

Project Planning & Control

Lesson 9

Application: Two Span Bridge – ES Schedule

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Professor

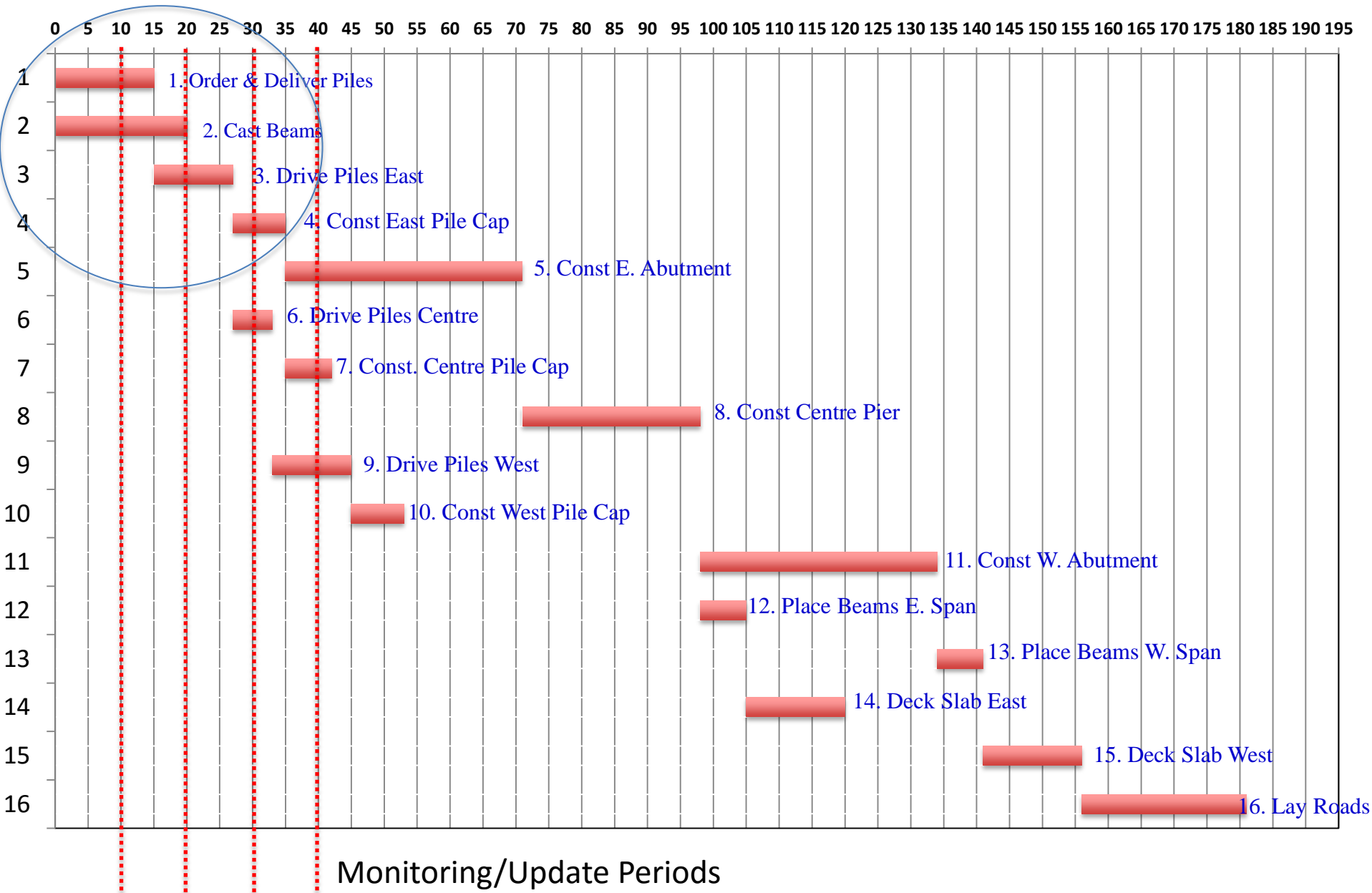
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TWO SPAN BRIDGE – ES Schedule



