BUILDERS RISK - MEASURING DELAY

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I. INTRODUCTION

Measuring delay from a loss under a builder's risk insurance policy is perhaps the most complicated of all time element measures in the claims world. Setting aside the numerous complex issues of coverage, builders risk time element losses require a complete understanding of the period of restoration and the facts surrounding the pre and post loss construction project in order to accurately measure the Period of Indemnity. Because the vast majority of builder's risk losses involve a repair period which does not run concurrently with the delay, an accurate measurement of the impact from a loss can be difficult to ascertain.

Understanding the many complex issues involved in planning, scheduling and implementing a construction project and the impact that a loss can have on the timely completion of project is complex and involves specific expertise. The following is intended to outline the important factors and typical issues that arise in a builder's risk loss with delay in opening coverage.

The Basics:

In order to understand the myriad of complex issues surrounding the measurement of delay, trigger of coverage and loss measurement must be understood. First, it is generally accepted that coverage for time element losses relating to Soft Costs[1] and Business Interruption/Rental Value loss is not triggered unless physical damage to covered property from a covered cause of loss results in a delay in the completion of the insured project. Second, the delay is measured from the date the project would have completed "had no loss occurred". Third, the period of delay assumes that repairs to covered property will be made with the exercise of "due diligence and dispatch".

Familiarity with the following terms is important to understand how the period of delay is measured:

- Period of Restoration – The time necessary to perform repairs covered by the property policy to insured property with the exercise of due diligence and dispatch. Period of

[1] Soft Costs are often referred to as Delay in Opening Expenses, and are typically covered under and limited by special endorsements to the basic builders risk property policy. Coverage is usually afforded for additional construction loan interest, realty taxes, marketing and re-leasing expenses, administrative expenses, and architectural/engineering fees which are incurred as a result of a covered loss which causes delay in the completion of a project. Certain endorsements allow coverage for any number of additional enumerated items which are agreed between the insurer and insured, although many endorsements provide Soft Cost coverage for the benefit of the property owner only, and not lenders, contractors or subcontractors, who can be named additional insureds in a property policy.

restoration typically runs from the date of loss and ends when repairs to covered property have been completed. Although this measurement, (unlike normal property losses) can be complicated because two things will happen after a loss occurs[2]:

1. Work to repair physical damage is performed.
2. Contract work in accordance with the project plans and specifications will continue through completion.

- Period of Delay – The period of time that runs from the date a project would have been completed had no loss occurred, to the date the project is actually completed. Generally, this time is not expected to exceed the period of restoration, although this measurement is often complicated by any number of things, including but not limited to:
    1. Project re-sequencing.
    2. Consequential impacts on the project schedule unrelated to repair of physical damage.
    3. Repairs to non-covered property.
    4. Post loss delays unassociated with repair from a covered loss.
- Notice to Proceed (NTP) – In many projects, NTP is the triggering date for the commencement of the contract for construction, and completion can often be linked to NTP, as expressed in a number of days or months.
- Date of Substantial Completion – the date that is typically established in a contract between an owner and construction manager/general contractor in which a project is complete to the point that it is put into service for its intended purpose. [3]
- Date of Final Completion – the date that a construction manager or general contractor completes his contract, and all work has been accepted by the owner.
- TCO Date – The date that a permit granting authority provides a temporary certificate of occupancy for a project or portion of a project. Typically, TCO dates are the dates that define the actual substantial completion dates.[4]
- Final CO Date – The date that a permit granting authority issues a final certificate of occupancy.
- Project Schedule – The plan for construction of the project which is typically created by the construction manager or general contractor, and which depicts the sequence and duration of construction activities, typically in a Gantt chart format.[5]

[2] Unless the project is abandoned after a loss.
[3] Contracts for construction will usually define Substantial Completion.
[4] TCO dates can be important dates in measuring a loss, since a TCO can often be considered a "triggering event" between and owner and tenant, and signal the commencement of a lease.
[5] Software published by Primavera (P3 through P6) is the industry standard for the development of project schedules, although Primavera Suretrak and MS Project are sometimes used for smaller, less complicated projects.

- Baseline Schedule – The initial project schedule generally developed at or within 90 days after Notice to Proceed is received by the contractor.
- Critical Path – The longest continuous chain of activities which establishes the minimum overall project duration.[6]
- Activity/Activities – Items of work to be accomplished on a project that are generally discrete, measurable and consume time.[7]
- Float - The amount of time that the commencement of an activity can be delayed before its completion causes it to become critical, thereby having the potential to cause delay. An activity which is critical has zero float. Thus a delay in the completion of any activity on the project's critical path will result in a delay in project completion.
- Project Milestone – A date which signifies an important event in the construction or completion of a project.[8]
- Acceleration – Changes to the project schedule to either perform work or deliver critical building components/materials on an expedited basis, often at additional cost. In builders risk claims, acceleration is usually a consideration in performing post loss, non loss related work, to minimize delays to a project, and mitigate time element losses.
- Change Order – a change to the contract between an owner and construction manager or general contractor either adding or deleting contract work. A change order typically amends the contract price and/or time.

