

National Park Service



EXPERIENCE
YOUR
AMERICA



CAPITAL ASSET PLANS

Part 3: Earned Value Calculations and Variances

AGENDA—PART 3

The Capital Asset Plan and Business Case

- The Big Picture
- Definition & impetus
- Schedule
- Scoring
- How to write a good one
 - ▶ Types of input required
- ***Variations***
 - ▶ Consequences
 - ▶ ***Earned value and other calculations***
- ***Questions***

VARIANCES FROM THE PROJECT BASELINE

- Three possible levels used in calculations
 - ▶ Specific project milestones
 - ▶ Divided phases
 - ▶ Cookbook
- All methods require 4 values
 - ▶ OMB approved baseline budget [BAC]
 - ▶ Budgeted cost of work scheduled [BCWS]
 - ▶ Budgeted cost of work performed [BCWP]
 - ▶ Actual cost of work performed [ACWP]

BEST: Develop the Project Budget and Schedule

**Use
Milestone
Activities**

**Budget covers
all phases, pre-
design through
construction**

**HINT:
Check Q-Track
milestones so
you only have to
do this once**

PROJECT DEVELOPMENT BUDGET

FY 03

Supp. Services 13K

Pre-design 48K

Activity	Completion Date	Cost	Cumulative Total
Scoping	1/30/2003	3,000	3,000
Proj. Agree	2/28/2003	2,000	5,000
Cap Asset P	3/15/2003	2,000	7,000
Alt Dev & VA	4/30/2003	33,000	40,000
Pref Alt Dev	6/15/2003	16,000	56,000
DAB	8/10/2003	3,000	59,000
Complete Concept Design	9/15/2003	2,000	61,000

FY 04

Supp. Services 7K

Design 90K

Activity	Completion Date	Cost	Cumulative Total
Complete PD on Concept	12/30/2003	25,000	86,000
25% CD dev	2/15/2004	18,000	104,000
50% CD dev	4/1/2004	13,000	117,000
75% CD dev	6/15/2004	15,000	132,000
100% CD dev	8/30/2004	26,000	158,000

Continue through the Construction phase, also

NOTE:
BAC includes construction contingency

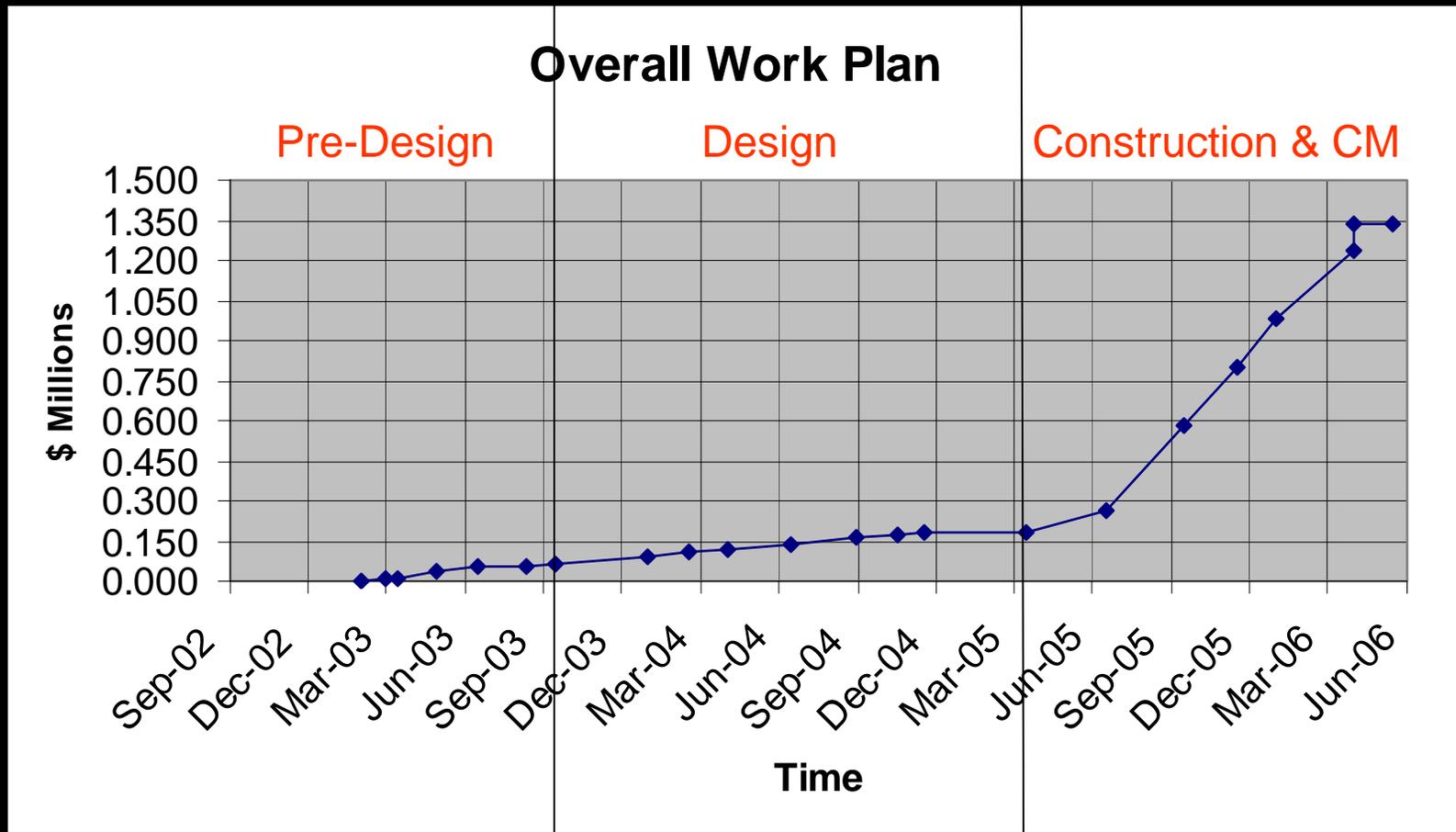
HINT:
Does your BAC match the spending schedule on your CAP— They should match!

PROJECT DEVELOPMENT BUDGET						
FY 05						
Design \$10K						
CM \$80k						
Net. Const \$1 Million						
Contingency \$90K						
Activity	Completion Date	Design Cost	CM Cost	Construct Cost	Contingency Cost	Cumulative Total
Constructability Review	10/15/2004	7,000	0	0	0	165,000
Advertise Contr	11/15/2004	3,000	0	0	0	168,000
Award Contract	3/15/2005	0	0	0	0	168,000
Mobil & Demo	6/15/2005	0	15,000	70,000	0	253,000
Rough Carp, Elect & Mech	9/15/2005	0	10,000	275,000	30,000	568,000
Int Fin Rough	10/15/2005	0	15,000	150,000	10,000	743,000
Final Elect, Mech & Plumb	11/15/2005	0	10,000	150,000	25,000	928,000
Final Interior	1/1/2006	0	15,000	215,000	25,000	1,183,000
Ext Sitework & Cleanup	4/1/2006	0	5,000	90,000	0	1,278,000
Final Inspection	5/15/2006	0	5,000	0	0	1,283,000
Punchlist	8/15/2006	0	5,000	50,000	0	1,338,000
Budget at Completion	BAC					1,338,000

Project graph

NOTE: The project graph reflects the project development budget @ \$1.338 million.

