



PERFORMANCE MEASUREMENT BASELINE

(LUNCH AND LEARN)

April 1, 2015



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LEARNING OBJECTIVES

Describe the purpose, steps and budget elements of the Performance Measurement Baseline (PMB) process

- **Describe content and purpose of the Work Breakdown Structure (WBS)**
- **Identify the elements and purpose of a control account**
- **Identify the relative desirability and risks associated with various earned value techniques**
- **Understand the relationship of budget to the PMB**



PMB SUMMARY

- **PMB provides agreed on plan for a contract**
- **Integrates technical, schedule, and cost**
- **Helps prevent problems rather than fixing them**
- **Defines means of determining status**



PMB DEVELOPMENT STEPS

Scope

1. Identify the scope of work

2. Extend to control account level

Schedule

3. Arrange the work packages in order

4. Schedule work packages

5. Select an EV technique

Budget

6. Budget the work packages

7. Spread the budget over time

8. Calculate cumulative BCWS



PMB DEVELOPMENT STEPS

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1. IDENTIFY THE WORK SCOPE

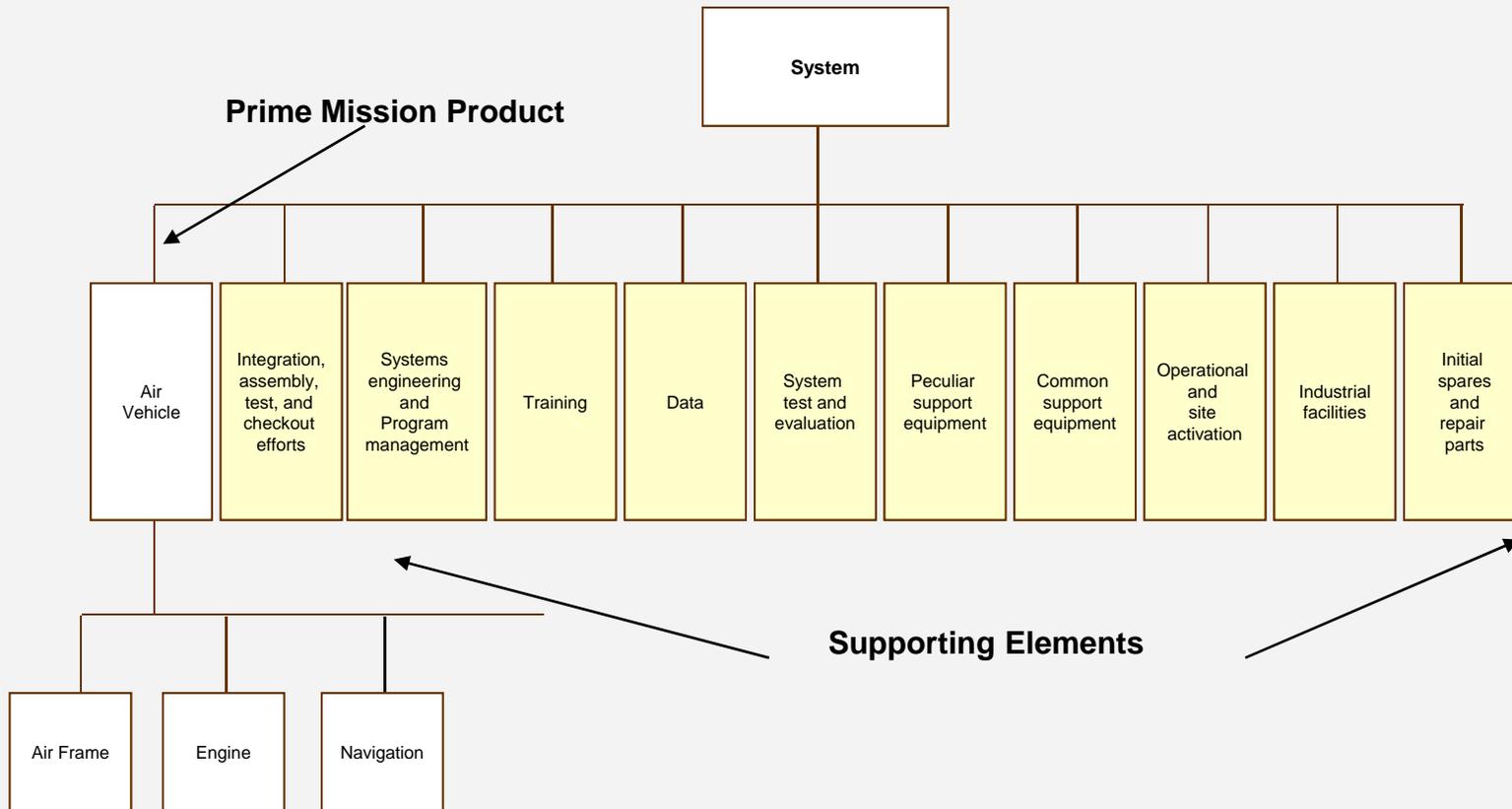
Work Breakdown Structure

A product-oriented family tree composed of hardware, software, services, data, and facilities.

- Results from systems engineering efforts during the acquisition of a defense materiel item.
- Designed to satisfy specific data collection needs.
 - To track certain components or subsystems
 - To support cost estimating data bases

Tool for defining the work

Common WBS Elements





2. EXTEND TO CONTROL ACCOUNT LEVEL

Organizational Breakdown Structure

The program organizational structure, including the major subcontractors, responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.