II. FUNDAMENTALS OF PROJECT SCHEDULING:

The Basics:

Constructing a project is essentially the assembly of many parts or elements over time, in proper sequence, ultimately resulting in successful completion. A successful construction project must be planned and scheduled so that all of its parts or elements are erected in a timely and efficient manner. From the outset of a project, a contractor works to create a plan by which the complete project is sequenced and documented to show the flow of activities over time. A *project schedule* depicts this plan, which is typically communicated, monitored and updated. Initial planning, therefore, is the first step in developing a measuring tool by which project performance will be tracked through completion.

[6] Delays to critical path activities will cause corresponding day for day delays in a project's completion. By definition, critical path activities have zero float.
[7] *The Associated General Contractors of America Construction Planning and Scheduling*, 2004.
[8] A milestone is not a construction activity, since it does not consume time or resources; however projects are almost always scheduled to achieve established milestone dates.

The development of the complete plan to erect or install all elements of a project requires certain considerations, including:

- Time,
- Availability of labor, materials and equipment,
- Logistics,
- Seasonal or other constraints.

The above considerations are necessary and must be accomplished so that the parties are assured that they have a complete and viable plan to successfully meet the project goals on time and on budget. Contractors generally provide varying levels of detail of this initial plan during the bid phase to assure themselves that the project can be built in the allotted time for their proposed bid amount.

After award, a contractor will usually produce a *baseline schedule* for an owner's approval, indicating the contractor's initial plan to successfully perform the required work. This baseline, is typically required in the contract for construction, and once approved, becomes the plan by which the progress of all project work will then be tracked and measured. It is common industry practice to update the project schedule on a monthly or periodic basis (or as events warrant).

A project plan or schedule can be documented using various methods, such as a list of project milestones or a Gantt bar chart. For large commercial construction projects, it is standard industry practice to use software such as Primavera (P3-P6) to document the contactor's plan (*project schedule*) and to allow for the efficient tracking, updating and monitoring of the plan. Scheduling software is essentially a tool which allows the contractor to provide the logical predecessor and successor relationships of all the *activities* necessary to complete a project. When proper logic, sequence and duration are input, scheduling software will calculate future dates of all project activities.

A contractor's goal is for a project to be a success, and as contractors recognize that change is inevitable, they must be able to react appropriately. Therefore, the plan must be continually monitored to measure progress and to manage change.

The project planning and monitoring cycle can be described as follows:

- Plan development - the detailed planning of work *activities* and sequencing.
- Plan execution - the communication and implementation of the plan.
- Plan monitoring - the measurement of the as-planned vs., as-built conditions.
- Adjusting and adapting, or "re-planning" the plan - adjusting or re-planning to accommodate any differences in the as-planned vs. as-built data.

Good project management practice requires a monthly or periodic update and review of the *project schedule*, and revisions or adjustments to the plan to accommodate unforeseen circumstances that may arise. It is generally understood that the realities of a construction project are dynamic, and thus the plan should be able to be revised and adjusted with the underlying premise that unless there is a change in scope and a corresponding change in time, the end date will not change. Therefore, notwithstanding issues such as extraordinary weather or other unforeseen events, a project is planned, monitored and adjusted continually to compensate for variations that have or will occur. Examples of these that are typical are late or early deliveries of material, or labor productivity rates which are different than as planned. These, amongst many issues must be dealt with so that a project will finish on time and on budget.

A competent project management team understands this dynamic process and will review and adjust the project plan as needed. Project managers realize that they must be flexible, adjusting and adapting, and "re-planning the plan" to adjust to the many conditions that arise on any construction project.

Elements of Project Scheduling – The Baseline Schedule:

Planning and Scheduling involves the understanding, coordination, and interplay of all of the work activities required to complete a given project with respect to:

1. Quantities of materials
2. Labor Productivity rates
3. Labor Availability
4. Material Availability
5. Seasonal Considerations
6. Site Logistics

In establishing a project schedule, activities required to complete the project are identified, and durations are assigned with the understanding of the following relationship:

Quantity of Material divided by Labor Productivity = Duration

It is not uncommon to find that schedulers and planners do not actually perform this equation for each activity, but experienced contractors understand the relationship. A test of the viability of a schedule can be made by reverse engineering the durations provided with

subcontractor or industry productivity rates. Obviously variations exist, including the actual durations measured against the plan. This is exactly why the measurement and re-planning phases of project planning are so important.

Activities are then organized with respect to the order in which they must be completed[9] by the use of logic predecessor and successor relationships. The contractor studies the logistics, hoisting requirements, weather, site access, availability of resources, etc for each activity to assure work can be performed. Each activity must be properly and logically linked to indicate planned restrictions with respect to labor crew flow, material and equipment availability, area availability etc and coordinated with other activities.

In a properly constructed project schedule, project phases should be presented as they either consume time or are important milestones, including but not limited to:

- Bid and Award (Purchasing and Sign contract),
- Submittals and Approvals,
- Fabrication and Delivery,
- Construction,
- Testing and Commissioning,
- Certificates of Occupancy and Turnover, and
- Punchlist and Closeout.

Other project delivery methods such as design build, should accommodate the above specific requirements, but will also include a design schedule. Therefore, depending on the delivery method and other contract requirements, all projects should be reviewed for their uniqueness.

