

SCHEDULE 'GAMES' PEOPLE PLAY, AND SOME SUGGESTED 'REMEDIES'

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ABSTRACT: The intended purpose of construction scheduling is to assist with proper planning and coordination of a project. All too frequently, construction schedules are used primarily to help build claims against project owners. Much of the process of "building claims" through the use of schedules involves "schedule gamesmanship." This paper briefly identifies 14 common schedule games played on public construction projects. The paper also offers 34 suggested "remedies" to help prevent schedule gamesmanship. Some suggested remedies involve changes to contract-document language and, thus, need to be implemented during the design stage. Other suggested remedies are pragmatic in nature and can be implemented on a daily basis by a knowledgeable construction management team even in the absence of specification language.

INTRODUCTION

The intended purpose of scheduling on a construction project is to help ensure that the work of the project is adequately planned. A schedule should be nothing more than a list of all activities required to complete the work in accordance with the requirements of the contract documents, organized in a logical or orderly sequence, and generally, time scaled. The concept of construction scheduling is to see that all activities necessary to complete the work are properly planned for and coordinated.

Unfortunately, it sometimes appears that the more frequent use of a construction schedule is to help build claims. Some construction contractors, not all, perform scheduling only because (1) It is a requirement of the contract documents; (2) it is required in order to receive their monthly payment; and/or (3) it will help enhance their chances of recovering more from the owner in change orders and claims. Scheduling to some contractors, therefore, is not a tool for planning and coordination (Zack 1984).

There is a "risk" involved with owners requiring that schedules be submitted by contractors, and then proceeding to review and accept them. "Approved" or "accepted" schedules tend to take on a legal status of sorts. The risk, of course, is that the owner inadvertently accepts a schedule and agrees to something that is later used as documentation of claims against him. Some owners contend that this is the construction industry's version of "self-incrimination." The downside risk of not requiring that construction schedules be submitted, however, is that the project is not planned properly, and the owner is left with no way to measure progress or check on coordination. In these days of tougher competition and declining profits, and given the absence of a scheduling requirement, some contractors may be tempted to dispense with proper project scheduling as a way of saving costs. It therefore appears to most experienced construction managers that the

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risk of not requiring schedules far outweighs the risk of requiring, reviewing and “buying into” the contractor’s schedule.

COMMON SCHEDULE “GAMES”

Construction managers involved in the review of project schedules submitted by contractors, especially on publicly funded projects, need to guard against “schedule gamesmanship” in its many forms. There are a number of games played with respect to construction scheduling. Among the more common games are those listed herein.

Failure to Provide a Construction Schedule

Some construction contractors seek to avoid giving the owner any project schedule at all. In situations like this, the contractor’s concept seems to be that without a construction schedule, the owner will be unable to demonstrate contractor failure to properly plan, prosecute, and coordinate the work. An ancillary theory seems to be that the absence of a project schedule on a job leaves the contractor or his construction claims consultant free to build an as-planned versus actual schedule at the end of the job to help demonstrate and document whatever recovery is being sought.

Submittal Review Time

If the contract documents specify that “the engineer will review contractor submittals within a reasonable period of time so as not to delay progress on the work” or language similar to this, some contractors may show submittal review times in the project schedule as three or five days. This approach is based upon the impriceness of the term “reasonable period of time.” If the project schedule is accepted as submitted, the review time shown in the schedule determines the definition of what is a “reasonable period of time.” It is arguable then that any owner review of contractor submittals that takes more time than indicated on the project schedule is “unreasonable” by definition, thus setting the stage for delay and impact claims.

Failure to Show Submittal Review

The converse of the aforementioned game is to show no submittal review times at all on the project schedule. In this scheduling game, submittals are shown on the construction schedule with the start of the construction activity the same day or the next day. The result can be that some contractors will raise the specter of a delay or impact claim any time the start of any on-site activity is “delayed” beyond the planned or scheduled start date, while the engineer reviews his submittal.

