CPM SCHEDULING

Adam Klinstiver, P.E.
Volkert, Inc.

INTRODUCTION TO CPM SCHEDULING

WHAT IS A CPM SCHEDULE?

- The **critical path method** (CPM) is a step-by-step project management technique for planning that defines **critical** and **non-critical** tasks with the goal of preventing delays to a project.

- CPM is commonly used with all forms of projects, including construction, aerospace and defense, software development, research projects, product development, engineering, and plant maintenance, among others.

- Any project with interdependent activities can apply this method of mathematical analysis.

INTRODUCTION TO CPM SCHEDULING

OBJECTIVE

- The objective of the CPM schedule is to provide a management tool for the proper and logical allocation and use of the resources needed to complete a project.

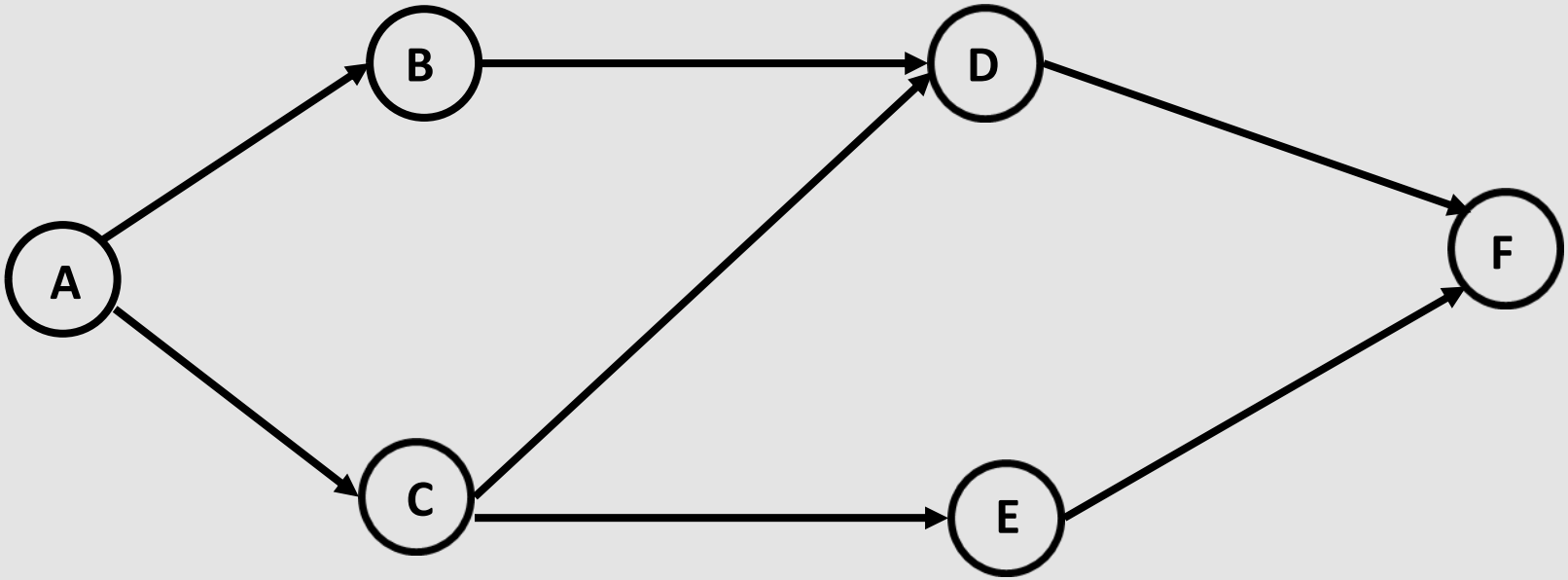
INTRODUCTION TO CPM SCHEDULING

PRECEDENCE METHOD

- The Precedence Method uses boxes to denote schedule activities.
- These boxes or “nodes” are connected with arrows to depict a logical progression of the dependencies between the schedule activities.
- Each node is coded with a letter or number that correlates to an activity on the project schedule.
- The Precedence Method allows different type of relationships.

INTRODUCTION TO CPM SCHEDULING

Precedence Diagram Example



CPM Terms

CPM Terms

TERMS

- Baseline Schedule
- Data Date
- Schedule Update
- Activity
- Types of Activities
- Relationship
- Types of Relationships
- Relationship Lag
- Calendar
- Original Duration
- Remaining Duration
- Percent Complete
- Total Float
- Free Float
- Critical Path (Longest Path)
- Controlling Work Item
- Resource
- Delay

CPM Terms

TERMS

- Fragnet
- Status, Statused or Statusing
- De-status
- Gantt Chart
- Sequestering Float
- Target

