



فرآیند مناسب در زمان عدم امکان تایید برنامه زمانی پیمانکار (مختص اعضای کانون VIP)

ارائه دهنده:

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What we will learn?

- ☐ The importance of schedule in project management
- ☐ Who bears the risks of failing to approve schedules?
- ☐ Review and response options
- ☐ Rejection options
- ☐ Reasons for failure to approve schedules
- ☐ Recommended process for project controls
- ☐ Scheduling requirement recommendations
- ☐ Recommended actions when a schedule cannot be approved
- ☐ Analysis
- ☐ Meet and present
- ☐ Conclusion
- ☐ General industry actions to improve scheduling

References

- ❑ Carson, C. “Dealing with Contractors Schedules that Cannot be Approved,” **Cost Engineering, Vol. September/October, pp. 4-16, 2013.**
- ❑ Carson, C. “Can a Contractor Use Baseline Durations in a Request for EOT?,” Project Control Academy Masterclass, Houston, 2019.
- ❑ Colbert, J. and K. Forbes, “Understanding Risks in Design-Build Schedules,” in AACE International Technical Paper, Morgantown, 2019.
- ❑ Griffith, D. “Scheduling Practices and Project Success,” in AACE International Transactions, Morgantown, 2005.
- ❑ Lewis, J. Project Planning, Scheduling & Control, Probus Publishing Company, 1991.
- ❑ McGraw Hill Construction, Mitigation of Risk in Construction, Smart Market Report, McGraw Hill Construction, 2011.
- ❑ Uyttewaal, E. Forecast Scheduling with Microsoft Project 2010, Best Practices for Real-World Projects, ProjectPro Corporation, 2010, p. 693.
- ❑ Zafar, Z. and D. Rasmussen, “Baseline Schedule Approval,” Cost Engineering, Vol. 43, No. 8, 2001.



The importance of schedule in project management

- ❑ Creating and approving a **workable baseline schedule** in the first precious months of a project is of **critical importance**.
- ❑ Project baseline schedules (“baseline”) are meant to be used by **all stakeholders** (owner, owner representatives, contractors, etc.)
to **compare** project progress against the plan.

What is the problem here?



The importance of schedule in project management

- ❑ Unfortunately, **most “plans”** are **not agreed** upon by **all the stakeholders** within a **reasonable time** after the project starts.
- ❑ This causes **misalignment** between stakeholders and weakens the ability to provide proper analysis of **disputes and delays** occurring in the **early stages of the project**.

How this could be resolved?



The importance of schedule in project management

- ❑ These **misalignments** (or disconnects or confusions or frustrations) could be solved by **agreeing on a baseline early** in the project.
- ❑ It is in the **best interests** of **any project** to get an approved as-planned schedule in place **as soon as possible** to ensure that appropriate planning is done.

Good for contractor or owner?



The importance of schedule in project management

- ❑ It will **allow management** of the project for **both the contractor and the owner**, to
 - ❖ Provide a basis for analysis of **trending**
 - ❖ Completion **predictions**, and **delay**, and
 - ❖ Develop **validated documentation** in support of future **resolution of disputes**

Is it only true for baseline schedule?



The importance of schedule in project management

☐ This is also true of schedule updates;

approved updates contribute to project success through fewer disagreements as to the intent of the schedule,

in addition to providing the **basis for analysis**.

☐ Clearly, the as-planned portion of the schedules must model the **contractor's means and methods** of construction.

☐ The as-built portion must accurately represent the **history**, and the schedule

1. Must meet contractual requirements,
2. Must represent a **reasonable approach** to scheduling all work outside the contractor's **responsibility**

Who bears the risks of failing to approve schedules?



Who bears the risks of failing to approve schedules?

- ☐ From the owner's standpoint
- ☐ From the Contractor's standpoint

Who bears the risks of failing to approve schedules?

- ☐ From the owner's standpoint, if a **poorly developed schedule** is approved,
 1. It enables **opportunities for claims** that were set up by the as-planned or baseline schedule.
 2. It also **reduces the ability** of the schedule to act as the **basis for analysis** for both completion and delays.
 3. In addition, it may **accept requirements** for the owner, or the architect/engineer (a/e), to provide **resources for owner responsibilities**,
such as submittal review, that may **not have been contemplated**.

How the contractor could manipulate the schedule for its advantage?



Who bears the risks of failing to approve schedules?

- ✓ Missing scope
- ✓ Logic and activity duration manipulation
- ✓ Float suppression or sequestering
- ✓ Misuse of relationship types or lags
- ✓ Forced or predefined critical paths
- ✓ Misuse of calendars
- ✓ False early completion
- ✓ Out of sequence work
- ✓ Hidden or unrecognized stacked trade work
- ✓ Shortened review and response durations
- ✓ Concurrent delay creation or concealment



Who bears the risks of failing to approve schedules?

*No matter the reason, if these techniques are included in the as-planned schedule, the owner is at **risk for claims for additional time and costs.***

Who bears the risks of failing to approve schedules?

- ☐ From the contractor's standpoint, failure to gain schedule approval means
 1. There is **no approved basis** from which to measure **delays or disruption**.
 2. The **owner has not accepted** any owner-responsible work requirements, and the **likelihood** of proving entitlement to time extensions is reduced.
 3. The **risk of failing** to prove owner-caused delays or disruption is **greatly increased**, requiring a **significantly higher level** of contemporaneous documentation.

What options owner have while reviewing and responding?



Review and response options

❑ The following are the **most common options** used by owners for dealing with the baseline schedule and subsequent updates.

1. Require approval and reconciliation of comments
 - ❖ “Approved with comments” or “approved as noted,” should be the most desired response for a contractor
2. Require acceptance only
3. Require submission only
4. Not required owner involvement

How to improve this process or reviewing?



Review and response options

- ☐ The **best choice of the options** for schedule review is the **requirement of schedules** to
1. Be reviewed and approved by the **owner**,
 2. Supplying deficiencies in **comments**,
 3. **Comments** to be addressed by the **contractor** and resubmitted for **final approval**,
 4. With **both** processes performed **timely**

What are the rejection options?



Rejection options

- ☐ When the **owner specifications** require review and approval and the submittal does not meet the minimum requirements, the schedule submittal should be **rejected**.
- ☐ **Rejection options** vary according to how closely the submission meets the requirements.
 1. Contractual noncompliance
 2. Technical noncompliance
 3. Inclusion of information not available at contract award
 4. Schedule not appropriate

What are the reasons for failure to approve schedules?

Reasons for failure to approve schedules

- ❑ Those **problems** typically result from **poor modeling** of the project plan and include **misalignment** between:
 - ✓ The schedule and the written narrative.
 - ✓ Missing written narrative, missing scope of project work.
 - ✓ Under-development of specific trades compared to much more highly developed scope of other trades.
 - ✓ Critical or near-critical paths that include inappropriate high proportion of owner-responsible or third-party-responsible work activities.
 - ✓ Missing or inappropriate logic relationships.
 - ✓ Failure to include resource logic, network problems such as inappropriate use of lags.
 - ✓ Calendars, or dangling activities.
 - ✓ Cost loading problems. And,
 - ✓ Resource loading problems

What is the recommended process for project controls?

Recommended process for project controls

1. First, **require a bid or tender schedule** to be submitted for evaluation of the offer.
 - ❖ This **bid schedule** will show **if the contractor has planned** the project sufficiently for a **reasonable depiction** of their means and methods.
2. Next, set up the project for **partnering**, providing transparent **discussions about contract documents** and the **impact upon schedule**.
3. Then, **acknowledge** the existence of change orders and mandate a good process for dealing with them in a **timely fashion**.
4. Finally, **plan and pay** for a constructability review so that **missing information** from the **contract documents** can be supplied **before the contractor** is on the job.
5. Next, **careful development** of the scheduling specifications is vital.
 - ❖ Field documentation of **actual events and effort** is a vital part of this process.



