



Project Delays and Extensions of Time

Dr Tony Farrow

NAVIGANT

Topics


1. Why Extensions of Time?
2. Methods of Analysis and examples
3. Schedule 'Float'
4. Concurrent Delay
5. Exercise
6. Questions

Construction Contracts and Project Delays

- Construction Contracts have Completion Dates and Liquidated Damages (LDs) are tied to Completion Date.
- Extension of Time (EoT) clauses maintain the enforceability of LD provisions where there has been failure/breach by Owner.
- If Owner causes a delay and there is no EoT clause, time may become 'at large' and LD clause fails.



Construction Contracts and Project Delays

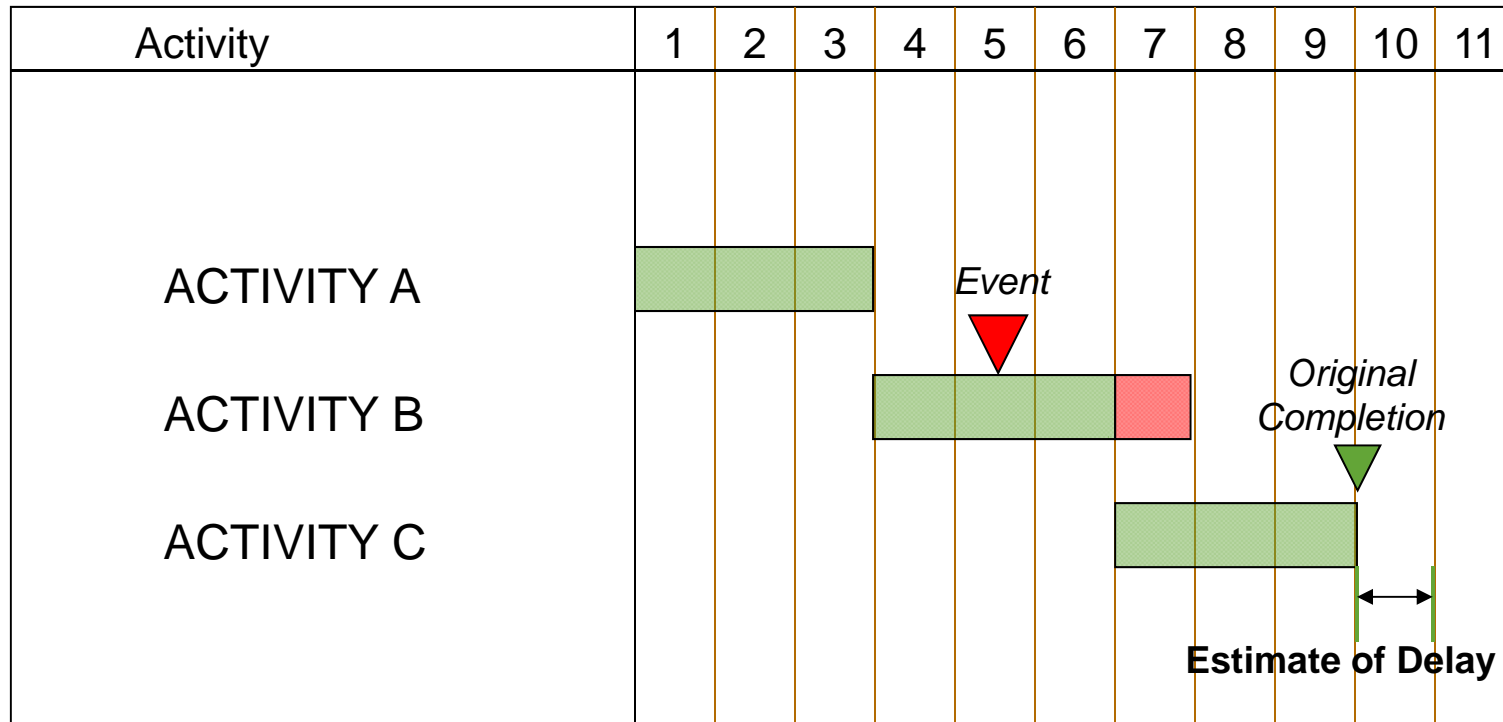
- Contract provisions define the basis of entitlement for EoT.
 - But most (if not all) Contracts are silent as to how to demonstrate delay and prove entitlement.
 - Debate about *actual* delay and contractual *entitlement*.
 - Hence 'Delay Analysis Methodology' has been developed.
 - Delay to be on the **critical path**.
- 

Extension of Time Methods

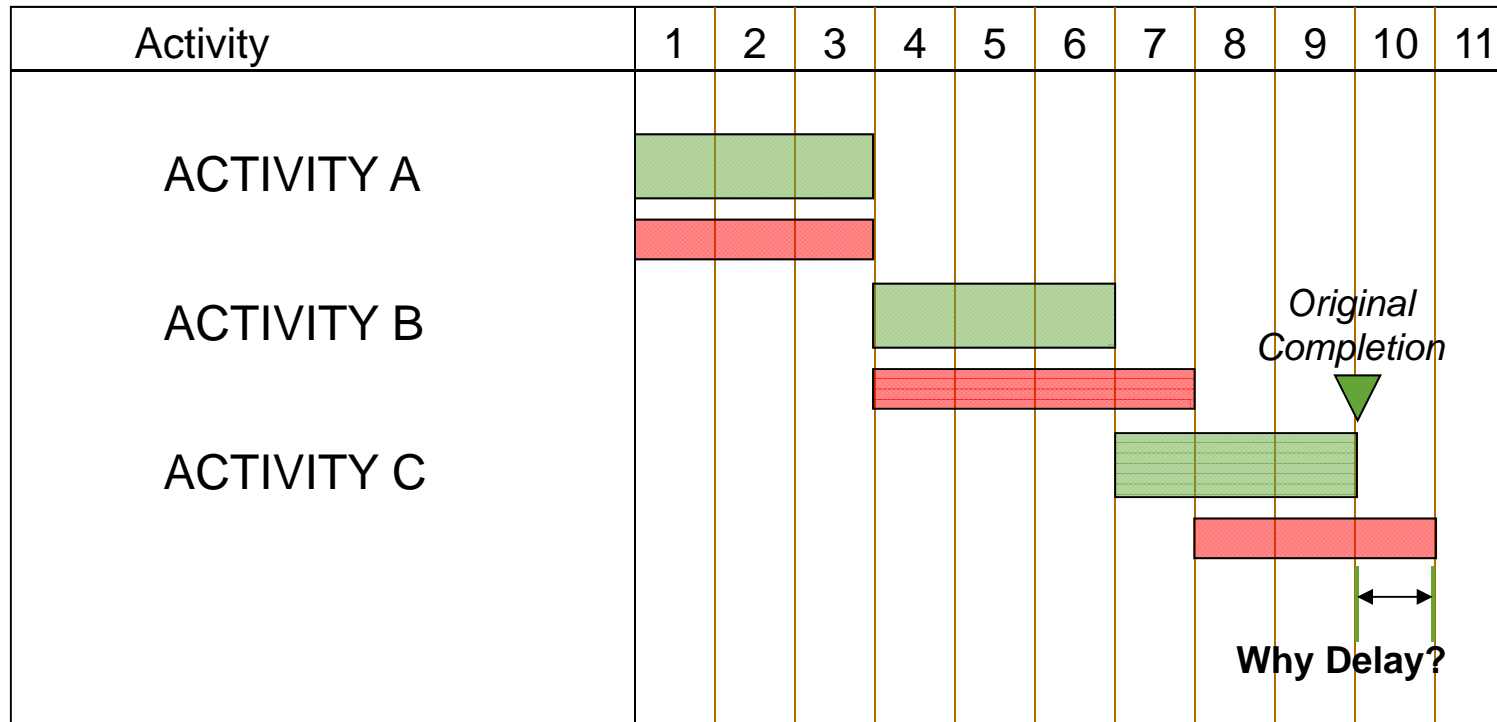
- Estimate or Model Methods (investigate the ***EVENT*** and its potential impact)
- Actual Methods (identify the ***DELAY period*** and investigate what caused it)




Model Based Analysis



Actual Based Analysis



Model Based Methods

- Global and Net Impact Methods
 - **As-Planned Impact**
 - As-Planned But For
 - **Collapsed As-Built (As-Built But For)**
 - Time Impact Analysis (Impact / Update)
- 

Actual Based Methods

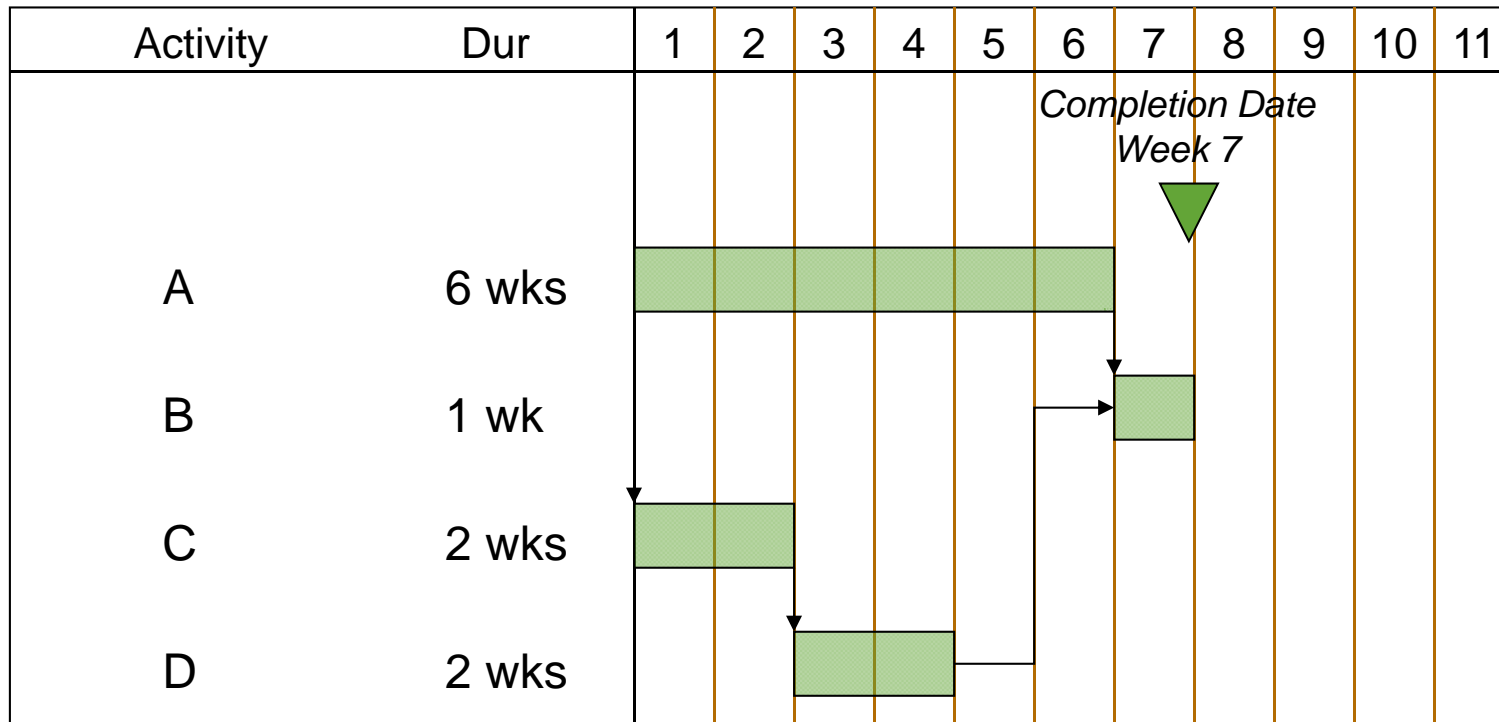
- **As-Planned vs As-Built (Windows)**
- Time Slice Windows
- Longest Path



Prospective and Retrospective Approaches

- Prospective methods look forward and anticipate delay (*Preventative*)
- Retrospective methods look back and establishes cause of actual delay (*Allocation of blame*)



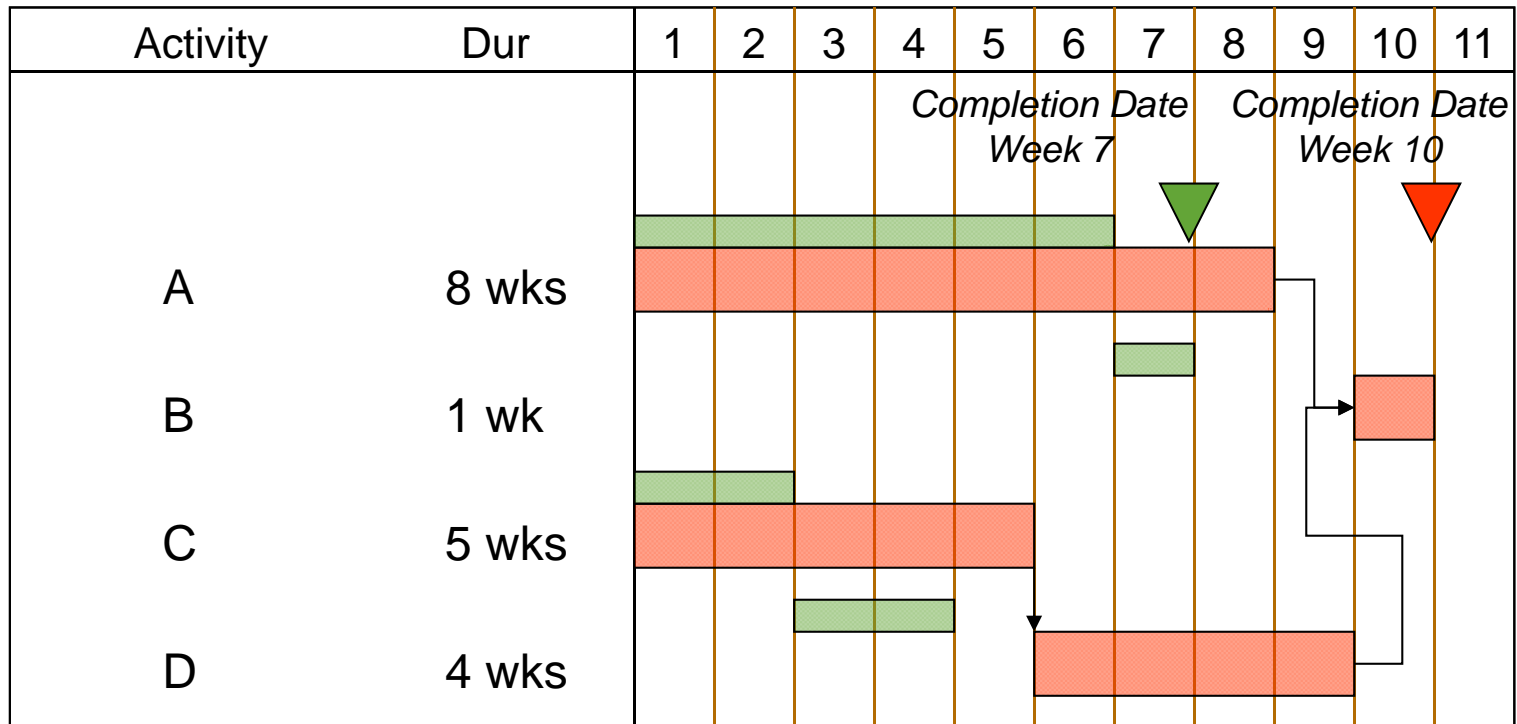


PLANNED PROGRAMME

Original Overall Duration 7 Weeks

Critical Path runs through activities A and B



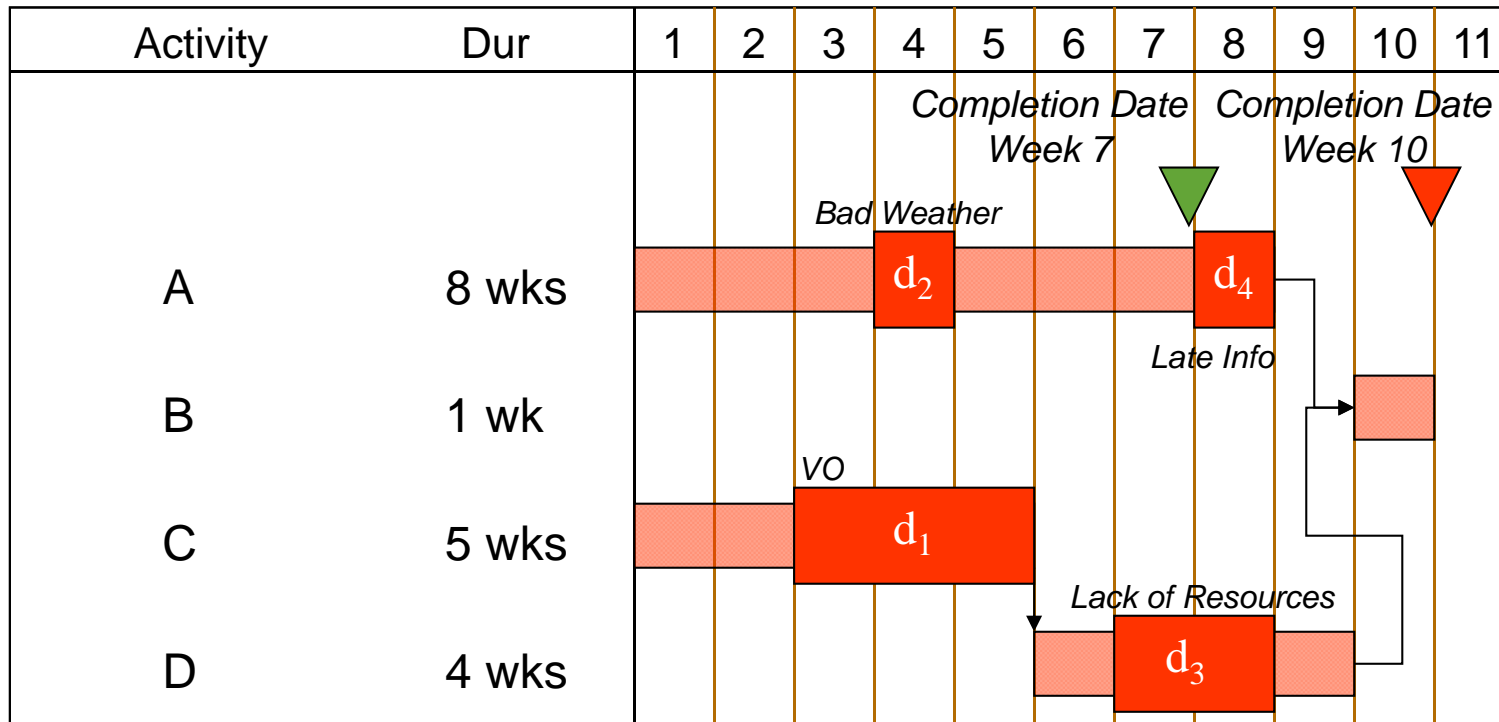


AS-BUILT PROGRAMME

As-Built Overall Duration 10 Weeks

Critical Path ran through activities C, D and B

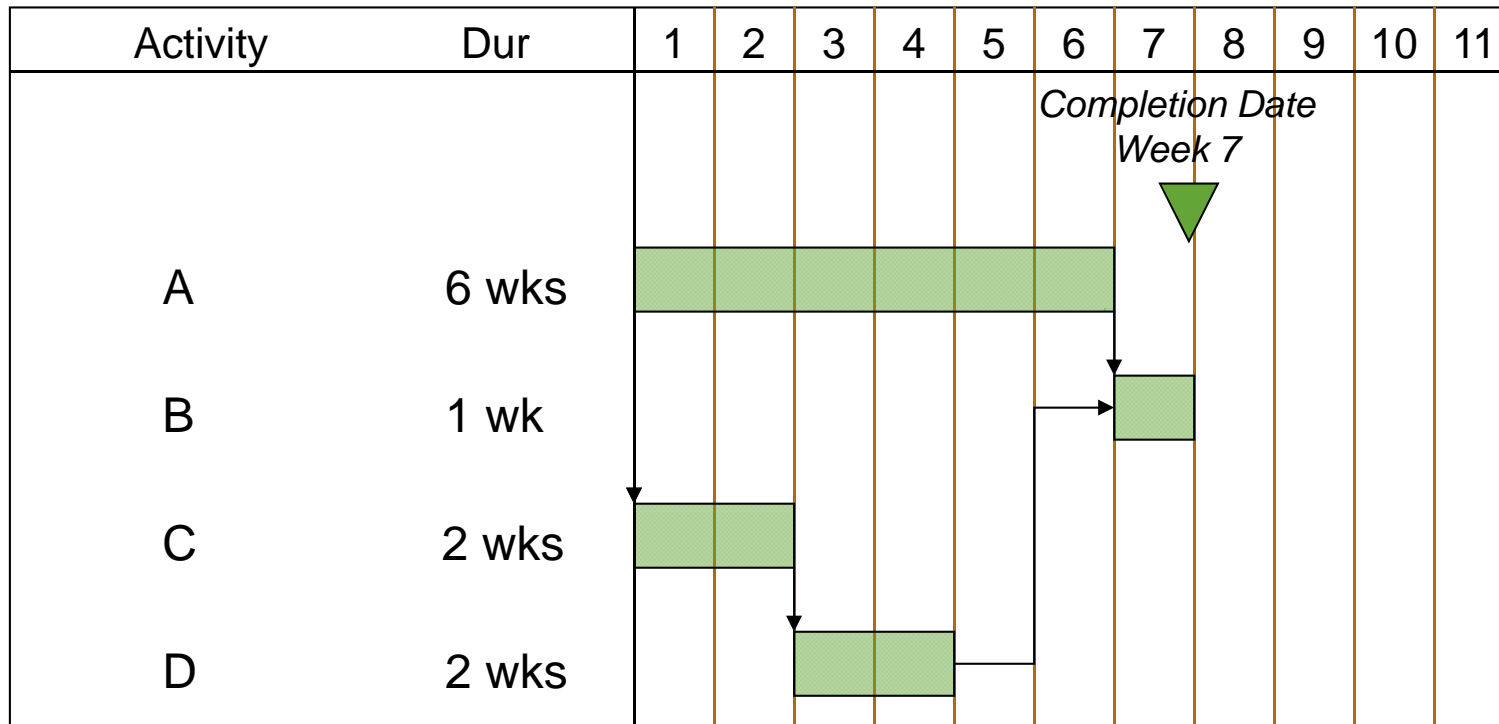




DELAYING EVENTS

Events d_1 , d_2 and d_4 Owner-responsible Delays

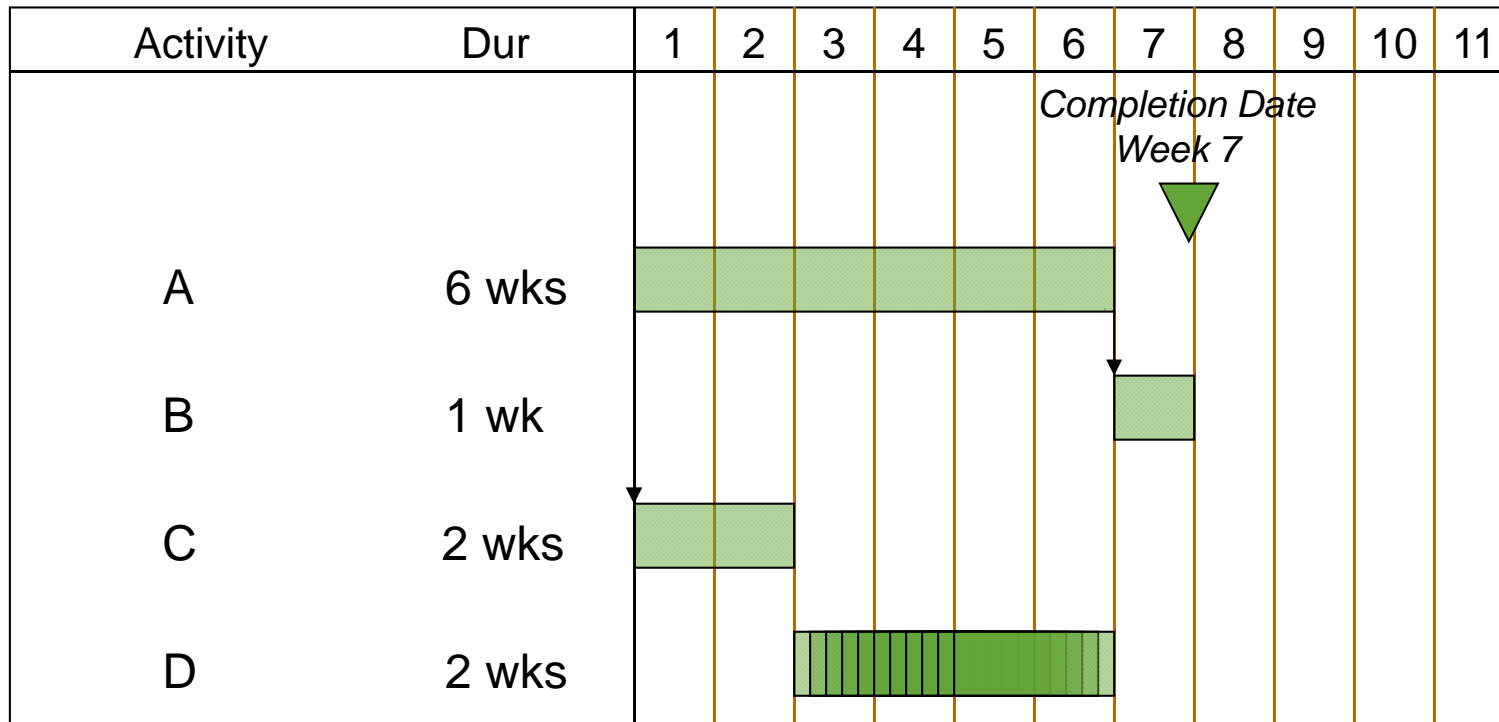
Event d_3 Contractor-responsible Delay



AS-PLANNED IMPACTED

Uses planned programme

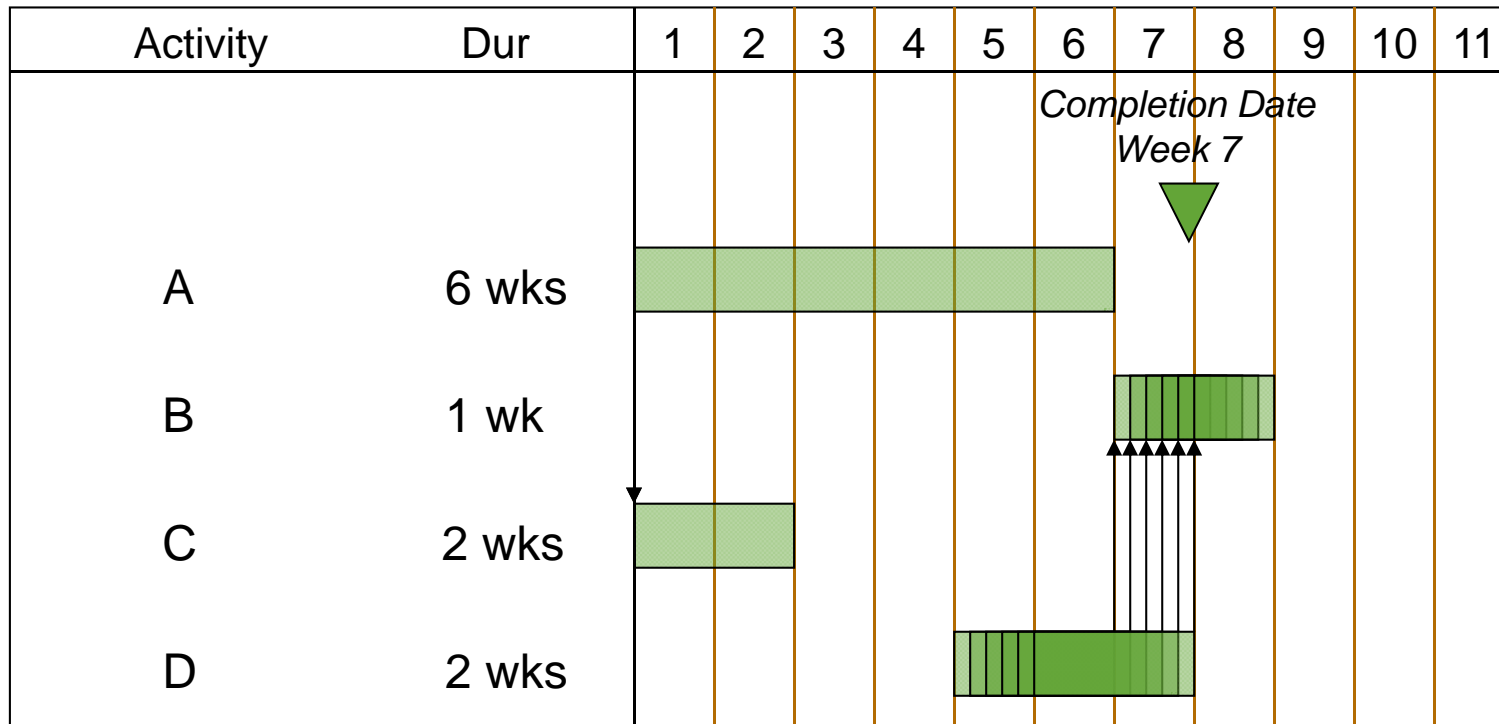




AS-PLANNED IMPACTED

Add in first delay to occur (d_1)