CPM Terms

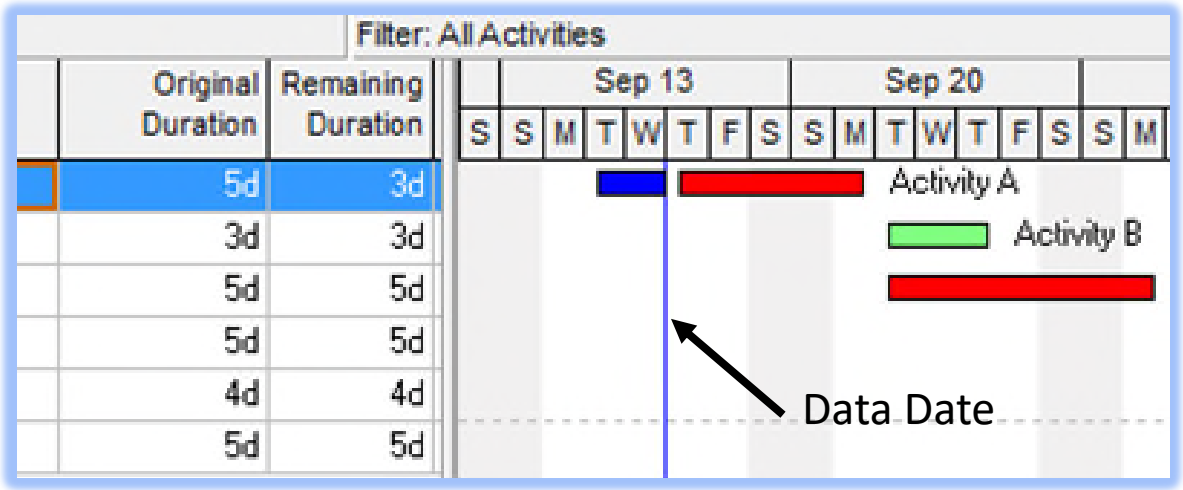
BASELINE SCHEDULE

- A **Baseline Schedule** is an original schedule that has not been updated. A Baseline schedule is sometimes referred to as an **Initial Schedule**. In the FDOT Specifications, the Baseline Schedule is referred to as the **Contract Schedule**.

CPM Terms

DATA DATE

- The Data Date is the date through which a schedule is calculated.



CPM Terms

SCHEDULE UPDATE

- A Schedule Update is the result of recording actual start and finish dates for each activity on a Baseline Schedule through the data date of the update and estimating the remaining duration and percent complete for the activities.

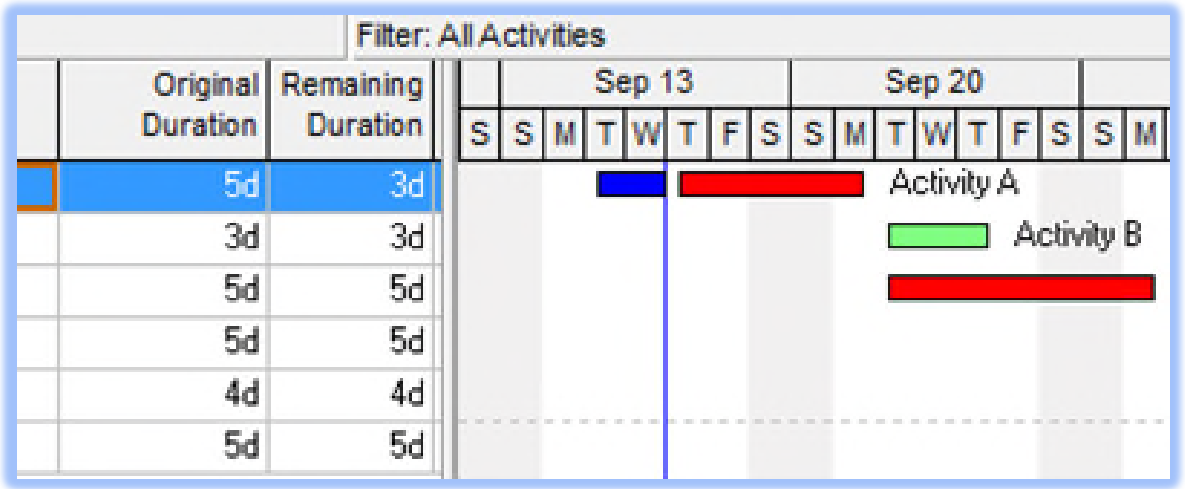
- Schedule Updates should also include adjustments of the relationships to reflect changes in the plan. These adjustments are called logic changes.

CPM Terms

ACTIVITY

- An **activity** is a unique unit of the project which can be described within prescribed limits of time – a task, function or decision that consumes time.

- Types of activities:
  - Task Dependent
  - Milestones (Start or Finish)
  - Level of Effort (Hammock)
  - WBS Summary



CPM Terms

TASK DEPENDENT

- A **task dependent** activity is the predominate type of activity in a CPM schedule and represents a specific element of the project that requires time to complete.

- Task dependent activities include administrative and production type elements such as:
  - Shop drawing submittals and reviews
  - Material procurement and fabrication
  - Construction of project elements at the site
  - Inspection activities
  - Curing periods
  - Specified non-work periods

CPM Terms

MILESTONES

- Start Milestone – A **Start Milestone** has a start date and no finish date and is scheduled at the start of a time period.
- Examples of Start Milestones are Start Project, NTP, Start Phase 1.
- Finish Milestone - A **Finish Milestone** has a finish date, no start date and is scheduled at the end of a time period.
- Examples of Finish Milestones are Complete Project, Final Completion, Complete Phase 1.
- Milestones do not have any duration and do not add to the duration of the schedule but can affect the end date of a schedule if not properly statused.

CPM Terms

LEVEL OF EFFORT (HAMMOCK)

- A **Level of Effort (Hammock)** activity is best described as a summary activity.
- The duration of a Level of Effort Activity is determined by the dates of its predecessor(s) and successor(s).
- Level of Effort activities do not have a static duration and do not add to the overall duration of the schedule.

CPM Terms

WBS SUMMARY

- A **WBS Summary** activity is another type of summary activity that summarizes the duration of a WBS element.
- The duration of a WBS Summary activity is determined by the earliest start date of an activity included in the WBS and the latest finish date of an activity included in the WBS.
- WBS Summary activities can be assigned predecessors or successors but the logic is overridden by the WBS dates.
- WBS Summary activities do not add to the overall duration of the schedule. They are an informational type of activity.