Recommended process for project controls

The **final part** of this process includes **extensive scheduling efforts** on the part of the **CM** or owner to determine the extent of **liability** on the **part of the owner**.

What recommendations could be given for scheduling?



Scheduling requirement recommendations

1. Staff requirement recommendations
2. Project planning recommendations
3. Scheduling and contract specifications
4. Scheduling meetings to improve ability to approve schedule



Staff requirement recommendations

- ☐ Lack of experience
- ☐ **Insufficient exposure** to managing, sequencing, and revisions at the project level.
- ☐ **Requiring a minimum** of 5 to 8 years of experience
- ☐ **Technical qualifications** to perform CPM scheduling (not only the software)



Project planning recommendations

☐ Sufficient time for planning

- ❖ Issuing a contract and **notice to proceed** at the **same time** is incorrect
- ❖ The **procurement** process generally **starts with the NTP** and runs **concurrently** with the contractor's start up process.
- ❖ This would **force contractors** to start projects with **insufficient planning** and **bad schedules**.

☐ Hold off on the issuance of the NTP until

- ❖ A **competent and sufficient planning** process is complete.
- ❖ **Field staff understands** the project
- ❖ GC has **subcontractors and materials** on hand in the **pipeline**.

How to allow adequate time for schedule preparation?



Scheduling and contract specifications

- ☐ This can be done with requirements for a **two stage schedule submission**,
designed to get an **approved short interim schedule** in place early, and
allowing **time to develop** a more detailed full schedule.
- 1. Initial project schedule covering **first 120 days in detail** and the balance of the project at
a **higher summary level**
 - ❖ *Due in 30 to 60 days from NTP*
- 2. **Detailed project schedule** built upon the **initial project schedule** and providing full
details **for the complete project**
 - ❖ *Due in 60 to 120 days from NTP*

Scheduling and contract specifications

- ☐ Use also the **penalties** for failure to **submit approvable schedules** at both baseline levels and updates.
- ☐ Withhold **approval of invoices** or **payment** until the schedule is submitted and approved.
 - ❖ This is very **dangerous** unless.....
- ☐ **Careful specifications** that provide:
 - ❖ A clarification of the **required schedule level of detail**
 - ✓ Minimum number of activities, or coverage, or requiring cost loading in detail
 - ❖ Providing a **specific list** of required **activities**
 - ❖ A requirement for a **written narrative**
 - ❖ A requirement for **resource loading** using crews as a way to improve the resource planning

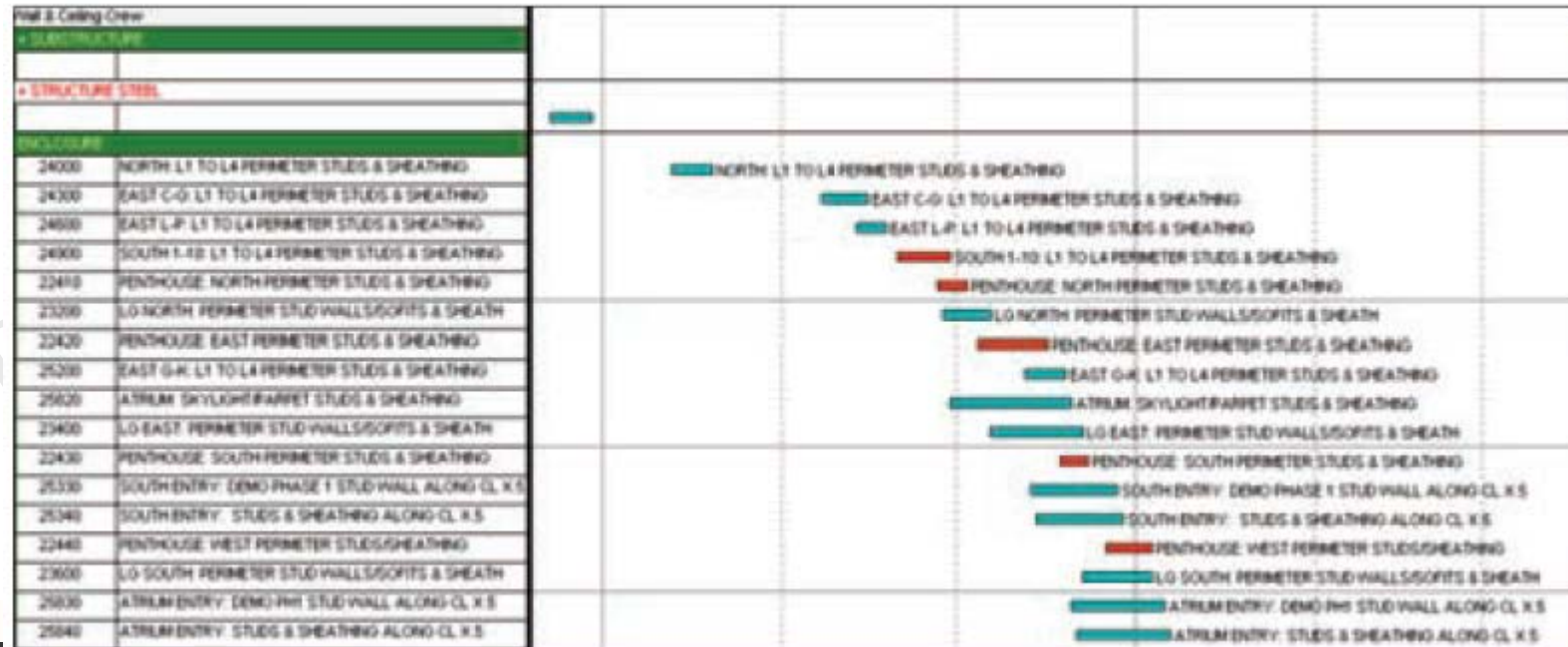
How to manage changes here?

Scheduling and contract specifications

- ❑ **One way to deal** with this is through the use of specifications that
 1. Separate and define **forensic analysis** for impacts that have **already been absorbed** into the schedule, and
 2. **Time impact analysis (TIA analysis)** for prospective impacts that have **not yet been absorbed**.
- ❑ In order to provide **good analysis**, the schedules have to be validated and cleaned up, so the quality improves with each delay analysis.
 - ❖ This makes it **more difficult for a contractor** to casually **choose a misleading** methodology such as the **impacted as-planned**.

Scheduling meetings to improve ability to approve schedule

- ❑ If the **preliminary schedule** is **reviewed immediately** upon submission
 - ❖ That **feedback** can be provided in a **short time** to allow the **contractor** to recognize that he needs to put **more effort** into the schedule.
 - ❖ This will lead to a **pre-scheduling meeting**.
 - ❖ This **feedback** can be **informal** and provide evidence of **legitimate concerns**.





Scheduling meetings to improve ability to approve schedule

- ☐ Hold a **risk workshop** by a team
- ☐ Generate **partnering atmosphere**
- ☐ Generate **informal discussions** of concepts as well as more **detailed discussions** about deficiencies.
- ☐ Discuss **concerns and the importance** of having schedules for **both parties**
- ☐ The **owner should be pleased** to allow and promote a **presentation of disputed issue** analysis in a working session **rather than just exchanging reports**.

What actions should be taken if a schedule cannot be approved?



