DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

Date: **17 April 2023**

Subject: [redacted] **– Dynamic versus As-planned v As- built Critical Path Delay Analysis**

1. Introduction

2. This paper briefly advises how the P6 data from the [redacted] Contract between [redacted] was used to perform an As-planned v As-built Delay analysis to determine the factual As-built critical path compared to the Dynamic critical path that the P6 output provides (which is a forecast of any as-planned for activities to the right of any programme update data date and therefore is not fact).

3. The data was entirely taken from the P6 XER files provided by Target. The data has not been modified or changed in any way and is "as is". The data used to produce the APAB delay analysis is therefore exactly as per the data contained in the approved Baseline P6 file and likewise exactly the same as the data contained in all the P6 XER updates which were provided to the Employer's Representative. These programmes were submitted as Monthly progress programme updates that accompanied the monthly progress reports.

4. The Problem,

5. Primavera P6 produces critical paths based on a forecast of as-planned for activities still to complete and therefore any critical path analysis derived from Primavera P6 software can only provide forecast theoretical statements of criticality. The critical forecast statements Primavera P6 produces are not factual.

6. Retrospective Time Impact Analysis and why As-planned v As-built Delay Analysis is more Factual

7. It is often the case that Time Impact Analysis (TIA) is employed to determine critical delay. TIA should be employed contemporaneously. However, TIA used retrospectively has many shortfalls. There are several problems with Time Impact Analysis delay analysis applied retrospectively (see "Retrospective TIAs: Time to Lay Them to Rest" - John C. Livengood, PSP).

8. The main criticism of TIA analysis either performed prospectively or retrospectively is as follows:

"The critical path in a TIA is always a projection of what may occur. The TIA critical path is a series of forward-looking critical paths. For example, if the TIA is done on a monthly basis, the critical path for the first month of the project is the projected critical path as of Notice to proceed (NTP). The critical path for the second month is the projected critical path calculated at the end of the first month looking forward. In this manner, the TIA critical path is never actually what happened, but is always a projection of what is anticipated to happen. Assuming the TIA was done in the best manner possible, this forward-looking critical path will usually be close to the actual critical path unless significant changes occurred during the course of a month. If significant changes to work on the project did occur, then the proper TIA methodology would be to perform a new TIA snapshot at the time of the change so the alterations in the critical path more closely reflect the timing of the events.

This raises another potential problem with TIAs. If the periods used for the TIA are too long, even if regularly occurring, they may be missing key changes that could affect the critical path. Careful selection of the periods when each TIA projection is performed is a key element in the analyst's application of a TIA methodology. By selecting a period that excludes certain events, an analyst may be excluding certain fragnets that ought to have been inserted. The selective exclusion of fragnets is mentioned above in more detail[1]."

9. A factual analysis would employ an as-planned v as-built (APAB) delay analysis. Where the actual critical path is identified as a matter of fact. A daily delay measure between updates within each 'window' can then be applied to identify the actual critical path within each 'window'; the start of the 'window' update being the de facto baseline and the last update in a series of updates within any given 'window' being the end of the 'window' period/threshold. Applying this APAB methodology determines criticality as a matter of fact and not on the basis of what may occur.

10. John Livengood, had this to say as regards, APAB delay analysis:

"If accurate data is available, APAB can be done on a monthly basis. This methodology has sometimes been called a "windows" approach.

The accuracy of the APAB analysis can be assisted by the use of the Daily Delay Measure methodology (DDM). [10] In this methodology, the analyst can calculate on a daily (or any other periodic basis) basis the delay of every activity against its late planned dates. This highly mathematical approach can assist the analysis by quickly identifying candidates for the critical path. The addition of this methodology could likely assist a user of the APAB methodology to overcome a Daubert challenge where an allegation that the APAB is "unscientific" has been raised.[2]"

11. Forward looking updates that determine their criticality on the basis of what may occur, can also be used to help aid the determination of the actual critical path. TIAs can be helpful, however, but for them to be helpful in determining the actual critical path, the planned logic post any update data date should follow closely the as-built order and sequence of the works. To emphasis this point, part of the previous quote (Footnote 3) is repeated:

"*Assuming the TIA was done in the best manner possible, this forward-looking critical path will usually be close to the actual critical path unless significant changes occurred during the course of a month. If significant changes to work on the project did occur, then the proper TIA methodology would be to perform a new TIA snapshot at the time of the change so the alterations in the critical path more closely reflect the timing of the events[3]."*

12. However, an APAB analysis performed accurately with programme updates to determine the actual critical path will still require some subjective opinion:

[1] Appendix 3 - "Retrospective TIAs: Time to Lay Them to Rest" - John C. Livengood, PSP – page 7 - CDR.08.7, sub section "IDENTIFICATION OF THE CRITICAL PATH", para 6 & 7.

[2] Appendix 3 - "Retrospective TIAs: Time to Lay Them to Rest" - John C. Livengood, PSP – page 3 - CDR.08.03, sub section "RELEVANCE OF THE PLANNED SCHEDULE", para 7 & 8.

[3] Appendix 3 "Retrospective TIAs: Time to Lay Them to Rest" - John C. Livengood, PSP – page 7 - CDR.08.7, sub section "IDENTIFICATION OF THE CRITICAL PATH", para 6 & 7

"Since the analyst is making the determination, the APAB methodology has been criticized as being too dependent on opinion and not readily reproducible in order to qualify as scientific fact. But if that opinion is "expert opinion" based on a thorough review of the schedule and the facts, it probably is more accurate that rote reliance on the logic identified in the schedule. Further, by the additional use of the DDM methodology, the vagaries of expert opinion are reduced, and the transparency of the choices made is enhanced."[4]

13. The Solution – As-planned v As-built Delay Analysis from P6 Programme Data.

14. The solution is to produce an As-planned v As-built (APAB) factual critical path delay analysis from the same P6 Programme data.

15. APAB Calculation

16. Calculating the APAB criticality is a simple exercise. For example, an activity ID: A1020 titled: "New Activity 1 (please refer to figure 001 below), it has a baseline planned start date for say 02 January 2016 and planned finish date for 10 January 2016 and has a planned late finish date of say 16 January 2016. This means the baseline activity has 5 days total float.

17. Now look at the same activity in an actual update (let's say the update data date is 10 January 2016), it has its progress recorded on an update data date (progress update date) of 10%. Therefore as the original duration was for 10 days, 9 days' work still remain before the activity will be complete. The completion date at the 10 January 2016 update (data date) therefore means the activity is scheduled to finish 9 days later. So, the scheduled finish of the activity is 18 January 2016. This, therefore, means the activity is in 2 days critical delay in terms of as-planned v as-built (please refer to figure 003 below).

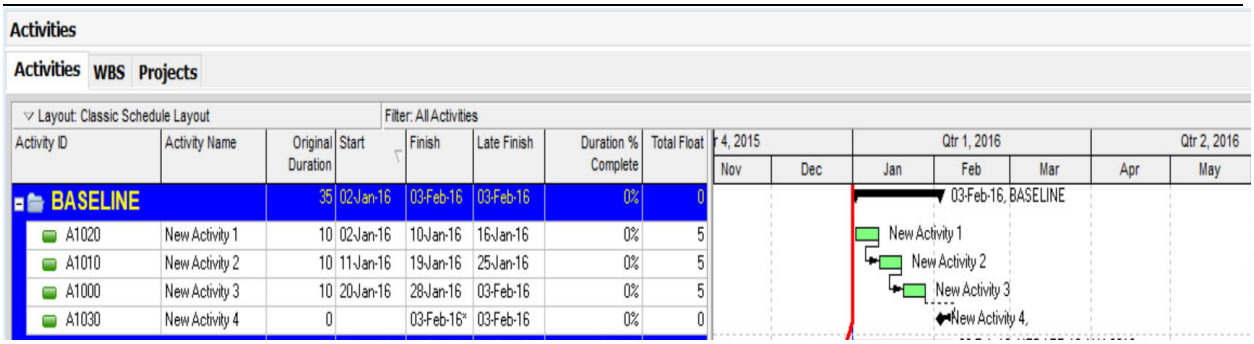
18. Let's now say on 10 February 2016 the same activity is 80% complete and therefore its remaining duration is 1 day. This makes the forecast date for its completion to be 11 February 2016. Therefore, it is in (16 January 2016 (planned late finish date baseline) – 11 February 2016 (finish date as of the 10 February 2016)) -26 days delay (please refer to figure 003 below).

19. The next update is on 10 March 2016 and the same activity finished (100%) on 12 Feb 2016. Therefore, the activity when it finished was (16 January 2016 – 12 Feb 2016) in 27 days in delay (please refer to figure 003 below).

20. Now let's look at an updated programme with three activities with a constrained finish date of 3 February 16. Each activity is 10 days long.

