

Project Planning & Control

*Project Monitoring & Control (Earned Value Concepts), Uncertainty in Project Schedules (PERT),
Course Summary*

Week 8

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Project Planning & Control

Lesson 1

Review of Key Issues in Project Monitoring, Earned Value Concept Through Examples

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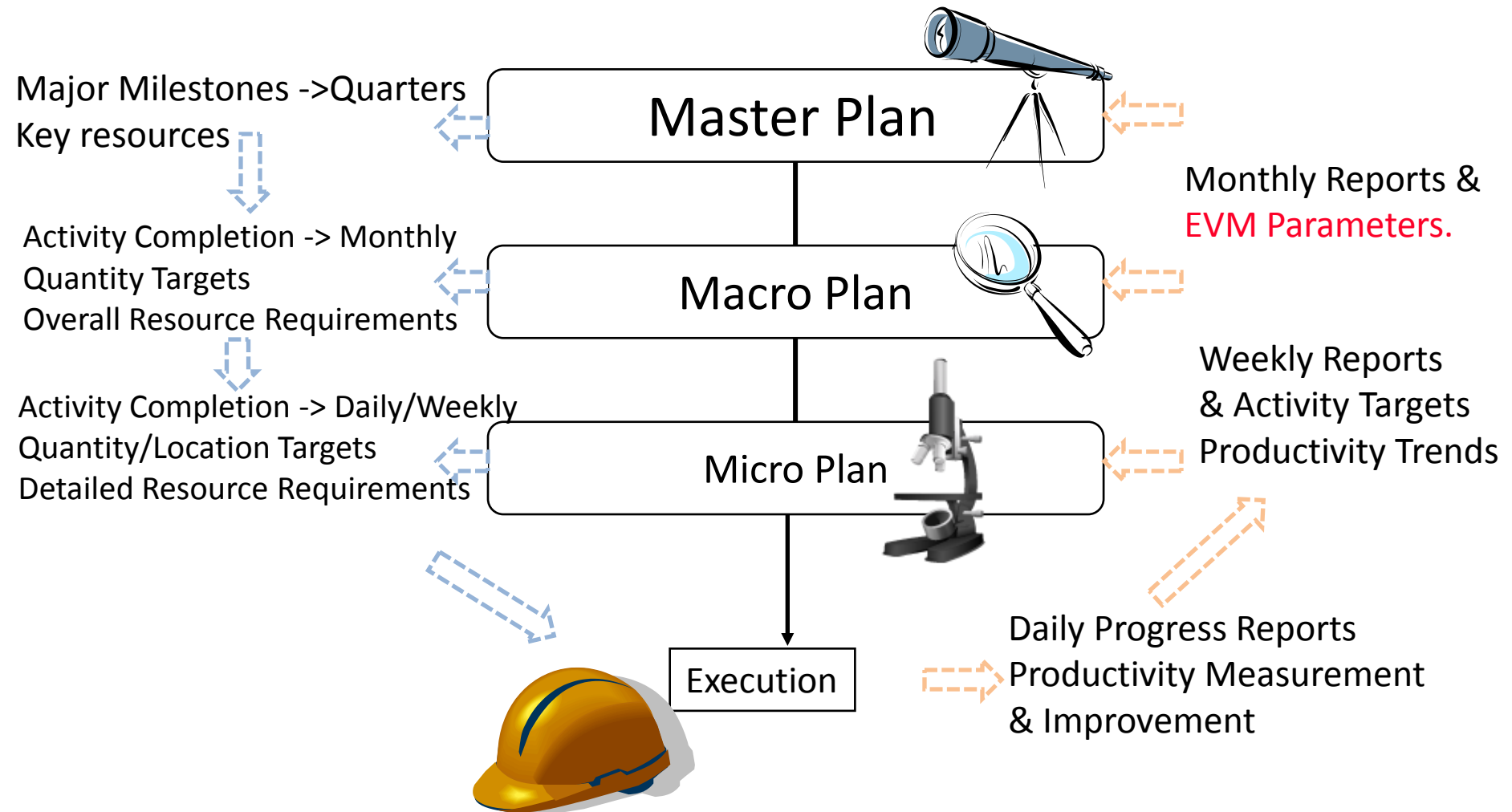
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LECTURE OUTLINE

1. Review of Key Issues in Project Monitoring
2. Earned Value Concept Through Examples
3. Basic Earned Value Definitions & Terminology
4. Summary

Planning & Monitoring Levels



Frequency of Macro Schedule Update

- Based on Project Duration and Criticality of Project.