CPM Terms

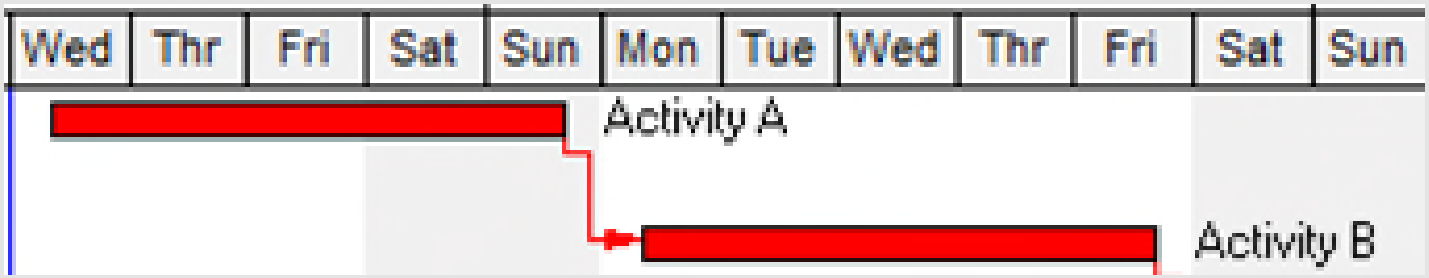
RELATIONSHIP

- A **relationship** is the interaction between elements (activities) of the work.
- Types of relationships:
  - Finish-to-Start
  - Start-to-Start
  - Finish-to-Finish
  - Start-to-Finish

CPM Terms

TYPES OF RELATIONSHIPS

- Finish-to-Start - (FS) - Activity A must be completed before Activity B can begin.

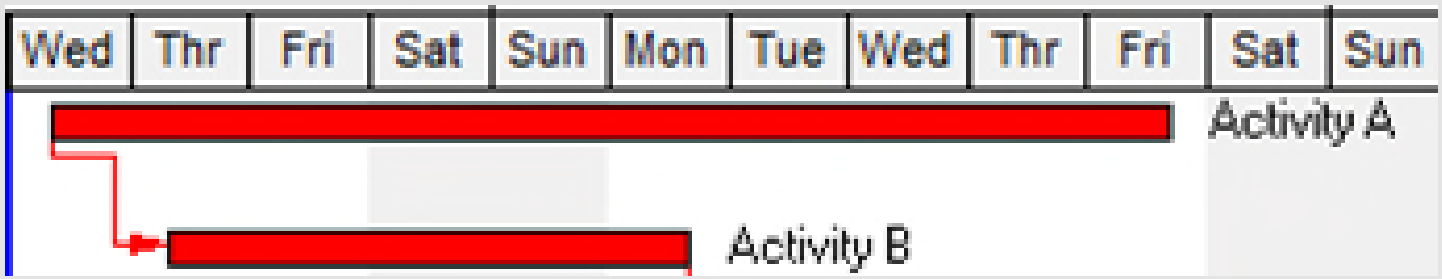


- Example – Piling must be complete before footing starts.

CPM Terms

TYPES OF RELATIONSHIPS

- Start-to-Start (SS) - Activity B can start after Activity A has started.

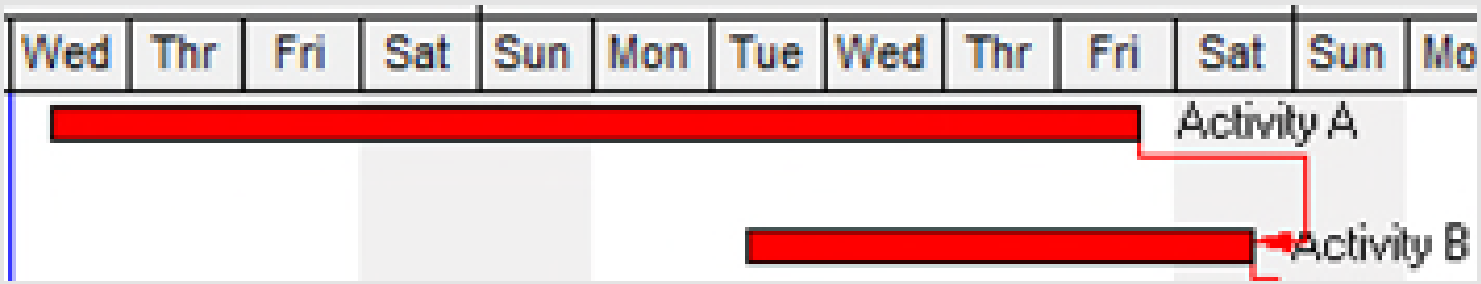


- Example – Sod can start 1 day after finish grading starts.

CPM Terms

TYPES OF RELATIONSHIPS

- Finish-to-Finish (FF) - Activity A must be complete before Activity B can finish.