Each dot below corresponds to an activity milestone on the project development schedule.



Now develop:

- Cost and schedule variances,
- Cost and schedule performance indices,
- Estimate at Completion . . . for the **June 3, 2003**, quarterly update.
- Formulas at right

Are BAC and EAC different? Maybe. **BAC** is the original budget and schedule, the **Budget At Completion**. From this point on, we develop the EAC, the Estimate at Completion

- A Provide the following project summary information from your EVMS software: As of: JUNE 3, 2003
- B Show the budgeted (planned) cost of work scheduled (BCWS): \$ _____
- C Show budgeted (planned) cost of work performed (BCWP): \$ _____
- D Show the actual cost of work performed (ACWP): \$ _____

	Value
OMB-approved baseline (BAC) -	
Budgeted (planned) cost of work scheduled (BCWS)-	
Budgeted (planned) cost of work performed (BCWP) -	
Actual cost of work performed (ACWP) -	
Cost Variance - (BCWP - ACWP) -	
Cost Variance % - (CV/BCWP) x 100% -	
Cost Performance Index (CPI) - (BCWP/ACWP) -	
Schedule Variance - (BCWP - BCWS) -	
Schedule Variance % - (SV/BCWS) x 100% -	
Schedule Performance Index (SPI) - (BCWP/BCWS) -	
First independent Estimate at Completion (EAC) - ACWP cum - (Performance Factor (PF) X (BAC minus BCWP cum)), where PF ₁ = 1/CPI	
Second independent Estimate at Completion, where PF ₂ = 1/CPI * SPI	
Variance at Completion (VAC) - (BAC - EAC) for both EACs above -	
Variance at Completion % - (VAC/BAC) x 100% for both EACs above -	
Expected Cost to Complete (ETC) - EAC - ACWP -	
Expected Completion Date -	

Definitions for Earned Value Management System:

- ACWP - Actual Cost for Work Performed - What you paid.
- BAC - Budget At Completion - The baseline (planned) budget for the project.
- BCWP - Budgeted Cost for Work Performed - The earned value.
- BCWS - Budgeted Cost for Work Scheduled - The planned costs.
- CPI - Cost Performance Index - The ratio of the budgeted to actual cost of work performed.
- CV - Cost Variance - The difference between planned and actual cost of work performed.
- EAC - Estimate At Completion - The latest estimated cost at completion.
- ETC - Estimate to Completion - Funds needed to complete the project.
- PF - Performance Factor - The cost to earn a dollar of value, or ACWP/BCWP, or 1/CPI.
- SPI - Schedule Performance Index - The percent of the project that has been completed.
- SV - Schedule Variance - The variance between the actual and planned schedules.
- VAC - Variance at Completion - The variance between the baseline and actual budget at completion.⁶⁵

How much was budgeted for the work scheduled?

(BCWS)

Take this from your milestone chart.

How much was budgeted for the work that was performed?

(BCWP)

For Quarterly Report Due June 3, 2003					
Budgeted Cost of Work Scheduled (BCWS)					
		<i>Activity</i>	<i>% scheduled</i>	<i>Budgeted Cost</i>	<i>Cum. Total</i>
		Scoping	100	3,000	3,000
		Proj Agreement	100	2,000	5,000
		Cap Asset Plan	100	2,000	7,000
		Alt. Devel. & VA	100	33,000	40,000
		Pref. Alternative	63	10,080	50,080
				BCWS	\$50,080
Budgeted Cost of Work Performed (BCWP)					
		Scoping	100	3,000	3,000
		Proj Agreement	100	2,000	5,000
		Cap Asset Plan	100	2,000	7,000
		Alt. Devel. & VA	100	33,000	40,000
		Pref. Alternative	0	0	0
				BCWP	\$40,000
Schedule Variance = BCWP - BCWS = 40,000 - 50,080 = (\$10,080)					
% Sched Variance = SV/BCWS x 100% = -10,080/50,080 x 100% = (20%)					

Can you figure % cost variance?

We just figured out the *budgeted cost* of the work performed.
Now, what is the *actual* cost of the work performed?

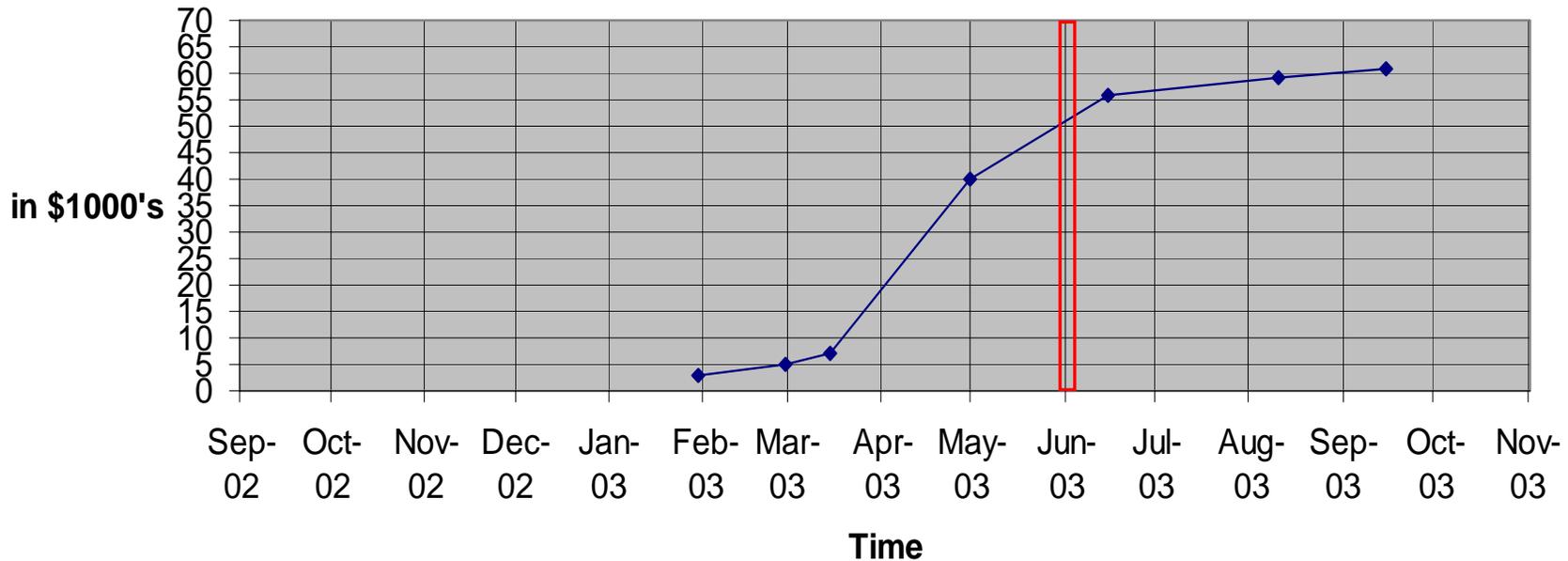
<u>For Quarterly Report Due June 3, 2003</u>				
Cost Variance		% Scheduled	BCWP	ACWP
	Scoping	100	3,000	5,000
	Proj Agreement	100	2,000	3,000
	Cap Asset Plan	100	2,000	4,000
	Alt. Devel. & VA	100	33,000	30,000
	Pref. Alternative	63	0	0
	Total		40,000	42,000
Cost Variance = BCWP - ACWP = \$40,000 - \$42,000 = (\$2,000)				
% Cost Variance = CV/BCWP x 100% = - \$2,000/ \$40,000 = (5%)				