Weekly/ Bi-Weekly/Monthly is Typical

- Required level at which monitoring and control can be effectively done.

Too frequent - High overhead- no value
Vs
Infrequent - inadequate information to monitor and control

- Billing cycle

Schedule updates only for bill generation!!
Not for planning & monitoring!!!

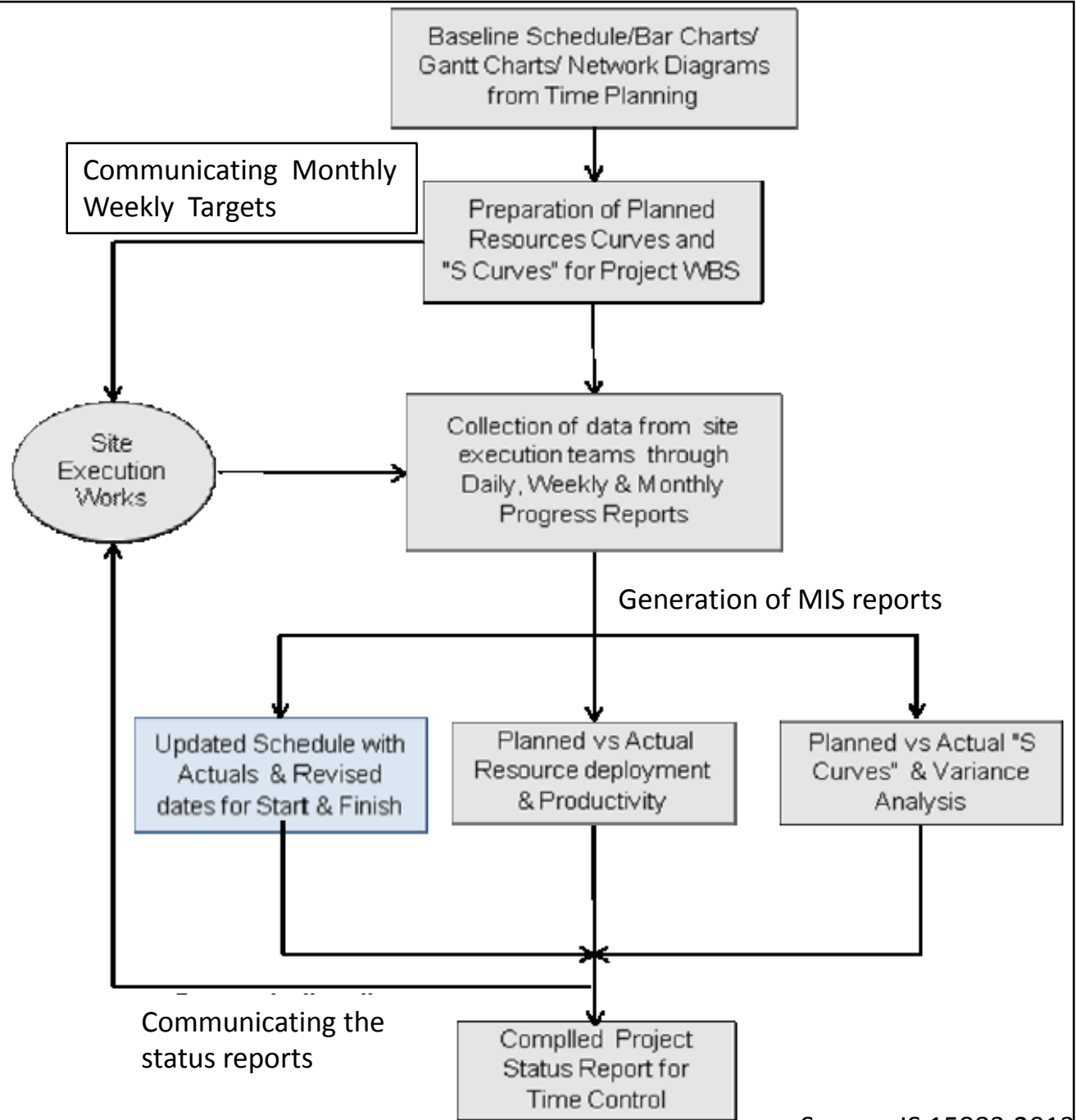
Only for finding delay responsibility!!