Recommended actions when a schedule cannot be approved

1. Project actions
2. Scheduling actions
3. As-built schedule actions
4. As-built documentation
5. As-planned documentation

Project actions

- ❑ On the project, the **CM should mandate** the following specification requiring the higher level of project documentation and including resources and productivity,
for **any potential delays** that are not negotiated with a **prospective TIA**.
 - ❑ This is the **implementation** of the force account type specifications
for **contractor maintenance** and daily verification with the CM of costs and time.
 - ❖ It will take **additional time**.
- However it is the **best approach** to **validating the changed condition** when the work **must proceed**.

Why do we need this approach?



Project actions

- ❑ Since the contractor will be billing actual costs and time,
it becomes **much more important** to **collect accurate daily records**.
- ❑ The goal is to **require sufficient documentation** to define delays and at the same time
to **encourage prospective TIA** analysis, since that is **much easier** on the
contractor's administration.

It requires good schedules to create the analysis benchmark.



Scheduling actions

- ☐ Careful identification of **major discrepancies** in the schedule.
- ☐ Good documentation **providing reasons** why it is unacceptable
- ☐ Include **summarized list** to make it easy to **correct the problems** and resubmit it again

What CM should do if the schedule cannot be approved?



Scheduling actions

- ☐ Implement the **separate forensic process** for delays that already absorbed into the schedule in the **as-built portion**.
- ☐ The **CM or owner's agent** must take **serious steps** to protect the owner's interests.

Why?

Scheduling actions

Why is this important?

- ☐ When records are not clear enough, the contractor can **assert owner liability and claim excessive damages**.

When does it happen?

- ☐ Contractor **refuses to revise** the schedule to address the deficiency list.

How much does it cost?

- ☐ The **costs to resolve** these types of disputes, when there is no approved schedule, will be considerably higher than necessary.

Why?

- ☐ Because the **claims are large and poorly documented** to be used in negotiation.

What actions should be taken here?



Scheduling actions

- ☐ **Additional steps** should be taken to document and protect the schedule
- ☐ These other schedule actions **break down** into those that deal with
 1. **As-built portion** of the **project schedule update**
 2. Those that deal with the **as-planned portion of the update**

As-built schedule actions

- ❑ Once schedule **cannot be used** to document, there is a **risk of the contractor attempting** to create a false history of the project.
- ❑ This is **often seen in changes** in the as-built side of the schedule in the actual dates of started or completed activities from one **schedule update to another**.
- ❑ This is a **dangerous situation** and it takes a serious effort at **capturing actual data** to position the owner to **prove the facts and halt efforts** to confuse the issues.

What steps should be taken here?



As-built schedule actions

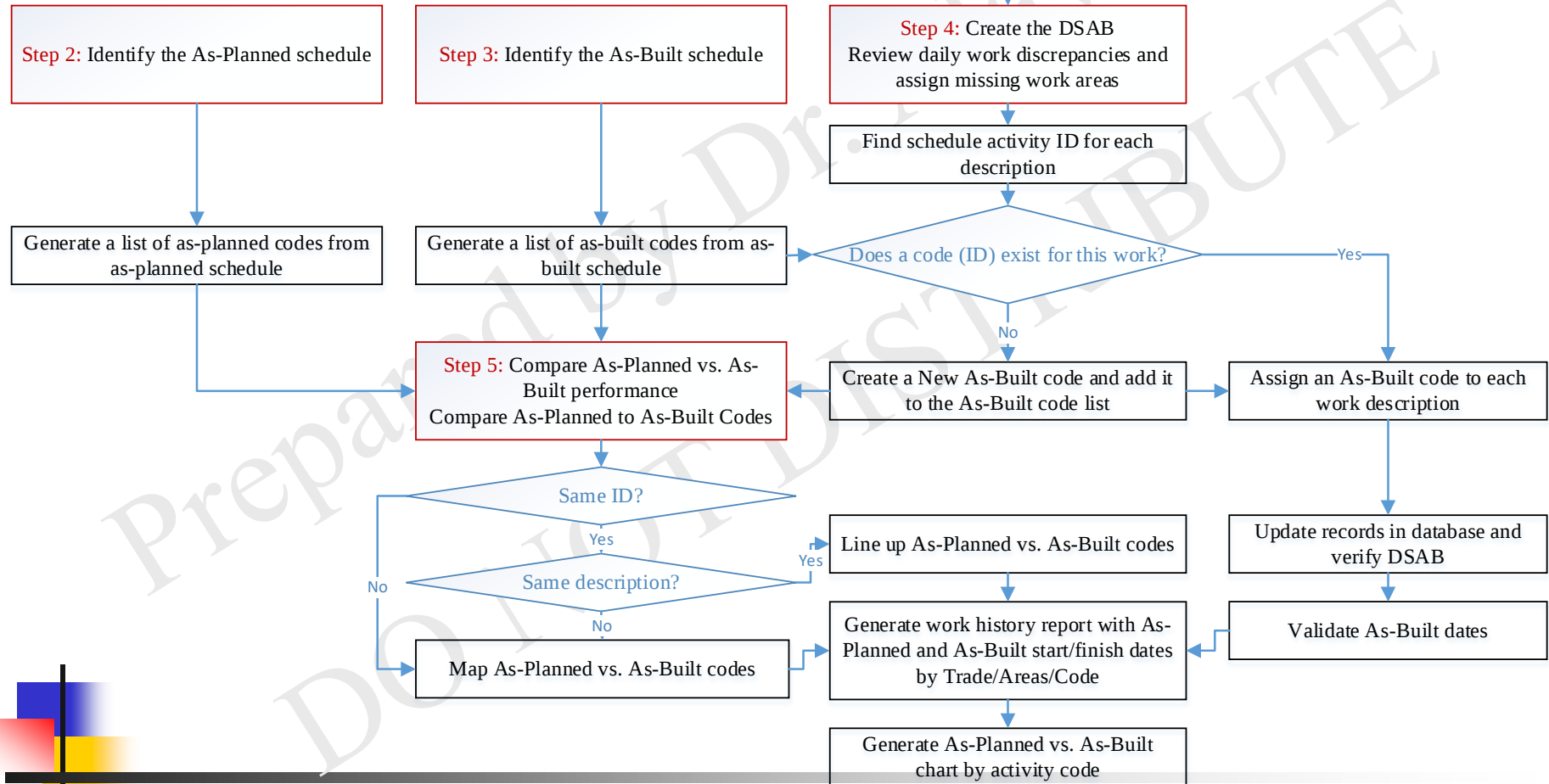
- ❑ The **first step** in this **as-built effort** is to **develop and maintain a daily record** of progress, called a daily specific as-built (DSAB) record, for use in the **forensic analysis**.

The DSAB is time consuming, but with a good system, can be accomplished.

- ❑ The benefit of this effort is that it **captures contemporaneous information** from daily project records, at the time of the daily records.
- ❑ This **allows for clarification and verification** of the data, so as the DSAB is advanced through the project, the **data is validated**.