Pre-design intentions as a Graph

What would the planning for our project look like on a graph for pre-design only?

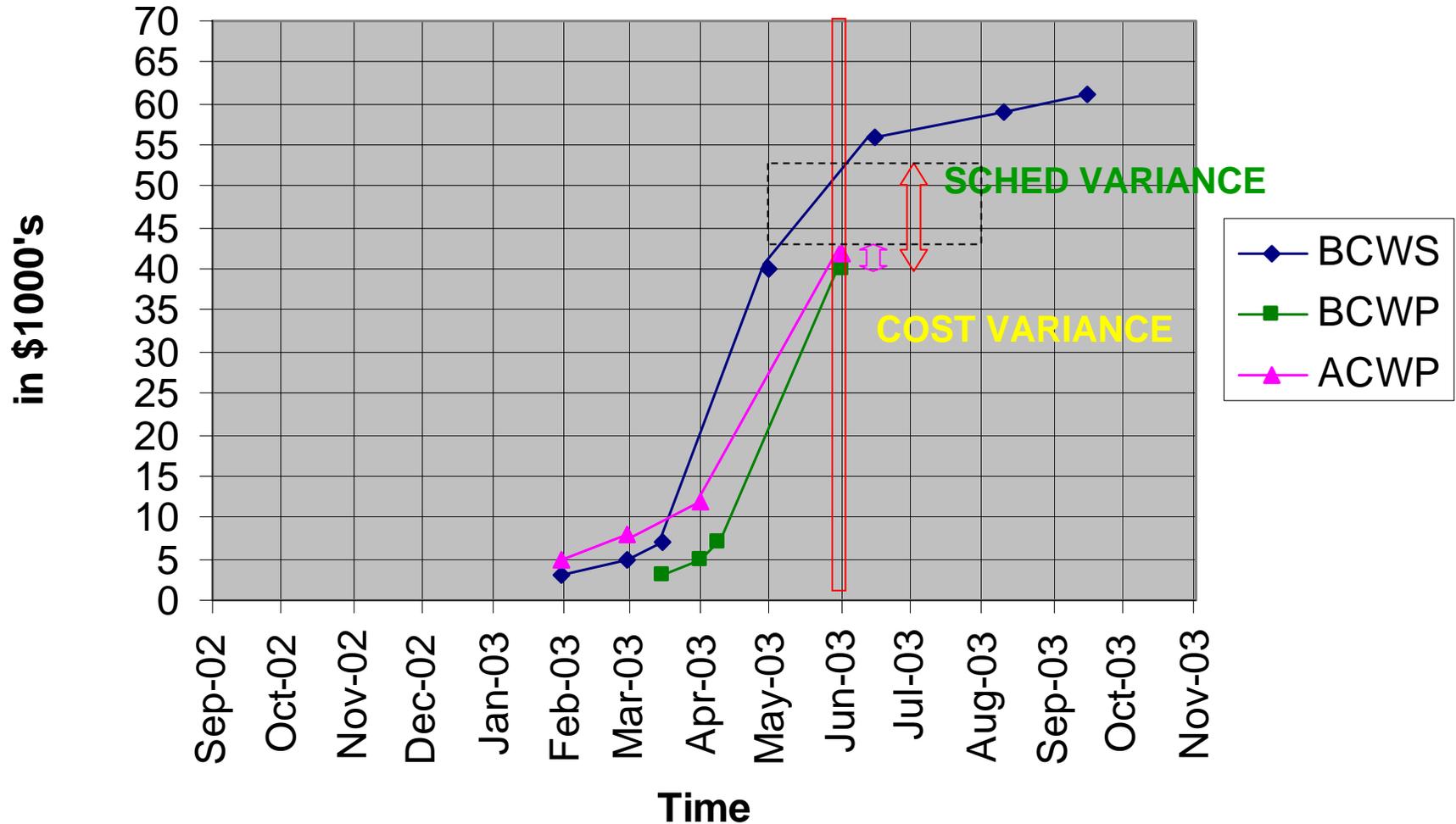
By June 3, the chart would show **\$50,080 BCWS**

Pre Design - What was planned



Pre-design—what really happened?