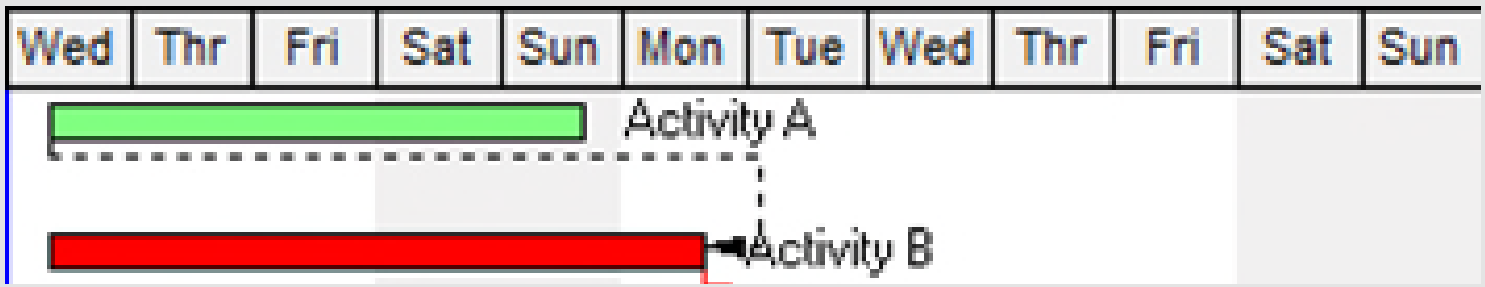


- Example – Base can finish 3 days after the subgrade finishes.

CPM Terms

TYPES OF RELATIONSHIPS

- Start-to-Finish (SF) - B cannot finish before A starts.



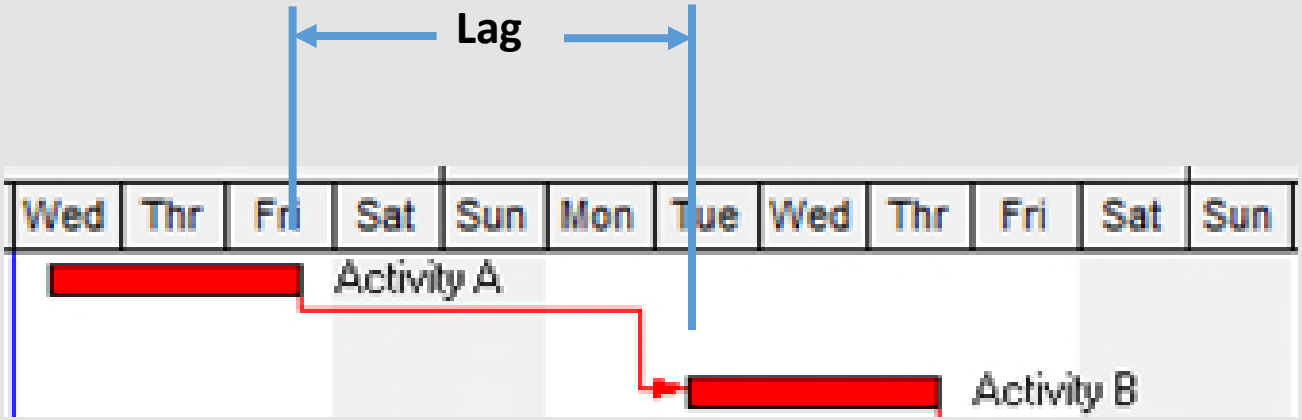
- Example – Maintenance period cannot finish until warranty period begins.

CPM Terms

RELATIONSHIP LAG

- A **Lag** is a duration that is applied to a relationship to make the successor start or finish earlier or later.

- Example of lag is flex-time start of construction after the notice to proceed.



CPM Terms

CALENDAR

- A **Calendar** establishes the days on which an activity can or will be worked on.
- Activities can have different calendars.
- Example – Submittals and reviews may be on a 7-day per week calendar while field production activities are on a 5-day per week calendar.
- It is very common to use many different calendars on more complex projects.
- P6 uses **Global** Calendars and **Project** Calendars.

CPM Terms

CALENDAR

- Global Calendars
  - Calendars that are “Global” to the P6 Program for all project schedules.
  - Calendars are not specific to a project schedule.
  - May create schedule calculation issues when project schedules are imported and exported between different computers.
- Project Calendars
  - Calendars that are specific to a project schedule.
  - Calendars “go with” the project schedule when imported and exported.

CPM Terms

ORIGINAL DURATION

- The **Original Duration** is the amount of time it will take to complete an activity, from beginning to end.
- Milestones always have a duration of zero.
- The original duration of Level of Effort activities is calculated based on the start date of the predecessor and the finish date of the successor.
- The original duration of WBS Summary activities is determined by the WBS the activity is associated with.

CPM Terms

REMAINING DURATION

- The **Remaining Duration** is the amount of time required to complete an activity from the data date until the end of the activity.

- On a baseline schedule, the Remaining Duration will always be the same as the Original Duration.

CPM Terms

PERCENT COMPLETE

- **Percent Complete** is a numerical representation of an activity's status. It is normally determined by the ratio of Remaining Duration to Original Duration.

Percent Complete = 1 - RD/OD

- For a baseline schedule, the Percent Complete is 0% for all activities.
- For a schedule update, the Percent Complete will range from 0% for activities that have not started to 100% for complete activities.

CPM Terms

TOTAL FLOAT

- **Total Float (TF)** is the maximum amount of time an activity can be delayed from its early start without delaying the entire project.

- Total Float is calculated as the difference between an activity's Late Finish Date and Early Finish Date. *(FDOT Specifications)*

Total Float = Late Finish-Early Finish

CPM Terms

FREE FLOAT

- **Free Float (FF)** is the maximum amount of time an activity can be delayed without delaying the early start of any of its succeeding activities.