As-built schedule actions

- ❑ Paper published in Cost Engineering, Volume 50/No. 3 March 2008, by Svetlana Lyasko, called, "Daily Specific As-Built in As-Planned vs. As-Built Schedule Analysis"



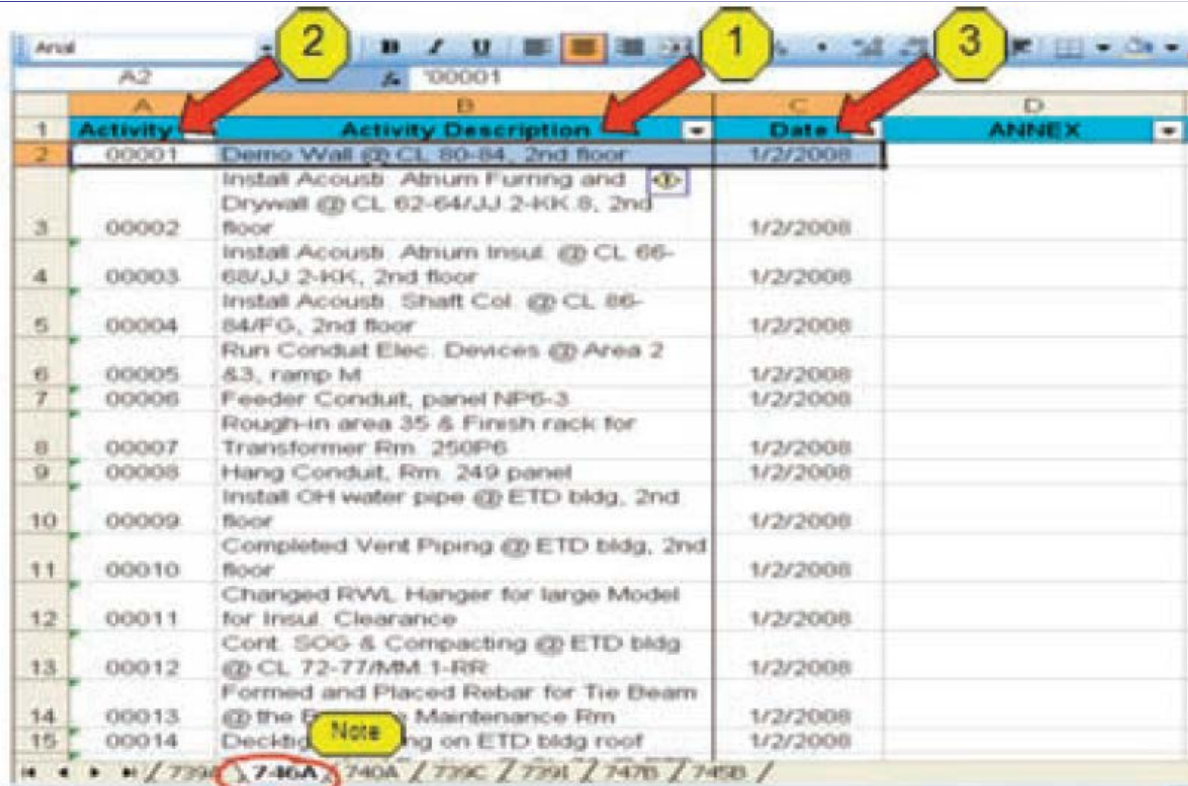
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As-built schedule actions

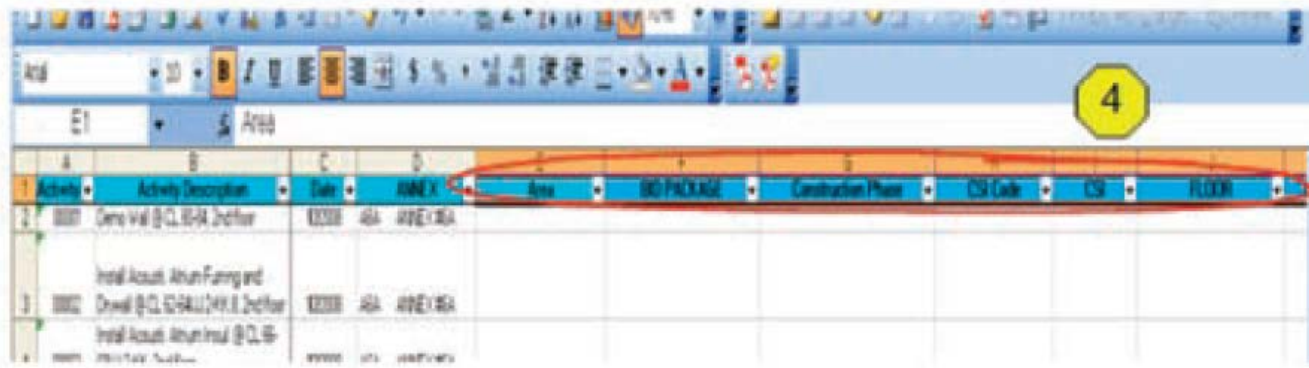
Title:	Inputting Daily Reports into As-Built
Purpose:	Record Daily Reports
Date Created:	30 June 2008
Author:	Aaron Fletcher
Date Revised:	1 July 2008
Revised by:	Mark Herbert

1. Record **daily reports** entry into **separate rows** into the Excel spreadsheet under the “**Activity Description**” column.
 - a) Note: **each projects** is labeled under a **separate tab**, and therefore each daily report will need to be filled in accordingly.
 - b) Note: If an **entry contains two different areas**: then a **separate row** will need to be added with the **same description** unless different
2. An activity ID number will be required for each line item.
3. Record the date of the daily report under the “Date” column in the spreadsheet.
4. Next, the activity codes will need to be assigned to each entry.
 - ❖ Annex, area, bid package, construction phase, CSI code, floor, general area, major project, etc.

As-built schedule actions



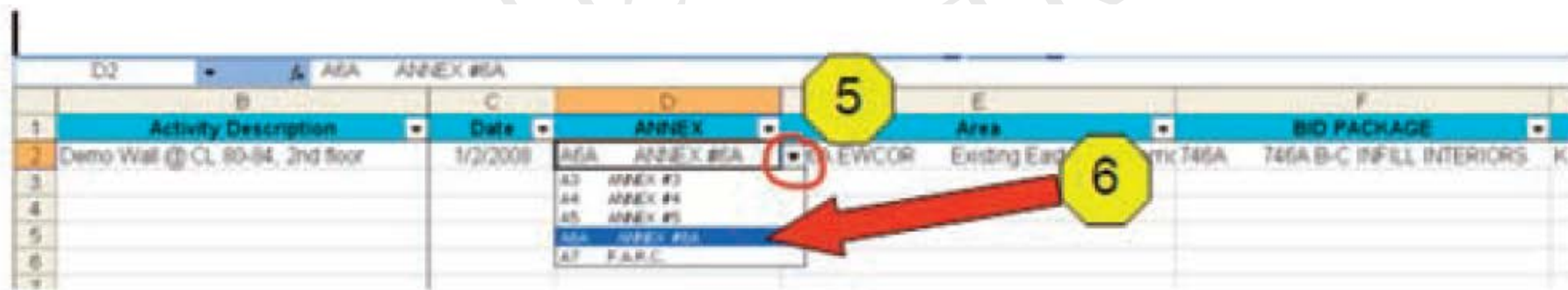
Activity	Activity Description	Date	ANNEX
00001	Demo Wall @ CL 80-84, 2nd floor	1/2/2008	
00002	Install Acoust. Atrium Furring and Drywall @ CL 62-64/JJ 2-KK 8, 2nd floor	1/2/2008	
00003	Install Acoust. Atrium Insul. @ CL 66-68/JJ 2-KK, 2nd floor	1/2/2008	
00004	Install Acoust. Shaft Col. @ CL 66-64/FG, 2nd floor	1/2/2008	
00005	Run Conduit Elec. Devices @ Area 2 & 3, ramp M	1/2/2008	
00006	Feeder Conduit, panel NP6-3	1/2/2008	
00007	Rough-in area 35 & Finish rack for Transformer Rm. 250P6	1/2/2008	
00008	Hang Conduit, Rm. 249 panel	1/2/2008	
00009	Install OH water pipe @ ETD bldg, 2nd floor	1/2/2008	
00010	Completed Vent Piping @ ETD bldg, 2nd floor	1/2/2008	
00011	Changed RWL Hanger for large Model for Insul. Clearance	1/2/2008	
00012	Cont. SOG & Compacting @ ETD bldg @ CL 72-77/MM 1-RR	1/2/2008	
00013	Formed and Placed Rebar for Tie Beam @ the ETD Maintenance Rm	1/2/2008	
00014	Decking on ETD bldg roof	1/2/2008	