Tool for Identifying Resources



2. EXTEND TO CONTROL ACCOUNT LEVEL

Control Account

- The management control point at which budgets and actual costs are accumulated and compared to earned value for management purposes.
- Natural management point for planning and control
- The intersection of a single responsible organization and a single WBS element
- Contains work scope, schedule and budget
- Detailed planning occurs at this level by the control account manager

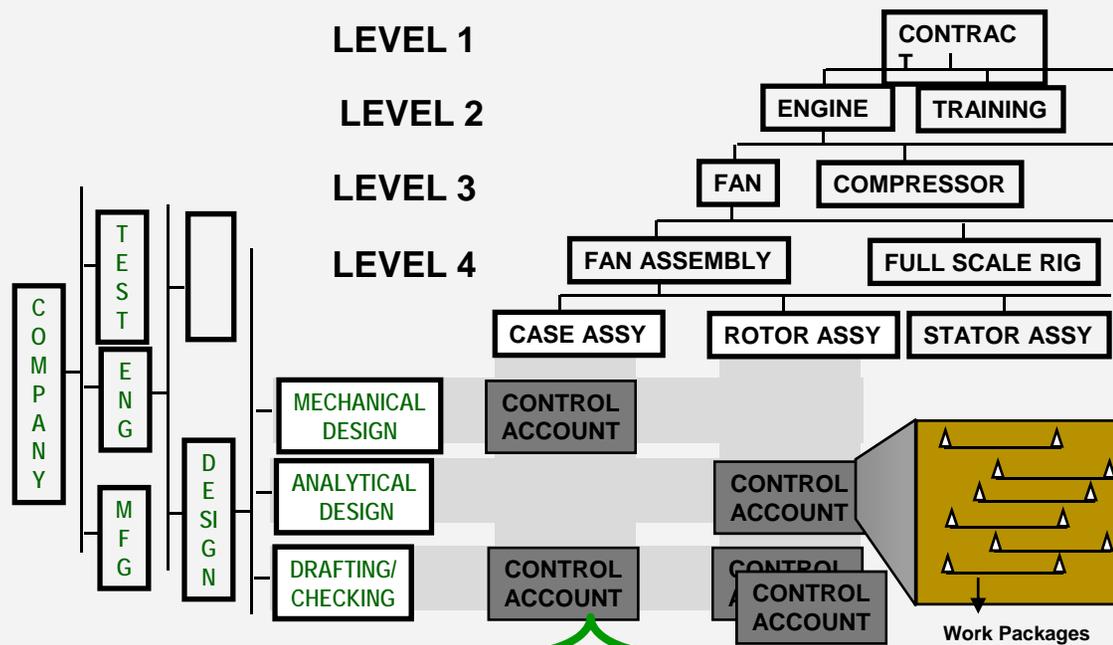
Tool for Assigning Responsibility

The Control Account:

A Key Management Control Point

(Responsibility Assignment Matrix)

WORK BREAKDOWN STRUCTURE



- * BCWS is established
- * BCWP is determined
- * ACWP is collected

- * Variances are assessed
- * Estimates are revised
- * Workaround plans are devised



BUILDING A DECK

Deck Scenario for EVM Lunch & Learn

You have just mailed in your income tax return, with a few days to spare! The good news is you'll be getting a refund this year, so you are thinking that it might be time to build that 10ft x 20ft deck you've always wanted. Although you won't be getting the refund check for a couple of months, you'd like to get the deck installed earlier so you can enjoy it over the summer. Your spouse 'hinted' that it would be great to have it done in time for your annual 4th of July barbeque (and may have already begun mentioning it to friends and neighbors).

You're pretty handy with a hammer and have a decent collection of power tools. About the only additional tool you might need is a PHD (post hole digger) that could be rented from the local 'big box' hardware store.

In order to do this right, you will also need to get building permits and have at least 2 inspections: one after the foundation goes in and a final building inspection.

You know a couple of local college kids who should be available to do most of the work. (You've used them for 'odd jobs' before.) They are willing to work for \$10/hour (after morning classes). Although they are available to put in a full workday after class during the week, they want their weekends and holidays free to 'party.' Because your two kids are on competitive soccer and lacrosse teams, your weekends are basically 'booked' too.

In order to determine if building the deck is feasible, you will need to put a plan (baseline) together to get a handle on how long it would take and what it would cost. In an EVM class you took recently, you learned about the steps on how to put a plan together and this seems like a perfect opportunity to apply those skills.



STEP 1 IDENTIFY THE SCOPE OF WORK

Building a Deck

- **Build an 10ft x 20ft Deck**
- **Need for 4th of July Picnic**
- **Only additional tool needed is a PHD**

Deck



2. EXTEND TO CONTROL ACCOUNT LEVEL

- **This is a simple project so we only have one Control Account (CA)**
- **What assumptions need to be made?**
 - Tools
 - Work week
 - Labor available to help, as needed
 - Pay \$10/hr
- **What tasks need to be accomplished?**
- **Are there any Milestones that need to be established?**



TASKS AND MILESTONES

Project Milestones

- Start Project
- Receive Permits
- Inspect Foundation
- Final Inspection
- Complete Project

Preliminary Tasks

- Draft Drawings
- Request Permits
- Clear Land
- Create Purchase List
- Purchase Materials
- Contact Miss Utility