Figure 001

[4] Appendix 3"Retrospective TIAs: Time to Lay Them to Rest" - John C. Livengood, PSP – page 7 - CDR.08.7, sub section "IDENTIFICATION OF THE CRITICAL PATH", para 2



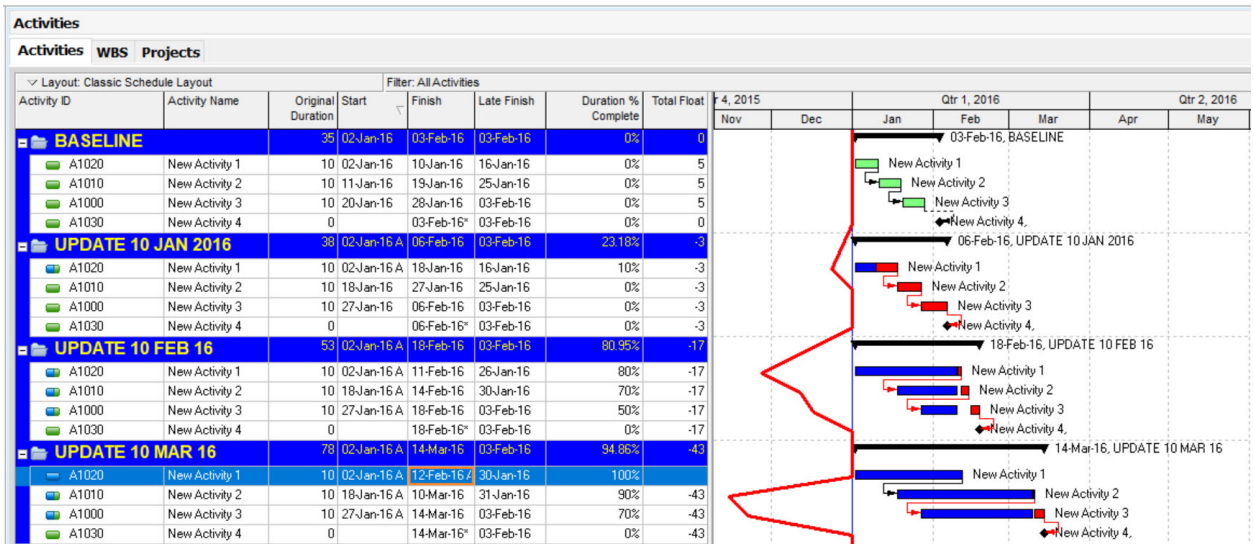
21. Now the update progresses on 10 January 1016, 10 February 1016 and 10 March 2016 and compare back to the baseline on figure 001 (please refer to figure 002 below).

22. The programme according to the Total Float on 10 January 2016 all activities are in -3 days delay, and this is based on a forecast (please refer to figure 002 below).

23. On 10 February 2016 the project suffered yet more delay and the Total Float column indicates all activities are in -17 days delay (please refer to figure 002 below),

24. On 10 March 2016 Activity ID: A1020 titled: "New Activity 1" has finished and is 100% complete on 12 Feb 16, no Total Float delay is recorded. The rest of the activities are shown to be all in -43 days delay (please refer to figure 002 below).

Figure 002



25. Now let's look at the delay in terms of an As-planned v As-built calculation (See figure 003).

26. (Note: As-planned finish date is the Late Finish Date of the Baseline, the As-built =finish date is the Finish Date of the Update).

27. On the 10 January 2016 update the most critical activity (APAB Calculation) is an Activity ID: A1000 and it is in -3 days delay.

28. On the 10 February 2016 update the most critical activity (APAB Calculation) is Activity ID: A10020 and it is in -26 days delay (note the forecast P6 CP said it was in -17 days delay)

29. On 10 March 2016 Activity ID: A1020 was complete on 12 February 2016 and was in delay relative to its baselined late finish -27 days. The driving critical delay (APAB Calculation) on 10 March 216 was Activity ID: A1010 and it was in -45 days delay (APAB Calculation). Activity ID: A1000 was in -40 days delay.

30. Figure 003 shows the APAB calculation criticalities in red in the column titled: "APAB - BASE LATE FINISH - UPDTAE FINISH".

Figure 003

BASELINE 01 JAN 2016									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1020	New Activity 1	10	2-Jan-16	10-Jan-16	16-Jan-16	0%	5	16-Jan-16	6
A1010	New Activity 2	10	11-Jan-16	19-Jan-16	25-Jan-16	0%	5	25-Jan-16	6
A1000	New Activity 3	10	20-Jan-16	28-Jan-16	3-Feb-16	0%	5	3-Feb-16	6
A1030	New Activity 4	0		03-Feb-16*	3-Feb-16	0%	0		
UPDATE 10 JAN 2016									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1000	New Activity 3	10	27-Jan-16	6-Feb-16	3-Feb-16	0%	-3	3-Feb-16	-3
A1020	New Activity 1	10	02-Jan-16 A	18-Jan-16	16-Jan-16	10%	-3	16-Jan-16	-2
A1010	New Activity 2	10	18-Jan-16	27-Jan-16	25-Jan-16	0%	-3	25-Jan-16	-2
A1030	New Activity 4	0		06-Feb-16*	3-Feb-16	0%	-3		
UPDATE 10 FEB 16									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1020	New Activity 1	10	02-Jan-16 A	11-Feb-16	26-Jan-16	80%	-17	16-Jan-16	-26
A1010	New Activity 2	10	18-Jan-16 A	14-Feb-16	30-Jan-16	70%	-17	25-Jan-16	-20
A1000	New Activity 3	10	27-Jan-16 A	18-Feb-16	3-Feb-16	50%	-17	3-Feb-16	-15
A1030	New Activity 4	0		18-Feb-16*	3-Feb-16	0%	-17		
UPDATE 10 MAR 16									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1010	New Activity 2	10	18-Jan-16 A	10-Mar-16	31-Jan-16	90%	-43	25-Jan-16	-45
A1000	New Activity 3	10	27-Jan-16 A	14-Mar-16	3-Feb-16	70%	-43	3-Feb-16	-40
A1020	New Activity 1	10	02-Jan-16 A	12-Feb-16	30-Jan-16	100%		16-Jan-16	-27
A1030	New Activity 4	0		14-Mar-16*	3-Feb-16	0%	-43		

Figure 004 shows the P6 forecast calculation in Red in the column titled: "Total Float".

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BASELINE 01 JAN 2016									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1020	New Activity 1	10	2-Jan-16	10-Jan-16	16-Jan-16	0%	5	16-Jan-16	6
A1010	New Activity 2	10	11-Jan-16	19-Jan-16	25-Jan-16	0%	5	25-Jan-16	6
A1000	New Activity 3	10	20-Jan-16	28-Jan-16	3-Feb-16	0%	5	3-Feb-16	6
A1030	New Activity 4	0		03-Feb-16*	3-Feb-16	0%	0		
UPDATE 10 JAN 2016									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1000	New Activity 3	10	27-Jan-16	6-Feb-16	3-Feb-16	0%	-3	3-Feb-16	-3
A1020	New Activity 1	10	02-Jan-16 A	18-Jan-16	16-Jan-16	10%	-3	16-Jan-16	-2
A1010	New Activity 2	10	18-Jan-16	27-Jan-16	25-Jan-16	0%	-3	25-Jan-16	-2
A1030	New Activity 4	0		06-Feb-16*	3-Feb-16	0%	-3		
UPDATE 10 FEB 16									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1020	New Activity 1	10	02-Jan-16 A	11-Feb-16	26-Jan-16	80%	-17	16-Jan-16	-26
A1010	New Activity 2	10	18-Jan-16 A	14-Feb-16	30-Jan-16	70%	-17	25-Jan-16	-20
A1000	New Activity 3	10	27-Jan-16 A	18-Feb-16	3-Feb-16	50%	-17	3-Feb-16	-15
A1030	New Activity 4	0		18-Feb-16*	3-Feb-16	0%	-17		
UPDATE 10 MAR 16									
ivity ID	Activity Name	Original Duration	Start	Finish	Late Finish	Duration % Complete	Total Float	Baseline Late Finish	APAB - BASE LATE FINISH - UPDTAE FINISH
A1010	New Activity 2	10	18-Jan-16 A	10-Mar-16	31-Jan-16	90%	-43	25-Jan-16	-45
A1000	New Activity 3	10	27-Jan-16 A	14-Mar-16	3-Feb-16	70%	-43	3-Feb-16	-40
A1020	New Activity 1	10	02-Jan-16 A	12-Feb-16	30-Jan-16	100%		16-Jan-16	-27
A1030	New Activity 4	0		14-Mar-16*	3-Feb-16	0%	-43		

31. The date used to calculate the As-planned v As-built comes direct from the P6 database and has not been changed in any way.

32. The P6 data from the Boulevard Heights Contract Primavera Programmes.

33. There are 10513 activities in the [redacted] Primavera Baseline Programme and 31 620 relationships.

34. The information provided in the tables titled: "TASK" and "TASKPRED" are used to process the data without changing any of the data into a format where the APAB CP calculation advised in Section xxx can be performed across multiple of updated progressed programmes either from the original baseline or any update thereof that can also be used as a baseline.

35. The result is the analysis provides both a Dynamic delay analysis based on a forecast of planned intent post any data date update and an As-planned v As-built Critical path delay analysis based on fact.

36. The following point needs to be understood. If the works were to be built (actually) exactly as planned, **the Dynamic critical path and the As-planned v As-built critical path would be the same.**

37. The activities and the relationship from the Baseline programme and all updates thereof can be downloaded as follows:

Figure 005 shows the spreadsheet export function in P6.