Delivery Dates for Owner-Furnished Equipment or Materials

It is not uncommon in the construction industry for public owners to procure and furnish to the contractor, long lead items necessary for the project, either equipment or materials. This is frequently seen as having a potential for both time and cost savings on a project that requires such long lead items. For obvious planning and coordination purposes, dates for delivery of owner-furnished items must be shown on the project schedule. If the owner-furnished equipment or material delivery dates are shown on the schedule, and the schedule is accepted by the owner after review, then this forms a sort of warranty (or implicit agreement between the owner and the

contractor) that the owner-furnished items will be delivered no later than the date shown on the schedule. Some contractors, in consequence of this, will show delivery of owner-furnished items in an unrealistic manner—generally, much earlier than is feasible or achievable. This is done either out of lack of knowledge of the planned delivery dates or as a schedule game. If the owner is unable to meet the previously scheduled and agreed-to delivery dates, this failure sets the stage for delay and impact claims.

Failure to Show Procurement Activities

Under this form of scheduling, the schedule will simply show installation of equipment, without showing required submittals, submittal review time, fabrication, or delivery times. (This is sometimes referred to as “Star Trek scheduling,” as when the legendary Captain Kirk hits his communicator and says, “Beam the equipment down, Scotty.”) Then, if installation takes place later than “planned” on the accepted schedule, some contractors may attempt to allege owner-caused delay and request a time extension and time-related damages. (Depending upon the terms of the contract documents, supplier or vendor delay may be alleged if the contract provides for a time extension for such delays.)

Failure to Include Contract Schedule Constraints

Many owners go to great length during the design phase of a project to plan for and include certain schedule constraints in the contract documents; that is, activities that have to be completed before other activities can start, or specific construction sequences that must be adhered to so as not to disrupt ongoing activities. This is, perhaps, more true in renovation-type projects than new facility projects. Notwithstanding the clear requirements of the contract documents, some construction contractors may not include these constraints and restraints in their initial schedule submittal to the owner—they either overlook or ignore these requirements. If the owner, after review of the schedule submittal, accepts the contractor’s schedule without the necessary constraints and then later attempts to enforce the requirements of the contract, some contractors will argue that the owner “waived the contract requirements” by acceptance of the schedule, and thus now owes an equitable adjustment in order to re-establish these constraints.

“Phony” Early Completion Schedules

Many early completion schedules are not real in the sense that the contractor did not bid an accelerated rate of progress in order to complete the job early. What is more typical is that a contractor bids the project for the full time of performance and then discovers, after bid opening and award, that the job can be accomplished in less time. Or, in the alternative, some contractors may bid the full time of performance and later may deliberately submit an accelerated schedule in order to increase their opportunity to raise claims for delay. (This type of construction schedule has been referred to frequently as a “phony” early completion schedule and can be considered as a new form of contingency bidding.) Artificially decreasing activity durations is the most common method of accomplishing this tactic. This scheduling game provides some contractors the opportunity to file claims for “delayed early completion” even if the job is completed on time or early, by arguing that “But for actions of the owner, I would have finished even earlier!” (Zack 1985, 1986).

Preferential Logic

In this sort of situation, some construction contractors will not sequence activities in the most logical manner, but rather, in such a manner as to create the maximum opportunity for owner interference. If this is the game being played, some contractors will put themselves in a position to claim delay or interruption whenever the owner requests a different sequence of activities.

Sequestering of Float

Sequestering of float is a scheduling technique whereby a project schedule is constructed that has little or no float within the schedule. That is, there will be multiple critical paths throughout the network or a single critical path with numerous other paths through the network containing, say, 10 or less days of float. The idea behind this type of scheduling is that no matter what the project owner does during the performance of the work, it will likely as not bring about an impact to the end date of the project. Methods of sequestering float on a project schedule are included next.

Preferential Sequencing

A variation of the game identified previously is that some contractors take activities that could be performed concurrently and establish them in the project schedule as sequential (that is, with finish-start relationships) simply to consume float within the schedule network.

Artificial Activity Durations

Some contractors attempt to sequester project float, by artificially extending or inflating activity durations in the schedule's network (i.e., a 30-day activity is placed in the schedule as a 40-day activity). This is done by some contractors simply to consume float within the network, and again, artificially impact or influence the critical path of the schedule.

Failure to Include Start-Up/Testing Activities

In facilities-type projects, some contractors fail to include any time for start-up and testing of the facility at the end of the project. The schedule submitted to the owner for review and concurrence will be almost entirely consumed with construction activities leaving only a one–five-day start-up and test activity. Then, when it takes longer to start up and test the facility, some contractors will attempt to assert delay and impact claims on the basis that they and the owner had previously agreed, by acceptance of the baseline schedule, that this activity would take a significantly shorter period of time than it actually did. Claims of superior knowledge on the part of the owner sometimes arise in this type of situation.