Post Work

- Dig Holes
- Pour Concrete
- Cut Posts
- Mount Posts

Structural Work

- Tie into House
- Install Header
- Install Floor Joists

Deck Work

- Install Deck
- Trim Deck Edge

Finish Work

- Install Rails
- Stain Deck
- Install Stairs
- Install Landscaping

Deck



PMB DEVELOPMENT STEPS

Scope

1. Identify the scope of work
2. Extend to control account level

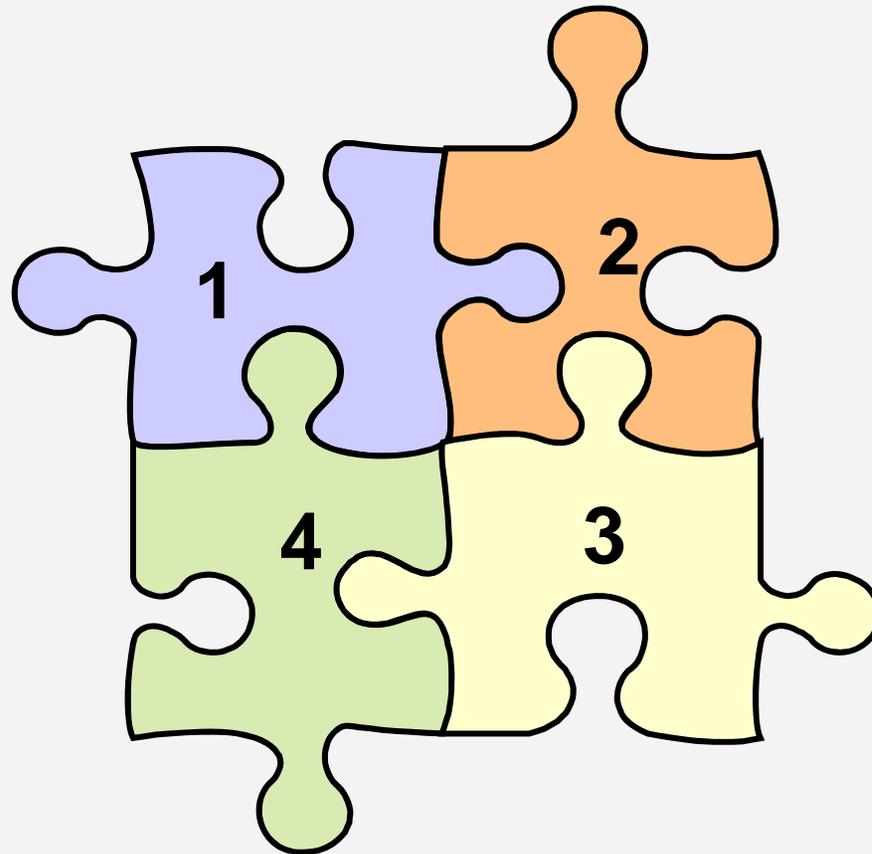
Schedule

3. **Arrange the work packages in order**
4. **Schedule work packages**
5. **Select Earned Value technique**

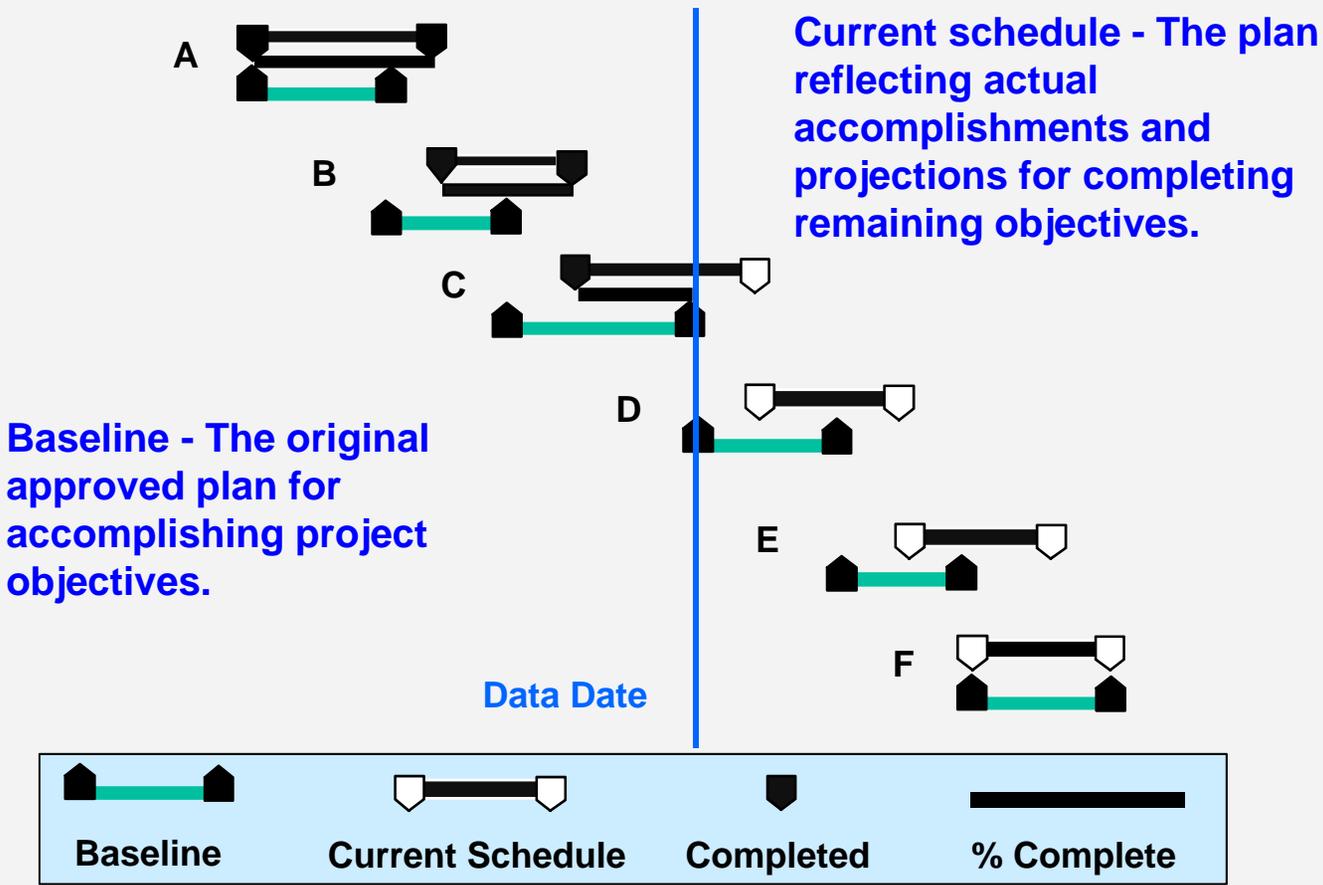
Budget

6. Budget the work packages
7. Spread the budget over time
8. Calculate cumulative BCWS

3. ARRANGE THE WORK PACKAGES IN ORDER



BASELINE VERSUS CURRENT SCHEDULE





NETWORK SCHEDULING PROCESS

Tasks

Identify everything needing to be done
Should trace to the WBS

Duration

Identify the duration of each task
Measure of duration (calendar days vs. business days)