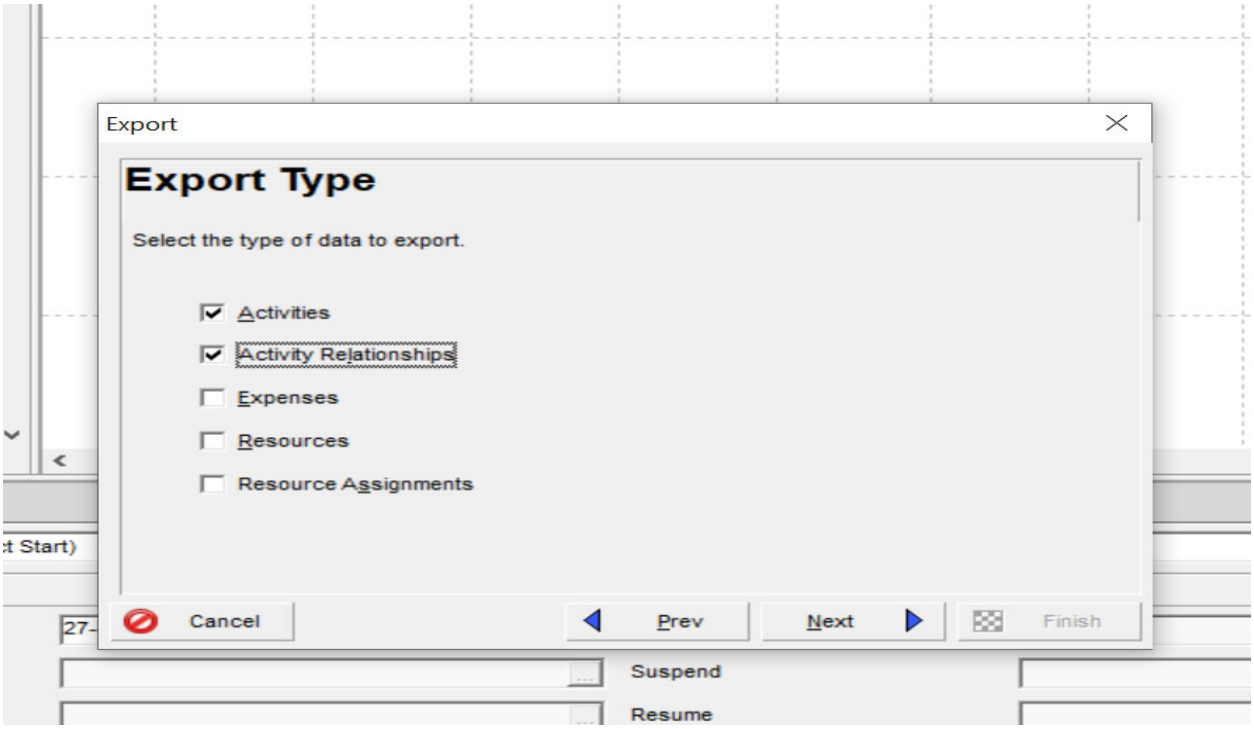
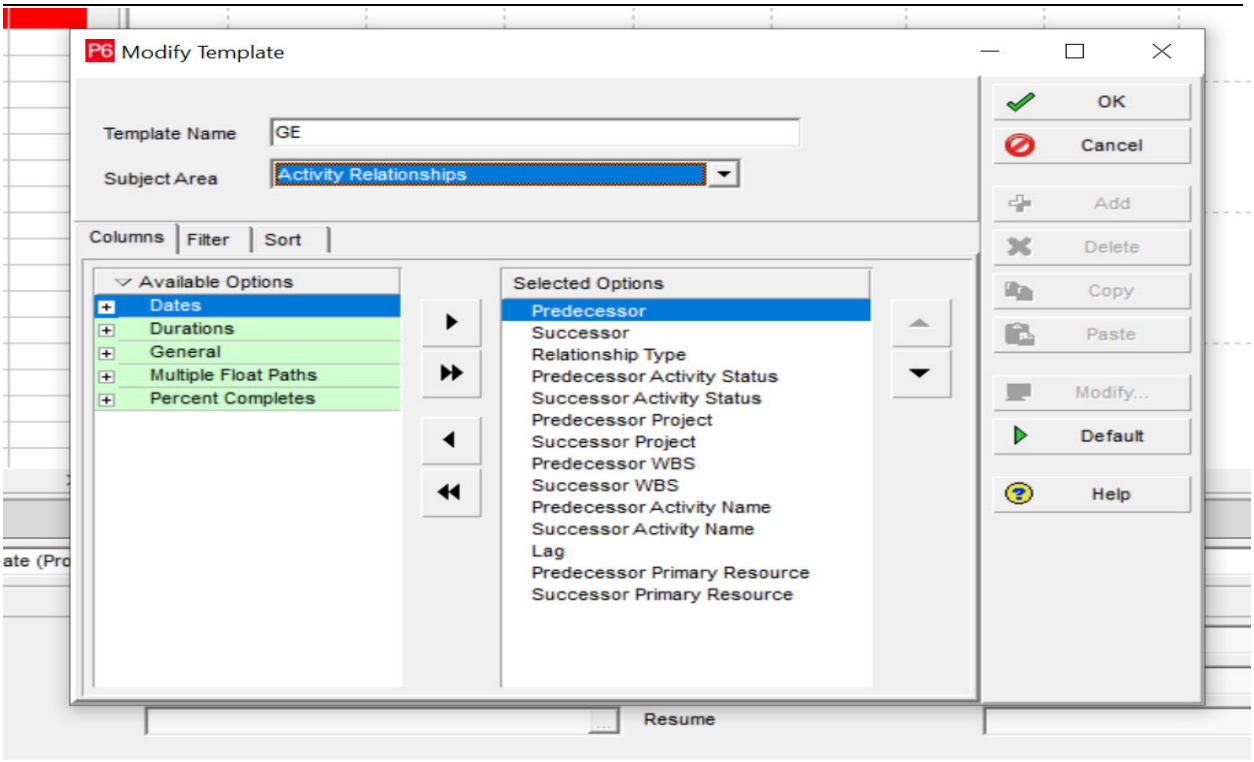


Figure 006 shows the columns= heads that can be chosen in the Activities and the Activity Relationship tables.



38. The tables that P6 provide are called "TASK" and "TASKPRED", respectively when Activities and Activity Relationships are downloaded from P6 from the spreadsheet download function built into Primavera P6.

Figure 007 shows the TASK and TASKPRED tables available for each P6 Programme.

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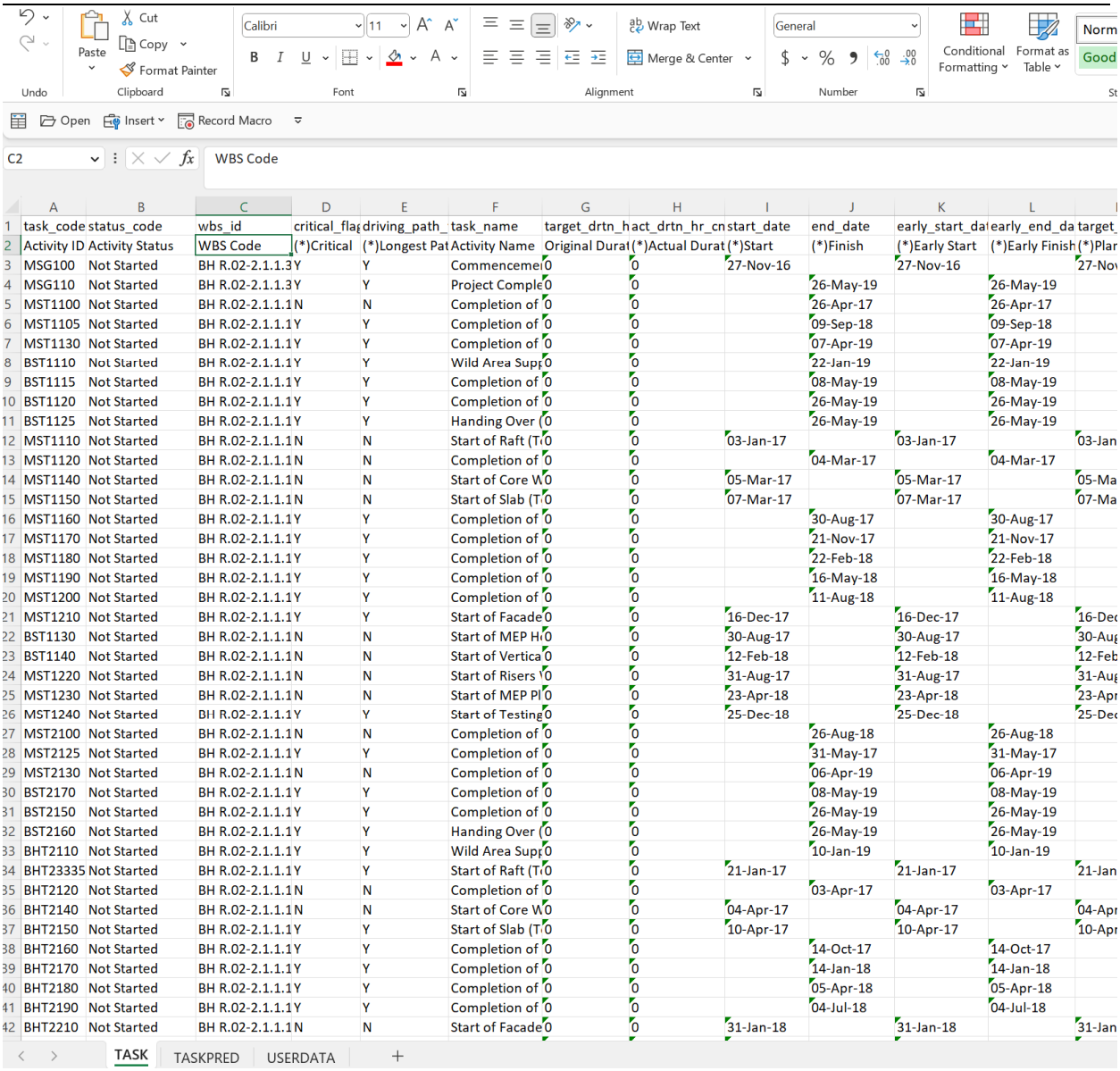


