

COURSE 850

EXTENSION OF TIME REQUESTS

Course ID 2412-PMP927

COURSE AGENDA

- ☐ **Technical Session 08:30 - 10:00 am**
- ☐ **Break 10:00 - 10:15 am**
- ☐ **Technical Session 10:15 - 12:00 noon**
- ☐ **Break 12:00 - 12:15 pm**
- ☐ **Technical Session 12:15 - 02:30 pm**
- ☐ **Lunch 02:30 - 03:45 pm**

Welcome...



❑ Ground rules

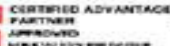
- We should all be on time
- The mobile telephones should be switched off
- The class room is non-smoking area
- Attendance sheet must be signed daily
- *Session relative* questions can be asked at any time



❑ Time: 8:30 am until 4:45 pm

❑ Toilets

❑ Fire exits



A World Without Failed Projects



WHO IS WHO?

- ☐ Who are you?
- ☐ Your designation?
- ☐ Your firm?
- ☐ What are your roles and responsibilities?
- ☐ Why you are attending this course?
- ☐ What do you expect to learn?



- ❑ **IN THIS COURSE CONTRACTUAL ASPECTS WILL BE ACCORDING TO FIDIC (INTERNATIONAL FEDERATION OF CONSULTING ENGINEERS) – CONDITIONS OF CONTRACT FOR CONSTRUCTION- 1999**

- ❑ **Delay Analysis Techniques are based on Best Practices and AACE International's Best Practices Guide**

- ❑ **Cost of Delays and Disruption Section is base on AACE International's Professional Practice Guide**

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DEFINING TIME



❑ **Baseline Schedule is:**

- The schedule that represents the Contractor's Original Plan for completing the work described by the Contract documents within the time frame specified therein
- Includes planned activities, durations and relationships, planned resources and any dates imposed by the Contract
- Submitted for the Engineer's approval, as a Contract requirement obliged by clause 8.3 of the Conditions of Contract
- Part of the Planning Process
- Represents the basis for measuring the Contractor's progress during execution of the Works



Clause 8.3 Programme

The Contractor shall submit a detailed time program to the Engineer within 28 days after receiving the notice under Sub-Clause 8.1 [Commencement of Works]. The Contractor shall also submit a revised program whenever the previous program is inconsistent with actual progress or with the Contractor's obligations.

Each program shall include:

- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing,**
- (b) each of these stages for work by each nominated Subcontractor (as defined in Clause 5 [Nominated Subcontractors])**
- (c) the sequence and timing of inspections and tests specified in the Contract, and**
- (d) a supporting report which includes:**
 - (i) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and**
 - (ii) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.**

Clause 8.3 Programme

Unless the Engineer, within 21 days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Employer's Personnel shall be entitled to rely upon the programme when planning their activities.

The Contractor shall promptly give notice to the Engineer of specific probable future events or circumstances which may adversely affect the work, increase the Contract Price or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances, and/or a proposal under Sub-Clause 13.3 [Variation Procedure].

If, at any time, the Engineer gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Engineer in accordance with this Sub-Clause.

Sample Specifications For Project Schedules

TECHNICAL SUBMISSION GENERAL SPECIFICATIONS

1. GENERAL

The Contractor shall submit to the Engineer, the Program of Works and Schedule in accordance with the Project Planning and Control System specifications listed below. The Contractor shall attend meetings with the Engineer and other parties concerned in order to review schedule and program of works.

2. PROJECT PLANNING and CONTROL SYSTEM

Contractor shall employ, full-time on site PROJECT PLANNING CONTROL STAFF (Managers and Planners). Contractor's personnel shall be thoroughly experienced (minimum of 10 years) in preparing work program and schedules, and shall have expertise of not less than 5 years in using Primavera Project Management and Primavera Contract Manager software (latest version).

Contractor shall also provide adequate number of incremental license(s) of Primavera Project Management (Project Manager), Contract Manager (Expedition), and Primavera Web to be linked to the Client Database, and shall also provide hardware's on site(s) such as; high speed internet access (of at least 2 MB), computers, and auxiliary devices including but not limited to; printer, scanner and others, for communication and reporting purposes.

3. PROGRAMME METHODOLOGY

Use latest version of Primavera Project Management (Project Manager) and Primavera Web Scheduling software for preparation and updating project schedule and cost. Use Primavera Contract Manager (Expedition) as contract document control software to track Correspondences, Drawings, Submittals, Material & Equipment Procurement, Daily Reports, Transmittals, Minutes of Meetings, Bill of Quantities, Proposals, Requests for Inspection, Request for Clarification, Change Orders, Invoices, Payment Requisitions and Snag Lists, etc. The Primavera Contract Manager shall be linked to the Primavera Project Management Schedule.

Work Breakdown Structure (WBS), Cost Breakdown Structure (CBS), Resource Breakdown Structure (RBS) and Activity/Cost Codes must be approved by the Engineer.

The level of schedule development (not less than Level 4 – Work Package Level) and details, shall be sufficient to enable the Engineer's ease in monitoring

the Contractors Project Management Plan with regard to the works of other Contractors and the obtaining of necessary approvals from the relevant local authorities.

Contractor shall use the standard forms and reports to be provided by the Client, and also provide all the calculations, reports, forecast, supporting documents and detailed list of assumptions and constraints made in the development of the work program.

TECHNICAL SUBMISSION GENERAL SPECIFICATIONS

4. PROGRAMME PREPARATION

DETAILED SCHEDULE

Contractor shall submit Detailed Work Schedule incorporating the Final BOQ and the Design Phase interface (if applicable), so as to clearly convey the extent of the scope of work.

The Schedule dates (duration) shall be calendar dates (duration) taking into consideration the Holidays and Non-Working days as per the local Labor Law. No activity shall have duration exceeding 25 days except for procurement activities. The work schedule shall be resource and cost loaded program.

Use the Retained Logic Option in calculating the schedule, FLOAT is an asset of the project and NOT for the exclusive use/benefit of the Contractor.

As minimum, Activities shall cover following categories:

- Mobilization, and Securing of Permits
- Engineering (Submittals and approval of Shop drawings, Material, Subcontractors and documents)- This to be integrated with the Submittal Log in Primavera Contract Manager (Expedition)
- Procurement of Equipment and Materials - This to be integrated with the Submittal Log in Primavera Contract Manager (Expedition)
- Temporary and Permanent Construction
- Testing and Commissioning (Preliminary and Final)
- Final Inspection and Handing Over
- Activities for other Contractors and Subcontractors including but not limited to site possession and access, and in which affect progress or completion date of all or part of the Works
- All activities of the Engineer which affect progress or completion date of all or part of the Works including but not limited to review and approval, etc
- Utility Notification, Relocation and Shutdown(s), if applicable

- Work Items of other Approving Authorities such as but not limited to Road Opening/Closure and Plant Certifications, which may affect or be affected by Contractor's activities.
- As built Drawings

RECOVERY PROGRAMME

In the event of substantial schedule slippage or out of sequence of works relative to the accepted Baseline Program, the Contractor shall submit Recovery Program, when necessary or as required by the Engineer. The Recovery Program shall identify which activities and milestones that are affected and demonstrate how the Contractor plans to recover his present delays. As the Recovery Program does not constitute an accepted revised baseline, the Contractor shall continue to report his progress against the accepted baseline program.

TECHNICAL SUBMISSION GENERAL SPECIFICATIONS

5. REVIEW and SUBMITTALS

Within 14 days after acceptance of Tender, Contractor shall submit the Detailed Construction (and/or Design) Work Schedule, Method Statement, and Cash Flow Statement to Engineer for review and approval.

Contractor shall submit also 90-Days Look Ahead Schedule within 14 days from receipt of Notice to Proceed and/or required by the Engineer.

The Engineer shall review within fourteen working (14) days the schedules and shall conduct a joint review for evaluation of logic network and assumptions made in the schedule development.

Within 14 days of receipt of comments, Contractor shall incorporate the comments and submit the revised schedule of the Engineer for approval.

Once approved this Baseline Schedule shall be the Clause 14 – Program. No changes to Baseline Schedule are permitted without complying to schedule revision requirements described in Section 6.2 below.

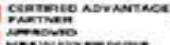
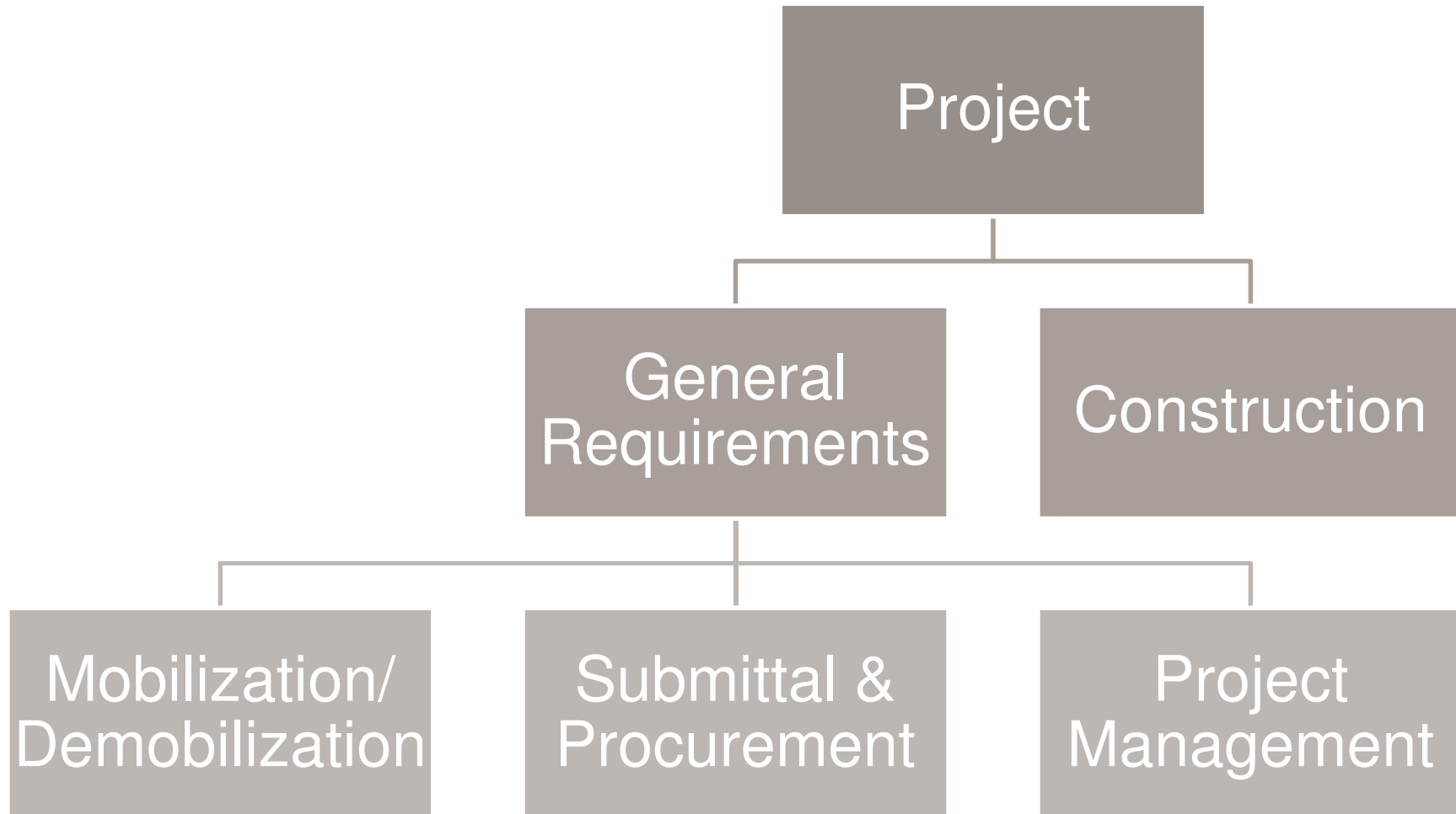
Submittals that are incomplete (both in form and contents) shall be returned to the Contractor without review and shall be held responsible for consequent delay.

6. UPDATING, REVISION and EXTENSION OF TIME

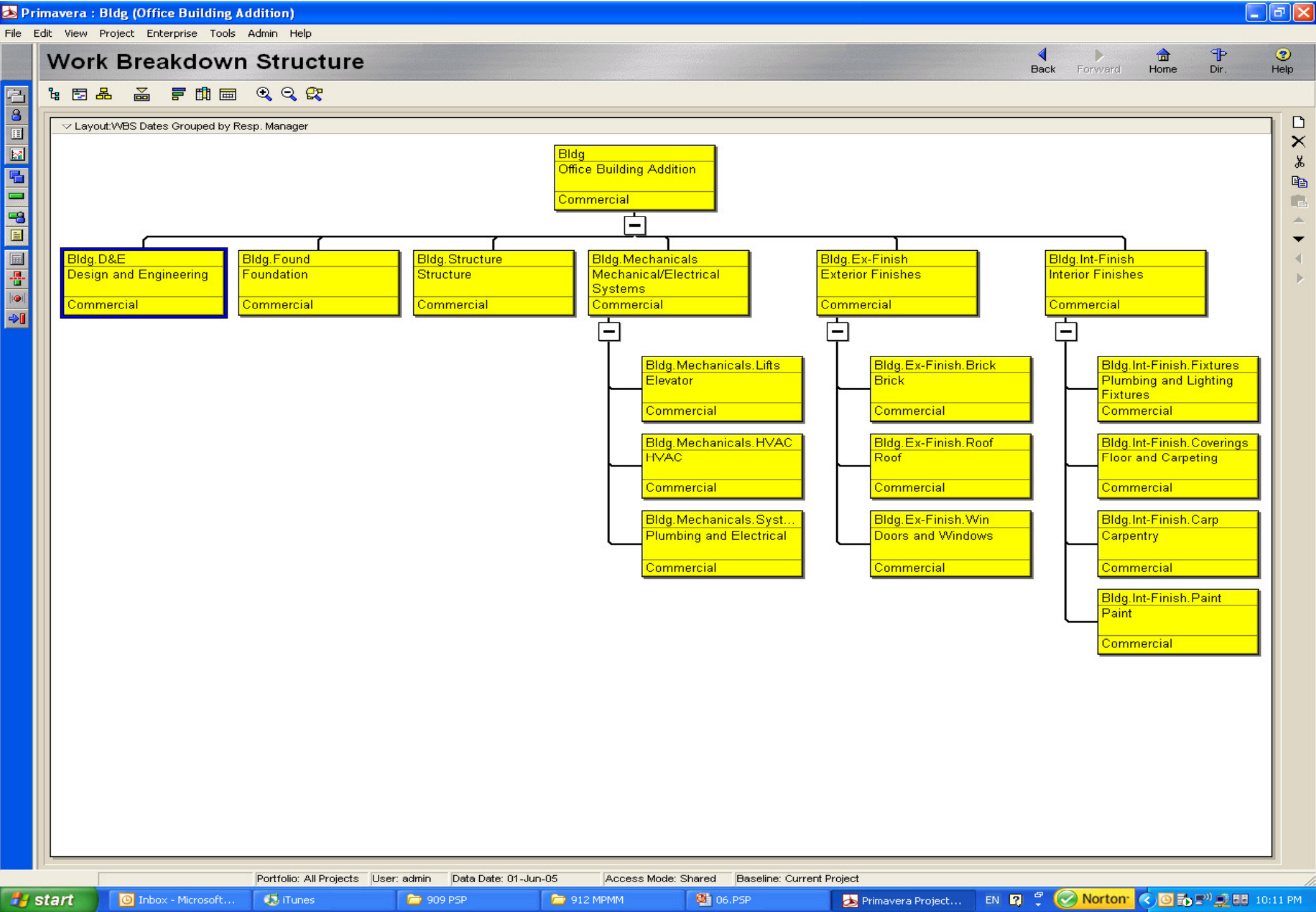
A Complete Baseline Schedule

- ☐ Covers the full scope of the project. Use WBS for defining the project scope.
- ☐ Covers all phases of the project.
- ☐ Resource loaded: Manpower, Material and Equipment
- ☐ Cost loaded
- ☐ Milestones constraints
- ☐ Submittal and Procurement schedule
- ☐ Mobilization and Demobilization
- ☐ Testing and Commissioning
- ☐ Calendars: Weekends and Holidays
- ☐ Includes subcontractors, own and nominated, activities
- ☐ Includes Owner and other stakeholders activities

The Complete As-Plan Schedule



A World Without Failed Projects



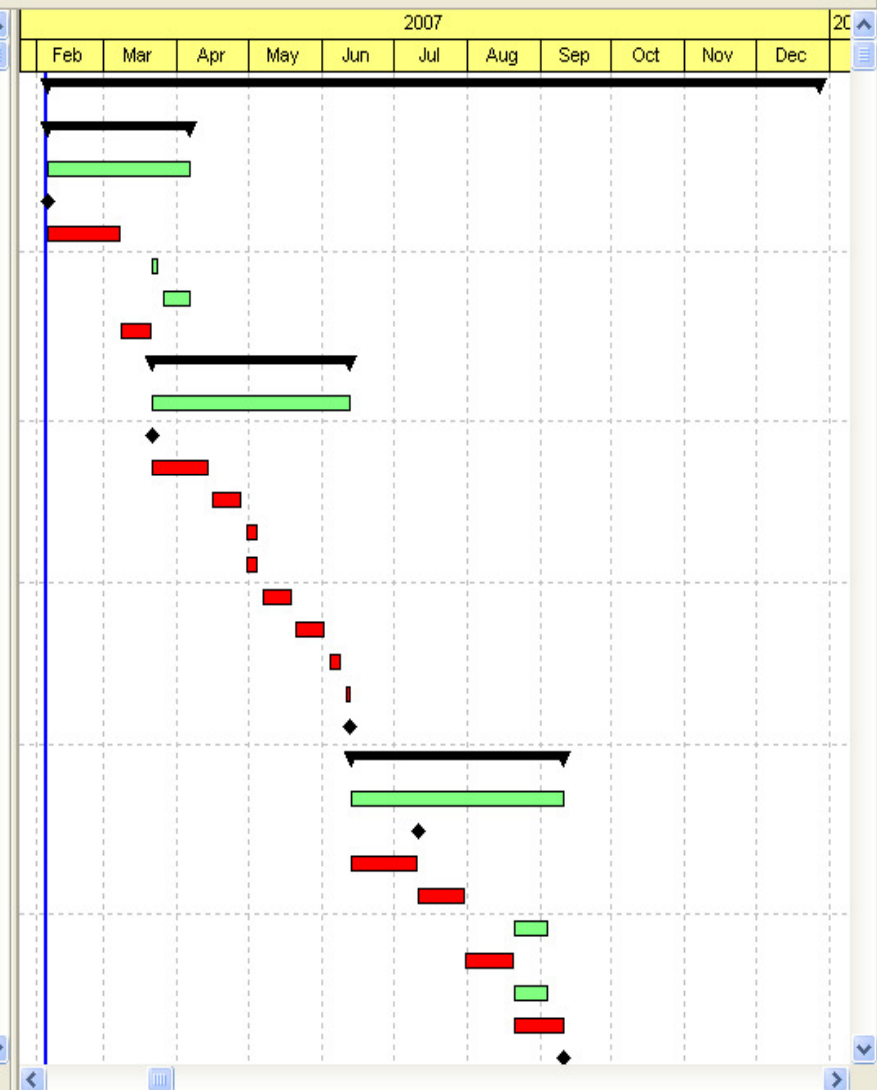
Activities



Layout: 2 Week Lookahead

Filter: All Activities

Activity ID	Activity Name	Original Duration	Early Start	Early Finish	Late Start	Late Finish	Total Float
Bldg - B1 Office Building Addition - ...		228	05-Feb-07	27-Dec-07	05-Feb-07	27-Dec-07	0
Bldg - B1.D&E Design and Engine...		45	05-Feb-07	06-Apr-07	05-Feb-07	05-Jun-07	41
BA-DE	Design & Engineering Summary	45	05-Feb-07	06-Apr-07	05-Feb-07	05-Jun-07	42
BA000	Start Office Building Addition Project	0	05-Feb-07		05-Feb-07		0
BA400	Design Building Addition	23	05-Feb-07	07-Mar-07	05-Feb-07	07-Mar-07	0
BA469	Assemble Technical Data for Heat Pu...	3	21-Mar-07	23-Mar-07	18-May-07	22-May-07	42
BA470	Review Technical Data on Heat Pum...	10	26-Mar-07	06-Apr-07	23-May-07	05-Jun-07	42
BA501	Review and Approve Designs	9	08-Mar-07	20-Mar-07	08-Mar-07	20-Mar-07	0
Bldg - B1.Found Foundation		59	21-Mar-07	12-Jun-07	21-Mar-07	27-Dec-07	137
BA-F	Foundation Summary	60	21-Mar-07	12-Jun-07	21-Mar-07	27-Dec-07	142
BA630	Begin Building Construction	0	21-Mar-07		21-Mar-07		0
BA640	Site Preparation	18	21-Mar-07	13-Apr-07	21-Mar-07	13-Apr-07	0
BA650	Excavation	10	16-Apr-07	27-Apr-07	16-Apr-07	27-Apr-07	0
BA660	Install Underground Water Lines	5	30-Apr-07	04-May-07	30-Apr-07	04-May-07	0
BA670	Install Underground Electric Conduit	5	30-Apr-07	04-May-07	30-Apr-07	04-May-07	0
BA680	Form/Pour Concrete Footings	10	07-May-07	18-May-07	07-May-07	18-May-07	0
BA681	Concrete Foundation Walls	10	21-May-07	01-Jun-07	21-May-07	01-Jun-07	0
BA690	Form and Pour Slab	5	04-Jun-07	08-Jun-07	04-Jun-07	08-Jun-07	0
BA700	Backfill and Compact Walls	2	11-Jun-07	12-Jun-07	11-Jun-07	12-Jun-07	0
BA701	Foundation Phase Complete	0		12-Jun-07		27-Dec-07	142
Bldg - B1.Structure Structure		62	13-Jun-07	10-Sep-07	13-Jun-07	27-Dec-07	75
BA-S	Structure Summary	64	13-Jun-07	10-Sep-07	13-Jun-07	27-Dec-07	78
BA702	Begin Structural Phase	0	11-Jul-07		27-Dec-07		122
BA710	Erect Structural Frame	20	13-Jun-07	10-Jul-07	13-Jun-07	10-Jul-07	0
BA712	Floor Decking	14	11-Jul-07	30-Jul-07	11-Jul-07	30-Jul-07	0
BA720	Erect Stairwell and Elevator Walls	10	21-Aug-07	03-Sep-07	28-Aug-07	10-Sep-07	5
BA730	Concrete First Floor	15	31-Jul-07	20-Aug-07	31-Jul-07	20-Aug-07	0
BA731	Concrete Basement Slab	10	21-Aug-07	03-Sep-07	28-Aug-07	10-Sep-07	5
BA735	Concrete Second Floor	15	21-Aug-07	10-Sep-07	21-Aug-07	10-Sep-07	0
BA737	Structure Complete	0		10-Sep-07		10-Sep-07	0



Portfolio: All Projects

User: admin

Date Date: 05-Feb-07

Access Mode: Shared

Baseline: Current Project

A Complete Baseline Schedule

What About Real Life?

- Some contractors prepare schedules only because it is a contract requirement.
- On far too many projects a schedule is created at the beginning of the project and never reviewed or revised until a problem develops
- Schedule is burden on Contractors' Shoulders
- Few projects take schedule seriously



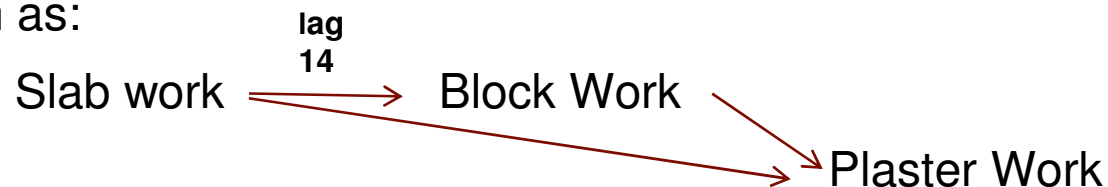
Common issues in baseline schedule

- ❑ Use of additional NOT REQUIRED relations

For example:

- Electrical first fix shop drawing linked with plaster Work
- Link the activity with the predecessor of another related activity predecessor:

Such as:



This will increase number of relations

Common issues in baseline schedule

- ❑ WBS LEVEL to be consistent as much as possible.

WBS Code	WBS Name
+ Muniyare B-4/cost-up.Guest A6.ZA.StructureRoom No.4	Structure Work RoomNo.4
+ Muniyare B-4/cost-up.Guest A6.ZA.MEP	Electromichanical Work
+ Muniyare B-4/cost-up.Guest A6.ZA.Finishing	Finishing Work
+ Muniyare B-4/cost-up.Guest A6.Zone B	Construction Work For Zone B
+ Muniyare B-4/cost-up.Guest A6.Zone J1	Construction Work For Zone J1
+ Muniyare B-4/cost-up.Guest A6.Zone C	Construction Work For Zone C
- Muniyare B-4/cost-up.Guest A6.Zone C.Structure	Structure Work
Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Excavation	Excavation Work
Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Foundation	Foundation Work
Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Column N	Column Neck Work
Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Slab O G	Slab On Grade & Tie Beam Work
+ Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Column	Column Work
+ Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Slab	Slab Work
Muniyare B-4/cost-up.Guest A6.Zone C.Structure.rOOF	Roof Work
Muniyare B-4/cost-up.Guest A6.Zone C.Structure.Stone	Stone Work
+ Muniyare B-4/cost-up.Guest A6.Zone C.MEP	Electromichanical Work
+ Muniyare B-4/cost-up.Guest A6.Zone C.Finishing	Finishing Work
- Muniyare B-4/cost-up.Guest A6.Zone D	Construction Work For Zone D
- Muniyare B-4/cost-up.Guest A6.Zone D.All Rooms	Construction Work For Zone D All Rooms
+ Muniyare B-4/cost-up.Guest A6.Zone D.All Rooms.Structure	Structure Work
+ Muniyare B-4/cost-up.Guest A6.Zone D.All Rooms.MEP	Electromichanical Work
+ Muniyare B-4/cost-up.Guest A6.Zone D.All Rooms.Finishing	Finishing Work
+ Muniyare B-4/cost-up.Guest A6.Zone D.Zone D R14	Construction Work For Zone D Room No.14
+ Muniyare B-4/cost-up.Guest A6.Zone E	Construction Work For Zone E

Common issues in baseline schedule

- ❑ To minimize the efforts of resource loadings, the similar activity should have the same text and WBS
- ❑ Use of Constraints. Why? What effect? How many?

General	Status	Resources	Relationships	Codes	Notebook	Steps	WPs & Docs	Expenses	Summary
Activity: BA1030 Assemble Technical Data for Heat Pump									
Duration Original: 3 Actual: 0 Remaining: 3 At Complete: 3 Total Float: 21 Free Float: 0		Status ☐ Started: 28-Jan-10 ... Duration %: 0% ☐ Finished: 01-Feb-10 ... Suspend: ... Exp Finish: ... Resume: ... Constraints Primary: < None > ... Secondary: < None > ... Date: ... Date: ...							

Constraints

- ◆ Constraints are imposed restrictions used to reflect project requirements that cannot be built into the logic.
- ◆ Use constraints to build a schedule that more accurately reflects the real-world aspects of the project, provide added control to the project, and impose a restriction on the entire project or an individual activity
 - Constraints are user-imposed.
 - Two constraints can be assigned to an activity.
 - After applying a constraint, the project must be rescheduled to calculate the new dates.

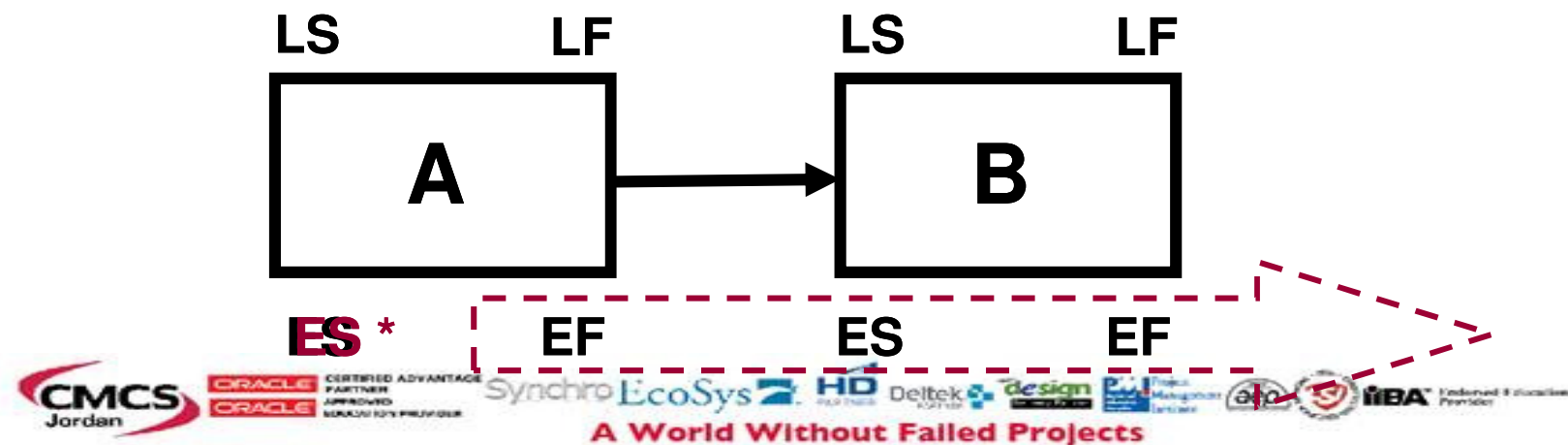
Commonly Used Constraints (cont.)

Must Finish By

- Used when an overall project deadline must be met.
 - Forces all activities in the project to finish by the date (and time) specified.
 - By default, the time associated to the Must Finish By date is set to 12:00 am. This means that if the project must finish by the end of day on 1-Nov, assign a Must Finish By of 02-Nov.
 - Affects the total float of the entire project.
 - Must be applied in the Dates tab in Project Details.
- ◆ The current Early Finish of Building Addition project is 17-Nov-10. You will apply a Must Finish By constraint of 02-Nov-10.
 - ◆ The next step is to reschedule the project to see the effect of the imposed deadline on the late dates and Total Float in the project plan.

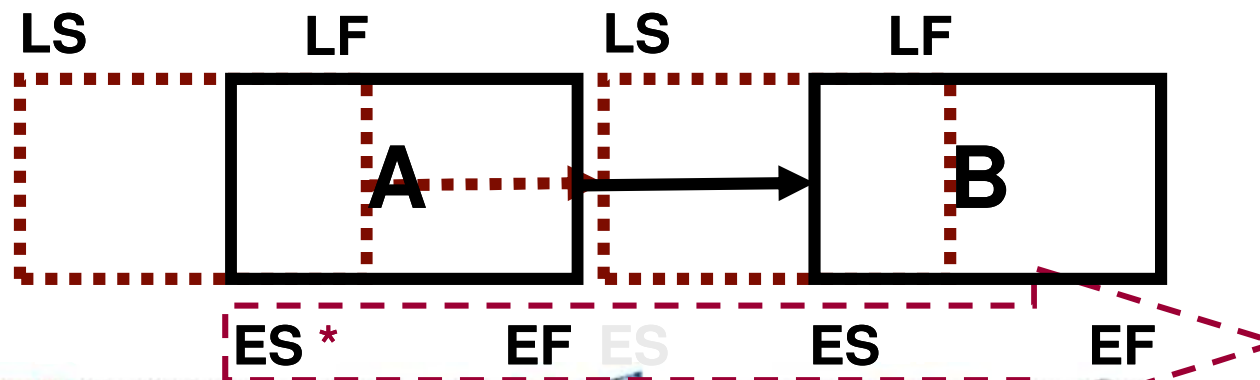
Start On or After

- ❑ Used to set the earliest date an activity can begin.
- ❑ Forces the activity to start no earlier than the constraint date
- ❑ Pushes the early start to the constraint date
- ❑ Affects the early dates of its successors



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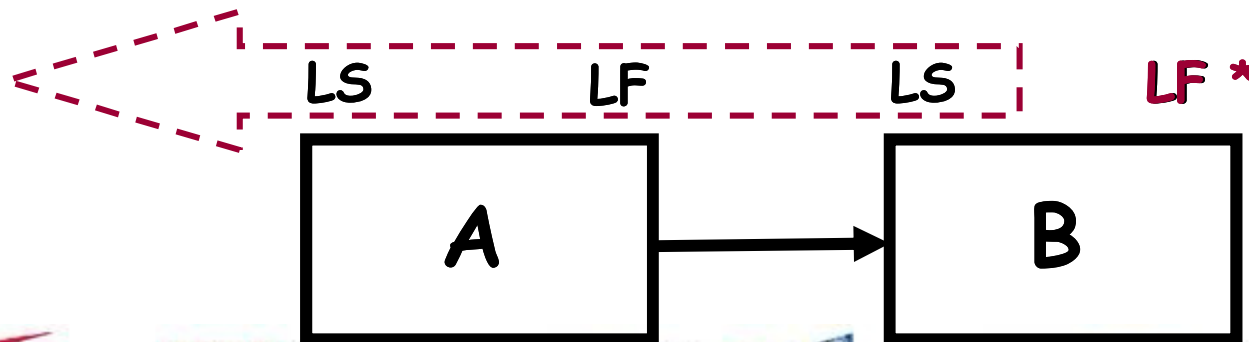
Commonly Used Constraints (cont.)