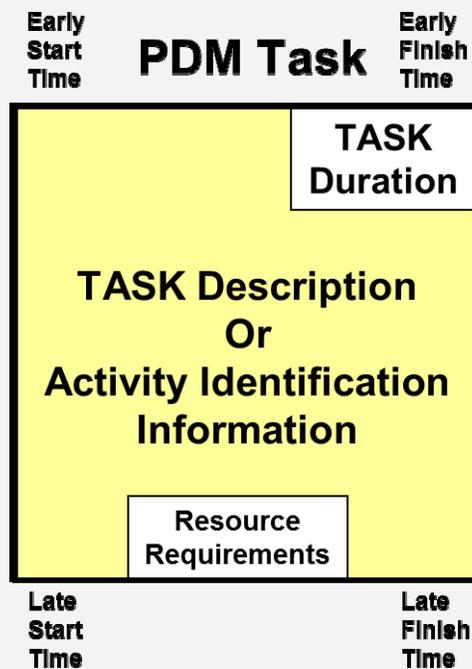
Order

Identify what must happen before each task
Establish criteria for starting a task

Constraints

Limitations to what may be done (i.e. facilities, resources)

PRECEDENCE DIAGRAM METHOD (PDM)



Task Relationships

Finish to Start

Finish to Finish

Start to Start

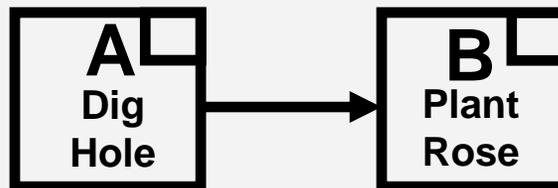
Start to Finish

Percent Complete

Constraints

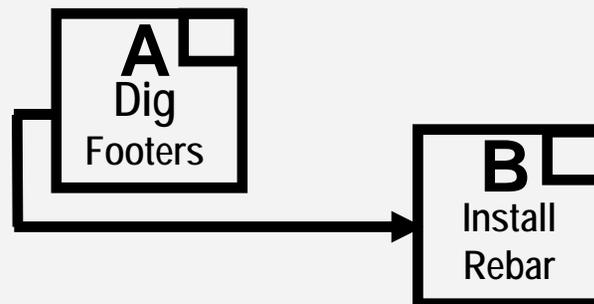
Task Relationships

Finish to Start



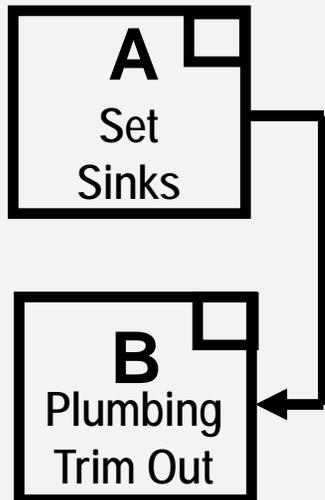
B Cannot Start Until A Finishes

Start to Start



B Cannot Start Until A Starts

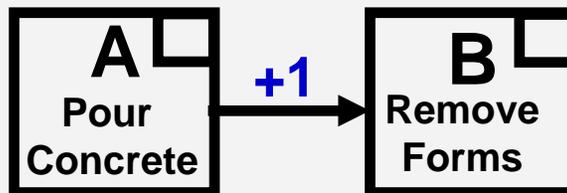
Task Relationships



Finish to Finish

B Cannot Finish Until A Finishes

Finish to Start with Lag



B Cannot Start Until one day after A Finishes



3. ARRANGE THE WORK PACKAGES IN ORDER

What order do the work packages/tasks need to be accomplished?

Where do the Milestones fit in to the schedule?