	A	B	C	D	E	F	G	H	I	J	K	L	
1	task_code	status_code	wbs_id	critical_fla	driving_path_	task_name	target_drtn_h	act_drtn_hr_cn	start_date	end_date	early_start_da	early_end_da	target_
2	Activity ID	Activity Status	WBS Code	(*)Critical	(*)Longest Pat	Activity Name	Original Durat	(*)Actual Durat	(*)Start	(*)Finish	(*)Early Start	(*)Early Finish	(*)Plar
3	MSG100	Not Started	BH R.02-2.1.1.3	Y	Y	Commencemer	0	0	27-Nov-16		27-Nov-16		27-Nov
4	MSG110	Not Started	BH R.02-2.1.1.3	Y	Y	Project Comple	0	0		26-May-19		26-May-19	
5	MST1100	Not Started	BH R.02-2.1.1.1	N	N	Completion of	0	0		26-Apr-17		26-Apr-17	
6	MST1105	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		09-Sep-18		09-Sep-18	
7	MST1130	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		07-Apr-19		07-Apr-19	
8	BST1110	Not Started	BH R.02-2.1.1.1	Y	Y	Wild Area Supp	0	0		22-Jan-19		22-Jan-19	
9	BST1115	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		08-May-19		08-May-19	
10	BST1120	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		26-May-19		26-May-19	
11	BST1125	Not Started	BH R.02-2.1.1.1	Y	Y	Handing Over (	0	0		26-May-19		26-May-19	
12	MST1110	Not Started	BH R.02-2.1.1.1	N	N	Start of Raft (T	0	0	03-Jan-17		03-Jan-17		03-Jan
13	MST1120	Not Started	BH R.02-2.1.1.1	N	N	Completion of	0	0		04-Mar-17		04-Mar-17	
14	MST1140	Not Started	BH R.02-2.1.1.1	N	N	Start of Core W	0	0	05-Mar-17		05-Mar-17		05-Ma
15	MST1150	Not Started	BH R.02-2.1.1.1	N	N	Start of Slab (T	0	0	07-Mar-17		07-Mar-17		07-Ma
16	MST1160	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		30-Aug-17		30-Aug-17	
17	MST1170	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		21-Nov-17		21-Nov-17	
18	MST1180	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		22-Feb-18		22-Feb-18	
19	MST1190	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		16-May-18		16-May-18	
20	MST1200	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		11-Aug-18		11-Aug-18	
21	MST1210	Not Started	BH R.02-2.1.1.1	Y	Y	Start of Facade	0	0	16-Dec-17		16-Dec-17		16-Dec
22	BST1130	Not Started	BH R.02-2.1.1.1	N	N	Start of MEP H	0	0	30-Aug-17		30-Aug-17		30-Aug
23	BST1140	Not Started	BH R.02-2.1.1.1	N	N	Start of Vertica	0	0	12-Feb-18		12-Feb-18		12-Feb
24	MST1220	Not Started	BH R.02-2.1.1.1	N	N	Start of Risers	0	0	31-Aug-17		31-Aug-17		31-Aug
25	MST1230	Not Started	BH R.02-2.1.1.1	N	N	Start of MEP Pl	0	0	23-Apr-18		23-Apr-18		23-Apr
26	MST1240	Not Started	BH R.02-2.1.1.1	Y	Y	Start of Testing	0	0	25-Dec-18		25-Dec-18		25-Dec
27	MST2100	Not Started	BH R.02-2.1.1.1	N	N	Completion of	0	0		26-Aug-18		26-Aug-18	
28	MST2125	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		31-May-17		31-May-17	
29	MST2130	Not Started	BH R.02-2.1.1.1	N	N	Completion of	0	0		06-Apr-19		06-Apr-19	
30	BST2170	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		08-May-19		08-May-19	
31	BST2150	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		26-May-19		26-May-19	
32	BST2160	Not Started	BH R.02-2.1.1.1	Y	Y	Handing Over (	0	0		26-May-19		26-May-19	
33	BHT2110	Not Started	BH R.02-2.1.1.1	Y	Y	Wild Area Supp	0	0		10-Jan-19		10-Jan-19	
34	BHT23335	Not Started	BH R.02-2.1.1.1	Y	Y	Start of Raft (T	0	0	21-Jan-17		21-Jan-17		21-Jan
35	BHT2120	Not Started	BH R.02-2.1.1.1	N	N	Completion of	0	0		03-Apr-17		03-Apr-17	
36	BHT2140	Not Started	BH R.02-2.1.1.1	N	N	Start of Core W	0	0	04-Apr-17		04-Apr-17		04-Apr
37	BHT2150	Not Started	BH R.02-2.1.1.1	Y	Y	Start of Slab (T	0	0	10-Apr-17		10-Apr-17		10-Apr
38	BHT2160	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		14-Oct-17		14-Oct-17	
39	BHT2170	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		14-Jan-18		14-Jan-18	
40	BHT2180	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		05-Apr-18		05-Apr-18	
41	BHT2190	Not Started	BH R.02-2.1.1.1	Y	Y	Completion of	0	0		04-Jul-18		04-Jul-18	
42	BHT2210	Not Started	BH R.02-2.1.1.1	N	N	Start of Facade	0	0	31-Jan-18		31-Jan-18		31-Jan

39. The data from the TASK table columns required to enable the APAB Calculation to be undertaken is as follows:

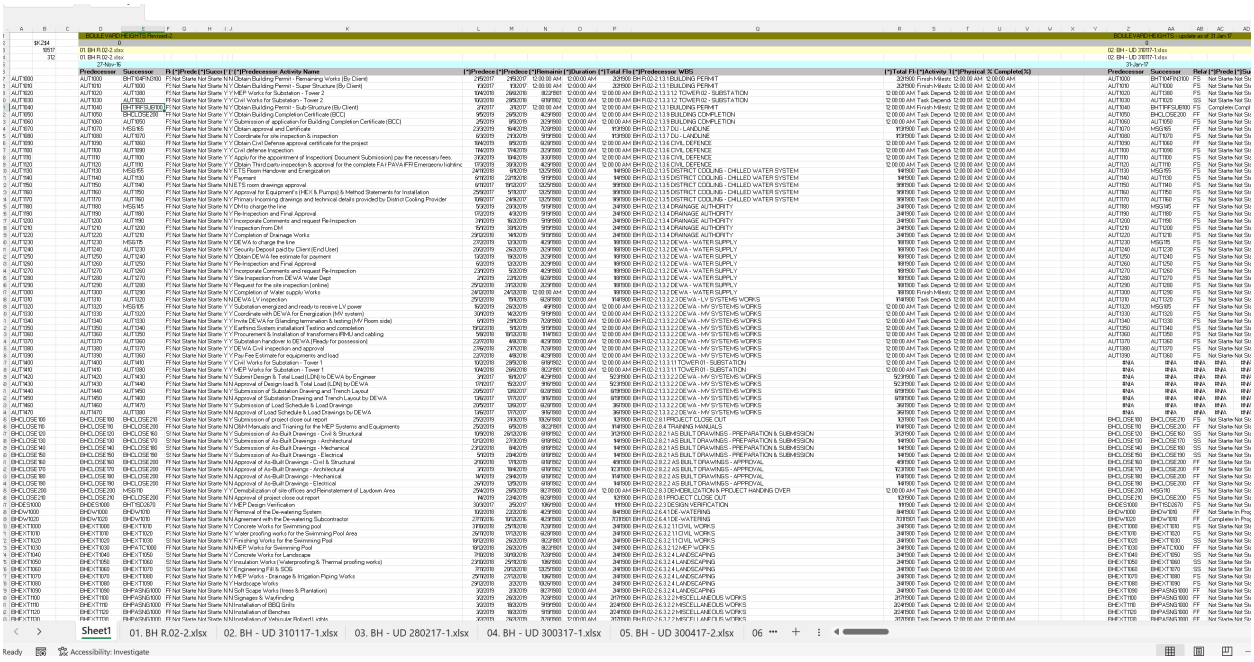
Activity ID
Activity Status
WBS Code
(*)Critical
(*)Longest Path
Activity Name
Original Duration(h)
(*)Actual Duration(h)
(*)Start
(*)Finish
(*)Early Start
(*)Early Finish
(*)Planned Start
(*)Planned Finish
Actual Start
Actual Finish
Remaining Duration(h)
(*)Duration % Complete(%)
(*)Total Float(h)
(*)WBS Name
(*)WBS Path
(*)Activity Type
(*)Physical % Complete(%)
(*)Late Finish
Delete This Row

40. The data from the TASKPRED table columns required to enable the APAB Calculation to be undertaken is as follows:

Predecessor			
Successor			
Relationship Type			
(*)Predecessor Activity Status			
(*)Successor Activity Status			
(*)Critical			
(*)Driving			
(*)Predecessor Activity Name			
(*)Predecessor Start			
(*)Predecessor Finish			
(*)Remaining Duration(h)			
(*)Duration % Complete(%)			
(*)Total Float(h)			
(*)Predecessor WBS			
Lag(h)			

41. The Baseline and the Update data from each programme is then collated together and line up using Vlookup formula to be able to perform the APAB Calculation for every update and thereby identify the As-planned v As-built critical path as it travels across the works, as the works progress by reference to the data downloaded and un-changed from the P6 Primavera programmes.

Figure 008 shows the combined sheet made from the baseline and the updates taken from "TASK" and "TASKPRED".



42. After the calculations have been made the data is transferred into what is known as a Dynamic Versus As-planned v As-built Critical Path Calculation sheet.

43. The sheet identifies the most critical P6 Forecast activities and the near critical activities and identifies the As-planned v As-built most critical and near critical activities.

44. Detailed Appraisal of How the As-planned v As-built Delay Analysis Calculation is Performed.

45. The document titled: "01. As-planned V as-built methodology"[5] provides a comprehensive of why the ABAP CP is undertaken and the document titled: "02. File Note 001-Delay Methodology-18-July-16[6]" provides a narrative the explains and supports the APAB Critical Path and draws reference to established authors on the subject.

46. Simple Appraisal of the Dynamic versus As-planned v As-built

47. The following is a very simple statement that provides the reasoning as to why ABAP is the sensible factual way of establishing critical delay factually. Whereas, Dynamic method simply are not factual, they are a forecast but can aid the sensible determination of EOT (the file this simple appraisal of Dynamic v APAB delay analysis methods are provided in the footnote[7].)

THE THREE METHODS USED TO DEMONSTRATE DELAYS TO WORKS UPON THE PROJECT ARE:

- **DYNAMIC – Forecasts future criticality (it is not fact, in the context of the as-planned activities still to complete at any progress update, they have not happened and may not be built as-planned)**
- **AS-PLANNED V AS-BUILT – Provides the actual critical path – Fact (The activities were constructed as per the actual start dateS and finish dateS, these dates may or may not be as-planned for, therefore they are a fact and not a forecast, they actually happened)**
- **TIME IMPACT ANALYSIS – Impacts Relevant Events and forecasts a prospective delay (which may not be a true delay, if the works once considered retrospectively (as actual) are constructed out of sequence and not as planned in the future).**

[5] 01. As-planned V as-built methodology
[6] 02. File Note 001-Delay Methodology-18-July-16
[7] 03. Simple Appraisal of Dynamic v ABAP Delay Analysis

The three methods are described in the Society of Construction Law Protocol 2nd Edition 2017

11.5 The following table provides a summary of the methods described below:

Method of Analysis	Analysis Type	Critical Path Determined	Delay Impact Determined	Requires
Impacted As-Planned Analysis	Cause & Effect	Prospectively	Prospectively	• Logic linked baseline programme. • A selection of delay
Time Impact Analysis	Cause & Effect	Contemporaneously	Prospectively	• Logic linked baseline programme. • Update programmes or progress information with which to update the baseline programme. • A selection of delay events to be modelled.
Time Slice Windows Analysis	Effect & Cause	Contemporaneously	Retrospectively	• Logic linked baseline programme. • Update programmes or progress information with which to update the baseline programme.
As-Planned versus As-Built Windows Analysis	Effect & Cause	Contemporaneously	Retrospectively	• Baseline programme. • As-built data.
Longest Path Analysis	Cause			• As-built programme.
Collapsed As-Built Analysis	Cause & Effect	Retrospectively	Retrospectively	• Logic linked as-built programme. • A selection of delay events to be modelled.