Adding Notebook Topic

- ◆ When a constraint is assigned to an activity, it is recommended that you add a note to document why the constraint was assigned. You can use the Notebook tab in the Activities window to document these reasons.

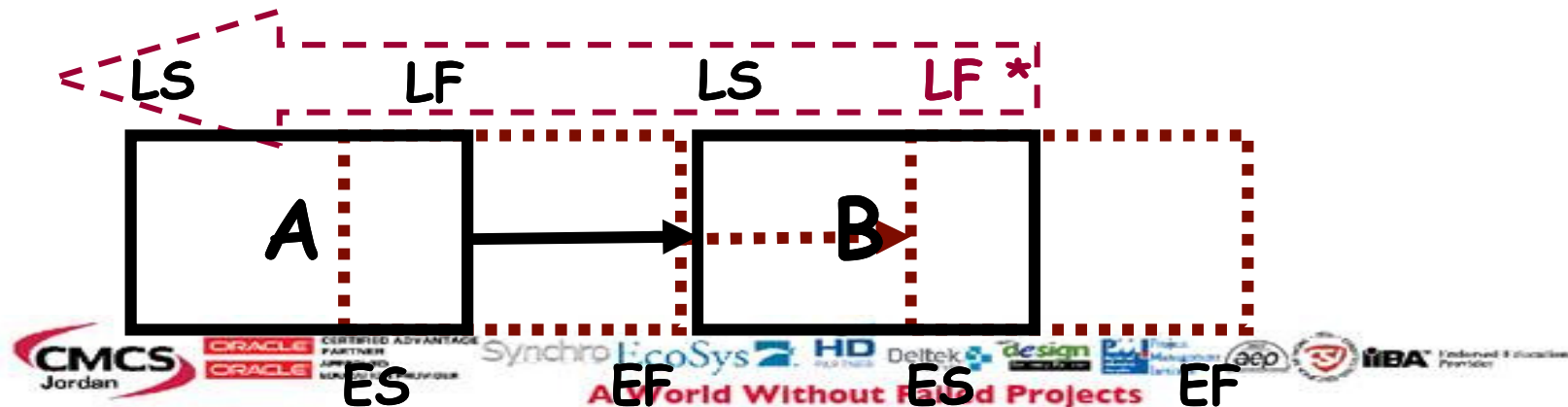
Finish On or Before

- ❑ Used to set intermediate completion points
- ❑ Forces the activity to finish no later than the constraint date
- ❑ Pulls the late finish date to the constraint date
- ❑ Affects the late dates of its predecessors



Finish On or Before

- ❑ Used to set intermediate completion points
- ❑ Forces the activity to finish no later than the constraint date
- ❑ Pulls the late finish date to the constraint date
- ❑ Affects the late dates of its predecessors



Commonly Used Constraints (cont.)

Start On

- **Forces the activity to start on the constraint date.**
 - Shifts both Early and Late Start dates.
 - Delays an Early Start or accelerates a Late Start.
 - Used to specify dates submitted by contractors or vendors.

Commonly Used Constraints (cont.)

Start On or Before

- **Forces the activity to start no later than the constraint date.**
 - Shifts the Late Start to the constraint date.
 - Affects the late dates of its predecessors.
 - Used to place a deadline on the start of the activity.

Commonly Used Constraints (cont.)

Finish On

- **Forces the activity to finish on the constraint date.**
 - Shifts both Early and Late Finish dates.
 - Delays an Early Finish or accelerates a Late Finish.
 - Used to satisfy intermediate project deadlines.

Commonly Used Constraints (cont.)

Finish On or After

- **Forces the activity to finish no earlier than the constraint date.**
 - Shifts the Early Finish to the constraint date.
 - Affects the early dates of its successors.
 - Used to prevent an activity from finishing too early.

Commonly Used Constraints (cont.)

As Late As Possible

- **Delays an activity as late as possible without delaying its successors.**
 - Shifts the early dates as late as possible.
 - Also called a zero free float constraint.

Commonly Used Constraints (cont.)

Mandatory Start and Finish

- **Forces early and late dates to be equal to the constraint date.**
 - Affects late dates of predecessors and early dates of successors.
 - May violate network logic.

Commonly Used Constraints (cont.)

Key Concepts

- Assign constraints to activities and projects to reflect real-world restrictions.
- A maximum of two constraints can be assigned to an activity.
- The Must Finish By constraint is used when an overall project deadline must be met.
- Use the Start On or After constraint to set the earliest date an activity can begin.



Common Issues in Baseline SChedule

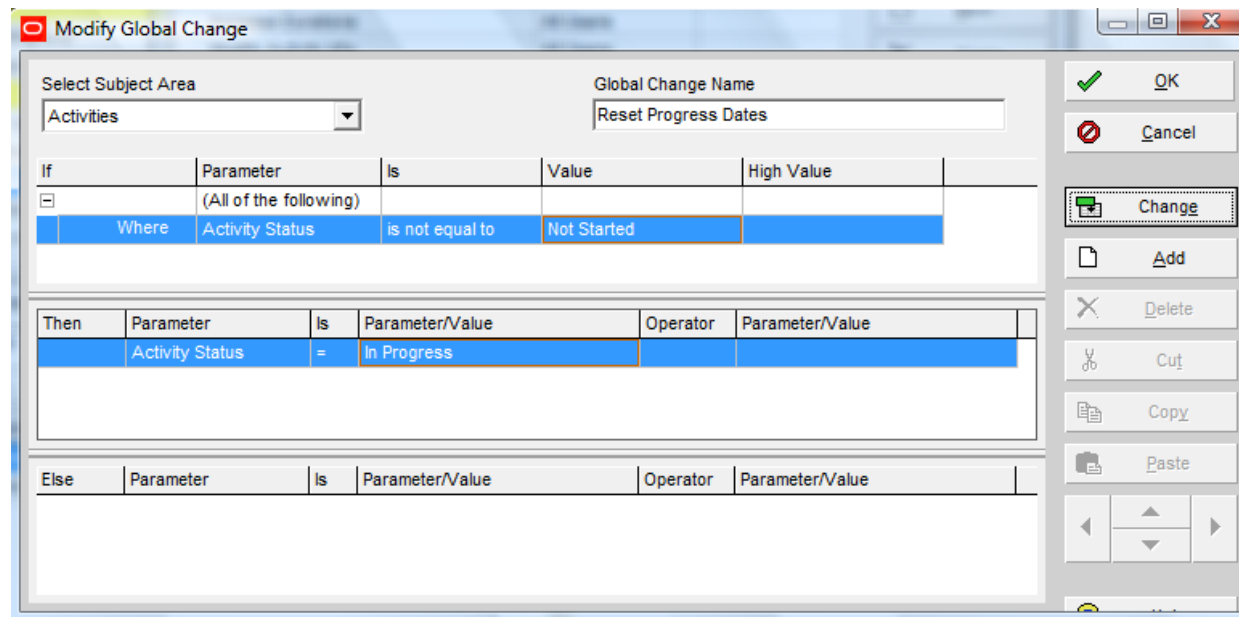
- ❑ Accidental Changes by Tool user
- ❑ Improper use of some functions like Global Changes



Common Issues in Baseline Schedule

The right steps to reset all actual data to convert an updated schedule to a baseline is as follows, otherwise an error will appear and not all activities actual data will be removed:

A.



Modify Global Change

Select Subject Area: **Activities** Global Change Name: **Reset Progress Dates**

If

	Parameter	Is	Value	High Value
☒	(All of the following)			
☐	Where	Activity Status	is not equal to	Not Started

Then

	Parameter	Is	Parameter/Value	Operator	Parameter/Value
☒	Activity Status	=	In Progress		

Else

	Parameter	Is	Parameter/Value	Operator	Parameter/Value
☐					

Buttons: OK, Cancel, Change, Add, Delete, Cut, Copy, Paste

Common Issues in Baseline Schedule

B.

Modify Global Change

Select Subject Area: Activities Global Change Name: Reset Progress Dates

If	Parameter	Is	Value	High Value
☐	(All of the following)			
☒	Where Activity % Complete	is not equal to	0%	

Then	Parameter	Is	Parameter/Value	Operator	Parameter/Value
☒	Duration % Complete	=	0%		
☒	And Physical % Complete	=	0%		

Else	Parameter	Is	Parameter/Value	Operator	Parameter/Value
☐					

Buttons: OK, Cancel, Change, Add, Delete, Cut, Copy, Paste, Navigation arrows

Common Issues in Baseline Schedule

C.

Modify Global Change

Select Subject Area: Global Change Name:

If	Parameter	Is	Value	High Value
☐	(All of the following)			
Where	Actual Cost	is not equal to	0.00	
And	Actual Duration	is not equal to	0d	

Then	Parameter	Is	Parameter/Value	Operator	Parameter/Value
	Actual This Period Lab	=	0h		
And	Actual This Period Non	=	0h		

Else	Parameter	Is	Parameter/Value	Operator	Parameter/Value

OK Cancel Change Add Delete Cut Copy Paste

Common Issues in Baseline Schedule

D.

Modify Global Change

Select Subject Area: Activities Global Change Name: Reset Progress Dates

If	Parameter	Is	Value	High Value
☐	(All of the following)			
Where	Activity Status	is not equal to	Not Started	

Then	Parameter	Is	Parameter/Value	Operator	Parameter/Value
	Activity Status	=	Not Started		

Else	Parameter	Is	Parameter/Value	Operator	Parameter/Value
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Buttons: OK, Cancel, Change, Add, Delete, Cut, Copy, Paste, Navigation arrows

Common Issues in Baseline Schedule

Effective date for resource must match with the project and activities effective dates.

General	Codes	Details	Units & Prices	Roles	Notes	Timesheets
Shift Calendar:				Shift: 1		
Effective Date		ice / Unit Settings 2	ice / Unit Settings 3			
01-Jan-10		0.00	0.00			

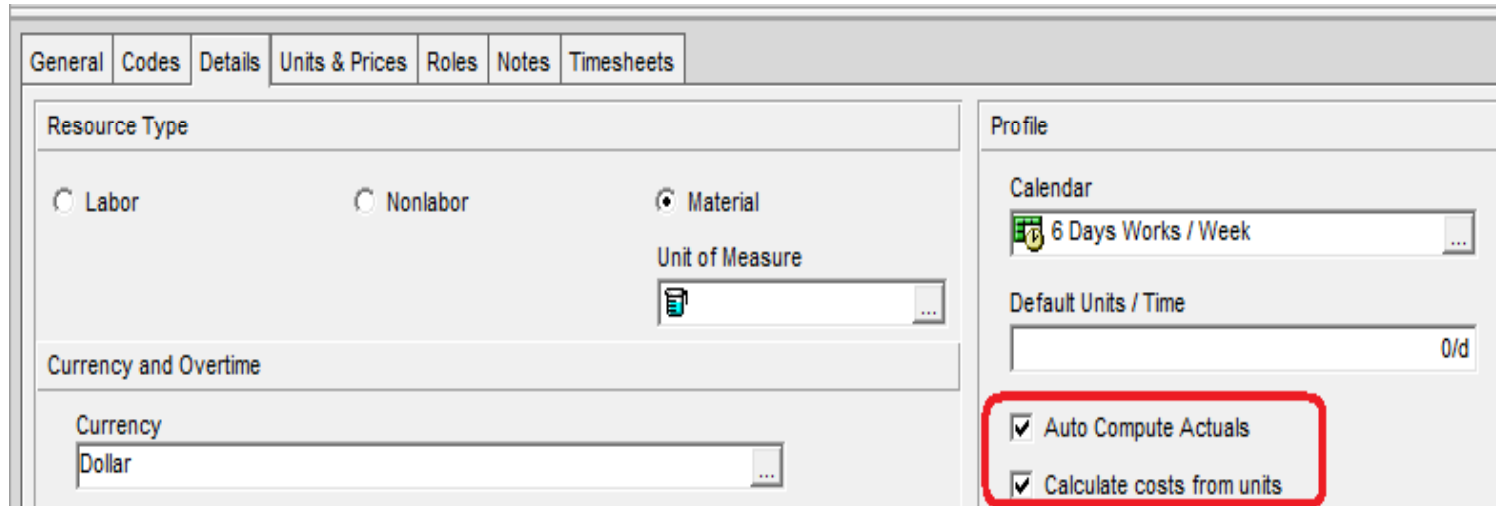
13.Currencies for resources ,Project ,Cost , Expenses must match.

Common Issues in Baseline Schedule

Before importing a project with Cost and Resources loaded we must check if we need the cost to be calculated from the units

or not cause if the project didn't match with the resource that will cause an error and inaccurate output .

The calendar as well, the resource calendar must match the assigned activities .



General Codes Details **Units & Prices** Roles Notes Timesheets

Resource Type

☐ Labor ☐ Nonlabor ☒ Material

Unit of Measure

Currency and Overtime

Currency

Dollar

Profile

Calendar

6 Days Works / Week

Default Units / Time

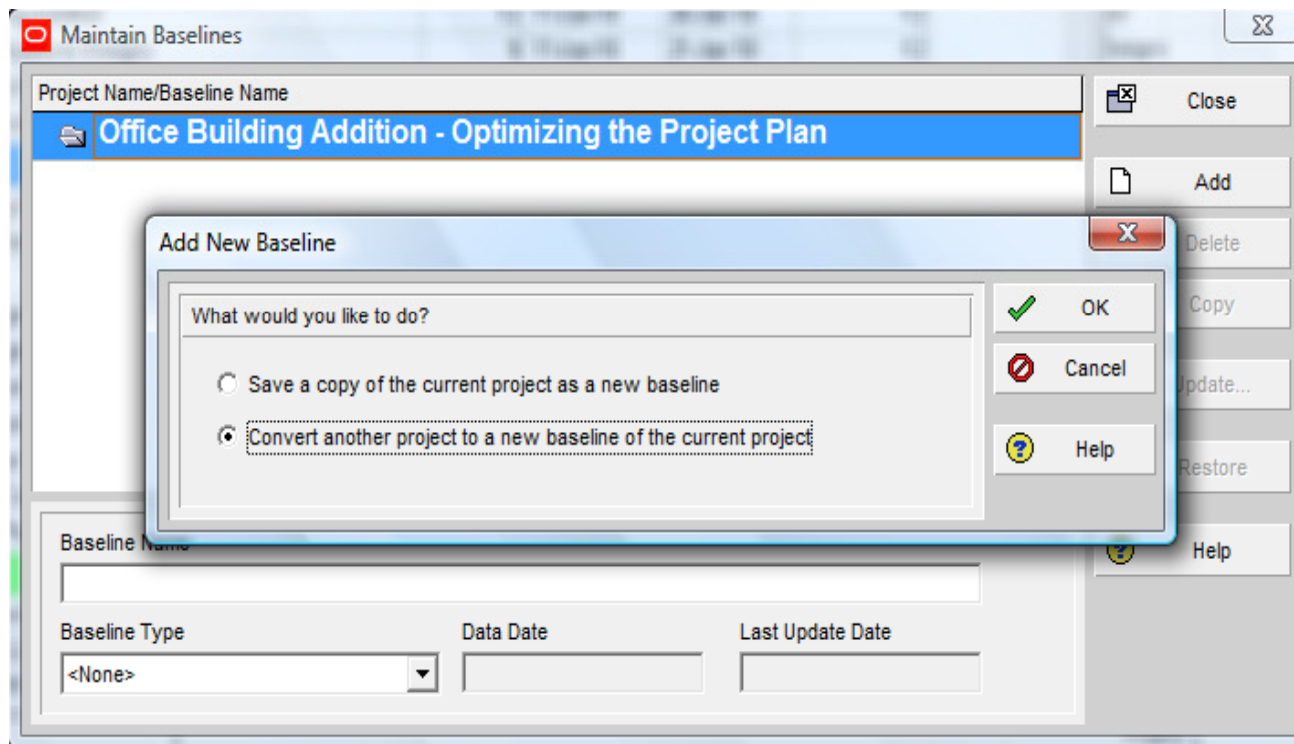
0/d

☒ Auto Compute Actuals

☒ Calculate costs from units

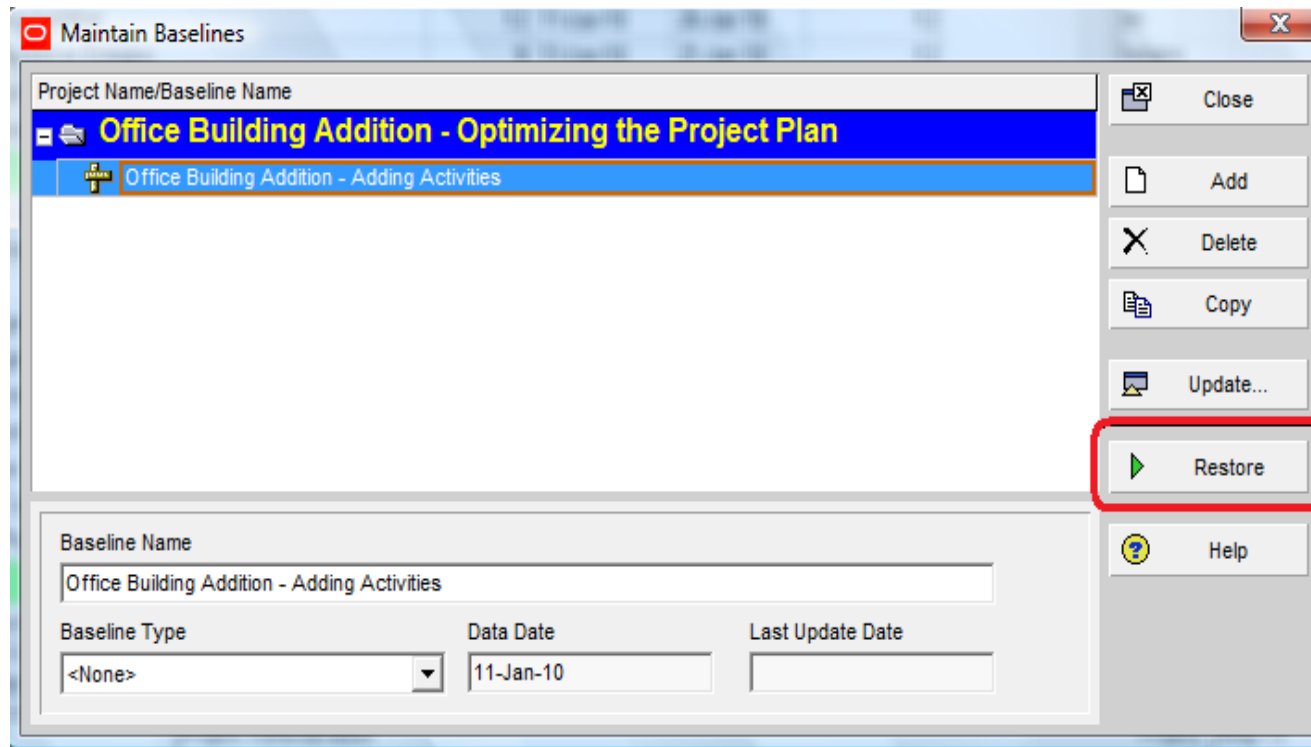
Common Issues in Baseline Schedule

10. When maintaining baseline if we click ok on the message below the selected project will disappear



Common Issues in Baseline Schedule

The solution is restoring the project

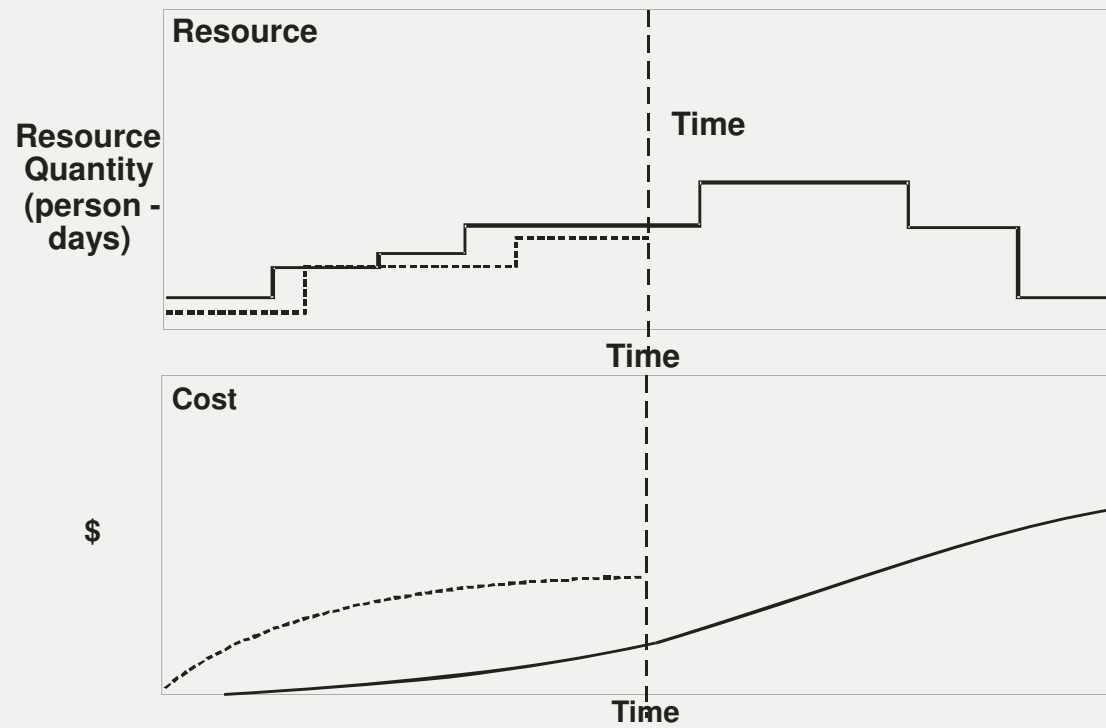
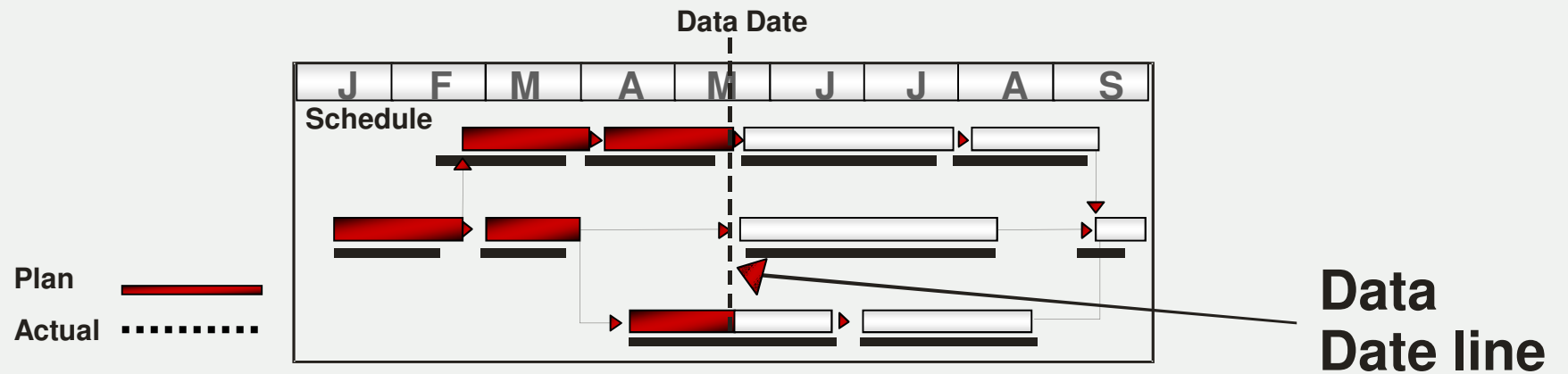


Updated Schedule

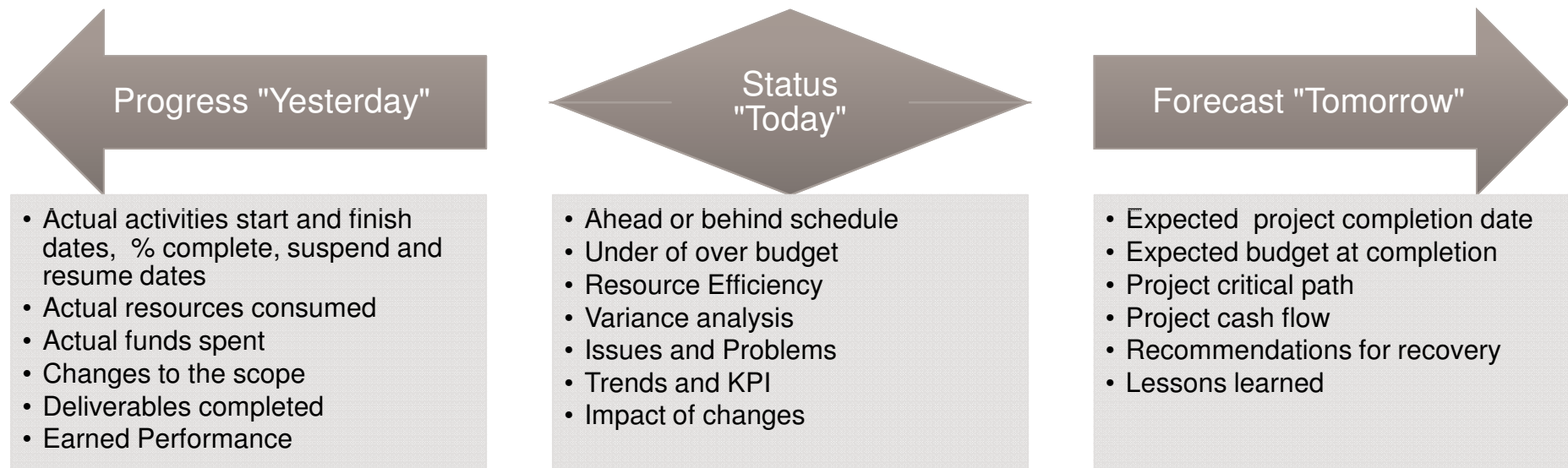
❑ Updated Schedule is:

- Schedule prepared during the course of executing the project at predetermined intervals “periodic basis”.
- Periodic basis (Monthly/weekly/bi-weekly) depends on the size and duration of the project
- Percent completion of activities, actual dates tracked during the preparation period, actual resources and any other data related to progress shall be included.
- Used to generate progress reports
- It is NOT a revised schedule
- Part of the monitoring and controlling processes





The Importance Of the Updated Schedule



As-Planned, Updated and As-Built



As-Planned: How We Plan To Execute Project?

Updated: What We Have Achieved To Date and How Would It Affect Completion Date>

As-Built: What Has Actually Happened During the Project Execution?



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A Complete Updated Schedule

- ☐ Records actual start and finish dates for completed activities
- ☐ Records actual start and remaining duration for activities in progress
- ☐ Records suspend and resume dates when needed
- ☐ Records actual resources used and remaining quantities
- ☐ Records Earned Value and Actual Cost
- ☐ Records notes of important progress and events
- ☐ Documents reasons of delays, should any occur



DEFINING TIME

❑ To Create Updated Schedule:

- Provide start and finish dates for all activities started and/or finished during the report period.
- Provide the current status for all activities reported as being in progress in the last update report. If they were completed during the current period, the date of actual completion should be recorded. For those remained in progress, provide remaining duration.
- Report on activities that need to be re-sequenced, added, deleted, or modified to add clarification, to reflect a change in plan or operation, or to maintain required schedule detail for proper monitoring and control.
- The fragment that has to be incorporated into the schedule to reflect delays and/or change conditions that influence the schedule and progress of the project.

Common Issues in Updates

1. When to use the suspend and resume key.

General	Status	Resources	Relationships	Codes	Notebook	Steps	WPs & Docs	Expenses	Summary
Activity BA1030 Assemble Technical Data for Heat Pump									
Duration Original 3 Actual 0 Remaining 3 At Complete 3 Total Float 21 Free Float 0		Status ☐ Started 28-Jan-10 ... Duration % 0% ☐ Finished 01-Feb-10 ... Suspend Exp Finish ... Resume Constraints Primary < None > Secondary < None > Date Date							

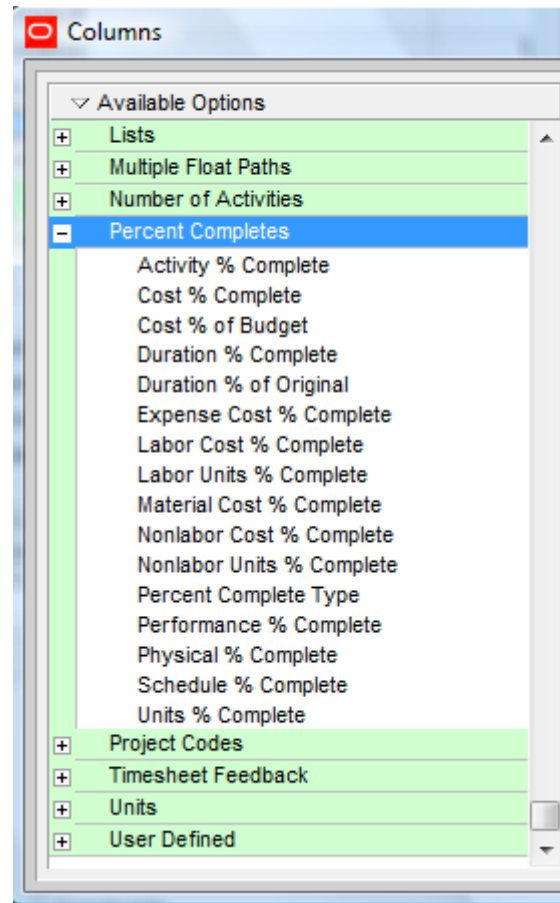
Common Issues in Updates

2. When to use the Duration as % Completion Type & when to use the Physical %.

General	Status	Resources	Relationships	Codes	Notebook	Steps	WPs & Docs	Expenses	Summary
Activity: BA1030 Assemble Technical Data for Heat Pump									
Duration Original: 3 Actual: 0 Remaining: 3 At Complete: 3 Total Float: 21 Free Float: 0		Status ☐ Started: 28-Jan-10 ☐ Finished: 01-Feb-10 Exp Finish: Duration %: 0% Suspend: Resume: Constraints Primary: < None > Secondary: < None > Date: Date:							

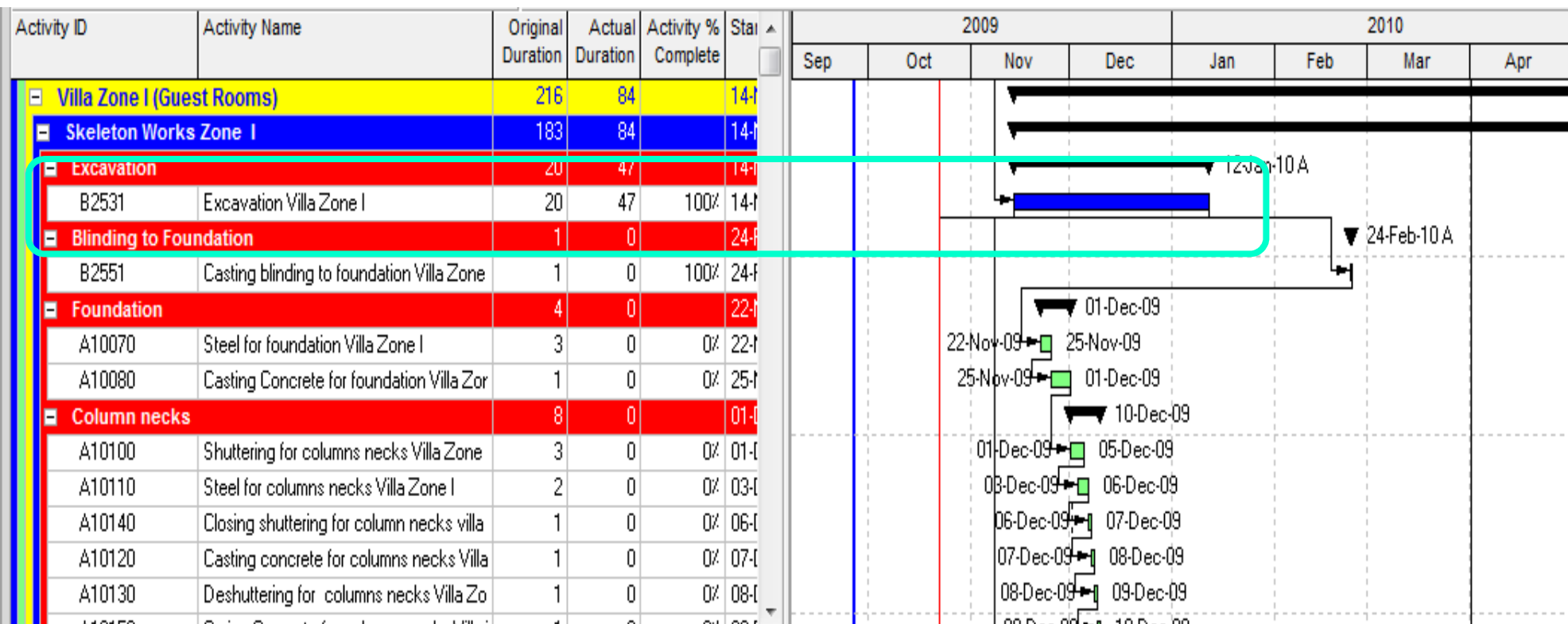
Common Issues in Updates

3.% completion when to use (units, duration ,duration of original, cost, schedule)%.