No Schedule Updates

Another game played by some contractors, especially when the scheduling specification requires a schedule update only when a “major change occurs,” is to not provide schedule updates to the owner, or to provide them quite infrequently, for example, once every six months or a year. This game rests on the lack of precise definition of the term *major change*. The hope of those contractors playing this game is that they can force the owner to calculate change-order impacts or delays on the basis of the baseline schedule (thus denying the owner the opportunity to analyze any contractor-caused impact to the progress of the work, i.e., concurrent delay).

Inaccurate Schedule Updates

A game that is somewhat rarer than others, but still played by a few contractors, is to provide schedule updates, but utilizing inaccurate start and finish dates. Typically, an activity on the schedule will be shown to have started earlier than it actually did, completed later than actual, or both, whichever is to the benefit of the individual playing the game. The concept here is to “absorb” schedule float slowly by using inaccurate dates, generally to the detriment of the owner.

Changing Project History

A very rare game, but one still occasionally played by some contractors, is to consume schedule float by going back and changing or adjusting start and finish dates on activities already completed a month or more previous to the present schedule update, and running out the schedule update utilizing the changed information. Based upon this “revised project history” the current monthly update is then calculated and submitted for review and concurrence. This has the effect of influencing or impacting the schedule update, again, almost always, to the detriment of the owner.

Failure to Incorporate Change Orders into Schedule Updates

In this type of game, some contractors will either (1) Fail to include change-order work in the schedule; or (2) include the changed work in such a manner as to impact the schedule to the maximum extent possible. In either scenario, some contractors attempt to set up a situation wherein they can show maximum possible impact at a later point in time.

SOME SUGGESTED “REMEDIES”

Some suggestions concerning the aforementioned schedule games are listed herein. Some of the concepts are pragmatic suggestions and can be implemented on a routine basis by the project management team working in cooperation with the contractor. Other suggestions are recommended changes to contract documents and specification language and can only be implemented during the design phase of the project, prior to bid opening.

Mobilization Payment Contingent upon Submittal and Approval of the Baseline Schedule

Many public construction contracts now provide for a mobilization payment to the construction contractor in recognition of the fact that cash flow at the outset of a project is very critical and in an effort to avoid “front-end loading” of the payment schedule. One way to entice the contractor to provide the baseline schedule is to make the mobilization payment contingent upon receipt of the contractor’s schedule. If there is to be more than a single mobilization payment, that is, if the mobilization payment is to be paid in more than one installment, then the second or third payment should be contingent upon acceptance or approval of the contractor’s baseline schedule and submittal of the first monthly update.

Construction Scheduling—Pay Item on the Schedule of Values

Another method that may help convince some contractors to perform appropriate construction scheduling is to include scheduling as a specific pay item on the schedule of values. Any specification of this sort should state that the contractor is entitled to bill for this pay item only after submittal

of his baseline schedule and each monthly schedule update. This type of specification provides the contractor with a financial incentive to submit the required schedule documents, and clearly acknowledges that proper project scheduling is a costly item for a construction contractor.

Minimum Owner/Engineer Review Time

If owners want to avoid being “set up” by three-day submittal review times being inserted in the baseline schedule, a clause can be inserted into the contract documents to the effect that “Unless specified elsewhere in these specifications, the engineer shall have 30 calendar days from receipt of a contractor’s submittal, in which to review and respond to the submittal.” A different time frame can be utilized if owners are uncomfortable with the 30-day suggestion, as can work days versus calendar days. This type of specification requirement helps provide for proper planning by both the contractor and the owner. There is a risk, however, in that if the owner fails to return the submittal within the stipulated time frame, this opens the door to delay and impact claims.

Resubmittals—The Same Review Time

To provide some additional protection, a clause can be added to the contract documents to the effect that resubmittals of contractor’s submittals shall have the same review time as the initial submittal. This clarifies entirely the issue of whether the owner and engineer have a single time frame in which to review the submittal and all resubmittals, or whether the “clock starts all over again” with each resubmittal. In the writer’s opinion, this is an equitable assignment of the “risk” of providing unacceptable submittals as the risk of having to resubmit an item is assigned to the party most capable of dealing with that risk—the contractor.