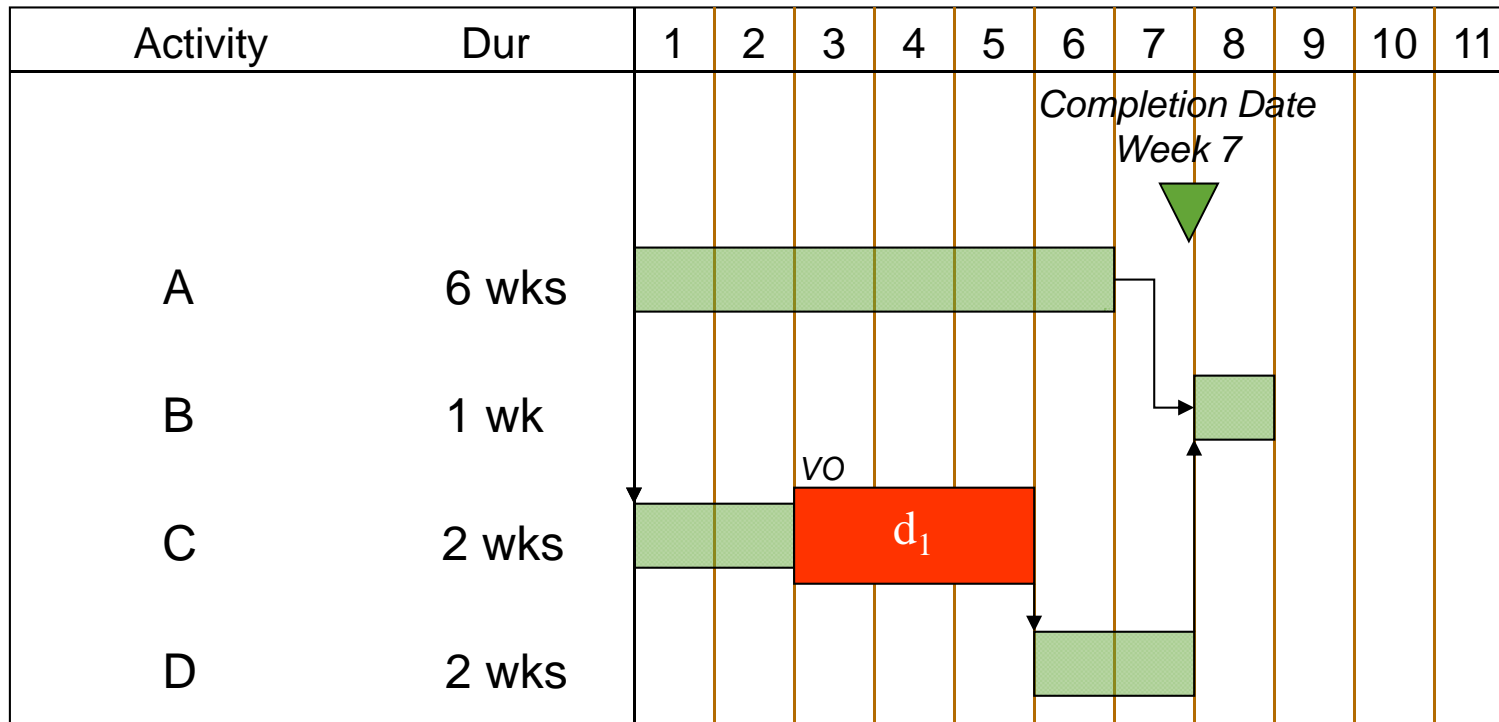




AS-PLANNED IMPACTED

Add in first delay to occur (d_1)

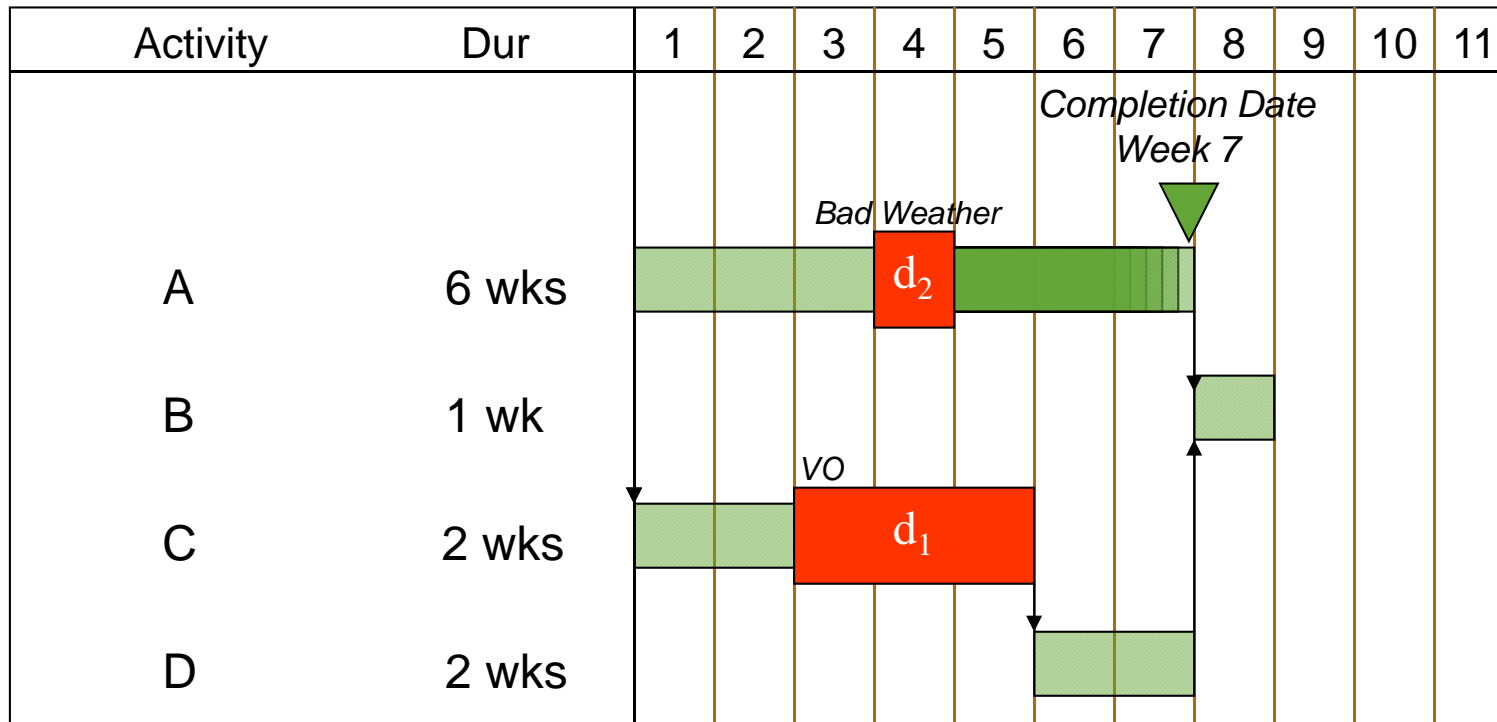




AS-PLANNED IMPACTED

Add in first delay to occur (d_1) - 1 Week Critical Delay

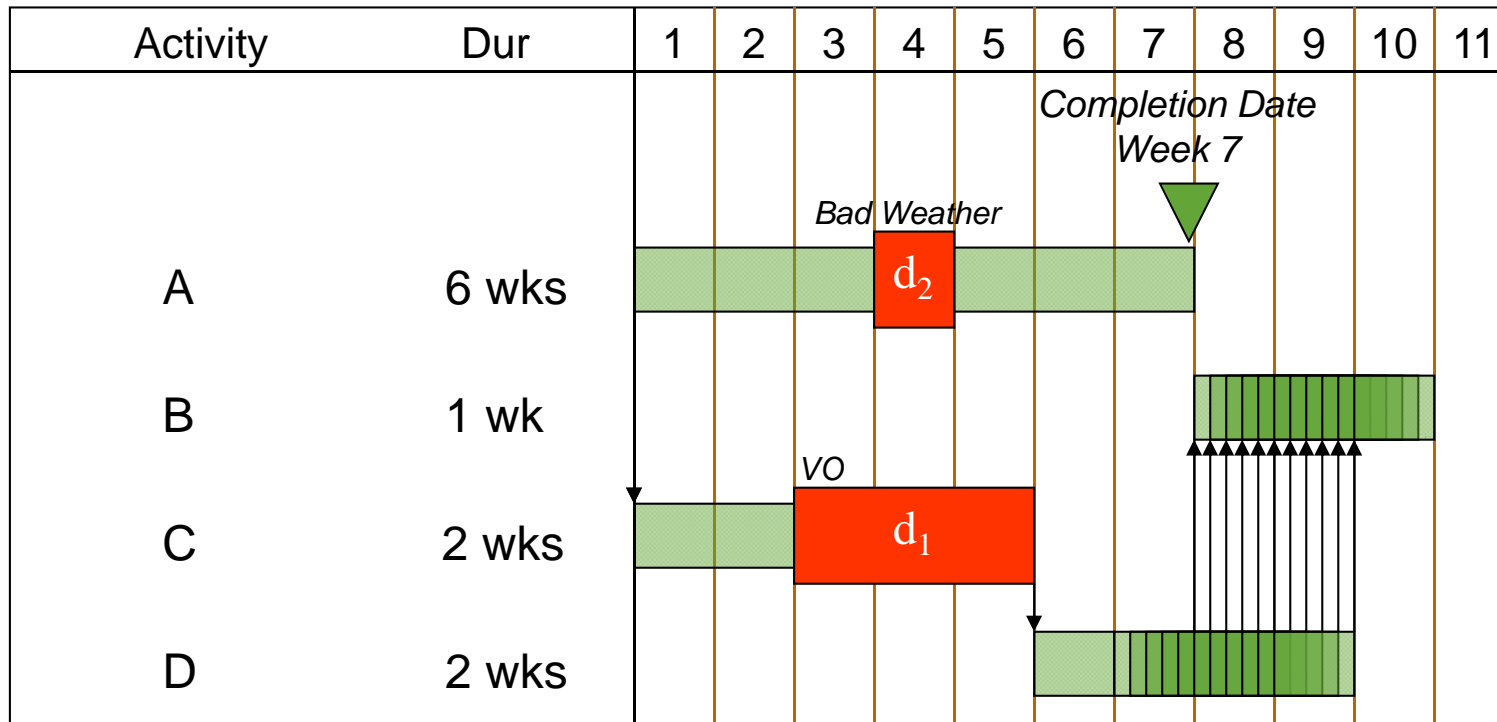




AS-PLANNED IMPACTED

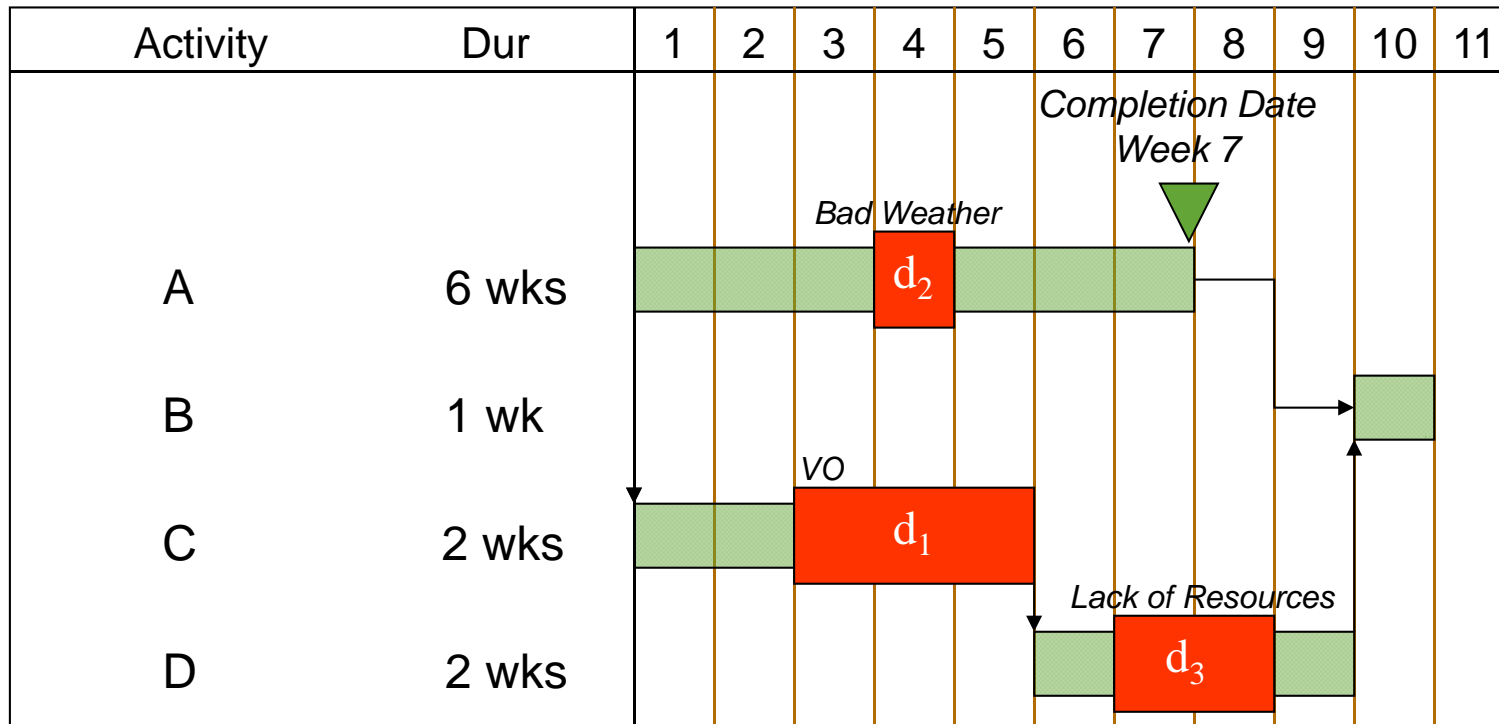
Add in first delay to occur (d_1) - 1 Week Critical Delay

Add in 2nd delay to occur (d_2) - No Critical Delay



AS-PLANNED IMPACTED

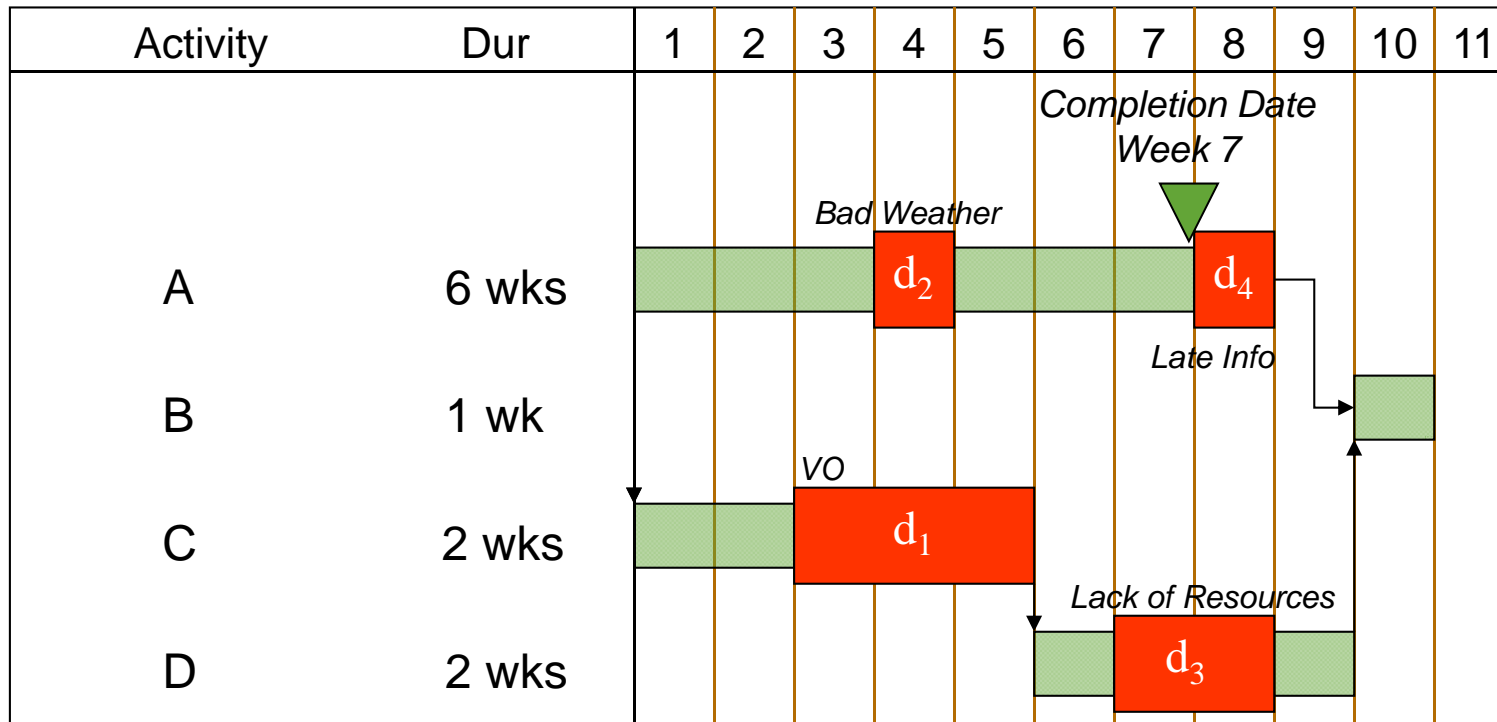
- Add in first delay to occur (d_1) - 1 Week Critical Delay
- Add in 2nd delay to occur (d_2) - No Critical Delay
- Add in 3rd delay to occur (d_3)



AS-PLANNED IMPACTED

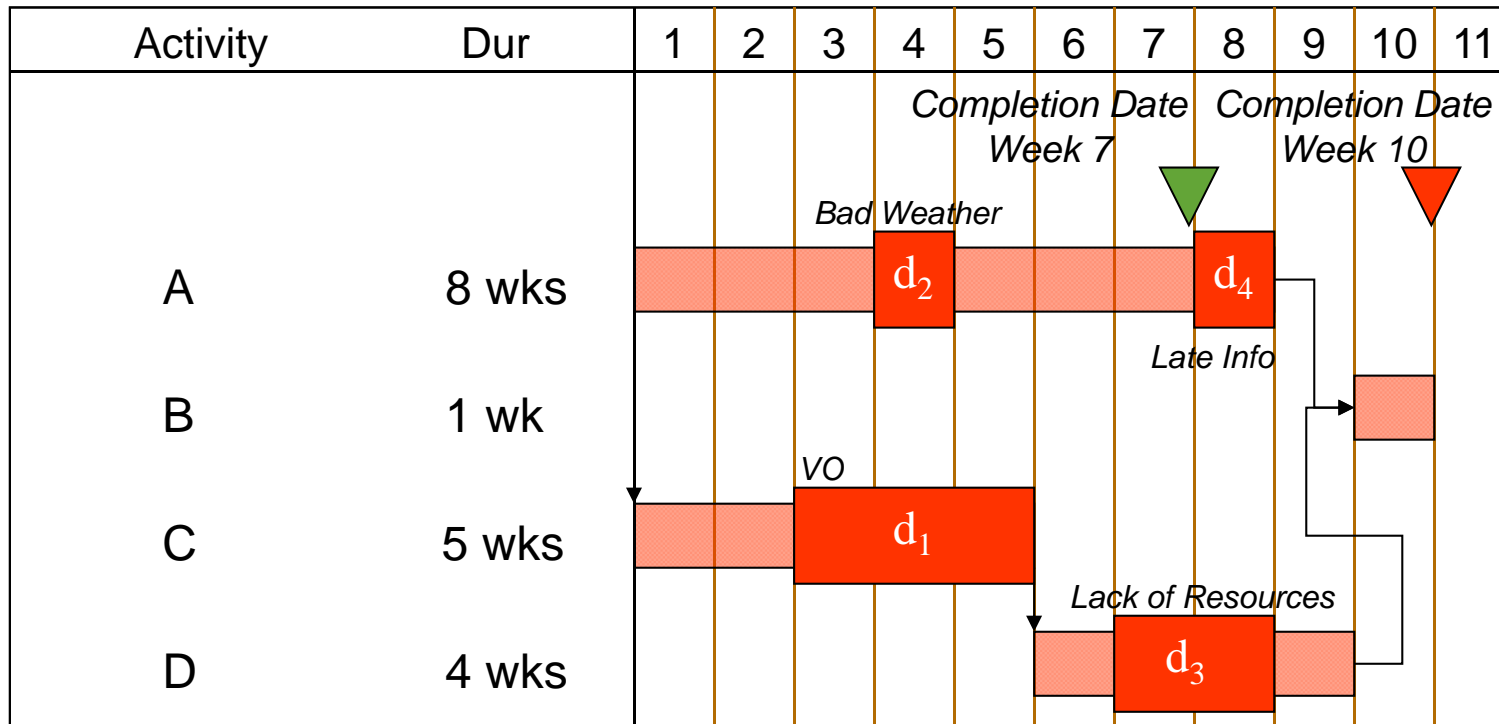
- Add in first delay to occur (d_1) - 1 Week Critical Delay
- Add in 2nd delay to occur (d_2) - No Critical Delay
- Add in 3rd delay to occur (d_3) - 2 Weeks Critical Delay