The table is taken from page 34 of the SCL Delay and Disruption Protocol 2nd Edition: February 2017. Note the Time Slice Windows Analysis is also known as the Dynamic Analysis. Nurol's "Windows" are the dates between monthly updates. The three methods used are shown in within the red box.

A key point from the Society of Construction Law Protocol 2nd Edition that distinguishes the difference between a forecast (prospective) delay analysis and a retrospective analysis is contained the following statement:

Delay impact is determined in **one of two different ways**.

1) A **prospective delay analysis** identifies the **likely impact** of historical progress or delay events on a completion date.
2) The conclusions of a **prospective delay analysis** **may not match the as-built programme** because the Contractor's **actual performance** may well have been influenced by the effects of attempted acceleration, re-sequencing or redeployment of resources in order to try to avoid liability for liquidated damages or due to other employer and contractor risk events.
3) A **retrospective delay analysis identifies** the **actual impact of the delay events** on the **identified actual or as-built critical path.**

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

THE DELAY ANALYSIS METHODS THE CONTRACTOR HAS EMPLOYED

The Contractor has chosen to demonstrate delay in three ways. But, however, the Dynamic (Time Slice Window's Analysis) and the Time Impact Analysis is one way and is prospective. The other way is the As-planned v as-built delay analysis method which is retrospective.

The Contractor's delay analysis method compares both the Dynamic (prospective – model not real) to the As-planned v As-built (retrospective – fact "it happened") critical path activities at each updated progressed programme data date.

To compare both critical paths from the opposing methods (prospective and retrospective), the data from the updated progressed programmes provided as a record of progress to the Employer have been used, and **no changes have** been made to the programmes data or logic, they are **"as is".**

The purpose of doing both a prospective and retrospective delay analysis:

- If the project is constructed as per the baseline programme without delay. There will be no difference between the two methods of analysis, the planned and actual start and finish dates will be the same.
- If the activities are prolonged in their actual durations as they are progressed, but the as-planned logic respected, there will be a delay between the as-planned baseline and actual as-built activities and likewise this will show delay at each update. The two analysis methods, however, will both provide the same delay.

The bit to consider and reflect upon:

- If the activities are **prolonged as they are built** and **go on longer than planned**, but also **the planned logical sequence of work is not respected**, the methods, once compared, **will provide different results of delay and different critical paths.**
- **If the out of sequence logic is corrected** between updates, the two methods, once compared, **will be closer** but will **still not provide the same delay result and there will still be different critical paths.**

(Note: by correcting the logic for out of sequence works, effectively a new baseline at the progress update is being proposed, although it is good practice)

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

WHICH METHOD IS TO BE PREFERRED?

Retrospective based on fact - Preference

The preferable method should be the method that provides a factual actual delay and identifies the factual as-built actual critical path . This therefore is the As-planned v as-built critical path determination method.

Prospective - Not as robust and is really a probability based on model and an intention, not fact.

The prospective methods of delay analysis will provide a delay result, but the result will not be a provable fact, only a likely probability based on a model. Although the result maybe be similar to a factual as-planned v as-built analysis, if the planned for durations and the logical sequence of work, upon the baseline, is respected.

Why is Retrospective preferred to Prospective methods of delay analysis:

Time and money are important considerations in building contracts and can be costly to either party. Therefore, provable facts borne from retrospective delay analysis techniques are preferred to speculative prospective delay analysis methods which will not be based on the full facts, only some facts.

OBSERVATIONS AND CONCLUSIONS PROVIDED FROM THE RETROSPECTIVE AND PROSPECTIVE DELAY ANALYSIS COMPARISON

- The Contractor by refence to both the prospective and retrospective delay analysis method results compared to one another, can be said to have, by and large, followed the logical sequence of work as-planned for on the Contractor's baseline.
- The Contractor, however, was delayed and actual activity durations were prolonged longer than the durations of the as-planned for durations.
- The critical paths derived from both the prospective and the retrospective delay analysis methods employed, show that they are similar to one another. Which supports the statement that the Contractor followed the baseline planned for logical sequence of work as set out upon the baseline programme.
- The Time Impact Analysis shown in Section 9 of the Claim demonstrates, further, that when impacting the factual causative durations of the events that delayed the works upon project, the TIA impacts provided a similar close critical impact as the delay results advised upon the retrospective as-planned v as-built method employed.

48. Graphics showing the Dynamic CP and As-built v As-planned |CP.

49. Dynamic CP Across Multiple Updates from the Baseline (This is [redacted] Delay Analysis)

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

10.2.30 Figure 014 below shows the output of "Window 1" for the dynamic critical path output identified from reviewing only the construction activities. The cells coloured red with their float values inside are the most critical activities. The cells coloured in green are critical with in six days of the most critical (those being the red cells). The cells shown coloured blue are within 10 days critical and so on. This has been done so that the most critical and near critical delayed activities can be easily identified. So that the dynamic as-built critical path and dynamic near critical paths can be easily identified.

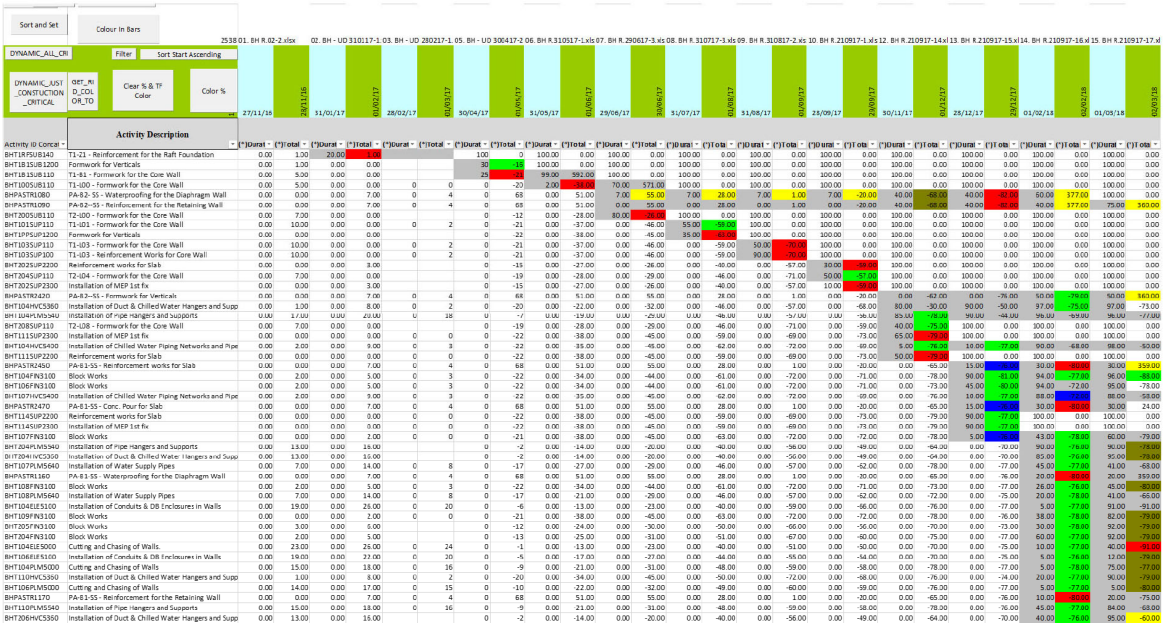


Figure 014

50. Dynamic CP compared to the As-planned v As-built CP from the Baseline (Dynamic CP is the filter for comparison purposes (the APAB Column is to the right of the Total Float Column (the Dynamic CP))

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

10.2.31 Figure 015 shows the same dynamic critical path activities (critical and near critical) but also matches the dynamic critical path activities with the corresponding activities that have had their "floats" calculated using the as-planned v as-built variance calculation established[9].

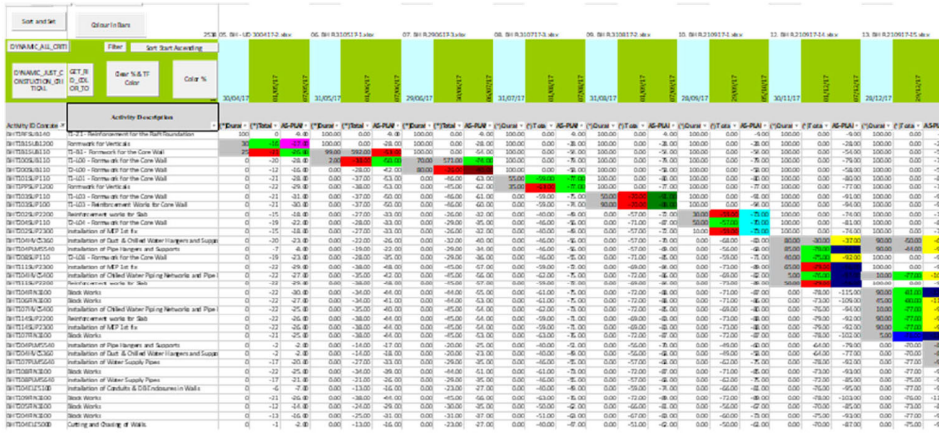


Figure 015

51. As-planned v As-built CP compared to the Dynamic CP from the Baseline (APAB CP is the filter for comparison purposes (the APAB Column is to the right of the Total Float Column (the Dynamic CP))

10.2.36 Figure 018 shows the as-planned v as-built method of calculating the as-built critical path. What is apparent at the top (please refer to Figure 19) of the graphic is that the as-planned v as-built critical path appears to run through the podium foundation and basement activities. It can be seen by reference to figure 19 that the basement podium activities were suspended for nearly six months. This is shown as critical as this is a direct comparison of actual planned and actual finish variances over time without a refence to physical logic.