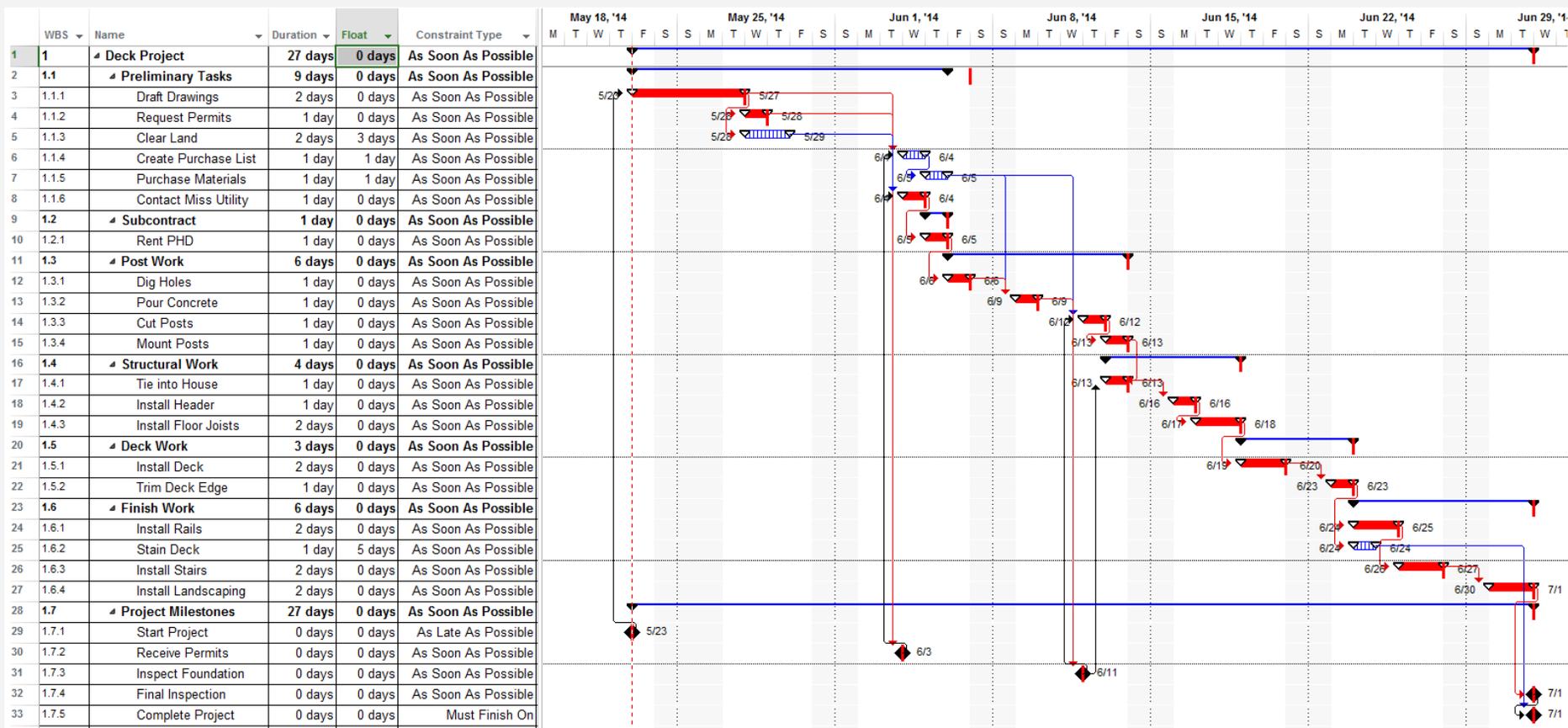
4. SCHEDULE WORK PACKAGES

Identify the task relationships

- **Finish to Start**
- **Start to Start**
- **Finish to Finish**

Are there any parallel paths?

INITIAL SCHEDULE



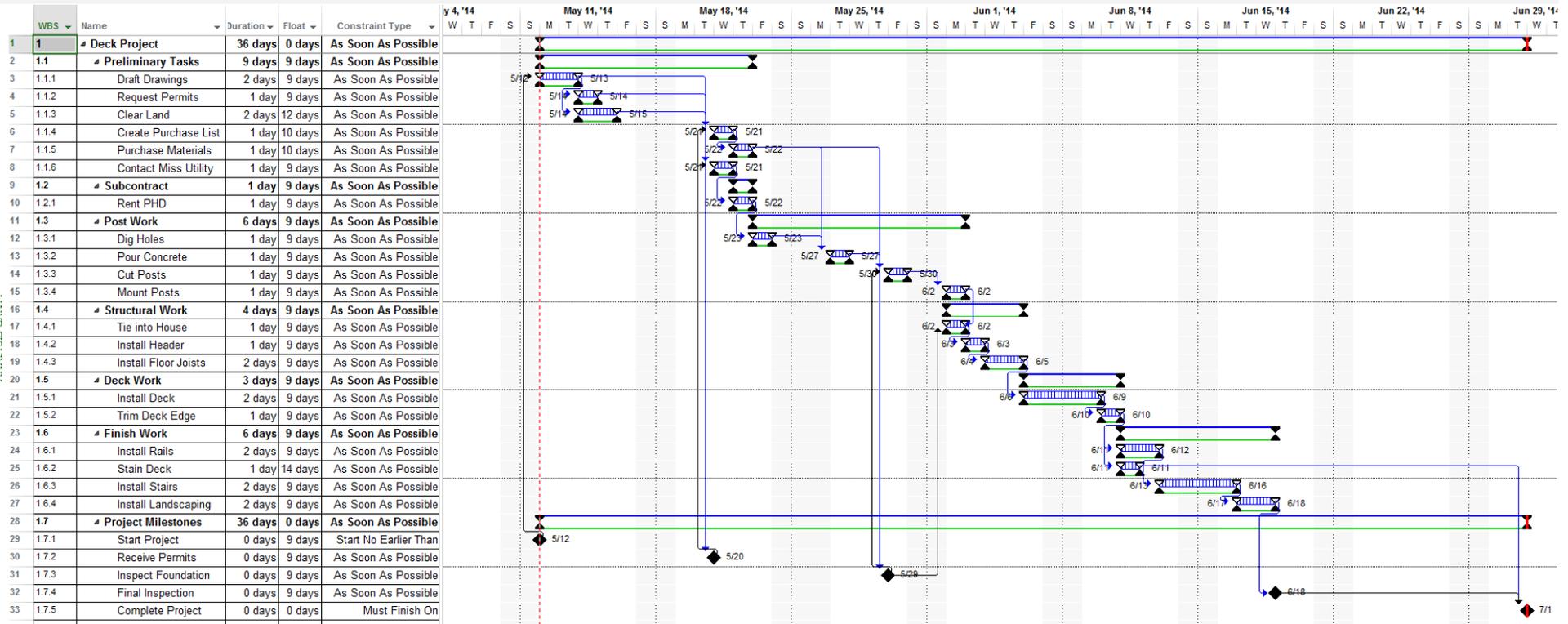


4. SCHEDULE WORK PACKAGES

Discussion

- How long will the project take?
- When is the latest we can start?
- What are some of the risks associated with the schedule?
- How soon should we start the project?

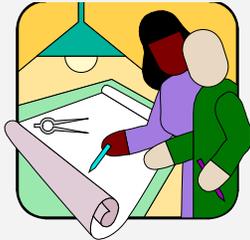
BASELINE SCHEDULE



5. SELECT EARNED VALUE TECHNIQUE

Discrete effort

Specific end product or result



Apportioned effort

Directly related to discrete tasks
(Measured as a factor)

Level of Effort

No final product or end result
(Measured by passage of time)



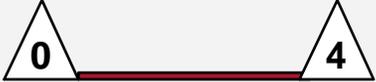


EARNED VALUE TECHNIQUE METHODS AVAILABLE

- Discrete Measures
 - 0-100
 - Percent Start/Percent Finished
 - Percent Complete
 - Weighted Milestones
 - Weighted Milestones with Percent Complete
- Apportioned Effort
- Level of Effort (LOE)