“Not Earlier Than” Delivery Dates for Owner-Furnished Items

To help avoid a situation that some contractors try to create by establishing very early delivery dates for all owner-furnished items (solely in an effort to enhance the chances of establishing a delay due to “late delivery” of owner furnished items) the contract documents should stipulate the “earliest possible delivery dates” for all owner-furnished items. These dates should be based upon delivery dates established by the manufacturer or supplier, plus an appropriate contingency time factor. If this is done, the specifications need to require inclusion of these “earliest possible dates” in the contractor’s schedule for planning and coordination purposes.

“Schedule Windows” for Delivery of Owner-Furnished Items

A variation of the aforementioned remedy is for the owner to establish schedule windows, in the contract documents, for providing owner-furnished items. That is, the owner can stipulate in the contract documents that the owner-furnished items will be delivered not earlier than a certain date, and not later than a later date specified. In this manner, the contractor is given some reasonable assurance of when the owner-furnished items will be on site, while at the same time the owner mitigates or lessens the risk of a schedule game concerning the items provided to the contractor by the owner. This sort of contract clause marginally increases the owner’s risk but allows for much better planning and coordination on the part of the contractor. Thus, both the owner and the contractor gain. Again, this sort of action

needs to be buttressed with a contract requirement that the schedule windows be incorporated into the contractor's baseline schedule.

Submittal Reviews Incorporated into Schedule

A contract requirement that requires that all submittal reviews be reflected as schedule activities will help avoid many of the games played concerning submittals, submittal reviews, and their time impact. If this is done, it is recommended that a master list of all required submittals be provided by the designer to assist the contractor in complying with such a requirement. This action will save the owner and the contractor a great deal of time.

“Submittal Schedule”

In addition to the aforementioned-suggested remedy, a contract requirement can be added that requires the contractor to prepare and submit a “schedule of submittals” required on the project, listing all anticipated submittals and when each submittal will be provided for review. This is now required in the Engineers Joint Contract Documents Committee (EJCDC) general conditions, for example (*EJCDC* 1990). This will help ensure that the contractor is aware of and plans for all submittals; allows the owner and engineer to plan their staffing and workload appropriately; and helps avoid some of the schedule games played concerning submittals. This is not an onerous requirement as some would claim. A contractor who is put on notice of such a requirement can easily set up his work breakdown structure (WBS) such that all submittal items contain a unique coding and then sort and report on this basis to provide the required report. Again, a master list of all required submittals should be provided by the designer to the contractor in order to help implement this requirement.

Incorporation of Fabrication, Delivery and Installation Activities

The scheduling specification can be modified to specifically require that fabrication, delivery, and installation times for all “major” contractor-furnished equipment be included as separate activities on the construction schedule. The designer ought to specify in the contract documents which items of equipment are considered “major” under the terms of such a requirement to avoid any disagreement over which equipment items fall under this requirement. Again, the primary purpose of this suggestion is to see that adequate planning and coordination is taking place and is provided for. A secondary impact of such a requirement would be to help avoid some schedule games concerning fabrication and delivery times.

Separate Equipment Procurement Schedule

Another means of assisting with proper planning and scheduling of contractor-furnished equipment is to insert a contract requirement that the contractor shall provide a schedule printout showing the anticipated order and delivery dates of each “major” piece of equipment on the project. If such a requirement is utilized, the contract documents should specify which pieces of equipment are considered “major” to prevent any argument over this ill-defined term. Of course, this will help avoid some schedule games associated with anticipated equipment delivery dates.

Schedule, Logic, and Operating Constraints and Sequences Listed in Specifications

All too frequently, the owner has specific constraints that must be adhered to during the construction of the project. For example, the contractor shall not have more than two influent pumps off line at any given time; no more than one battery of clarifiers can be taken out of service at a time; power shutdowns and cutovers must take place between midnight and 5:00 A.M.; etc. A review of the project by owners and their operating staffs must take place during the design phase of the project and all identifiable constraints noted in the bidding documents. If the owner and engineer cannot identify such constraints during design, it is unreasonable to assume that a contractor can successfully guess, at the time of bidding, what constraints he will need to adhere to. All such constraints and sequences must be incorporated into the specifications in order to make them enforceable. The specifications should also make it mandatory that the construction schedule reflect all such constraints.