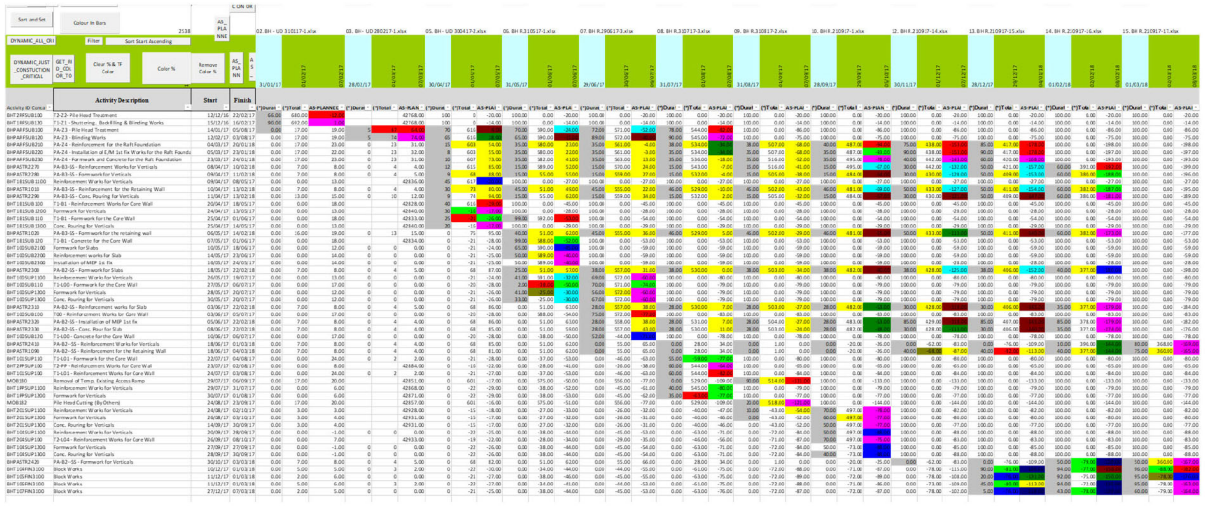
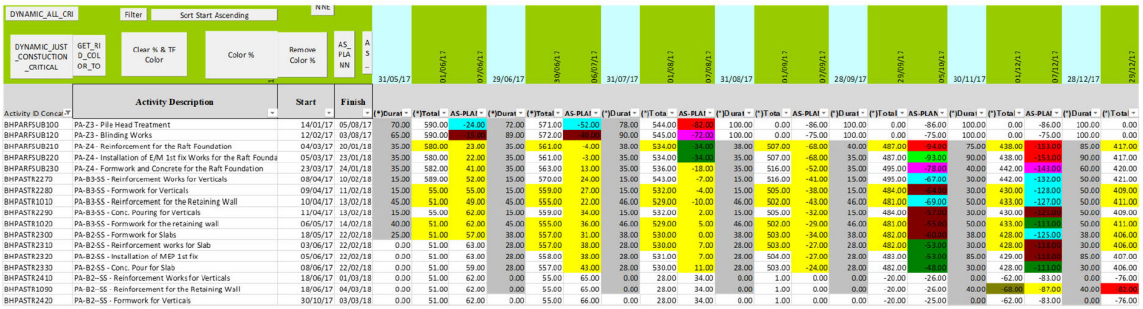


Figure 018

Figure 018



Activity ID Concat	Activity Description	Start	Finish	31/05/17	01/06/17	07/06/17	29/06/17	30/06/17	06/07/17	31/07/17	01/08/17	07/08/17	31/08/17	01/09/17	07/09/17	28/09/17	29/09/17	05/10/17	30/11/17	01/12/17	07/12/17	28/12/17	29/12/17
				(*)Durat	(*)Total	AS-PLAI	(*)Durat	(*)Total	AS-PLAI	(*)Durat	(*)Tota	AS-PLAI	(*)Durat	(*)Tota	AS-PLAI	(*)Durat	(*)Total	AS-PLAN	(*)Durat	(*)Total	AS-PLAI	(*)Durat	(*)Total
BHPARFSUB100	PA-Z3 - Pile Head Treatment	14/01/17	05/03/17	70.00	590.00	-24.00	72.00	571.00	-52.00	78.00	544.00	-82.00	100.00	0.00	-86.00	100.00	0.00	-86.00	100.00	0.00	-86.00	100.00	0.00
BHPARFSUB120	PA-Z3 - Blinding Works	12/02/17	03/08/17	65.00	590.00	-24.00	89.00	572.00	-52.00	90.00	545.00	-72.00	100.00	0.00	-75.00	100.00	0.00	-75.00	100.00	0.00	-75.00	100.00	0.00
BHPARFSUB210	PA-Z4 - Reinforcement for the Raft Foundation	04/03/17	20/01/18	35.00	580.00	23.00	35.00	561.00	-4.00	38.00	534.00	-34.00	38.00	507.00	-68.00	40.00	487.00	-94.00	75.00	438.00	-153.00	85.00	417.00
BHPARFSUB220	PA-Z4 - Installation of E/M 1st fix Works for the Raft Founda	05/03/17	23/01/18	35.00	580.00	22.00	35.00	561.00	-3.00	35.00	534.00	-34.00	35.00	507.00	-68.00	35.00	487.00	-93.00	90.00	438.00	-153.00	90.00	417.00
BHPARFSUB230	PA-Z4 - Formwork and Concrete for the Raft Foundation	23/03/17	24/01/18	35.00	582.00	41.00	35.00	563.00	13.00	35.00	536.00	-18.00	35.00	516.00	-52.00	35.00	495.00	-78.00	40.00	442.00	-143.00	60.00	420.00
BHPASTR2270	PA-B3-SS - Reinforcement Works for Verticals	08/04/17	10/02/18	15.00	589.00	52.00	15.00	570.00	24.00	15.00	543.00	-7.00	15.00	516.00	-41.00	15.00	495.00	-67.00	30.00	442.00	-132.00	50.00	421.00
BHPASTR2280	PA-B3-SS - Formwork for Verticals	09/04/17	11/02/18	15.00	55.00	55.00	15.00	559.00	27.00	15.00	532.00	-4.00	15.00	505.00	-38.00	15.00	484.00	-64.00	30.00	430.00	-128.00	50.00	409.00
BHPASTR1010	PA-B3-SS - Reinforcement for the Retaining Wall	10/04/17	13/02/18	45.00	51.00	49.00	45.00	555.00	22.00	46.00	529.00	-10.00	46.00	502.00	-43.00	46.00	481.00	-69.00	50.00	433.00	-127.00	50.00	411.00
BHPASTR2290	PA-B3-SS - Conc. Pouring for Verticals	11/04/17	13/02/18	15.00	55.00	62.00	15.00	559.00	34.00	15.00	532.00	2.00	15.00	505.00	-32.00	15.00	484.00	-57.00	30.00	430.00	-121.00	50.00	409.00
BHPASTR1020	PA-B3-SS - Formwork for the retaining wall	06/05/17	14/02/18	40.00	51.00	62.00	45.00	555.00	36.00	46.00	529.00	5.00	46.00	502.00	-29.00	46.00	481.00	-55.00	50.00	433.00	-115.00	50.00	411.00
BHPASTR2300	PA-B2-SS - Formwork for Slabs	18/05/17	22/02/18	25.00	51.00	57.00	38.00	557.00	31.00	38.00	530.00	0.00	38.00	503.00	-34.00	38.00	482.00	-60.00	38.00	428.00	-125.00	38.00	406.00
BHPASTR2310	PA-B2-SS - Reinforcement works for Slab	03/06/17	22/02/18	0.00	51.00	63.00	28.00	557.00	38.00	28.00	530.00	7.00	28.00	503.00	-27.00	28.00	482.00	-53.00	30.00	428.00	-113.00	30.00	406.00
BHPASTR2320	PA-B2-SS - Installation of MEP 1st fix	05/06/17	22/02/18	0.00	51.00	63.00	28.00	558.00	38.00	28.00	531.00	7.00	28.00	504.00	-27.00	28.00	483.00	-53.00	85.00	429.00	-114.00	85.00	407.00
BHPASTR2330	PA-B2-SS - Conc. Pour for Slab	08/06/17	22/02/18	0.00	51.00	59.00	28.00	557.00	43.00	28.00	530.00	11.00	28.00	503.00	-24.00	28.00	482.00	-50.00	30.00	428.00	-113.00	30.00	406.00
BHPASTR2410	PA-B2--SS - Reinforcement Works for Verticals	18/06/17	01/03/18	0.00	51.00	62.00	0.00	55.00	65.00	0.00	28.00	34.00	0.00	1.00	0.00	0.00	-20.00	-26.00	0.00	-62.00	-83.00	0.00	-76.00
BHPASTR1090	PA-B2--SS - Reinforcement for the Retaining Wall	18/06/17	04/03/18	0.00	51.00	62.00	0.00	55.00	65.00	0.00	28.00	34.00	0.00	1.00	0.00	0.00	-20.00	-26.00	40.00	-62.00	-87.00	40.00	-81.00
BHPASTR2420	PA-B2--SS - Formwork for Verticals	30/10/17	03/03/18	0.00	51.00	62.00	0.00	55.00	66.00	0.00	28.00	34.00	0.00	1.00	0.00	0.00	-20.00	-25.00	0.00	-62.00	-83.00	0.00	-76.00

Figure 019

10.2.37 On further query, it was found that the podium basement activities were indeed suspended in favour of progressing the critical Tower 1 and Tower 2 works for the core walls and the suspended slabs and their verticals associated with each Tower.

