

Automated Development of As-Built Construction Schedules

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Project Controls Track

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The point of this presentation is:

Use the information you already get from inspectors to produce a record of the actual schedule performance as accurate (if not more) than the contractor's own "internal" numbers.

What is an “As-Built” Schedule?

- Let’s start with an “as-planned” schedule:
 - Defined activities with realistic durations
 - Proper predecessor and successor logic between activities
 - Overall start (or finish) dates
 - Calculated start and finish dates for activities
 - Usually loaded with cost or quantities

An “As-Built” Schedule

- Actual Start and Finish Dates for each activity
- Sometimes actual quantities or cost
- Theoretically used to evaluate the performance of the contractor or to defend against (or support) delay claims

Why Do We Hate Doing As-Built Schedules?

- Usually prepared in haste at the end of the project
- Seems like extra work
- Start and stop dates usually subjective based on people's memories
- Rarely reflects actual production rates or multiple starts and stops on activities

How Can We Make This Process Easier?

- Use data that is already collected on a typical job.
- Keep up to date with actual quantities done each day for each activity.
- Make the computer (i.e. the relational database) do the work for you

What Is Already Collected By Inspectors on Projects?

- It varies from State to State, but usually:
 - Date (on the inspection form)
 - Work on job (usually in narrative language)
 - Equipment
 - Labor
 - Pay Items for work (which has a unit cost)
 - Quantity of each pay item
 - Location of each paid item of work

What Information Can Be Used With The Schedule?

- Date – the actual date of the work
- Pay Item – these are usually tied to specification and have a unit price and unit of pay for each one.
- Quantity – ideally this would be the quantity that was completed to specification that day

What Extra Information Do We Need?

- Project Activity ID – the schedule activity that the work fell under.
- Location – not the long written narrative location, but something that can be processed, such as Station and Offset, or Northing and Easting for project with multiple alignments.

Example Data Collection

Date					From	To		
Pay Item	Unit	Quantity	Description	Location and/or Activity ID & Desc	Station	Offset	Station	Offset
0455- 88-3	LF	30	D. S. 36" Dia	B03SU4 - Bridge 3 Substruc Pier 4	134+50	40 LT		
0430-98-2125	EA	1	MES, OR, 18" CD	CD00024 - Cross Drain #24	139+75	60 LT		
0430-98-2125	EA	1	MES, OR, 18" CD	CD00024 - Cross Drain #24	139+75	60 RT		
0430-17-2101	LF	120	Pipe, Opt, 0-24" CD	CD00024 - Cross Drain #24	139+75	60 LT	139+75	60 RT

