}}$$

the percentage that each contract represented against the total estimated project cost. This percentage would then be applied against what the MWRA estimated would be its "extended cost" during the life of the entire project. These extended costs included the costs of construction management, design services, in-house project management costs, utilities, power, water and the wide variety of support contractors required on-site during the construction period. Each contract was assigned its proportionate share of the MWRA's extended costs based solely on each contract's cost estimate.

In order to determine a per diem liquidated damages amount, the MWRA then divided each contract's proportionate share of the extended costs by an estimate of how long each contract would take to perform. The resulting per diem cost estimate was then used to establish the per diem liquidated damages cost for both contract milestone and completion date breaches.

The MWRA's formulation is provided in Equation 3. Its application is depicted in Table 1.

The MWRA formula inherently assumed that the cost incurred by the MWRA because of late completion is a linear function of contract cost. It is not unreasonable to assume, as a general proposition, that the greater the contract cost, the more resources the MWRA must expend to support that contract. However, construction contracts are not created equal and support costs will not be expended in a linear fashion. For example, support costs on complicated and intensively inspected work would be greater than on more common construction. The MWRA formula does not provide for such adjustment.

It is also not unreasonable to assume that the longer the contract duration, the greater the extended costs will be. Again, however, construction contracts are not created equal. Longer duration contracts may require the ex-

**TABLE 1.**  
**Liquidated Damages for the Boston Harbor Project**

Contract Package	Contractor	Description of Work	Value (\$)	Percent of Total Project Cost	Extended Cost (\$)	Duration (Days)	Cost Per Day (\$)	Liquidated Damages Per Day (\$)
024	Modern Continental	Administration/ Lab Bldg.	53,687,000	2.643	10,070,558	742	13,572	13,000
028	Sciaba	Maintenance Shops	1,915,601	0.094	359,327	152	2,364	2,000
030	Cashman	Till Disposal	14,305,570	0.704	2,683,426	496	5,410	2,000
040	Cashman	Prison Demolition	18,220,000	0.897	3,417,691	757	4,515	4,000
102	JFW/PFK-Mark	N. Main Pump Station	55,838,000	2.749	10,474,040	1,545	6,779	8,000
103	Barletta/Daniel	N. System Headworks	87,123,000	4.290	16,342,452	1,091	14,979	14,000
104	Dick	S. System Pump Station	49,375,000	2.431	9,261,717	1,170	7,916	8,000
105	Gust K. Newburg	Primary Clarifiers	96,997,000	4.776	18,194,607	1,217	14,950	15,000
282	Kiewit	Effluent Outfall	201,919,000	9.942	37,875,779	1,702	22,254	30,000
283	Cashman	Effluent Diffusers	76,770,000	3.780	14,400,445	1,034	13,927	30,000
301	Perini	Residuals for Primaries	160,756,000	7.915	30,154,461	1,293	23,321	22,000
427	Sciaba	Perm. Swgr.	10,551,000	0.520	1,979,147	1,182	1,674	5,000
805	Sciaba	Sludge Transfer	4,062,000	0.200	761,946	390	1,954	1,000
816	Fishbach & Moore	Personnel Facility	1,880,920	0.093	352,821	184	1,918	1,000
901	Sciaba	Construction Utilities	4,112,000	0.202	771,325	354	2,236	2,000
902	Albert J. Welch	Fuel Facility	4,810,000	0.237	902,255	250	3,609	2,500

Note: Contract packages 030, 805 and 816 have liquidated damages amounts significantly less than what the MWRA had estimated. Contract packages 282, 283 and 427 have contract liquidated damages amounts well in excess of what the MWRA had estimated. The remaining contracts cited have liquidated damages amounts between 70 and 118 percent of the estimated amounts and considered within the general range of the estimate.

penditure of more extended costs per day than shorter duration contracts of equal cost simply because of the nature of the work. The MWRA formula does not consider the nature and timing of support cost expenditures during and after the contract duration.

The MWRA will incur certain fixed support costs independent of project progress. The MWRA will also incur certain variable support costs that ebb and flow with job site activity. By uniformly applying these costs across the entire project, the resulting liquidated damages provision does not reflect the significance of when a contract is performed. Certain contracts may be performed during a critical period of project performance and late completion could have a drastic effect on extended costs. Other contracts may not be critical and late completion may be of far less consequence to overall job progress. The uniform application of extended costs does not allow for this type of

distinction since each contract is given equal weight with regard to the overall project schedule. In other words, it is more important *when* a contractor is late than how much the contract was estimated to cost and how long it was expected to take to complete.