Activity	Activity Description	Date	ANNEX	Area	DC/PACKAGE	Construction Phase	CSI Code	CSI	ROOM
00001	Demo Wall @ CL 80-84, 2nd floor	02/08	84	AREX-84					
00002	Install Acoust. Atrium Furring and Drywall @ CL 62-64/JJ 2-KK 8, 2nd floor	02/08	84	AREX-84					
00003	Install Acoust. Atrium Insul. @ CL 66-68/JJ 2-KK, 2nd floor	02/08	84	AREX-84					

As-built schedule actions

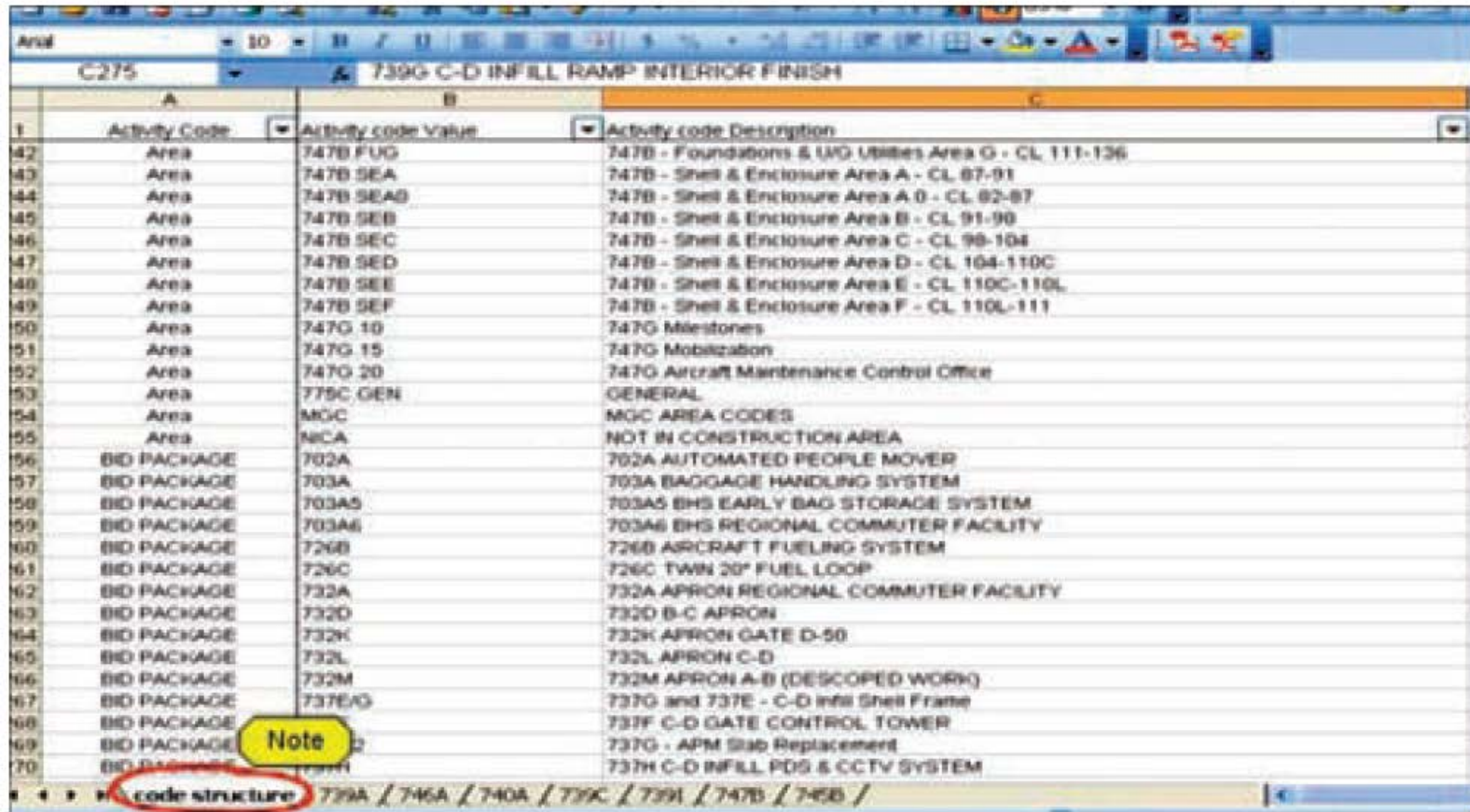
- ❑ The **database or spreadsheet** is then **used to capture data used to create records** for each line item that eventually can become coding similar to the activity codes used to organize schedules.
- ❑ This **coding is aligned** with the schedule activities so that this data can be **imported into a schedule and compared to activities** in the project schedule.



	D2	A	AAA	ANNEX #5A	
	B	C	D	E	F
	Activity Description	Date	ANNEX	Area	BID PACKAGE
1					
2	Demo Wall @ CL 80-84, 2nd floor	1/2/2008	5A ANNEX #5A	LEV COR Existing East	745A 745A B-C INFILL INTERIORS
3			A3 ANNEX #3		
4			A4 ANNEX #4		
5			A5 ANNEX #5		
6			5A ANNEX #5A		
7			A7 F.A.R.C.		

As-built schedule actions

- ☐ Then the **DSAB** is **fleshed out** with all the data necessary to **create and assign codes**.
- ☐ Once it is **fully populated**, the data is **imported into the schedule**.