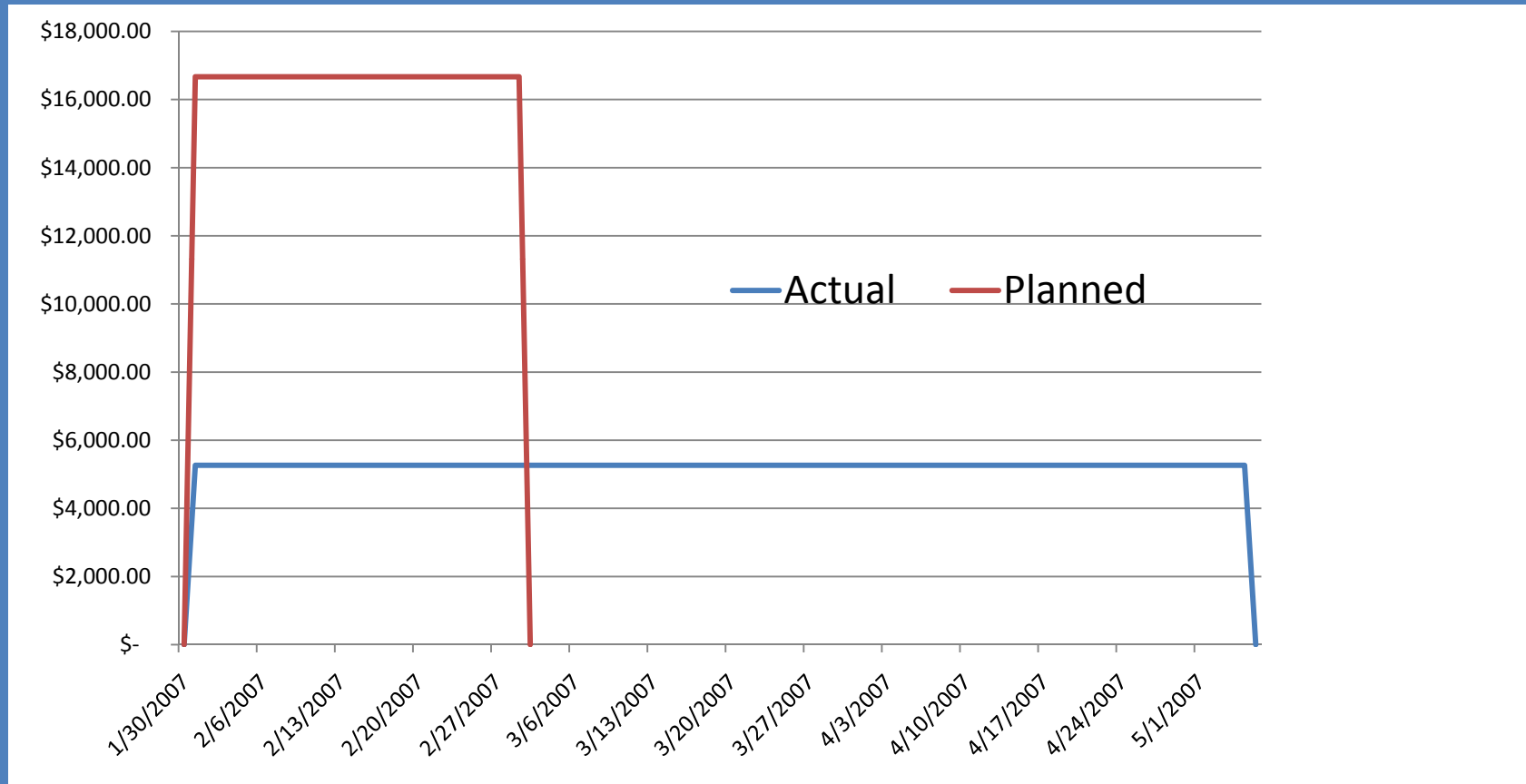
Why Is The Activity Number So Important?

- Each Activity Usually Has:
 - A unique ID number
 - A cost loading (earned cost)
- Inspection Data With Activities Will:
 - Roll up pay items costs to activities
 - Capture dates and quantities on each activity

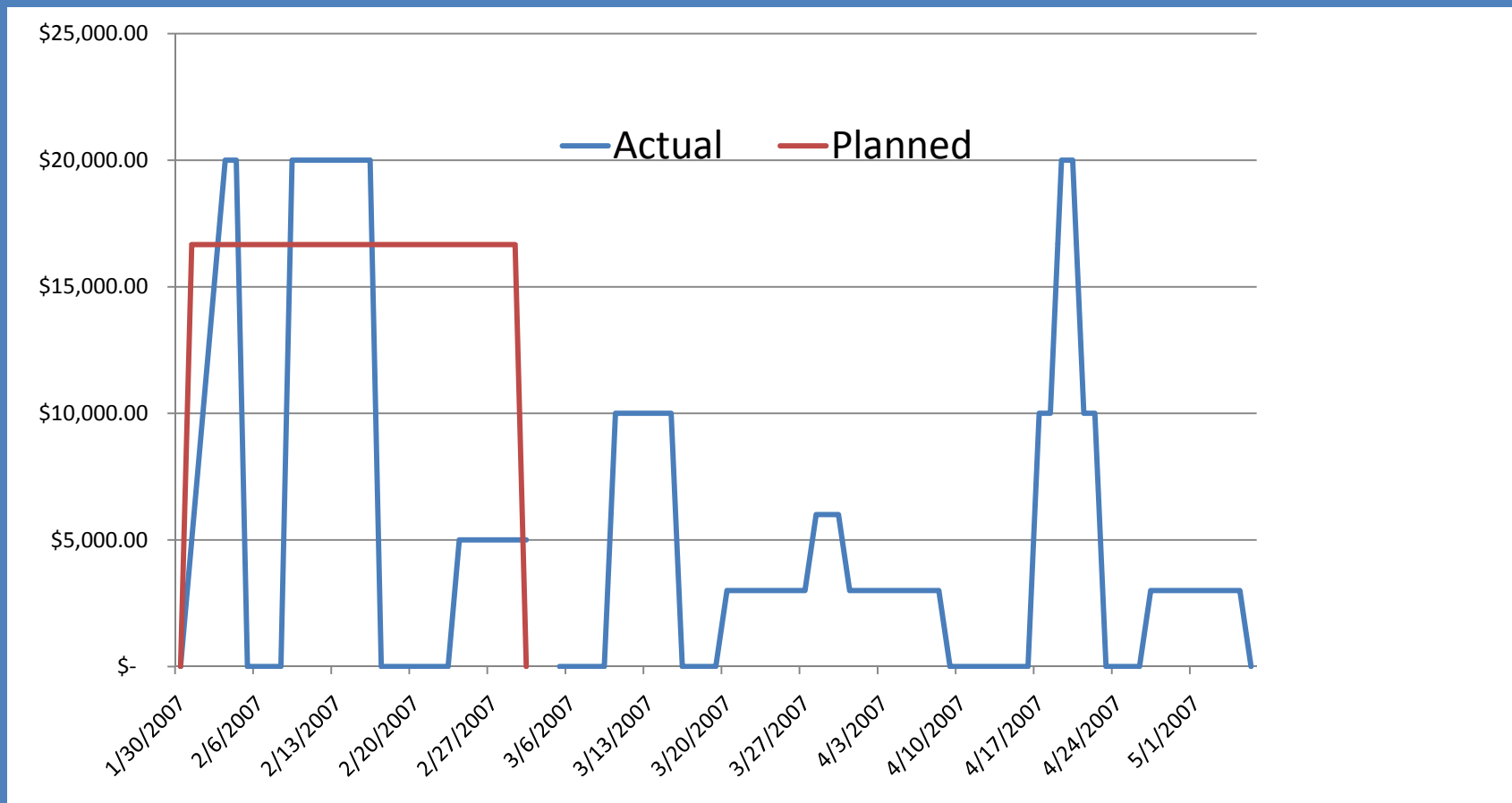
How Will This Help?