Common Issues in Updates

The actual date after the data date





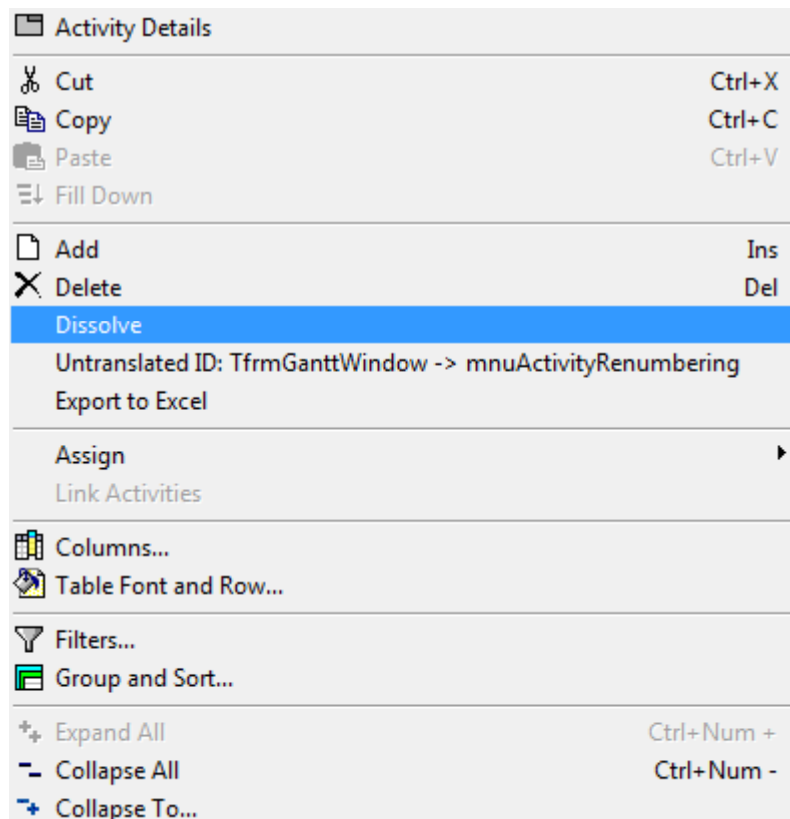
Common Issues in Updates

Ctrl+Z can undo modifying activities relations, start and finish dates, editing text, but deleting activities or WBS, projects cannot be undone.



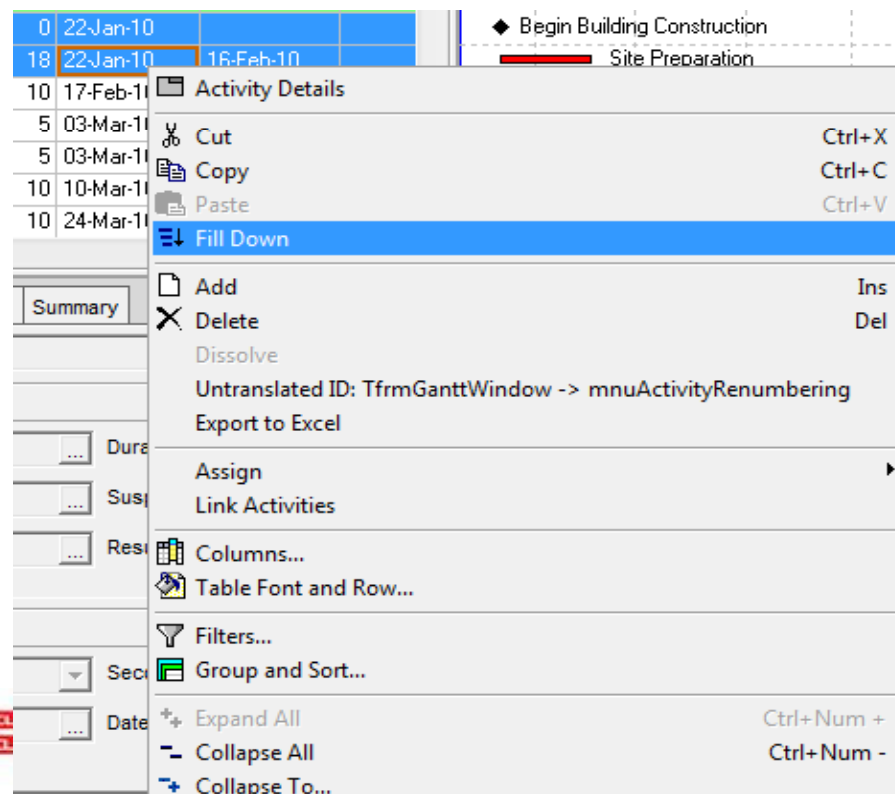
Common Issues in Updates

7.The dissolve option. It erases the activity but keeps the links and relations between the dissolved activity's successor and predecessor and that will prevent the open ends to take place.



Common Issues in Updates

8.Fill down is a very useful option and it can save time and effort if we needed to copy data from a project to project with no need to select the dates every single activity for example .



Common Issues in Updates



9. When can I set the activity as finished ? At the time of Inspection request or the actual start and finish?



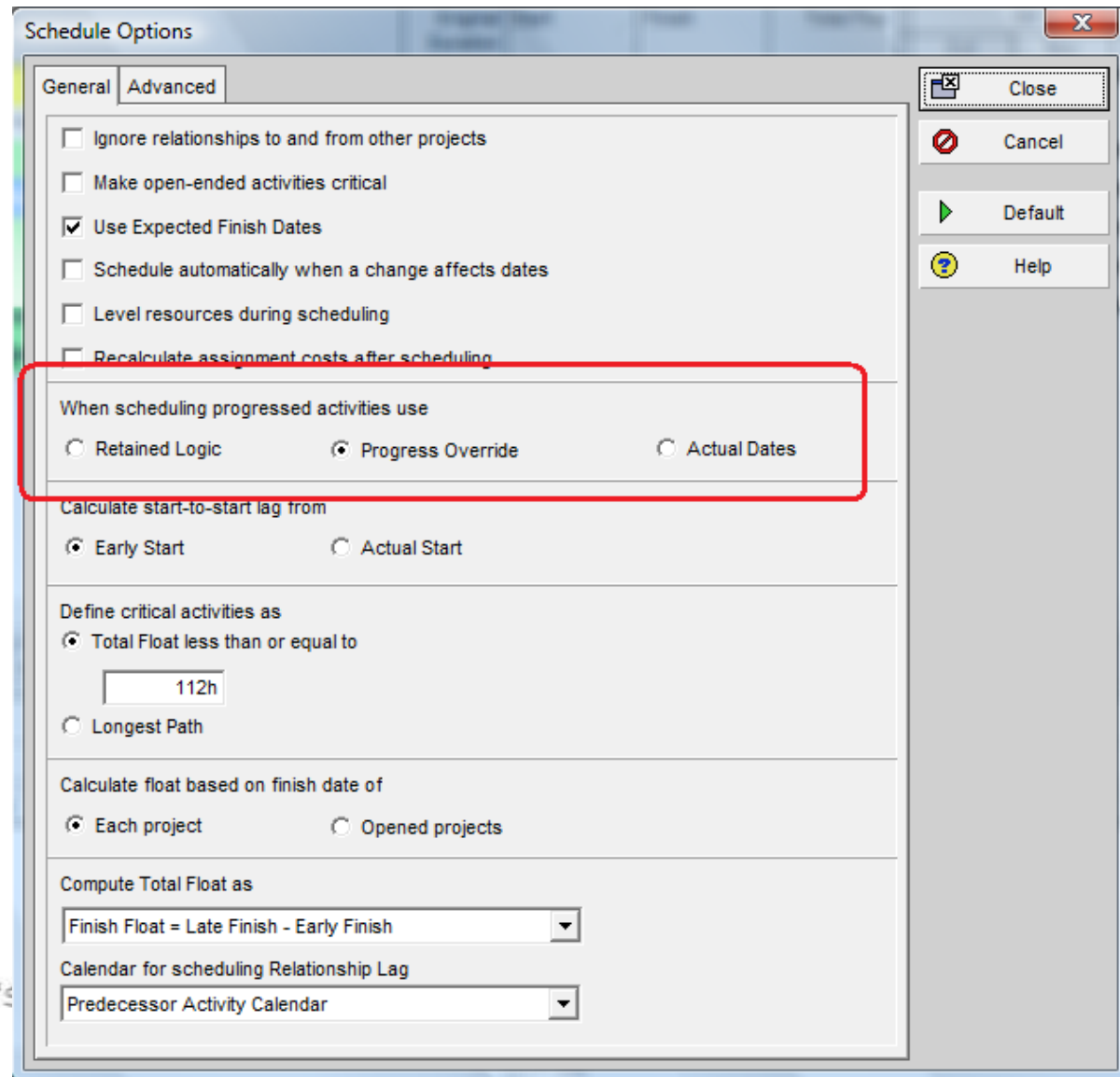
Common Issues in Updates

11. When updating activities we should check the status and select started before changing the start or finish date cause if we don't that will change the original duration of the activity.

General	Status	Resources	Relationships	Codes	Notebook	Steps	WPs & Docs	Expenses	Summary
Activity: BA1020 Review and Approve Designs									
Duration Original: 9 Actual: 0 Remaining: 9 At Complete: 9 Total Float: Free Float:		Status ☒ Started ☐ Finished Exp Finish:							
		11-Jan-10 ... Duration %: 0% 21-Jan-10 ... Suspend: ... Resume:							
		Constraints Primary: < None > Secondary: < None > Date: Date:							

Common Issues in Updates

12. Progress override and retained logic in scheduling options.



Schedule Options

General | **Advanced**

☐ Ignore relationships to and from other projects

☐ Make open-ended activities critical

☒ Use Expected Finish Dates

☐ Schedule automatically when a change affects dates

☐ Level resources during scheduling

☐ Recalculate assignment costs after scheduling

When scheduling progressed activities use

☐ Retained Logic ☒ Progress Override ☐ Actual Dates

Calculate start-to-start lag from

☒ Early Start ☐ Actual Start

Define critical activities as

☒ Total Float less than or equal to

112h

☐ Longest Path

Calculate float based on finish date of

☒ Each project ☐ Opened projects

Compute Total Float as

Finish Float = Late Finish - Early Finish

Calendar for scheduling Relationship Lag

Predecessor Activity Calendar

Close Cancel Default Help



Common Issues in Updates

13. Copying activities from a project to another, we must open the two projects together then select the activities and copy it. The same happens with the WBS.

14. Updating an activity before updating its successor with cause a big total float. For example starting the block work after the shop drawing submittal but before the approval.

15. Lack of use of Thresholds and issues

16. Lack of use of Claim Digger options

17. Changing the relations and lags



Duration Types Overview

- ♦ Duration Type is a setting which allows you to control how the duration, resource units, and resource units/time are synchronized for activities so that the following equation is always true:

$$\text{Duration} \quad \times \quad \text{Units/Time} \quad = \quad \text{Units}$$

Duration Types Overview (cont.)

Non-Progressed Activity

- ♦ For a non-progressed activity, the basic equation remains the same but the names of the values are:

Original Duration x Budgeted Units/Time = Budgeted Units

Duration Types Overview (cont.)

Progressed Activity

- ♦ For a progressed activity:

Remaining Duration x Remaining Units/Time = Remaining Units

- ♦ The following is also true:

Actual Units + Remaining Units = At Completion Units

Budgeted Units - At Completion Units = Variance (in Units)

Balancing the Equation

- The following table lists the value that changes to balance the equation $Duration \times Units/Time = Units$ whenever one of the variables is changed.

Activity duration type	When you change duration, what changes?	When you change units/time, what changes?	When you change units, what changes?	When you add a resource, what changes?
Fixed Units/Time	Units	Duration	Duration	Duration
Fixed Duration and Units/Time	Units	Units	Units/Time	Units
Fixed Units	Units/Time	Duration	Duration	Duration
Fixed Duration & Units	Units/Time	Units	Units/Time	Units/Time

Balancing the Equation (cont.)

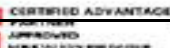
- ♦ Use the following information as a reference when selecting Duration Types.
 - If the duration is fixed, Primavera will never recalculate the duration.
 - If the duration is not fixed, Primavera will always recalculate the duration.

If you do not want Primavera to recalculate ...	... then use
Budget or work effort	Fixed units
Daily resource allocation	Fixed units/time

Balancing the Equation (cont.)



If you do not want Primavera to recalculate the schedule and ...	... then use
Budget or work effort	Fixed duration and units
Daily resource allocation	Fixed duration and units/time



A World Without Failed Projects

Duration Type: Fixed Units/Time

Fixed Units/Time indicates that the activity's resource availability is limited.

- ♦ Choose Fixed Units/Time if you are planning the activity according to the resources assigned to the activity and need to focus on:
 - Resource availability
 - Resource overallocation or under-utilization.

Duration Type: Fixed Duration and Units/Time

Fixed Duration and Units/Time indicates that the activity's duration and units/time are not subject to change, regardless of the number of resources assigned to the activity.

- ◆ Choose Fixed Duration and Units/Time if:
 - You are planning the activity in terms of the calendar or schedule dates.
 - The activity has a "drop dead date."
 - You are entering an original duration value for this activity rather than budgeted labor units.

Duration Type: Fixed Units

- ♦ Fixed Units indicates that the number of labor/nonlabor units assigned to the activity (the work effort) is not subject to change. Since cost is directly correlated with units, it is also not subject to change.
- ♦ Choose Fixed Units if:
 - You are planning this activity in terms of its work effort, i.e., number of resource hours that you think will be required to complete the activity.
 - You need to work within a set budget.
 - You are entering budgeted labor/nonlabor units for this activity, rather than the original duration.

Duration Type: Fixed Duration & Units

Fixed Duration & Units indicates that the units/time should be recalculated if either duration or units are changed.

- ◆ Choose Fixed Duration & Units if:
 - You are planning the activity in terms of schedule dates and its work effort.
 - You have a "drop dead date" and know the total effort needed to complete the activity.

Assigning a Duration Type

- ♦ The default Duration Type assigned to all new activities is set at the project level.
- ♦ You can modify the Duration Type for each individual activity.

Modifying Activity with Fixed Units/Time Duration Type

- ♦ In the following exercise, Paul Kim's availability is fixed. He will work 8 hours per day unless you type a new duration or units/time. Type in a new Budgeted Units, Original Duration, Budgeted Units/Time and add a new resource on the activity.

Modifying Activity with Fixed Units/Time Duration Type (cont.)

Background

- ♦ Modify Paul Kim's Budgeted Units, Original Duration, Budgeted Units/Time, and add a new resource on an activity. Record the new values based on the Duration Type used.

Percent Complete Types

- ◆ The Activity Percent Complete is used to identify the amount of work completed on an activity. The user controls the calculation of Activity Percent Complete by assigning one of the three percent complete types to the activity: Duration Percent Complete, Units Percent Complete, or Physical Percent Complete.
- ◆ The default percent complete type is assigned at the project level but may be changed at the activity level.
 - Duration Percent Complete
 - Units Percent Complete
 - Physical Percent Complete

Assigning a Percent Complete Type

- ♦ The default Percent Complete Type assigned to all new activities is set at the project level. This will not affect existing activities in the project. When a new project is created, the percent complete type defaults to Duration Percent Complete.
- ♦ You can modify the Percent Complete type for each activity.

Updating Activities Based on Physical Percent Complete

- ◆ Physical Percent Complete reflects the actual progress made on the activity's work product so far. To update an activity, type the following:
 - A value into the Physical Percent field.
 - A remaining duration.
 - Each resource's actual units.
- ◆ When using a Physical Percent Complete type, the Remaining Duration and Actual Units must also be updated manually.

Updating Activities Based on Physical Percent Complete (cont.)

- ◆ The Duration and Units Percent Complete columns are calculated according to the following equations:

Updating Activities Based on Duration Percent Complete

- ◆ Select Duration Percent Complete type when progress can most easily be reported in terms of actual days of work remaining.
 - $\text{Duration Percent Comp} = [(\text{Orig Dur} - \text{Rem Dur}) / \text{Orig Dur}] \times 100$
 - To progress an activity, the following information must be updated:
 - When using a Duration Percent Complete type, Actual Units must be manually updated.
 - The Units Percent Complete column is calculated according to the following equation: $\text{Units Percent Comp} = (\text{Actual Units} / \text{At Completion Units}) \times 100$

Updating Activities Based on Units Percent Complete

- ◆ Use Units Percent Complete to specify that the activity's percent complete be calculated from the Actual Units and At Completion units.
 - $\text{Units Percent Complete} = \text{Actual Units} / \text{At Completion Units} * 100$
 - To progress an activity, each resource's actual and remaining units must be updated manually.
 - Remaining Duration is updated based on the Remaining Units according to the equation: $\text{Remaining Duration} = \text{Remaining Units} / \text{Units per Time}$
 - Duration Percent Complete is modified based on the equation: $\text{Duration Percent Comp} = [(\text{Orig Dur} / \text{Rem Dur}) / \text{Orig Dur}] * 100$.

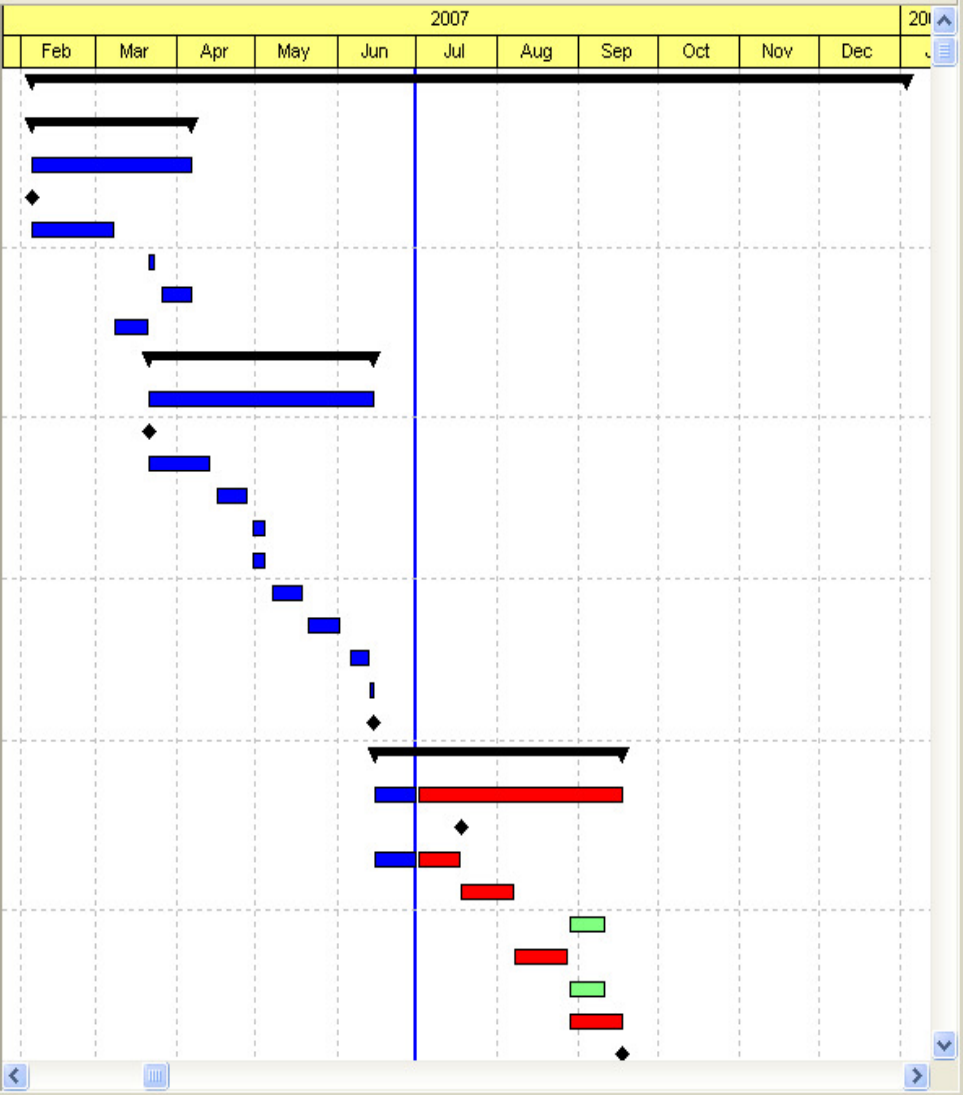
Activities



Layout: 2 Week Lookahead

Filter: All Activities

Activity ID	Activity Name	Remaining Duration	Actual Start	Actual Finish	Activity % Complete	Total Float
Bldg Office Building Addition		128	05-Feb-07			0
Bldg.D&E Design and Engineering		0	05-Feb-07	06-Apr-07		
BA-DE	Design & Engineering Summary	0	05-Feb-07	06-Apr-07	100%	
BA000	Start Office Building Addition Project	0	05-Feb-07		100%	
BA400	Design Building Addition	0	05-Feb-07	07-Mar-07	100%	
BA469	Assemble Technical Data for Heat Pu...	0	21-Mar-07	23-Mar-07	100%	
BA470	Review Technical Data on Heat Pum...	0	26-Mar-07	06-Apr-07	100%	
BA501	Review and Approve Designs	0	08-Mar-07	20-Mar-07	100%	
Bldg.Found Foundation		0	21-Mar-07	14-Jun-07		
BA-F	Foundation Summary	0	21-Mar-07	14-Jun-07	100%	
BA630	Begin Building Construction	0	21-Mar-07		100%	
BA640	Site Preparation	0	21-Mar-07	13-Apr-07	100%	
BA650	Excavation	0	16-Apr-07	27-Apr-07	100%	
BA660	Install Underground Water Lines	0	30-Apr-07	04-May-07	100%	
BA670	Install Underground Electric Conduit	0	30-Apr-07	04-May-07	100%	
BA680	Form/Pour Concrete Footings	0	07-May-07	18-May-07	100%	
BA681	Concrete Foundation Walls	0	21-May-07	01-Jun-07	100%	
BA690	Form and Pour Slab	0	06-Jun-07	12-Jun-07	100%	
BA700	Backfill and Compact Walls	0	13-Jun-07	14-Jun-07	100%	
BA701	Foundation Phase Complete	0		14-Jun-07	100%	
Bldg.Structure Structure		54	15-Jun-07			74
BA-S	Structure Summary	56	15-Jun-07		16.42%	0
BA702	Begin Structural Phase	0			0%	122
BA710	Erect Structural Frame	12	15-Jun-07		40%	0
BA712	Floor Decking	14			0%	0
BA720	Erect Stairwell and Elevator Walls	10			0%	5
BA730	Concrete First Floor	15			0%	0
BA731	Concrete Basement Slab	10			0%	5
BA735	Concrete Second Floor	15			0%	0
BA737	Structure Complete	0			0%	0
Bldg.Mechanical Mechanical/Elec		126	09-Apr-07			0

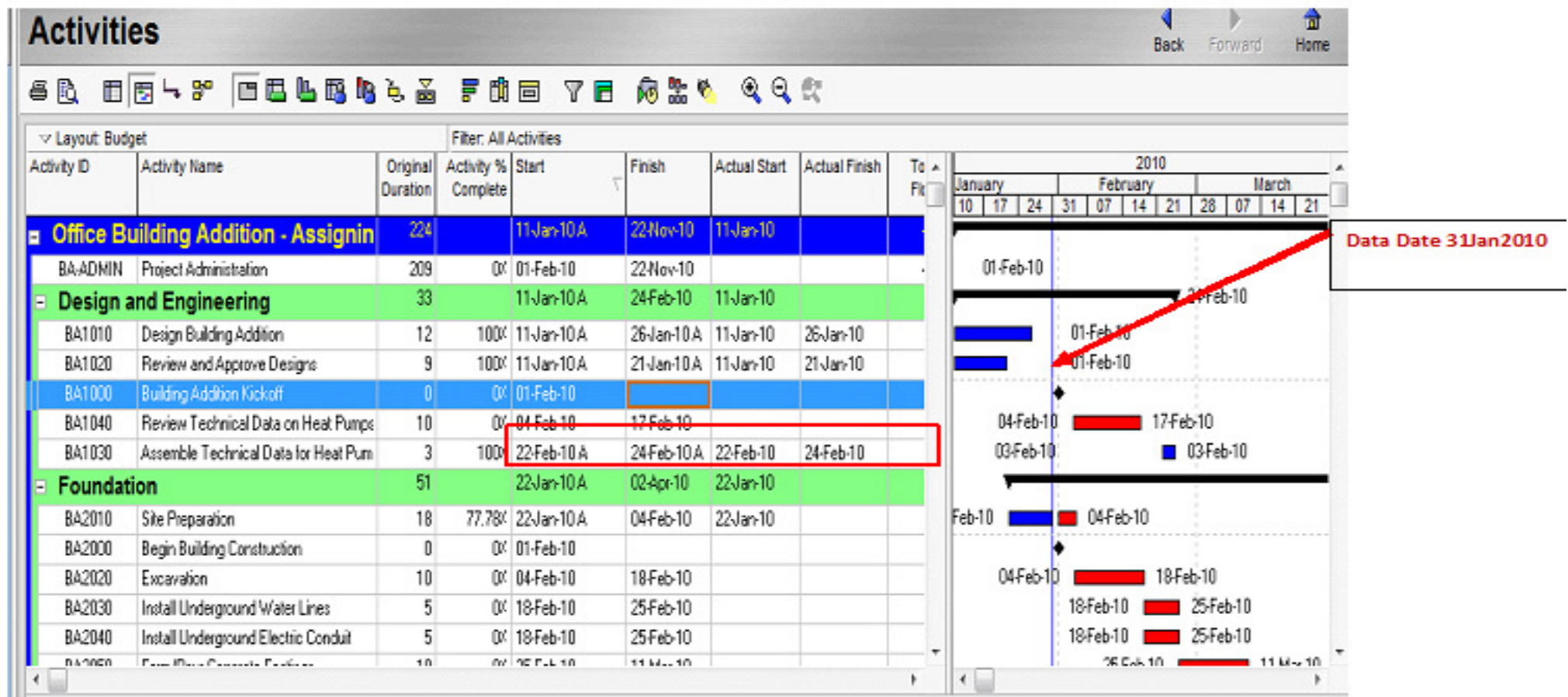




Note: Common Errors During Updating Schedule



Up Dated Schedule – Common Errors



Up Dated Schedule – Common Errors



Primavera P6: Bldg-10 (Office Building Addition - Assigning Constraints)

File Edit View Project Enterprise Tools Admin Help

Activities

Layout: Budget Filter: All Activities

Activity ID	Activity Name	Original Duration	Activity % Complete	Start	Finish	Actual Start	Actual Finish	To	From
BA-ADMIN	Project Administration	209	0%	01-Feb-10	22-Nov-10	11-Jan-10			
Design and Engineering									
BA1010	Design Building Addition	12	100%	11-Jan-10 A	26-Jan-10 A	11-Jan-10	26-Jan-10		
BA1020	Review and Approve Designs	9	100%	11-Jan-10 A	21-Jan-10 A	11-Jan-10	21-Jan-10		
BA1000	Building Addition Kickoff	0	0%	01-Feb-10					
BA1040	Review Technical Data on Heat Pumps	10	0%	04-Feb-10	17-Feb-10				
BA1030	Assemble Technical Data for Heat Pump	3	100%	22-Feb-10 A	24-Feb-10 A	22-Feb-10	24-Feb-10		
Foundation									
BA2010	Site Preparation	18	77.78%	22-Jan-10 A	04-Feb-10	22-Jan-10			
BA2000	Begin Building Construction	0	0%	01-Feb-10					
BA2020	Excavation	10	0%	04-Feb-10	18-Feb-10				
BA2030	Install Underground Water Lines	5	0%	18-Feb-10	25-Feb-10				
BA2040	Install Underground Electric Conduit	5	0%	18-Feb-10	25-Feb-10				

General Status Resources Relationships Codes Notebook Steps Feedback WPs & Docs Expenses Summary

Activity BA2010 Site Preparation Project Bldg-10

Duration: Original 18, Actual 1, Remaining 4, At Complete 10

Status: ☒ Started 22-Jan-10, ☐ Finished 04-Feb-10, ☐ Exp Finish, ☐ Resume

Duration %: 77.78%

Constraints: Primary <None>, Secondary <None>, Date

Portfolio: All Projects User: admin Data Date: 31-Jan-10 Access Mode: Shared Baseline: Current Project

Primavera P6: Bldg-10 (Office Building Addition - Assigning Constraints)

File Edit View Project Enterprise Tools Admin Help

Activities

Layout: Budget Filter: All Activities

Activity ID	Activity Name	Original Duration	Activity % Complete	Start	Finish	Actual Start	Actual Finish	To	From
BA-ADMIN	Project Administration	209	0%	01-Feb-10	22-Nov-10	11-Jan-10			
Design and Engineering									
BA1010	Design Building Addition	12	100%	11-Jan-10 A	26-Jan-10 A	11-Jan-10	26-Jan-10		
BA1020	Review and Approve Designs	9	100%	11-Jan-10 A	21-Jan-10 A	11-Jan-10	21-Jan-10		
BA1000	Building Addition Kickoff	0	0%	01-Feb-10					
BA1040	Review Technical Data on Heat Pumps	10	0%	04-Feb-10	17-Feb-10				
BA1030	Assemble Technical Data for Heat Pump	3	100%	22-Feb-10 A	24-Feb-10 A	22-Feb-10	24-Feb-10		
Foundation									
BA2010	Site Preparation	18	77.78%	22-Jan-10 A	04-Feb-10	22-Jan-10			
BA2000	Begin Building Construction	0	0%	01-Feb-10					
BA2020	Excavation	10	0%	04-Feb-10	18-Feb-10				
BA2030	Install Underground Water Lines	5	0%	18-Feb-10	25-Feb-10				
BA2040	Install Underground Electric Conduit	5	0%	18-Feb-10	25-Feb-10				

General Status Resources Relationships Codes Notebook Steps Feedback WPs & Docs Expenses Summary

Activity BA2010 Site Preparation Project Bldg-10

Notebook Topic: (No Notebook Topic selected)

Previous screen shoot shows that the activity BA2010 suspended ant no note book assign to show the reason

Portfolio: All Projects User: admin Data Date: 31-Jan-10 Access Mode: Shared Baseline: Current Project



Up Dated Schedule – Common Errors

Primavera P6 : Bldg-15 (Office Building Addition - Assigning Resources and Costs)

File Edit View Project Enterprise Tools Admin Help

Activities

Layout: Budget Filter: All Activities

Activity ID	Activity Name	Original Duration	Activity % Complete	Start	Finish	Actual Start	Actual Finish	To Fk
BA1020	Review and Approve Designs	9	100%	14-Jan-10 A	26-Jan-10 A	14-Jan-10	26-Jan-10	
BA1030	Assemble Technical Data for Heat Pum	3	100%	28-Jan-10 A	01-Feb-10 A	28-Jan-10	01-Feb-10	
BA1040	Review Technical Data on Heat Pumps	10	100%	02-Feb-10 A	15-Feb-10 A	02-Feb-10	15-Feb-10	
Foundation		59		22-Jan-10 A	14-Apr-10	22-Jan-10		
BA2000	Begin Building Construction	0	100%	22-Jan-10 A		22-Jan-10		
BA2010	Site Preparation	18	100%	22-Jan-10 A	16-Feb-10 A	22-Jan-10	16-Feb-10	
BA2020	Excavation	10	100%	17-Feb-10 A	02-Mar-10 A	17-Feb-10	02-Mar-10	
BA2030	Install Underground Water Lines	5	0%	03-Mar-10	09-Mar-10			
BA2040	Install Underground Electric Conduit	5	0%	03-Mar-10	09-Mar-10			
BA2050	Form/Pour Concrete Footings	10	0%	10-Mar-10	23-Mar-10			
BA2060	Concrete Foundation Walls	10	0%	24-Mar-10	06-Apr-10			
BA2070	Form and Pour Slab	5	0%	07-Apr-10	13-Apr-10			
BA2080	Backfill and Compact Walls	1	0%	14-Apr-10	14-Apr-10			
BA2090	Foundation Phase Complete	0	0%					
Structure		64		15-Apr-10	15-Jul-10			