Minimum/Maximum Number of Activities

The scheduling specification can specify the minimum and maximum number of activities required in the construction schedule in an effort to influence the level of detail the schedule contains and to help mitigate schedule gamesmanship. The requirement can be enhanced by another requirement that no more than a certain percentage of the activities shown on the schedule can be critical, although this sort of requirement needs to be used with a great deal of caution as it starts to intrude on the contractor's right to select means and methods.

Maximum Duration Requirement

The scheduling specification can state the maximum duration of any activity on the schedule (other than submittal, fabrication, and delivery activities), again in an effort to influence the level of detail of the construction schedule. Although it is still being debated in the project-management profession, it is the writer's opinion that more detailed project scheduling requirements result in better planning and coordination than less detailed requirements. This belief is the genesis of the suggestions oriented at influencing the level of detail of the project schedule.

Interim Milestone Dates

Another method of establishing construction sequences, especially useful when working on projects involving renovation of existing facilities while the facilities remain fully operational, is to establish interim milestone dates in the contract documents. For example, the contract documents may establish that the headworks portion of the project must be operational no later than July 1, 1992 or work on the digesters shall not commence until on or after September 1, 1993. Such a requirement may also be useful on projects with multiple prime contractors or projects that interface with other concurrent projects. This will assist the contractor in planning, coordinating, and sequencing his work and should help alleviate delay and impact claims arising when an owner tries to impose requirements during the performance of the work that were not known to the contractor at the time of bidding.

Thorough Review of Baseline and Schedule Updates

From a practical point of view, owners, engineers, and construction managers need to comprehend the liability associated with the review an ac-

ceptance of a contractor's construction schedule. Schedule review is every bit as important as review of technical submittals, and has a similar amount of legal risk associated with it. Therefore, thorough, detailed review of the contractor's baseline schedule as well as all schedule updates is one mechanism to detect and defeat schedule games. Careful review of the schedule submittals for compliance with specification requirements, preferential logic, unrealistically shortened activity durations, artificially increased activity durations, construction logic, review times, sequestering of float, and failure to include critical activities or known constraints identified in the contract documents, is absolutely critical. Schedule update reviews should also include comparison of the start and finish dates with field records of inspection staff, job photos, weekly meeting minutes, monthly progress reports, contractor weekly bar charts or three-week "look-ahead" schedules.

Subcontractor Participation Requirement

Experience indicates that those contractors who are playing schedule games against owners generally do not involve their subcontractors in the formation of the baseline schedule or any schedule updates. They do not involve subcontractors because many of the scheduling games identified earlier cut as much against subcontractors as against the owner. Accordingly, a contract requirement that "major" subcontractors participate in and sign off on the baseline schedule, and all schedule updates will help prevent some schedule games since there is rarely an advantage to the subcontractors to participate in such games. If such a clause is utilized, the contract documents should stipulate which subcontractors are considered "major" under the terms of the specification to prevent argument over this term. Such a requirement enhances project coordination and communication, provides for better project planning, and serves to ward off schedule gamesmanship.

Specified Constraints and Sequences Correctly Reflected in Schedule

If the owner has included specific operating constraints, logic sequences, delivery windows, review times, and/or interim milestone dates in the contract documents, a careful review needs to be made of the baseline and all schedule updates to determine that these mandated items are correctly reflected in the project schedule. Otherwise, some contractors may take the position that the owner "waived" requirements not shown on the schedule at the time the owner accepted the baseline schedule.

Define Substantial Completion

It is a commonly accepted rule of construction law that liquidated damages under a contract stop at the time the project is determined to be substantially complete because the owner has the benefit of the bargain contracted for at that point. One of the most common arguments in the construction industry, therefore, revolves around questions such as "When was the project substantially complete?" or "What is substantial completion for this project?" Contractors generally want, of course, to argue the earliest time possible, and, as a result, some contractors may place an activity called "substantial completion" on the schedule. This is an acceptable practice, provided that the owner carefully defines the term *substantial completion* in the contract documents prior to bidding. For example, the owner must consider whether start-up and testing need to occur prior to the time the project is considered substantially complete; or, can this activity take place after the job is declared substantially complete? This type of definition

written clearly in the contract documents will help avoid problems concerning schedule games, imposition of liquidated damages, completion and closeout of the project, etc., and can only be done by the owner and engineer during the design phase of the project.