FF = Early Start of next activity – Early Finish of current activity

CPM Terms

CRITICAL PATH (LONGEST PATH)

- The **Critical Path** is the longest / most time-consuming path in a network of activities, following the network logic and using the planned remaining durations for the network activities.
- A critical activity is any activity on the longest path.
- A critical activity may or may not have zero total float.
- SP 8-3.2.6 Critical Path: The critical path shall be defined as the longest path and is represented by the longest logical path through the remaining activities, resulting in the earliest calculated completion date. There may be more than one longest path in the schedule. However, the use of float suppression techniques as described in 8-3.2.5 shall not be used to force the schedule to have more than one longest path.

CPM Terms

CONTROLLING WORK ITEM

- The activity or work item on the critical path having the least amount of total float. The controlling item of work will also be referred to as a Critical Activity. *(1-3 Definitions January 2021 FDOT Standard Specifications)*

CPM Terms

RESOURCE

- A **resource** is something of value that is needed in the production and prosecution of a project. Resources include labor, equipment and materials.

- Resources are seldom unlimited in quantity and therefore, must be managed.

- The amount of resources available can directly impact the duration of a schedule activity and must be taken into account.

CPM Terms

DELAY

- Any unanticipated event, action, force or factor which extends the Contractor's time of performance of any controlling work item under the Contract. The term "delay" is intended to cover all such events, actions, forces or factors, whether styled "delay", "disruption", "interference", "impedance", "hindrance", or otherwise, which are beyond the control of and not caused by the Contractor, or the Contractor's subcontractors, materialmen, suppliers or other agents. This term does not include "extra work". *(January 2021 FDOT Standard Specifications)*

CPM Terms

Fragnet

- A **fragnet** is a fragment of a schedule. A fragnet is defined as the sequence of new activities that are proposed to be added to the existing schedule. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities. (Ohio DOT Specification 2008)

CPM Terms

Status, Statused or Statusing

- This is the process of providing actual starts, actual finishes and adjusting remaining durations and/or percent complete to schedule activities, up to a specific data date.

CPM Terms

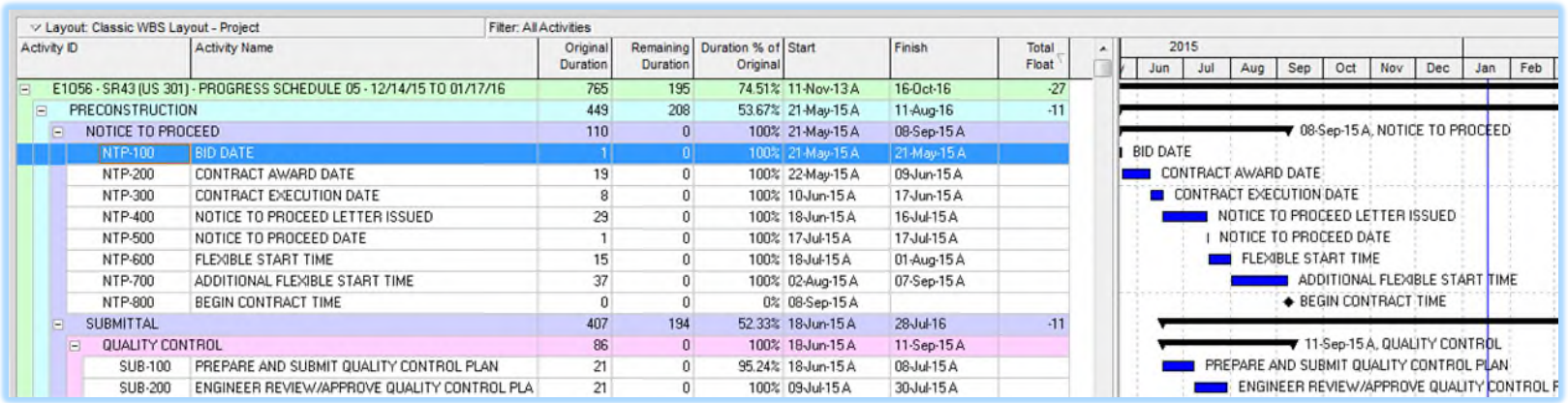
De-status

- This is the process of removing actual starts, actual finishes and adjusting remaining durations and/or percent complete on schedule activities, back to a specific data date in the past.

CPM Terms

Gantt Chart

- A Gantt chart, commonly used in project management, is one of the most popular and useful ways of showing activities (tasks or events) displayed against time. On the left of the chart is a list of the activities and along the top is a suitable time scale. Each activity is represented by a bar; the position and length of the bar reflects the start date, duration and end date of the activity. (Gantt.com)