2010
January 10 17 24 31 February 07 14 21 28 07 14 21 March

Activity BA2020 Excavation Project Bldg-15

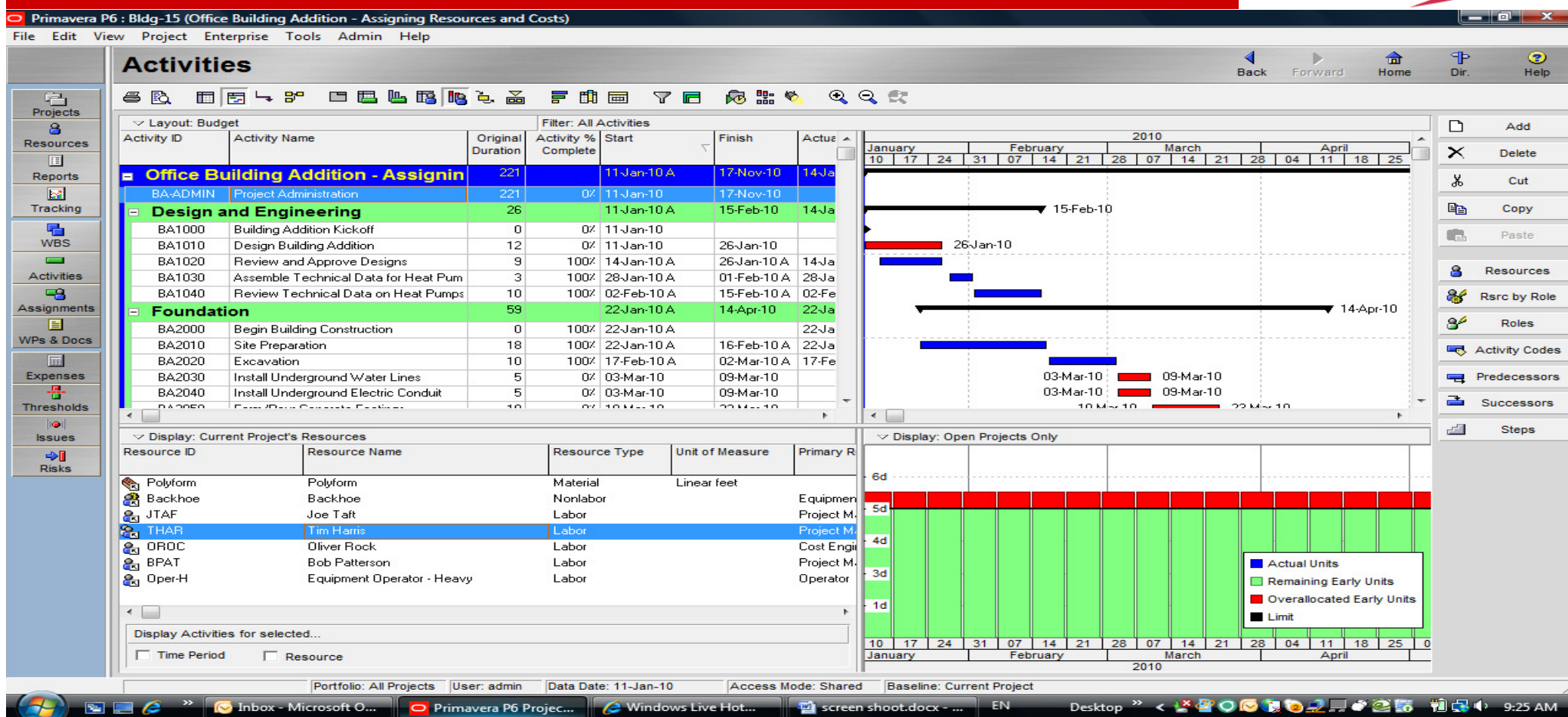
Expense Item	Cost Account	Expense Category	Accrual Type	Budgeted Cost	Actual Cost	Remaining Cost	At Completion Cost	Vendor	o Compute Act
Course		Administration	End of Activity	\$1,000.00	\$0.00	\$1,000.00	\$1,000.00		☐

Not updating the expenses

Portfolio: All Projects User: admin Data Date: 11-Jan-10 Access Mode: Shared Baseline: Current Project

Inbox - Microsoft O... Primavera P6 Projec... Windows Live Hot... screen shoot.docx - ... EN Desktop 9:22 AM

Up Dated Schedule – Common Errors



Neglecting the effect of update on resources

DEFINING TIME



❑ **As-Built Schedule:**

- Represents the actual sequence of works as occurred during the execution of the project
- Dates represent the actual start and actual finish dates of activities
- Includes change orders executed on the project. May also include activity disruptions
- Resources represent the actual resources exhausted to execute the Works
- Part of the closing processes of the project



Activities

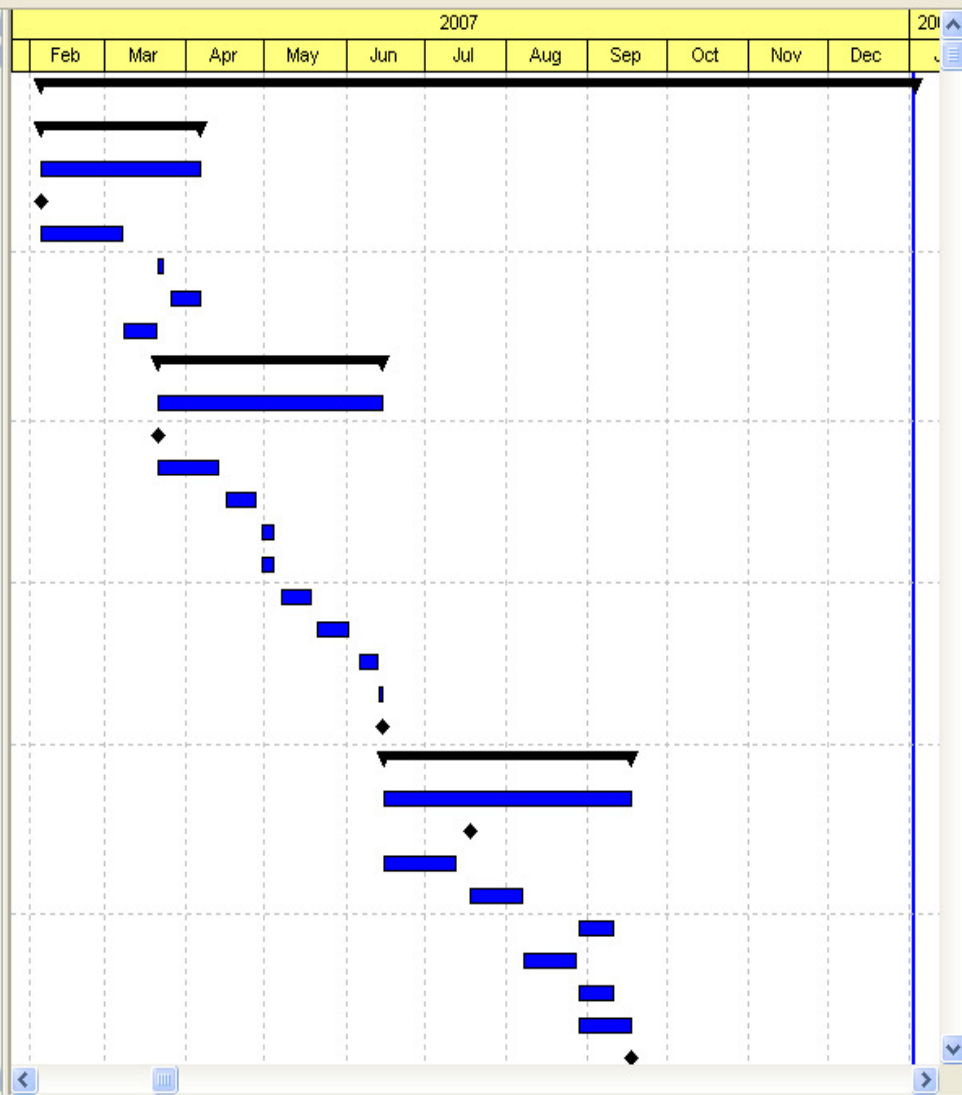
Back Forward Home Dir. Help



Layout: 2 Week Lookahead

Filter: All Activities

Activity ID	Activity Name	Remaining Duration	Actual Start	Actual Finish	Activity % Complete	Total Float
Bldg Office Building Addition		1	05-Feb-07			0
Bldg.D&E Design and Engineering		0	05-Feb-07	06-Apr-07		
BA-DE	Design & Engineering Summary	0	05-Feb-07	06-Apr-07	100%	
BA000	Start Office Building Addition Project	0	05-Feb-07		100%	
BA400	Design Building Addition	0	05-Feb-07	07-Mar-07	100%	
BA469	Assemble Technical Data for Heat Pu...	0	21-Mar-07	23-Mar-07	100%	
BA470	Review Technical Data on Heat Pum...	0	26-Mar-07	06-Apr-07	100%	
BA501	Review and Approve Designs	0	08-Mar-07	20-Mar-07	100%	
Bldg.Found Foundation		0	21-Mar-07	14-Jun-07		
BA-F	Foundation Summary	0	21-Mar-07	14-Jun-07	100%	
BA630	Begin Building Construction	0	21-Mar-07		100%	
BA640	Site Preparation	0	21-Mar-07	13-Apr-07	100%	
BA650	Excavation	0	16-Apr-07	27-Apr-07	100%	
BA660	Install Underground Water Lines	0	30-Apr-07	04-May-07	100%	
BA670	Install Underground Electric Conduit	0	30-Apr-07	04-May-07	100%	
BA680	Form/Pour Concrete Footings	0	07-May-07	18-May-07	100%	
BA681	Concrete Foundation Walls	0	21-May-07	01-Jun-07	100%	
BA690	Form and Pour Slab	0	06-Jun-07	12-Jun-07	100%	
BA700	Backfill and Compact Walls	0	13-Jun-07	14-Jun-07	100%	
BA701	Foundation Phase Complete	0		14-Jun-07	100%	
Bldg.Structure Structure		0	15-Jun-07	17-Sep-07		
BA-S	Structure Summary	0	15-Jun-07	17-Sep-07	100%	
BA702	Begin Structural Phase	0	18-Jul-07		100%	
BA710	Erect Structural Frame	0	15-Jun-07	12-Jul-07	100%	
BA712	Floor Decking	0	18-Jul-07	06-Aug-07	100%	
BA720	Erect Stairwell and Elevator Walls	0	28-Aug-07	10-Sep-07	100%	
BA730	Concrete First Floor	0	07-Aug-07	27-Aug-07	100%	
BA731	Concrete Basement Slab	0	28-Aug-07	10-Sep-07	100%	
BA735	Concrete Second Floor	0	28-Aug-07	17-Sep-07	100%	
BA737	Structure Complete	0		17-Sep-07	100%	
Bldg.Mechanical Mechanical/Elec		0	09-Apr-07	01-Jan-08		



Portfolio: All Projects

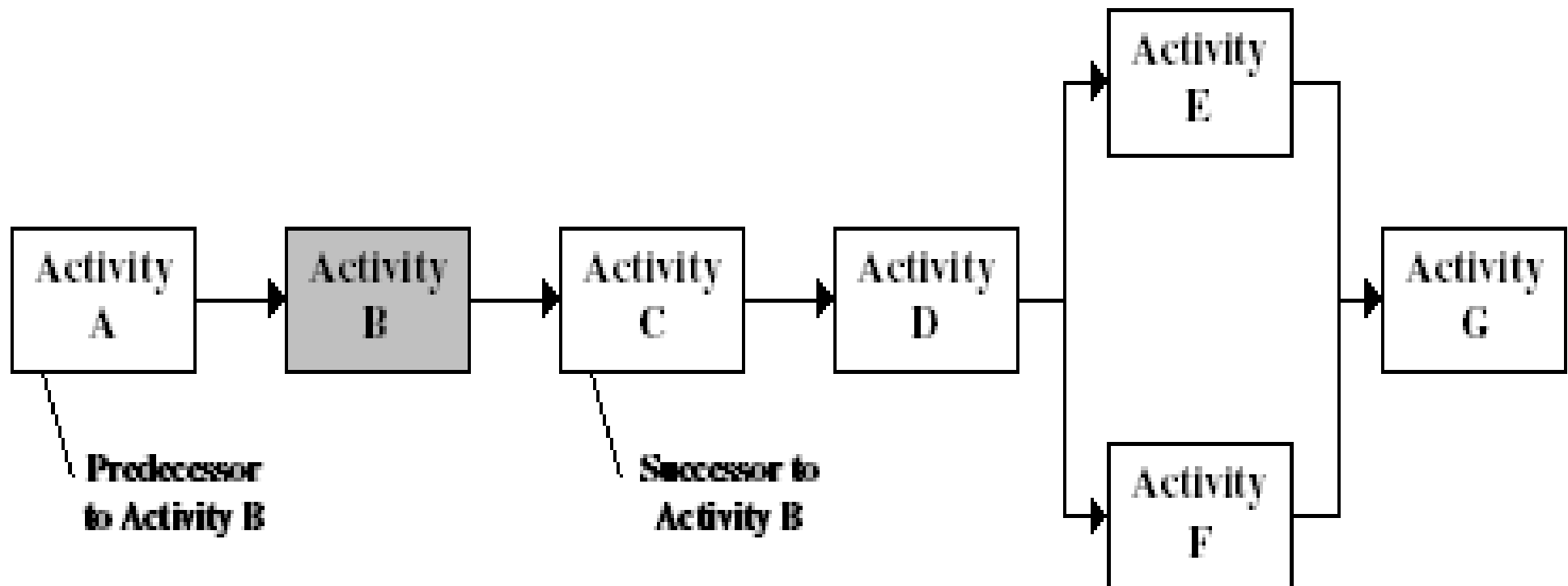
User: admin

Data Date: 03-Jan-08

Access Mode: Shared

Baseline: Current Project

A network logic diagram is commonly used to represent all activities in a project and their dependency relationships.



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DEFINING TIME



❑ Types of Relations used while sequencing the schedule:

■ Compulsory Relation

This is enforced by technical requirement or work methodology. This type of relations cannot be changed during acceleration or recovery.

■ Preferable Relations

This is used as decision of team member, planner or project manager where he/she prefers to do the work using this sequence. This can be changed during acceleration or recover

■ External Relation

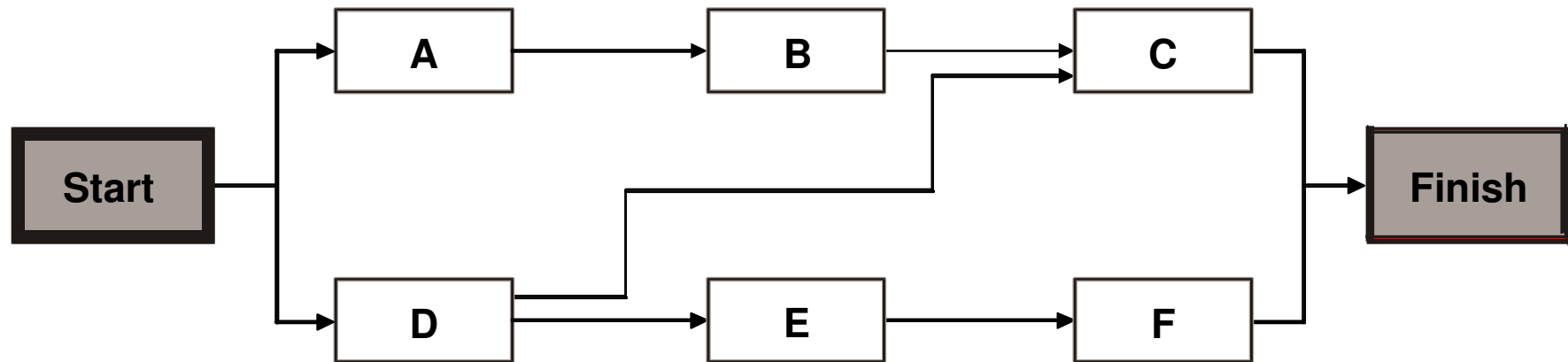
This is relation introduced by external party like authorities for example. Changing this relation depends on the approval of the party enforcing such relation



DEFINING TIME

- ❑ **Types of Relations used while sequencing the schedule:**
 - Record of types of relations used must be kept and documented
 - This record will be used at later stages
 - Record is preferably created in coordination with all related team members and approved by project manager

Precedence Diagramming Method



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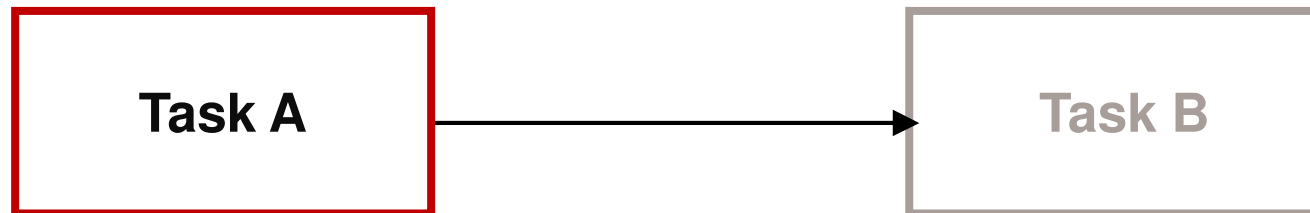


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Precedence Relationships Finish to Start (FS)

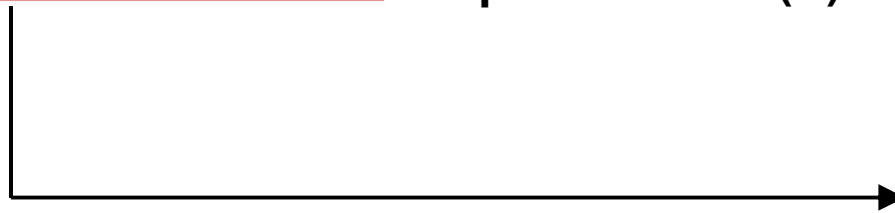
The “from” activity Task A must finish before the “to” activity Task B can start



Precedence Relationships Start to Start (SS)

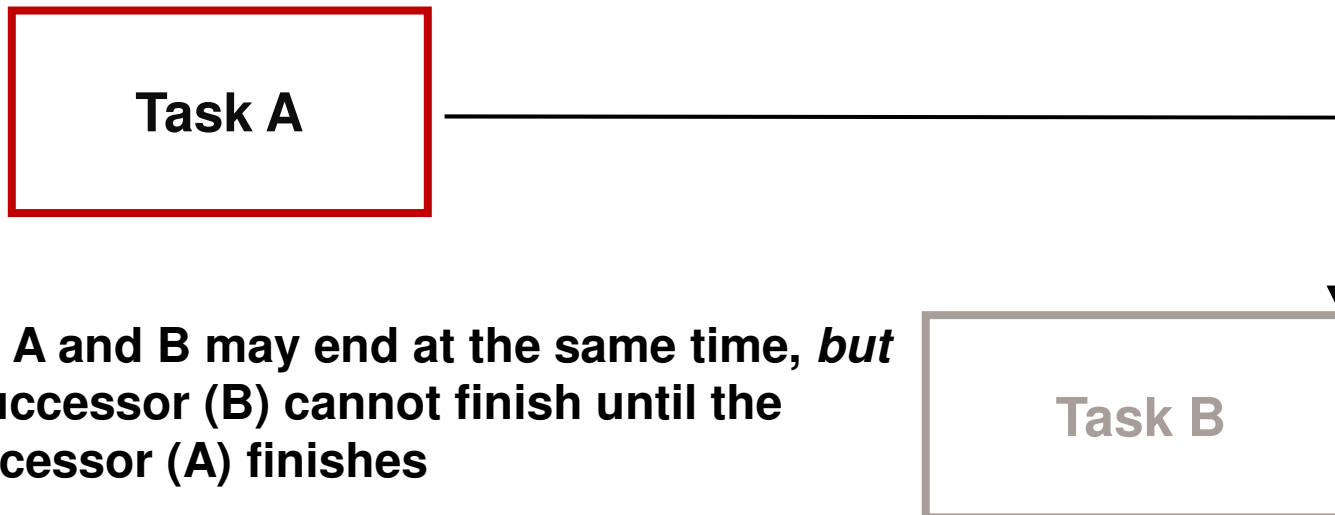


Tasks A and B may start at the same time, *but* the successor (B) cannot start until the predecessor (A) begins.



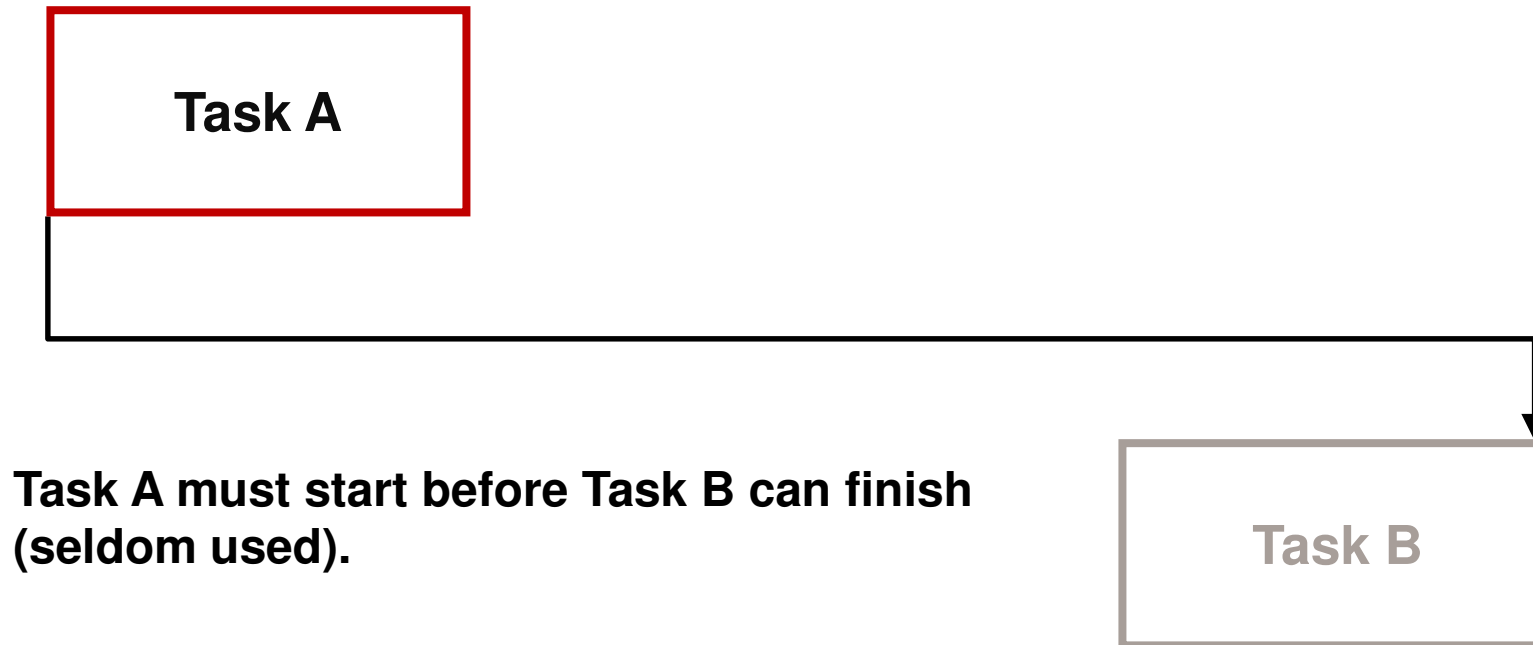
The direction of the arrow defines which task is the predecessor and which is the successor.

Precedence Relationships Finish to Finish (FF)



Tasks A and B may end at the same time, *but* the successor (B) cannot finish until the predecessor (A) finishes

Precedence Relationships Start to Finish (SF)



**Task A must start before Task B can finish
(seldom used).**

Lag



- ❑ A modification of a logical relationship that directs a delay in the successor activity. For example, in a finish-to-start dependency with a ten-day lag, the successor activity cannot start until ten days after the predecessor activity has finished.



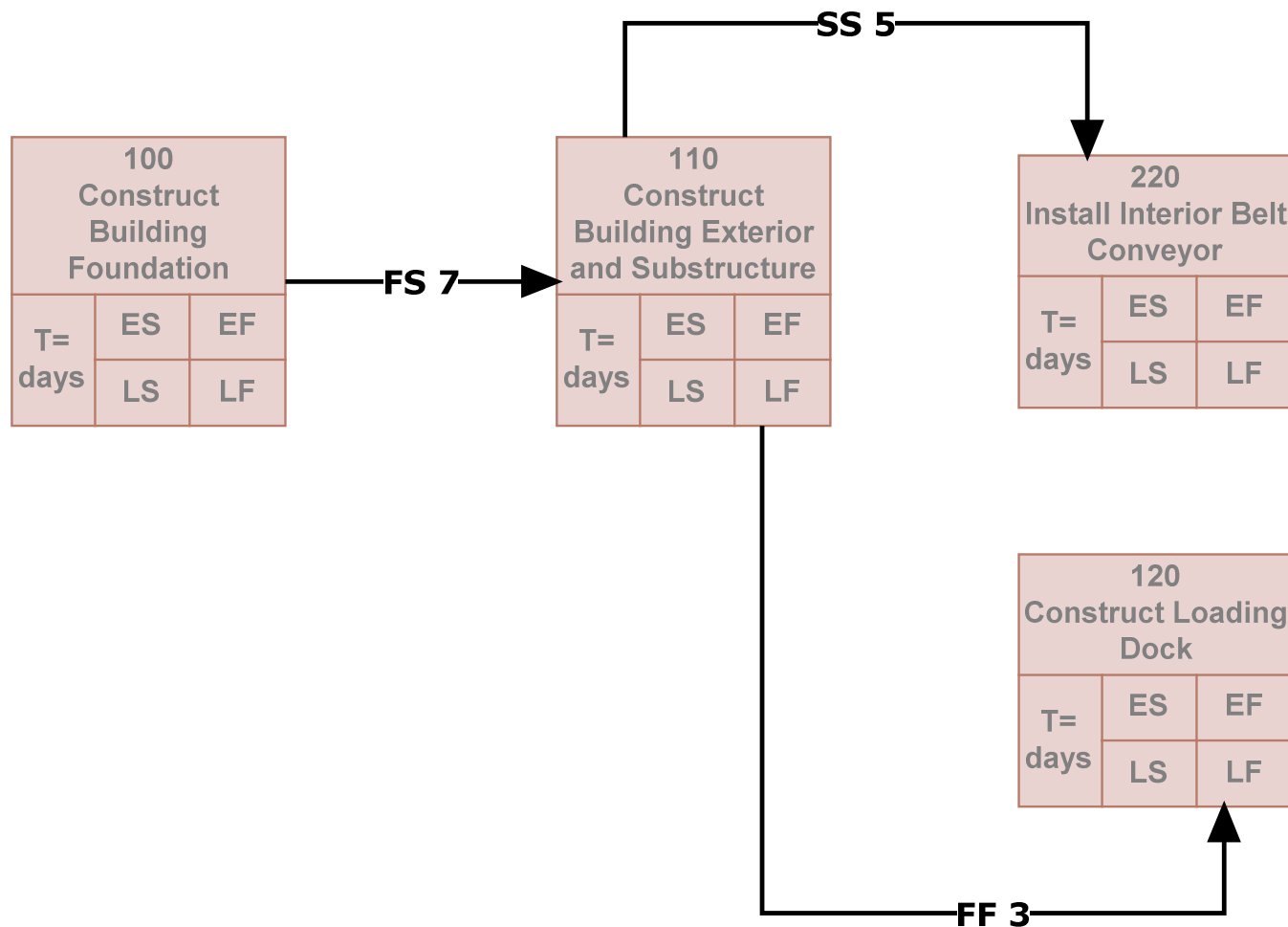
Lead



- ☐ A modification of a logical relationship that allows an acceleration of the successor activity. For example, in a finish-to-start dependency with a ten-day lead, the successor activity can start ten days before the predecessor activity has finished.
- ☐ A negative lead is equivalent to a positive lag.