Project schedules are intended to accurately represent a contractors plan to complete all work. This doesn't mean that every screw, nail or bolt has to be listed as an activity, with logic ties from bolt to bolt. Generally, the minimum unit of an activity's time is one day. Sometimes, however, projects may require hourly monitoring, such as an "over-the-weekend" bridge replacement, where each hour is monitored and critical to the success of the project. It is also customary to have individual activity durations of no longer than 30 calendar days, or from one update period to the next, except for administrative activities such a bid and award, submittals and approvals, and long lead fabrications. *Critical path activities* (activities which, if delayed will have a corresponding delay in completion), should have more detail, i.e., more *activities* over

[9] For example, the first floor steel will be erected before the second floor steel, etc.

time. More detail allows shorter measurement periods, allowing earlier recognition of issues which may lead to a delay. This will allow a quicker response should an unforeseen event arise.

Project schedules are often accompanied by a schedule narrative, explaining what may not be readily apparent in the schedule such as logistics, equipment and crew flow, etc. Thus, a completed baseline schedule should represent a viable plan to complete the work, with the available resources, within the available time.

The Dynamic Project - Monthly/Periodic Schedule Update:

It is understood that a project is unlikely to proceed exactly as planned, and that the contractor, by monitoring and measuring progress, will recognize this, and adjust the schedule accordingly. At the end of each update period, assuming no change in scope or unforeseen event occurs, the project should be tracking on time. The point, therefore, of a monthly update is to allow early recognition of activities that may not be tracking on time, and to be able to adjust the schedule to accommodate this difference. The result is an updated schedule to be implemented and communicated to the project team.

A contractor should take care to accurately update the schedule by using appropriate data. For instance, if an activity's original duration is 20 work days, and 15 days have passed, but only 25% of the work is completed, the contractor should not use the 5 remaining days duration in the schedule, if the rate of installation is not planned to be changed. Clearly, the same installation rate used during the first 25 days will generate a remaining duration longer than 5 days. Simply put, contractors recognize that their original plan and schedule of the work is likely to change, and for that reason schedule updates are an important tool to track progress.

III. MEASUING THE LOSS:

"Completion – Time and Money"

A loss, which is nothing more than an "event" which causes a change to the project, can impact a project in only 2 ways. First, physical damage to real property may cause a change in the scope of work required to complete the project, resulting in additional cost. Second, physical damage affecting a project's critical path, may cause a delay in the completion of the project.[10] But what does "completion" mean?

[10] In either instance, for a loss to be payable by a builders risk insurer, physical damage by a covered cause of loss must first occur, which may then result in specifically enumerated time element losses..

From the standpoint of measuring economic losses,[11] it is important to note that the only "completion" date that is relevant, is one in which, if delayed, additional expenses will be incurred and/or revenue will be lost. In most large projects, delaying one or more milestone dates can cause increased expenses and lost revenue. For example, high rise condominium projects will typically have rolling turnover dates for apartment units, floors or areas, which will allow unit closings to take place. These dates will often represent contractual requirements that a contractor or construction manager is obligated to meet, and which are established in a project's schedule. Since condominium unit sales produce the revenue necessary to retire construction debt and provide profit to the developer, it goes without saying that a delayed milestone date caused by an "event" can result in economic loss, even if substantial completion and final completion of the entire project is unaffected. Likewise, office buildings and retail projects will typically require turnover dates for tenant finishes, Industrial buildings will require turnover to install manufacturing equipment, etc.

The Pre-Loss Completion Date:

Establishing the date by which the insured project would have "completed" had no loss occurred is the first step in any analysis of delay, when measuring time element claims. Determining whether a project was "on schedule" immediately prior to a loss is key in being able to both measure a delay period, if any, or make a decision to "accelerate" work to mitigate anticipated delays and losses. The date a project would have completed absent a loss is generally considered the commencement date for the *period of delay* for time element losses.

In order to determine the pre-loss completion date and/or milestone dates, a virtual snapshot of the project's progress immediately prior to a loss must be taken and compared to the project schedule. Since project schedules are designed to be dynamic, they are typically updated on a monthly or periodic basis to show how the project is proceeding against the contractor's plan.[12] Therefore, understanding the pre-loss project history is vital to being able to establish a project's accurate pre-loss completion date. The following are typically analyzed in order to determine the accuracy of the pre-loss completion date:

[11] Economic Losses in the form of Soft costs (expenses) and lost income (business interruption or lost rents) are the most typical time element related claims.

[12] Most large projects have contract requirements that the construction manager or general contractor provide schedule updates, usually accompanied by a monthly progress report, progress photographs and the monthly payment requisition.

- Change order requests or project cost events – requests made by the construction manager, general contractor or subcontractors to change either the contract price and/or the contract time.
- Executed change orders and related scope of work
- General project progress prior to the loss including delay.
- Pre loss weather delays
- Other events which can jeopardize the project's milestone or completion dates.

On most projects, a contractor or construction manager will typically update and/or change the project schedule to reflect the realities that arise in construction. Therefore, sole reliance on the baseline schedule is improper and can result in the establishment of an erroneous pre-loss completion date.