- Contractual Requirements – Delay analysis

Typical Project Time Monitoring Process

"BASELINE PLAN"

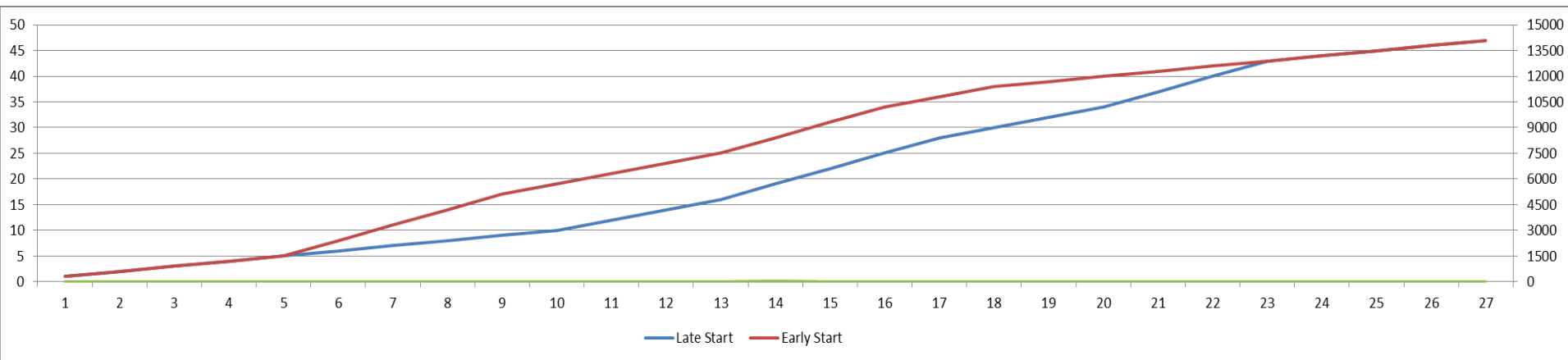
The initial approved plan to which deviations will be compared as the project proceeds