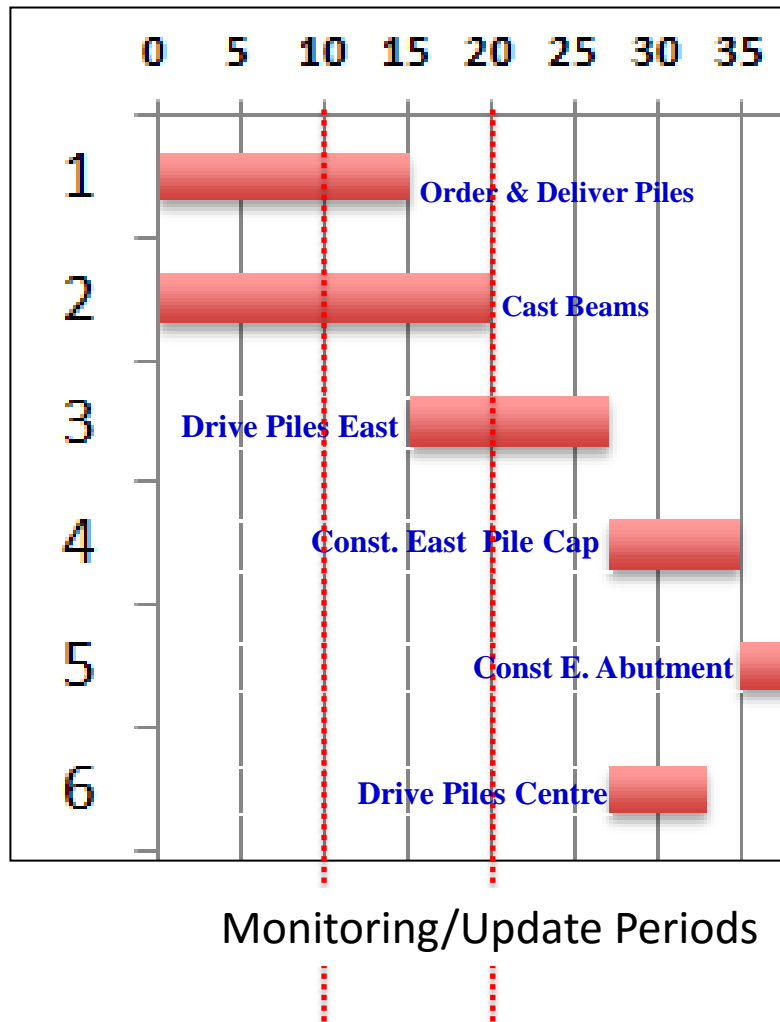
Basic Schedule Updating - Illustration

Update-1 Day 10

No.	Activity	Planned Start	Actual Start	Planned Finish	Actual Finish	% complete
1	Order Deliver Piles	0	0	15		?
2	Cast Beam	0	0	20		?
3	Drive Piles East	15		27		
4	Const. East Pile Cap	27		35		
5	Const. E. Abutment	35		71		
6	Drive Piles Center	27		33		

Update-2 Day 20

No.	Activity	Planned Start	Actual Start	Planned Finish	Actual Finish	% complete
1	Order Deliver Piles	0	0	15	15	100
2	Cast Beam	0	0	20	20	100
3	Drive Piles East	15	15	27		?
4	Const. East Pile Cap	27		35		
5	Const. E. Abutment	35		71		
6	Drive Piles Center	27		33		



(Ideal updates – everything going as planned!!)