It is also important that anticipated future dates (after a loss) be studied to determine whether certain milestones or activity dates affecting the project are expected to be met, thereby affecting the anticipated date of completion. For example, suppose a labor strike at a plant manufacturing component equipment for the project's elevators was underway at a time of loss, and would have affected a future critical path activity. In such a case, the anticipated post loss delay, which may not be related to physical damage caused by a covered peril, could impact the project's completion date. Although the project schedule update prior to the date of loss should reflect this problem, this is not always the case.

<u>Measuring the Impact of the Loss – establishing the post loss completion date:</u>

The *period of delay* typically begins on the date a project would have completed had no loss occurred[13], and ends on the date the project is actually completed, although in many cases this can be difficult to measure for any number of reasons, including:

- Post loss delays unrelated to the loss.
- Delays which are affected by non covered issues, including:
  - Consequential impacts on the project schedule;
  - The need to repair or replace non insured property;
  - The need to correct an uninsured condition such as a product or failure or design flaw.

[13] Often, a waiting period expressed in number of days will be stated in time element endorsements, resulting in payments to a policyholder for losses that extend beyond the waiting period.

It is important that pre-loss project schedules be analyzed in their electronic format, in order that the analysis can study (among other things), the project logic, including an activity's predecessor and successor relationships.

IV. HYPOTHETICAL PROJECT EXAMPLE:

In this section, we present a sample project schedule to illustrate the initial plan, updated plan and schedule impact caused by an unforeseen event. This example shows the original project schedule, a pre-loss delay in TCO completion dates due to productivity issues at the building skin, and a fire which disrupts the project and affects the critical path.

The project schedule illustrated in Primavera format is for a hypothetical 30 story condominium building (with all activities except Milestones "rolled-up" to a higher level of detail). Note that activity headings in Figure 1, below are generally as have been discussed previously herein.

Figure 1. The Baseline Schedule:

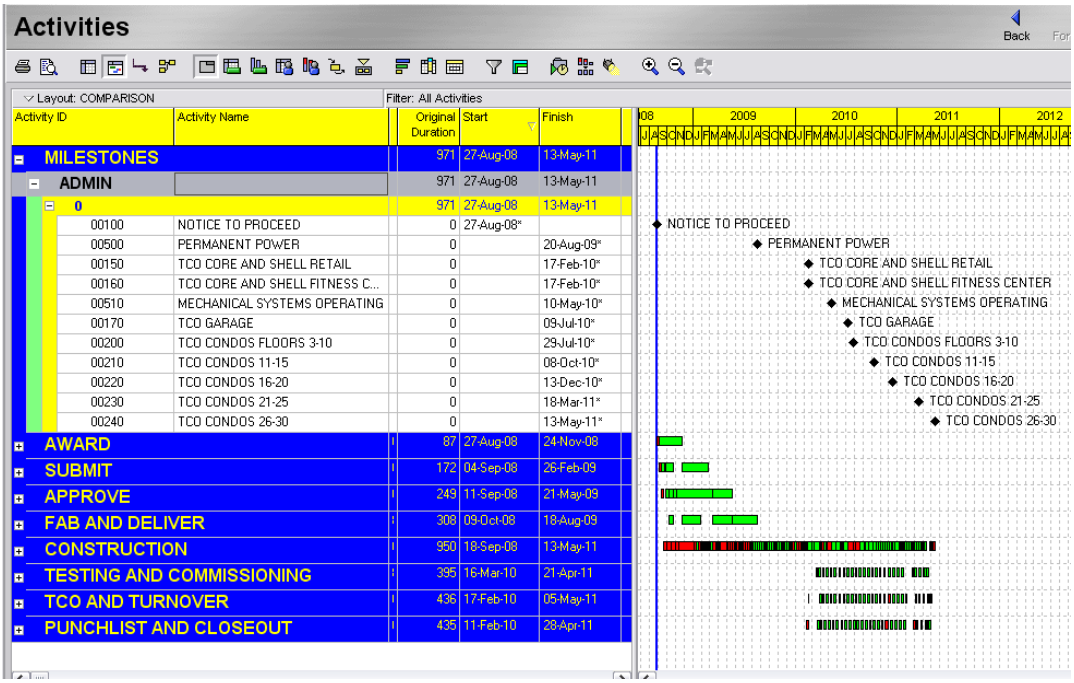
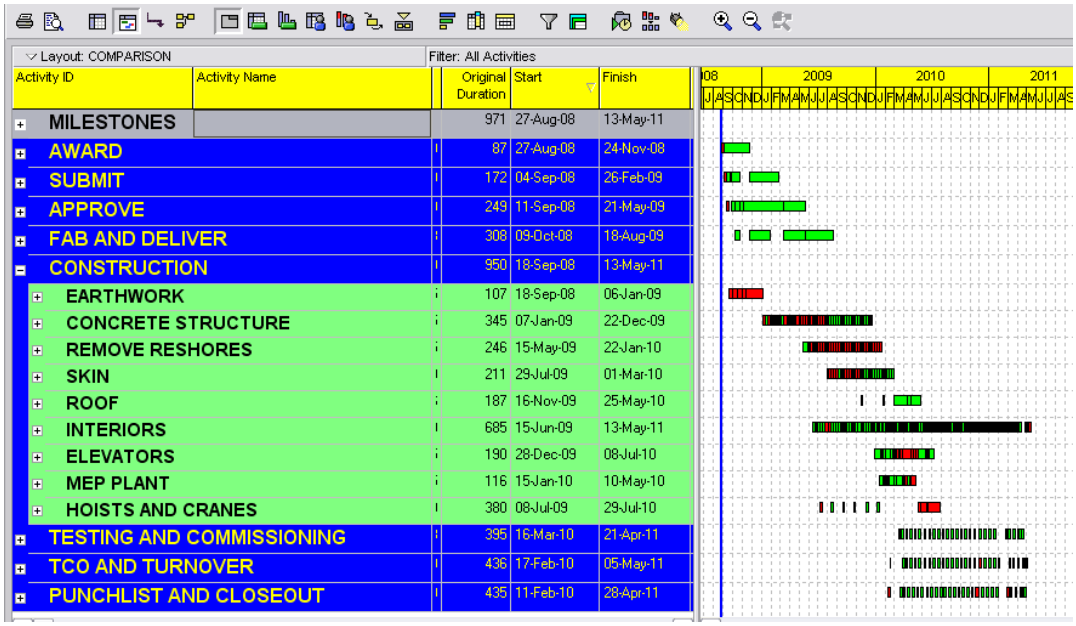