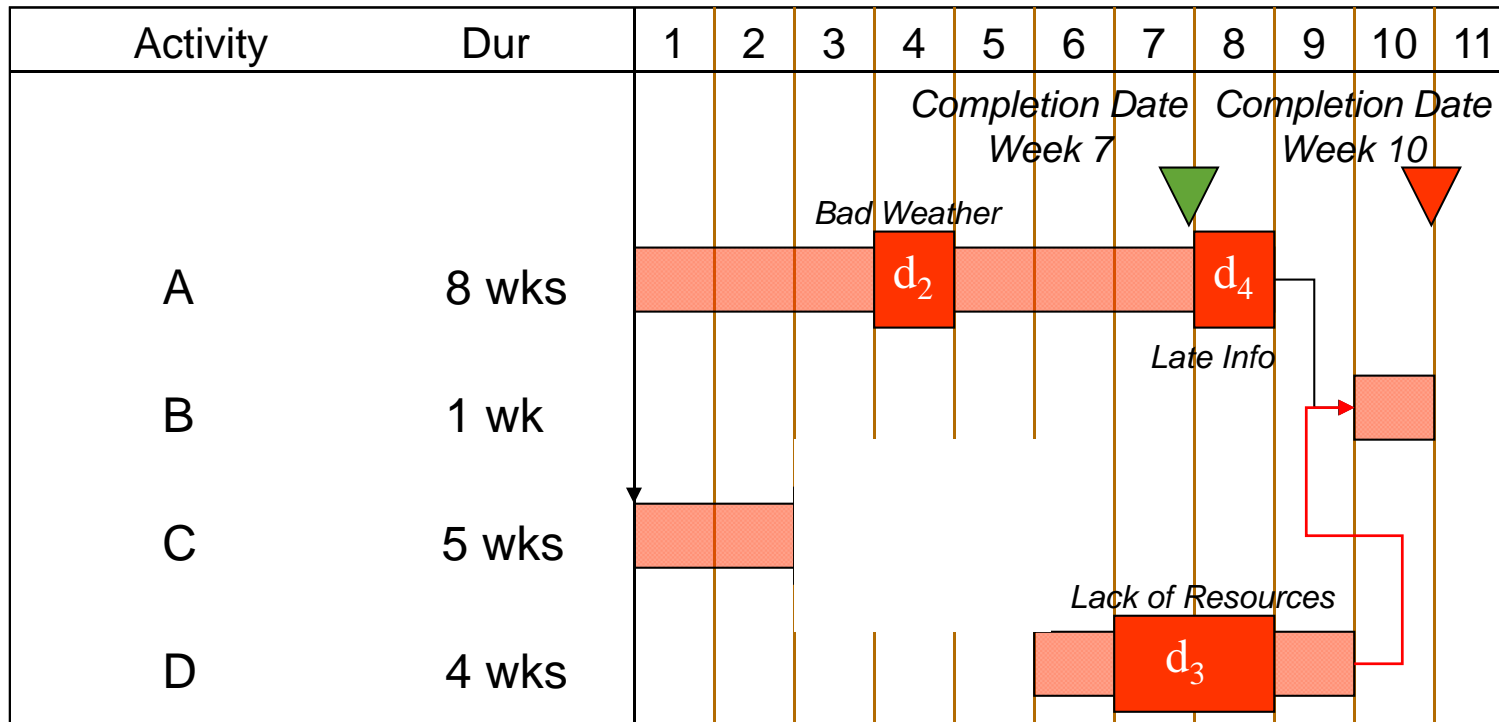
AS-PLANNED IMPACTED

- Add in first delay to occur (d_1) - 1 Week Critical Delay
- Add in 2nd delay to occur (d_2) - No Critical Delay
- Add in 3rd delay to occur (d_3) - 2 Weeks Critical Delay
- Add in 4th delay to occur (d_4) - No Critical Delay



COLLAPSED AS-BUILT

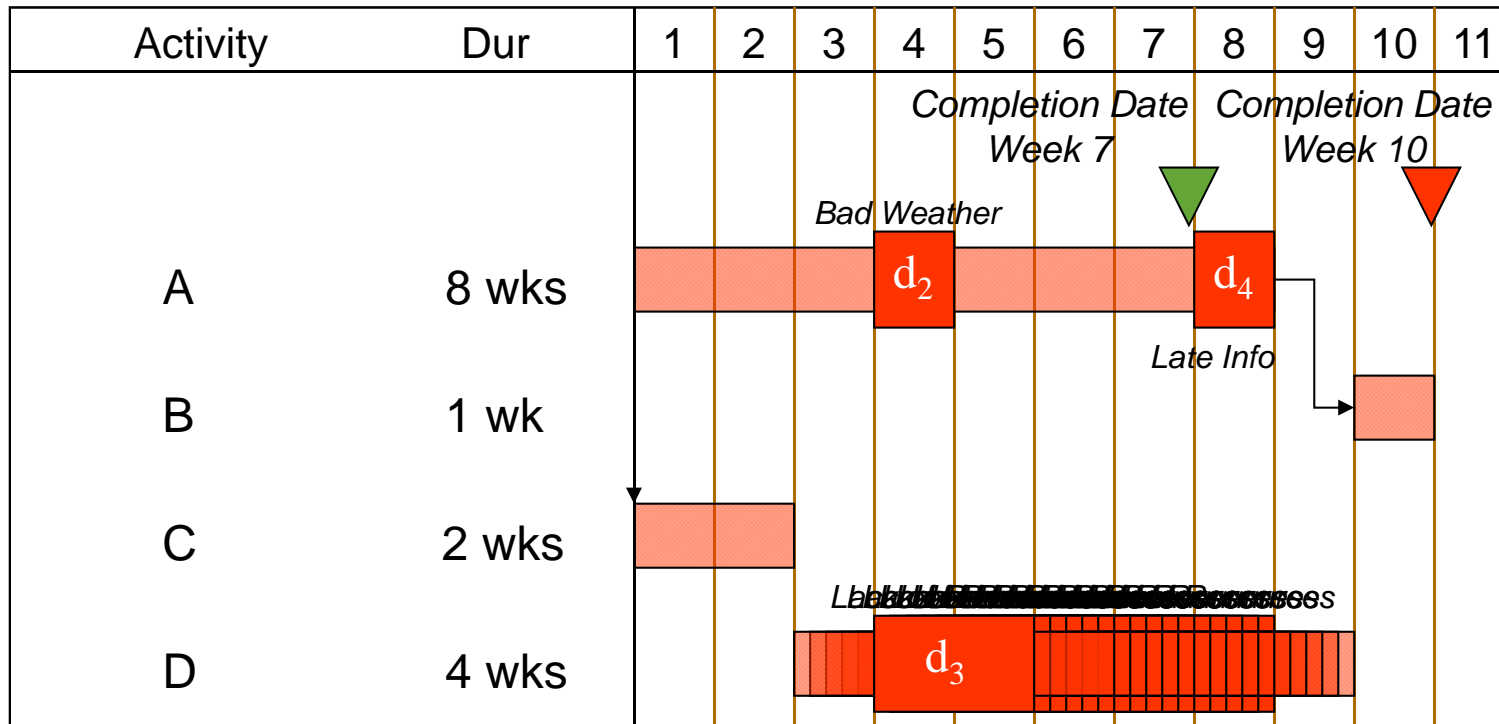
Uses as-built programme logic linked



COLLAPSED AS-BUILT

Critical Path Identified and first Owner delay removed

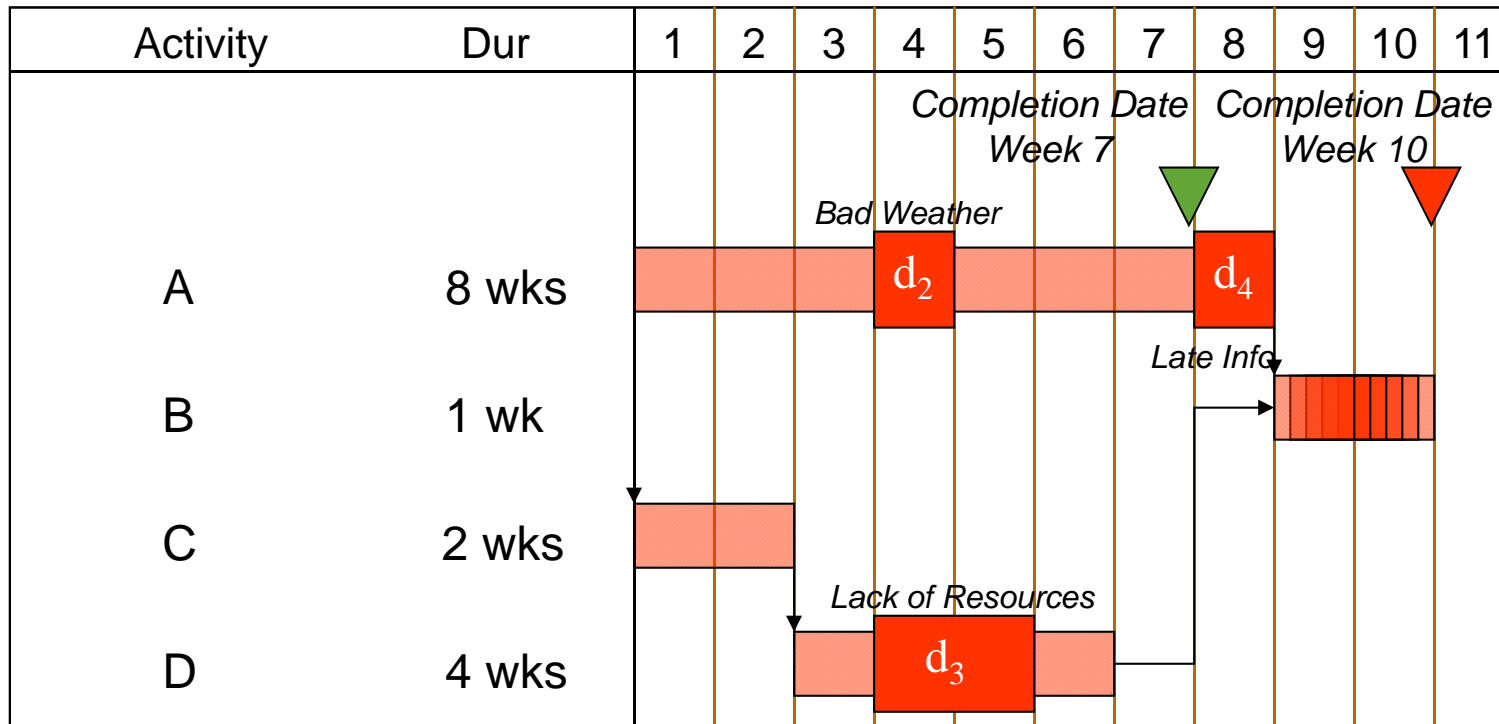




COLLAPSED AS-BUILT

Critical Path Identified and first Owner delay removed

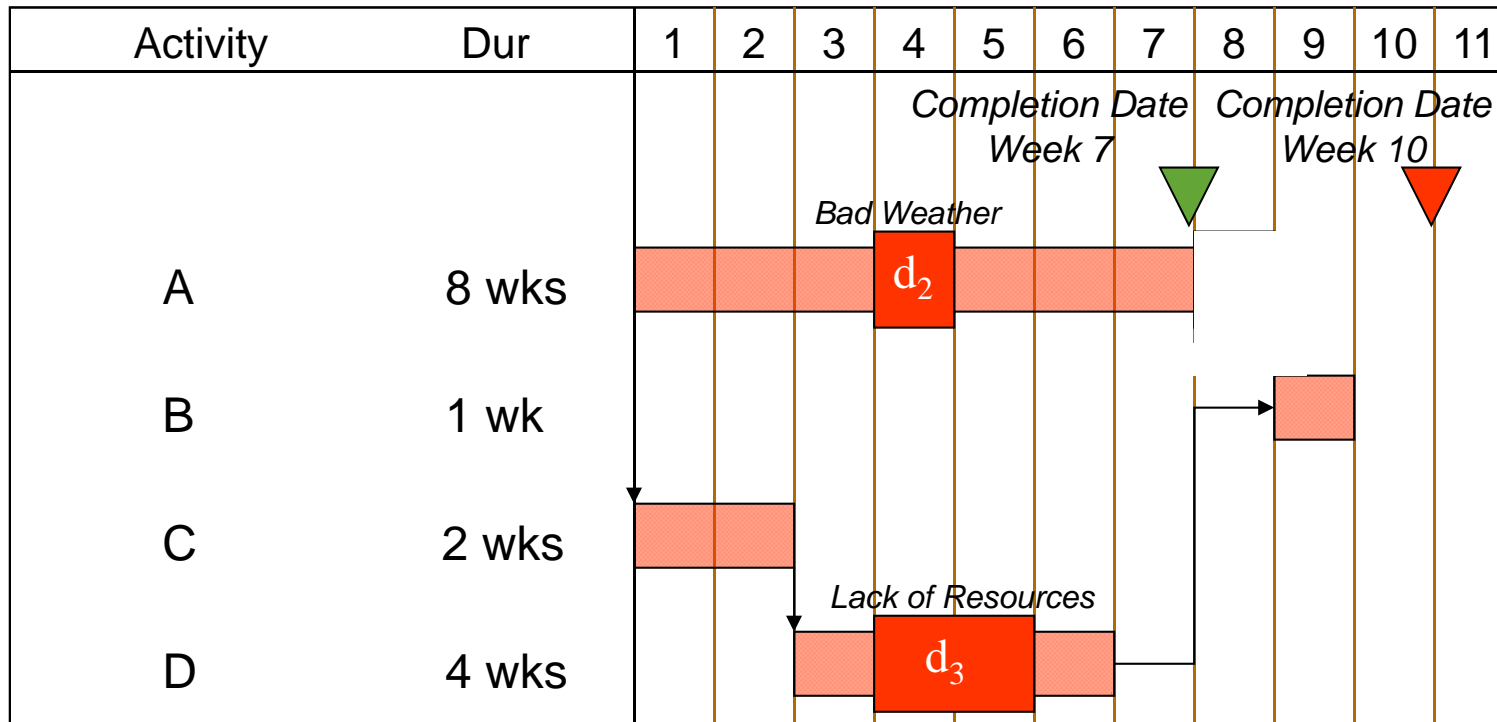




COLLAPSED AS-BUILT

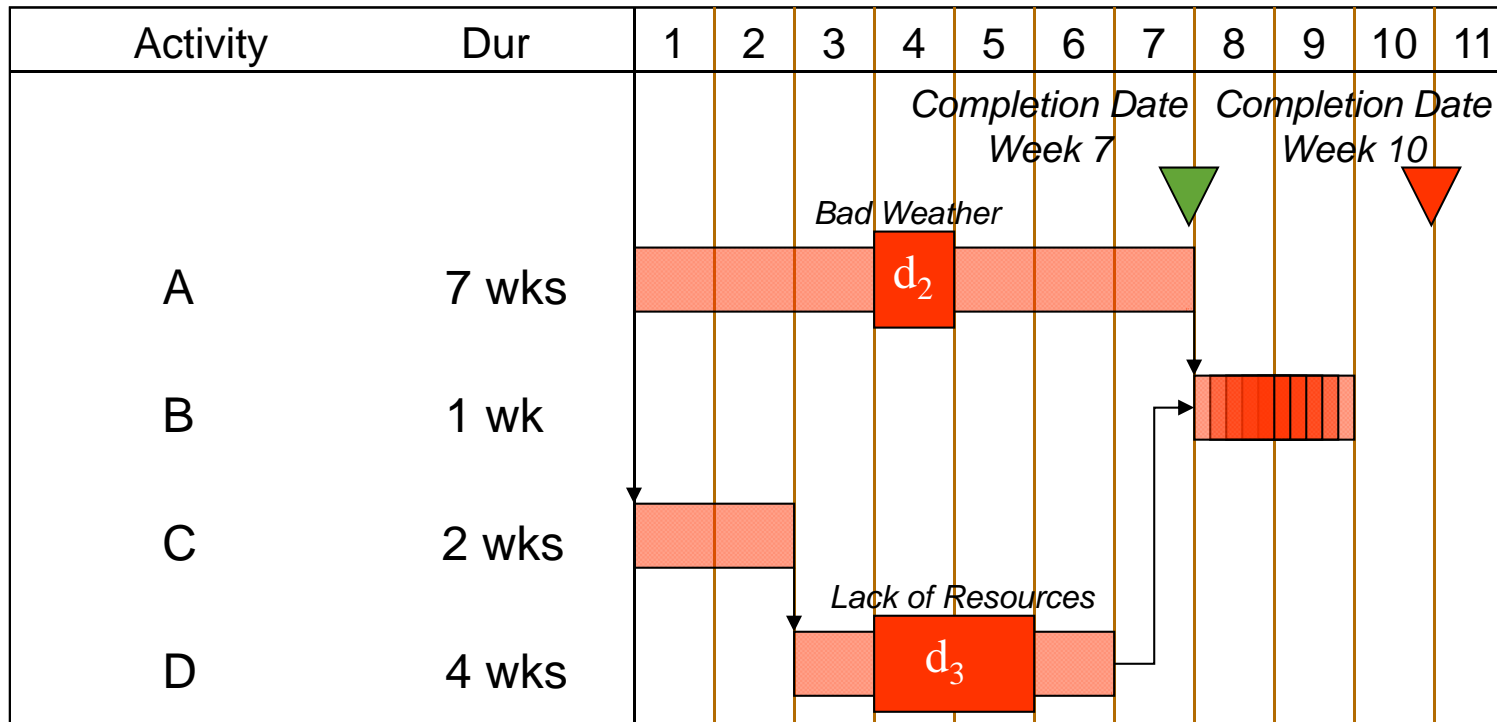
Critical Path Identified and first Owner delay removed
 1 Weeks Critical Delay Allocated to d_1





COLLAPSED AS-BUILT

Critical Path Identified and next Owner delay removed
 1 Weeks Critical Delay Allocated to d_1



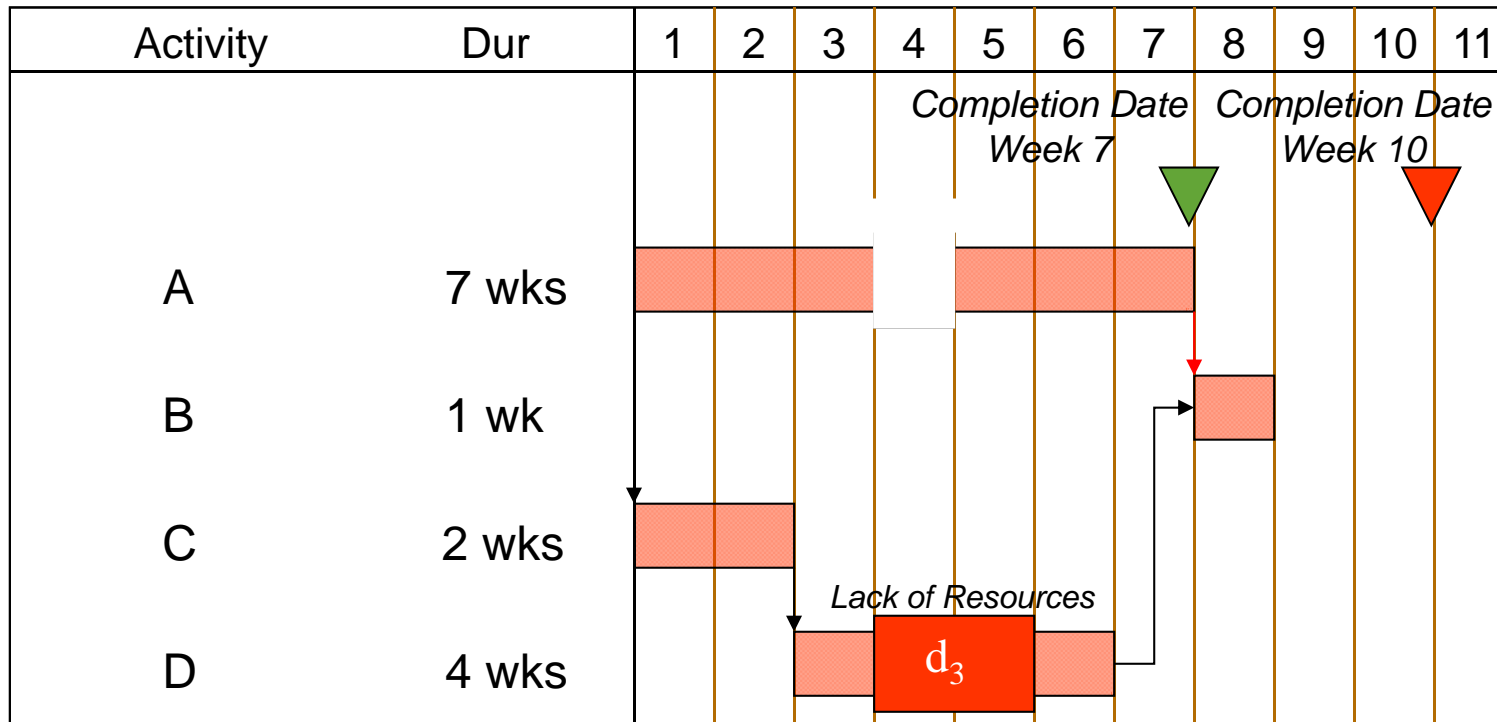
COLLAPSED AS-BUILT

Critical Path Identified and next Owner delay removed

1 Weeks Critical Delay Allocated to d_1

1 Weeks Critical Delay Allocated to d_4





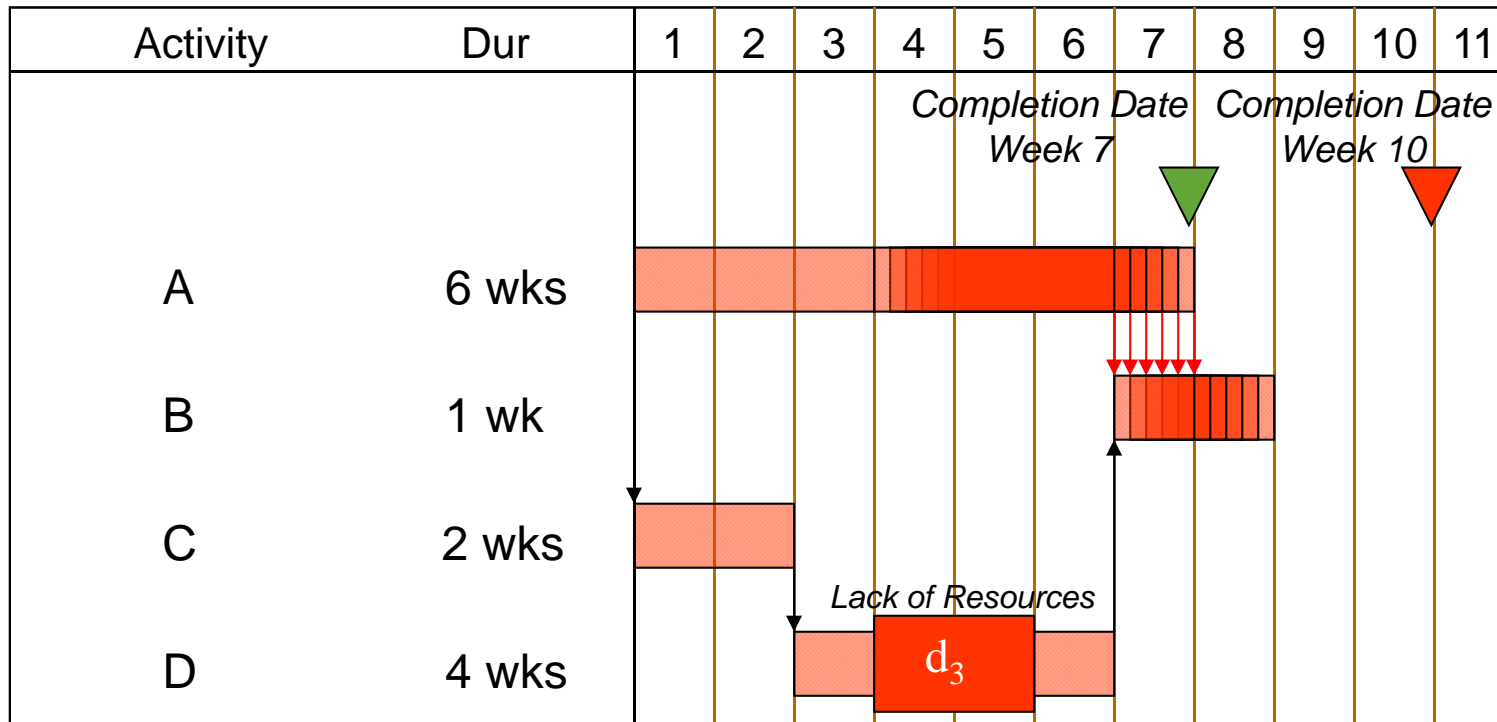
COLLAPSED AS-BUILT

Critical Path Identified and next Owner delay removed

1 Weeks Critical Delay Allocated to d_1

1 Weeks Critical Delay Allocated to d_4





COLLAPSED AS-BUILT

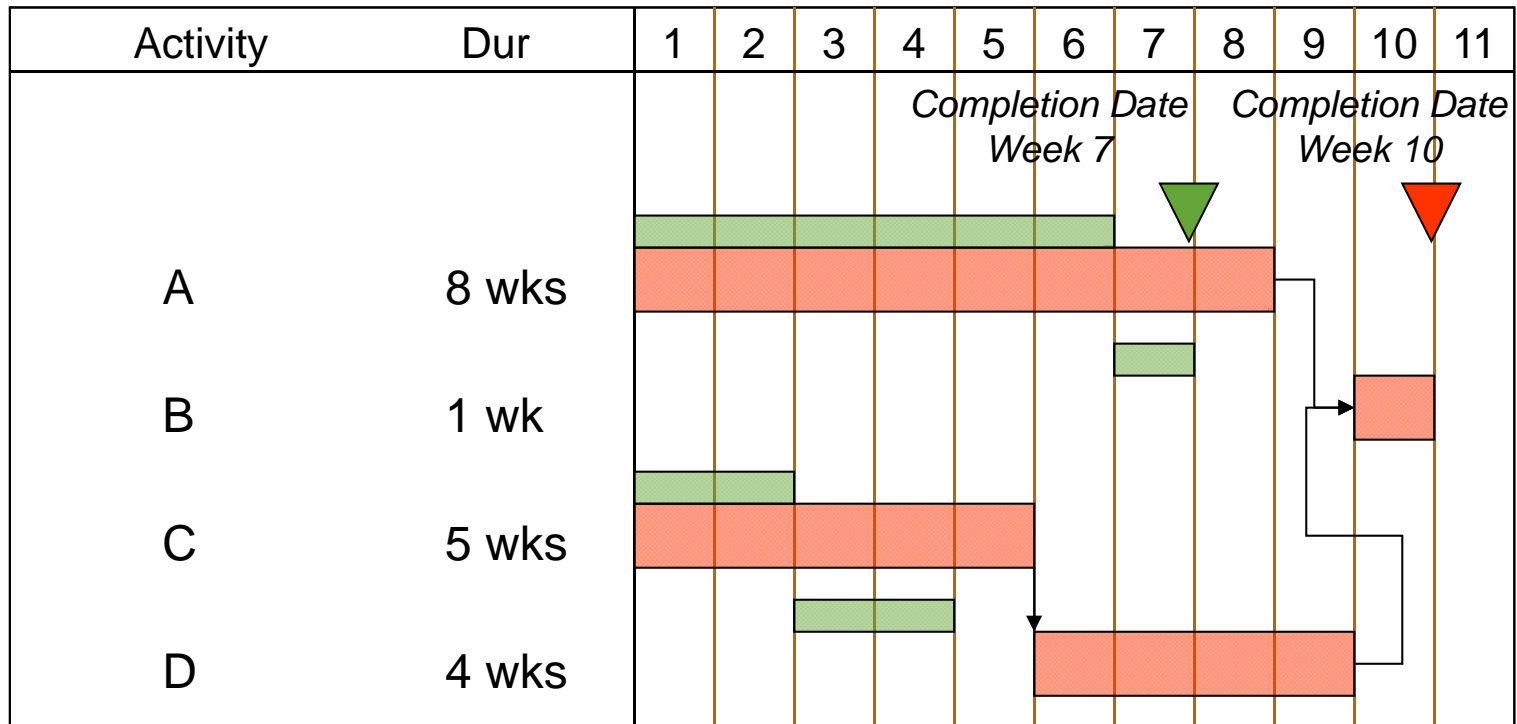
Critical Path Identified and next Owner delay removed