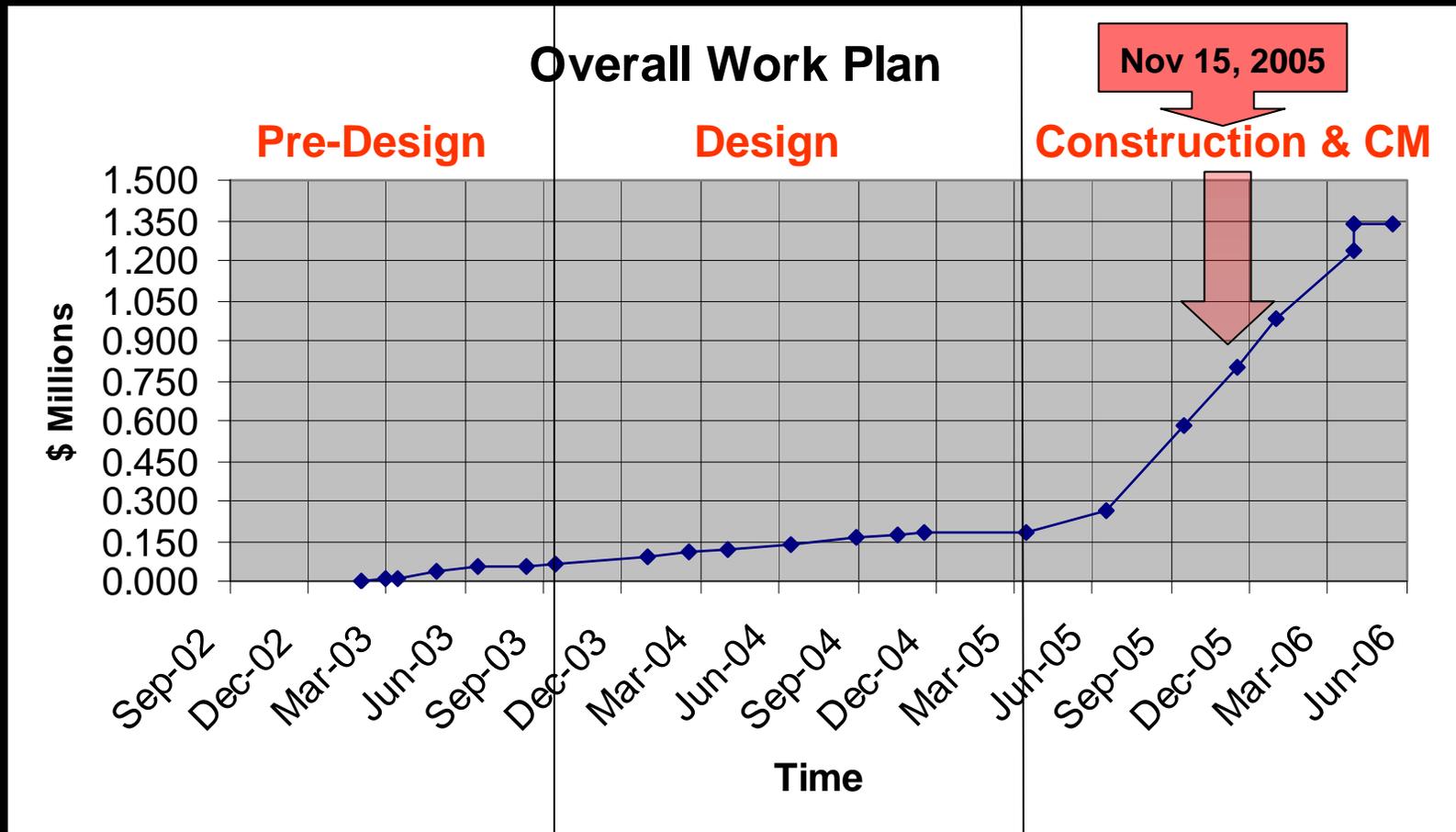
Pre-Design: What really happened



The next update will be a calculation exercise.
This will be for November 15, 2005—during
the construction phase.

What is the project status on November 15, 2005?

1. Determine whether project is on schedule and within budget.
2. Calculate variances and other values as shown on chart from Capital Asset Plan and Business Case form.
3. Will the Expected Completion Date change?



First, Update Milestones for Nov. 15, 2005

For Quarterly Report As of November 15, 2005

Activity	BCWP	ACWP	BCWS	Scheduled Compl. Date	Actual Compl. Date
Scoping		5,000			3/15/2003
Project Agreement		3,000			4/1/2003
Cap Asset Plan		4,000			4/10/2003
Alt. Development & VA		30,000			6/1/2003
Pref. Alt.		21,000			7/10/2003
DAB		3,000			8/10/2003
Compl. Concept. Design		6,000			10/21/2003
Compl PD on Concept		31,000			1/15/2004
25% CD Development		18,000			3/15/2004
50% CD Development		15,000			5/3/2004
75% CD Development		17,000			7/20/2004
100% CD Development		30,000			10/2/2004
Constructability Review		5,000			12/1/2004
Advertise Contr		4,000			12/28/2004
Award Contract		0			4/18/2005
Mobil & Demo		93,000			7/10/2005
Mobil & Demo--CM		18,000			7/10/2005
Rough Carp, Elect & Mech		320,000			10/21/2005
R Carp, Elect & Mech--CM		10,000			10/21/2005
Int Fin Rough		175,000			11/3/2004
Int Fin Rough--CM		21,000			11/3/2004
Final Elect, Mech & Plumb		31,000			15% complete
Final E, M & P--CM		2,000			20% complete
TOTALS		862,000			

Pre-Design

Design

Construct & CM

First, Update Milestones for Nov. 15, 2005

- Variances are all expressed in dollar ratios.

One of the biggest difficulties seems to be in distinguishing among the 4 critical values.

- **BAC** Your total project budget, the bottom line.
- **BCWS** Amount of money that you were planning, or budgeting, for the work tasks that you planned, or scheduled, to have done by a certain date.
- **BCWP** Amount of money you were planning to spend on the work that you actually got done by that date.
- **ACWP** Amount of money you *actually* spent for the work that you *actually* got done.

A way to look at developing Values

- Variances are all expressed in dollar ratios.
- **Schedule Variance** **BCWP – BCWS**
 - ▶ Look at the work that you were scheduled to do against the work that you actually got done. Remember, it's all in \$\$.
 - ▶ Subtract the \$ of what you had scheduled from the \$ of what you actually got done, or performed.
 - ▶ Schedule variance holds constant the budgeted \$ and measures differences in what got done vs what you planned to get done
- **Cost Variance** **BCWP – ACWP**
 - ▶ Look at the work that you actually got done (Work Performed).
 - ▶ Subtract what you actually paid for this from what you were planning to pay for it.
 - ▶ Cost variance holds constant the work performed, and measures differences in \$ planned vs \$ paid

Now update the values for Nov. 15, 2003

	Value
OMB-approved baseline (BAC) =	
Budgeted (planned) cost of work scheduled (BCWS)=	
Budgeted (planned) cost of work performed (BCWP) =	
Actual cost of work performed (ACWP) =	
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $ACWP_{cum} + (Performance\ Factor\ (PF) \times (BAC - BCWP_{cum}))$, where $PF_1 = 1/CPI$	
Second independent Estimate at Completion, where $PF_2 = 1/CPI \times SPI$	
Variance at Completion (VAC) = (BAC - EAC) for both EACs above =	
Variance at Completion % = (VAC/BAC) x 100% for both EACs above =	
Expected Cost to Complete (ETC) = EAC - ACWP =	
Expected Completion Date =	