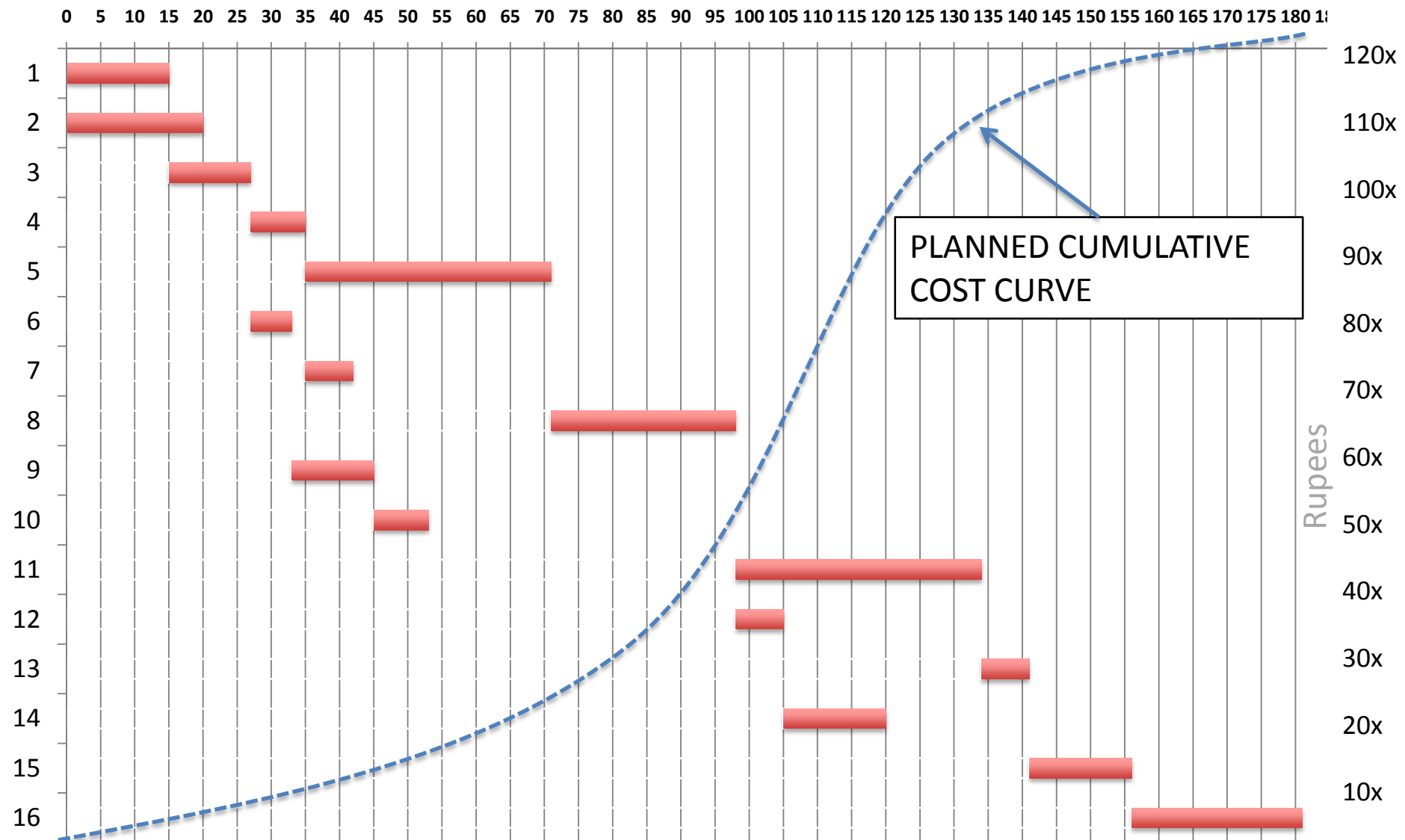
Cumulative Cost Graph – S CURVE

From – Resource Scheduling Lecture

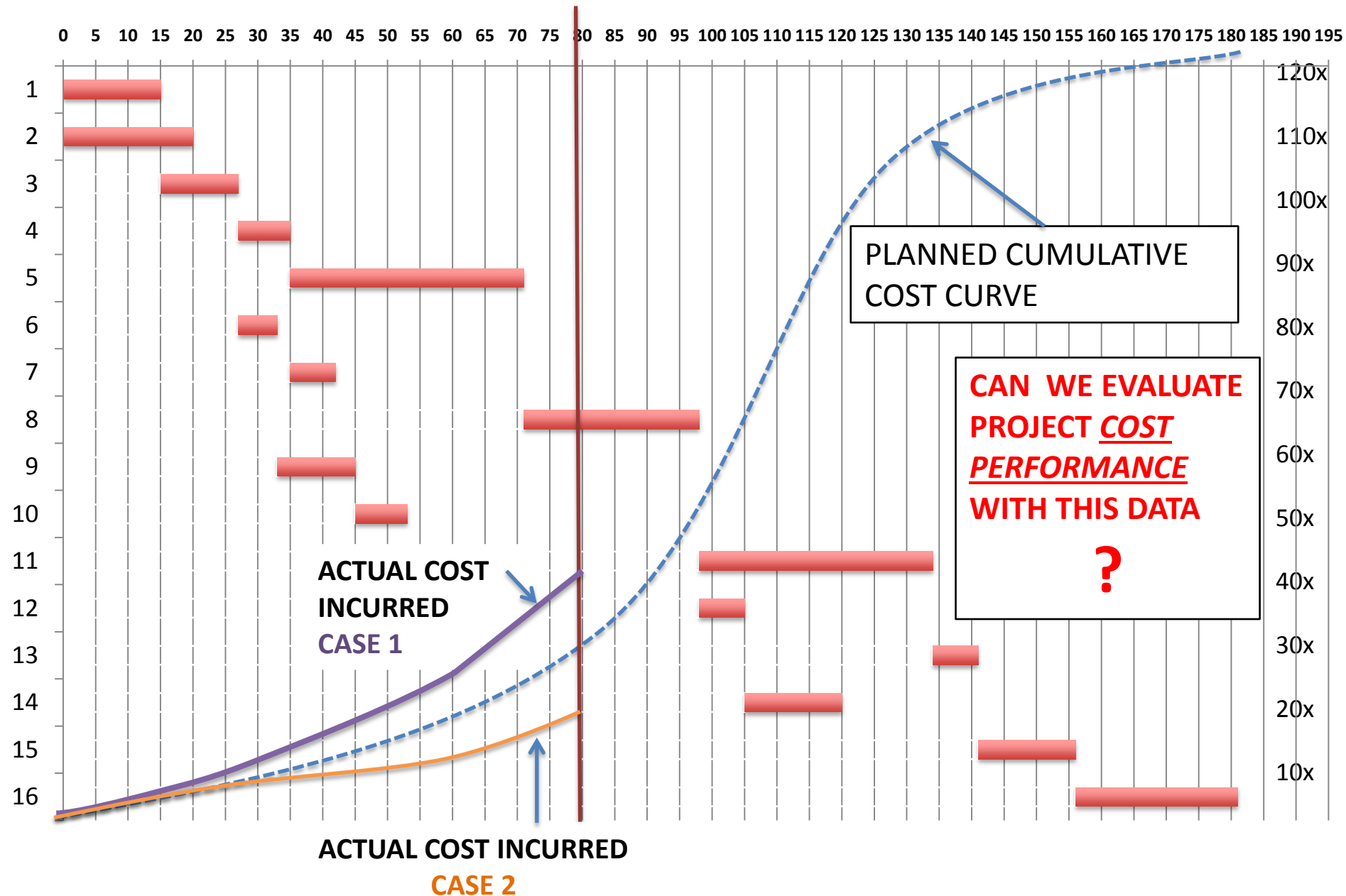
- Consider a cost of Rs.250/- per manpower resource per day, a cumulative cost curve can be obtained.
- The cash-flow for the two scenarios can be visualized in the plot below -