- 1 Weeks Critical Delay Allocated to d_1
- 1 Weeks Critical Delay Allocated to d_4
- 1 Weeks Critical Delay Allocated to d_2



Results from Model Based Methods

Delay	As-Planned Impact	Collapsed As-Built
d_1 (VO)	1 week critical delay	1 week critical delay
d_2 (bad weather)	no critical delay	1 week critical delay
d_3 (lack of resources)	2 weeks critical delay	No critical delay
d_4 (late info)	No critical delay	1 week critical delay

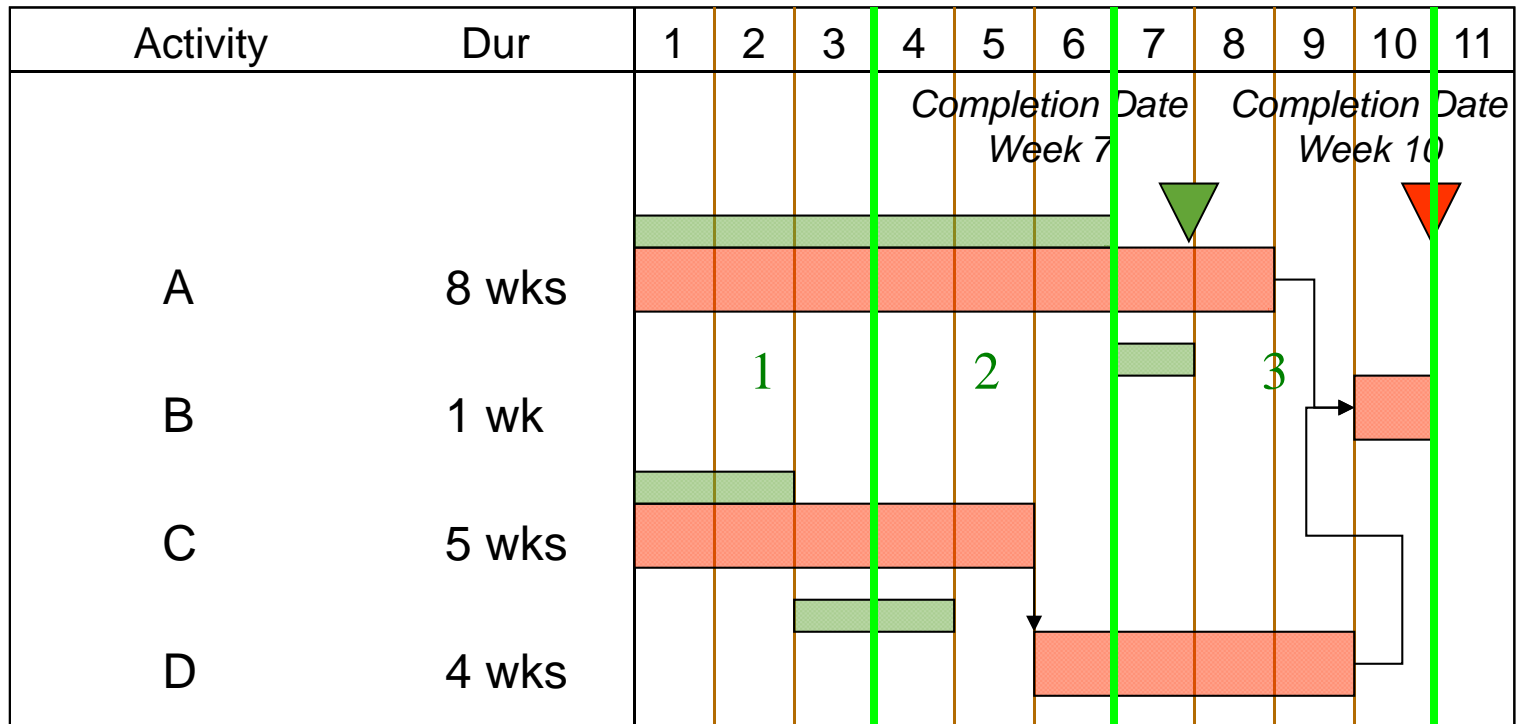


AS-PLANNED vs AS-BUILT

As-Built Overall Duration 10 Weeks

Critical Path ran through activities C, D and B

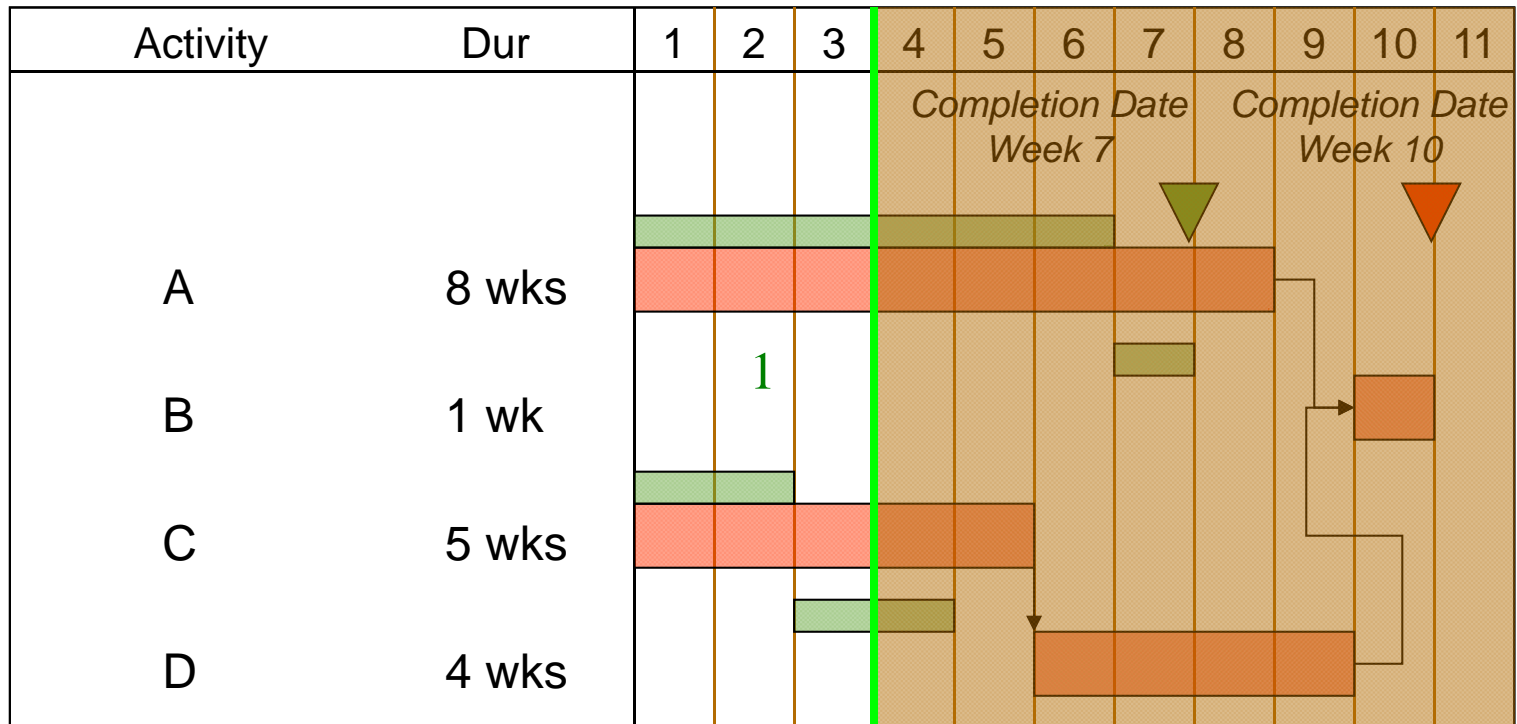




AS-PLANNED vs AS-BUILT (WINDOWS)

Programme divided into time slices
and analysed progressively

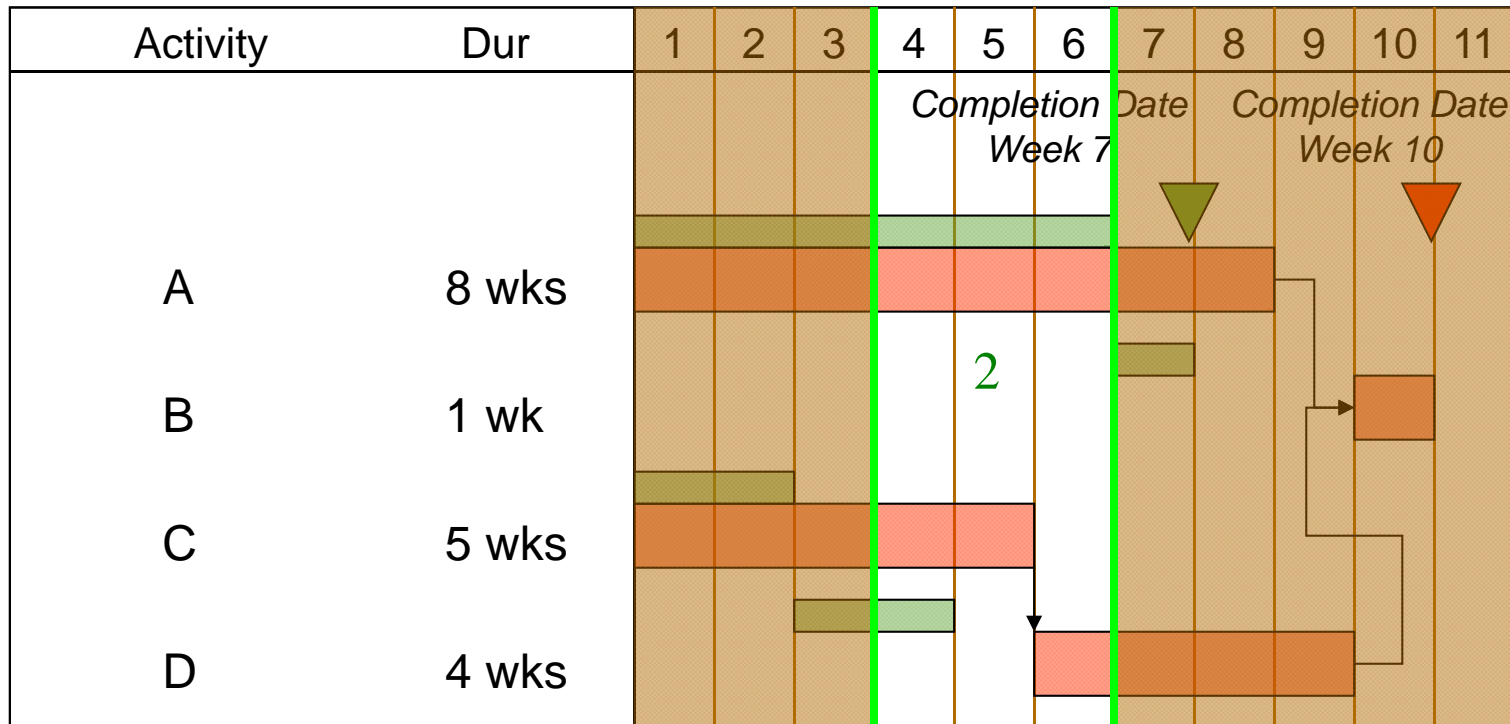




AS-PLANNED vs AS-BUILT (WINDOWS)

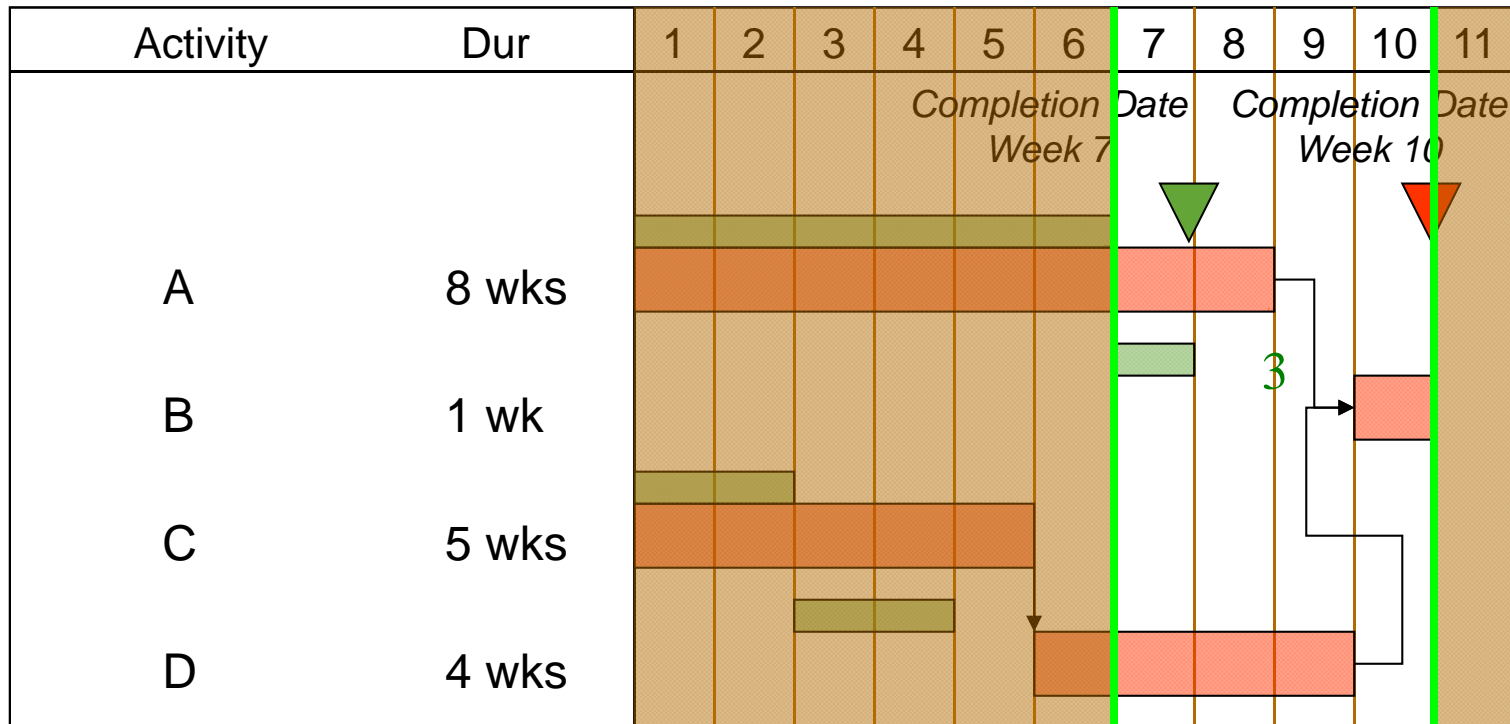
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AS-PLANNED vs AS-BUILT (WINDOWS)

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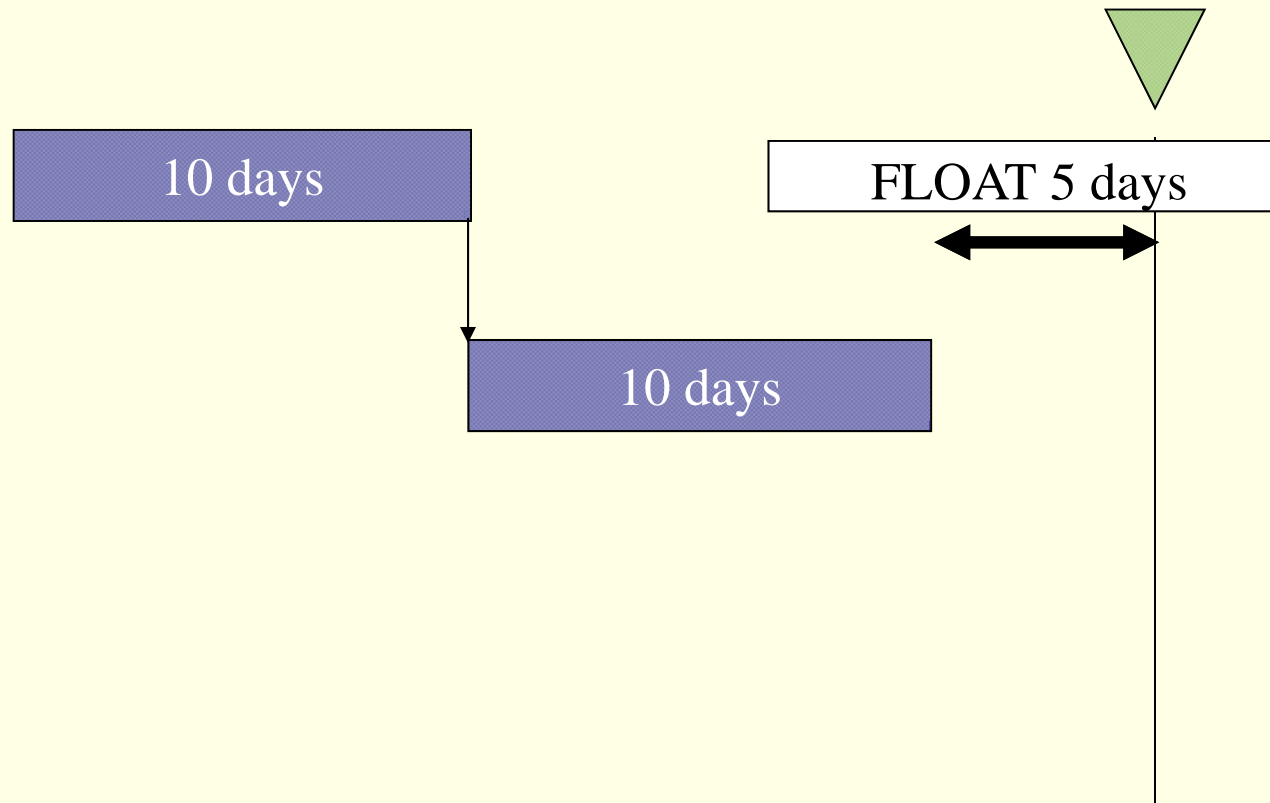
AS-PLANNED vs AS-BUILT (WINDOWS)

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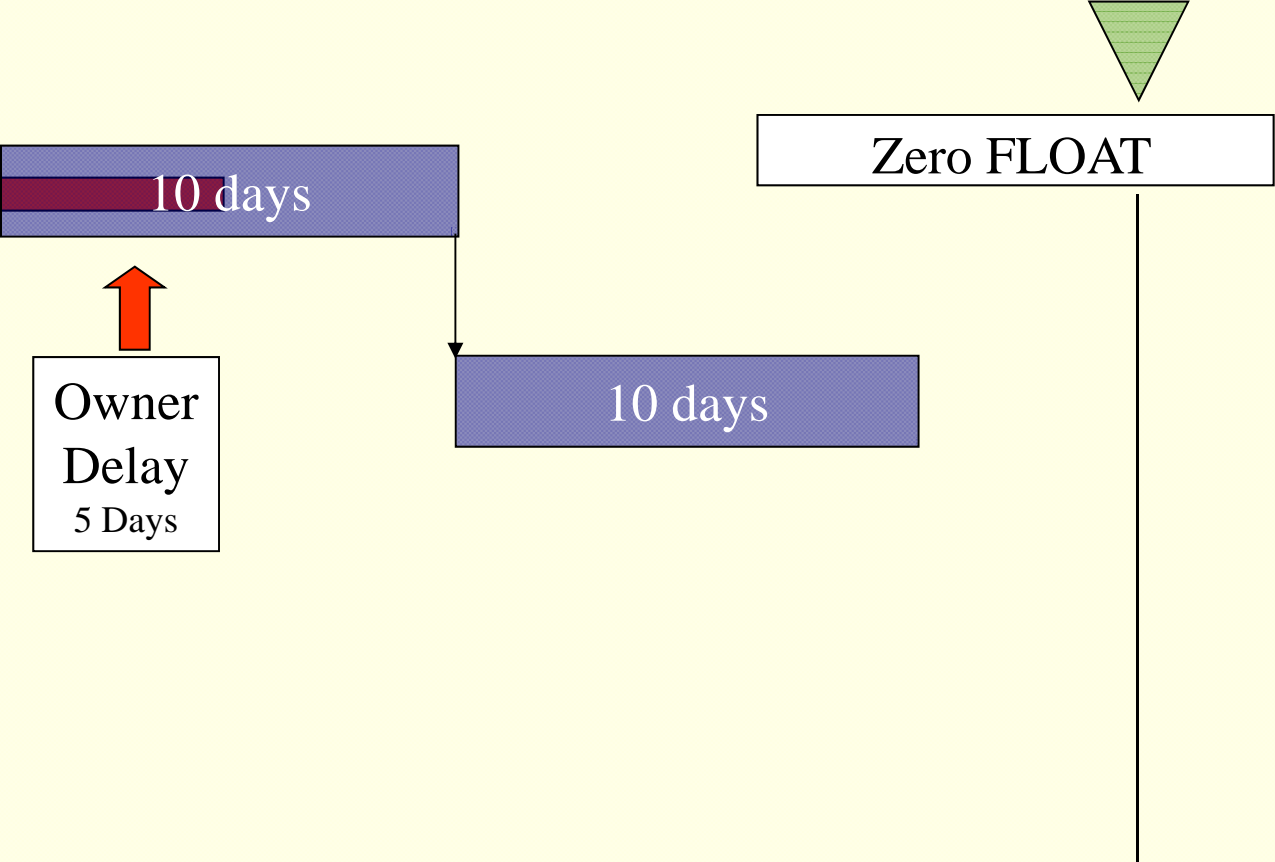
Who Owns the Float ?