Links BCWS to BCWP

EARNED VALUE TECHNIQUES

<u>METHOD</u>	<u>BAC</u>	<u>LENGTH</u>	<u>BCWP CALCULATION</u>
0/100	4	1 Period	
50/50	8	2 Periods	
MILESTONE	20	2 or more periods	
% COMPLETE	72	VARIABLES	
Apportioned Effort	Varies	Tied to the Discrete Item	
Level of Effort (LOE)	Varies		



5. SELECT AN EV TECHNIQUE

Discussion

- **How do we select what technique to use?**
- **What are the periods of performance? (Frequency of statusing)**
- **Which techniques are appropriate for our project?**



PMB DEVELOPMENT STEPS

Scope

1. Identify the scope of work
2. Extend to control account level

Schedule

3. Arrange the work packages in order
4. Schedule work packages
5. Select an EV technique

Budget

6. **Budget the work packages**
7. **Spread the budget over time**
8. **Calculate cumulative BCWS**

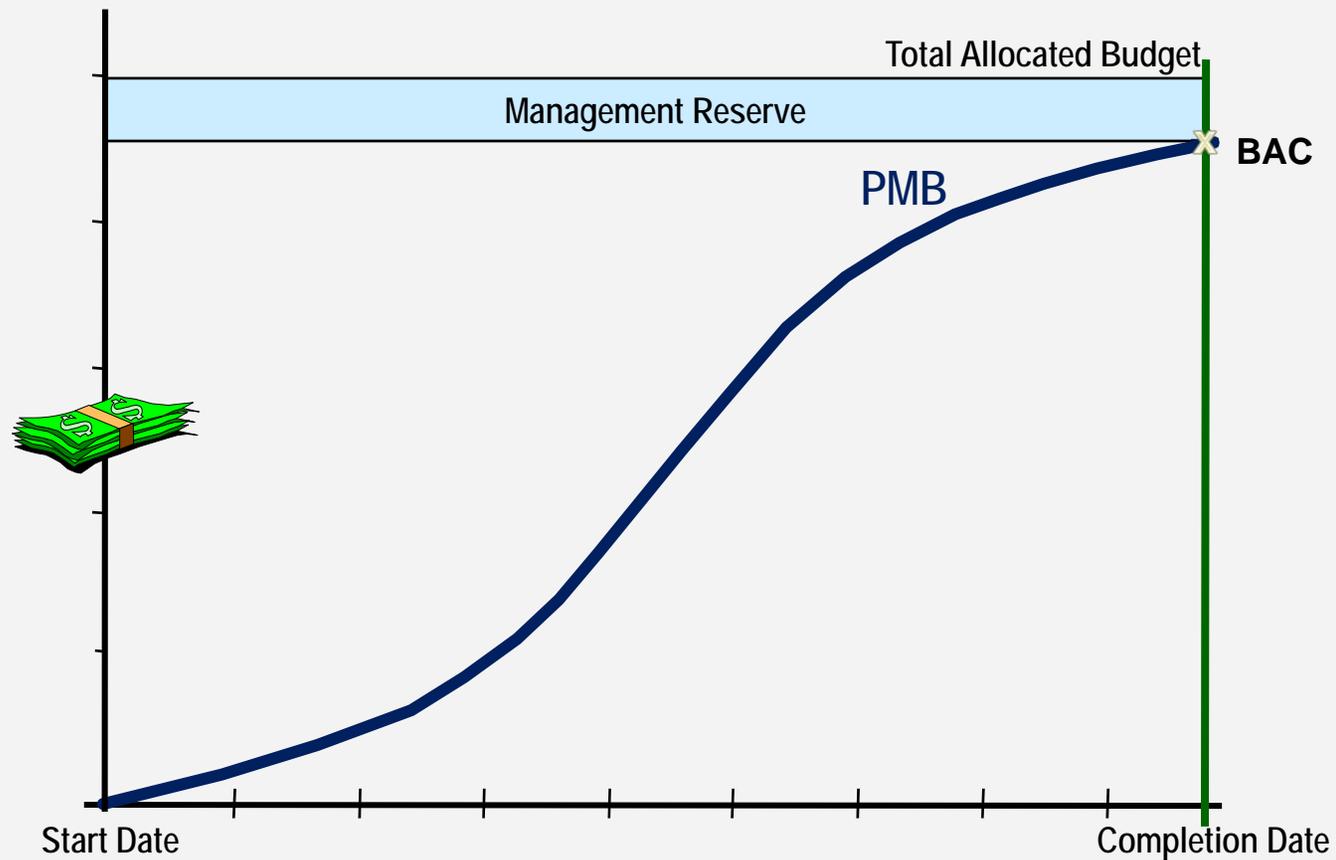


6. BUDGET THE WORK PACKAGES

The Performance Measurement Baseline (PMB) is established based on good budgeting practices derived from a sound cost estimating basis to provide a realistic baseline and is time phased based on the established schedule.