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
A	1	1	1	1	1																						
B						1	1	1	1																		
C						1	1	1	1	1	1	1															
D						1	1	1	1	1	1	1	1														
E													1	1	1	1	1	1									
F														1	1	1											
G														1	1	1	1	1	1	1	1	1	1				
H																								1	1	1	1
	1	1	1	1	1	3	3	3	3	2	2	2	2	3	3	3	2	2	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	8	11	14	17	19	21	23	25	28	31	34	36	38	39	40	41	42	43	44	45	46	47
	250	500	750	1000	1250	2000	2750	3500	4250	4750	5250	5750	6250	7000	7750	8500	9000	9500	9750	10000	10250	10500	10750	11000	11250	11500	11750



PROJECT STATUS MONITORING OPTION ??

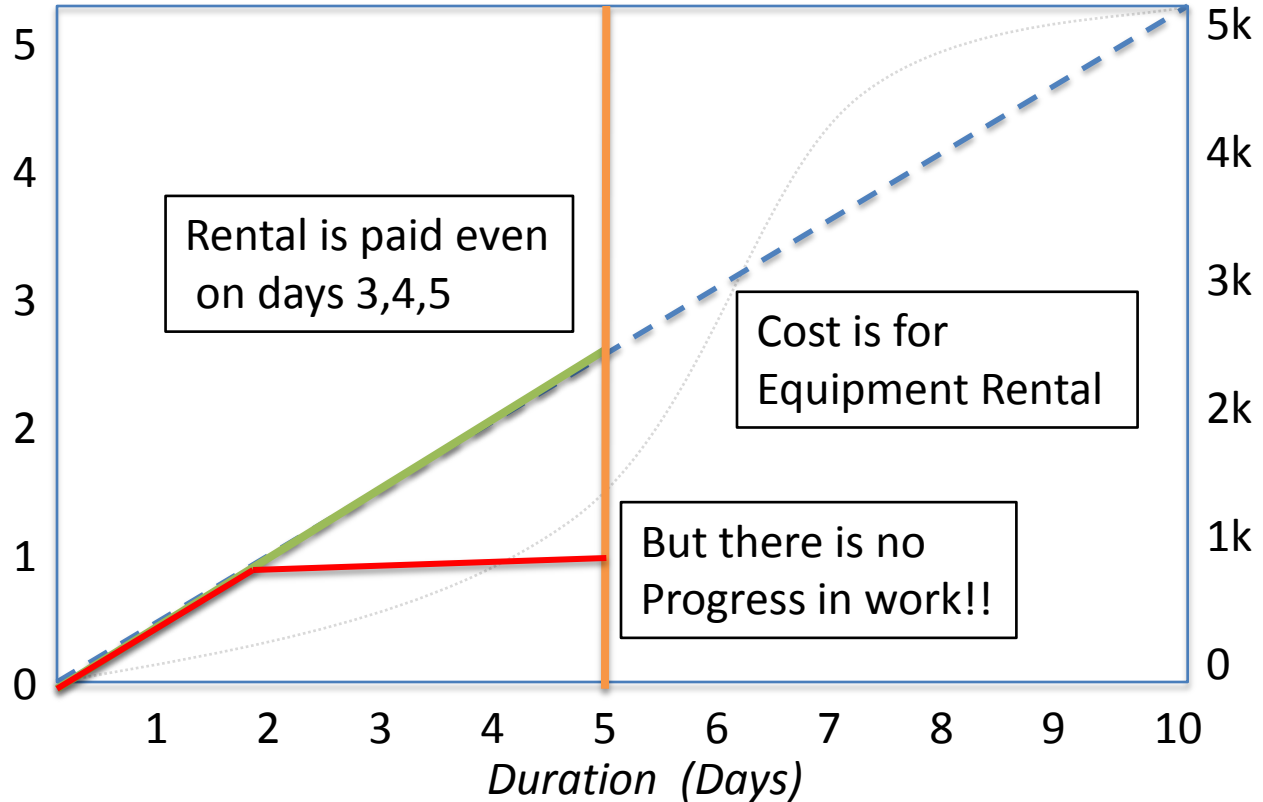


Actual Cost vs. Planned Cost - Issue Illustration



Length of Trench (Stn)

Cost (Rs.)



ACTUAL COST VS PLANNED COST : *PROGRESS IS AS PLANNED ??*
BUT

PROGRESS DEPENDS ON WORK PERFORMED NOT ACTUAL COST

Metrics Based on Work Performed

QUANTITY WORK PERFORMED / TOTAL QUANTITY = % COMPLETE
(1 / 5 = 0.20)

Schedule Performance

As Scheduled % 0.5

As Performed % 0.2 --- (As Scheduled > As Performed)
hence Behind Schedule

Cost Performance

Actual Cost of Work Performed: Rs.2.5k (indp. of work done)

Value of Work Performed: 0.20 x 5.0k = 1.0k

(Actual Cost of Work Performed > Value of Work Performed)
hence Over Budgeted Cost

Metrics Based on Work Performed

Schedule Performance

As Scheduled %0.5 As Performed % 0.2

(As Scheduled > As Performed) hence Behind Schedule

$$(\% \text{ As Performed} / \% \text{ As Scheduled}) = 0.2 / 0.5 = 0.4$$

Cost Performance

Actual Cost of Work Performed: Rs.2.5x

Value of Work Performed: $0.20 \times 5.0x = 1.0x$

(Actual Cost of Work Performed > Value of Work Performed)