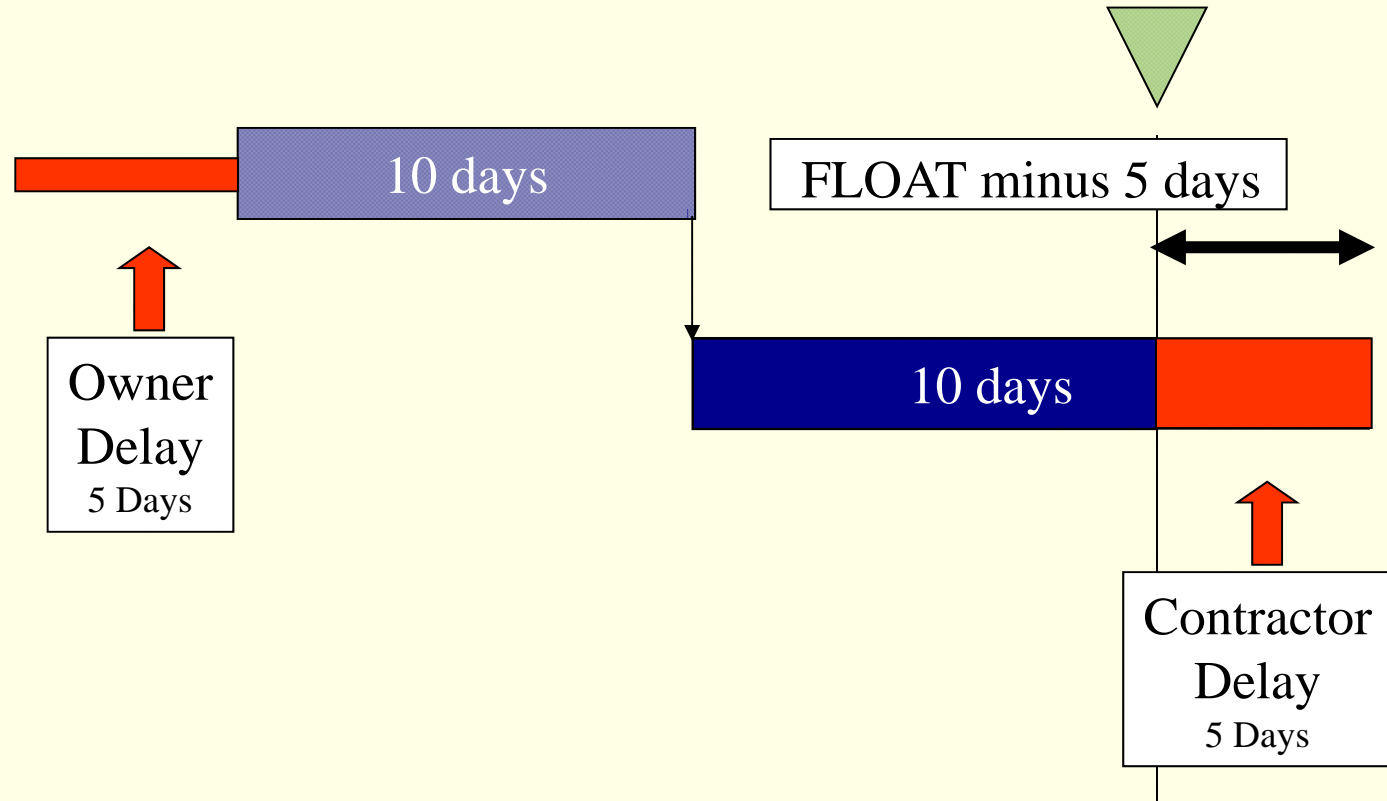
Contract Completion Date



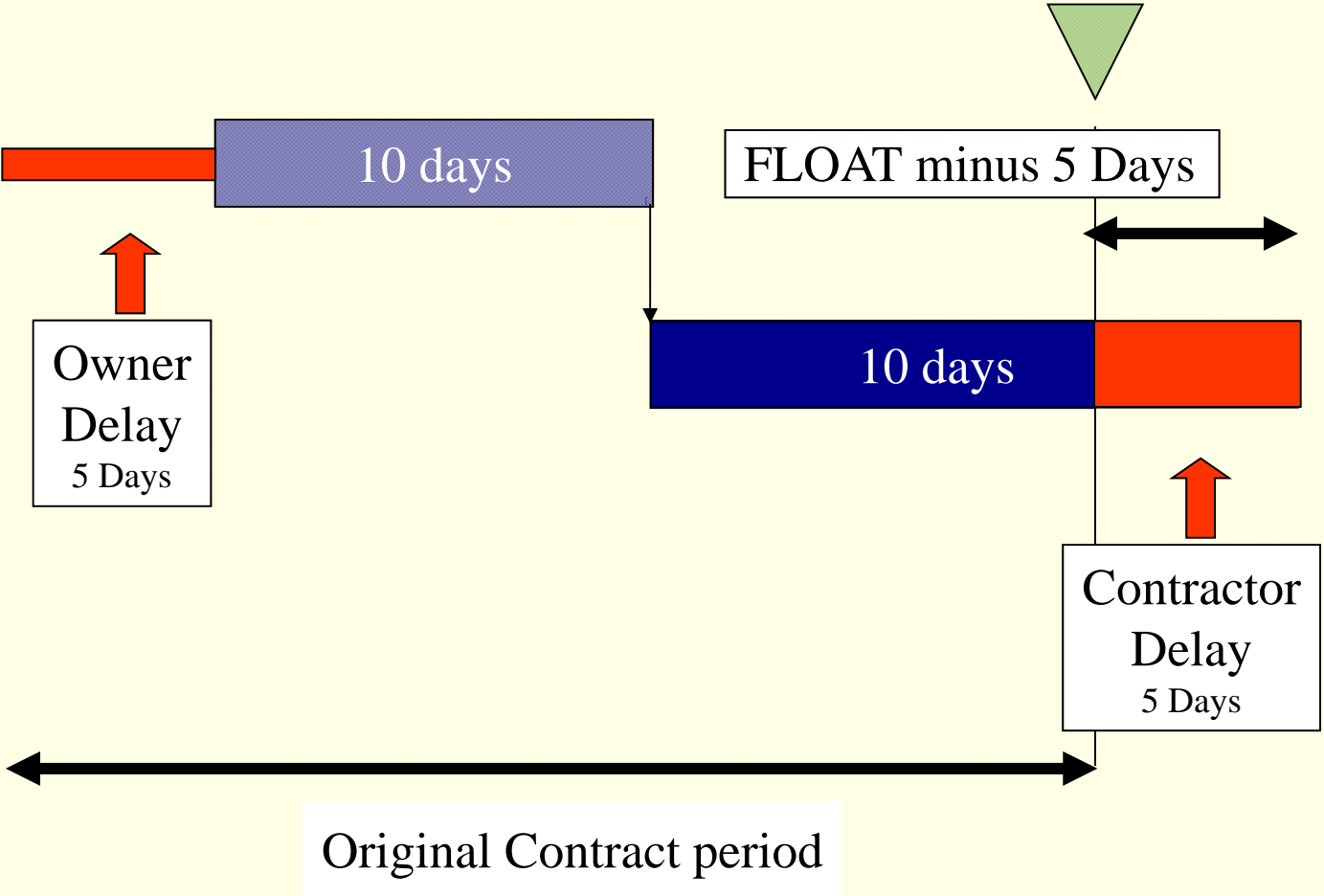
Contract Completion Date



Contract Completion Date



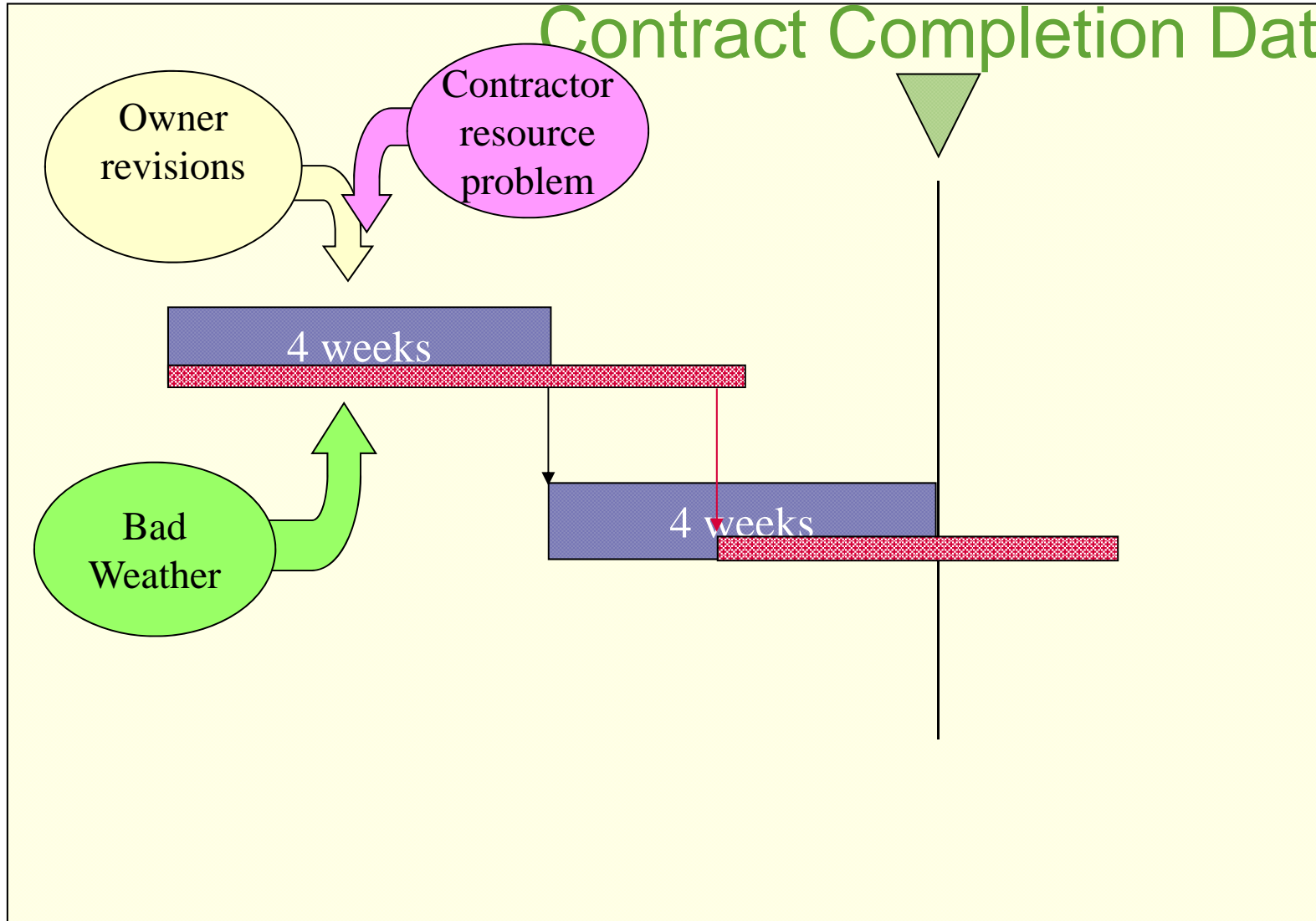
Contract Completion Date

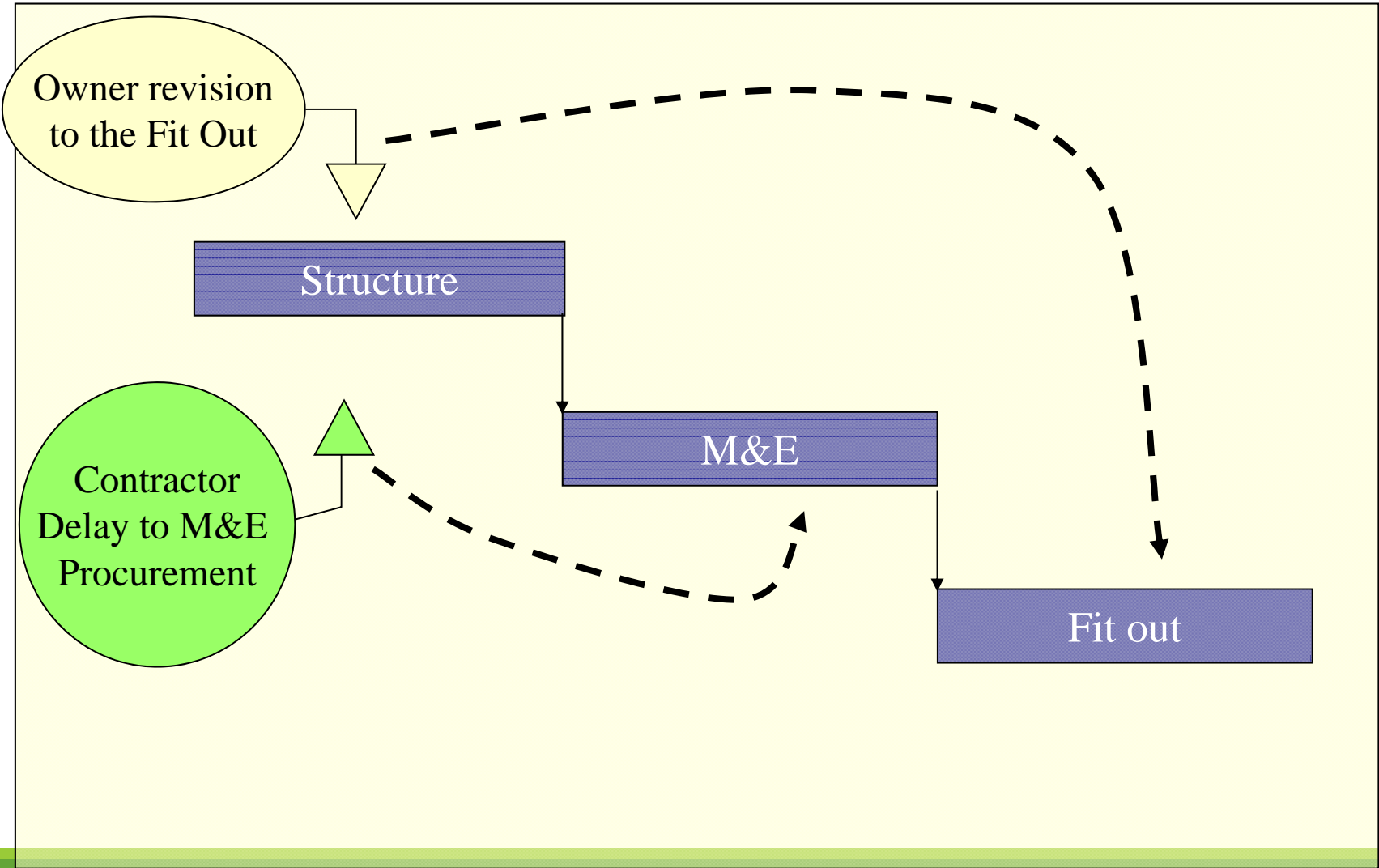


CONCURRENT DELAY

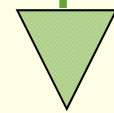
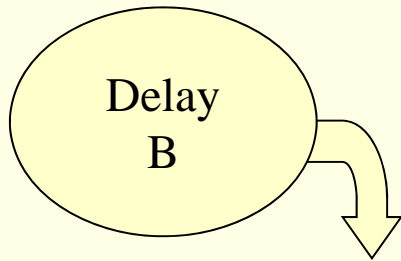
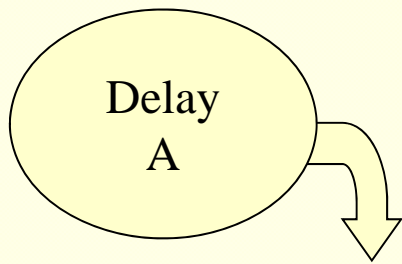


Contract Completion Date





Contract Completion Date

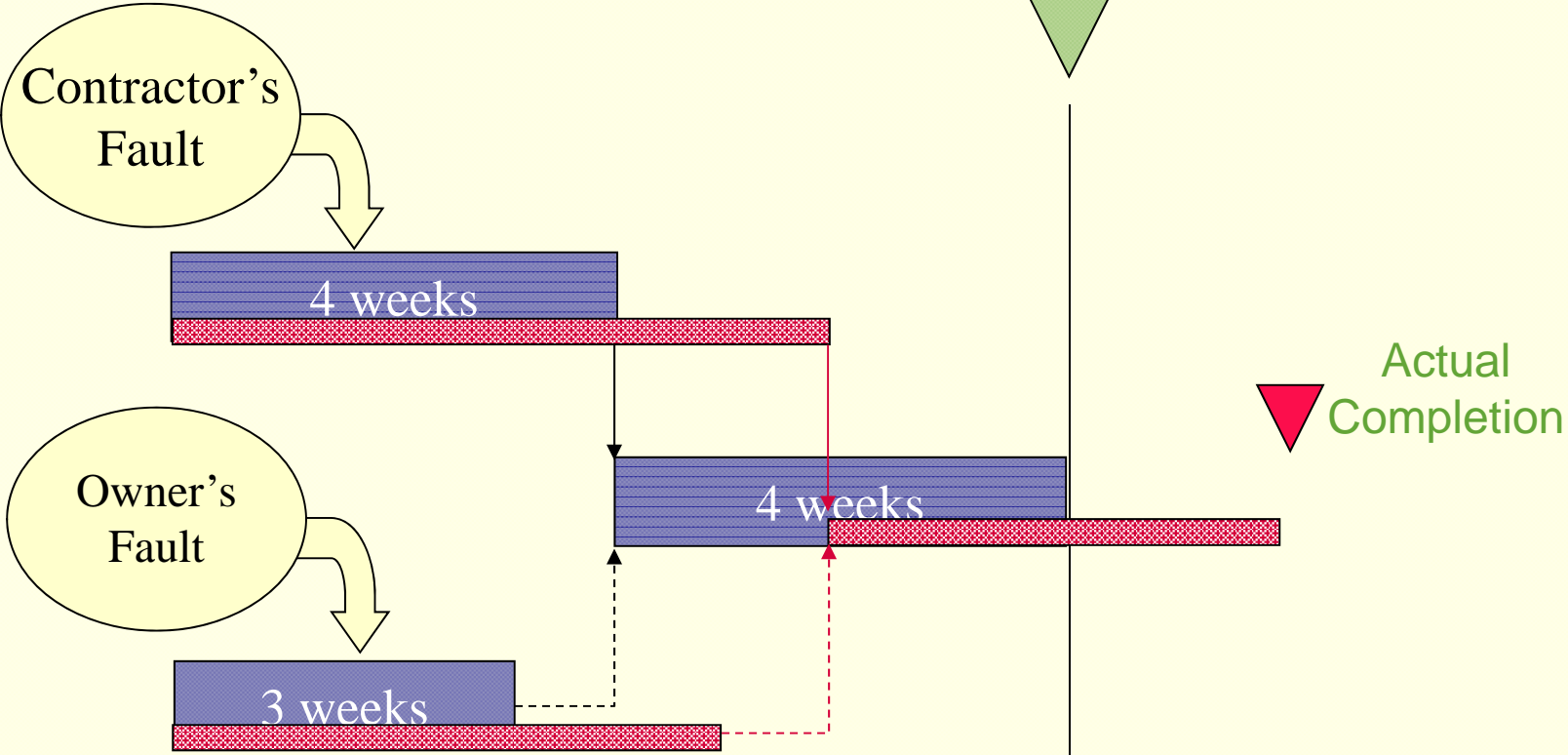


Actual Completion

A red downward-pointing triangle indicating the Actual Completion date.