- **The Budget at Completion (BAC) is the cumulative total of the BCWS.**

Performance Measurement Baseline



6. BUDGET THE WORK PACKAGES

7. SPREAD THE BUDGET OVER TIME

8. CALCULATE CUMULATIVE BCWS

Name	Duration	Start	Finish	EV Technique	Budget \$	BCWS									
						1/16/2014	5/23/2014	5/30/2014	6/6/2014	6/13/2014	6/20/2014	6/27/2014	7/4/2014		
Deck Project	36 days	5/12/2014	7/1/2014												
Preliminary Tasks	9 days	5/12/2014	5/22/2014												
Draft Drawings	2 days	5/12/2014	5/13/2014	0-100	\$200.00	\$200.00									
Request Permits	1 day	5/14/2014	5/14/2014	0-100	\$40.00	\$40.00									
Permit Cost					\$100.00	\$100.00									
Clear Land	2 days	5/14/2014	5/15/2014	0-100	\$320.00	\$320.00									
Create Purchase List	1 day	5/21/2014	5/21/2014	0-100	\$20.00		\$20.00								
Purchase Materials	1 day	5/22/2014	5/22/2014	0-100	\$1,000.00		\$1,000.00								
Contact Miss Utility	1 day	5/21/2014	5/21/2014	0-100	\$10.00		\$10.00								
Subcontract	1 day	5/22/2014	5/22/2014												
Rent P-H-D	1 day	5/22/2014	5/22/2014	0-100	\$100.00		\$100.00								
Post Work	6 days	5/23/2014	6/2/2014												
Dig Holes	1 day	5/23/2014	5/23/2014	0-100	\$160.00		\$160.00								
Pour Concrete	1 day	5/27/2014	5/27/2014	0-100	\$80.00			\$80.00							
Cut Posts	1 day	5/30/2014	5/30/2014	0-100	\$40.00			\$40.00							
Mount Posts	1 day	6/2/2014	6/2/2014	0-100	\$20.00				\$20.00						
Structural Work	4 days	6/2/2014	6/5/2014												
Tie into House	1 day	6/2/2014	6/2/2014	0-100	\$40.00				\$40.00						
Install Header	1 day	6/3/2014	6/3/2014	0-100	\$40.00				\$40.00						
Install Floor Joists	2 days	6/4/2014	6/5/2014	0-100	\$320.00				\$320.00						
Deck Work	3 days	6/6/2014	6/10/2014												
Install Deck	2 days	6/6/2014	6/9/2014	50-50	\$320.00				\$160.00	\$160.00					
Trim Deck Edge	1 day	6/10/2014	6/10/2014	0-100	\$40.00					\$40.00					
Finish Work	6 days	6/11/2014	6/18/2014												
Install Rails	2 days	6/11/2014	6/12/2014	0-100	\$200.00					\$200.00					
Stain Deck	1 day	6/11/2014	6/11/2014	0-100	\$40.00					\$40.00					
Install Stairs	2 days	6/13/2014	6/16/2014	50-50	\$320.00					\$160.00	\$160.00				
Install Landscaping	2 days	6/17/2014	6/18/2014	0-100	\$320.00						\$320.00				
Project Milestones	36 days	5/12/2014	7/1/2014												
Program Management	36 days	5/12/2014	7/1/2014	LOE	\$230.00	\$10.00	\$20.00	\$60.00	\$60.00	\$60.00	\$20.00				
Start Project	0 days	5/12/2014	5/12/2014												
Receive Permits	0 days	5/20/2014	5/20/2014												
Inspect Foundation	0 days	5/29/2014	5/29/2014												
Final Inspection	0 days	6/18/2014	6/18/2014												
Complete Project	0 days	7/1/2014	7/1/2014												
Cur Data						\$670.00	\$1,310.00	\$180.00	\$640.00	\$660.00	\$500.00	\$0.00	\$0.00		
Cum Data						\$3,960.00	\$670.00	\$1,980.00	\$2,160.00	\$2,800.00	\$3,460.00	\$3,960.00	\$3,960.00	\$3,960.00	

Deck

IS THE BUDGET SUFFICIENT?

Discussion

- How much are we estimating the project will cost?
- What are some of the cost risks?
- How much should we budget for the project?

Deck

Name	Duration	Start	Finish	EV Technique	Budget \$	Budget Risk
Deck Project	36 days	5/12/2014	7/1/2014			
Preliminary Tasks	9 days	5/12/2014	5/22/2014			
Draft Drawings	2 days	5/12/2014	5/13/2014	0-100	\$200.00	
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Permit Cost					\$100.00	
Clear Land	2 days	5/14/2014	5/15/2014	0-100	\$320.00	
Create Purchase List	1 day	5/21/2014	5/21/2014	0-100	\$20.00	
Purchase Materials	1 day	5/22/2014	5/22/2014	0-100	\$1,000.00	
Contact Miss Utility	1 day	5/21/2014	5/21/2014	0-100	\$10.00	
Subcontract	1 day	5/22/2014	5/22/2014			
Rent PHD	1 day	5/22/2014	5/22/2014	0-100	\$100.00	
Post Work	6 days	5/23/2014	6/2/2014			
Dig Holes	1 day	5/23/2014	5/23/2014	0-100	\$160.00	
Pour Concrete	1 day	5/27/2014	5/27/2014	0-100	\$80.00	
Cut Posts	1 day	5/30/2014	5/30/2014	0-100	\$40.00	
Mount Posts	1 day	6/2/2014	6/2/2014	0-100	\$20.00	
Structural Work	4 days	6/2/2014	6/5/2014			
Tie into House	1 day	6/2/2014	6/2/2014	0-100	\$40.00	
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Install Floor Joists	2 days	6/4/2014	6/5/2014	0-100	\$320.00	
Deck Work	3 days	6/6/2014	6/10/2014			
Install Deck	2 days	6/6/2014	6/9/2014	50-50	\$320.00	
Trim Deck Edge	1 day	6/10/2014	6/10/2014	0-100	\$40.00	
Finish Work	6 days	6/11/2014	6/18/2014			
Install Rails	2 days	6/11/2014	6/12/2014	0-100	\$200.00	
Stain Deck	1 day	6/11/2014	6/11/2014	0-100	\$40.00	
Install Stairs	2 days	6/13/2014	6/16/2014	50-50	\$320.00	
Install Landscaping	2 days	6/17/2014	6/18/2014	0-100	\$320.00	
Project Milestones	36 days	5/12/2014	7/1/2014			
Program Management	36 days	5/12/2014	7/1/2014	LOE	\$230.00	
Start Project	0 days	5/12/2014	5/12/2014			
Receive Permits	0 days	5/20/2014	5/20/2014			
Inspect Foundation	0 days	5/29/2014	5/29/2014			
Final Inspection	0 days	6/18/2014	6/18/2014			
Complete Project	0 days	7/1/2014	7/1/2014			
Total Budget					\$3,960.00	
Management Reserve					\$0.00	
Total Budget (w/MR)					\$3,960.00	

IS THE BUDGET SUFFICIENT?