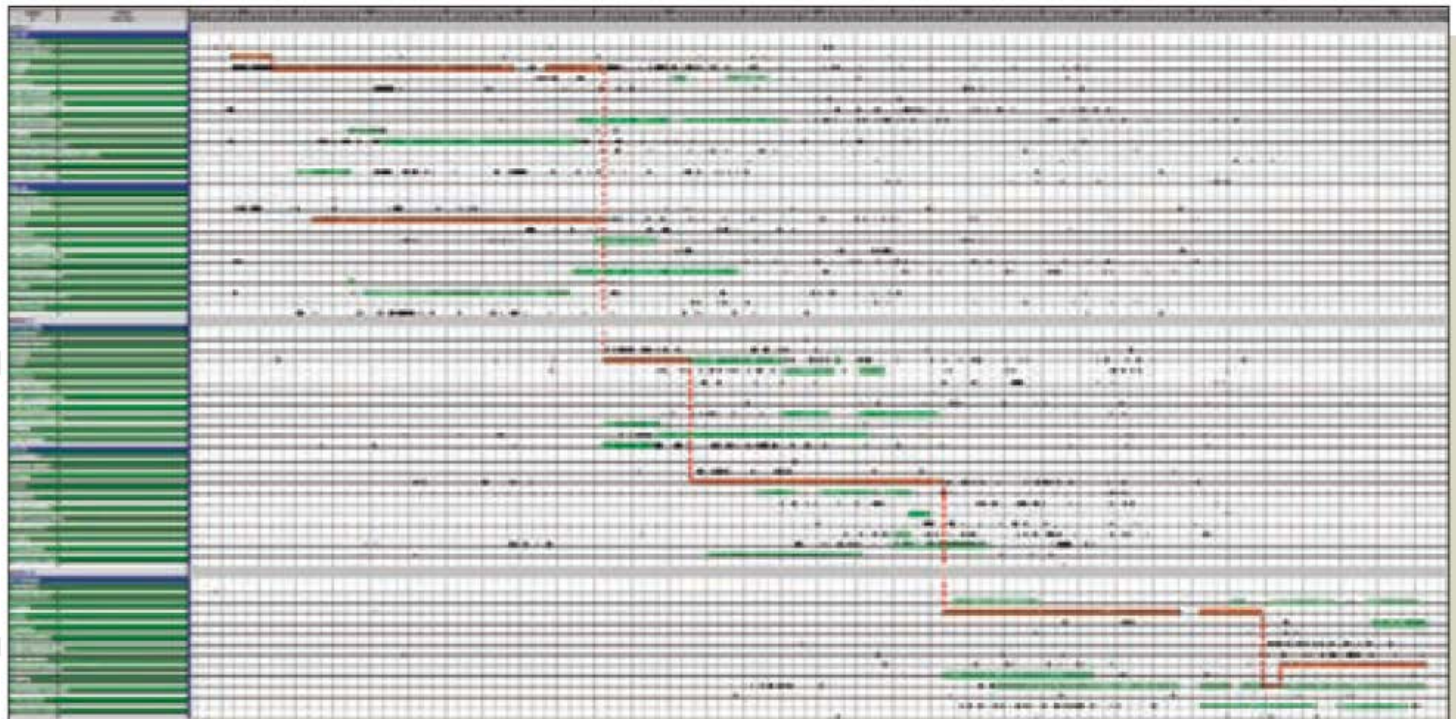
	A	B	C
1	Activity Code	Activity code Value	Activity code Description
42	Area	747B FUG	747B - Foundations & UFD Utilities Area G - CL 111-136
43	Area	747B SEA	747B - Shell & Enclosure Area A - CL 87-91
44	Area	747B SEAB	747B - Shell & Enclosure Area A B - CL 82-87
45	Area	747B SEB	747B - Shell & Enclosure Area B - CL 91-99
46	Area	747B SEC	747B - Shell & Enclosure Area C - CL 99-104
47	Area	747B SED	747B - Shell & Enclosure Area D - CL 104-110C
48	Area	747B SEE	747B - Shell & Enclosure Area E - CL 110C-110L
49	Area	747B SEF	747B - Shell & Enclosure Area F - CL 110L-111
50	Area	747G 10	747G Milestones
51	Area	747G 15	747G Mobilization
52	Area	747G 20	747G Aircraft Maintenance Control Office
53	Area	775C GEN	GENERAL
54	Area	MOC	MOC AREA CODES
55	Area	NCA	NOT IN CONSTRUCTION AREA
56	BID PACKAGE	702A	702A AUTOMATED PEOPLE MOVER
57	BID PACKAGE	703A	703A BAGGAGE HANDLING SYSTEM
58	BID PACKAGE	703AS	703AS BHS EARLY BAG STORAGE SYSTEM
59	BID PACKAGE	703AS	703AS BHS REGIONAL COMMUTER FACILITY
60	BID PACKAGE	726B	726B AIRCRAFT FUELING SYSTEM
61	BID PACKAGE	726C	726C TWIN 20" FUEL LOOP
62	BID PACKAGE	732A	732A APRON REGIONAL COMMUTER FACILITY
63	BID PACKAGE	732D	732D B-C APRON
64	BID PACKAGE	732K	732K APRON GATE D-50
65	BID PACKAGE	732L	732L APRON C-D
66	BID PACKAGE	732M	732M APRON A-B (DESCOPE WORK)
67	BID PACKAGE	737E/G	737G and 737E - C-D Infill Shell Frame
68	BID PACKAGE		737F C-D GATE CONTROL TOWER
69	BID PACKAGE		737G - APM Slab Replacement
70	BID PACKAGE		737H C-D INFILL PDS & CCTV SYSTEM

code structure 739A / 746A / 740A / 739C / 739A / 747B / 746B /

DASB - Final Spreadsheet Data Ready for Schedule Import

As-built schedule actions

- ❑ The data, **once imported**, provide the as-built schedule, showing where the work was done and when.
- ❑ Sometimes it is **easy to identify** the flow of work, but more often it requires judgment to make the **determination of what drove the schedule delays**.



As-built schedule actions

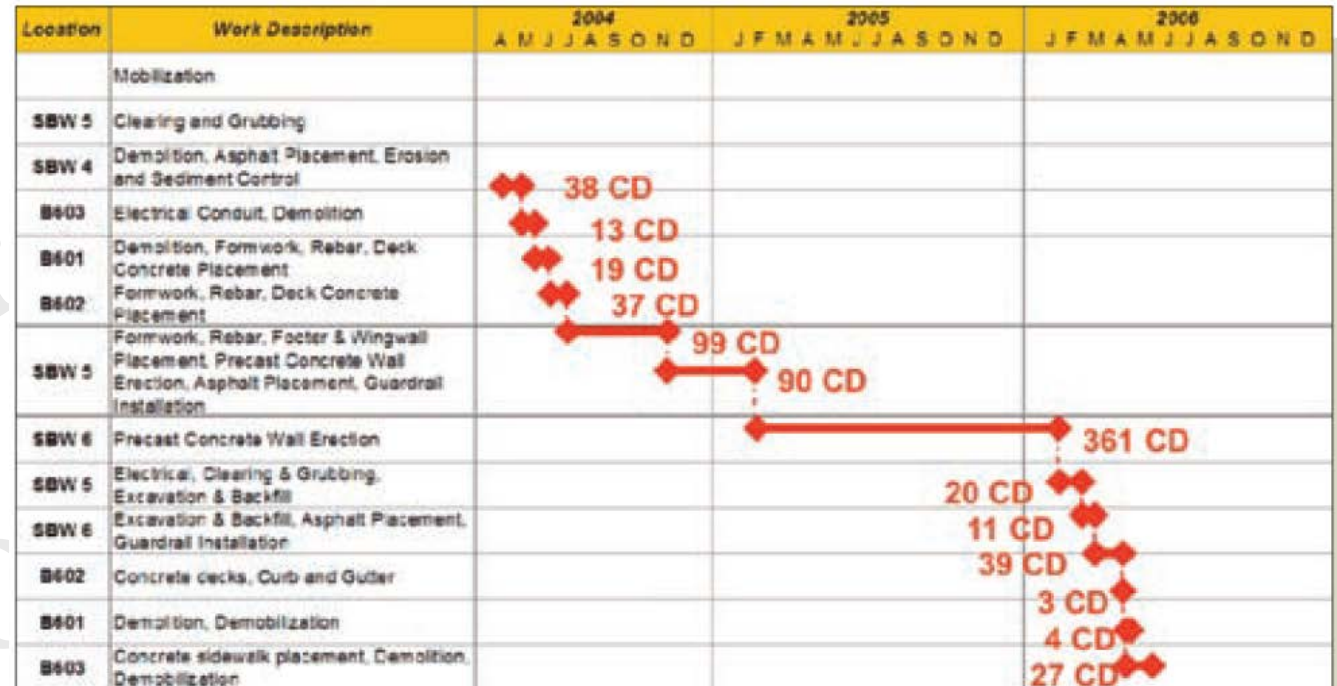
- ❑ This **development process** for the DSAB, while time **consuming**, is **very effective** when negotiating or litigating the claims from the contractor.
- ❑ Since **claims related** to project schedules that were **never approved** tend to be **very large**, the typical risk to the owner is losing the case because the **contractor simply assembles a large amount of delay documentation** that is really just a thick issue log data.

Carson has had very good success with this process and used it successfully to provide a reasonable and appropriate analysis that is fair to all parties.

What if the negotiations fail?

As-built schedule actions

- ❑ If the **negotiations fail**, the owner is in a **very strong position** to go to formal dispute resolution.
- ❑ **No data** is as **powerful in litigation** as the contemporaneous data.
- ❑ This path can be **summarized** and **represented simply** in order to facilitate discussions and negotiations.



As-built schedule actions

- ☐ The time performance ratio or missed starts and finishes are good data to secure and **use in analysis.**
- ☐ When the **contractor routinely misses** his or her planned durations, it is **clear** that this **has an effect** on performance and completion.