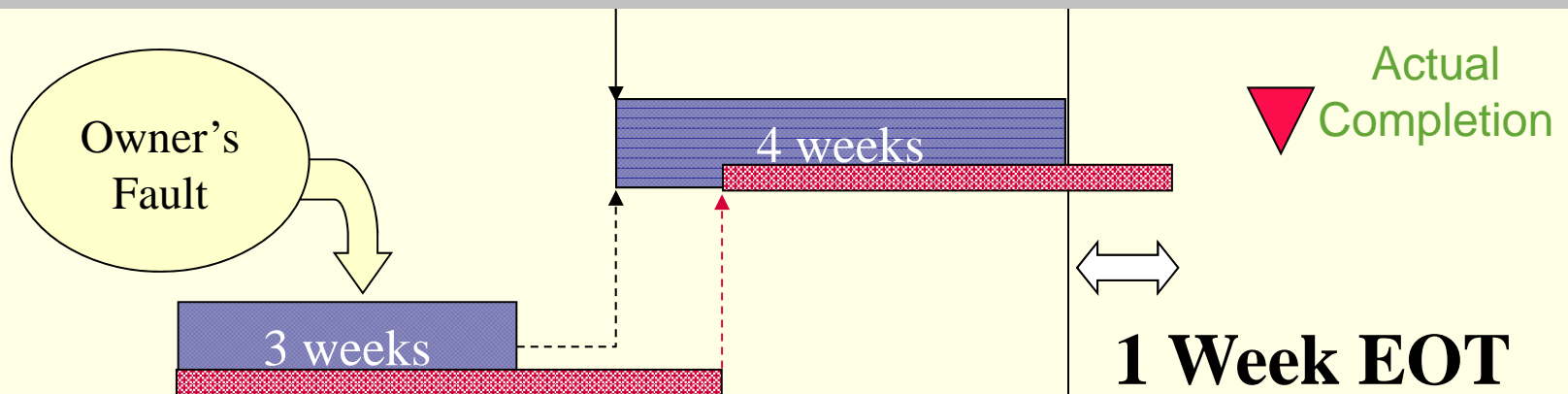


Contract Completion Date



Contract Completion Date

EFFECT OF THE OWNER'S FAULT

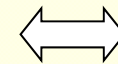


Contract Completion Date

Contractor's Fault

4 weeks

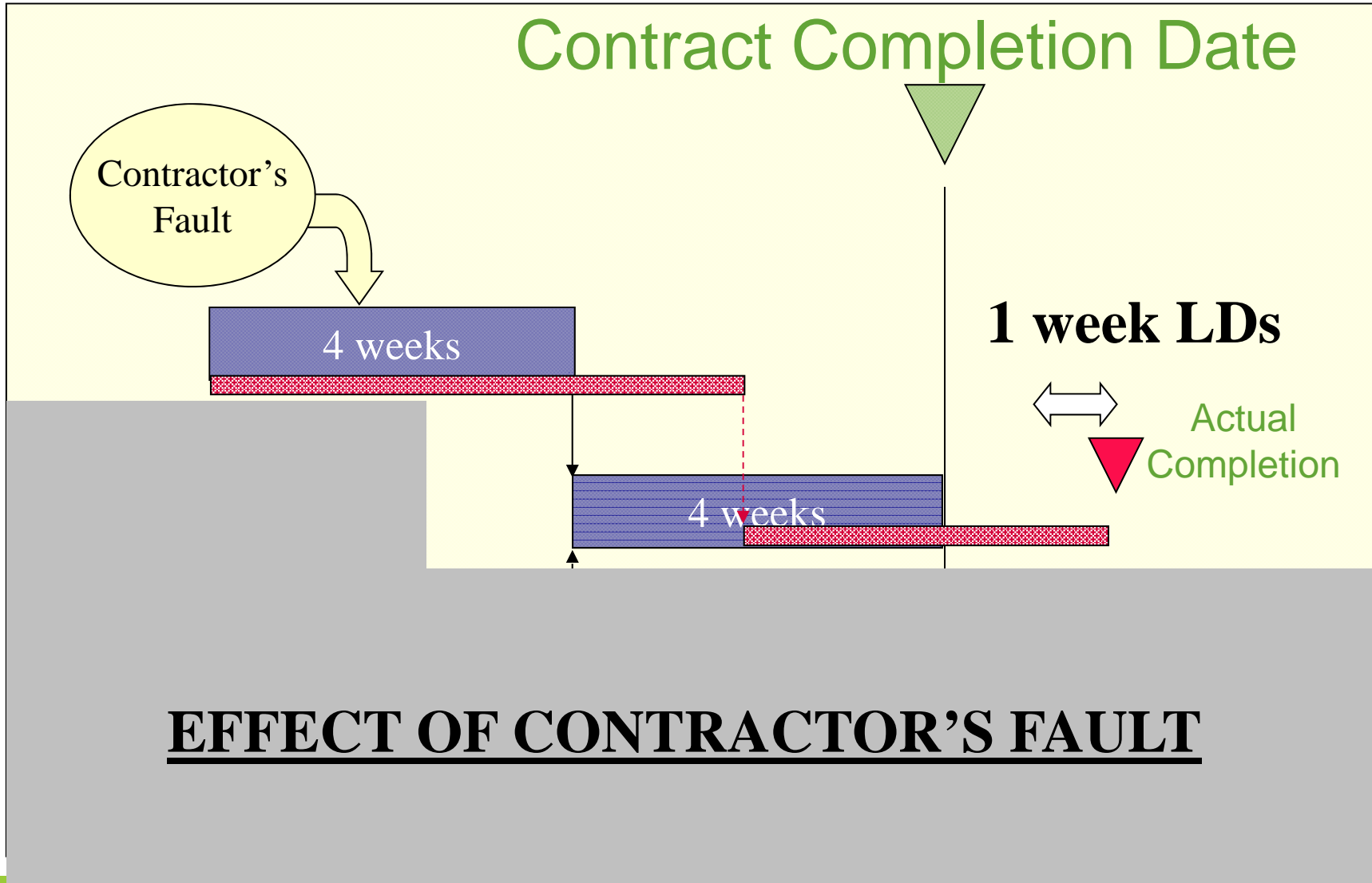
1 week LDs



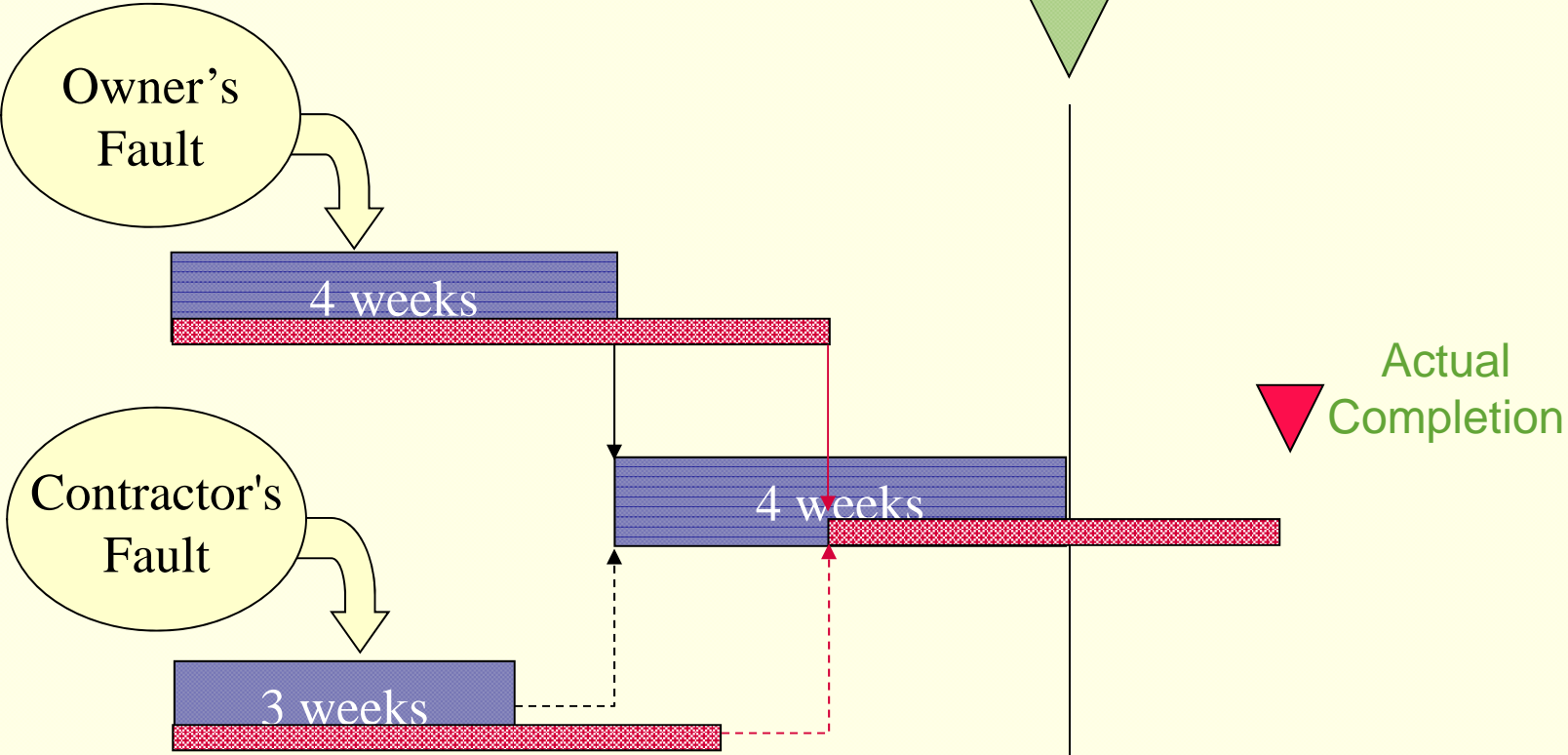
Actual Completion

4 weeks

EFFECT OF CONTRACTOR'S FAULT



Contract Completion Date



Contract Completion Date

Owner's Fault

4 weeks

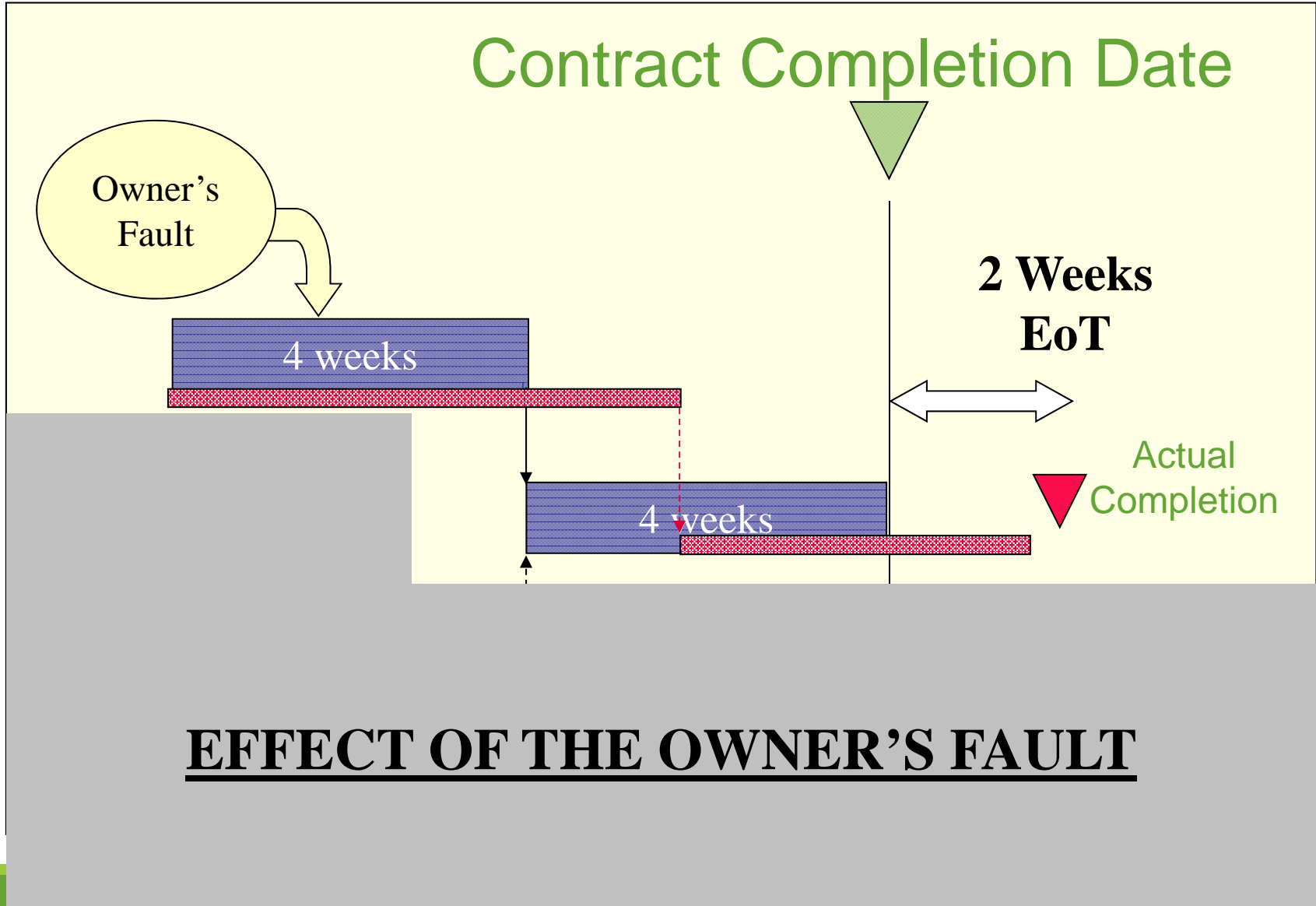
4 weeks

4 weeks

2 Weeks
EoT

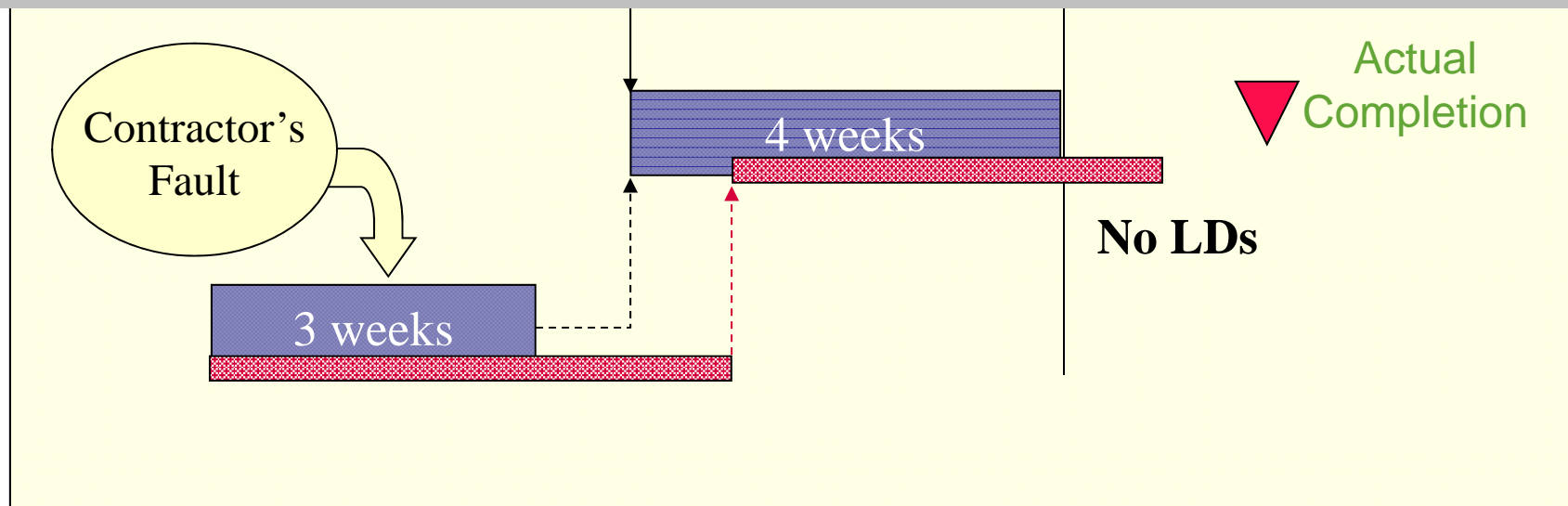
Actual
Completion

EFFECT OF THE OWNER'S FAULT



Contract Completion Date

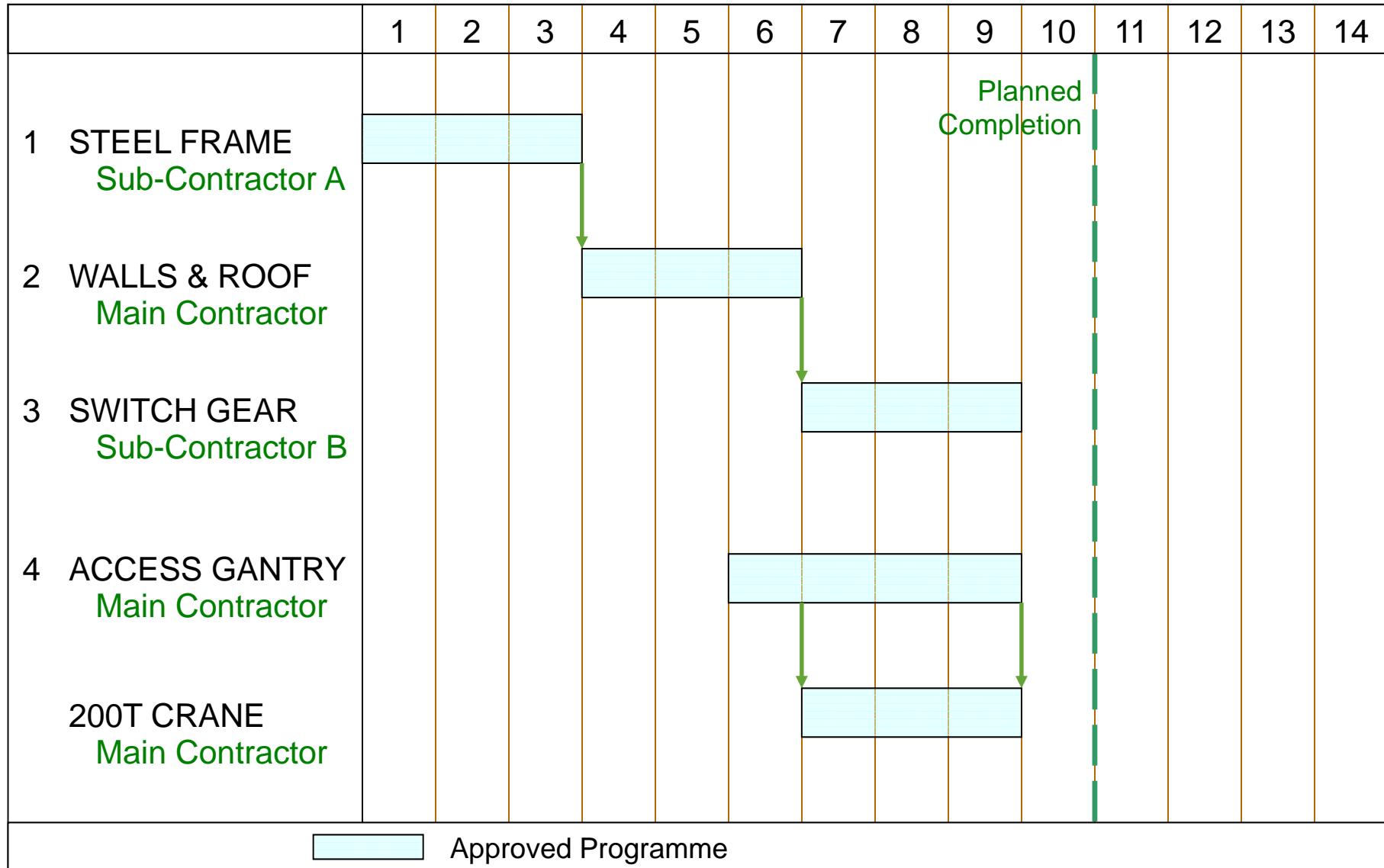
EFFECT OF CONTRACTOR'S FAULT



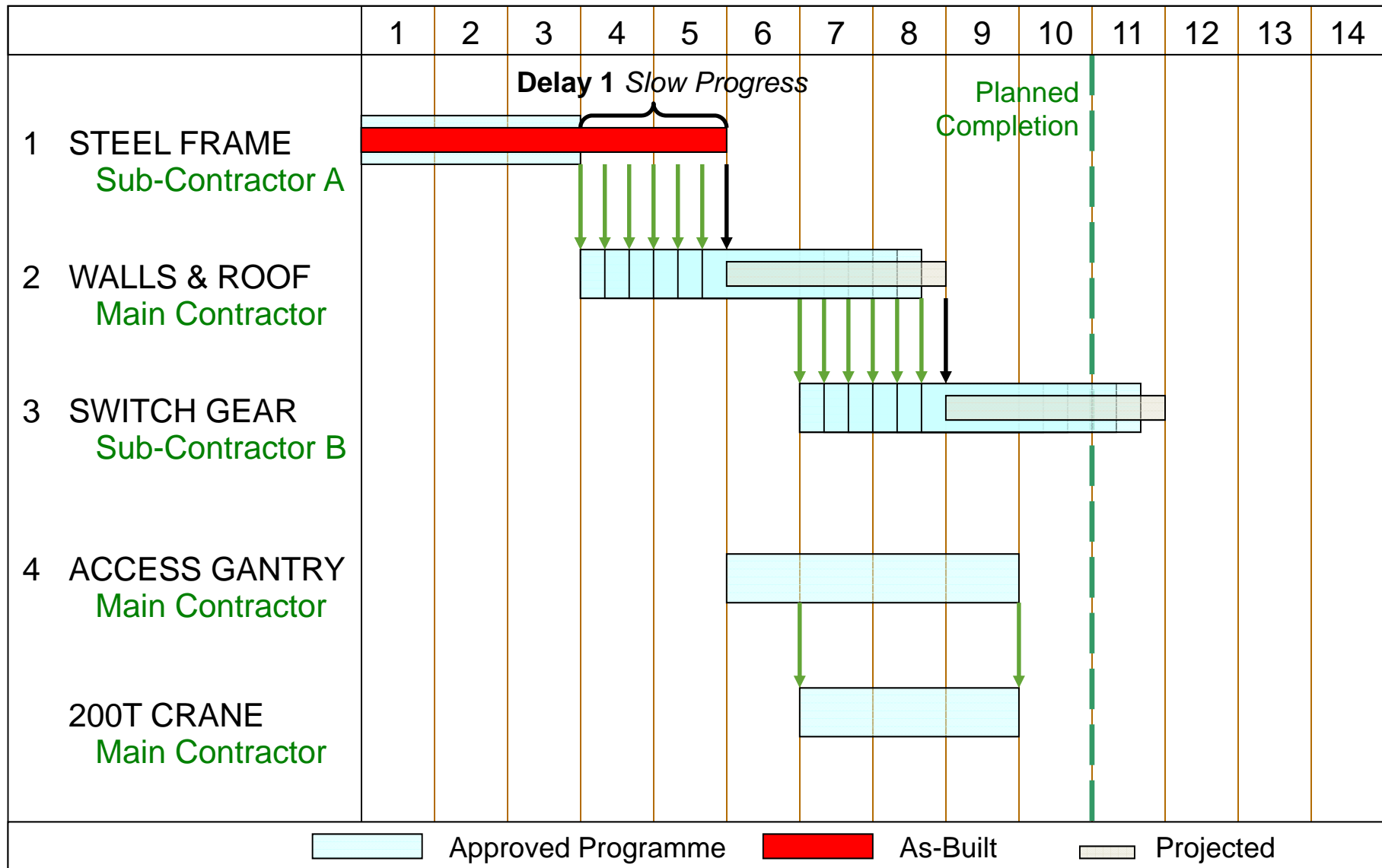
Win a Prize!