- Consider typical “as-built” project data:
- B03SU4 – Bridge 3 Substructure Pier 4
 - Start Date – 1 Feb 07
 - Original Duration – 30 Days
 - Total Float – 60 Days
 - Budgeted Cost - \$500,000
 - Actual Duration – 95 Days

Might Look Like A Reduced Production Capability Claim



Actual Data Shows Inconsistent Effort Towards Activity



What If An Activity Has Multiple Pay Items?

- This is typical. That's why it's best to compare the dollars earned for each activity for each day against the activity's budgeted cost.
- Data for each pay item can still be analyzed separately.

What About Partial Work Under A Single Pay Item?

- Sometimes work is “partially” paid under a pay item at different dates. Examples may be pipe excavation, pipe bedding, pipe, and pipe backfilling and compaction all paid under PIPE by the linear foot.
- It would be confusing to report 20 feet of pipe when it was 100 feet of excavation and bedding paid at 20%

Breaking Out Pay Items into Subitems of Work

- It may be possible for a Project Engineer to create “interim” items for tracking work paid under a single pay item
- Example:
- 1104 RCP Pipe, 48” Dia, \$200 per LF (bid)
 - 1104A Excavation \$30 per LF (est.)
 - 1104B Bedding \$20 per LF (est.)
 - 1104C Pipe \$100 per LF (est.)
 - 1104D Backfill and Compaction \$50 per LF (est.)

“Interim” Items Can Be Useful

- Tracking types of work more detailed than the contract pay items.
- Eliminating confusion about what’s been paid for (was it 20 feet of fully installed pipe or 100 feet of pipe excavation and bedding?)
- May be limited by standard software (would SiteManager allow it?)

Has This Approach Been Done Before?

- In Parts....
 - Some of this was prototyped on projects in Virginia in the early 90's and in Florida in the late 90's.
 - A variation is currently being used on a Kansas City Design-Build to track Quality Audits against cost-loaded schedules, but there is no quantity tracking.
 - No doubt someone else has done it as well....

Did It Work?

- Sure did. Back when I was an Office Engineer for a CEI firm on I-95 in Northern Virginia, the prime's subcontractors used to ask for printouts of the inspector's data every week because they trusted those numbers more than their own superintendants.

My Advice

- Focus on the raw data needed. Don't get hung up on the software.
- When you establish what data you need, make the software work for you. If it doesn't allow you to do what you want, get a tool that does.
- If you're locked into software that won't adapt to your needs, set up an offline system that uses data directly from your official software.

Available by email...

- Proposal I did ten years ago updated into a “paper”. The technology has advanced since then but the basic concepts are the same.

Questions?

For Further Information Contact...

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