Prebid Project Scheduling

One way to avoid “phony” early completion schedules or contractors claiming that they bid the project on an accelerated schedule or early completion basis, is to determine what is a realistic period of performance for the work of the contract before the project is let for bids. The best means of determining this time frame is to have some prebid project scheduling performed by a construction scheduler, at the time the project’s plans and specifications are undergoing the quality control/quality assurance review (QC/QA) process (that is, once the plans and specifications are considered essentially complete). This will also help prevent a situation where the time to perform the work is either too long or too short; either one of which may lead to scheduling games and contingency-type bidding on the part of some contractors.

“Joint Ownership of Float” Clause

In most states, “float” within the project schedule is the property of the contractor unless otherwise specified in the contract documents. With this rule in mind, some contractors try to obtain time extensions (both excusable and compensable) even though the end date of the project is not impacted by an owner-issued change order. Their approach is to apply the equitable adjustment theory of leaving the contractor in the same relative time and cost position after the change as before. Thus, they argue, prior to the change order, this activity had 10 days of float and now it will only have five days—therefore, they continue, they are owed five days to restore the “lost float.” To avoid this type of schedule gamesmanship, it is recommended that a “joint ownership of float” clause be inserted in the scheduling specification. Language such as “The contractor’s construction schedule shall begin with the date of issuance of notice to proceed and conclude with the date of final completion of the project. Float or slack time within the construction schedule is not for the exclusive use or benefit of the owner or the contractor, but is a project resource available to both parties as needed to meet contract milestones and the contract completion date.” Under this specification language, a contractor can still show early completion of the work by identifying the difference between the planned completion and the contract completion dates as “project float.” This sort of specification language, therefore, does not interfere with the contractor’s “right to finish early” but simply serves to protect owners from delayed early completion claims.

Limited Form of “No Damage for Delay” Clause

It is commonly accepted in public construction contracts that broad form “no damage for delay” clauses are unenforceable or construed in the strictest manner possible out of a sense of equity. However, specifically crafted and sharply limited “no damage for delay” clauses are generally still enforceable. Therefore, it is suggested that contract documents include language such as the following to help enforce the “joint ownership of float” concept and decrease the owner’s exposure to unrealistic “delayed early completion claims.” “Pursuant to the contract’s float sharing requirements, no time

extensions will be granted nor delay damages paid until a delay occurs that impacts the project's critical path, consumes all available float or contingency time available, and extends the work beyond the contract completion date." Another limited form of "no damage for delay" clause generally considered reasonable and enforceable is one that modifies the standard "differing site condition" clause to the extent that if the contractor encounters uncharted or undocumented utilities, which do not belong to the project owner, then the contractor is entitled to recoup the direct costs associated with the problem and an excusable, noncompensable time extension, but is not entitled to receive extended overhead or delay damages, that is, a compensable time extension. This is a specifically crafted risk-sharing/risk-assignment clause whereby the owner and the contractor are each being assigned some of the risk of unknown utilities belonging to a third party.

"Reduction of Contract Duration" Clause

One way of defeating early completion schedules that are truly "phony" (that is, not actually bid on an early completion basis) is by inserting a clause in the contract documents that allows the owner to reduce the time of performance of the work under the contract to match the time of completion shown on a contractor's baseline early completion schedule, at no cost to the owner. This effectively restores the status quo between the contractor and the owner. That is, neither side can assess damages against the other at a different point in time. This is an effective means of dealing with the problem of unrealistic early completion schedules but needs to be used judiciously and in conjunction with an effective prebid scheduling effort that helps to establish a realistic time of completion.