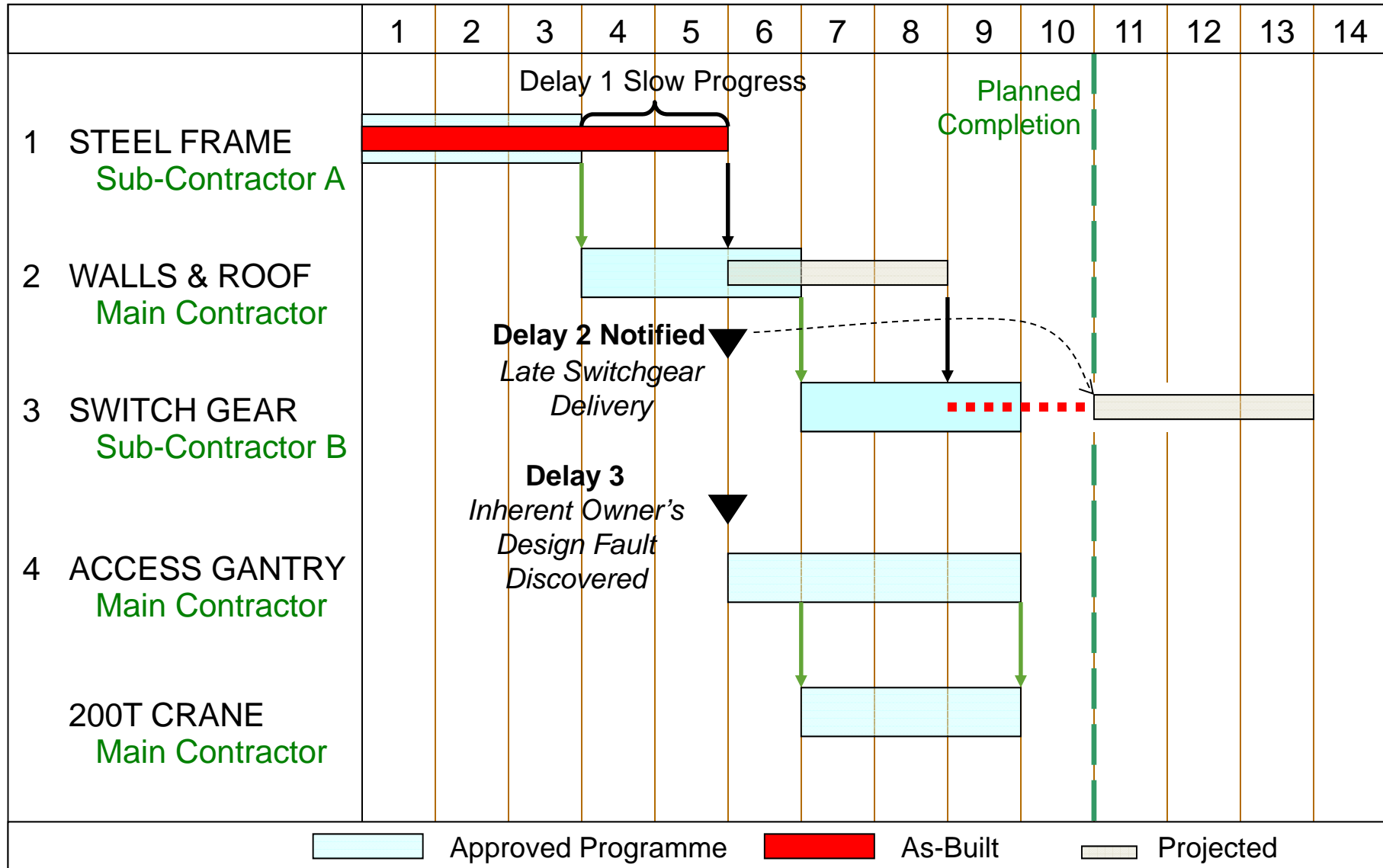
The Switch Room



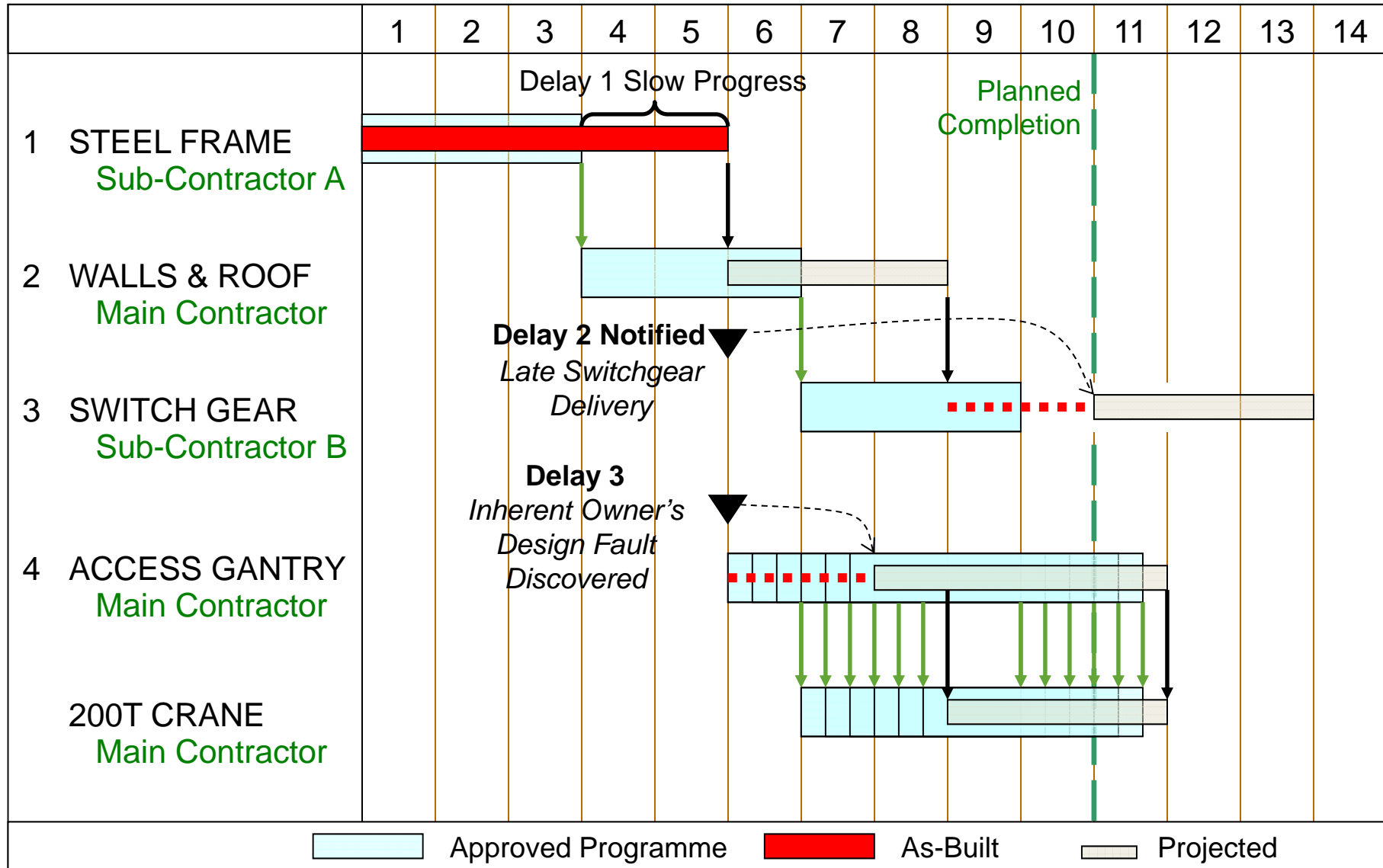
The Switch Room



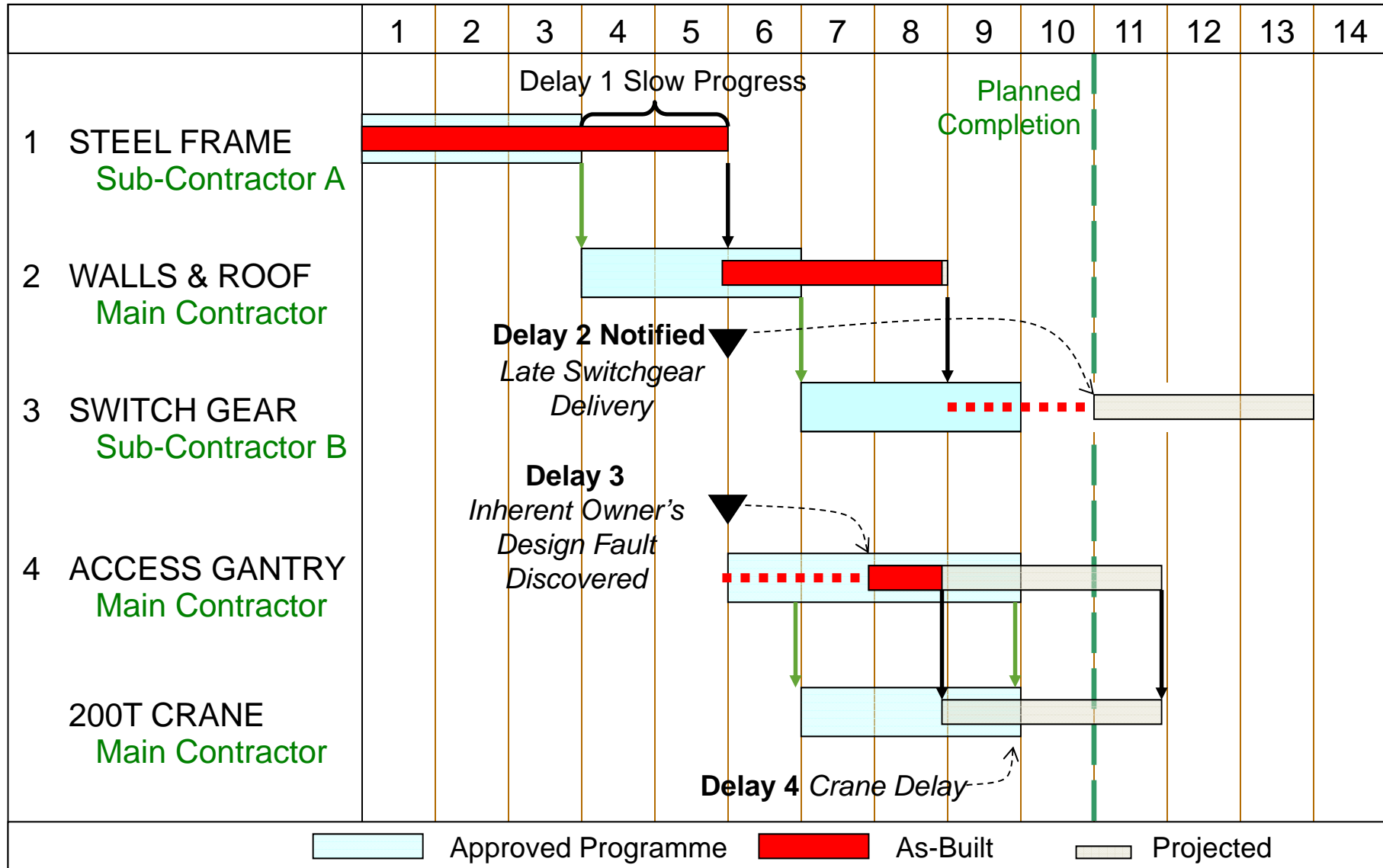
The Switch Room



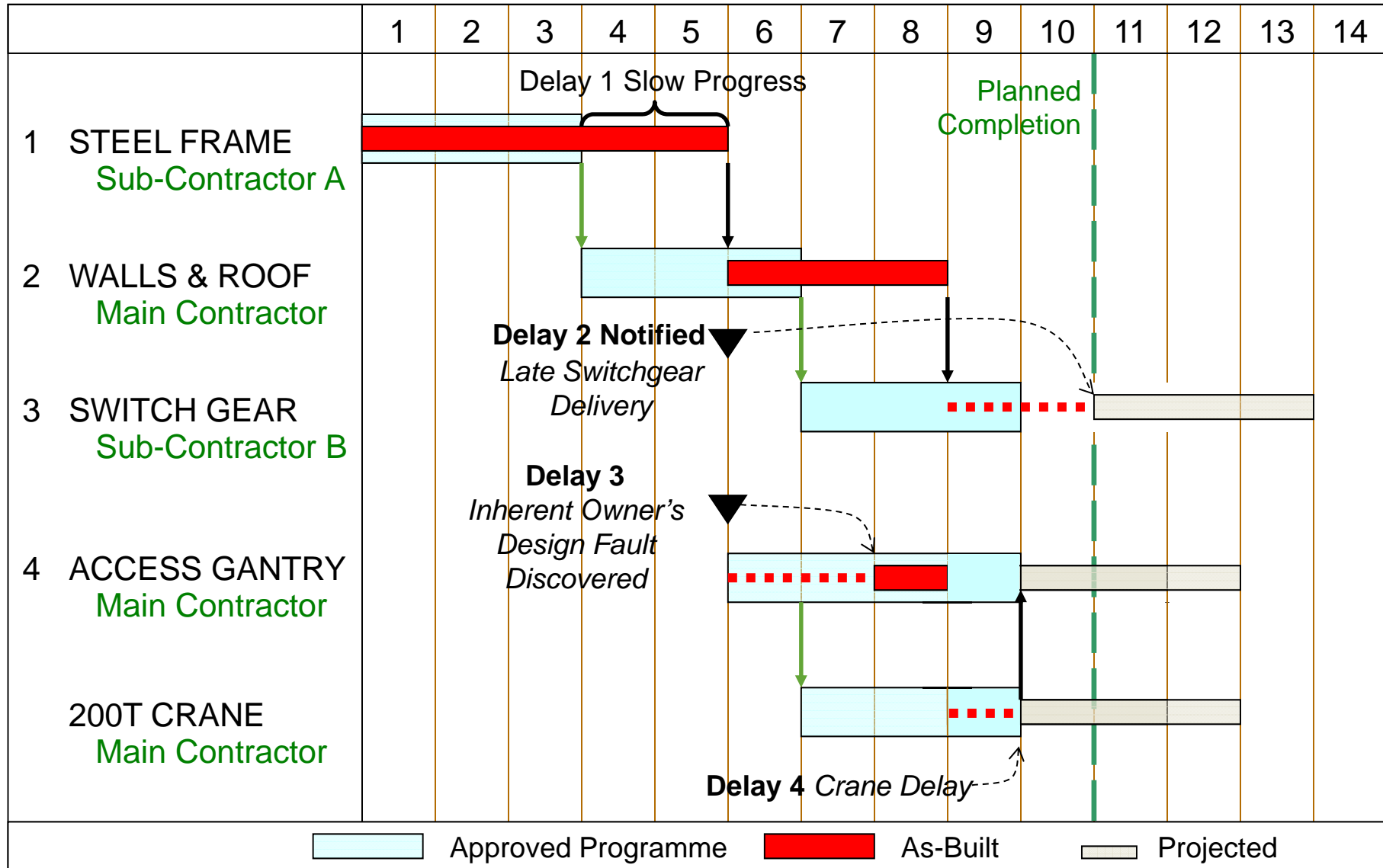
The Switch Room



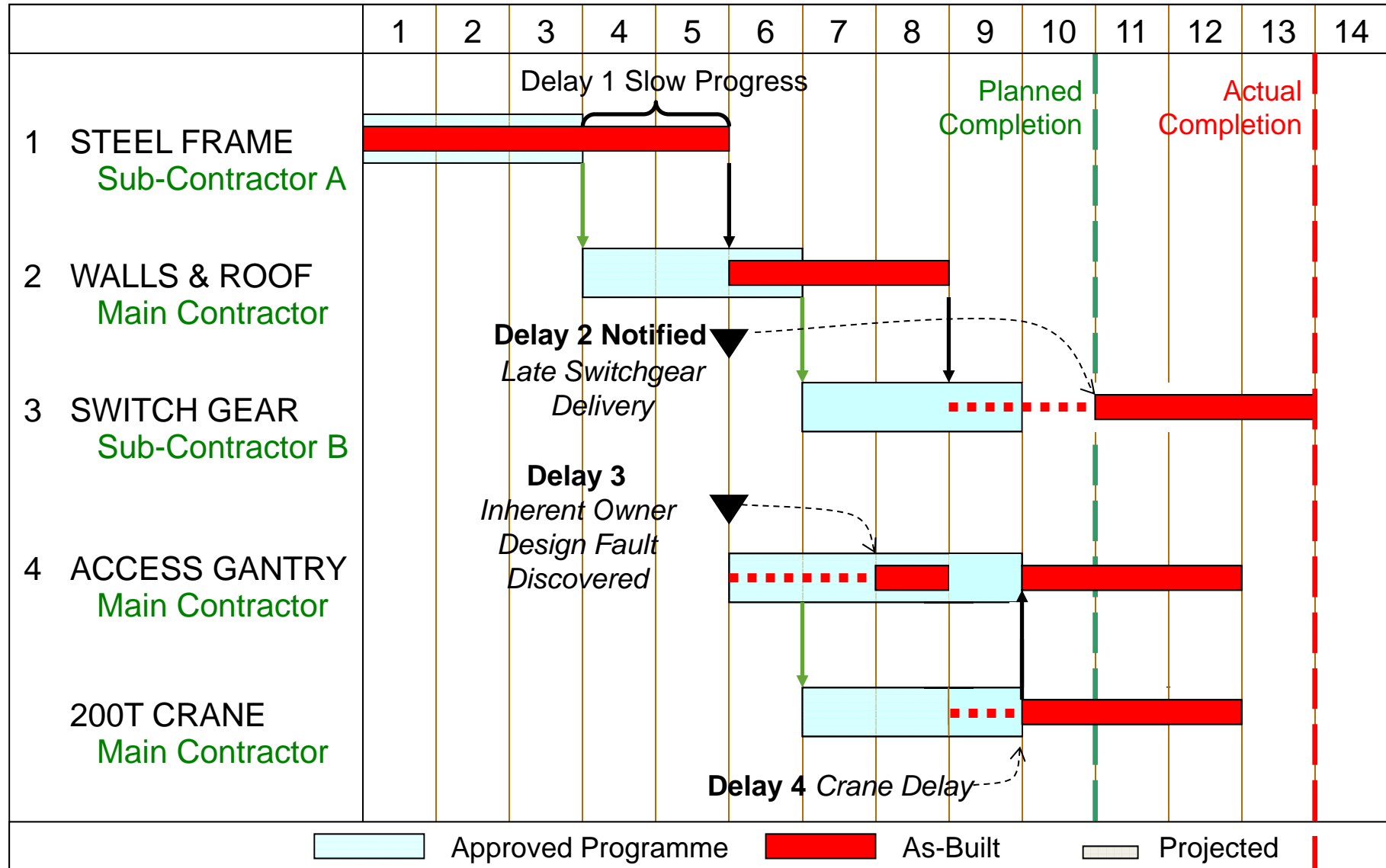
The Switch Room



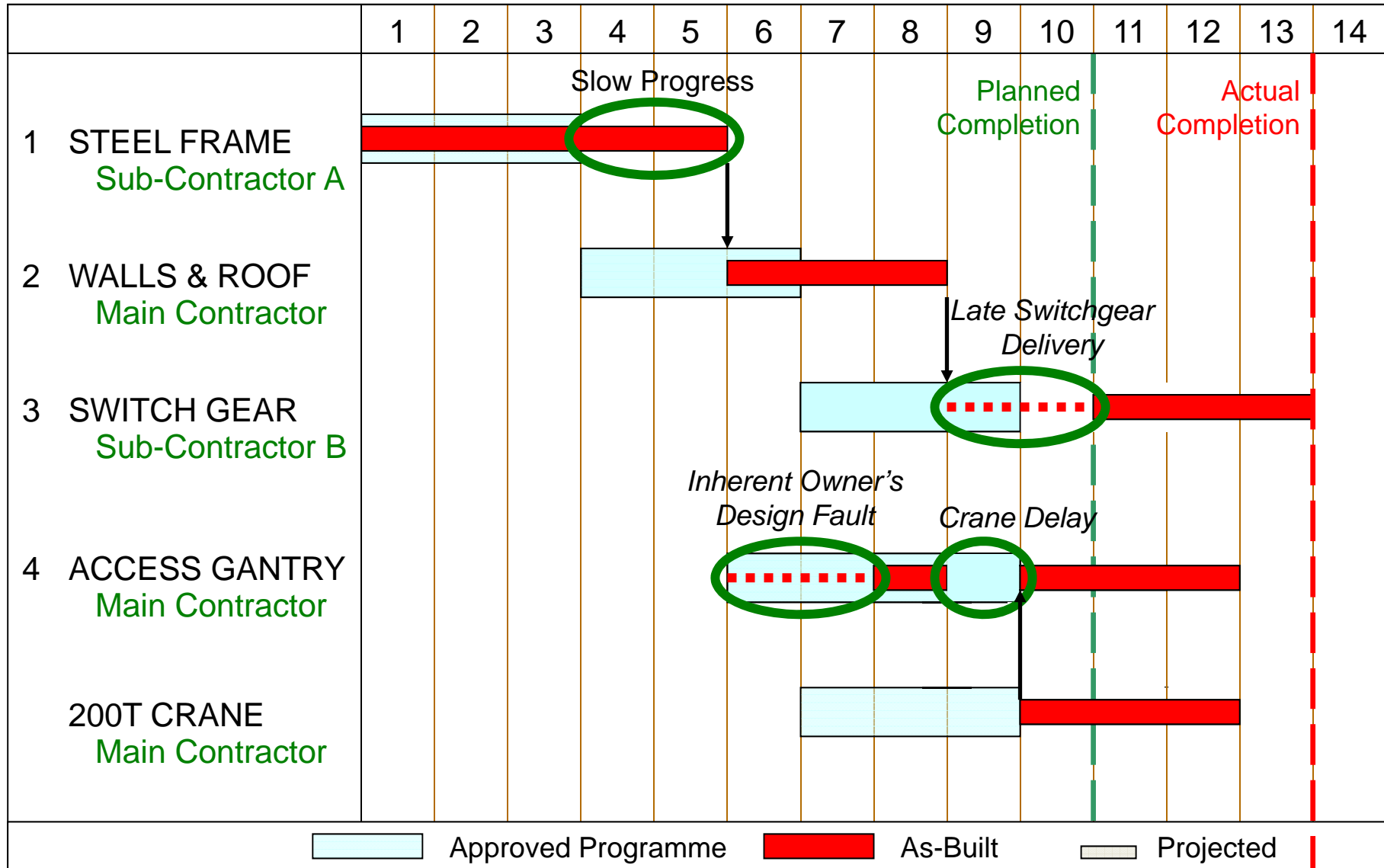
The Switch Room



The Switch Room



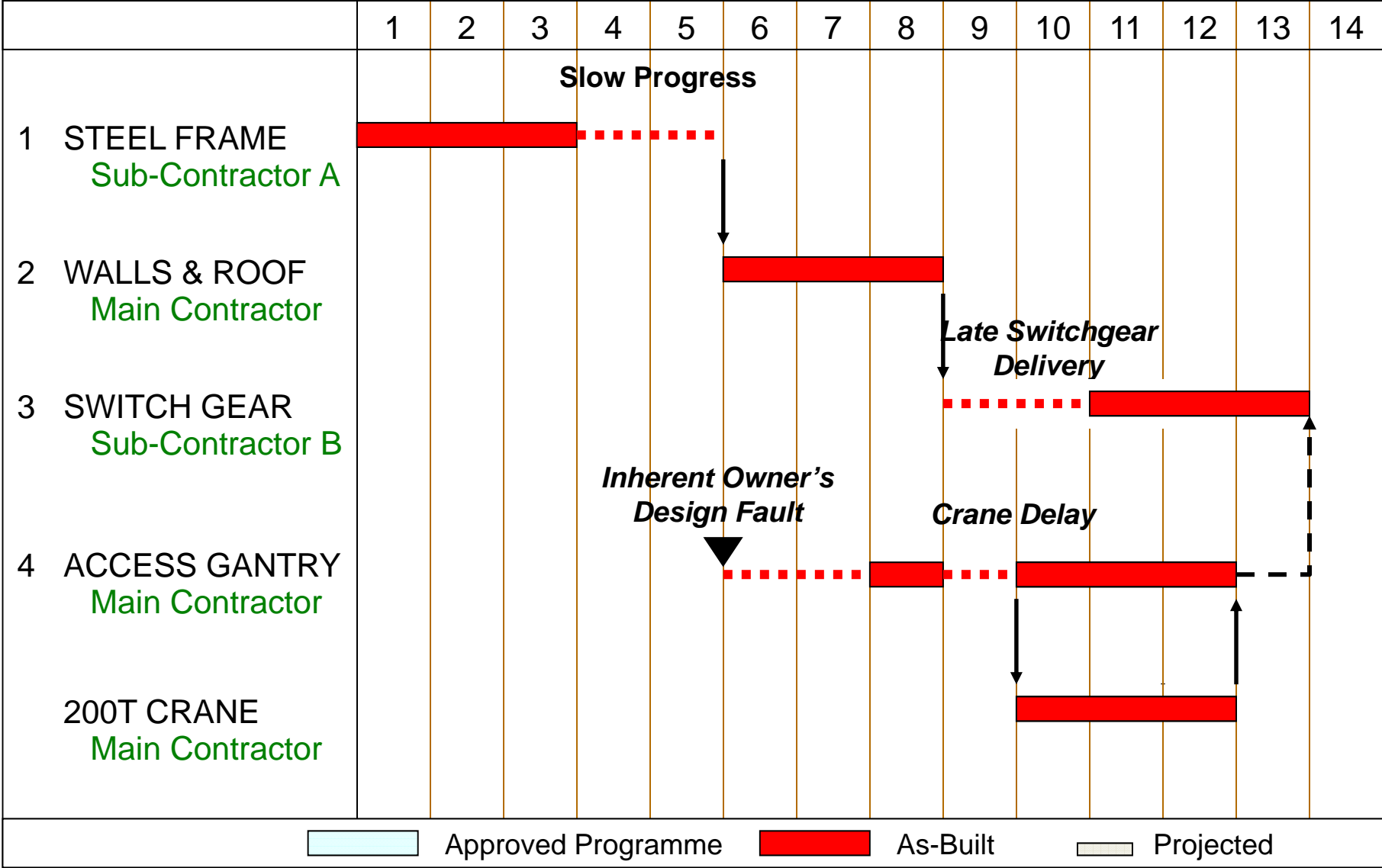
The Switch Room



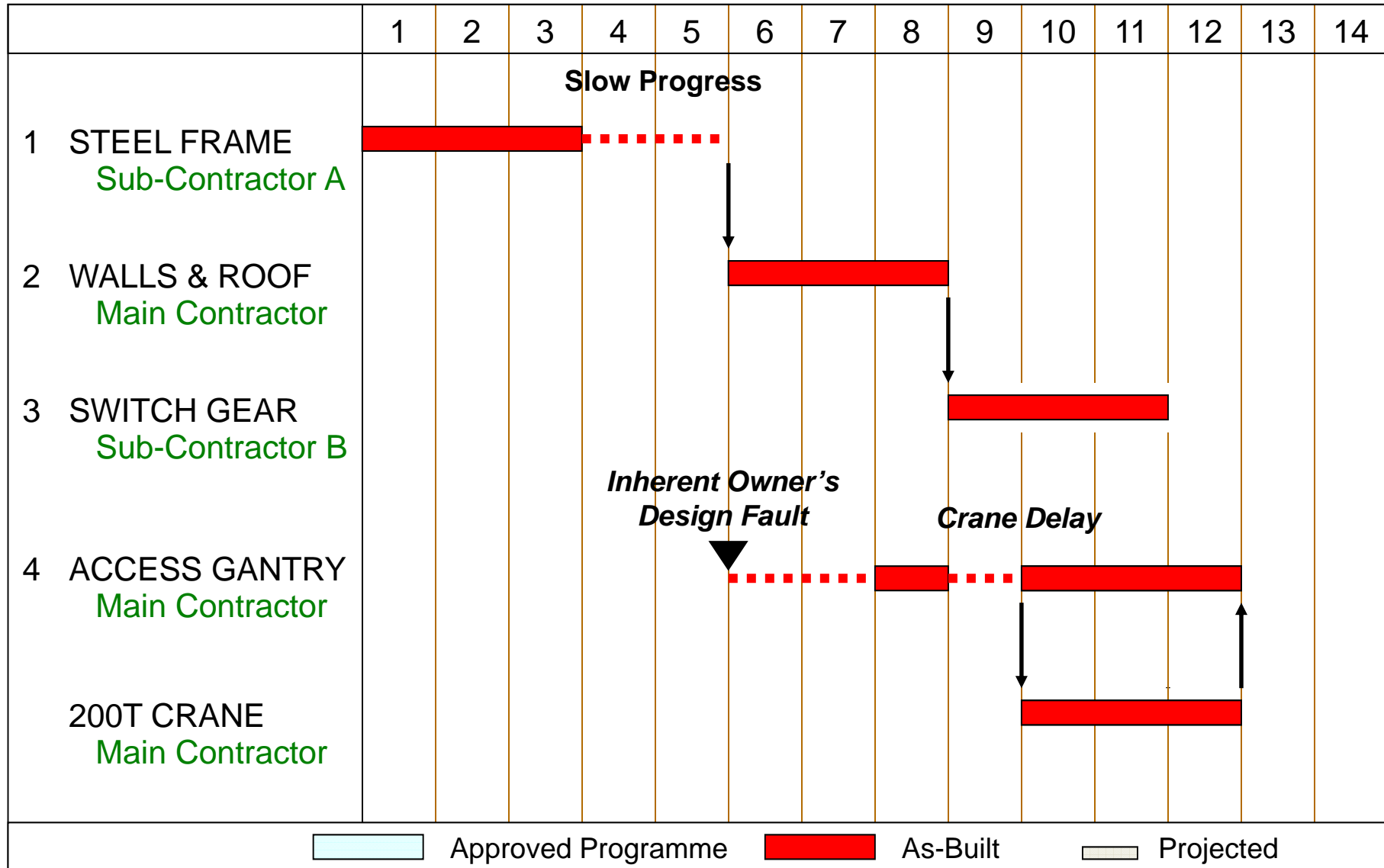
**WHO IS RESPONSIBLE FOR
THE DELAY?**



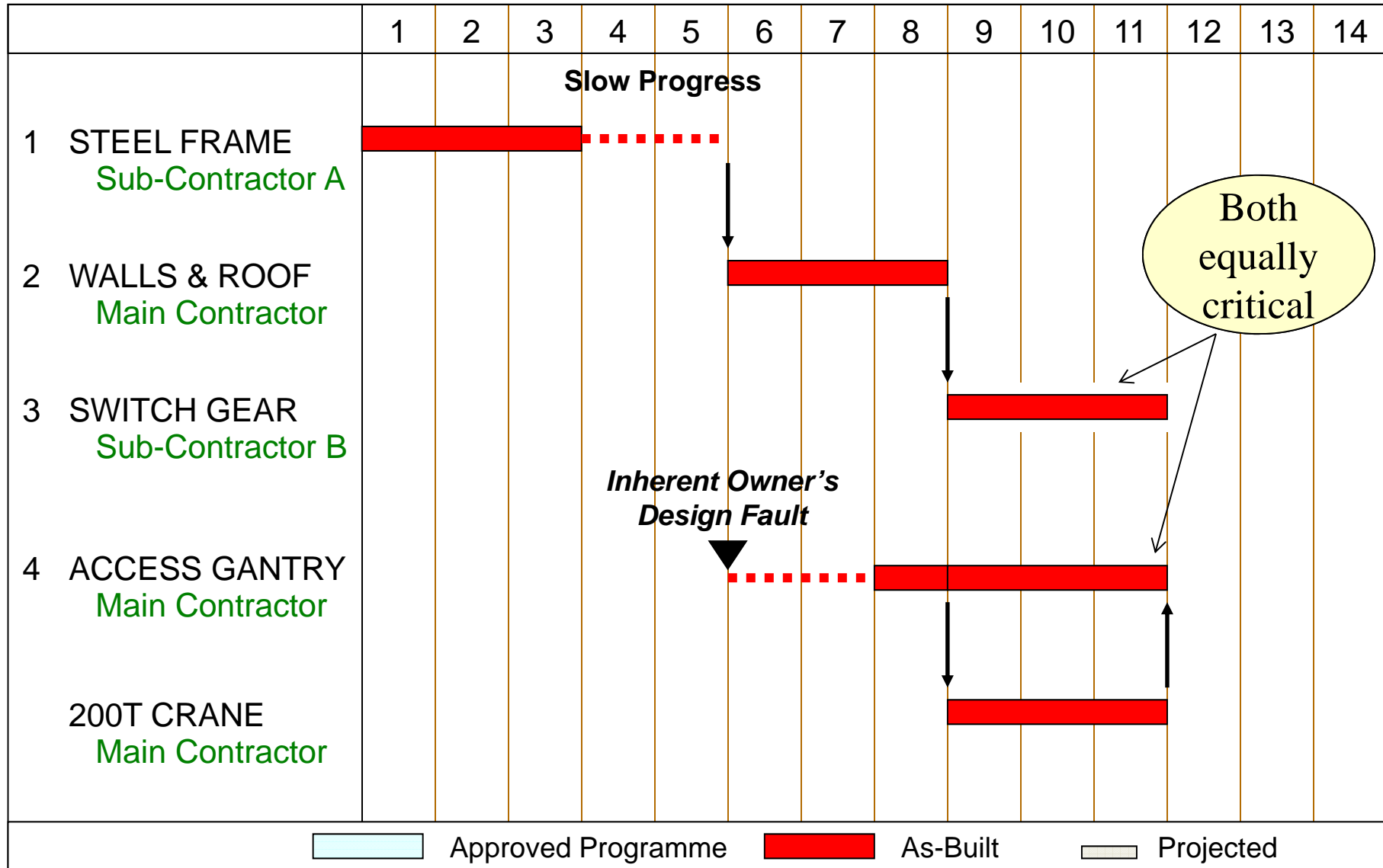
Collapsed As-Built Method



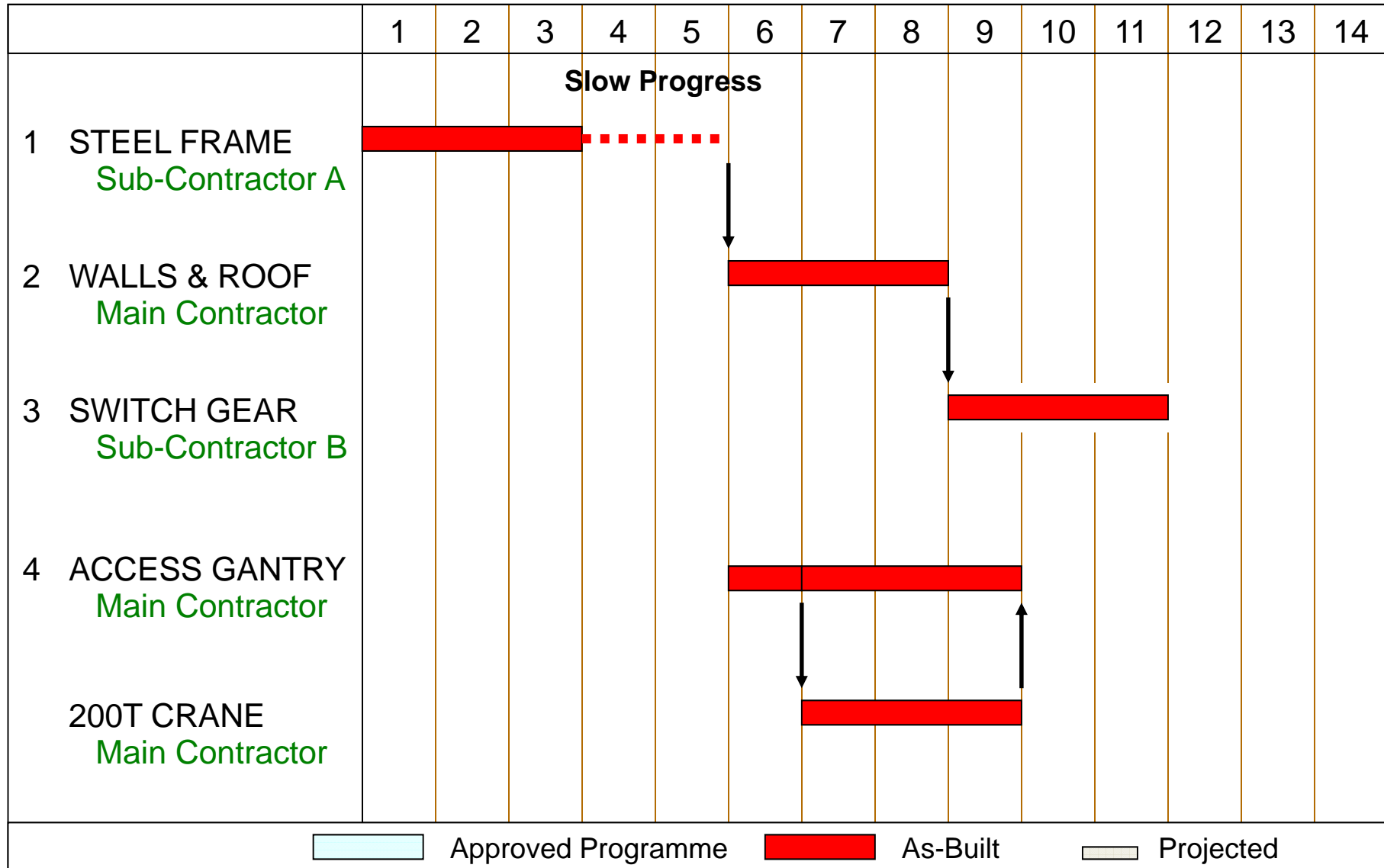
Collapsed As-Built Method



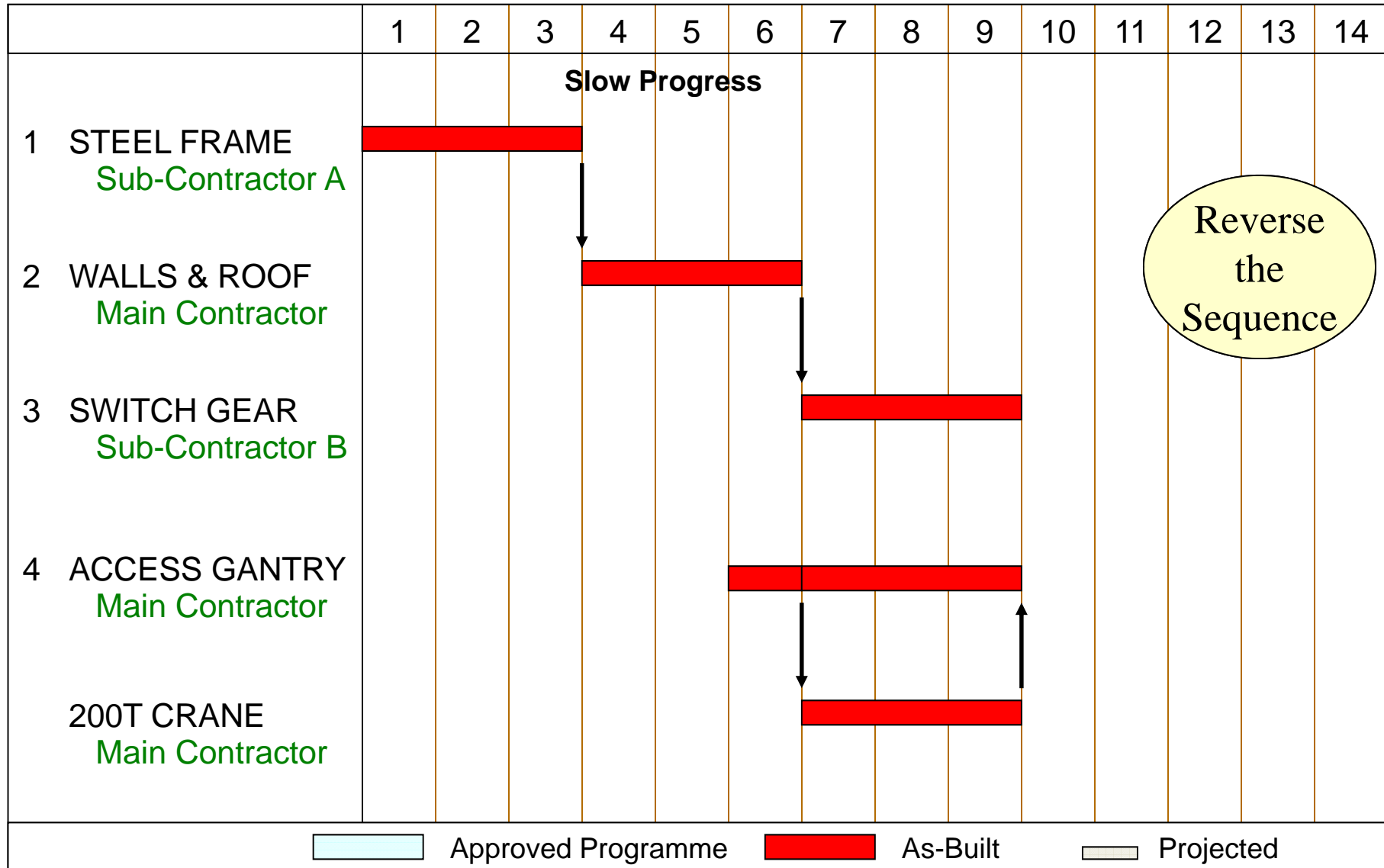
Collapsed As-Built Method



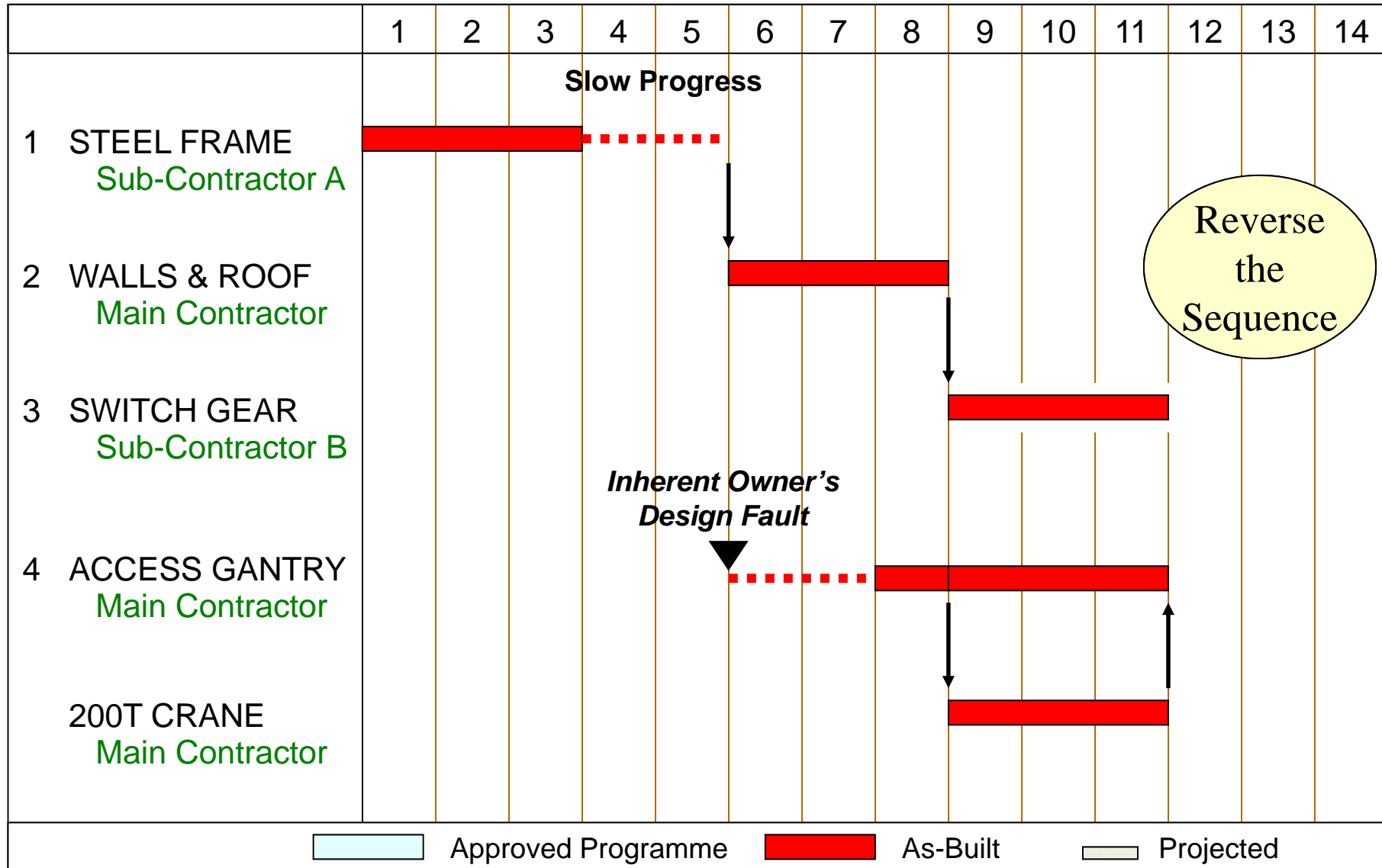
Collapsed As-Built Method



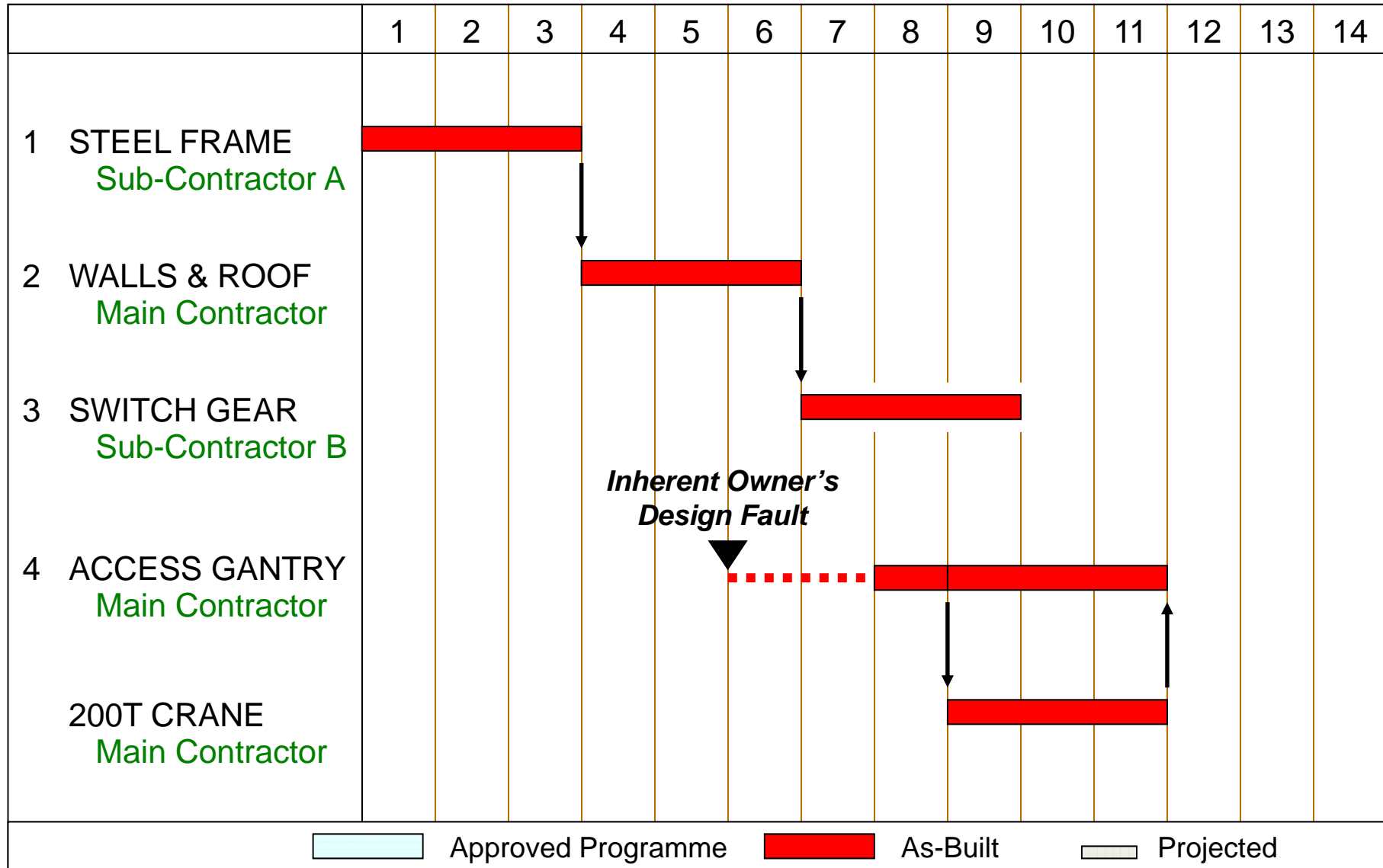
Collapsed As-Built Method