CPM Terms

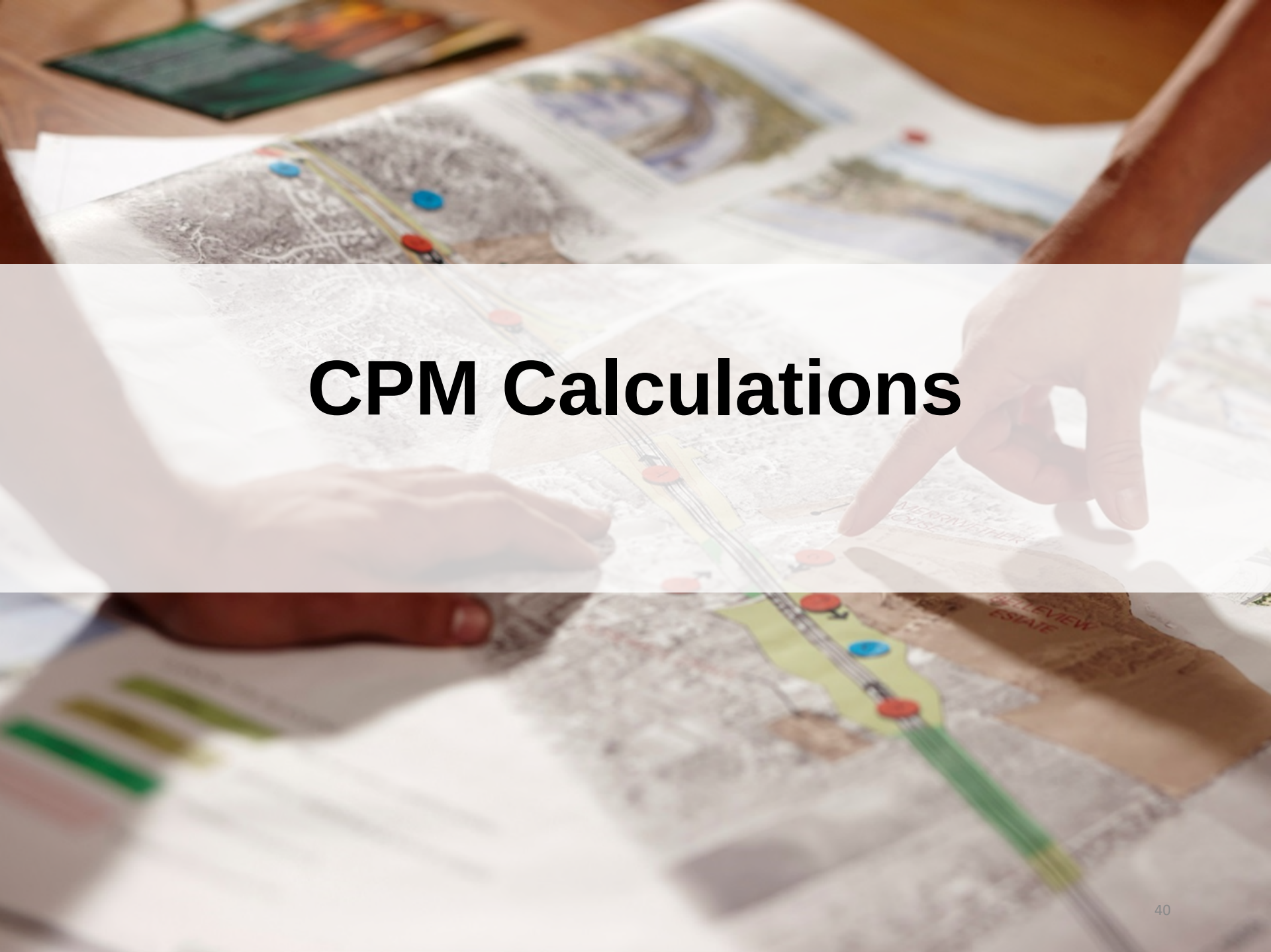
Sequestering Float

- Taking up float through the use of lags and preferential logic and constraints.

CPM Terms

Target

- Term used when comparing two schedules. The target is normally the schedule that an update or an impacted schedule is being compared with. The target could be the baseline schedule or it could be an update. For example, if you were comparing the February update to the January update, the January update would be the Target.



CPM Calculations

CPM Calculations

CALCULATIONS

The primary calculations in the CPM process are:

- **Forward Pass** – process of determining the early start & finish dates
- **Backward Pass** – process of determining the late start & finish dates
- **Total Float** – difference between the early & late dates

CPM Calculations

CALCULATIONS

The variables in the CPM calculations are:

- Data date
- Imposed finish date
- Remaining duration
- Logic (including constraints)
- Calendar(s)
- Retained Logic or Progress Override – methods for handling out-of-sequence progress

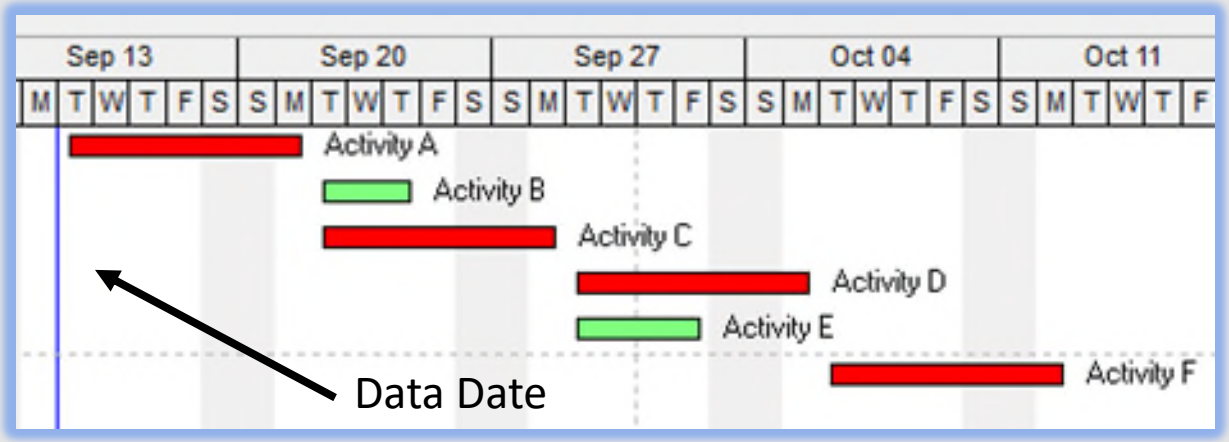
A change to any one of these variables can affect the calculated dates in the schedule.