Lags



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DEFINING TIME

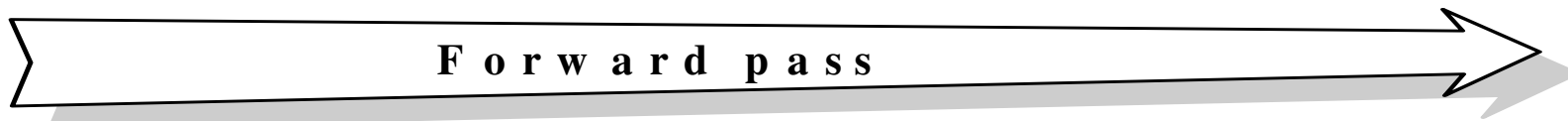
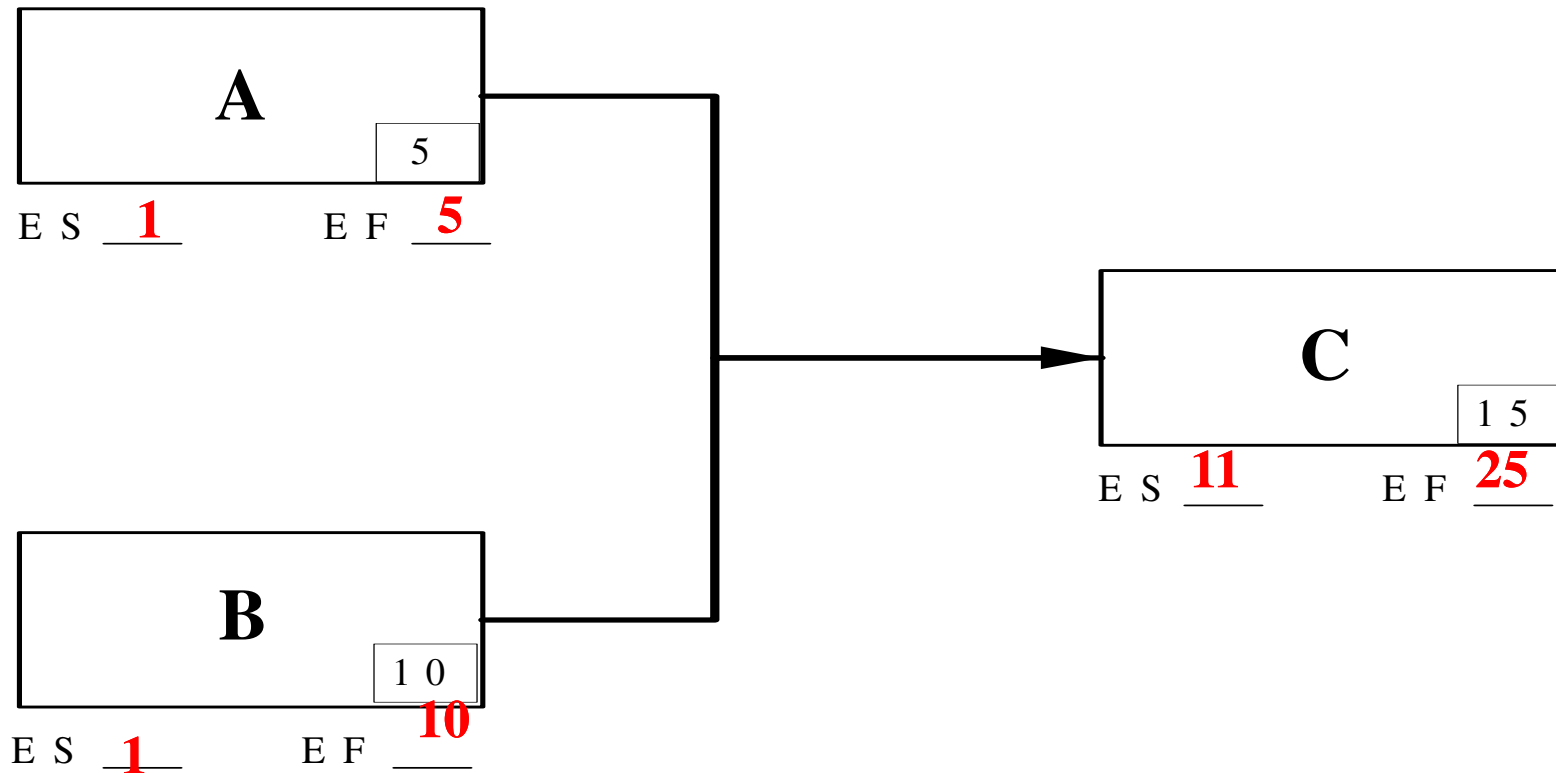


❑ Forward Pass

- The forward pass calculates an activity's early dates.
- Early dates are the earliest times an activity can start and finish once its predecessors have been completed.
- The calculation begins with the activities without predecessors.
- $\text{Early Start (ES)} + \text{Duration} - 1 = \text{Early Finish (EF)}$



DEFINING TIME

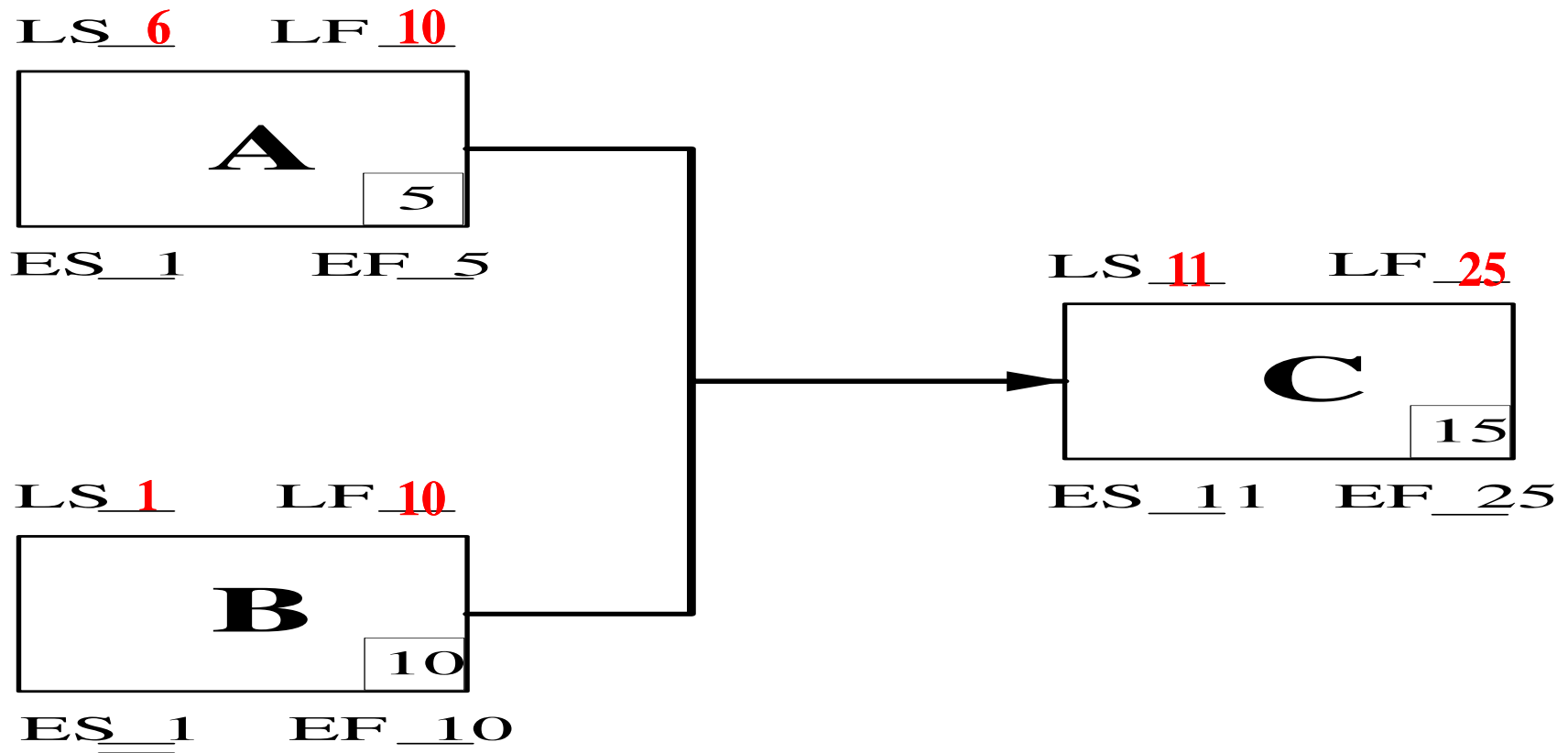


DEFINING TIME

❑ Backward Pass

- The backward pass calculates an activity's late dates.
- Late dates are the latest times an activity can start and finish without delaying the end date of the project.
- The calculation begins with the activities without successors.
- $\text{Late Finish} - \text{Duration} + 1 = \text{Late Start}$

DEFINING TIME



DEFINING TIME

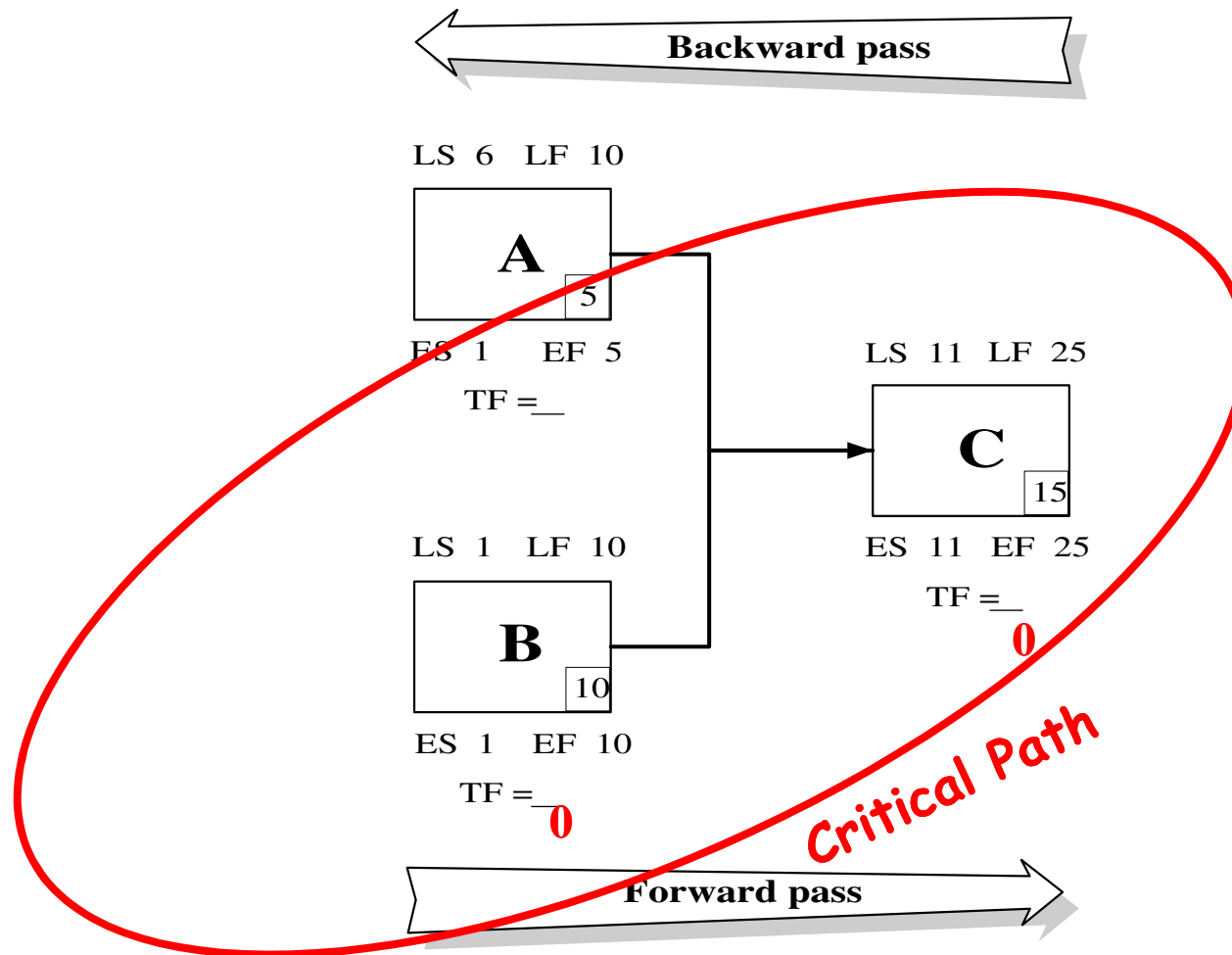


❑ Total Float

- The amount of time an activity can slip from its early start without delaying the project.
- The difference between an activity's late dates and early dates.
- Activities with zero Total Float are critical.
- $\text{Late date} - \text{Early date} = \text{Total Float (TF)}$
- An activity's Total Float is automatically calculated each time you schedule the project. You cannot edit an activity's float values direct



DEFINING TIME



DEFINING TIME

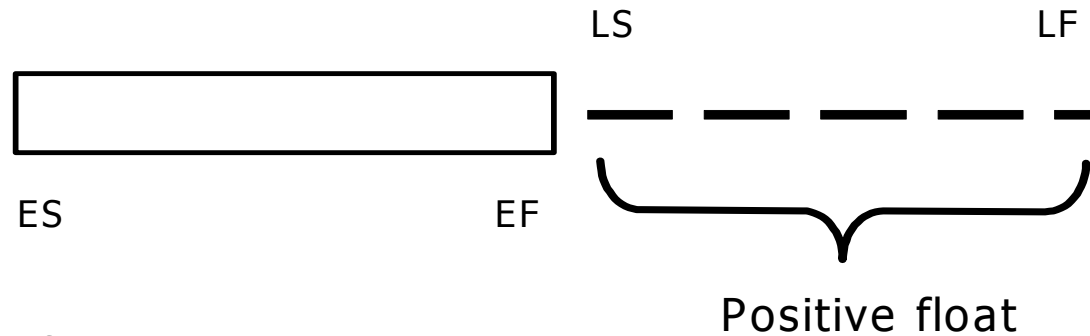
❑ Total Float Indicator

- Positive Float: Project/Activity in good situation
- Zero Float: Project/ Activity is critical
- Negative Float: Project/ Activity is extremely critical

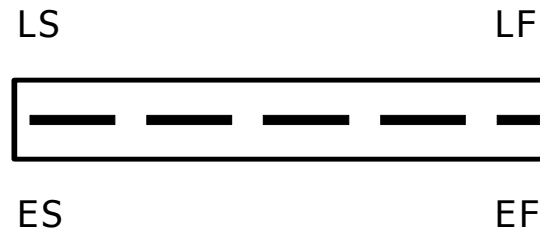
Total Float



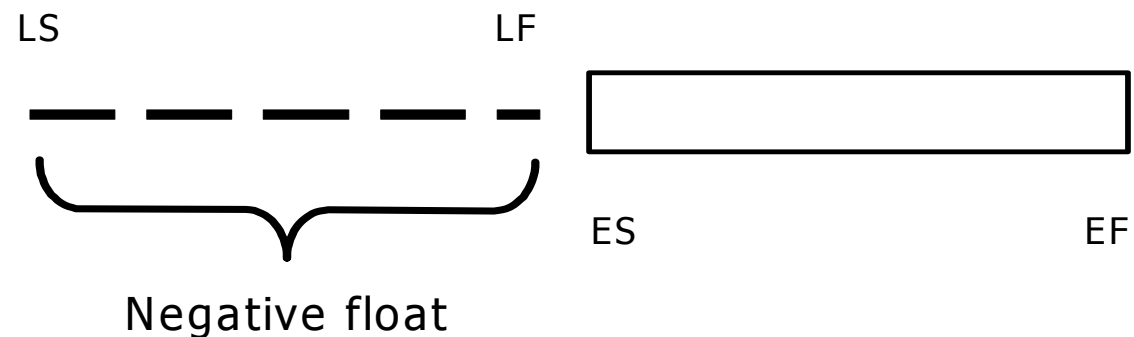
Positive float



Zero float (critical)



Negative Float (extremely critical)



DEFINING TIME

❑ Who Owns Float?

- Debatable Issue: Case Law does not provide consensus
- Best practices: 50% owned by the Contractor and 50% owned by the Client/Employer

❑ Critical Activities

- If your project schedule falls behind, focus on critical activities causing delay. Critical activities are usually defined as those with zero or negative float.
- How to define critical activities :
 - If you are focusing on specific activities, define critical activities as those whose Total Float is less than or equal to a specific value.
 - If you want to focus on the overall end date of the project, define critical activities as those on the longest path.

DEFINING TIME

TIP

- When creating your project plan, avoid open ends: Other than at the beginning and end of the project, and circular relationships, all activities should have a predecessor and successor activities to avoid inaccurate results when calculating the network.

DEFINING TIME

❑ Free Float

- Free float is the time the activity can be delayed with out delaying the successor activity/activities
- It is very important to monitor in packages/multi contractor environment

Exercise



- ☐ Calculate “Early Schedule”
- ☐ Calculate “Late Schedule”
- ☐ Calculate Total Float
- ☐ Calculate Critical Path



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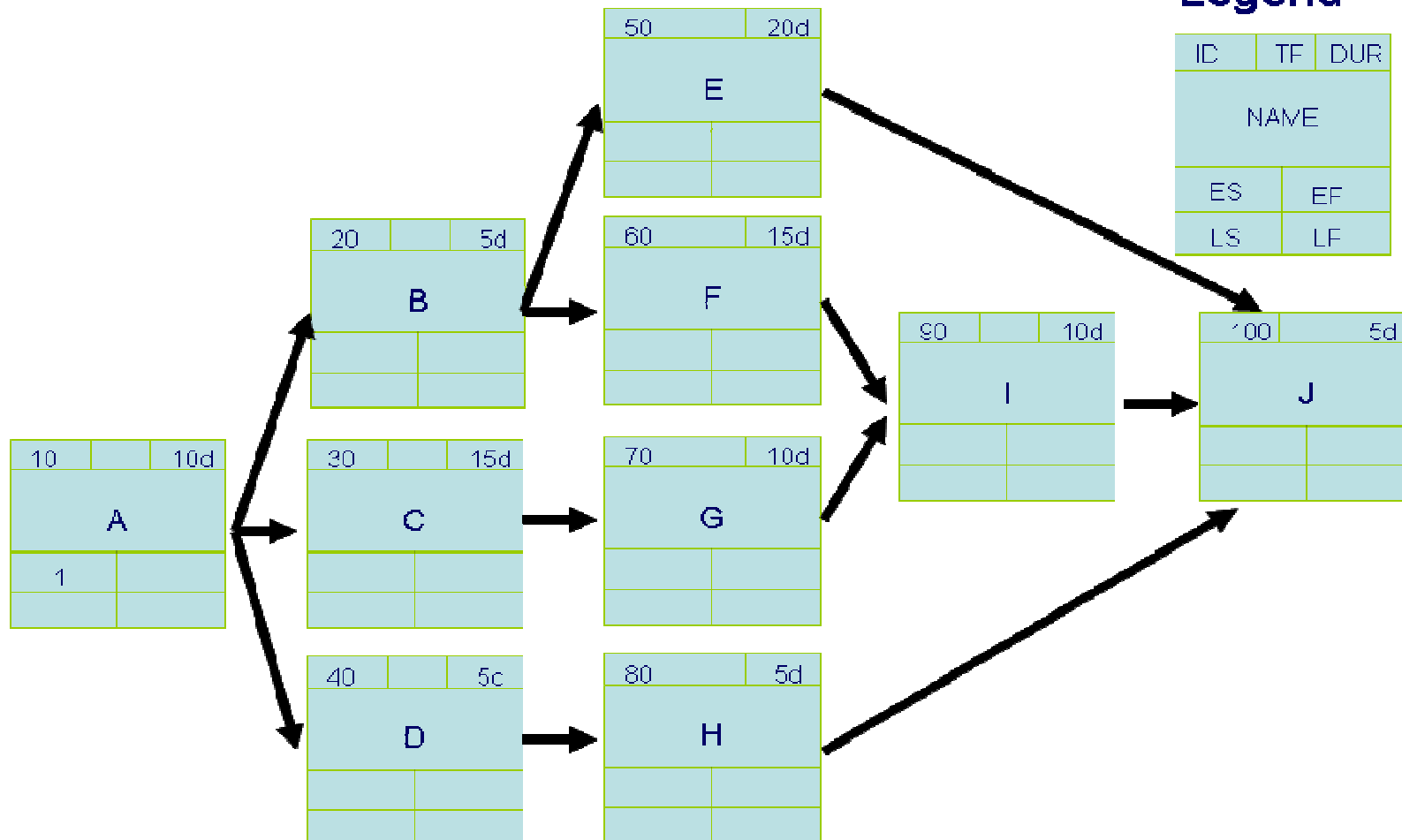
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Project Plan



Legend

ID	TF	DUR
NAME		
ES	EF	
LS	LF	



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The Project Schedule

Activity	DU	ES	EF	LS	LF	TF
A	10	1				
B	5					
C	15					
D	5					
E	20					
F	15					
G	10					
H	5					
I	10					
J	5					

DELAYS

- ☐ What is Delay?
- ☐ Why to Care About Delay?
- ☐ How Do Delays Arise?
- ☐ Types of delays
- ☐ Related FIDIC Clauses

WHAT IS DELAY?

- ❑ **DELAY is an act or event that extends the time required to perform tasks or activities under a Contract . It is usually reflected as additional days of work or as delayed start of activities.**
- ❑ **DELAY May or may not include change(s) in the scope of work of activity(s) or the Contract.**
- ❑ **DELAY May or may not shift the over all completion date of the contract or the entire scope completion date.**
- ❑ **DELAY May or may not be on the critical path**

CONCERNS REGARDING DELAYS

❑ EMPLOYERS

- Delayed completion date results in loss of income and penalties imposed by end users
- Assessment of causes of delays allocate entitlement of Liquidated Damages and or required additional Contractor's compensation payment(s)
- Delays usually affect the Project's budget

❑ CONTRACTORS

- Delayed completion date results in additional overheads and costs
- Assessment of causes of delays allocates entitlement of Liquidated Damages or compensation payment(s)



CONCERNS REGARDING DELAYS

☐ CONSULTANTS AND/OR CONSTRUCTION MANAGERS

- Affects their projects' control capacities
- Responsibility of assessment of delays

☐ BONDING COMPANIES AND SURETIES

- They have to indemnify the Contractor's Performance



HOW DO DELAYS ARRISE

❑ DELAYS ORIGINATE FROM ONE OF TWO SOURCES:

- Within the Performing Organization's control; or
- Factors beyond the Performing Organization's control.

HOW DO DELAYS ARRISE - EXAMPLE

- ❑ **Examples of delays originating from Within the Performing Organization's control**
 - Contractor's delay in ordering material "after approval is granted"
 - Contractor's delay in executing critical activity after all related requests are released

- ❑ **Examples of factors beyond the Performing Organization's control.**
 - Adverse weather conditions
 - Labor strikes
 - Changes in legislation
 - Force Majeure



Customer Caused Delay

- ☐ **Failure to provide the Performing Organization access:**
 - Late Notice To Proceed
 - Failure to provide entry to the project

- ☐ **Failing to provide necessary right-of-way**

- ☐ **Failing to provide necessary materials or facilities**

- ☐ **Suspending the work**





Customer Caused Delay

- ❑ **Changing the design or implementation requirements**
 - Change Orders
 - ❖ **Ordered Changes**
 - ❖ **Constructive Changes**
 - Changed Conditions
 - ❖ **Subsurface**
 - ❖ **Access**

- ❑ **Failing to make timely decisions**





Customer Caused Delay

- ☐ **Interfacing or obstructing the Performing Organization's performance.**
 - Direct Interference
 - Early Occupancy

- ☐ **Requiring the work to be done out of the normal and customary work sequence.**

- ☐ **Failing to coordinate separate Performing Organizations.**





Customer Caused Delay

- ☐ **Defective plans and specifications:**
 - Errors and Omissions
 - Lack of coordination
 - Ambiguity

- ☐ **Failure to provide drawings on schedule**

- ☐ **Unreasonable delay in review of shop drawings or approval of material.**





Customer Caused Delay

- ☐ Improper or delayed change orders.
- ☐ Stop work orders.
- ☐ Inadequate supervision/observation/ inspection.
- ☐ Failure to accept completed work in a timely manner.





Customer Caused Delay

- ❑ Unreasonable or delayed interpretation of contract requirements.
- ❑ Unreasonable delay in issuing orders to proceed.



Performing Organization Caused Delay



- ❑ **Slow mobilization.**
- ❑ **Failure to properly man the project.**
- ❑ **Poor workmanship.**
- ❑ **Failure to coordinate or manage:**
 - Poor productivity
 - Inadequate supervision
 - Poor planning
 - Failure to schedule
 - Subcontractors



Performing Organization Caused Delay



☐ Cash flow limitations

- Slow to pay subcontractors and suppliers
- Inadequate financing

☐ Late Material Delivery

☐ Late submission or resubmission of shop drawings.

☐ Failure to make reasonable site investigations.

☐ Default, failure or abandonment.



Delays Not Caused By A Party To The Project



- ☐ Acts of God.
- ☐ Acts of the Government.
- ☐ Strikes.
- ☐ Acts of the Public Enemy.



Delay Causes



Activity Codes

☒ Global ☐ Project

Select Activity Code

Delay Causes

Modify...

Display: All Values

Code Value	Description
OW	Owner Caused Delays
AE	Architect / Engineer Caused Delays
CO	Contractor Caused Delays
NP	Delays Not Caused by a Party to the Project

Close

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Delay Causes



Activity Codes

Global Project

Select Activity Code

Delay Causes

Modify...

Display: All Values

Code Value	Description
OW	Owner Caused Delays
OW.CA	Failure to Provide the Contractor Access
OW.CA.LP	Late Notice To Proceed
OW.CA.EP	Failure to Provide Entry to the Project
OW.RW	Failing to Provide Necessary Right-of-Way
OW.MF	Failing to Provide Necessary Materials or Facilities
OW.SW	Suspending the Work
OW.DC	Changing the Design or Construction Requirements
OW.DC.CO	Change Orders
OW.DC.CO.OC	Ordered Changes
OW.DC.CO.CC	Constructive Changes
OW.DC.CC	Changed Conditions
OW.DC.CC.SS	Subsurface
OW.DC.CC.AC	Access
OW.TD	Failing to Make Timely Decisions
OW.CP	Interfacing or Obstructing the Contractor's Performance
OW.CP.DI	Direct Interference
OW.CP.EO	Early Occupancy
OW.AW	Failing to Accept the Work
OW.WS	Requiring the Work to be Done Out of the Normal and Customary Work Sequence
OW.SC	Failing to Coordinate Separate Contractors

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Delay Causes



Activity Codes

☒ Global ☐ Project

Select Activity Code

Delay Causes

Modify...

Display: All Values

Code Value	Description
AE	Architect / Engineer Caused Delays
AE.PS	Defective Plans and Specifications
AE.PS.EO	Errors and Omissions
AE.PS.LC	Lack of Coordination
AE.PS.AG	Ambiguity
AE.DW	Failure to Provide Drawings on Schedule
AE.SM	Unreasonable Delay in Review of Shop drawings or Approval of Material
AE.CO	Improper or Delayed Change Orders
AE.WO	Stop Work Orders
AE.SI	Inadequate Supervision/ Observation/ Inspection
AE.TM	Failure to Accept Completed Work in a Timely Manner
AE.CR	Unreasonable or Delayed Interpretation of Contract Requirements
AE.TD	Failure to make Timely Decisions

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Delay Causes



Activity Codes

☒ Global ☐ Project

Select Activity Code

Delay Causes

Modify...

Display: All Values

Code Value	Description
CO	Contractor Caused Delays
CO.SM	Slow Mobilization
CO.MP	Failure to Properly Man the Project
CO.PW	Poor Workmanship
CO.CM	Failure to Coordinate or Manage
CO.CM.PP	Poor Productivity
CO.CM.IS	Inadequate Supervision
CO.CM.PN	Poor Planning
CO.CM.FS	Failure to Schedule
CO.CM.SC	Subcontractors
CO.CF	Cash Flow Limitations
CO.CF.SS	Slow to Pay Subcontractors and Suppliers
CO.CF.IF	Inadequate Financing
CO.MD	Late Material Delivery
CO.SD	Late Submission or Resubmission of Shop Drawings
CO.SI	Failure to Make Reasonable Site Investigations
CO.FA	Default, Failure or Abandonment

Close

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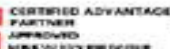
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Delay Causes



Activity Codes

☒ Global ☐ Project

Select Activity Code

Delay Causes

Modify...

Display: All Values

Code Value	Description
OW	Owner Caused Delays
AE	Architect / Engineer Caused Delays
CO	Contractor Caused Delays
NP	Delays Not Caused by a Party to the Project
NP.AG	Acts of God
NP.GT	Acts of the Government
NP.ST	Strikes
NP.PE	Acts of the Public Enemy

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EVENTS AND DELAYS

- ❑ Events giving rise to delays and/or claim must be clearly defined through out the project life cycle.
- ❑ Events must be classified (type of delay).
- ❑ Contractual analysis must be carried out for each event giving rise to delay. Entitlement is accordingly determined.
- ❑ “What if” analysis/scenarios can be utilized using CPM and Network to pre-determine the effect of the event on the project.
- ❑ Defining Events giving rise to claim instantaneously gives space for pro-active actions.

TYPES OF DELAYS

- ❑ **Generally Delays are Classified in three main categories:**
 - Independent Delays
 - Serial Delays, and
 - Concurrent Delays

TYPES OF DELAYS

☐ Independent Delays

- Those are isolated delays and do not result from previous delay. Effect of independent delays on the project's completion date can be easily calculated.
- Independent delays may cause serial Delays

☐ Serial Delays

- Occur exclusively from previous un-related delay to predecessor activity.
- They are a sequence of consecutive non-overlapping delays in a particular network.
- Determining the timing of Delay with respect to other delays is the primary issue.
- Individual delays in a series of delay do not conflict and the determination of the over all effect on the project's completion date is relatively easy.

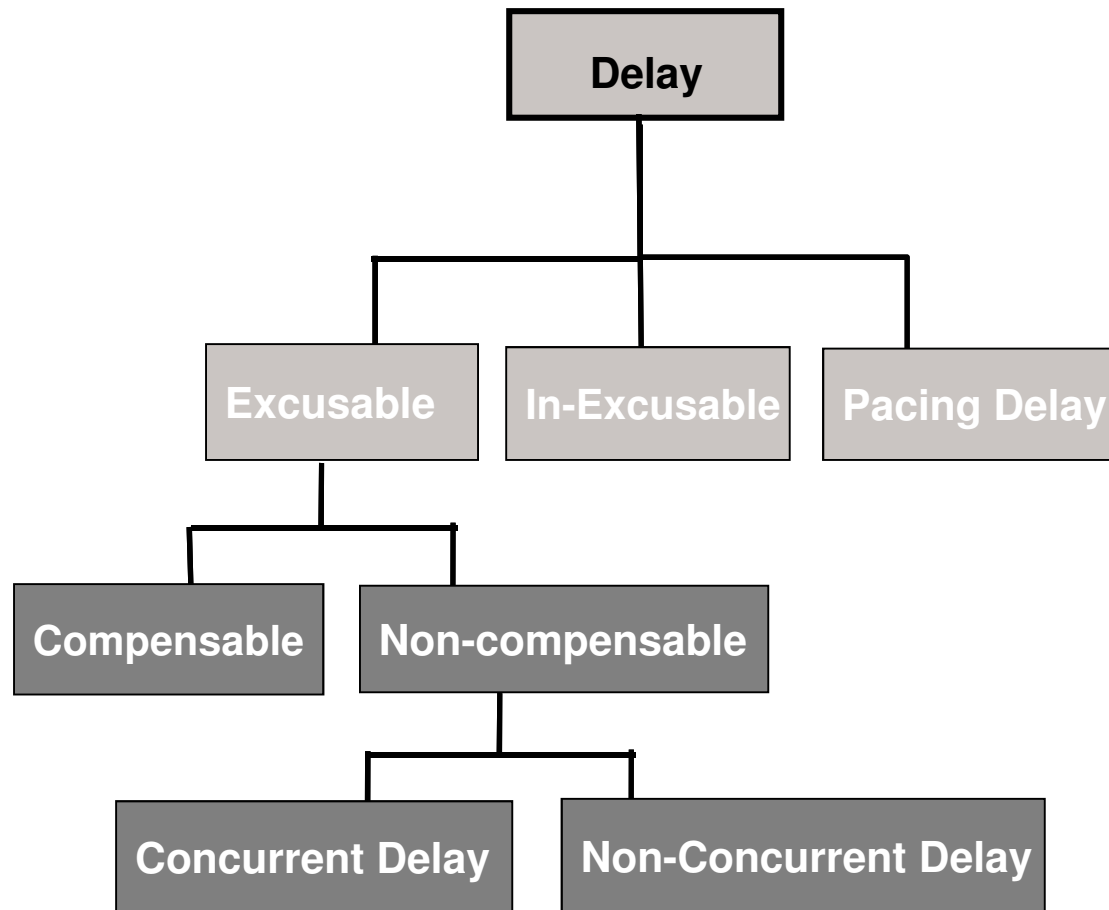
☐ Concurrent delays

TYPES OF DELAYS

☐ In Construction Industry, Delays are known to be classified as:

- Excusable Delays
- In-Excusable Delays
- Non-Compensable Delays
- Compensable Delays
- Concurrent delays
- Pacing Delays

DELAYS LIABILITY DIAGRAM



TYPES OF DELAYS

☐ In-Excusable Delays (N/N)

- Delays caused by the actions or inactions of the Contractor or one of his Sub-Contractors, Suppliers or any other party whose in contractual relation with the Contractor.
- The Contractor will not be entitled for an Extension of Time

☐ Excusable Delays

- Delays that are not caused by the Contractor's action or inactions, but occur as a result of events beyond the Contractor's control
- Such delays entitle the Contractor to an extension of time (if the contractual completion date of the project is affected as a result of occurrence of the excusable delay event)
- Might be compensable or non-compensable delays

TYPES OF DELAYS

❑ Excusable Non Compensable Delays (E/N)

- Excusable delays that are caused by neither of parties (Contractor and Employer) or (both parties in case of concurrent delays).
- Both parties have been affected by the delay
- Only extension of time is warranted (without compensation) to eliminate the Contractor's liability for Liquidated Damages
- Generally both parties are precluded from the recovery of the delay damages.
- Each party bears his costs incurred as a result of non-compensable delays
- Examples may include **labor strikes, acts of nature, adverse weather conditions...etc.**

TYPES OF DELAYS

❑ Excusable Compensable Delays (E/C)

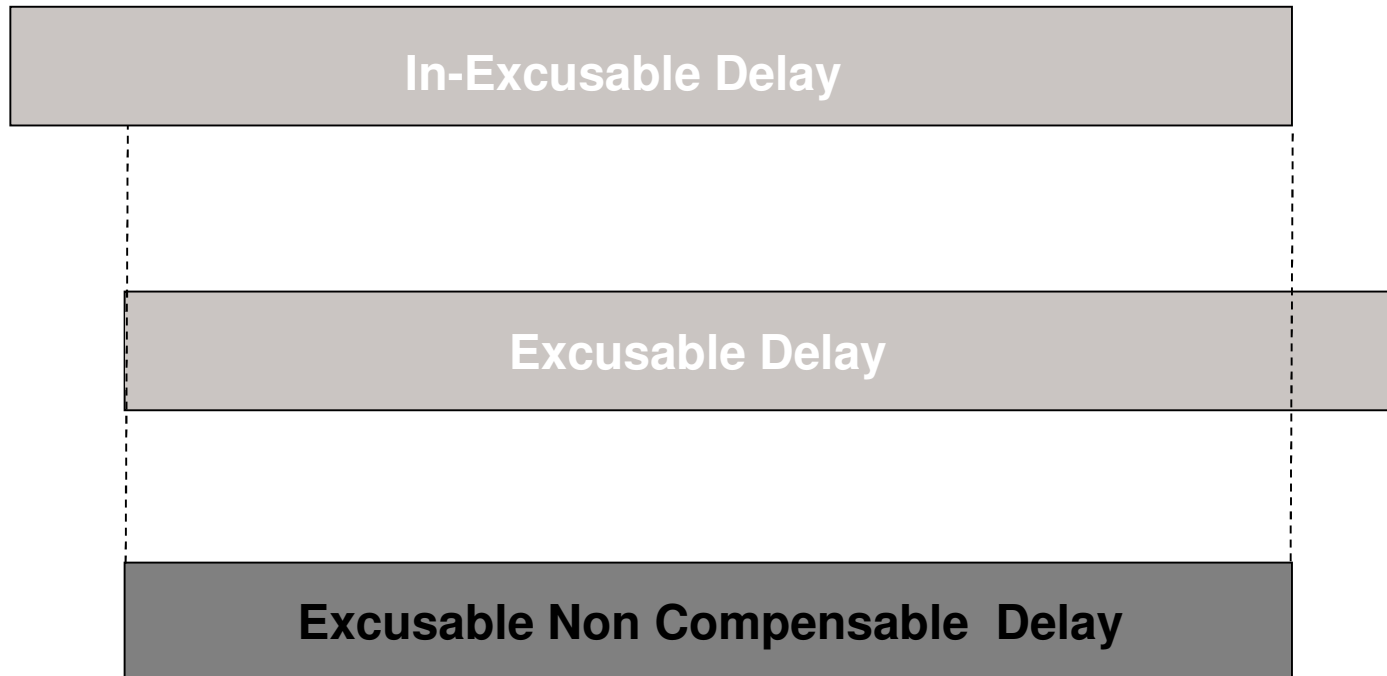
- Excusable delays generated as a result of event(s)) that are within the control of the Employer, one of his employees or agents (Engineer/CM/Designer/ another Contractor at site ...etc)
- Most of the times, it entitles the Contractor for an extension of time as well as prolongation costs that may include all his head office support, site management expenses, disruptions, ...etc.
- Examples may include delay in material submittal review, change orders, other contractors delays, suspension of works to the convenience of the client ...etc.