"Owner Credit for Field Overhead Associated with Early Completion" Clause

Another mechanism to fight off "phony" early completion schedules is to insert a clause that allows the owner to obtain a credit (through the issuance of a deductive change order) from the contractor based upon the field-office overhead costs saved for every day of early completion shown on the baseline schedule. If utilized, the clause should state that the owner is entitled to this credit unless the contractor can document, through submittal and review of his bid takeoff, that the contractor actually bid the contract on an early completion basis. (In such a case, the owner has already received his credit through a lower bid cost.) This is a controversial contract clause and a high-risk proposition. As such, it should be created and reviewed carefully, and used with a great deal of caution. It is perceived that such a clause is a defense against truly "phony" early completion schedules. Some, however, argue that it may actually increase bid costs because contractors will not bid or schedule early completion that they might otherwise actually be able to achieve through higher productivity rates and that would mutually benefit both the owner and the contractor.

"Nonsequestering of Float" Clause

In order to combat float sequestering games a "nonsequestering of float" clause ought to be inserted into the scheduling specification. Language such as the following can be utilized. "Pursuant to the float sharing requirements of the contract documents, the use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and ex-

tended activity times are prohibited and the use of float time disclosed or implied by the use of alternate float suppression techniques shall be shared to the proportionate benefit of the owner and the contractor.” Such a contract clause should go on to state that sequestering of float shall be the cause for rejection of the contractor’s schedule submittal.

Resource Loading of Schedule Activities

One way to determine whether games are being played with schedule activities is to have a specification requirement that all on-site activities shown on the schedule shall be “resource loaded” with costs, manpower (labor by craft or trade), and equipment. If this is done, then a schedule reviewer can compare the resource loading with the duration to see if each is logical, reasonable, and mutually supportable. This also allows the owner to review the reasonableness of the contractor’s plan for construction of the project as well as forming a baseline against which to measure actual contractor performance during the construction of the project, and which can be used as a part of a delay and impact claim analysis in the event such claims later arise.

“Pay Off the Schedule” Specification

In order to emphasize the necessity for proper planning and execution, some major government construction owners (i.e., the U.S. Army Corps of Engineers) have gone to a “pay off the schedule” specification wherein every schedule activity is cost loaded and the “schedule of payment values” is a listing of all schedule activities. At the end of every month, the contractor’s payment application is a listing of all schedule activities started and completed, the percentage of work accomplished, and a calculation of the value of the work performed (i.e., the percentage completed times the cost loaded value of the schedule activity, less amounts previously paid and applicable retainage). It is perceived that this approach greatly enhances the quality of the contractor’s scheduling and helps defeat schedule games. It does, however, make the monthly progress payment process more complicated and requires that all owner personnel dealing with monthly payment applications be schedule oriented and knowledgeable of both the progress of the project and the status of the schedule.

Estimate of Start-Up and Testing Activity

As noted earlier, one schedule game is for the construction schedule to show a one–five-day start-up activity. This is, partially, a game. However, in fairness, it needs to be noted that most contractors are unfamiliar with starting up and testing various types of facilities. Their expertise lies in constructing facilities, not starting them. Thus, to a great extent, this type of scheduling is not necessarily a game but a true lack of knowledge and experience with this type of work effort. Most owners, on the other hand, are experienced with the operation of the facilities under construction. Therefore, owners are in a superior position (relatively speaking) to estimate the amount of time needed to successfully start up and test a facility. Such an estimate should be made and a notation made in the specifications that the contractor should expect to spend “no less than x calendar days starting up and testing the facility.” This puts the contractor on notice at the time of bidding, which allows the contractor to properly factor in this amount of time and, also, helps defeat this type of game.

Liquidated Damages Associated with Schedule Submittals

One means of demonstrating the criticality of project scheduling to contractors and help assure proper and timely submittal of the baseline schedule and all schedule updates is to have a contract clause that provides for the imposition of liquidated damages (that is, "\$x"/day of damages) for every day the schedule submittal is late. It is beyond the scope of this article to discuss the formula for establishing and calculating such liquidated damage amounts. Suffice it to say that it is possible to establish a "reasonable value" of the damages to be incurred by the owner in the event that the contractor fails to submit the baseline schedule of any schedule updates in a timely manner. The costing approach would be based upon the amount of scheduling work the owner would have to have performed, at his own expense, if the contractor fails to conform to the requirements of the scheduling specification.