What if it can be shown that no delays are because of the duration overruns?

As-built schedule actions

- ☐ **Production inefficiencies** or **disruption** from resource problems.

What is time performance ration (TRP)?



As-built schedule actions

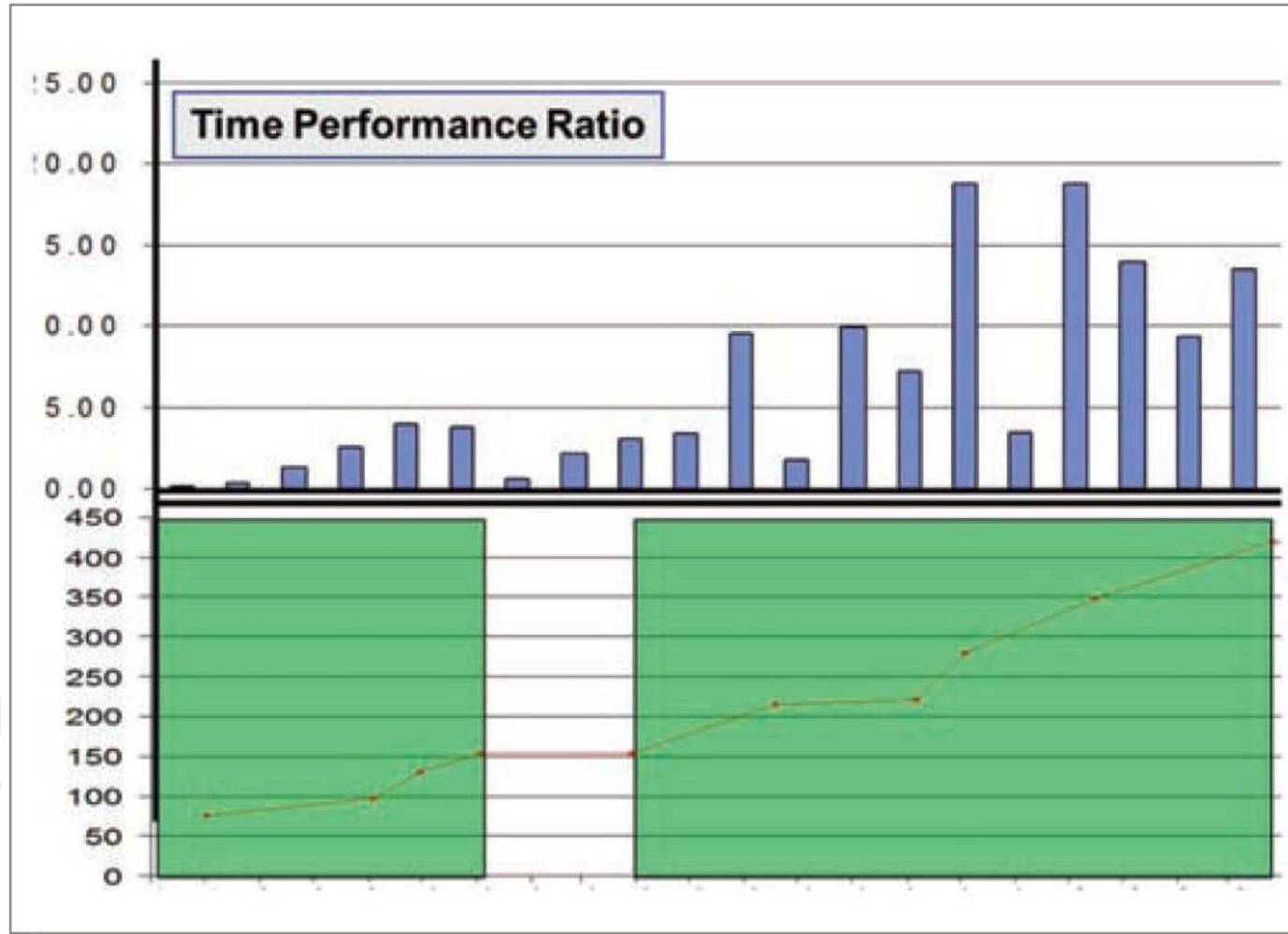
- ❑ The **time performance ratio (TPR)** can be plotted to show the effects on certain areas, or by trades, or by other codes,

but **when there is failure** to make production, it is **hard to argue** that the project was **staffed correctly**.

*Most projects do not have the luxury of producing planned resource levels so there is **no opportunity** to provide this type of **powerful comparison**, and*

*a **TPR report can fill the voids** from that documentation.*

As-built schedule actions



TPR Comparison with Cumulative Delay Chart



As-built documentation

- ☐ It is **imperative** that accurate **as-built data** is collected from project records and validated.
- ☐ This information should be **documented in a format** to **support meeting** with contractor.
- ☐ **Graphics** are strong convincers in **disputes**, and with proper as-built documentation, the combination will help resolution.

Is it the only documentation we need?

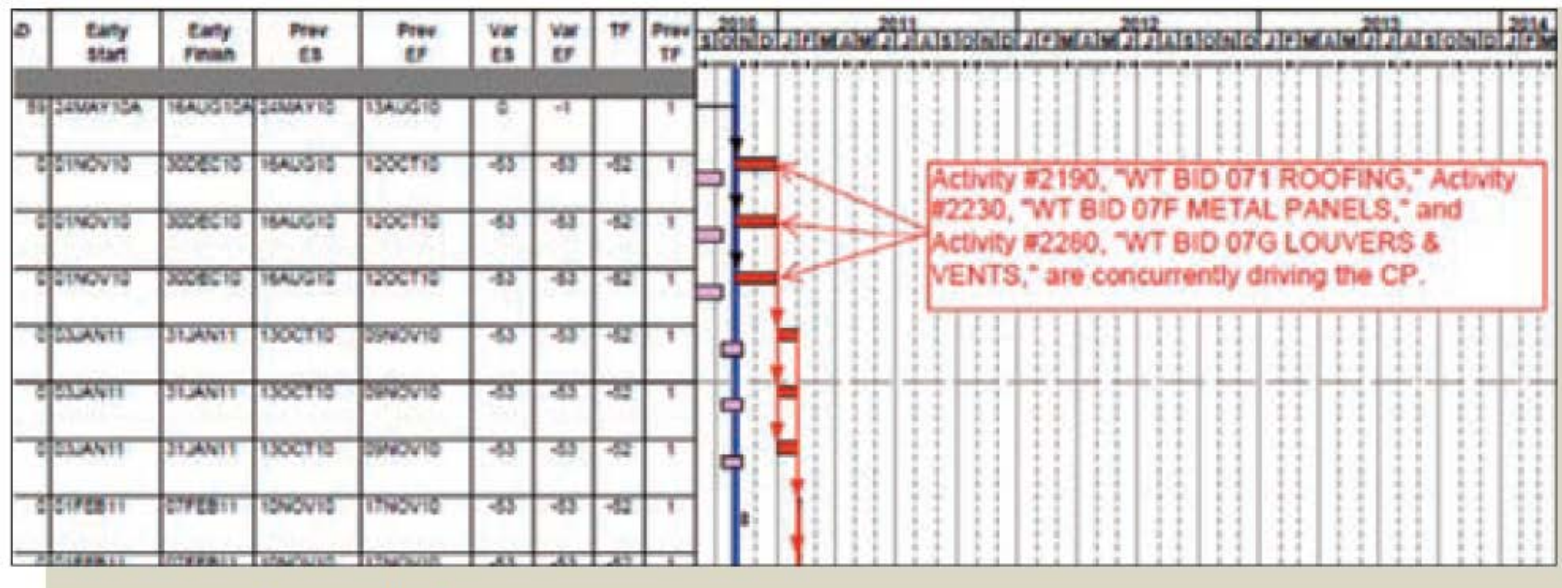
As-planned documentation

- ☐ While the **as-built documentation** is important to show what actually happened, it is also important if the **analyst can produce** an as-planned analysis to show what the plan actually was, and how it changed period-by period by the contractor.
- ☐ If the **contractor's schedule updates** do not provide the accuracy to do this, it is helpful to have a series of schedules that do represent the **dynamic schedules**.