The MWRA formulation also fails to take into consideration milestone delays. If liquidated damages are applied against each milestone, late completion could conceivably result in multiple liquidated damages being charged. For instance, a project schedule with three milestones, all of which are missed, could cause liquidated damages to be assessed at three times the calculated rate. No matter how reasonable the original estimate of an owner's actual damages are, it is unreasonable to charge three times that estimate and assert that such charges are "liquidated."

In sum, MWRA's proportionate methodology results in expensive contracts (that must be

performed in short periods of time) having disproportionately higher liquidated damages rates than less expensive contracts that could be performed over longer periods of time regardless of the nature of the work or the timing of the work within the entire project schedule. Furthermore, the MWRA's formulation allows a liquidated damages rate to be determined without considering the logic in the construction schedule or the effect of intermediate milestones.

It should be noted that the MWRA's methodology has been challenged.<sup>11</sup> The court found that there were questions of fact that must be tried before the enforceability of the MWRA's liquidated damages formulation could be determined. The case was settled before trial, therefore these questions were never directly addressed.

### Central Artery/Third Harbor Tunnel Project

The Central Artery/Third Harbor Tunnel Project (CA/T) is the largest current construction project in New England. Like the Boston Harbor Project, the CA/T Project will have numerous contractors working within interdependent schedules. Similarly, the CA/T Project has an extensive and expensive management and support services burden for the project construction.

Unlike the Boston Harbor Project, however, the MHD determined liquidated damages for the CA/T Project on a case-by-case basis. The MHD examined the scope of each individual contract, determined where that contract fit within the schedule of the entire project and estimated the level of the support services (such as resident engineers, office engineers, field inspectors, and secretaries) that would be needed if the project were to go beyond its contract completion dates. The MHD also considered costs associated with permits, fees, licenses, right-of-way, pest control and, most importantly, evaluated the impact that late completion of milestone or final contract completion dates would have on other contractors.

The MHD also considered the probability that the delay in one contract would have on related contracts. This impact was then classified in three ways:

**TABLE 2.**  
**CA/T Project General Conditions Costs**

Contract Value \$ Million	General Conditions Impact
1-9.9	\$500-800 Per Calendar Day Per \$5 Million
10-99.9	\$800-1,300 Per Calendar Day Per \$10 Million
100-210	\$600-900 Per Calendar Day Per \$10 Million

- No consequence;
- Relating to non-critical activities; or,
- Causing a critical impact to other contractors.

In the event that another contractor was affected, the MHD then estimated the anticipated cost that a delayed contractor could assert based on historical data of "general conditions" costs. These costs are described in Table 2. For example, for an \$8 million project the general conditions costs would be on the order of \$800 to \$1,280 per day.

The MHD then discounted the impact cost based on the probability of impact as measured by available float time between the projects. Finally, the MHD considered project postponement and financing costs by applying cost escalation factors. For example, for CA/T Project package No. CBED9, the MDH calculated liquidated damages for contract milestones at: \$2,500 for final acceptance; \$9,000 per day for the building ready to receive equipment; and, \$500 per day for a complete remediation plan.

There may disagreement with the various rates, probability factors and historical data on which the MHD relied to develop liquidated damages. However, the systematic analysis of impacts on a contract-by-contract basis is rational, considers scheduling logic and requires the exercise of sound engineering judgment.

### Conclusion

An engineer must make a reasonable estimate of the owner's damages in the event of the late completion of a milestone or contract completion date in order to apply that estimate as a liquidated damages clause in a contract. The more difficult it is to estimate an owner's dam-

ages, the more likely a court will defer to the liquidated damages provision as agreed to by the owner and contractor. There are a number of ways to estimate liquidated damages.

The MWRA utilized a proportionate application of its extended costs across all contracts regardless of the interdependence between contractor performance, schedule logic and nature of contract work. The MHD estimated liquidated damages on a case-by-case basis using historical data that were adjusted for the probability of affecting other work as well as individual estimates of management and other costs. The MHD's method is more sophisticated and requires the exercise of engineering judgment. The MWRA's method reflects an across-the-board application that is more open to being challenged.



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