Updated Milestones for Nov. 15, 2005

For Quarterly Report As of November 15, 2005

Activity	BCWP	ACWP	BCWS	Scheduled Compl. Date	Actual Compl. Date
Scoping	3,000	5,000	3,000	1/30/2003	3/15/2003
Project Agreement	2,000	3,000	2,000	2/28/2003	4/1/2003
Cap Asset Plan	2,000	4,000	2,000	3/15/2003	4/10/2003
Alt. Development & VA	33,000	30,000	33,000	4/30/2003	6/1/2003
Pref. Alt.	16,000	21,000	16,000	6/15/2003	7/10/2003
DAB	3,000	3,000	3,000	8/10/2003	8/10/2003
Compl. Concept. Design	2,000	6,000	2,000	9/15/2003	10/21/2003
Compl PD on Concept	25,000	31,000	25,000	12/30/2003	1/15/2004
25% CD Development	18,000	18,000	18,000	2/15/2004	3/15/2004
50% CD Development	13,000	15,000	13,000	4/1/2004	5/3/2004
75% CD Development	15,000	17,000	15,000	6/15/2004	7/20/2004
100% CD Development	26,000	30,000	26,000	8/30/2004	10/2/2004
Constructability Review	7,000	5,000	7,000	10/15/2004	12/1/2004
Advertise Contr	3,000	4,000	3,000	11/15/2004	12/28/2004
Award Contract	0	0	0	3/15/2005	4/18/2005
Mobil & Demo	85,000	93,000	85,000	6/15/2005	7/10/2005
Mobil & Demo--CM	15,000	18,000	15,000	6/15/2005	7/10/2005
Rough Carp, Elect & Mech	305,000	320,000	305,000	9/15/2005	10/21/2005
R Carp, Elect & Mech--CM	10,000	10,000	10,000	9/15/2005	10/21/2005
Int Fin Rough	160,000	175,000	160,000	10/15/2005	11/3/2004
Int Fin Rough--CM	15,000	21,000	15,000	10/15/2005	11/3/2004
Final Elect, Mech & Plumb	36,000	31,000	175,000	11/15/2005	15% complete
Final E, M & P--CM	1,500	2,000	10,000	11/15/2005	20% complete
TOTALS	795,500	862,000	943,000		

Pre-Design

Design

Construct & CM

Completed calculations for Nov. 15, 2005, update:

	Value
OMB-approved baseline (BAC) =	1.338
Budgeted (planned) cost of work scheduled (BCWS)=	.943
Budgeted (planned) cost of work performed (BCWP) =	.7955
Actual cost of work performed (ACWP) =	.862
Cost Variance = (BCWP-ACWP) =	-0.0665
Cost Variance % = (CV/BCWP) x 100% =	-8.4%
Cost Performance Index (CPI) = (BCWP/ACWP) =	0.92
Schedule Variance = (BCWP-BCWS) =	-0.1475
Schedule Variance % = (SV/BCWS) x 100% =	-15.6%
Schedule Performance Index (SPI) = (BCWP/BCWS) =	0.84
First independent Estimate at Completion (EAC) = $\frac{ACWP_{cum}}{CPI}$ = (Performance Factor (PF) X (BAC minus $BCWP_{cum}$)), where $PF_1 = 1/CPI$,	1.45
Second independent Estimate at Completion, where $PF_2 = 1/CPI * SPI$	1.56
Variance at Completion (VAC) = (BAC - EAC) for both <u>EACs</u> above =	-0.112
Variance at Completion % = (VAC/BAC) x 100% for both <u>EACs</u> above =	116.59
Expected Cost to Complete (ETC) = EAC - ACWP =	0.588
Expected Completion Date =	10/15/2006

You haven't developed a list of milestones??

A familiar—although less precise
—way to do the calculations:

- Measure the project as 4 phased milestones
 - ▶ Pre-Design
 - ▶ Design
 - ▶ Construction + Contingency
 - ▶ Construction Management
- Develop the 4 critical values
 - ▶ BAC
 - ▶ BCWS
 - ▶ BCWP
 - ▶ ACWP

Key to every method is developing the 4 values

- Use 4 phases as milestones
- Put into an active worksheet
- Keep results for project tracking

CAPITAL ASSET PLAN - BUDGET WORKSHEET							
PARK	INFO						
PKG/PMIS	123/012345						
DATE	November 15, 2005						
Billing Through	November 10, 2005						
			BCVS		ACVP		BCVP
	Budget (\$)	Budget (%)	Budget to date	Actual (%)	Actual spent to date	Planned%	Actual Budget
Predesign	\$61,000	100	\$61,000	100	\$72,000	\$100	\$61,000
Design	\$117,000	100	\$117,000	100	\$120,000	\$100	\$117,000
Construction - contin	\$1,080,000	69.9074	\$755,000	57.3	\$619,000	\$15	\$162,000
Construction Mgmt	\$90,000	68.748	\$54,998	63.75	\$52,000	\$20	\$16,000
BAC =	\$1,338,000		\$987,998		\$863,000		\$356,000
BCVS =	\$987,998						
ACVP =	\$863,000						
BCVP =	\$356,000						
Cost Variance (CV) =	BCVP - ACVP =	-\$507,000					
Cost Variance (%) =	(CV/BCVP) * 100%	-142.42					
CPI =	BCVP/ACVP =	0.413					
Schedule Variance (SV) =	BCVP - BCVS =	-\$631,998					
Schedule Variance (%) =	(SV/BCVS) * 100%	-63.97					
SPI =	BCVP/BCVS =	0.36					
Critical Ratio =	CPI * SPI =	0.15					
							Note: If CR is between 0.9 & 1.2, it's OK; if below 0.8 or above 1.3, then there is a problem; if btwn 0.8-0.9 & 1.2-1.3, then check
EAC	(BAC - BCVP) / CPI	\$3,243,522					
Est. to Complete (ETC)	EAC - ACVP =	\$2,380,522					
Variance @ Compl. (VAC)	BAC - EAC =	-\$1,905,522					
VAC %	VAC/BAC * 100%	-142.42					
Est. to Complete (ETC)	EAC - ACVP =	\$2,380,522					

- Info must still be entered into the official CAP format

Worksheet filled in for Nov 15, 2005

CAPITAL ASSET PLAN - BUDGET WORKSHEET							
PARK	INFO						
PKG/PMIS	123/012345						
DATE	November 15, 2005						
Billing Through	November 10, 2005						
			BCVS		ACVP		BCVP
	Budget (\$)	Budget (%)	Budget to date	Actual (%)	Actual spent to date	Planned%	Actual Budget
Predesign	\$61,000	100	\$61,000	100	\$72,000	\$100	\$61,000
Design	\$107,000	100	\$107,000	100	\$120,000	\$100	\$107,000
Construction + contin	\$1,090,000	66.514	\$725,003	56.8	\$619,000	\$54	\$585,984
Construction Mgmt	\$80,000	62.5	\$50,000	63.75	\$51,000	\$52	\$41,500
BAC =	\$1,338,000		\$943,003		\$862,000		\$795,484
BCVS =	\$943,003						
ACVP =	\$862,000						
BCVP =	\$795,484						
Cost Variance (CV) =	BCVP - ACVP =		-\$66,516				
Cost Variance (%) =	(CV/BCVP) * 100%		-8.36				
CPI =	BCVP/ACVP =		0.923				
Schedule Variance (SV) =	BCVP - BCVS =		-\$147,519				
Schedule Variance (%) =	(SV/BCVS) * 100%		-15.64				
SPI =	BCVP/BCVS =		0.84				
Critical Ratio =	CPI * SPI =		0.78				Note: If CR is between 0.9 & 1.2, it's OK; if below 0.8 or above 1.3, then there is a problem; if btwn 0.8-0.9 & 1.2-1.3, then check
EAC	(BAC - BCVP) / CPI		\$1,449,880				
Est. to Complete (ETC)	EAC - ACVP =		\$587,880				
Variance @ Compl. (VAC)	BAC - EAC =		-\$111,880				
VAC %	VAC/BAC * 100%		-8.36				
Est. to Complete (ETC) =	EAC - ACVP =		\$587,880				