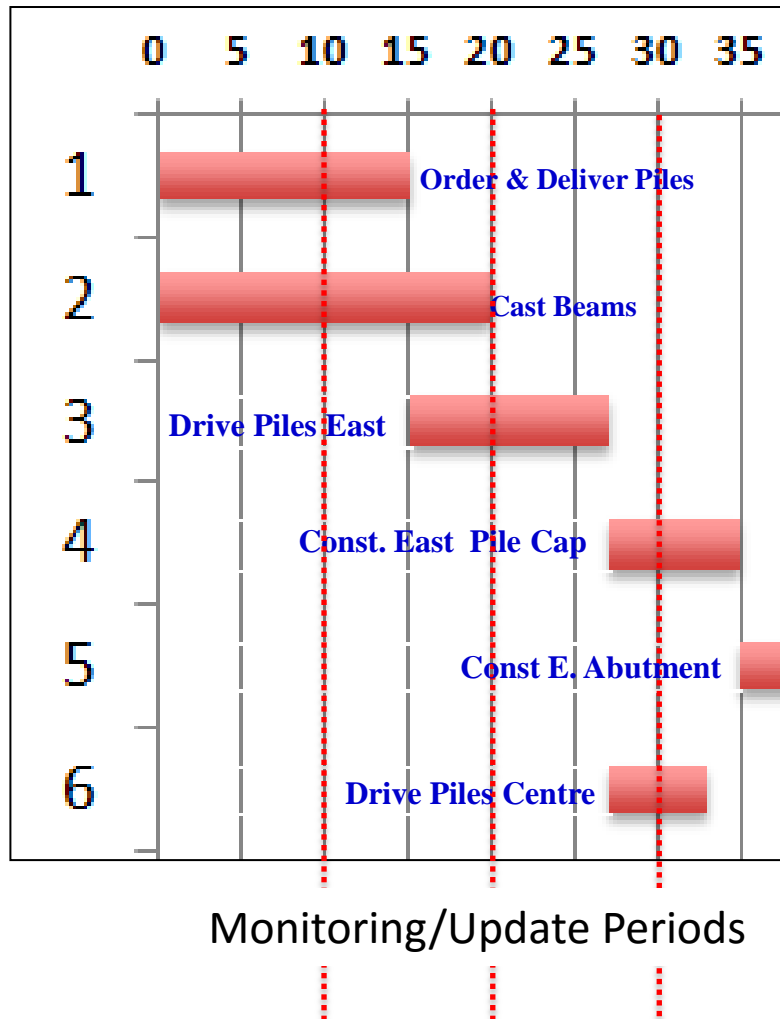
Basic Schedule Updating - Illustration

Update-3 Day 30

No.	Activity	Planned Start	Actual Start	Planned Finish	Actual Finish	% complete
1	Order Deliver Piles	0	0	15	15	100
2	Cast Beam	0	0	20	20	100
3	Drive Piles East	15	15	27	27	100
4	Const. East Pile Cap	27	27	35		??
5	Const. E. Abutment	35		71		
6	Drive Piles Center	27	27	33		??

Update-4 Day 40

No.	Activity	Planned Start	Actual Start	Planned Finish	Actual Finish	% complete
1	Order Deliver Piles	0	0	15	15	100
2	Cast Beam	0	0	20	20	100
3	Drive Piles East	15	15	27	27	100
4	Const. East Pile Cap	27	27	35	35	100
5	Const. E. Abutment	35	35	71		??
6	Drive Piles Center	27	27	33	33	100