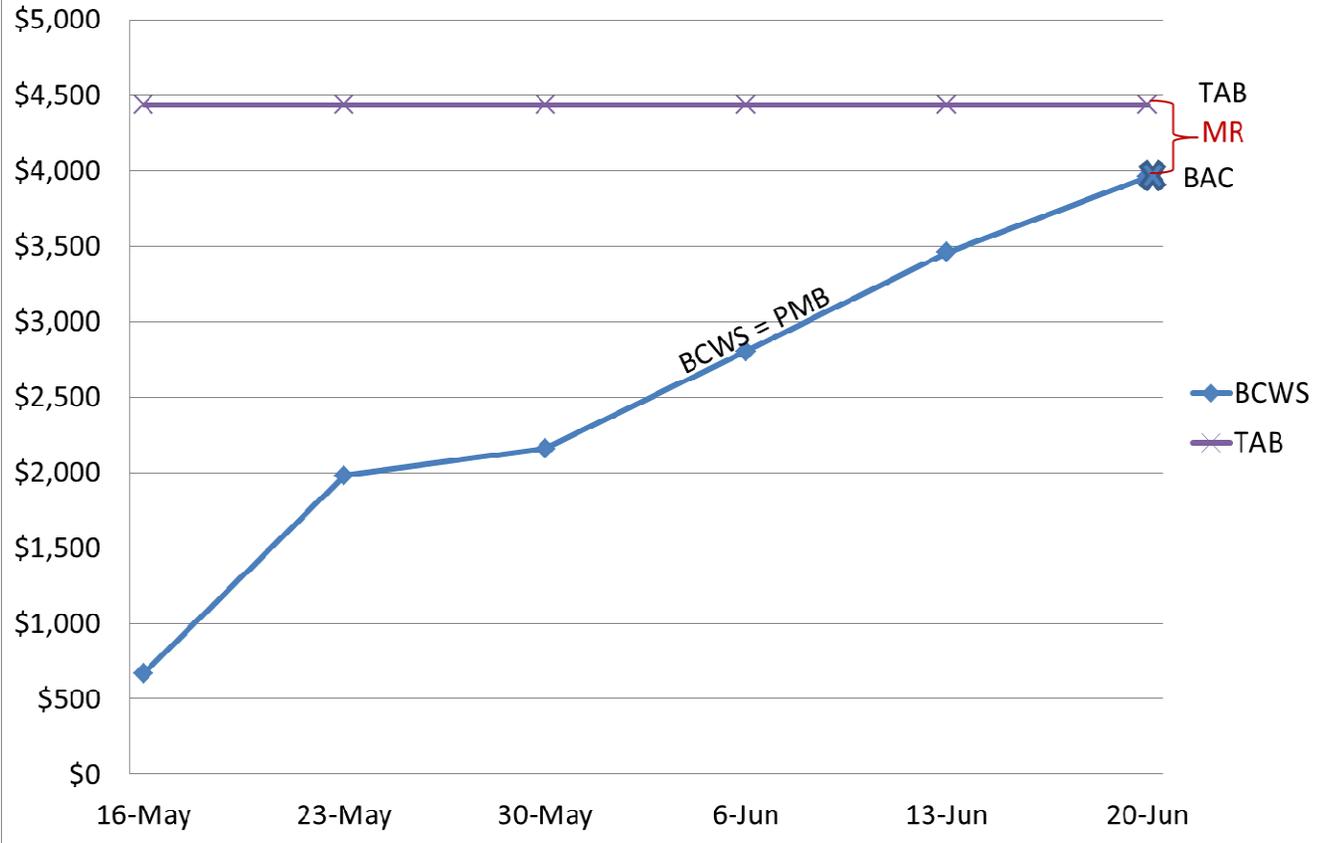
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Permit Cost					\$100.00	
Clear Land	2 days	5/14/2014	5/15/2014	0-100	\$320.00	\$50.20
Create Purchase List	1 day	5/21/2014	5/21/2014	0-100	\$20.00	
Purchase Materials	1 day	5/22/2014	5/22/2014	0-100	\$1,000.00	\$150.00
Contact Miss Utility	1 day	5/21/2014	5/21/2014	0-100	\$10.00	
Subcontract	1 day	5/22/2014	5/22/2014			
Rent PHD	1 day	5/22/2014	5/22/2014	0-100	\$100.00	\$75.00
Post Work	6 days	5/23/2014	6/2/2014			
Dig Holes	1 day	5/23/2014	5/23/2014	0-100	\$160.00	\$10.00
Pour Concrete	1 day	5/27/2014	5/27/2014	0-100	\$80.00	
Cut Posts	1 day	5/30/2014	5/30/2014	0-100	\$40.00	
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Finish Work	6 days	6/11/2014	6/18/2014			
Install Rails	2 days	6/11/2014	6/12/2014	0-100	\$200.00	\$10.00
Stain Deck	1 day	6/11/2014	6/11/2014	0-100	\$40.00	\$10.00
Install Stairs	2 days	6/13/2014	6/16/2014	50-50	\$320.00	\$25.00
Install Landscaping	2 days	6/17/2014	6/18/2014	0-100	\$320.00	\$20.00
Project Milestones	36 days	5/12/2014	7/1/2014			
Program Management	36 days	5/12/2014	7/1/2014	LOE	\$230.00	
Start Project	0 days	5/12/2014	5/12/2014			
Receive Permits	0 days	5/20/2014	5/20/2014			
Inspect Foundation	0 days	5/29/2014	5/29/2014			
Final Inspection	0 days	6/18/2014	6/18/2014			
Complete Project	0 days	7/1/2014	7/1/2014			
Total Budget					\$3,960.00	
Management Reserve						\$475.20
Total Budget (w/MR)						\$4,435.20

Deck Contract Performance





SUMMARY

Describe the purpose, steps and budget elements of the Performance Measurement Baseline (PMB) process

- **Describe content and purpose of the Work Breakdown Structure (WBS)**
- **Identify the elements and purpose of a control account**
- **Identify the relative desirability and risks associated with various earned value techniques**
- **Understand the relationship of budget to the PMB**