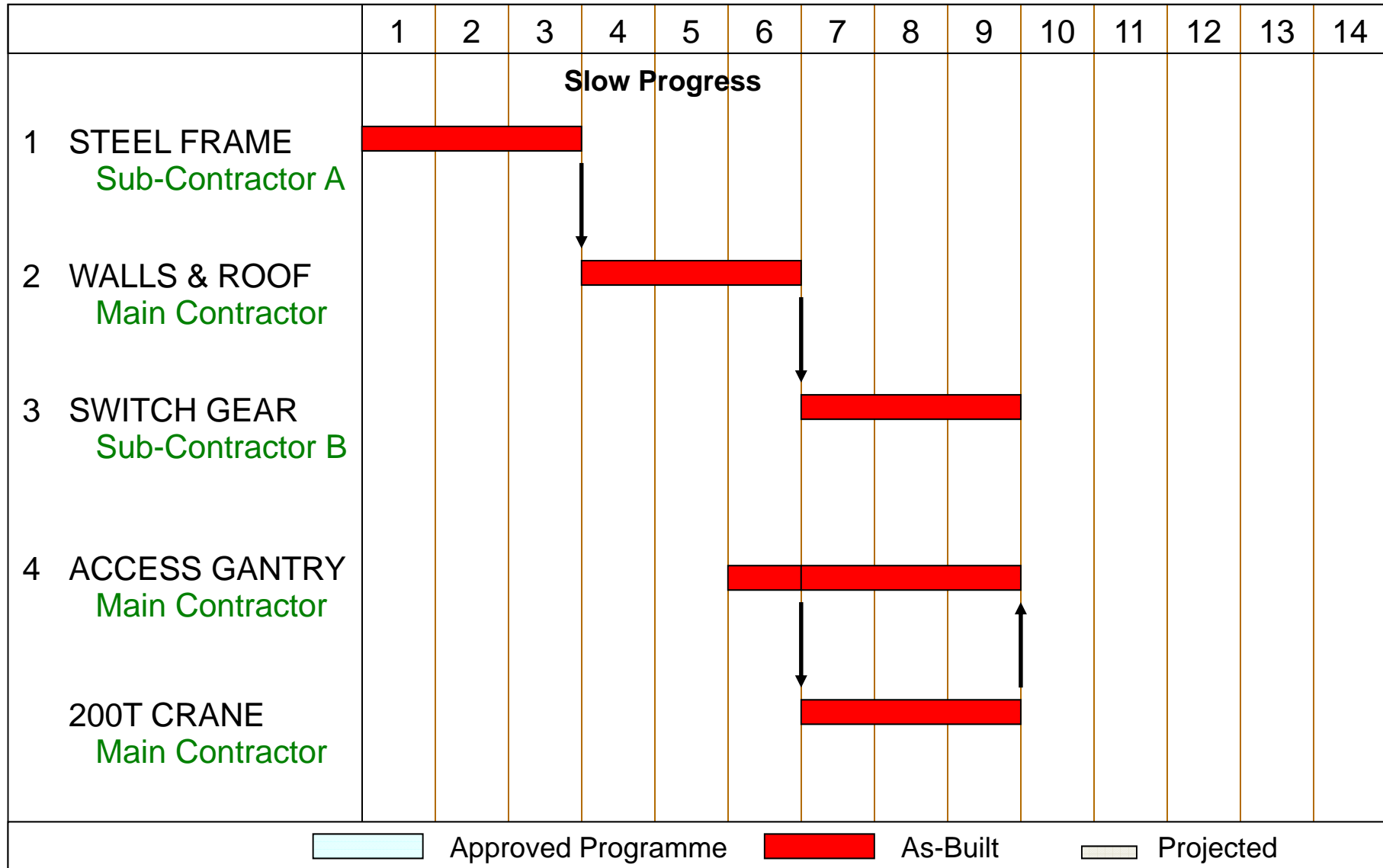
Collapsed As-Built Method



Collapsed As-Built Method

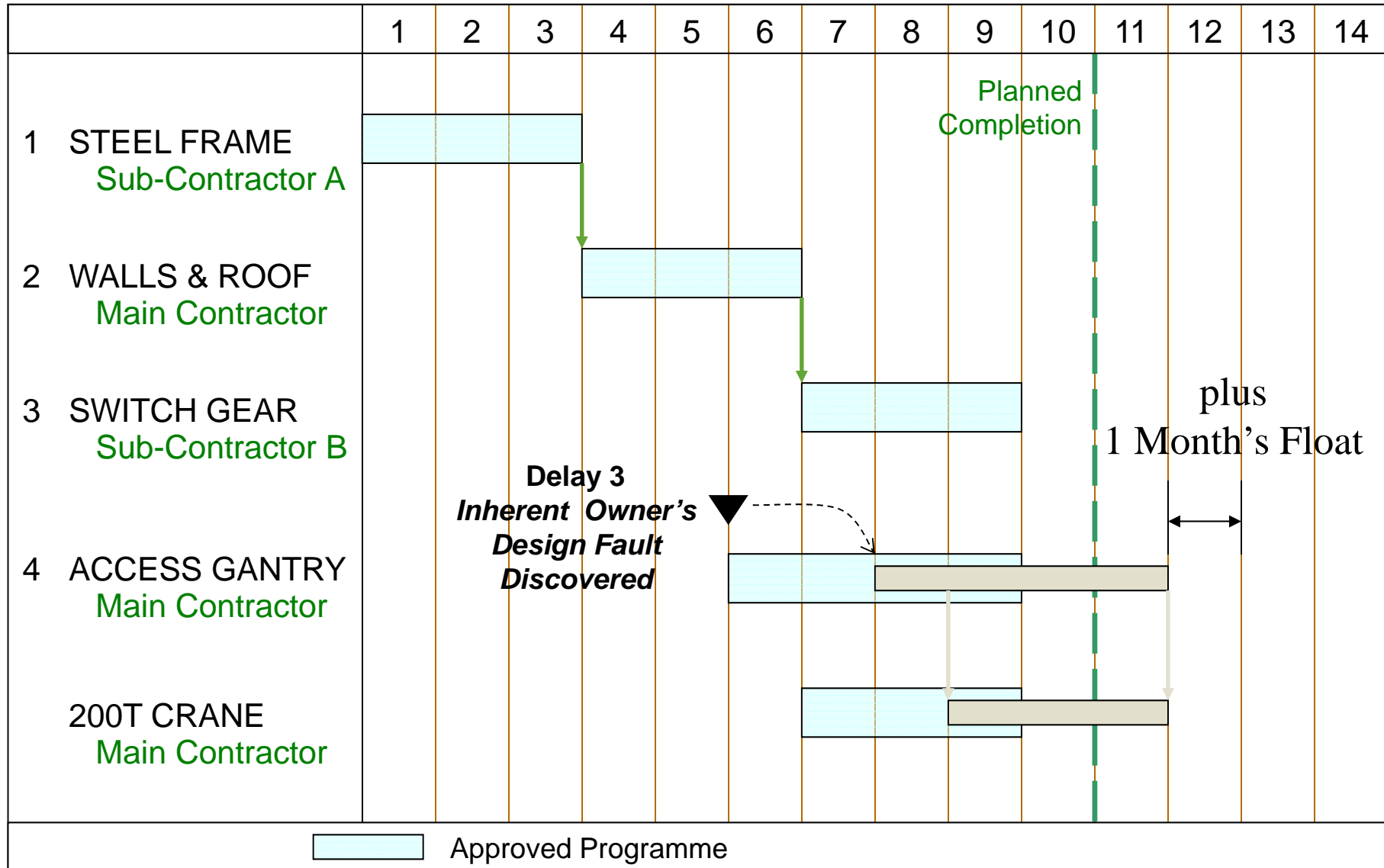


Collapsed As-Built Method

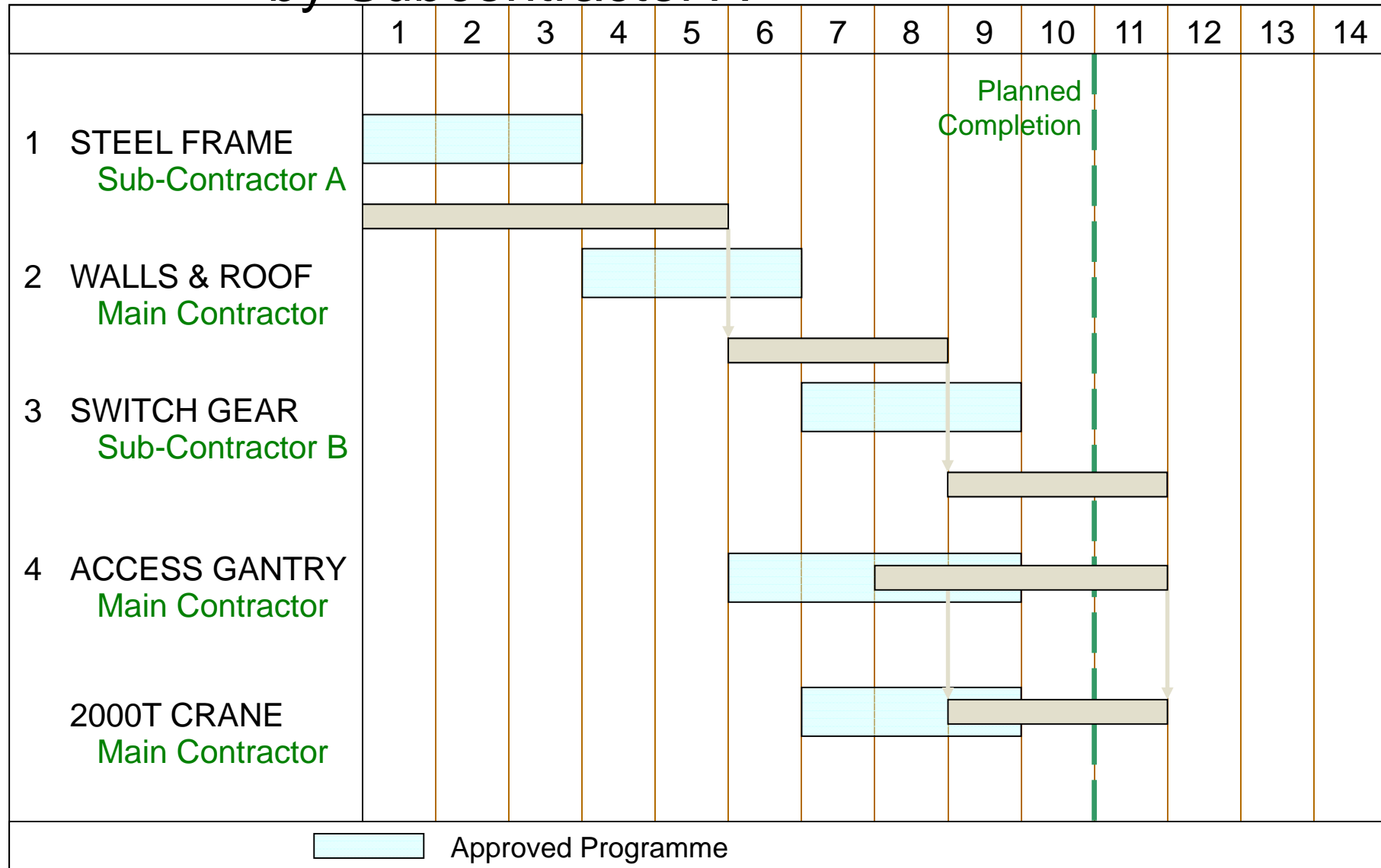


Owner's Liability for Week 11 & 12

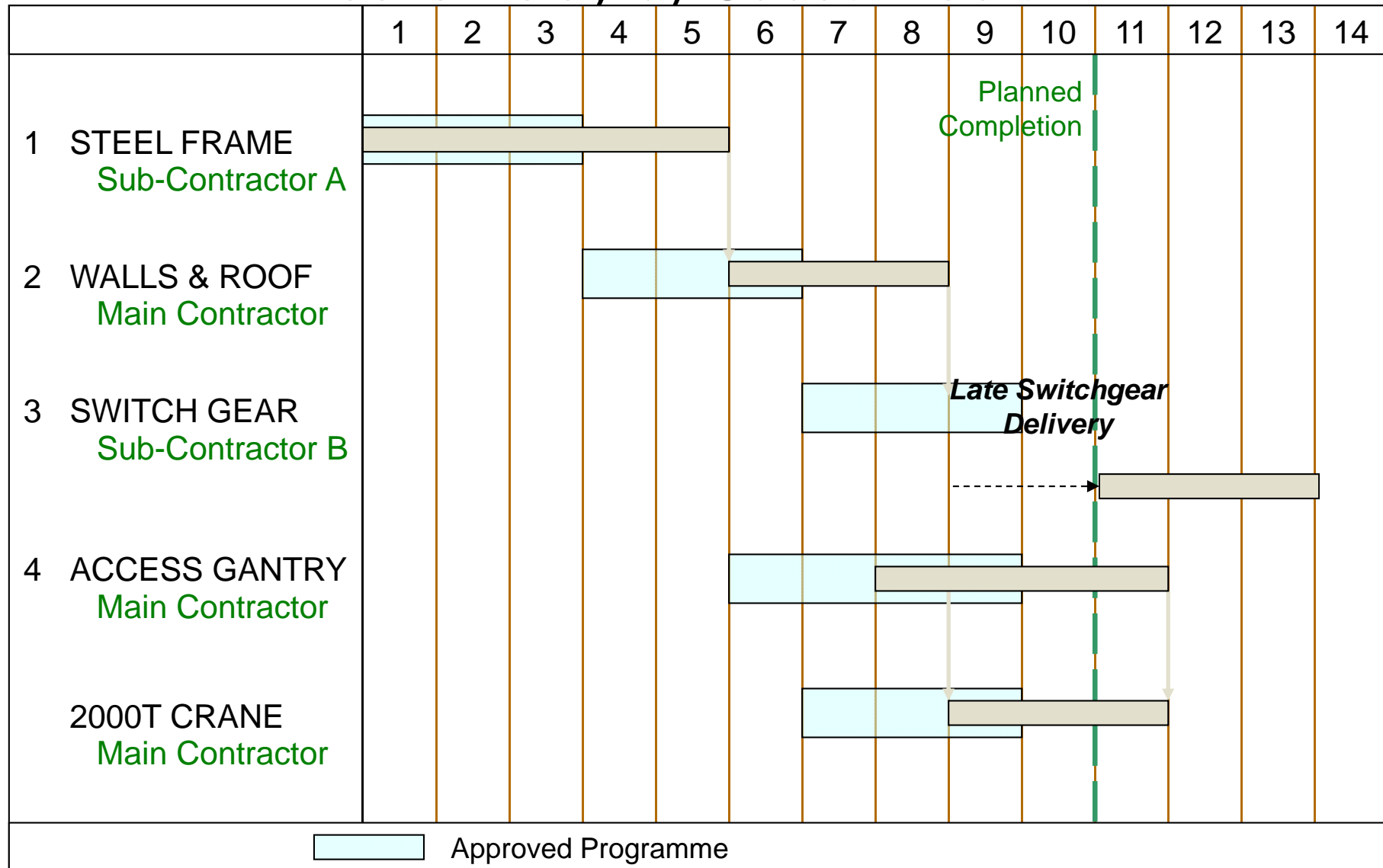
- As-Planned Impact Method



Concurrency - No Critical Delay by Subcontractor A



Dominant Delay – 2 Weeks Delay by Subcontractor B



Which do you think?

<u>Answer 1</u> Month 11 - Subcontractor A Month 12 - Subcontractor B Month 13 - Subcontractor B	<u>Answer 2</u> Month 11 – Main Contractor Month 12 - Subcontractor B Month 13 - Subcontractor B
<u>Answer 3</u> Month 11 - Owner Month 12 - Subcontractor B Month 13 - Subcontractor B	<u>Answer 4</u> Month 11 – Owner Month 12 – Owner Month 13 - Subcontractor B



**ANY
QUESTIONS?**



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