A third way to do the calculations

The COOKBOOK METHOD

● Ingredients:

- ▶ BAC
- ▶ BCWS
- ▶ BCWP
- ▶ ACWP
- ▶ Project Summary sheet with active macros

Find the website for Construction Program Management at construction.den.nps.gov

The screenshot shows a Microsoft Internet Explorer browser window. The title bar reads "Intro - Microsoft Internet Explorer". The address bar contains the URL "http://construction.den.nps.gov/". The main content area displays the National Park Service logo, which includes a tree, mountains, and the text "NATIONAL PARK SERVICE" and "Department of the Interior". Below the logo, the text "Construction Program Management" is displayed in a large, blue font. Underneath this text is a link that says "| Skip Intro |". The browser's taskbar at the bottom shows the Start button, several open applications including "Cap Presentation", "sv", "put cursor her...", "EVMS softwar...", and "Intro - Microso...", and the system clock showing "12:46 PM".

Go into the website

Construction Program Management - Microsoft Internet Explorer

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Capital Asset Management | Value Analysis | Construction Project Review | Construction Program Guidance | Facility Planning Model

You are here: Construction Program Management

Today is Sunday, September 7.

Our Mission

The mission of Construction Program Management Division is to assure that all major construction completed by the National Park Service materially contributes to effective resource protection, safe high quality visitor experience, and improved park operations in the most cost effective and environmentally responsive manner possible.

Appropriations 2003

Click here to find out more about

General Contact Information

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Go to the Capital Asset Section

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Descriptions:

General

A Capital Asset Plan and Business Case is required for all capital improvement construction projects over \$2 million. It is a format to outline the funding, schedule, background, and performance requirements of a project. For projects \$10 million and over the Capital Asset Plan and Business Case must be submitted to the Department of Interior (DOI) and the Office of Managerial Budget (OMB) for approval, and then will be updated on a quarterly basis.

[Capital Asset Plan and Business Case Form](#)

This page has the blank form.

[Update your Project Summary \(Cumulative\)](#)

Are you having trouble calculating variances? If you are using an old format and would like to cut and paste the chart with macros that will do the calculation for you, use this chart. Do not forget the [Macro](#) instructions.

[CONSTRUCTION PROJECT SCORING 2005](#)

Shows OMB priorities in Capital Asset Plans.

Internet

start Cap Presentation sv first page web... EVMS softwar... CPM Capital A... 12:52 PM

Open there on the web

CPM Capital Asset - Microsoft Internet Explorer

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management

Capital improvement construction projects over ground, and performance requirements of a and Business Case must be submitted to budget (OMB) for approval, and then will

[Capital Asset Plan and Business Case Form](#)

This page has the blank form.

[Update your Project Summary \(Cumulative\)](#)

Are you having trouble calculating variances? If you are using an old format and would like to cut and paste the chart with macros that will do the calculation for you, use this chart. Do not forget the [Macro](#) instructions.

Downloading from site: http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.doc

Internet

start Cap Presentation sv EVMS softwar... June 3 blank c... CPM Capital A... 3:28 PM

What are macros?

Macro Tutorial

Macros Usage Tutorial

Date: 06/10/03

PLACE YOUR CURSOR AT THE APPROPRIATE LOCATION TO ENABLE THE MACRO TO ACT.

For the footnote and header:

- 1.) For *footnote* macro place the cursor right before your text starts [see the figure M1].
- 2.) For *header date* place your cursor right before the date in *Prepared By*.

For Addition in the Summary of Spending:

- 3.) For *addition* macro place the cursor in the last column and fourth row
- 4.) For *addition2* macro place the cursor in the second column and row corresponding to Budget Authority

To Calculate Variances:

- 5.) For *compute* place your cursor in the value column and to the row corresponding to Cost Variance.

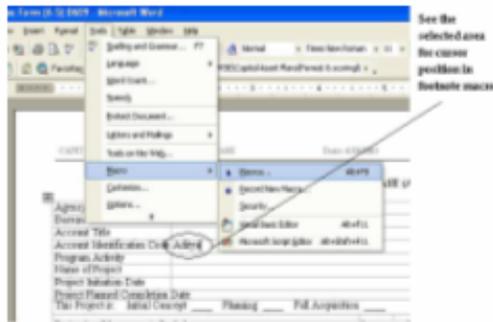


Figure M1

To find the Macro activator:

- 6.) Go to Tools on the menu box, select Macro and then Macros.
- 7.) A screen as shown in figure M2 opens.
- 8.) Select Run to run the macro.

The CPM website has instruction for using macros

Enter the first 4 values

● For the latest CAP format, macros should work right there in the form.

● To cut the chart into your old, existing format, work it on the website, then later cut and paste into your existing file.

- A Provide the following project summary information from your EVMS software: As of: SEPT 3, 2003
- B Show the budgeted (planned) cost of work scheduled (BCWS): \$ 60,600
- C Show budgeted (planned) cost of work performed (BCWP): \$ 60,200
- D Show the actual cost of work performed (ACWP): \$ 68,000

	Value
OMB-approved baseline (BAC) =	1,338,000
Budgeted (planned) cost of work scheduled (BCWS) =	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = ACWPcum + (Performance Factor (PF) X (BAC minus BCWPcum)), where PF ₁ = 1/CPI	
Second independent Estimate at Completion, when PF ₂ = 1/CPI*SPI	
Variance at Completion (VAC) = (BAC - EAC) for both EACs above =	
Variance at Completion % = (VAC/BAC) x 100% for both EACs above =	
Expected Cost to Complete (ETC) = EAC - ACWP =	
Expected Completion Date =	

Definitions for Earned Value Management System:

- ACWP - Actual Cost for Work Performed - What you paid.
- BAC - Budget At Completion - The baseline (planned) budget for the project.
- BCWP - Budgeted Cost for Work Performed - The earned value.
- BCWS - Budgeted Cost for Work Scheduled - The planned costs.
- CPI - Cost Performance Index - The ratio of the budgeted to actual cost of work performed.
- CV - Cost Variance - The difference between planned and actual cost of work performed.
- EAC - Estimate At Completion - The latest estimated cost at completion.
- ETC - Estimate to Completion - Funds needed to complete the project.
- PF - Performance Factor - The cost to earn a dollar of value, or ACWP/BCWP, or 1/CPI.
- SPI - Schedule Performance Index - The percent of the project that has been completed.
- SV - Schedule Variance - The variance between the actual and planned schedules.
- VAC - Variance at Completion - The variance between the baseline and actual budget at completion.