TYPES OF DELAYS

❑ Concurrent Delays

- Two or more delay events share the same time and fall in parallel critical paths.
- If any of the delays occurred, the project's completion date would be affected
- Delays might, or might not be related
- Delay on the critical path is not considered concurrent with other delays off of the critical path arising in an overlapping period.
- If concurrent delays arise from two different parties (Contractor and Employer) it may result in issuance of excusable non-compensable extension of time, where Employer furnishes time and gives up liquidated damages.
- However, compensation is highly dependant on the situation, claim analyst must be aware of each case independently.

Concurrent Delays



**In-Excusable
Delay concurrent
with Excusable
Delay yields a net
Excusable Non
Compensable
Delay**

**ONLY Time
Extension is
Granted**



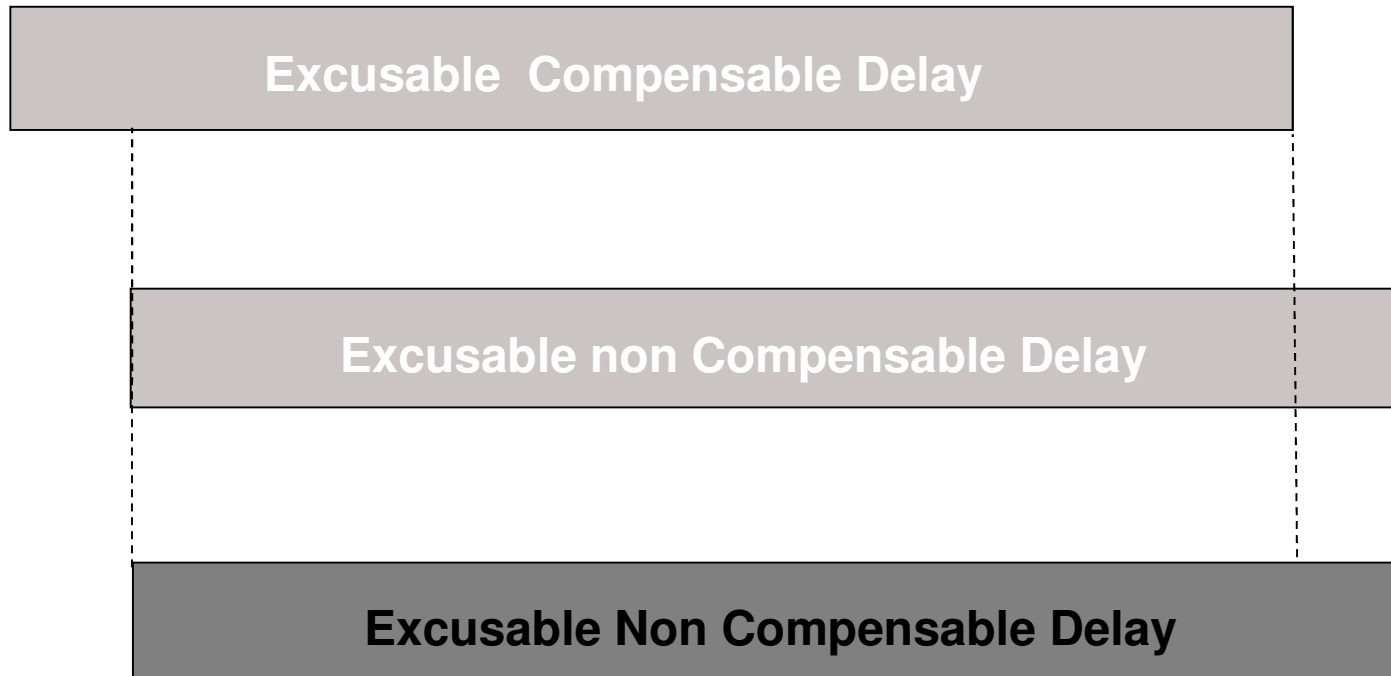
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Concurrent Delays



**Excusable
Compensable
Delay concurrent
with Excusable
Non
Compensable
yields a net
Excusable Non
Compensable
Delay**

**ONLY Time
Extension is
Granted**



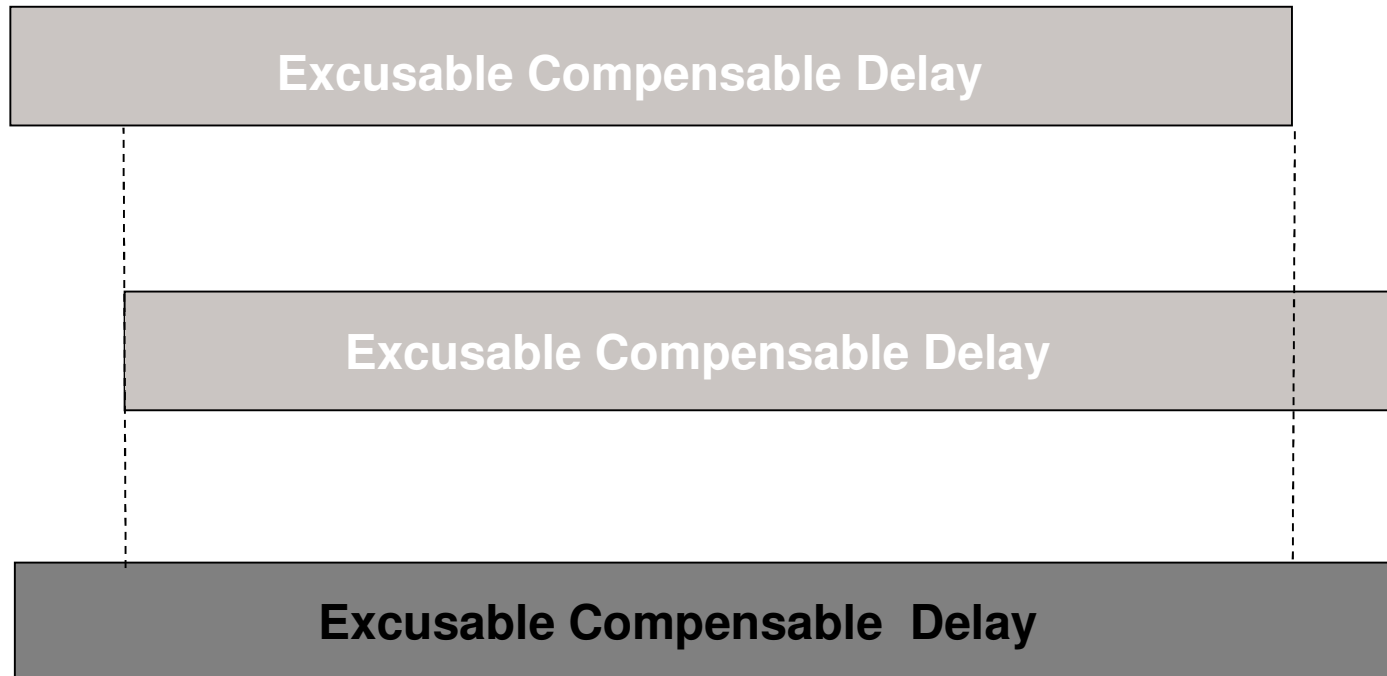
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Concurrent Delays



Excusable Delay concurrent with Excusable Delay yields a net Excusable Compensable Delay

Contractor might be entitled for Time Extension and Delay Damages.



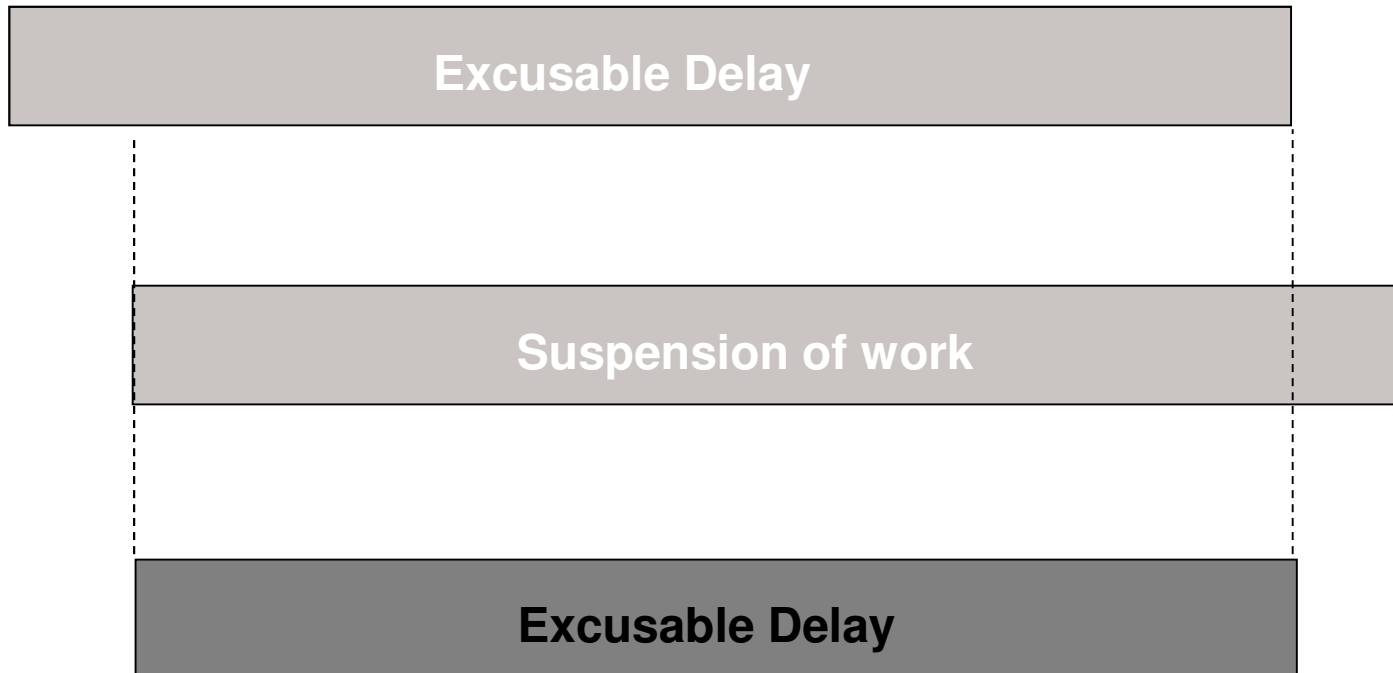
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Concurrent Delays



Excusable Delay concurrent with Suspension of work yields a net Excusable Delay

Contractor might be entitled for Time Extension and Delay Damages.



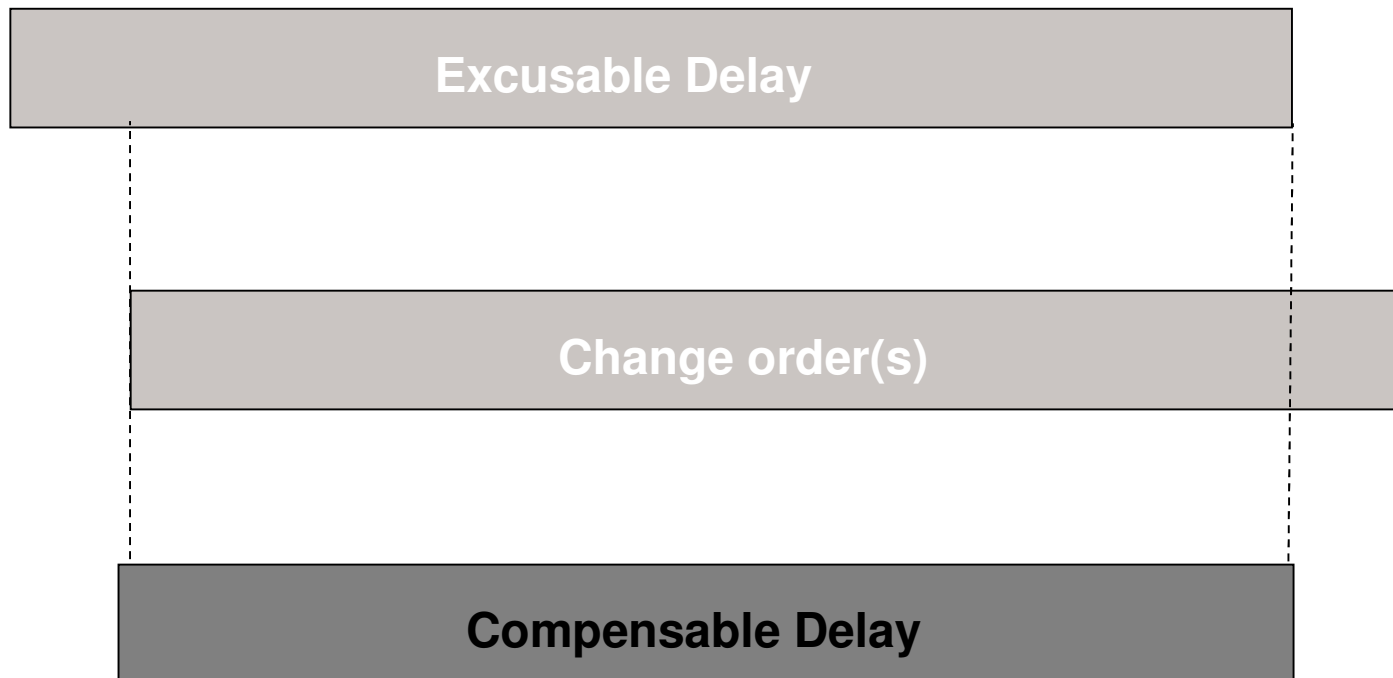
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Concurrent Delays



Excusable Delay concurrent with Change order(s) yields a net Compensable Delay

Contractor might be entitled for Time Extension and Delay Damages.



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NOTE



- ❑ ONLY THE OVERLAPPING DURATION IS CONSIDERED CONCURRENT AND ANALYZED ACCORDING TO THE CONCURRENT DELAYS CRITERIA. THE NON OVERLAPPING PORTIONS OF EACH DELAY ARE TO BE TREATED AS INDIVIDUAL DELAY AND ANALYZED ACCORDINGLY.



TYPES OF DELAYS

❑ Pacing Delays

- This is a new type of delays in construction claims. It is addressed as legitimate business decision rather than being contractual, where the Contractor's management takes a decision to de-accelerate non critical areas, due to the Employer's delays or Employer's expected delays in critical areas, for the purpose of keeping pace with Employer's delays
- It is usually disputed issue as no contractual cover for such decision
- Contractors in England and USA has won some cases related to pacing delays in courts.

EXERCISE



- ❑ **Is the Delays in the following case concurrent? If Yes, is the Contractor entitled for Time Extension and Claim Damages or Time Extension Only**

- ❑ **Exercise 1:**

- Activity A is in the critical path of the Contractor's schedule. Employer decided to implement some changes in the design which will cause activity A that was planned to start in week 15 of the project to be hindered for 20 days. Activity B has a total float of 20 days and was delayed by the contractor due to delay in material delivery. Activity B was supposed to start in week 15 of the Project.



EXERCISE



❑ Exercise 1 - Answer:

- Those are not concurrent delays. Activity B is not a critical activity



EXERCISE

- ☐ Is the Delays in each of the following case concurrent?
- ☐ If Yes, is the Contractor entitled for Time Extension and Claim Damages or Time Extension Only?

- ☐ **Exercise 2:**

- Adverse weather condition has occurred that causes delay in the start of foundations works for 20 days. Foundation activity is very critical and was supposed to start on day number 8 of the project. It was the Employer responsibility to provide the pipes for the main drainage line for this project on day number 11 of the project and Contractor to start laying the pipes in day number 20. Pipe laying is another critical activity in the Project The employer did not deliver the pipes on time causing the start of laying the pipes to start in day number 31.

EXERCISE



❑ Exercise 2 - Answer:

- Those are concurrent delays
- This case represents excusable non-compensable delays with excusable compensable delay.
- The result is excusable non compensable delay. The contractor will be entitled for Time extension but not claim damages



EXERCISE



❑ Exercise 3:

- A Project is composed of four buildings. All buildings must be completed at the same completion date .i.e. there is no partial handing over
- All design drawings must be completed on the fifth week, this is critical activity. Due to technical reasons all foundations for the four buildings must be completed before proceeding further with the remaining activities.
- It is the Eighth week Employer is still changing the designs of building number 4. Final for construction drawings was not released to the contractor
- According to the delay in building 4. Contractor decided to pull out some resources working in buildings 2 and 3. Accordingly foundation completion date for these two buildings was not completed as scheduled. Completing foundations for buildings 2 and 3 is another critical activity in the project.



EXERCISE



❑ Exercise 3 - Answer:

- This is Pacing Delay.



EXERCISE

- ☐ Is the Delays in each of the following case concurrent?
- ☐ If Yes, is the Contractor entitled for Time Extension and Claim Damages or Time Extension Only?
- ☐ If the Contractor is entitled for time extension, what is the concurrent delay duration that will be considered in this case?

☐ Exercise 4:

- A project of 200 days duration, in day 180 of the project Contractor received formal instruction for executing additional floor in the 50 story tower project. It was agreed with the Engineer that Contractor needs additional 30 days to complete this additional floor. The execution will start according to schedule in day 200 of the project.
- This project schedule contains 3 critical paths. One of them lies through the external works which was also delayed by 30 days due to the Contractor's delay in delivering very important materials. The external works were planned to be completed in the day 200 of the project.

EXERCISE



❑ Exercise 4 - Answer:

- This is excusable compensable delay concurrent with in- excusable delay
- Contractor will be entitled for time extension only with out delay damages costs for 30 days



EXERCISE



❑ Exercise 5:

- Project A has strict Engineering milestones where delay damages are imposed on these milestones. Review duration is 20 days. Engineer delayed first milestone which was planned to be completed on day 80 of the project for 20 days. Parallel to this and on another critical path of the project, Contractor was delayed due to delay in issuance of required authorities approval (Employer's responsibility) for 55 days . Authorities Approvals were planned to be released on the day 80.



EXERCISE



❑ Exercise 5 - Answer:

This is not Concurrent Delay. Delays are caused by the same party



TYPES OF DELAYS - RELATED CONTRACT CLAUSES

- ☐ Clause 2.1: Right of Access to the Site
- ☐ Clause 2.5: Employer's Claim
- ☐ Clause 4.2: Performance Security
- ☐ Clause 4.7: Setting Out
- ☐ Clause 4-12: Unforeseeable Physical Conditions
- ☐ Clause 4-24: Fossils
- ☐ Clause 7.4: Testing
- ☐ Clause 8.4: Extension of Time for Completion
- ☐ Clause 8.5: Delays caused by Authorities
- ☐ Clause 11.3: Extension of Defects Notification Period
- ☐ Clause 11.4: Failure to Remedy Defects
- ☐ Clause 13.3: Variation Procedure
- ☐ Clause 13.7: Adjustments for Changes in legislations
- ☐ Clause 16.1: Contractor's Entitlement to Suspend the Works
- ☐ Clause 16.2: Termination by the Contractor
- ☐ Clause 17.4: Consequences of Employer's Risks
- ☐ Clause 19: Force Majeure
- ☐ Clause 20.1: Contractor's Claims



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Clause 2.1: Right of Access to the Site

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the Contract Data. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Specification. However, the Employer may withhold any such right or possession until the Performance Security has been received. If no such time is stated in the Contract Data, the Employer shall give the Contractor right of access to, and possession of, the Site within such times as may be required to enable the Contractor to proceed in accordance with the program submitted under Sub-Clause 8.3 [*Programme*].

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [*Contractor's Claims*] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [*Extension of Time for Completion*], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [*Determinations*] to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

Clause 2.5: Employer's Claim

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Employer or the Engineer shall give notice and particulars to the Contractor. However, notice is not required for payments due under Sub-Clause 4.19 [Electricity, Water and Gas], under Sub-Clause 4.20 [Employer's Equipment and Free-Issue Material], or for other services requested by the Contractor.

The notice shall be given as soon as practicable after the Employer became aware, or should have become aware, of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. The Engineer shall then proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor, and/or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 [Extension of Defects Notification Period].

This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

Clause 4.2: Performance Security

The Contractor shall obtain (at his cost) a Performance Security for proper performance, in the form, amount and currencies stated in the Contract Data. If an amount is not stated in the Contract Data, this Sub-Clause shall not apply.

The Contractor shall deliver the Performance Security to the Employer within 28 days after receiving the Letter of Acceptance, and shall send a copy to the Engineer. The Performance Security shall be issued by an entity and from within a country (or other jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract.



Clause 4.2: Performance Security

The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim. The Employer shall return the Performance Security to the Contractor within 21 days after receiving a copy of the Performance Certificate.

Without limitation to the provisions of the rest of this Sub-Clause, whenever the Engineer determines an addition or a reduction to the Contract Price as a result of a change in cost and/or legislation or as a result of a Variation amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor shall at the Engineer's request promptly increase, or may decrease, as the case may be, the value of the Performance Security in that currency by an equal percentage.



Clause 4.7: Setting Out

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

The Employer shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and

(b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.



Clause 4-12: Unforeseeable Physical Conditions

In this Sub-Clause, “physical conditions” means natural physical conditions and manmade and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions. If the Contractor encounters adverse physical conditions which he considers to have been Unforeseeable, the Contractor shall give notice to the Engineer as soon as practicable.

This notice shall describe the physical conditions, so that they can be inspected by the Engineer, and shall set out the reasons why the Contractor considers them to be

4.10 Site Data

4.11 Sufficiency of the Accepted Contract Amount

4.12 Unforeseeable Physical Conditions

Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions which the Engineer may give. If an instruction constitutes a Variation, Clause 13 [Variations and Adjustments] shall apply.

If and to the extent that the Contractor encounters physical conditions which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor’s Claims] to:



Clause 4-12: Unforeseeable Physical Conditions

- (a)** an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b)** payment of any such Cost, which shall be included in the Contract Price. After receiving such notice and inspecting and/or investigating these physical conditions, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) whether and (if so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in subparagraphs (a) and (b) above related to this extent. However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Engineer may also review whether other physical conditions in similar parts of the Works (if any) were more favourable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favourable conditions were encountered, the Engineer may proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under sub-paragraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in the Contract Price.

The Engineer may take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender, which may be made available by the Contractor, but shall not be bound by any such evidence.

Clause 4-24: Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

Clause 7.4: Testing

This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

7.1 Manner of Execution

7.2 Samples

7.3 Inspection

7.4 Testing Plant, Materials and Workmanship

The Engineer may, under Clause 13 [Variations and Adjustments], vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

The Engineer shall give the Contractor not less than 24 hours' notice of the Engineer's intention to attend the tests. If the Engineer does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer, and the tests shall then be deemed to have been made in the Engineer's presence.

Clause 7.4: Testing

If the Contractor suffers delay and/or incurs Cost from complying with these instructions or as a result of a delay for which the Employer is responsible, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed, the Engineer shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Engineer has not attended the tests, he shall be deemed to have accepted the readings as accurate.

Clause 8.4: Extension of Time for Completion

The Contractor shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 [Taking-Over of the Works and Sections] is or will be delayed by any of the following causes:

- (a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 [Variation Procedure]) or other substantial change in the quantity of an item of work included in the Contract,
- (b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,
- (c) exceptionally adverse climatic conditions,
- (d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions, or
- (e) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors.

If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with Sub-Clause 20.1 [Contractor's Claims]. When determining each extension of time under Sub-Clause 20.1, the Engineer shall review previous determinations and may increase, but shall not decrease, the total extension of time.



Clause 8.5: Delays caused by Authorities

If the following conditions apply, namely:

- (a) the Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in the Country,
 - (b) these authorities delay or disrupt the Contractor's work, and
 - (c) the delay or disruption was Unforeseeable,
- then this delay or disruption will be considered as a cause of delay under subparagraph (b) of Sub-Clause 8.4 [Extension of Time for Completion].





Clause 11.3: Extension of Defects Notification Period

The Employer shall be entitled subject to Sub-Clause 2.5 [Employer's Claims] to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or damage. However, a Defects Notification Period shall not be extended by more than two years.

If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause 8.8 [Suspension of Work] or Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work], the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.



Clause 11.4: Failure to Remedy Defects

If the Contractor fails to remedy any defect or damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date. If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2 [Cost of Remedying Defects], the Employer may (at his option):

- (a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.5 [Employer's Claims] pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage;
- (b) require the Engineer to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.5 [Determinations]; or
- (c) if the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works, terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

Clause 13.3: Variation Procedure

If the Engineer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

- (a) a description of the proposed work to be performed and a programme for its execution,
- (b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 [Programme] and to the Time for Completion, and
- (c) the Contractor's proposal for evaluation of the Variation.

The Engineer shall, as soon as practicable after receiving such proposal (under Sub-13.2 Value Engineering or otherwise), respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Engineer to the Contractor, who shall acknowledge receipt.

Each Variation shall be evaluated in accordance with Clause 12 [Measurement and Evaluation], unless the Engineer instructs or approves otherwise in accordance with this Clause.

Clause 13.7: Adjustments for Changes in legislations

The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of the Country (including the introduction of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the Base Date, which affect the Contractor in the performance of obligations under the Contract.

If the Contractor suffers (or will suffer) delay and/or incurs (or will incur) additional Cost as a result of these changes in the Laws or in such interpretations, made after the Base Date, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

Notwithstanding the foregoing, the Contractor shall not be entitled to such an extension of time if the same shall already have been taken into account in determining an extension and such Cost shall not be separately paid if the same shall already have been taken into account in the indexing of any inputs to the table of adjustment data in accordance with the provisions of Sub-Clause 13.8.

Clause 16.1: Contractor's Entitlement to Suspend the Works

If the Engineer fails to certify in accordance with Sub-Clause 14.6 [Issue of Interim Payment Certificates] or the Employer fails to comply with Sub-Clause 2.4 [Employer's Financial Arrangements] or Sub-Clause 14.7 [Payment], the Contractor may, after giving not less than 21 days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice.

Notwithstanding the above, if the Bank has suspended disbursements under its loan, which finances in whole or in part the execution of the Works, and no alternative funds are available as provided for in Sub-Clause 2.4 [Employer's Financial Arrangements], the Contractor may by notice suspend work or reduce the rate of work at any time, but not less than 7 days after the Borrower having received the suspension notification from the Bank.

The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.8 [Delayed Payment] and to termination under Sub-Clause 16.2 [Termination by Contractor].

If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.



Clause 16.1: Contractor's Entitlement to Suspend the Works

If the Contractor suffers delay and/or incurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.



Clause 16.2: Termination by the Contractor

The Contractor shall be entitled to terminate the Contract if:

- (a) the Contractor does not receive the reasonable evidence within 42 days after giving notice under Sub-Clause 16.1 [Contractor's Entitlement to Suspend Work] in respect of a failure to comply with Sub-Clause 2.4 [Employer's Financial Arrangements],
- (b) the Engineer fails, within 56 days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate,
- (c) the Contractor does not receive the amount due under an Interim Payment Certificate within 42 days after the expiry of the time stated in Sub-Clause 14.7 [Payment] within which payment is to be made (except for deductions in accordance with Sub-Clause 2.5 [Employer's Claims]),
- (d) the Employer substantially fails to perform his obligations under the Contract in such manner as to materially and adversely affect the ability of the Contractor to perform the Contract,
- (e) the Employer fails to comply with Sub-Clause 1.6 [Contract Agreement] or Sub-Clause 1.7 [Assignment],
- (f) a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 [Prolonged Suspension], or
- (g) the Employer becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.

Clause 16.2: Termination by the Contractor

(h) In the event the Bank suspends the loan or credit from which part of the payments to the Contractor are being made, if the Contractor has not received the sums due to him upon expiration of the 14 days referred to in Sub-Clause 14.7 for payments under Interim Payment certificates, the Contractor may, without prejudice to the Contractor's entitlement to financing charges under Sub-Clause 14.8, immediately take one or both of the following actions, namely (i) suspend work or reduce the rate of work, and (ii) terminate his employment under the Contract by giving notice to the Employer, with a copy to the Engineer, such termination to take effect 14 days after the giving of the notice.

In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Employer, terminate the Contract. However, in the case of subparagraph (f) or (g), the Contractor may by notice terminate the Contract immediately.

The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

Clause 17.4: Consequences of Employer's Risks

If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 20.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be included in the Contract Price. In the case of sub-paragraphs (f) and (g) of Sub-Clause 17.3 [Employer's Risks], Cos plus profit shall be payable.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine these matters.

Clause 19.1: Force Majeure

In this Clause, “Force Majeure” means an exceptional event or circumstance:

- (a) which is beyond a Party’s control,
- (b) which such Party could not reasonably have provided against before entering into the Contract,
- (c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- (d) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (ii) rebellion, terrorism, sabotage by persons other than the Contractor’s Personnel, revolution, insurrection, military or usurped power, or civil war,
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor’s Personnel,
- (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor’s use of such munitions, explosives, radiation or radio-activity, and
- (v) natural catastrophes such as earthquake, hurricane, typhoon or volcanic activity.

Clause 20.1: Contractor's Claims

If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 days after the Contractor became aware, or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance. The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Employer's liability, the Engineer may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.

Clause 20.1: Contractor's Claims

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed.