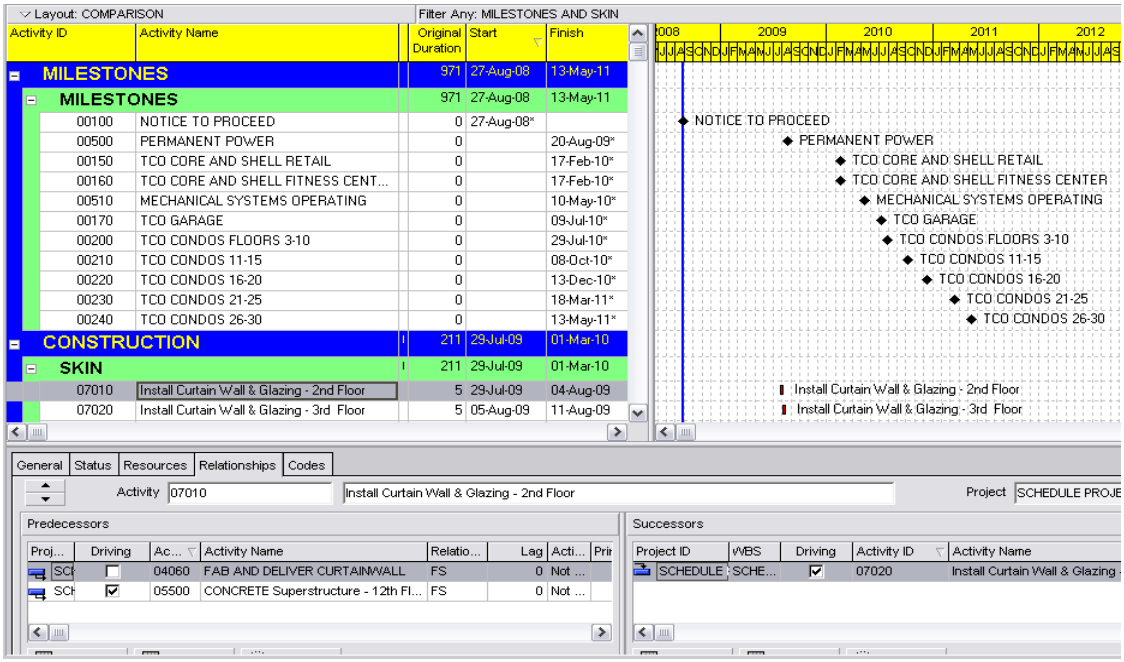
Figure 2. depicts the same project schedule with the “Construction” heading expanded one level to show durations of major building components:

Figure 2. Baseline Schedule Expanded:



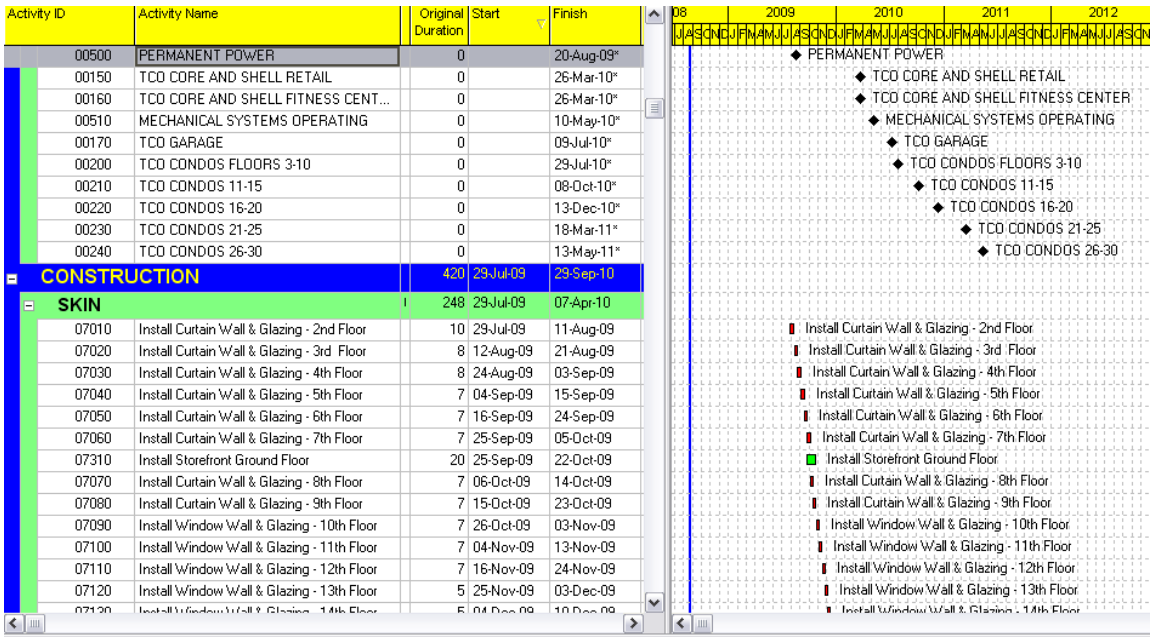
The schedule is developed using “Logic Relationships”, which are provided by the contractor to indicate how far along one activity must be before beginning the next (or another) activity. Figure 3 depicts that the predecessor, “fab and deliver curtainwall” has a finish to start (FS) relationship with a zero lag to the start of curtainwall on the 2nd floor and also requires the completion of the 12th floor of concrete. The choice of predecessor (or successor) activities is not a function performed by the software. Rather, it is the contractor who determines this “logic” and “lag,” and all relationships, using experience and understanding the specific requirements of the project. The scheduling software is merely a tool which will calculate dates after relationships are established and linked in the software program.

Figure 3. Schedule Logic:



Changes in the scope of work, late deliveries of material and/or slower than planned productivity rates affecting activities on the critical path will change the end dates if no measures are taken to “re-plan” and make up the time. Figure 4 depicts the same hypothetical building, except that job conditions have now caused the contractor to use 10 days to erect the 2nd floor curtain wall, 8 days to erect floors 3 and 4, and 7 days to erect floors 3-12, in lieu of the planned 5 day durations depicted in Figure 3.

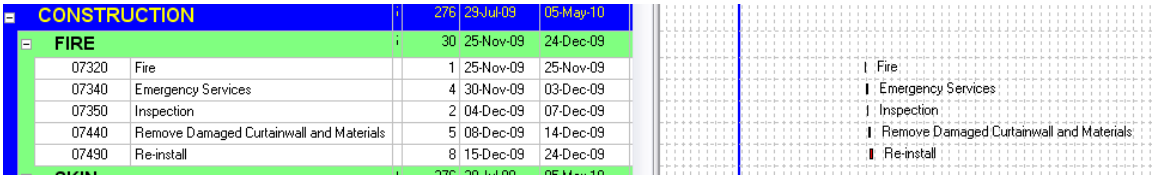
Figure 4. Productivity of Curtainwall less than "as planned":



Activity ID	Activity Name	Original Duration	Start	Finish
00500	PERMANENT POWER	0		20-Aug-09*
00150	TCO CORE AND SHELL RETAIL	0		26-Mar-10*
00160	TCO CORE AND SHELL FITNESS CENT...	0		26-Mar-10*
00510	MECHANICAL SYSTEMS OPERATING	0		10-May-10*
00170	TCO GARAGE	0		09-Jul-10*
00200	TCO CONDOS FLOORS 3-10	0		29-Jul-10*
00210	TCO CONDOS 11-15	0		08-Oct-10*
00220	TCO CONDOS 16-20	0		13-Dec-10*
00230	TCO CONDOS 21-25	0		18-Mar-11*
00240	TCO CONDOS 26-30	0		13-May-11*
CONSTRUCTION		420	29-Jul-09	29-Sep-10
SKIN		248	29-Jul-09	07-Apr-10
07010	Install Curtain Wall & Glazing - 2nd Floor	10	29-Jul-09	11-Aug-09
07020	Install Curtain Wall & Glazing - 3rd Floor	8	12-Aug-09	21-Aug-09
07030	Install Curtain Wall & Glazing - 4th Floor	8	24-Aug-09	03-Sep-09
07040	Install Curtain Wall & Glazing - 5th Floor	7	04-Sep-09	15-Sep-09
07050	Install Curtain Wall & Glazing - 6th Floor	7	16-Sep-09	24-Sep-09
07060	Install Curtain Wall & Glazing - 7th Floor	7	25-Sep-09	05-Oct-09
07310	Install Storefront Ground Floor	20	25-Sep-09	22-Oct-09
07070	Install Curtain Wall & Glazing - 8th Floor	7	06-Oct-09	14-Oct-09
07080	Install Curtain Wall & Glazing - 9th Floor	7	15-Oct-09	23-Oct-09
07090	Install Window Wall & Glazing - 10th Floor	7	26-Oct-09	03-Nov-09
07100	Install Window Wall & Glazing - 11th Floor	7	04-Nov-09	13-Nov-09
07110	Install Window Wall & Glazing - 12th Floor	7	16-Nov-09	24-Nov-09
07120	Install Window Wall & Glazing - 13th Floor	5	25-Nov-09	03-Dec-09