Hence Over Budgeted Cost

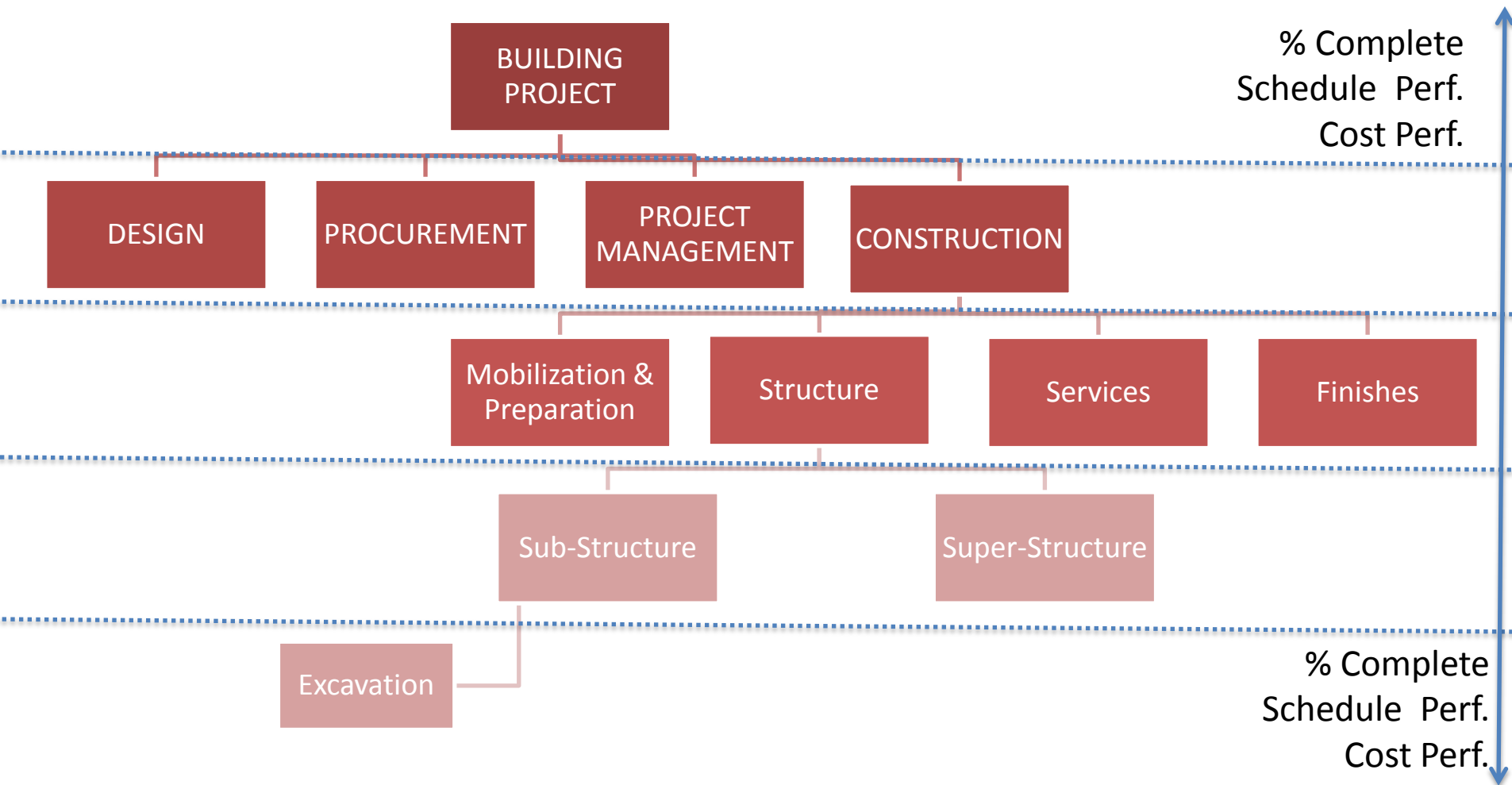
$$(\text{Value of Work Performed} / \text{Actual Cost..}) = 1.0x / 2.5x = 0.4$$

What if Actual Cost Work Performed = 2.5x + extra costs due to rain ??

PROJECT MONITORING REQUIREMENT:

MULTIPLE ACTIVITIES

MULTIPLE LEVELS



% Complete for Multiple Activities

- Cannot be **Work Done / Total Quantity** as units of each item of work are different.

Eg. Concreting— m^3 , Reinforcement-T, Plastering— m^2



MONEY
&
MAN-HOURS
are Common Units For
all activities



Example

Activity	Total Quantity	Unit	Rate (Rs/unit)	Value of Work Rs.
1. Earthwork	5000	cum	100	500,000
2. Concrete	1200	cum	7000	8,400,000
3. Formwork	12000	sqm	350	4,200,000
4. Reinforcement	160	t	70000	11,200,000
5. Brickwork	680	cum	5000	3,400,000
6. Plastering	10000	sqm	150	1,500,000
Total Value				29,200,000

Project Duration 10 months

Monitor Status of Project every month

Example (contd.)

Month #3

Activity	Total Qty	Rate (Rs/unit)	Value of Work (L)	Work Perf. QTY	% Comp.	Act. Cost
1. Earthwork	5000	100	5	2500	0.50	3.0
2. Concrete	1200	7000	84	240	0.20	18
3. Formwork	12000	350	42	3600	0.30	13.6
4. Reinforcement	160	70000	112	48	0.30	35.0
5. Brickwork	680	5000	34	102	0.15	4.5
6. Plastering	10000	150	15	0	0	0
			292			
						74.1

What is Project % Complete ?
 What is Schedule Performance ?
 What is Cost Performance ?