Start the action . . . Put cursor here.

- A Provide the following project summary information from your EVMS software: As of: **SEPT 3, 2003**
- B Show the budgeted (planned) cost of work scheduled (BCWS): **\$ 60,600**
- C Show budgeted (planned) cost of work performed (BCWP): **\$ 60,200**
- D Show the actual cost of work performed (ACWP): **\$ 68,000**



	Value
OMB-approved baseline (BAC) =	1,338,000
Budgeted (planned) cost of work scheduled (BCWS)=	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $\frac{ACWP_{cum}}{CPI} = (\text{Performance Factor (PF)} \times (\text{BAC} - \text{BCWP}_{cum})) + \text{BCWP}_{cum}$, where $PF_1 = 1/CPI$	
Second independent Estimate at Completion, where $PF_2 = 1/CPI * SPI$	
Variance at Completion (VAC) = (BAC - EAC) for both EACs above =	
Variance at Completion % = (VAC/BAC) x 100% for both EACs above =	



Go to "Tools"

Address: http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.doc

File Edit View Insert Format **Tools** Table Go To Favorites Help

Back Forward Home Search Favorites Media

Address: http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.doc

Search Compete

What are you looking for?
Type your question below. For best results, use complete words.
Please type your question.
Sample question: Look in class for a...
You may also want to...
Search this computer for

Search

CAPITAL ASSET PLAN AND BUSINESS CASE Date: EXHIBIT 300

A Provide the following project summary information from your EVMS software: As of: (date)

B Show the budgeted (planned) cost of work scheduled (BCWS): \$ 60,600

C Show budgeted (planned) cost of work performed (BCWP): \$ 60,200

D Show the actual cost of work performed (ACWP): \$ 68,000

	Value
OMB-approved baseline (BAC) =	1,338,000
Budgeted (planned) cost of work scheduled (BCWS) =	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $ACWP_{cum} + (Performance\ Factor\ (PF) \times (BAC - BCWP_{cum}))$, where $PF_1 = 1/CPI$,	
Second independent Estimate at Completion, where $PF_2 = 1/CPI \times SPI$	

Unknown Zone

start Cap Presentation sv find program -... EVMS softwar... http://construc... 12:55 PM

Go to 'macro'

The screenshot shows a Microsoft Word document titled "EXHIBIT 300" displayed in a web browser. The browser's address bar shows the URL: http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.... The Word application's menu bar includes File, Edit, View, Insert, Format, Tools, Table, Go To, Favorites, and Help. The "Tools" menu is open, and the "Macro" option is selected, which has opened a sub-menu. A red arrow points from the "Macro" option in the Tools menu to the sub-menu. The sub-menu contains the following options:

- Spelling and Grammar... F7
- Language
- Word Count...
- AutoSummarize...
- Look Up Reference...
- Speech
- Track Changes Ctrl+Shift+E
- Compare and Merge Documents...
- Protect Document...
- Online Collaboration
- Letters and Mailings
- Tools on the Web...
- Macro**
- Templates and Add-Ins...
- AutoCorrect Options...
- Customize...
- Options...
- Macros... Alt+F8
- Record New Macro...
- Security...
- Visual Basic Editor Alt+F11
- Microsoft Script Editor Alt+Shift+F11

The document content includes a table with the following data:

	Value
Budgeted (planned) cost of work scheduled (BCWS) =	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP - ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP - BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $ACWP_{cum} + (BAC - ACWP_{cum}) / CPI$, where $PF_1 = 1/CPI$,	
Second independent Estimate at Completion, where $PF_2 = 1/CPI * SPI$	

Check 'security'

The screenshot shows a web browser window with the address http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.... The browser's search engine is set to 'What are you looking for?'. The main content area displays a report titled 'EXHIBIT 300' with the following data:

Date: EXHIBIT 300

on from your EVMS software: As of: [\(date\)](#)

cluded (BCWS): \$ 60,600

d (BCWP): \$ 60,200

	Value
Budgeted (planned) cost of work scheduled (BCWS) =	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $ACWP_{cum} = (Performance\ Factor\ (PF) \times (BAC\ minus\ BCWP_{cum}))$, where $PF_1 = 1/CPI$,	
Second independent Estimate at Completion, where $PF_2 = 1/CPI * SPI$	

The Microsoft Word 'Tools' menu is open, showing options like 'Spelling and Grammar...', 'Language', 'Word Count...', 'AutoSummarize...', 'Look Up Reference...', 'Speech', 'Track Changes', 'Compare and Merge Documents...', 'Protect Document...', 'Online Collaboration', 'Letters and Mailings', 'Tools on the Web...', 'Macro', 'Templates and Add-Ins...', 'AutoCorrect Options...', 'Customize...', and 'Options...'. The 'Macro' sub-menu is open, highlighting 'Security...'. A red arrow points to the 'Security...' option.

The Windows taskbar at the bottom shows the Start button, several open applications (Cap Presentation, sv, go to macro - ..., EVMS softwar..., http://construc...), and the system clock showing 12:59 PM.

'Security' has to be 'low'

Security

Security Level | Trusted Sources

- High. Only signed macros from trusted sources will be allowed to run. Unsigned macros are automatically disabled.
- Medium. You can choose whether or not to run potentially unsafe macros.
- Low (not recommended). You are not protected from potentially unsafe macros. Use this setting only if you have virus scanning software installed, or you are sure all documents you open are safe.

No virus scanner installed.

OK Cancel

If security isn't low, set it there. Leave the site; return, and the macro security setting should now work

	Value
OMB-approved baseline (BAC) =	1,338,000
Budgeted (planned) cost of work scheduled (BCWS) =	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $ACWP_{cum} + (Performance\ Factor\ (PF) \times (BAC - BCWP_{cum}))$, where $PF_1 = 1/CPI$,	
Second independent Estimate at Completion, where $PF_2 = 1/CPI \times SPI$	

Now back to the macro

The screenshot shows a web browser window with the address bar containing the URL: http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.... The browser's address bar also shows a document icon and the text "ve.doc".

The browser's search bar is active, displaying "Search Compe" and a search button. Below the search bar, there is a section titled "What are you looking for?" with a search input field and a search button. A small cartoon dog is visible in the bottom left corner of the browser window.