10.2.38 At the point at which both parties had jointly decided to progress the Towers as the most critical elements to be progressed a revised baseline should have been submitted, which then would have reflected the

12

Contractor's new construction intent. The activities shown in the as-planned v as-built that are associated with the podium basement were not the driving or controlling activities. The driving and the controlling activities were those associated with Towers 1 and 2. If the dynamic criticality is looked at closely it can be seen that the logic there has been compromised (How can a dynamic statement of total float attrition say that is has 487 days total float but the as-planned v as-built variance state that it is in -94 calendars days delay?).

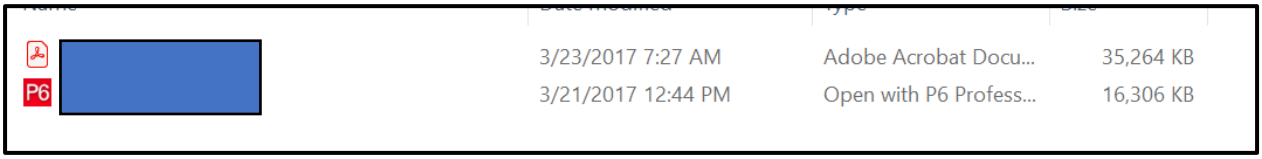
10.2.39 It can be said that the dynamic update has not incorporated corrected logic at each update and no revised logic was implemented to reflect the change in the sequence and the logic of the works. As such, the dynamic update cannot be properly used to reflect upon criticality because the as-planned works to compete to the right of the data date line as of 30 April 2017 did not reflect the Contractor's true intent for the Podium works. In reality there would have been plenty of float available within the Podium activities, if the works had been re-sequenced.

10.2.40 To reflect on the actual as-planned for intent of the works (i.e. the real intended construction logic and sequence undertaken in Window 1 after the Employer's Representative had requested that resource be concentrated on the two Towers construction) as the Works were being progressed, the delay analysis for Works was re-run just for Towers and then run again for Towers 1 and the Tower 2 Works. To facilitate this a dynamic analysis of updated progressed programmes within Window 1 has been produced for the construction activities of the Towers only independent of Podium activities, and likewise the same has been provided for just Tower 1 and Tower 2 on their own. To ensure the correct activities making up the actual as-built critical path is established without the complications associated with as-planned for future intent theoretical statements been solely relied upon (dynamic analysis), the Towers (independent of the Podium activities) have been also run to define an as-planned v as-built critical path, and likewise both Towers 1 and 2 independent of one another have also been run to define an as-planned v as-built critical path.

52. The Dynamic v APAB CP Calculation Sheet for Window 1

53. The Dynamic v APAB CP Calculation Sheet for Window 1 comprises the following P6 programmes:

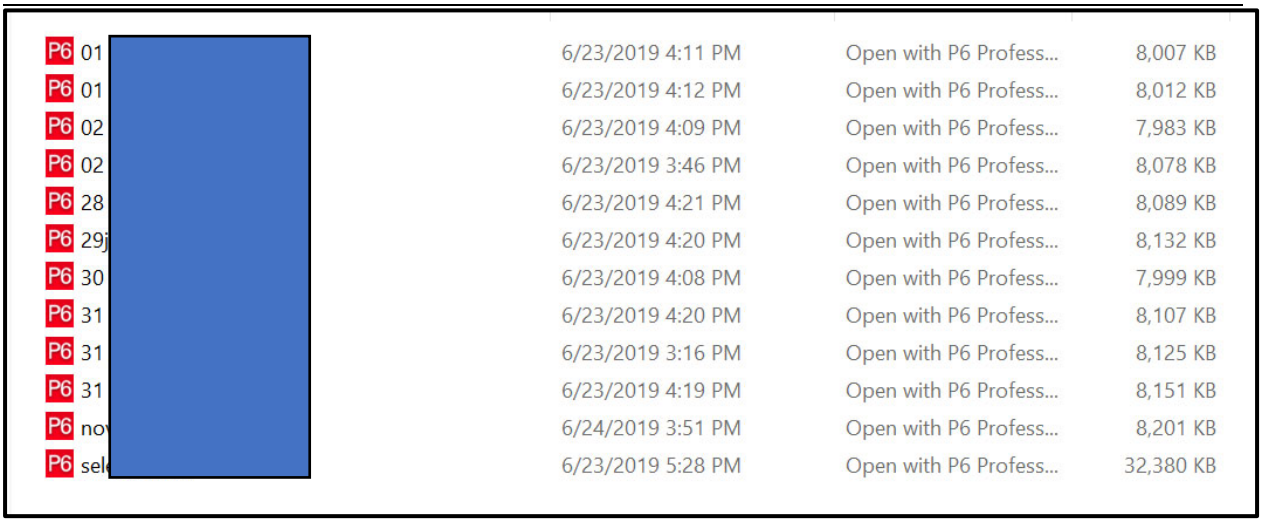
54. Baseline[8]



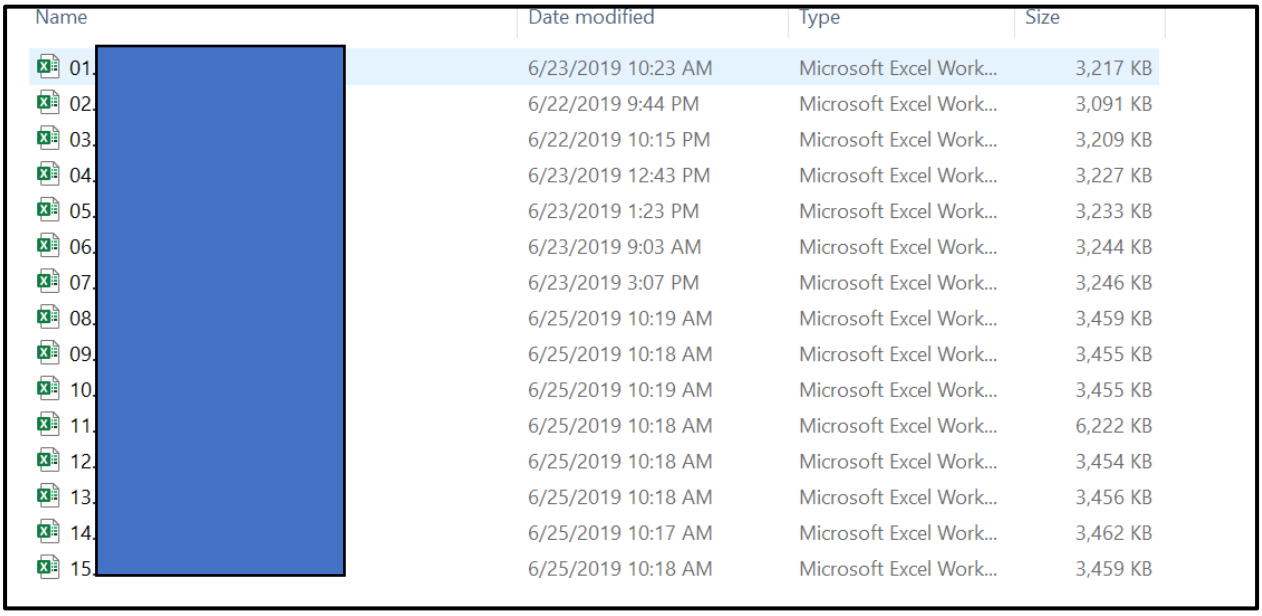
55. The Updates from the Baseline[9]

[8] Baseline
[9] Updates from the Baseline.

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".



56. The "TASK" and "TASKPRED" files used and downloaded from the XER files advised above to provide the As-planned v As-built Delay Analysis.[10]



57. P6 Programme Directory showing Baseline used and Updates thereof for Window 1[11].

[10] The "TASK" and "TASKPRED" files used and downloaded from the XER files advised above to provide the As-planned v As-built Delay Analysis

[11] Programme Directory

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

S.No.	Project ID	Project Name	Data Date	Number of Activities	Project CD	Description		Letter Ref. No.
1	[redacted]		27-Nov-16	10513	26-May-19	Original Baseline		DTF No.: 0387, Document Reference: EBH-SC-C-002 LET/GCI/BLH/TEC/106
PROGRAMME UPDATE DIRECTORY					ADDITIONAL COLUMNS		1	2	3
S.No.	Project ID	Project Name	Data Date	Update on	Baseline	Baseline DD	Activity Count		
1	[redacted]		31-Jan-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
2			28-Feb-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
3			30-Mar-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
4			30-Apr-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
5			31-May-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
6			29-Jun-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
7			31-Jul-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
8			31-Aug-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
9			28-Sep-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
10			2-Nov-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
11			30-Nov-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
12			28-Dec-17	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
13			1-Feb-18	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		
14			1-Mar-18	BH R.02-1	BH R.02-1	27-Nov-16	10513.00		