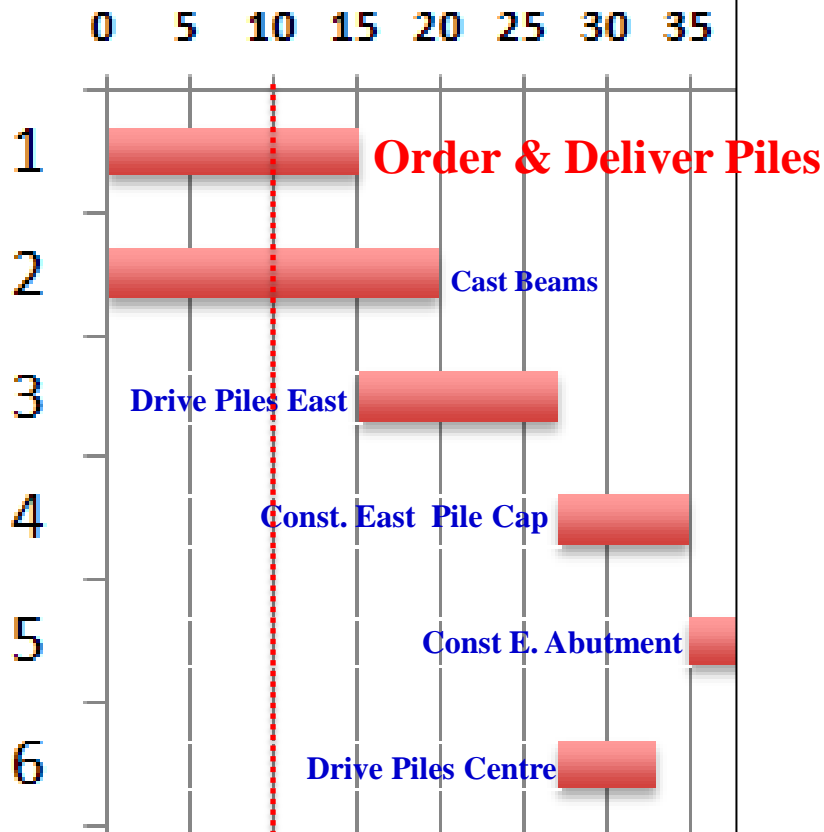
(Ideal updates – everything going as planned!!)

Work Progress Measurement

(Estimating % complete of an activity)

Method	Approach
Cost-Time Ratio	Proportion Spent vs. Total
Units Complete	Units Completed/ Total Units
Incremental Milestone	Define & Monitor Milestones
Start-Finish	Start & Completion Milestone
Level of Effort	Weighted Sum of Sub-Activities
Supervisor Opinion	Opinion of Supervisor Who is Responsible for the Work

Update Day 10 - Order and Deliver Piles



Cost-Time Ratio

Units Complete

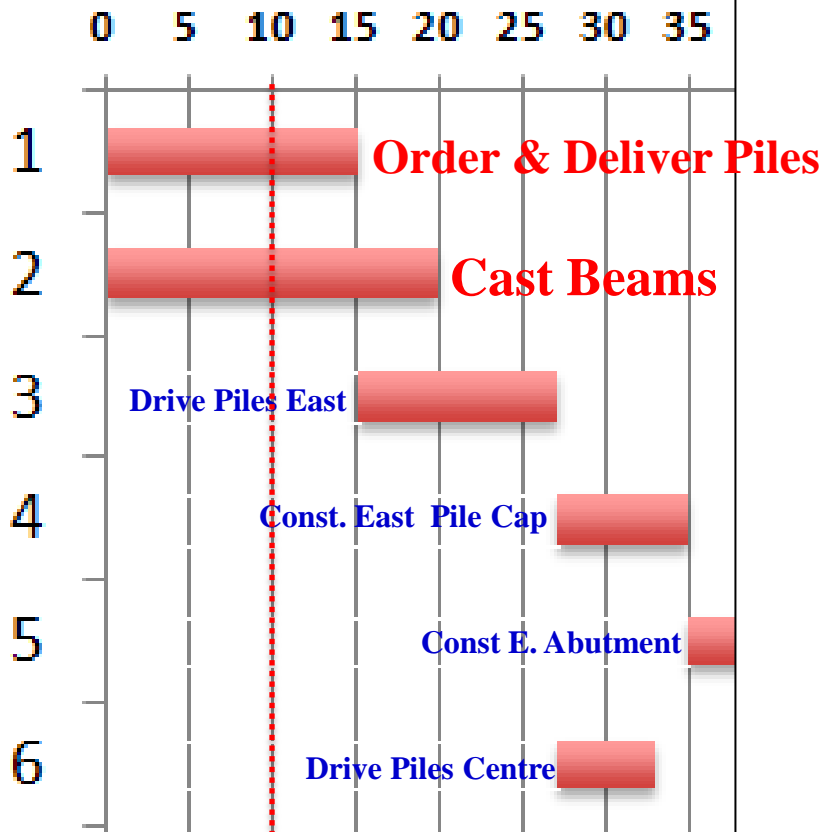
Incremental Milestone

Start-Finish

Level of Effort

Supervisor Opinion

Update Day 10 – Cast Beams



Cost-Time Ratio

Units Complete

Incremental Milestone

Start-Finish

Level of Effort

Supervisor Opinion

2. Cast Beams – Duration (Lecture 8)

Beams are prefabricated in casting yard set-up on site.
No. Beams required is say *3 for each span- total = 6*