The main content area of the browser displays a document titled "EXHIBIT 300". The document contains the following text:

Date: EXHIBIT 300

ion from your EVMS software: As of: [\(date\)](#)

uled (BCWS): \$ 60,600

d (BCWP): \$ 60,200

The document also contains a table with the following data:

	Value
Budgeted (planned) cost of work scheduled (BCWS) =	60,600
Budgeted (planned) cost of work performed (BCWP) =	60,200
Actual cost of work performed (ACWP) =	68,000
Cost Variance = (BCWP-ACWP) =	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = $ACWP_{cum} = (Performance\ Factor\ (PF) \times (BAC\ minus\ BCWP_{cum}))$, where $PF_1 = 1/CPI$,	
Second independent Estimate at Completion, where $PF_2 = 1/CPI * SPI$	

The Microsoft Word menu is open, showing the following options:

- Spelling and Grammar... F7
- Language
- Word Count...
- AutoSummarize...
- Look Up Reference...
- Speech
- Track Changes Ctrl+Shift+E
- Compare and Merge Documents...
- Protect Document...
- Online Collaboration
- Letters and Mailings
- Tools on the Web...
- Macro (highlighted) -> Macros... Alt+F8 (highlighted)
- Record New Macro...
- Security...
- Visual Basic Editor Alt+F11
- Microsoft Script Editor Alt+Shift+F11
- Templates and Add-Ins...
- AutoCorrect Options...
- Customize...
- Options...

The Windows taskbar at the bottom shows the Start button and several open applications: Cap Presentation, sv, security should..., EVMS softwar..., and http://construc... The system clock shows 1:01 PM.

Choose the right macro

http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.c

File Edit View Insert Format Tools Table Go To Favorites Help

Back Search Favorites Media

Address http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.doc

Search Compe

What are you looking for?
Type your question below. For best results, use complete
Please type your
Sample question:
Look in classit for a
You may also want to...
Search this comp for

Search

EXHIBIT 300

As of: (date)

Macros

Macro name:
compute
addHorizontal
addvertical
compute

Run
Step Into
Edit
Create
Delete
Organizer...
Cancel

Macros in: All active templates and documents

Description:

A Pro
B Sho
C Sho
D Sho

	Value
OMB-	1,338,000
Budge	60,600
Budge	60,200
Actual	68,000
Cost V	
Cost Variance % = (CV/BCWP) x 100% =	
Cost Performance Index (CPI) = (BCWP/ACWP) =	
Schedule Variance = (BCWP-BCWS) =	
Schedule Variance % = (SV/BCWS) x 100% =	
Schedule Performance Index (SPI) = (BCWP/BCWS) =	
First independent Estimate at Completion (EAC) = ACWP_{cum} = (Performance Factor (PF) X (BAC minus BCWP_{cum})), where $\text{PF}_1 = 1/\text{CPI}$,	
Second independent Estimate at Completion, where $\text{PF}_2 = 1/\text{CPI} * \text{SPI}$	

start Cap Presentation sv back to macro ... EVMS softwar... http://construc... 1:02 PM

Now run the macro

http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.doc

File Edit View Insert Format Tools Table Go To Favorites Help

Address http://construction.den.nps.gov/Mike_downloads/Project%20Review%20Cumulative.doc

Search Compe X

What are you looking for?

Type your question below. For best results, use complete words.

Sample question: Look in class for a

You may also want to...

Search this comp for

Search

EXHIBIT 300

As of: (date)

Macros

Macro name: compute

addHorizontal
addvertical
compute

Run
Step Into
Edit
Create
Delete
Organizer...
Cancel

Macros in: All active templates and documents

Description:

	Value
OMB-	1,338,000
Budget	60,600
Budget	60,200
Actual	68,000

Cost Variance % = $(CV/BCWP) \times 100\% =$

Cost Performance Index (CPI) = $(BCWP/ACWP) =$

Schedule Variance = $(BCWP-BCWS) =$

Schedule Variance % = $(SV/BCWS) \times 100\% =$

Schedule Performance Index (SPI) = $(BCWP/BCWS) =$

First independent Estimate at Completion (EAC) = $ACWPCum = (Performance\ Factor\ (PF) \times (BAC\ minus\ BCWPCum))$, where $PF_1 = 1/CPI$,

Second independent Estimate at Completion, where $PF_2 = 1/CPI \times SPI$

Cursor has to be here

All your values will be filled in

- A Provide the following project summary information from your EVMS software: As of Sept 3, 2003
- B Show the budgeted (planned) cost of work scheduled (BCWS): \$ 61,600
- C Show budgeted (planned) cost of work performed (BCWP): \$ 60,600
- D Show the actual cost of work performed (ACWP): \$ 63,000

	Value
OMB-approval baseline (BAC) -	1,338,000
Budgeted (planned) cost of work scheduled (BCWS)-	61,600
Budgeted (planned) cost of work performed (BCWP) -	60,600
Actual cost of work performed (ACWP) -	63,000
Cost Variance - (BCWP-ACWP)-	-7,400
Cost Variance % - (CV/BCWP) x 100% -	-12.21%
Cost Performance Index (CPI) - (BCWP/ACWP) -	0.89
Schedule Variance - (BCWP-BCWS) -	-1,000
Schedule Variance % - (SV/BCWS) x 100% -	-1.62%
Schedule Performance Index (SPI) - (BCWP/BCWS) -	0.98
First independent Estimate at Completion (EAC) - ACWP/Param - (Performance Factor (PF) X (BAC minus BCW/Param)), where PF = 1/CPI,	1,500,280.9
Second independent Estimate at Completion, where PF = 1/CPI; SPI	1,532,572.25
Variance at Completion (VAC) - (BAC - EAC) for both EACs above -	-165,280.9
Variance at Completion % - (VAC/BAC) x 100% for both EACs above -	12.45%
Expected Cost to Complete (ETC) - EAC - ACWP -	1,435,280.9
Expected Completion Date -	8/15/06

Definitions: for Earned Value Management System:

- ACWP - Actual Cost for Work Performed - What you paid.
- BAC - Budget At Completion - The baseline (planned) budget for the project.
- BCWP - Budgeted Cost for Work Performed - The earned value.
- BCWS - Budgeted Cost for Work Scheduled - The planned costs.
- CPI - Cost Performance Index - The ratio of the budgeted to actual cost of work performed.
- CV - Cost Variance - The difference between planned and actual cost of work performed.
- EAC - Estimate At Completion - The latest estimated cost at completion.
- ETC - Estimate to Completion - Funds needed to complete the project.
- PF - Performance Factor - The cost to earn a dollar of value, or ACWP/BCWP, or 1/CPI.
- SPI - Schedule Performance Index - The percent of the project that has been completed.
- SV - Schedule Variance - The variance between the actual and planned schedules.
- VAC - Variance at Completion - The variance between the baseline and actual budget at completion.



**Always Be Sure
Your Questions
Are Answered**

WASO
Park Planning, Facilities, and Lands
Construction Program Management
<http://construction.den.nps.gov>