If the event or circumstance giving rise to the claim has a continuing effect:

- (a) this fully detailed claim shall be considered as interim;**
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer may reasonably require; and**
- (c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.**

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor, the Engineer shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

Clause 20.1: Contractor's Claims

Each Payment Certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The Engineer shall proceed in accordance with Sub-Clause 3.5 [Determinations] to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 [Extension of Time for Completion], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

NOTE



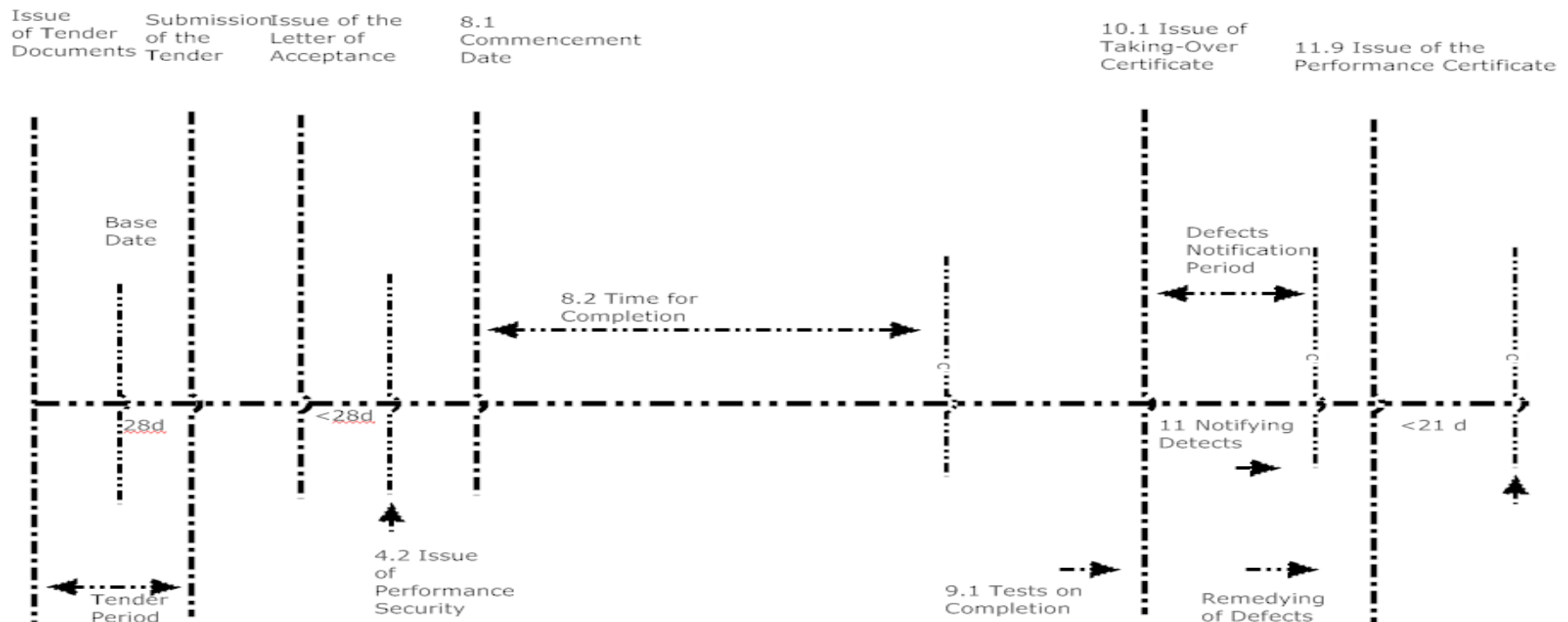
- ❑ IT IS VERY IMPORTANT TO KNOW THE CONTRACTUAL VALIDITY AND SUPPORT TO YOUR DELAY, THE TIME FRAME RELATED TO THE ISSUE AND ANY OTHER CONTRACTUAL ENTITELEMENT(S) THAT MIGHT BE RELATED BEFORE COMMUNICATING ANY REQUESTS TO ANY OTHER PARTY



NOTE

❑ TIPS:

- Always keep records of all Contractual Time Frames in quick, easy and readable format “this might help”:

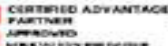
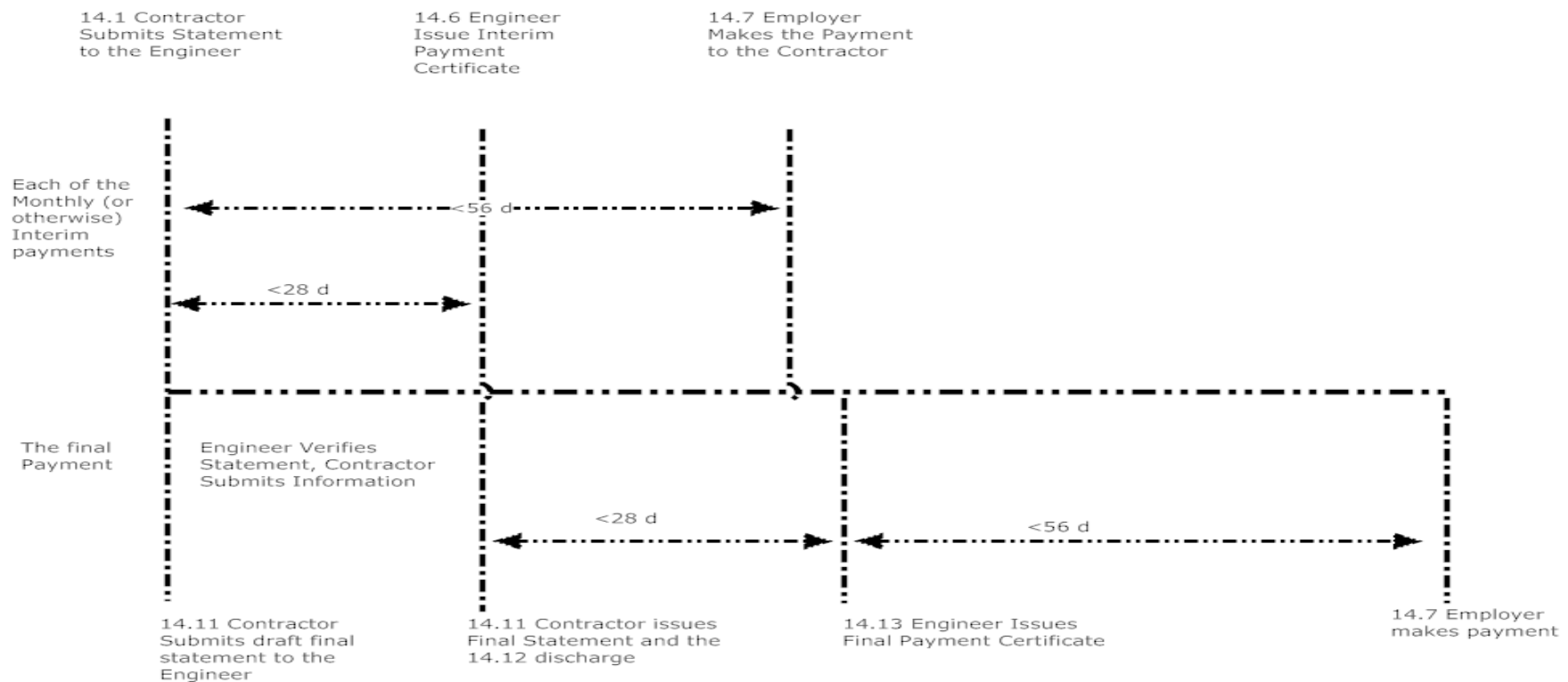


NOTE



TIPS:

- Always keep records of all Contractual Time Frames in quick, easy and readable format “this might help”:



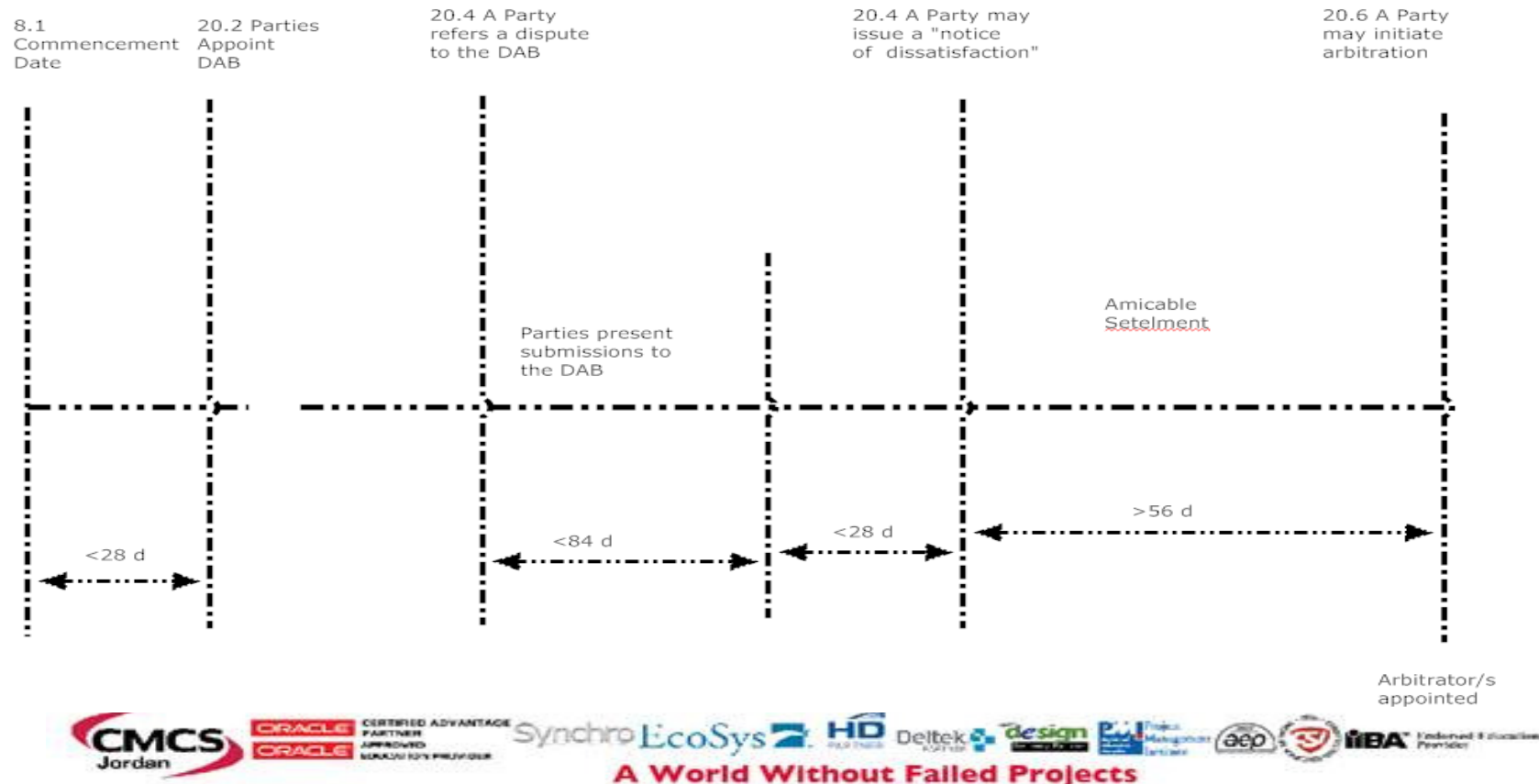
A World Without Failed Projects

NOTE



TIPS:

- Always keep records of all Contractual Time Frames in quick, easy and readable format "this might help":



NOTE

❑ TIPS:

❑ Document Management and Control:

- Use Reliable Contract Manager and Document Control System
- Define Clear Procedure for Document Control from the beginning of the project
- Small piece of paper might worth millions some day!
- If you are the Contractor, the Employer or the Engineer try to put all other parties with you in the same boat!

NOTE

❑ TIPS:

Tricks commonly used by Contractors:

- Reducing Design/Drawings review time
- Unrealistic as planned schedule
- Artificial logic to hide float or exaggerate known/expected delays
- Playing with data while creating as built schedule
- Incorrect actual dates in progress updates
- Hidden logic/duration changes in updates
- Using incorrect productivity rates
- In proper breakdown of activities

Before using any of these tricks, you have to be aware of current and future effects that might mess up your case.

NOTE

❑ TIPS:

Tricks commonly used by Engineer:

- Not consenting the baseline schedule
- Continuous queries for revising the schedule. Always the type of schedule required must be classified (baseline, revised baseline, acceleration, recovery, impacted---etc.)
- Releasing variations/changes without approving exact time impact
- Not documenting some facts related to Employer's delays
- Not updating the milestone schedule in case of multi packages projects

Always push for having the data you believe it is important to your project and case. Documenting the facts and approving the schedules from your Engineer/client is extremely vital.

NOTE

❑ TIPS:

▪ Results of Tricks Commonly Used

- ❖ Wait and see situations
- ❖ Conflicts and disputes

▪ To avoid such situations

- ❖ Use of contractual provisions
- ❖ Use of protocol compliant procedure
- ❖ Keeping records



END OF SECTION



ANALYZING DELAYS



- ☐ Why Should we Analyze Delays?
- ☐ How to Analyze Delays?
- ☐ What is Baseline Schedule?
- ☐ What is as-built Schedule?
- ☐ What is updated Schedule?
- ☐ Different Techniques to Analyze Delays
- ☐ Which Technique to use
- ☐ Case Study



CERTIFIED ADVANTAGE
PARTNER
APPROVED
SOLUTION FOR PROJECTS



A World Without Failed Projects

WHY DELAYS SHOULD BE ANALYZED?

- ❑ The amount of delay experienced on a project is a measurement of time. Just like any measurement, a standard is needed to measure against. One could determine the amount of delay by subtracting the contract completion date from the actual completion date thereby arriving at the time overrun. Unfortunately, this simplistic method does not establish when the delay occurred during the project, nor does it establish who is responsible for the delay.

- ❑ According to FIDIC 1999 Clause 20.1. Claim submittal shall be substantiated with proper documentation and supporting documents that proves the cause and effect.

HOW TO ANALYZE DELAYS?

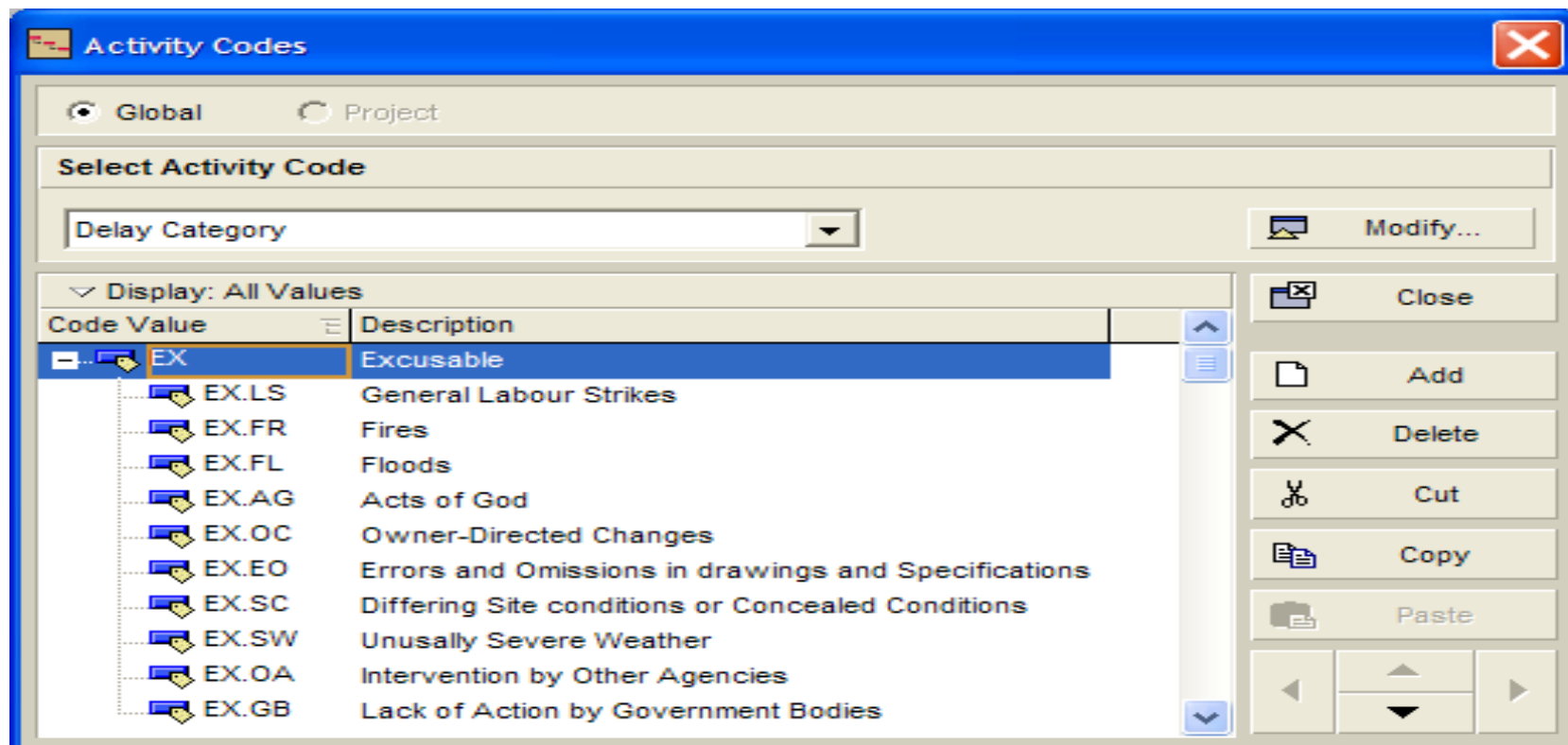
❑ To Analyze Delays you should:

- Clearly define all causes of Delays and/or event giving rise to claim that occurred during the analyzed period.
- Determine to which type of delays each event is related.
- Include the delay event(s) to the Time Schedule of the Project and determine the effect of such event(s) on the contractual completion date of your project.

HOW TO ANALYZE DELAYS?

TIPS:

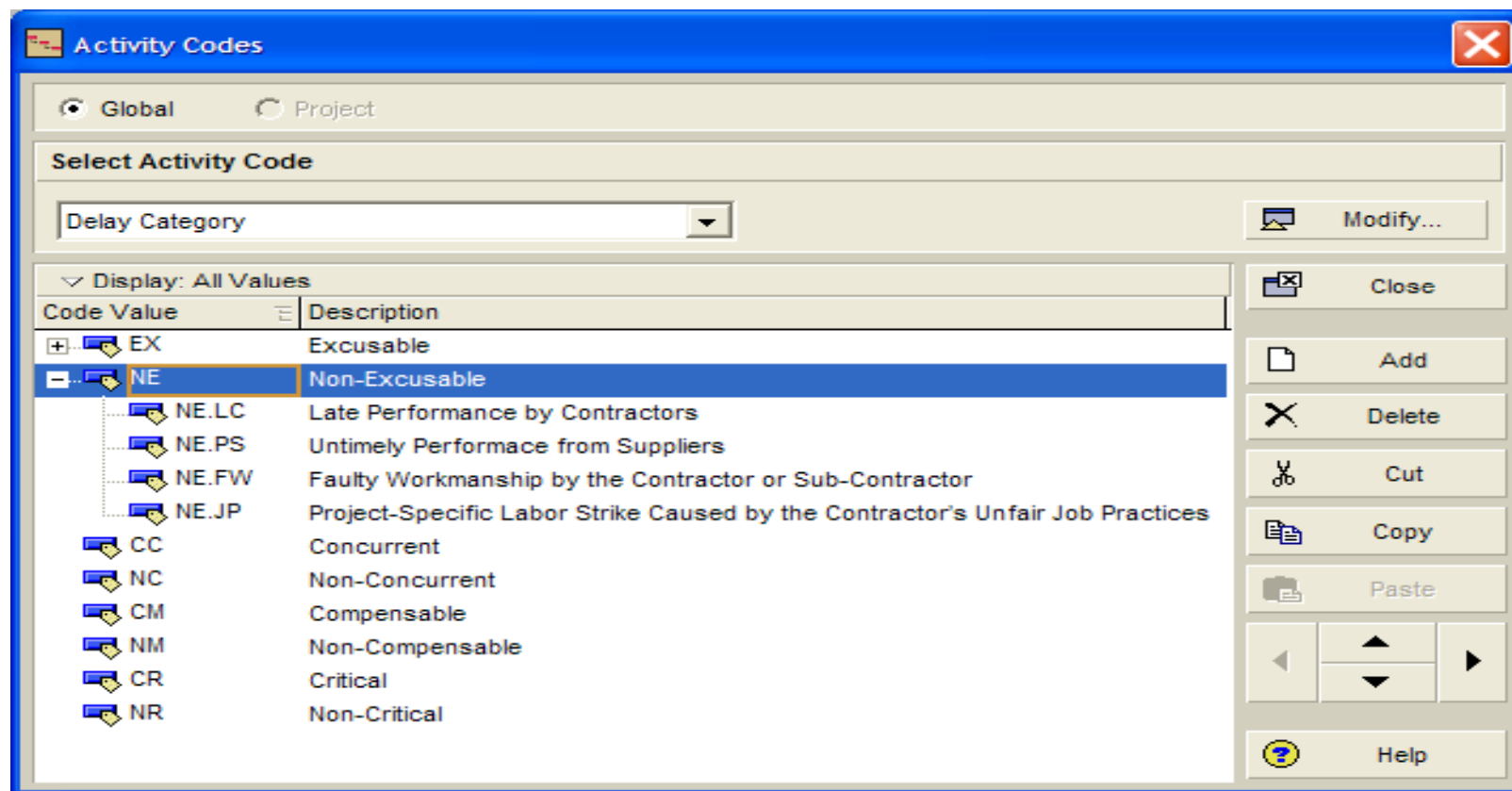
- Tip 1: Create Coding for your Delays



HOW TO ANALYZE DELAYS?

TIPS:

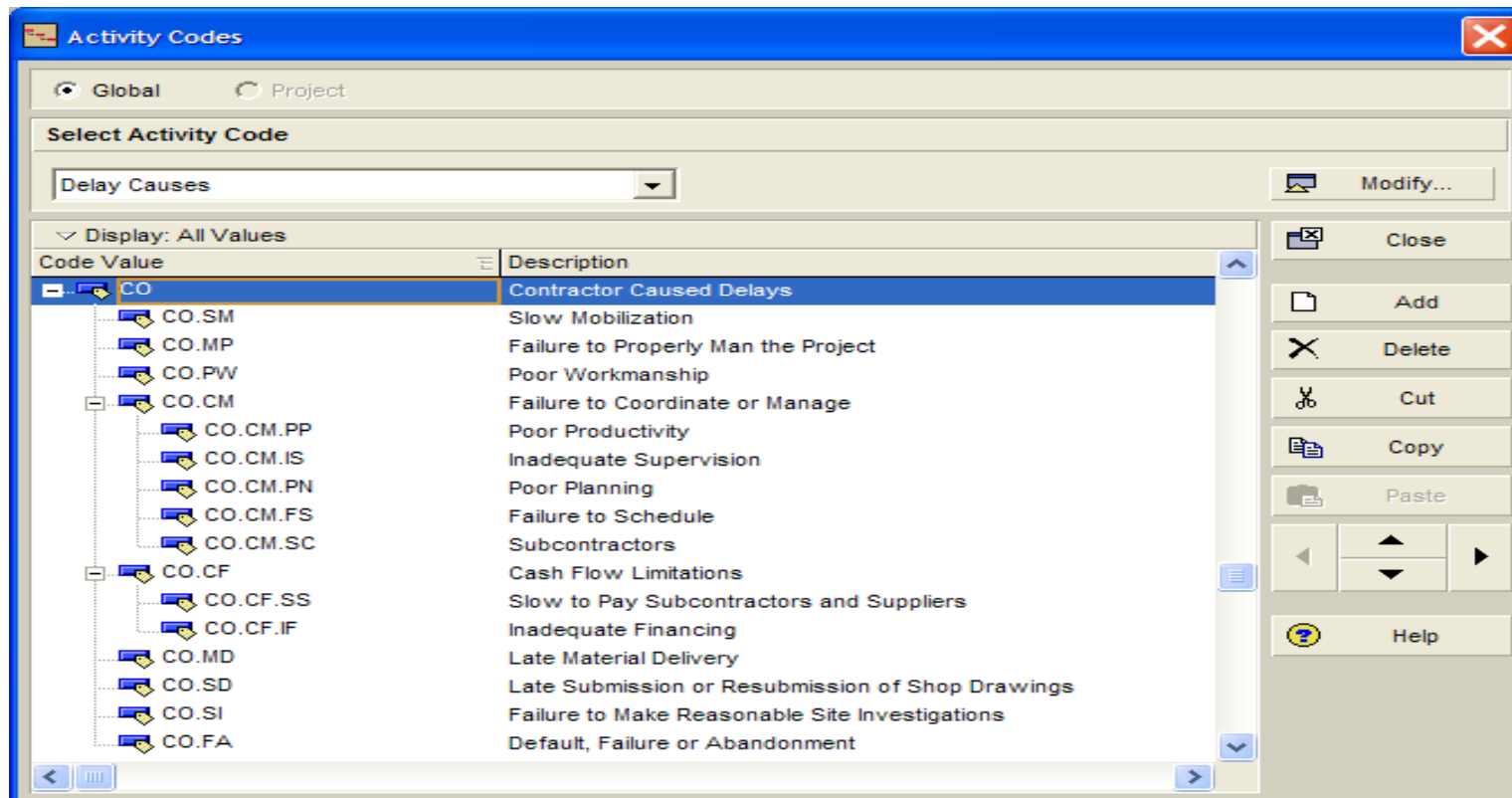
- Tip 1: Create Coding for your Delays



HOW TO ANALYZE DELAYS?

TIPS:

- Tip 1: Create Coding for your Delays



HOW TO ANALYZE DELAYS?

❑ TIPS:

▪ Tip 2: Important Terminologies:

- ❖ **Early Start (ES)/ Early Finish (EF):** The earliest date an activity can start/finish on.
- ❖ **Late Start (LS):** The latest date an activity can start/finish on without delaying the project.
- ❖ **Total Float (TF):** It is the excess time along non-critical chain of activities. As long as the number of total float days is not exceeded, activities containing float may be delayed either in starting or in finishing without delaying total project completion.

$$TF = LS - ES \text{ or } LF - EF$$

- ❖ **Free Float (FF):** It is the amount days activity could be delayed with out delaying the successor activity(s) in the network. This is very important when having intermediate milestones imposed by the Employer and/or packaging nature projects.

$$FF = \min. ES \text{ of Activity's successors} - EF$$

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

- ❑ **There are several techniques to analyze delays, but the most commonly used are:**
 - As planned Vs. As built comparison method (Total Time Approach)
 - The impacted as planned method (What If Approach)
 - The collapsed as built method (But For Approach)
 - The contemporaneous period analysis method (Windows Approach)

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 1- As planned Vs. As built – How?

- Compares the as planned Vs. As built Schedule.
- It assumes that the party uses the method did not cause any delay and all delays have been cause by the other party.
- To carry the analysis:
 - ❖ a- Recover your baseline (as planned) schedule.
 - ❖ b- Prepare as built schedule.
 - ❖ c- Add delays to the as built schedule.
 - ❖ d- Mathematically calculate the difference in the two completion dates.

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 1- As planned Vs. As built – How?

■ For Example:

- ❖ As planned (Baseline) schedule shows total project duration of 10 months
- ❖ As built schedule reflects total project duration of 20 months
- ❖ The total delays tracked will be 10 months

■ If Types of Delays Needs to be Classified:

- ❖ In your as built schedule allocate Employer's and Contractor's Delay
- ❖ If we assume Contractor's Delays = 12 Months
- ❖ If we assume Employer's Delays = 14 Months, Therefore:
 - Both parties were responsible for at least 12 months delay. Concurrent Delays=12 Months
 - The Employer's responsible for 2 months extra delays. Employer Caused Delays= 2 months
 - Contractor caused delays= Total Delays – Employer Delays = 10-2= 8 months

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ As Planned Vs. As built Technique – Strengths

- Easy to apply
- Simple mathematical difference calculations
- Straight forward

❑ As Planned Vs. As built Technique – Weaknesses

- Considers only one party delays
- Do not considers time of occurrence of delay event or type of delay
- Assumes the baseline is accurate
- Might be rejected by arbitrators or courts

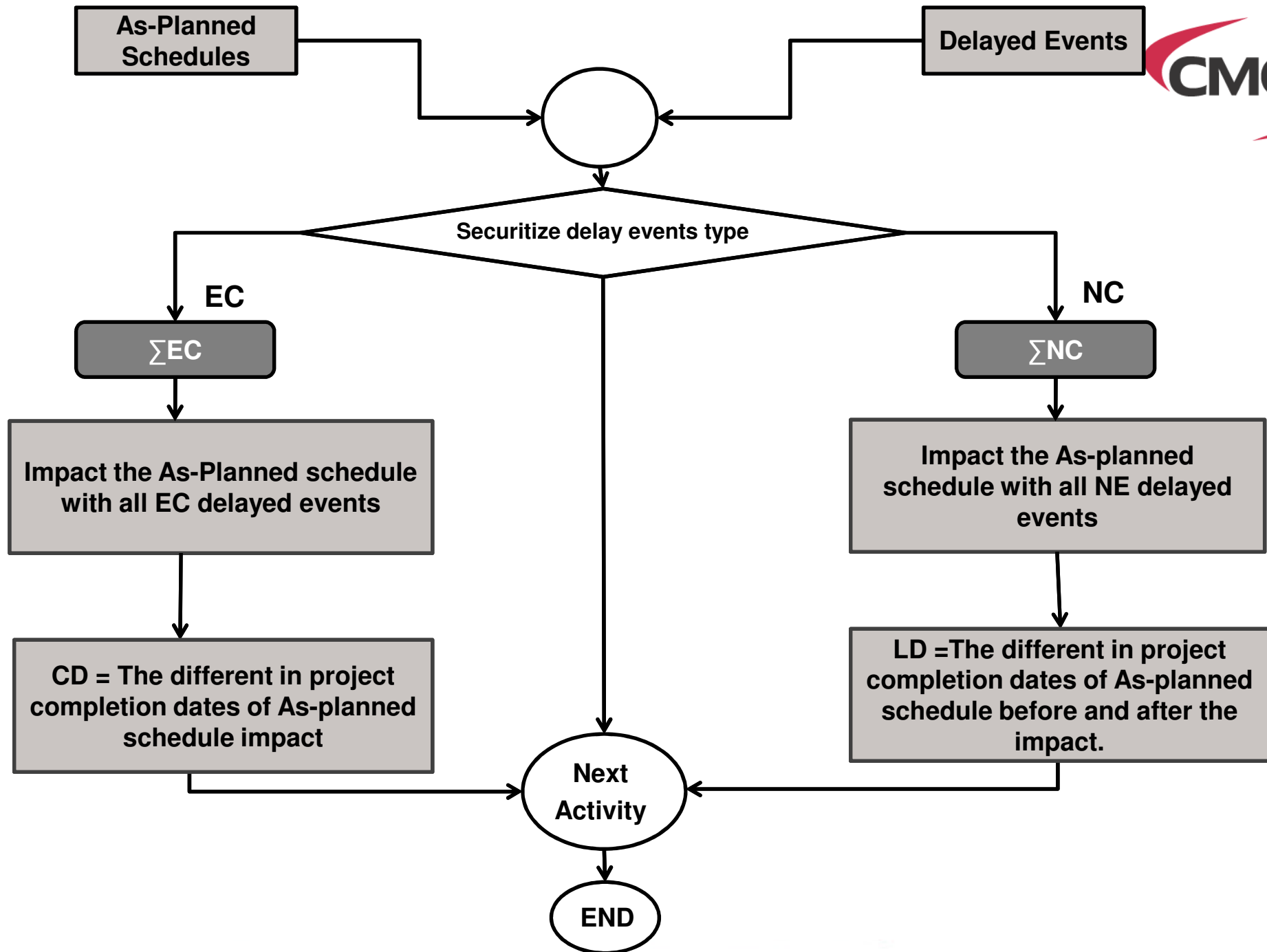
DIFFERENT TECHNIQUES TO ANALYZE DELAYS

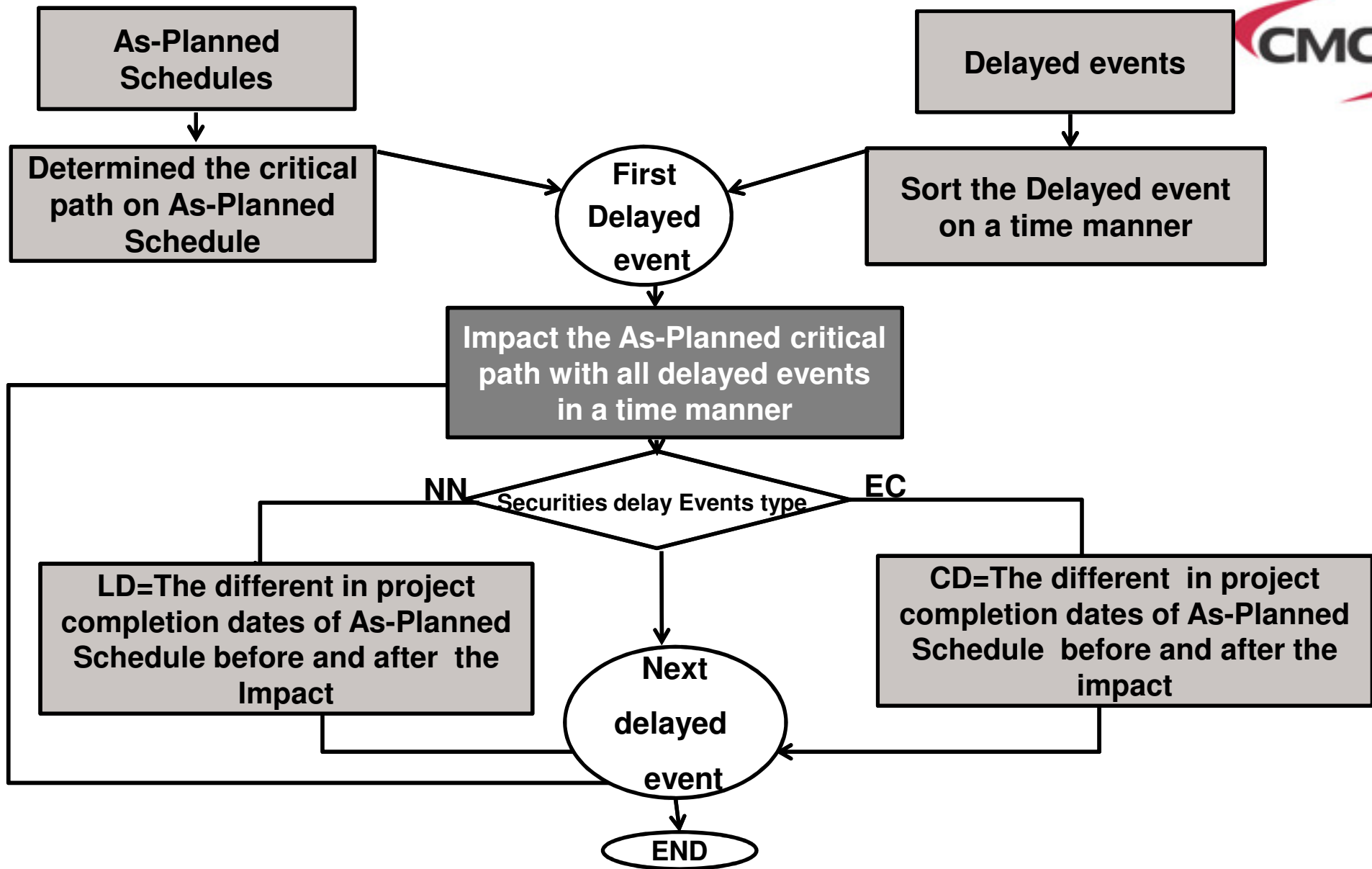
❑ 2- The Impacted As Planned Method – How?