No. beams required = 3 + 3

Operation Sequence:

1.0 Reinforcement Fabrication – 2 days

2.0 Casting Beam

2.1 Formwork Assembly – 1 day

2.2 Concrete pouring – 1 day

2.3 Form removal after – 1 day

2.4 Form removal time- 1 day

Curing before usage – 28 (14) days regular
3 days steam curing

Assume reinforcement fabrication is
done in parallel

Production Rate – based on No. Forms/Beds

No. Sets of forms

1 1 beam in 4 days -> 24 days for 6 beams

2 2 beams in 4 days -> 12 days “

3 3 beams in 4 days -> 8 days “

What production rate is required ?

Assume 3 sets of forms:

Total Duration= 2 +14 (1st set);
Day 6+14 (2nd set)?

Day	First Set	Second Set
1	Assemble Forms & Reinforce	
2	Pour Concrete	
3	Setting	
4	Remove Formwork	
5	Curing	Assemble Forms & Reinforce
6		Pour Concrete
7		Setting
8		Remove Formwork
9		
10		Curing
11		
12		
13		
14		
15		
16		
17	BEAMS COMPLETE	
18		
19		
20		
21		BEAMS COMPLETE

Cost-Time Ratio

Units Complete

Incremental

Milestone

Start-Finish

Level of Effort

Supervisor Opinion

Level of Effort

Assign weights to the sub-activities:

Assemble & Reinforce - 0.5

Pour Concrete – 0.2

Setting – 0.1

Remove formwork -0.1

Curing -0.1

Day	First Set	Second Set
1	Assemble Forms & Reinforce	
2	Pour Concrete	
3	Setting	
4	Remove Formwork	
5	Curing	Assemble Forms & Reinforce
6		Pour Concrete
7		Setting
8		Remove Formwork
9		
10		
11		Curing
12		
13		
14		
15		
16		
17	BEAMS COMPLETE	
18		
19		
20		
21		BEAMS COMPLETE

Sub-Activity	Weightage	Quantity Complete	Weighted Quantity
Assemble Forms & Reinforce	0.5	6	3
Pour Concrete	0.2	6	1.2
Setting	0.1	6	0.6
Remove Formwork	0.1	6	0.6
Curing	0.1	0	0
Total	1		5.4
Total to be done			6 No's
% complete			0.9

% Complete for Different Methods

Day	First Set	Second Set
1	Assemble Forms & Reinforce	
2	Pour Concrete	
3	Setting	
4	Remove Formwork	
5	Curing	Assemble Forms & Reinforce
6		Pour Concrete
7		Setting
8		Remove Formwork
9		
10		
11		Curing
12		
13		
14		
15		
16		
17	BEAMS COMPLETE	
18		
19		
20		
21		BEAMS COMPLETE

Method	Result
Time Ratio	$10/20 = 0.50$?
Units Complete	0 ?
Start Finish	?
Level of Effort	0.90 (OK Depends on Wt's)
Incremental Milestone	OK - Depends on milestone defined
Supervisor's Opinion	OK - Depends on experience

Key Issues in Monitoring

- Planning detail has to be adequate to enable reasonable monitoring.
- The percentage complete for a activity will vary based on the method used!!
- Optimistic reporting early in the project results in problems at a later stages of the project.

Lecture Summary

- Monitoring & Control - critical to ensure that the project is steered towards meeting objectives.
- Schedule Update frequency – Based on Project Requirements & Level of Control
- Several Monitoring Reports are Generated for Discussion and Action at Various Levels
- Selection of Work Progress Measurement is Critical – it Has Significant Impact on Progress Results

Questions & Discussions