Now, assume that a fire affecting the exterior curtainwall on the 12th floor, immediately after its completion delays the installation of the replacement and remaining curtainwall by 20 work days, including emergency services, inspection, demolition and rebuild of the 12th floor. Figure 5 depicts activities relating to the fire, which are inserted into the project schedule resulting from the fire:

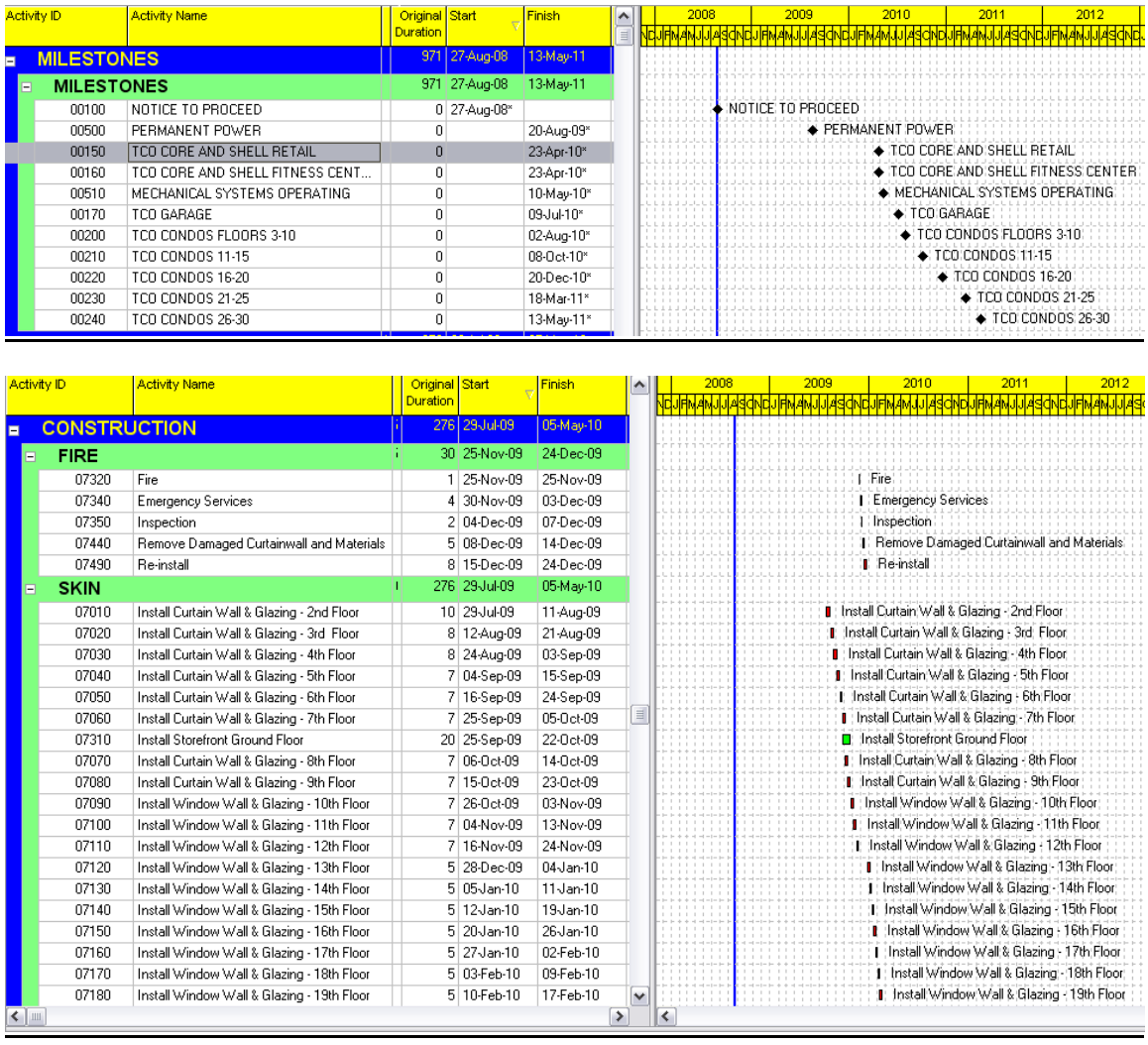
Figure 5. The Loss



CONSTRUCTION		276	29-Jul-09	05-May-10
FIRE		30	25-Nov-09	24-Dec-09
07320	Fire	1	25-Nov-09	25-Nov-09
07340	Emergency Services	4	30-Nov-09	03-Dec-09
07350	Inspection	2	04-Dec-09	07-Dec-09
07440	Remove Damaged Curtainwall and Materials	5	08-Dec-09	14-Dec-09
07490	Re-install	8	15-Dec-09	24-Dec-09

After the loss, the contractor also realizes the as-planned durations for curtainwall erection, but does not make up the already lost time on curtain wall. Assuming the contractor will not make up this time, the new TCO dates are established as depicted in Figure 6.

Figure 6. – Impact of the Loss on Completion.