(No Scheduled Time Line to Compare)

Example (contd.)

Scheduled Monthly Quantities



Months

Activity	1	2	3	4	5	6	7	8	9	10
Earthwork	250	750	1000	1250	1250	500				
Concrete		120	240	240	300	180	120			
Formwork		1200	2400	2400	3000	1800	1200			
Reinforcement		16	32	32	40	24	16			
Brickwork			68	102	136	136	136	68	34	
Plastering				1000	1500	2000	2000	2000	1000	500

Example (contd.)

Scheduled Monthly Rupee Value

Quantity x Item Rate

Rs. 1000's

Activity	1	2	3	4	5	6	7	8	9	10
Earthwork	25	75	100	125	125	50				
Concrete		840	1680	1680	2100	1260	840			
Formwork		420	840	840	1050	630	420			
Reinforcement		1120	2240	2240	2800	1680	1120			
Brickwork			340	510	680	680	680	340	170	
Plastering				150	225	300	300	300	150	75
Month	25	2455	5200	5545	6980	4600	3360	640	320	75
Cum Cash.	25	2480	7680	13225	20205	24805	28165	28805	29125	29200
% Complete.	0.001	0.085	0.263	0.453	0.692	0.849	0.965	0.986	0.997	1.000

% Complete Based on Money as the Unit

Budgeted % Complete Scheduled

1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000

1 2 3 4 5 6 7 8 9 10

Budgeted Cost of Work Scheduled

30000
25000
20000
15000
10000
5000
0

Cum Cash.	25	2480	7680	13225	20205	24805	28165	28805	29125	29200
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% Complete.	0.001	0.085	0.263	0.453	0.692	0.849	0.965	0.986	0.997	1.000
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Example (contd.)

Month #3 - Update

Activity	Total Qty	Rate (Rs/unit)	Value of Work (L)	Work Perf. QTY	% Comp.	Act. Cost
1. Earthwork	5000	100	5	2500	0.50	3.0
2. Concrete	1200	7000	84	240	0.20	18
3. Formwork	12000	350	42	3600	0.30	13.6
4. Reinforcement	160	70000	112	48	0.30	35.0
5. Brickwork	680	5000	34	102	0.15	4.5
6. Plastering	10000	150	15	0	0	0
			292			
						74.1

What is Project % Complete ?
 What is Schedule Performance ?
 What is Cost Performance ?

Scheduled Time Line to Compare is
Now Available

Example (contd.)

Month #3 - Update

Activity	Rate (Rs/unit)	Value of <i>Wrk Schd</i> <i>Mth #3</i> <i>Rs. L</i>	Work Perf. QTY	Val of Wrk Perf. Rs.L	Act. Cost Rs.L
1. Earthwork	100	2.0	2500	2.5	3.0
2. Concrete	7000	25.2	240	16.8	18
3. Formwork	350	12.6	3600	12.6	13.6
4. Reinforcement	70000	33.6	48	33.6	35.0
5. Brickwork	5000	3.4	102	5.1	4.5
6. Plastering	150	0	0	0	0
		76.80		70.6	74.1

What is Project % Complete ? = $70.6 / 292 = 24.18\%$

Planned -- $76.8/292 = 26.3\%$

What is Schedule Performance ? = $70.6 < 76.8$ (Behind Schedule Target)

What is Cost Performance ? = $70.6 < 74.1$ (Over Budget Cost Target)

Earned Value Terminology

Activity	Rate (Rs/unit)	Value of <i>Wrk Schd</i> <i>Mth #3</i> <i>Rs. L</i>	Work Perf. QTY	Val of Wrk Perf. Rs.L	Act. Cost Rs.L
1. Earthwork	100	2.0	2500	2.5	3.0
2. Concrete	7000	25.2	240	16.8	18
3. Formwork	350	12.6	3600	12.6	13.6
4. Reinforcement	70000	33.6	48	33.6	35.0
5. Brickwork	5000	3.4	102	5.1	4.5
6. Plastering	150	0	0	0	0
		76.80		70.6	74.1

Budgeted Cost of Work Scheduled
BCWS

Budgeted Cost of Work Performed
BCWP

Actual Cost of Work Performed
ACWP

Project Performance