CPM Calculations

CALCULATIONS

Data Date

- The date on which the forward pass begins

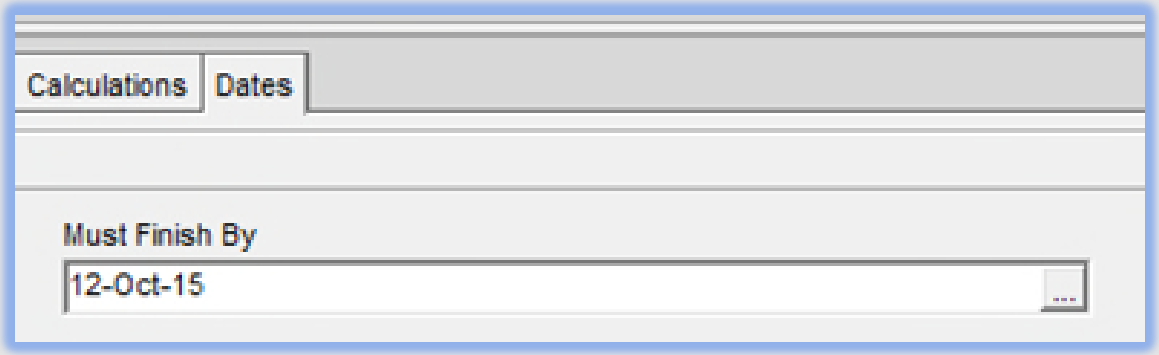


CPM Calculations

CALCULATIONS

Imposed Finish Date

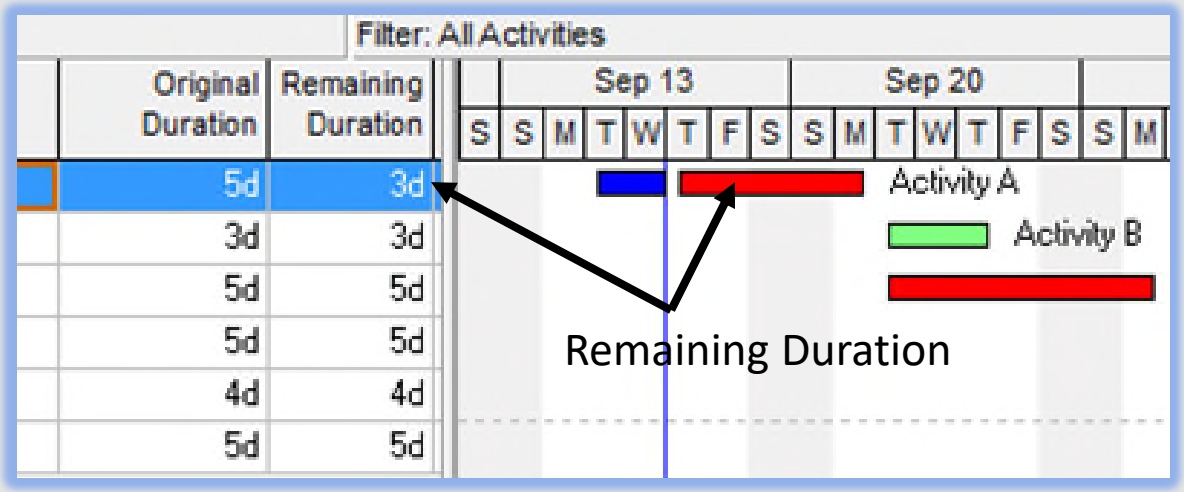
- The date on which the backward pass begins



CPM Calculations

CALCULATIONS

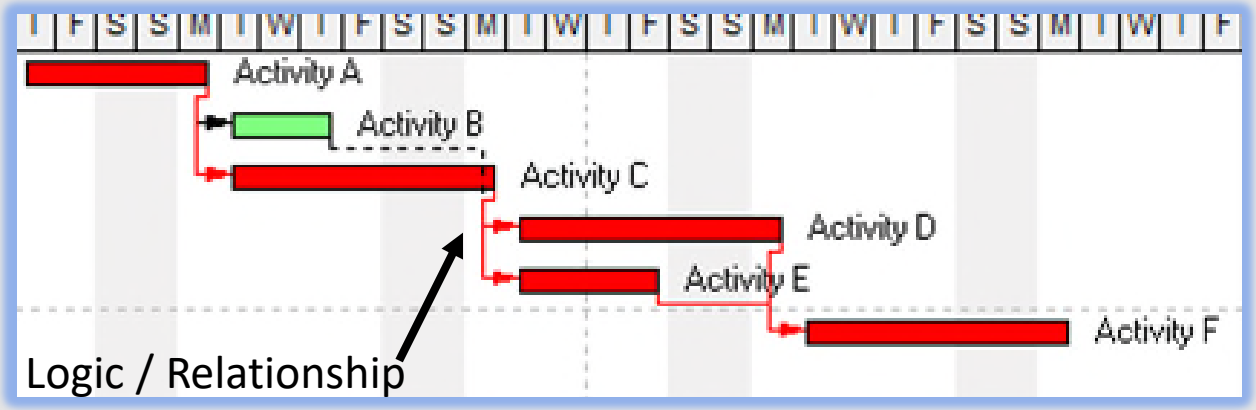
- Remaining duration



CPM Calculations

CALCULATIONS

- Logic (including constraints)