58. Combined calculation Sheet – SH-1 Single[12]

	KZ4	BOULEVARD HEIGHTS	BOULEVARD HEIGHTS -	BOULEVARD HEIGHTS Revi	BOULEVARD HEIGHTS Revised-1, updated 30 Mar 17				
		0	0	0	0				
	10517	01. BH R.02-2.xlsx	02. BH - UD 310117-1.xlsx	03. BH - UD 280217-1.xlsx	04. BH - UD 300317-1.xlsx				
	312	01. BH R.02-2.xlsx	02. BH - UD 310117-1.xlsx	03. BH - UD 280217-1.xlsx	04. BH - UD 300317-1.xlsx				
		27-Nov-16	31-Jan-17	28-Feb-17	30-Mar-17				
		Predecessor	Predecessor	Predecessor	Predecessor	Successor	Relat	(*)Predece	(*)Successo
	AUT1000	AUT1000	AUT1000	AUT1000	AUT1000	BHT104FIN3100	FS	Not Started	Not Started
	AUT1010	AUT1010	AUT1010	AUT1010	AUT1010	AUT1000	FS	Not Started	Not Started
	AUT1020	AUT1020	AUT1020	AUT1020	AUT1020	AUT1380	FS	Not Started	Not Started
	AUT1030	AUT1030	AUT1030	AUT1030	AUT1030	AUT1020	SS	Not Started	Not Started
	AUT1040	AUT1040	AUT1040	AUT1040	AUT1040	BHT1RFSUB100	FS	Completed	Completed
	AUT1050	AUT1050	AUT1050	AUT1050	AUT1050	BHCLOSE200	FF	Not Started	Not Started
	AUT1060	AUT1060	AUT1060	AUT1060	AUT1060	AUT1050	FS	Not Started	Not Started
	AUT1070	AUT1070	AUT1070	AUT1070	AUT1070	MSG165	FF	Not Started	Not Started
	AUT1080	AUT1080	AUT1080	AUT1080	AUT1080	AUT1070	FS	Not Started	Not Started
	AUT1090	AUT1090	AUT1090	AUT1090	AUT1090	AUT1060	FF	Not Started	Not Started
	AUT1100	AUT1100	AUT1100	AUT1100	AUT1100	AUT1090	FS	Not Started	Not Started
	AUT1110	AUT1110	AUT1110	AUT1110	AUT1110	AUT1100	FS	Not Started	Not Started
	AUT1120	AUT1120	AUT1120	AUT1120	AUT1120	AUT1110	FS	Not Started	Not Started
	AUT1130	AUT1130	AUT1130	AUT1130	AUT1130	MSG155	FS	Not Started	Not Started
	AUT1140	AUT1140	AUT1140	AUT1140	AUT1140	AUT1130	FS	Not Started	Not Started
	AUT1150	AUT1150	AUT1150	AUT1150	AUT1150	AUT1140	FS	Not Started	Not Started
	AUT1160	AUT1160	AUT1160	AUT1160	AUT1160	AUT1150	FS	Not Started	Not Started
	AUT1170	AUT1170	AUT1170	AUT1170	AUT1170	AUT1160	FS	Not Started	Not Started
	AUT1180	AUT1180	AUT1180	AUT1180	AUT1180	MSG145	FF	Not Started	Not Started
	AUT1190	AUT1190	AUT1190	AUT1190	AUT1190	AUT1180	FS	Not Started	Not Started
	AUT1200	AUT1200	AUT1200	AUT1200	AUT1200	AUT1190	FS	Not Started	Not Started
	AUT1210	AUT1210	AUT1210	AUT1210	AUT1210	AUT1200	FS	Not Started	Not Started
	AUT1220	AUT1220	AUT1220	AUT1220	AUT1220	AUT1210	FS	Not Started	Not Started
	AUT1230	AUT1230	AUT1230	AUT1230	AUT1230	MSG115	FS	Not Started	Not Started
	AUT1240	AUT1240	AUT1240	AUT1240	AUT1240	AUT1230	FS	Not Started	Not Started
	AUT1250	AUT1250	AUT1250	AUT1250	AUT1250	AUT1240	FS	Not Started	Not Started
	AUT1260	AUT1260	AUT1260	AUT1260	AUT1260	AUT1250	FS	Not Started	Not Started
	AUT1270	AUT1270	AUT1270	AUT1270	AUT1270	AUT1260	FS	Not Started	Not Started
	AUT1280	AUT1280	AUT1280	AUT1280	AUT1280	AUT1270	FS	Not Started	Not Started
	AUT1290	AUT1290	AUT1290	AUT1290	AUT1290	AUT1280	FS	Not Started	Not Started
	AUT1300	AUT1300	AUT1300	AUT1300	AUT1300	AUT1290	FS	Not Started	Not Started
	AUT1310	AUT1310	AUT1310	AUT1310	AUT1310	AUT1320	FS	Not Started	Not Started
	AUT1320	AUT1320	AUT1320	AUT1320	AUT1320	MSG105	FF	Not Started	Not Started
	AUT1330	AUT1330	AUT1330	AUT1330	AUT1330	AUT1320	FS	Not Started	Not Started
	AUT1340	AUT1340	AUT1340	AUT1340	AUT1340	AUT1330	FS	Not Started	Not Started
	AUT1350	AUT1350	AUT1350	AUT1350	AUT1350	AUT1340	FS	Not Started	Not Started

Sheet1 | 01. BH R.02-2.xlsx | 02. BH - UD 310117-1.xlsx | 03. BH - UD 280217-1.xlsx | 04. BH - UD 300317-1.xlsx | 05. BH - UD 300417-2.xlsx | 06 ...

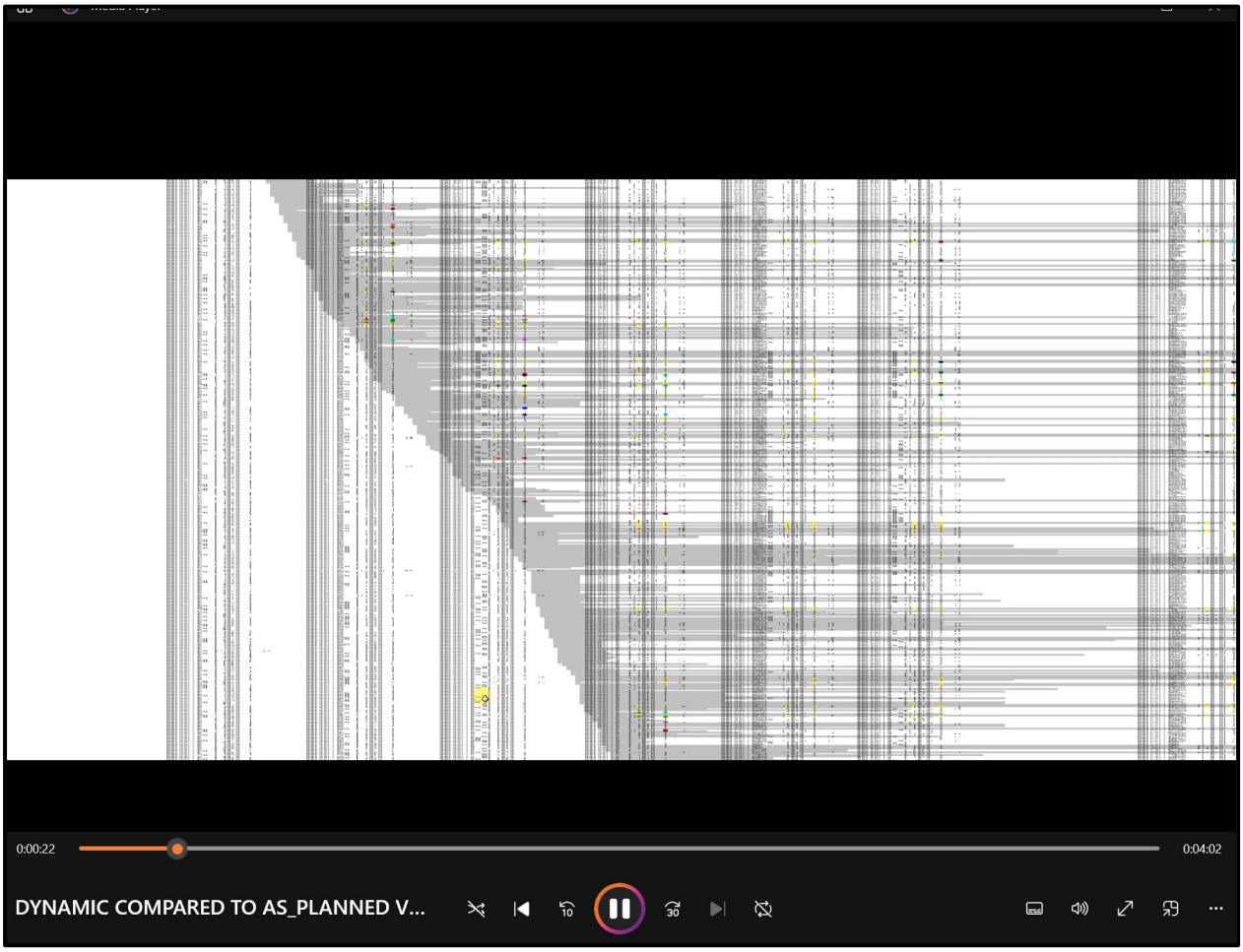
[12] SH1 – Single

59. Dynamic Versus As-planned V As-built CP Calculator Presentation Sheet[13]

60. The file titled: "DYNAMIC COMPARED TO AS_PLANNED V AS_BUILT CRITICAL PATHS.webm[14]" provides a video to explain how the Dynamic Versus As-planned V As-built CP Calculator Presentation Sheet works and how to comprehend the differences with the Dynamic CP compared to the APAB CP.

61. The following snapshots are taken from the Video.

62. Figure 009 shows the As-Built activities horizontally traversing the updated programmes. The vertical lines are the programme update data from the P6 Primavera Programmes.



63. Figure 010 shows Dynamic Critical Path (the P6 forecast). The red-coloured bars are the most critical.

[13] Dynamic Versus As-planned V As-built CP Calculator Presentation Sheet
[14] DYNAMIC COMPARED TO AS_PLANNED V AS_BUILT CRITICAL PATHS.webm

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

64. Figure 011 shows the APAB CP compared to the Dynamic CP. The filter is for the APAB CP, note how different the APAB CP (Factual) is compared to the P6 Dynamic (Forecast).

DYNAMIC VERSUS AS-PLANNED v AS-BUILT CP CALCULATION – THE DATA TO PERFORM THE APAB CALCULATION IS TAKEN EXCLUSIVELY FROM THE P6 PROJECT APPROVED BASELINE AND UPDATE PROGRAMMES THEREOF – NO CHANGES TO THE DATA FROM P6 IS MADE. THE DATA IS "AS-IS".

65. The conclusion is the Works were not built as per the P6 forecast for the as-planned works to complete after any data date.

66. Therefore, if the planned intent and order and sequence of the works has not been largely followed, can the P6 Primavera forecast be relied upon to provide an accurate assessment of a factual Extension of Time. Or, for that matter, can it also be relied upon to determine parallel concurrent critical paths factually.

67. The answer: No!