Withholding of Payment for Failure to Update Schedule

A contract clause can be created that states that submittal of the schedule update is a "condition precedent" to monthly progress payments being processed by the owner. (Note that the term *condition precedent* is required in order to make such a clause enforceable.) This is one way to defeat the game of not submitting schedule updates. It is, however, a harsh clause in that if a contractor does a great deal of acceptable work during the month but fails to submit a schedule update, all compensation for the work in place would be denied. However, if the owner is utilizing a "pay off the schedule" specification, as discussed previously, then this type of clause is entirely logical and defensible.

Spot-Check Project History/Schedule-Change Report

The only way to defend against the game of changing project history in order to sequester float or enhance the chances of raising delay claims is for the project scheduler to routinely spot check project history every month. It is suggested that the scheduler check the schedule reports every month to see that no changes in previously completed activities have been made. A variation of this is to insert a requirement in the scheduling specification that the contractor has to submit a separate report with each schedule update that specifically identifies every change made to the schedule since the last monthly update (including logic changes, durations, actual starts/finishes, activity additions/deletions, etc.). This makes it easier for the scheduler to review schedule updates. This requirement can be buttressed with language to the effect that the owner is not responsible for any changes made to the schedule that were not specifically identified in the "schedule change report" provided with the monthly update. Further, in this regard, experience has shown that it is possible to electronically check schedule updates for changes by loading the update into a computer and programming the computer to identify and printout all changes from the last update loaded. With this computer printout in hand, the project scheduler can then check quickly to determine whether any changes made were made to previously completed activities or activities not worked on during the update period.

"Joint Updating" Requirement

A contract requirement can be inserted that requires that the owner, the engineer, the contractor, and all "major" subcontractors shall participate in a joint schedule update meeting every month. If this requirement is

included in the scheduling specification, the contract documents should specify which subcontractors are considered “major” to avoid arguments over who should attend the meeting. This joint discussion will help enhance communications between the parties involved in the project and help avoid surprises when schedule updates are provided. This should also help reduce the incidence of schedule games since all parties are involved in the schedule update-process, and thus a “check-and-balance” system is established for the project.

Fee for Change-Order Schedule Analyses

One way to get most contractors to do those things they should is to offer a financial incentive. It is suggested that the “payment for change orders” clause of the specifications require a time impact analysis be submitted with each change-order proposal and provide a set value for each change-order schedule analysis performed and submitted. For example, a \$200 flat payment on each change-order proposal will allow approximately five manhours for a schedule analysis of a change order. If the schedule analysis is performed and submitted, the contractor will receive this flat rate (even if the schedule analysis only took 10 minutes). There is a greater likelihood that this work will be done if the owner is willing to pay for it; and the overall cost to the owner is not very high.

As-Built CPM Submittal “Condition Precedent” to Retainage Release

A common problem for owners is that some contractors present “as-built schedules” purporting to represent the way the job was actually built, but which were actually “constructed” by the contractor’s claims consultant long after the work was completed. These schedules are often submitted as “documentation” of a cumulative impact or loss of productivity claim. A way to avoid such “claims documentation schedules” is to insert a provision in the contract documents that the contractor must submit an “as-built construction schedule” (certified by the contractor to represent the way the project was actually constructed) as a “condition precedent” to requesting retainage release. This will help form a record of how the project was built, put together, and submitted contemporaneously with the end of the job by the contractor, and can be used to help “keep the record straight” when faced with a claims-documentation schedule later on.

Escrow of Bid Documents

Although a controversial topic in the construction industry, it is perceived that escrow of bid documents will go far to help reduce schedule games. (Escrow of bid documents is a contract requirement that the low bidder turn in certified copies of all bid takeoff information utilized in preparing his bid within, say 24 hours after bid opening. These documents remain in the possession of a third party for use in analyzing claims, change orders, impacts, etc., for the duration of the project.) Having possession of the contractor’s bid takeoff allows the owner and engineer to review for claims that the job was bid on an early completion basis; that the project was bid on an accelerated basis; that the project was bid on the basis of four electrical crews for six months; that the project was premised at the time of bidding on a certain productivity rate; etc. (Sutliff and Zack 1987).

CONCLUSION

The intended purpose of construction scheduling is to see that proper, prudent planning and coordination of all activities needed to complete the work has been done. As has been shown, an all too frequent use of construction schedules is to help raise construction claims. Many scheduling games are played throughout the construction industry. There are means to defend against such games that, if applied properly, can help restore construction scheduling to its intended purpose.

APPENDIX. REFERENCES

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