How?

As-planned documentation

- ❑ One way is to create a **separate set of schedules** incorporating revisions to correct discrepancies that were **identified and rejected** in the schedule review comments.
- ❑ **Document how** discrepancies are incorporated in these revised schedules because they are **no longer the contemporaneous** project schedules.



— Revised “Approvable” Schedule Critical Path Presentation

How could we use these schedule series?



As-planned documentation

- ☐ Document the difference in the critical path between contractor's unapproved schedules and revised "fixed" schedules.
- ☐ The results can be compared to the DSAB results, and that will provide some level of proof that the original schedules are meaningless or less than useful.

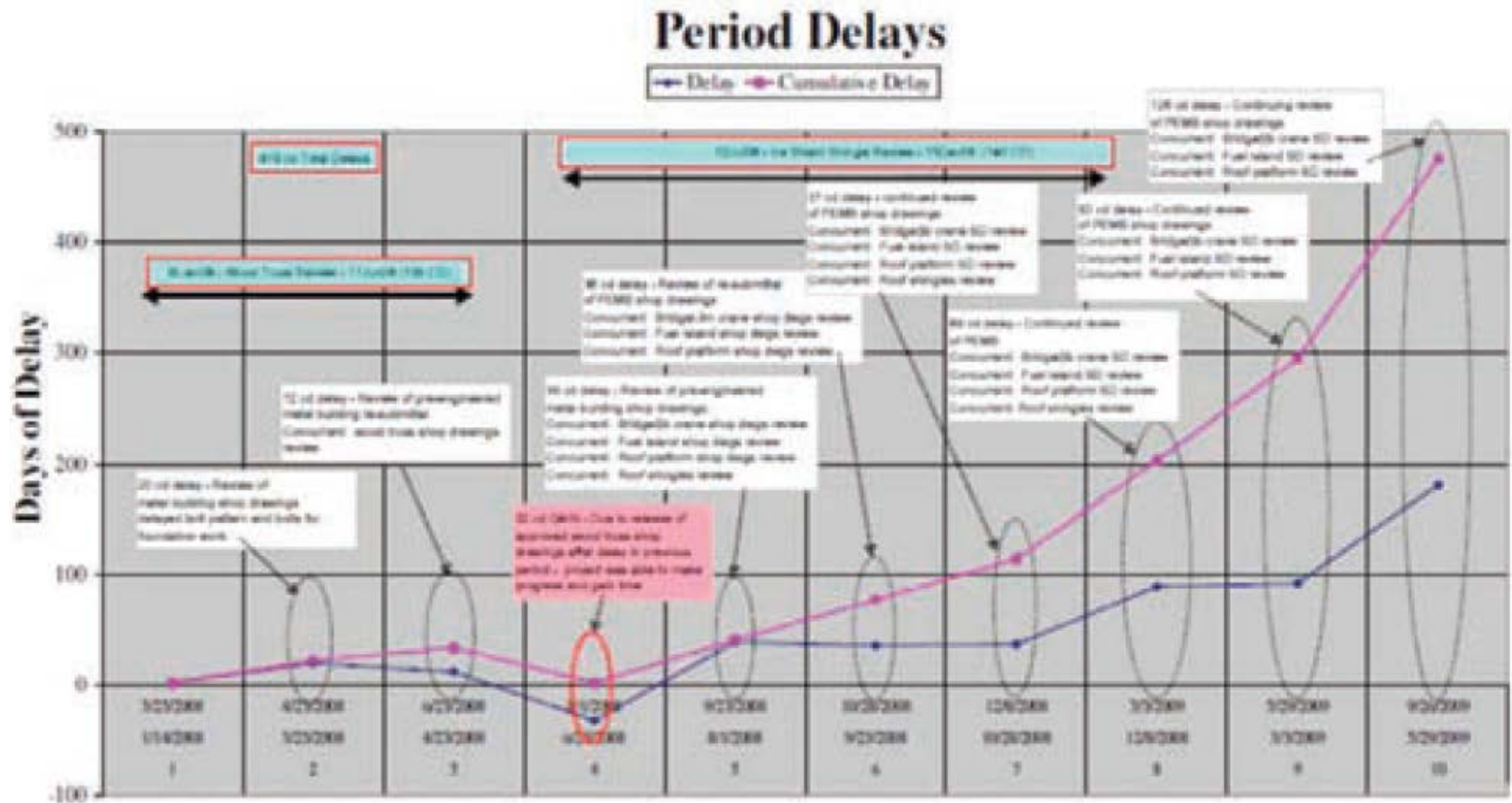
How could we improve keeping records?

As-planned documentation

- ❑ Use **schedule log** to generate a cumulative delay chart.
- ❑ This is used to **input and track** a certain amount of **summary data** on each schedule update.
- ❑ It is recommended to **use this to track** the predicted delays when the schedules are **reasonable and appropriate**.
- ❑ The **revised schedule updates** can be carried in the **schedule log** and used to **record the cumulative delay** in the as-built schedule.

Class Code	Site Name	Start Date	End Date	Study Date	Activity Code	Global Location	Class Only	Cycle/Week (Site ID)	Project/Week (Site ID)	Intensity, Watt (W)	Notes
1	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	29	0	70%	407	407	Intensity 20, 2003
	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	180	31	1	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	10	10	422	239	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	1	10	407	407	Intensity 20, 2003
2	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
3	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
4	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	6-04-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003
	15-Aug-19	15-Aug-19	15-Aug-19	25-Aug-19	179	31	0	70%	407	407	Intensity 20, 2003

As-planned documentation



Annotated Cumulative Delay Chart

Analysis

- ☐ This analysis should **identify** the **differences** between
 1. Unapproved submitted schedules
 2. Corrected/revised schedules

- ☐ Often, the **unreasonableness of the impact** from the mistakes in the **original submitted schedules**

helps show **how the contractor unreasonably refused** to fix the egregious problems that **rendered the schedules unusable**.

What should be done when analysis is done?



Meet and present

- ☐ **Meet with the contractor and present the results of schedule**
- ☐ Have an open and frank discussion.
- ☐ It helps **undermine the faulty schedules** along with any analysis performed by the contractor using **those faulty schedules**.

The intent is to show how the revised schedule analysis (incorporating discrepancy revisions) aligns with actual project data in the as-built analysis.

Conclusion

- ❑ These steps will put the owner in a strong position even **without** **approvable schedules**, and build the **documentation during the project**
so as to **encourage the contractor** to improve the quality of the schedules.
- ❑ The goal is to **use the data** to meet with the contractor, convince them to cooperate, fix the schedules, convince them that documentation is a strong rebuttal to loose/inaccurate claims.
- ❑ It also shows that the **owner's analysis process** is accurate and convincing.

Once convinced, the contractor is more likely to provide approvable schedules, and to accept the reasonableness of the suggested settlement.



General industry actions to improve scheduling

- ☐ Providing training in the industry to improve the **quality of schedules**.
- ☐ **Referring contractors** to quality scheduling consultants.
- ☐ **Engaging** in respected industry certifications that are based on **expertise**.
- ☐ Industry involvement to **define and raise** the level of **good practices for scheduling**.
- ☐ Promoting membership in the relevant and **useful association**
- ☐ Helping the owner to develop a **schedule-driven culture**.

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

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