Activity ID	Activity Name	Original Duration	Start	Finish
MILESTONES		971	27-Aug-08	13-May-11
MILESTONES		971	27-Aug-08	13-May-11
00100	NOTICE TO PROCEED	0	27-Aug-08*	
00500	PERMANENT POWER	0		20-Aug-09*
00150	TCO CORE AND SHELL RETAIL	0		23-Apr-10*
00160	TCO CORE AND SHELL FITNESS CENT...	0		23-Apr-10*
00510	MECHANICAL SYSTEMS OPERATING	0		10-May-10*
00170	TCO GARAGE	0		09-Jul-10*
00200	TCO CONDOS FLOORS 3-10	0		02-Aug-10*
00210	TCO CONDOS 11-15	0		08-Oct-10*
00220	TCO CONDOS 16-20	0		20-Dec-10*
00230	TCO CONDOS 21-25	0		18-Mar-11*
00240	TCO CONDOS 26-30	0		13-May-11*

Activity ID	Activity Name	Original Duration	Start	Finish
CONSTRUCTION		276	29-Jul-09	05-May-10
FIRE		30	25-Nov-09	24-Dec-09
07320	Fire	1	25-Nov-09	25-Nov-09
07340	Emergency Services	4	30-Nov-09	03-Dec-09
07350	Inspection	2	04-Dec-09	07-Dec-09
07440	Remove Damaged Curtainwall and Materials	5	08-Dec-09	14-Dec-09
07490	Re-install	8	15-Dec-09	24-Dec-09
SKIN		276	29-Jul-09	05-May-10
07010	Install Curtain Wall & Glazing - 2nd Floor	10	29-Jul-09	11-Aug-09
07020	Install Curtain Wall & Glazing - 3rd Floor	8	12-Aug-09	21-Aug-09
07030	Install Curtain Wall & Glazing - 4th Floor	8	24-Aug-09	03-Sep-09
07040	Install Curtain Wall & Glazing - 5th Floor	7	04-Sep-09	15-Sep-09
07050	Install Curtain Wall & Glazing - 6th Floor	7	16-Sep-09	24-Sep-09
07060	Install Curtain Wall & Glazing - 7th Floor	7	25-Sep-09	05-Oct-09
07310	Install Storefront Ground Floor	20	25-Sep-09	22-Oct-09
07070	Install Curtain Wall & Glazing - 8th Floor	7	06-Oct-09	14-Oct-09
07080	Install Curtain Wall & Glazing - 9th Floor	7	15-Oct-09	23-Oct-09
07090	Install Window Wall & Glazing - 10th Floor	7	26-Oct-09	03-Nov-09
07100	Install Window Wall & Glazing - 11th Floor	7	04-Nov-09	13-Nov-09
07110	Install Window Wall & Glazing - 12th Floor	7	16-Nov-09	24-Nov-09
07120	Install Window Wall & Glazing - 13th Floor	5	28-Dec-09	04-Jan-10
07130	Install Window Wall & Glazing - 14th Floor	5	05-Jan-10	11-Jan-10
07140	Install Window Wall & Glazing - 15th Floor	5	12-Jan-10	19-Jan-10
07150	Install Window Wall & Glazing - 16th Floor	5	20-Jan-10	26-Jan-10
07160	Install Window Wall & Glazing - 17th Floor	5	27-Jan-10	02-Feb-10
07170	Install Window Wall & Glazing - 18th Floor	5	03-Feb-10	09-Feb-10
07180	Install Window Wall & Glazing - 19th Floor	5	10-Feb-10	17-Feb-10

When determining the pre-loss completion date, and loss related *period of delay,* the important question will be: How many days are calculated due to the unplanned loss of productivity vs. days due to the fire? Obviously post-loss delays unrelated to the loss will affect the end date and must be considered. Many other factors must be reviewed and considered in reviewing a schedule such as calendars, retained vs. override logic, weather, etc. Figure 7, below shows how the difference between pre-loss and post loss schedules are affected by the issues raised in the hypothetical:

Figure 7. Calculation of Delays.

ACTIVITY NAME	BASELINE SCHEDULE	PRE-LOSS SCHEDULE	POST LOSS SCHEDULE	DIFFERENCE PRE VS POST
NOTICE TO PROCEED	27-Aug-08		27-Aug-08	
PERMANT POWER	20-Aug-09	20-Aug-09	20-Aug-09	-
TCO CORE AND SHELL RETAIL	17-Feb-10	26-Mar-10	5-May-10	40.00
TCO CORE AND SHELL FITNESS CENTER	17-Feb-10	26-Mar-10	5-May-10	40.00
MECHANICAL SYSTEMS OPERATING	10-May-10	10-May-10	10-May-10	-
TCO GARAGE	9-Jul-10	9-Jul-10	9-Jul-10	-
TCO CONDOS FLOORS 3-10	29-Jul-10	29-Jul-10	23-Sep-10	56.00
TCO CONDOS 11-15	8-Oct-10	8-Oct-10	8-Oct-10	-
TCO CONDOS 16-20	13-Dec-10	13-Dec-10	14-Feb-11	63.00
TCO CONDOS 21-25	18-Mar-11	18-Mar-11	11-Apr-11	24.00
TCO CONDOS 26-30	13-May-11	13-May-11	27-May-11	14.00

IV. SUMMARY

Measuring the delay period to buildings in the course of construction is a complex, time consuming and expensive process requiring both retrospective and prospective analysis of a project. Knowledge of the construction process, project scheduling and integrating repairs to a project which has been damaged by an event are required in order accurately measure the delay from a loss.