- Use the baseline schedule and impact the schedule with delays
- To examine the effect of Contractor's delays, impact the baseline schedule with Contractor's delay events. To examine Employer's Delays, impact the schedule with Employer's Delays
- To conclude the delay period do mathematical sum between the baseline completion date and impacted as planned schedule completion date
- To conclude the other party delays you may use the as built schedule OR the actual completion date and do mathematical sum between the as built completion date and the as planned completion date

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

- ☐ NC Non Compensable Delays/ Contractor Delays.
- ☐ EC Excusable compensable.
- ☐ NN Non excusable non compensable.
- ☐ LD Liquidated damages.
- ☐ CD Claim Damages/ prolonging disruption costs.





DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 2- The Impacted As Planned Method – How?

▪ EXAMPLE

- ❖ If we use the same example, the as planned schedule shows project Duration of 10 months
- ❖ As built Project Duration = 20 Months
- ❖ After impacting the baseline schedule with Employer's delays, project duration tends to be 25 Months

▪ Therefore,

- ❖ Employer Caused Delays = $25 - 10 = 15$ months this is will be compensable delays
- ❖ Contractor Caused Delays = $25 - 20 = 5$ months , this will be entitled for liquidated damages

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 2- The Impacted As Planned Method – How?

▪ EXAMPLE

- ❖ After Impacting the baseline schedule with Contractor's delays, project duration tends to be 23 months.
- Therefore:
 - ❖ Contractor Caused Delays = $23 - 10 = 13$ months this will be entitled for liquidated damages.
 - ❖ Employer Caused Delays = $23 - 20 = 3$ months , this will be compensable delays.

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 2- The Impacted As Planned Method – Strength

- Can be prepared quickly (providing that all required data is available)
- Easy Mathematical calculations to represent net delays

❑ 2- The Impacted As Planned Method – Weaknesses

- It assumes that the as planned schedule is perfect
- It assumes that the Contractor always follows the original plan
- It assumes nobody responsible for delays except the party who is doing the analysis
- As planned logic usually amplifies the effect of delays because of various simple assumptions the planner may take during planning
- It may ignore what actually happened on the project. That's why some Engineers and arbitrators consider this method argumentative rather than analytical technique

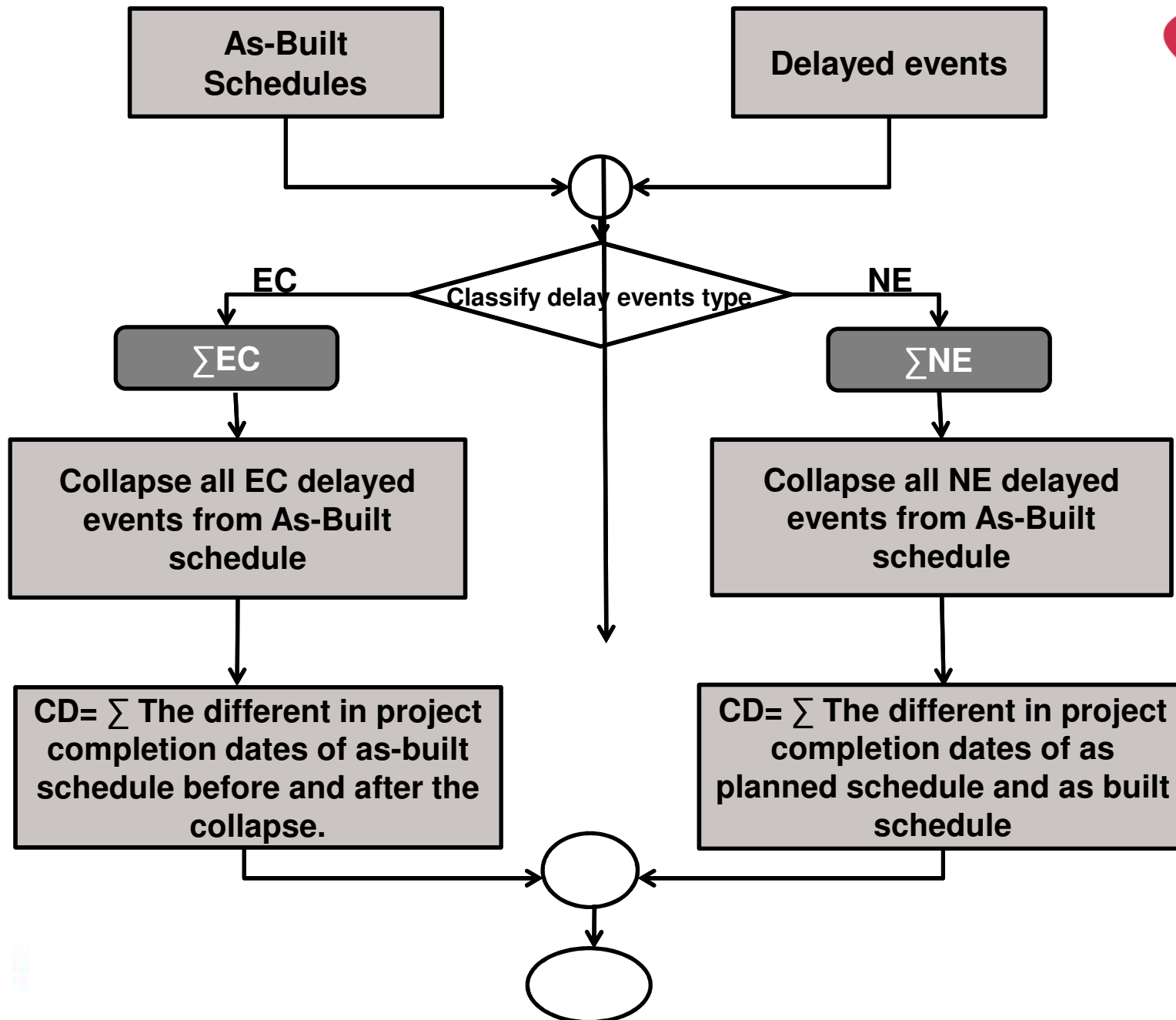
DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 3- The Collapsed As Built Method – How?

- Have your as built schedule complete
- Include all delay activities
- Analyze and remove all apparent Employer caused delays
- Collapse the Schedule
- The result should be the schedule that the Contractor should have followed during the course of execution of the project
- Calculate Employer caused delays, Contractor caused delays and concurrent delays.

❑ ***Note: The but for schedule results from removing all owner caused delays that affect the as built critical path. The amount of compensable delays is the difference in time between the actual completion date shown in the as built schedule and the completion date shown in the but – for analysis.***

The Collapsed As Built Method



DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 3- The Collapsed As Built Method – How?

▪ Example

- ❖ If we use the same example, the as planned schedule shows project Duration of 10 months
 - As built Project Duration = 20 Months.
- ❖ After removing Employer's Delays from the as built schedule, total project duration shows 18 months.
- ❖ Employers Delays' = the difference between the as built and collapsed schedule = $20 - 18 = 2$ months, that is compensable delays.
- ❖ Contractor's Delays = the difference between the collapsed schedule and the as planned schedule = $18 - 10 = 8$ months, this is subject to liquidated damages.

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 3- The Collapsed As Built Method – Strengths

- Reflects cause and effect on the as built schedule that represents the actual sequence of work.
- Eliminates the use of the base line schedule, which is more theoretical
- Reliable.

❑ 3- The Collapsed As Built Method – Weaknesses

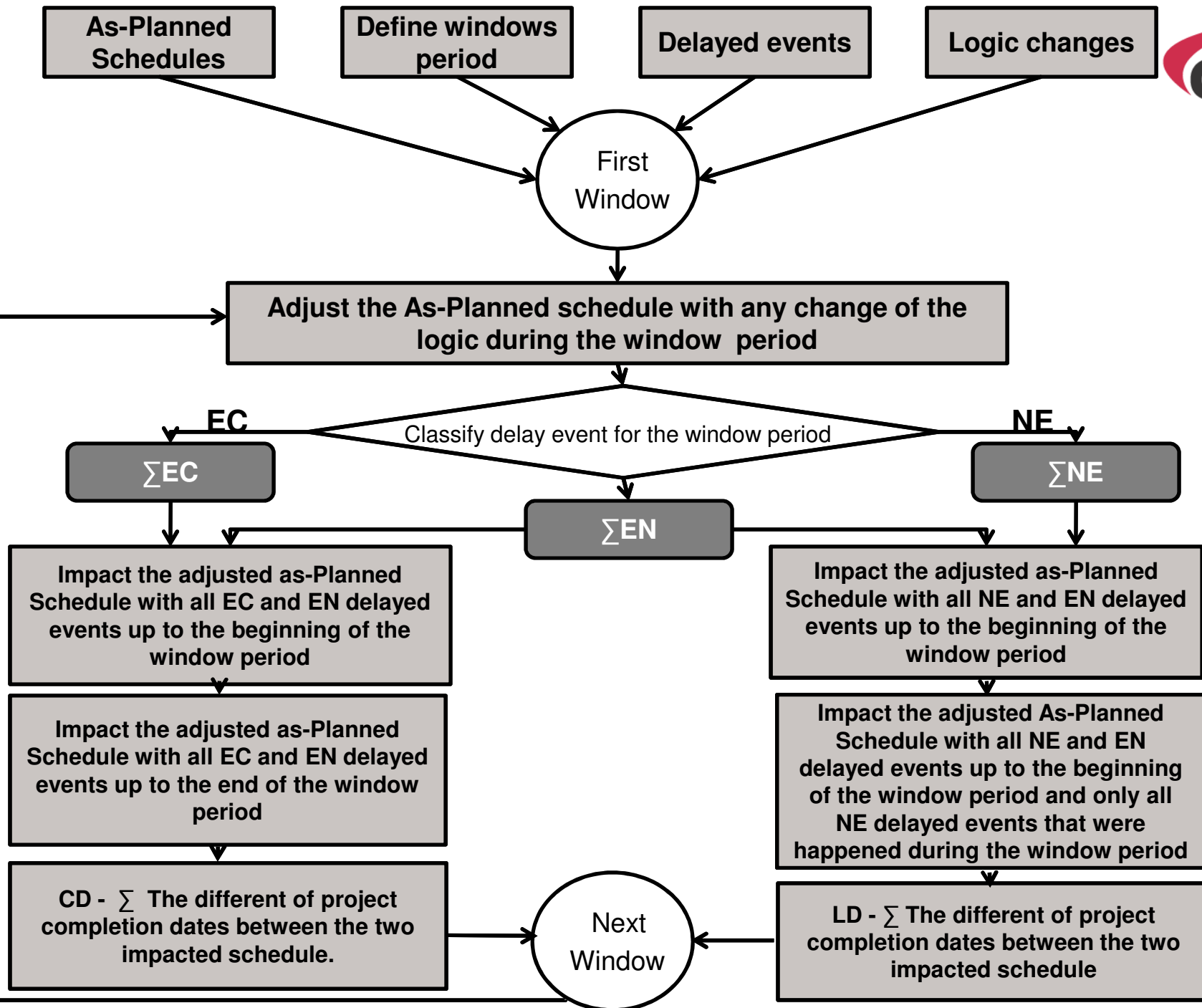
- Considers nobody to be blamed for the delay but the Employer.
- Do not put delays in timely sequence as when they have occurred.
- Can be considered as argumentative rather than analytical.
- Not as easy to prepare as it shows.

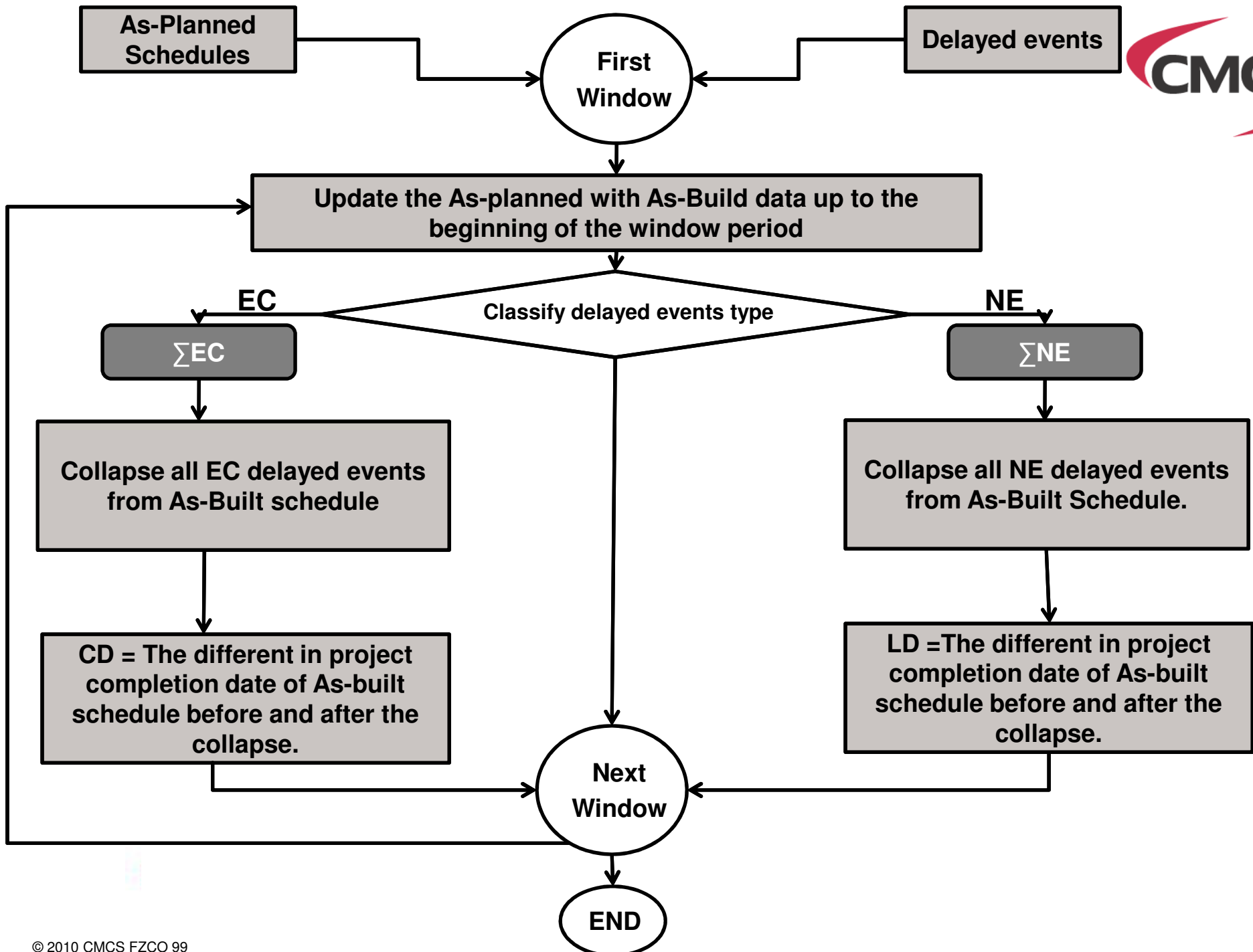
DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 4-The contemporaneous period analysis method (Windows Approach)

- To carry out this analysis:
 - ❖ Get your as planned - baseline schedule ready
 - ❖ Select reliable window periods to analyze
 - ❖ Enter actual project progress and delay activities to copy of the original baseline schedule using contemporaneous project documents for the first window period
 - ❖ Calculate the schedule to analyze delays for the first window period
 - ❖ Calculate the Employer caused delays, Contractor caused delays and concurrent delays for the first window period
 - ❖ Copy the schedule to use as bases for the second window run
 - ❖ Repeat this procedure for each window period till the end of the project

4- The contemporaneous period analysis method (Windows Approach)





4- The contemporaneous period analysis method (Windows Approach)

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 4- The contemporaneous period analysis method (Windows Approach/CPM)

▪ NOTES:

- ❖ Once the first CPM schedule is prepared and periodically up dated during the construction period, the first schedule update is compared to the original schedule, and any delays in the project that occurred during that period are analyzed using a but for approach. Later on, the first update becomes the new baseline and the process repeated at the end of the second update period.
- ❖ The process can be repeated at the end of each reporting period
- ❖ The excusable, compensable, non compensable delays sum to the cumulative delay on the project. The damages delays are allocated accordingly

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 4- The contemporaneous period analysis method (Windows Approach/CPM)

▪ Sample Data Out Put

Up Date Number	Schedule Date(Month Number)	Project completion (Month No.)	Slip During Period	Delays			Remarks
				Non Excusable Non Compensable	Excusable Compensable	Excusable Non Compensable	
0	0	10	0	0	0	0	
1	2	11.5	1.5	0	0	1.5	
2	4	14	2.5	0	2.5	0	
3	6	14	0	0	0	0	
4	8	20	6	6	0	0	
5	10	22	2	1	0	1	

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

❑ 4- The contemporaneous period analysis method (Windows Approach/CPM) – Strengths:

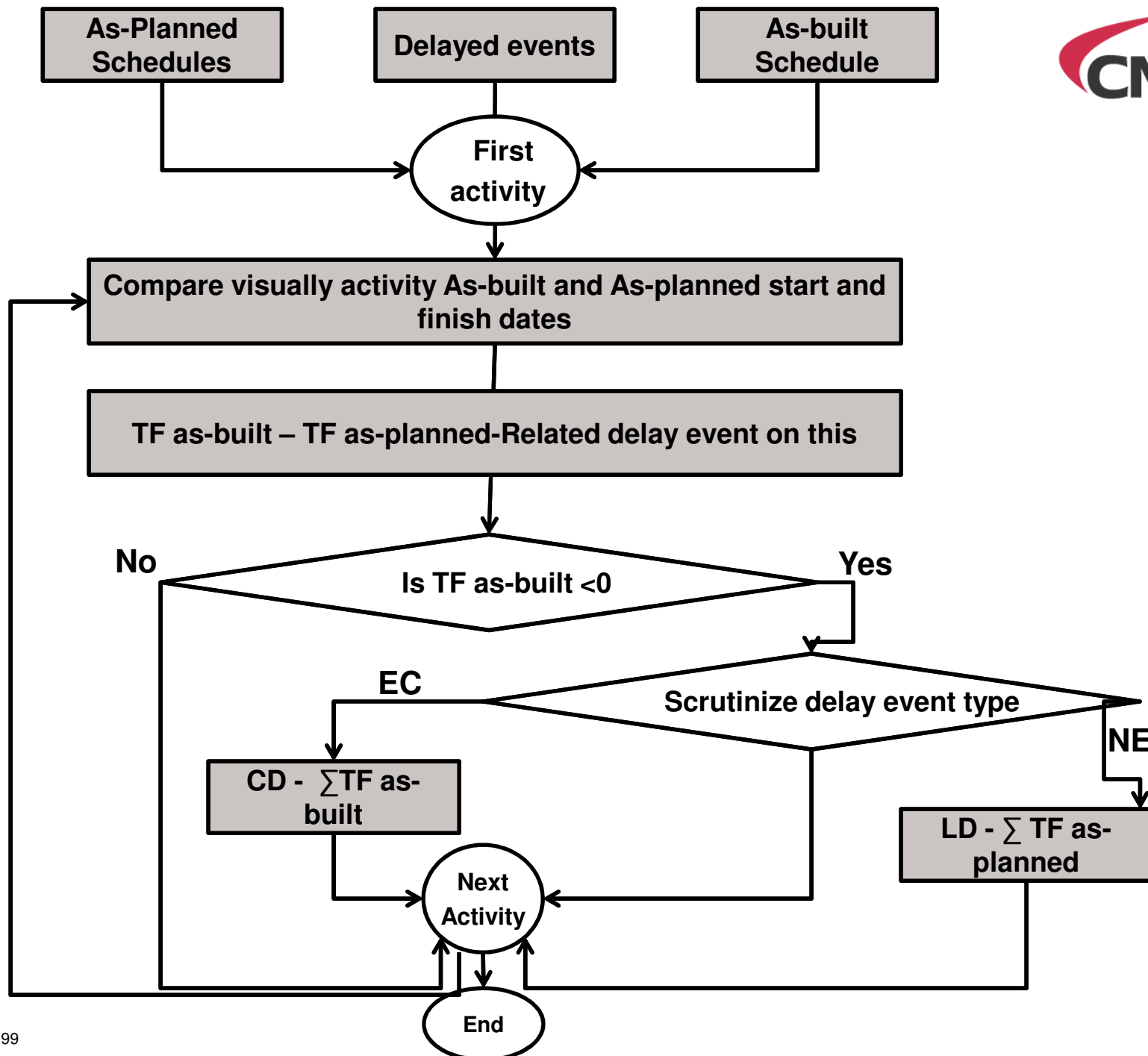
- Most controversial and analytical method, therefore most claims reviewer consider its results reliable
- Analyzes all types of delays
- Allows for complying with FIDIC clauses, especial this related to interim claims
- Tends to be very accurate
- Puts all delays in the context of time, place and actual conditions of the project
- Periodical runs allows easier documentation

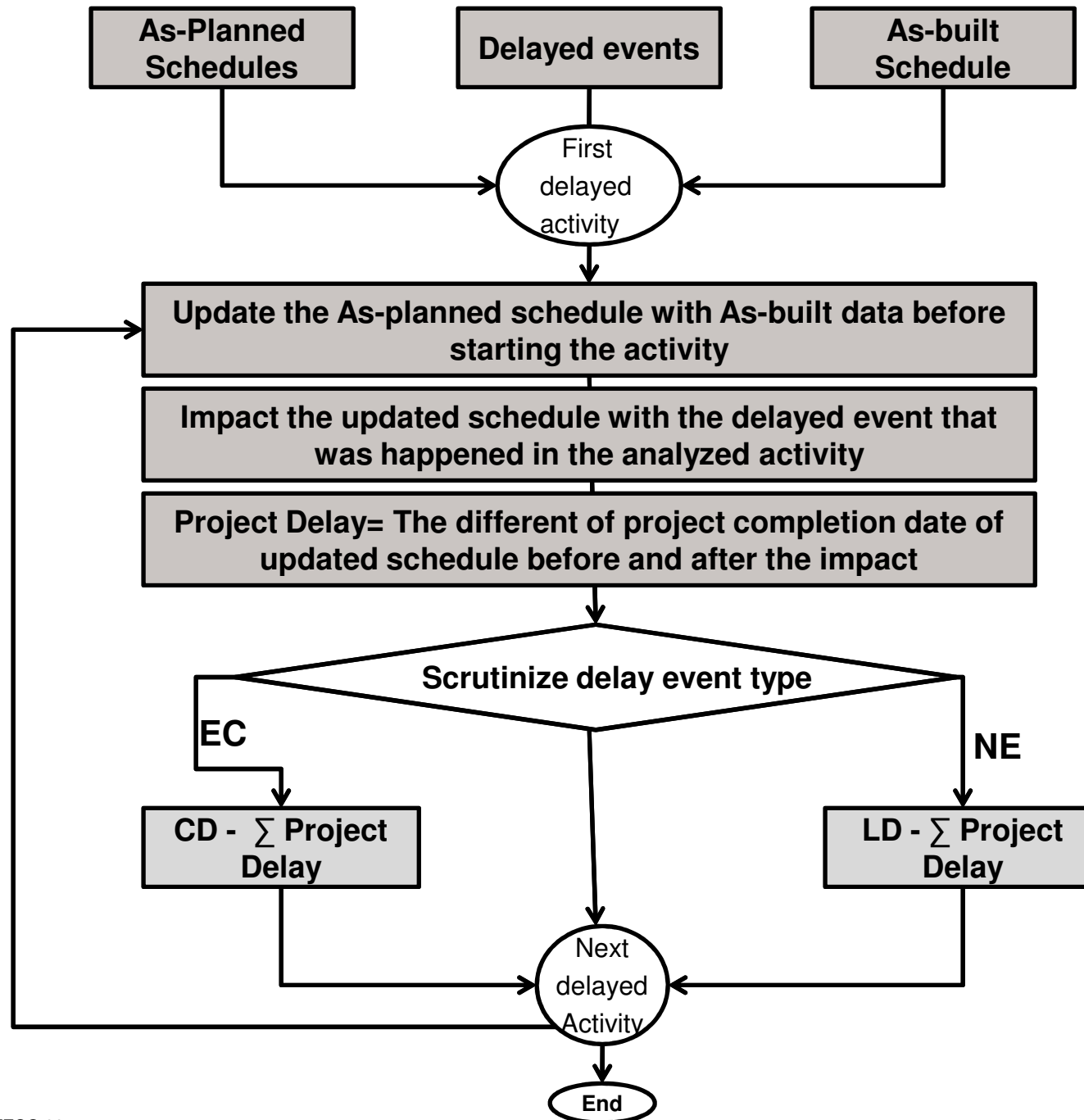
❑ 4- The contemporaneous period analysis method (Windows Approach/CPM) – Strengths – Weaknesses:

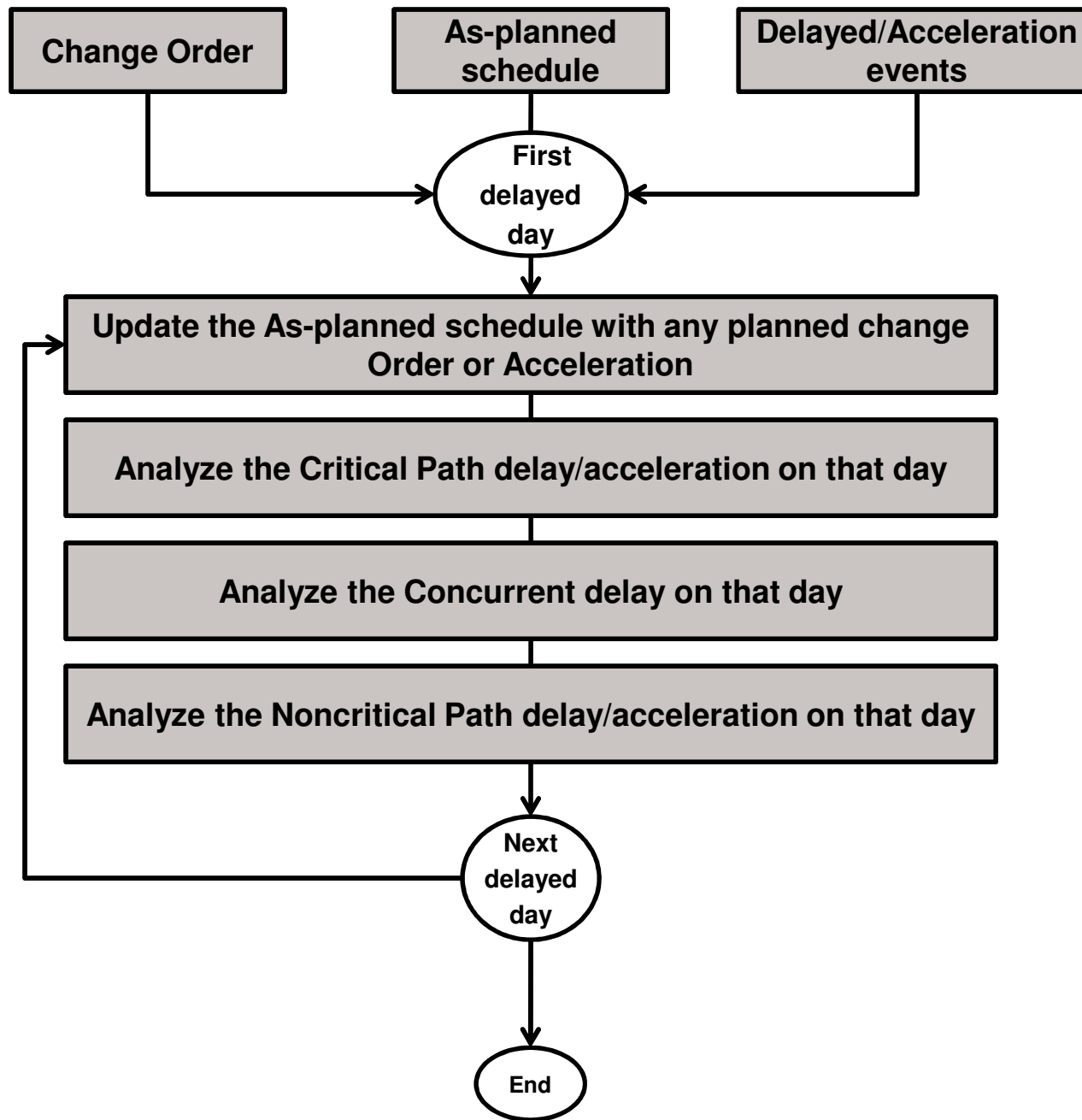
- Not as easy as it sound s to be utilized
- The most time consuming schedule delay analysis

DIFFERENT TECHNIQUES TO ANALYZE DELAYS

- ❑ There are another techniques to analyze delays:
 - As Built Technique
 - Time Impact Technique
 - Total Float Management Technique







WHICH TECHNIQUE TO USE

❑ The Choice of technique depends on:

- Type and quality of Data available.
- Type and quality of Documentation available.
- Capacities of the analyst.
- of the project.
- Capacities of the reviewer or who is going to prepare the counter claim.
- Complexity of the delays tracked.

❑ Case

- Project A with duration of 180 days. We have one main Contractor, Engineer and Construction Manager (CM). Project was delayed for 60 days. You have approved Baseline schedule. Complete as built, although you are not sure (as Contractor) that actual dates included are very accurate. The following events were tracked during the execution:
 - ❖ **Contractor to complete mobilization and site setup on Day 14. It was completed in day 30. Engineer work was affected**
 - ❖ **Contractor planned to start foundations on day 30. Foundations started on day 40**
 - ❖ **On day 70 Employer decided to implement some changes on the design. Works were hindered at site for 14 days**
 - ❖ **Adverse weather conditions occurred on the day 90. Works at site stopped for 7 days**
 - ❖ **Engineer stopped the works for 7 days in critical area asking for additional tests. It finally occurred that Contractor's works were as specified**
 - ❖ **Delivery of equipment for critical area delayed to Contractor's delay in processing payment for the supplier. Equipment were planned to be delivered on Day 100. They were delivered on Day 130.**

GAME



☐ How?

- We will have Two groups in the Class.

☐ Mr. Contractor

- You want to submit Claim to the Engineer. What events will you claim for? What technique will you use? Assume results for the analysis output.

☐ Mr. Engineer

- Employer asked you to prepare claim as he has lost income estimated as \$20,000/day. What events will you include how you will support your counter claim. Assume outputs for the analysis outcome



GAME



☐ NOW

☐ Mr. Contractor

- You have the Engineer's claim you want to negotiate/reply. What will you say

☐ Mr. Engineer

- You have the Engineer's claim you want to negotiate/reply. What will you say



GAME



No.	Delay Description	Owner	Contractor	Entitlement
1	Delayed Mobilization			
2	Delayed Start Of Foundation			
3	Owner Ordered Changes			
4	Adverse Weather Conditions			
5	Work Stoppage for Additional Tests			
6	Delayed Equipment Delivery			



GAME



No.	Delay Description	Owner	Contractor	Entitlement
1	Delayed Mobilization		Y	NE
2	Delayed Start Of Foundation		Y	NE
3	Owner Ordered Changes	Y		EC
4	Adverse Weather Conditions	N	N	EN
5	Work Stoppage for Additional Tests	Y		EC
6	Delayed Equipment Delivery		Y	NE



GAME



No.	Delay Description	Delays	Cumulative	Entitlement
1	Delayed Mobilization	16	16	NE
2	Delayed Start Of Foundation	10	26	NE
3	Owner Ordered Changes	14	40	EC
4	Adverse Weather Conditions	7	47	EN
5	Work Stoppage for Additional Tests	7	54	EC
6	Delayed Equipment Delivery	30	84	NE
7	Acceleration by Contractor	-26	60	