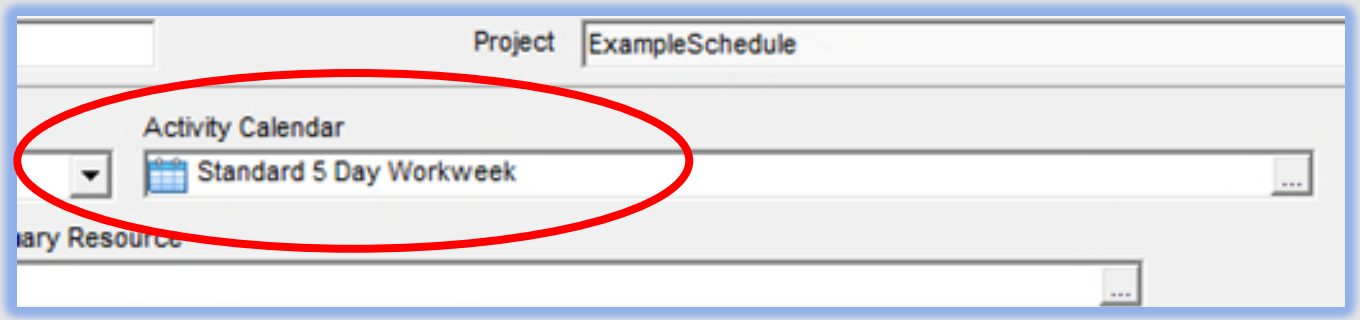


- Constraints are dates assigned to activities regardless of the logic
- Examples are “Start On”, “Start On or After”, “Finish On”, “Finish On or Before”

CPM Calculations

CALCULATIONS

- Calendar(s)



CPM Calculations

FORWARD PASS

- A **Forward Pass** calculates early start and early finish dates, starting with the first activity within the network
- **Early Start** is the earliest time an activity can start
- Early Start = Early Finish (predecessor) + lag
- **Early Finish** is the earliest time an activity can finish
- Early Finish = Early Start + Duration

CPM Calculations

BACKWARD PASS

- A **Backward Pass** calculates late finish and late start dates, starting with the last activity within the network
- **Late Finish** is the latest time an activity can finish
- Late Finish = Late Start (successor) - lag
- **Late Start** is the latest time an activity can start
- Late Start = Late Finish – Duration

CPM Calculations

TOTAL FLOAT

- **Total Float (TF)** = the maximum amount of time an activity can be delayed from its early start without delaying the entire project.
- Total Float is calculated by subtracting Early Finish from Late Finish
- Total Float = Late Finish Date – Early Finish Date

CPM Calculations

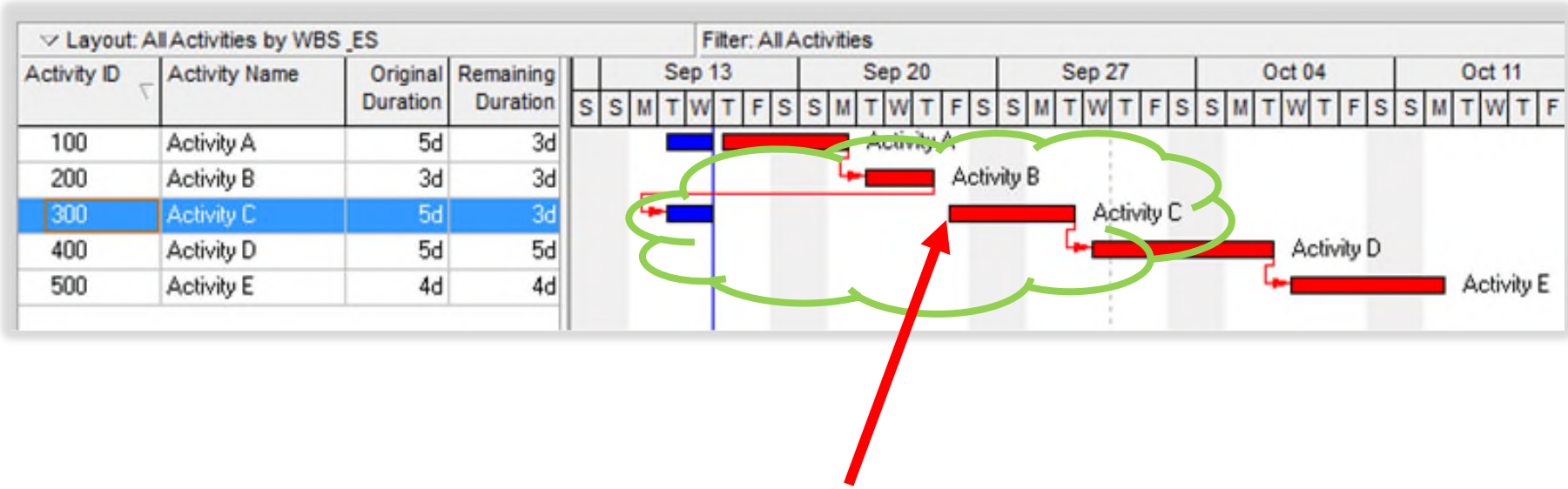
RETAINED LOGIC

- **Retained Logic** calculation holds schedule logic constant during calculation of in-progress schedules, regardless of the status of predecessor activities.

- The Retained Logic calculation results in a **conservative representation** of the project status when there is significant out-of-sequence logic.

CPM Calculations

RETAINED LOGIC



CPM Calculations

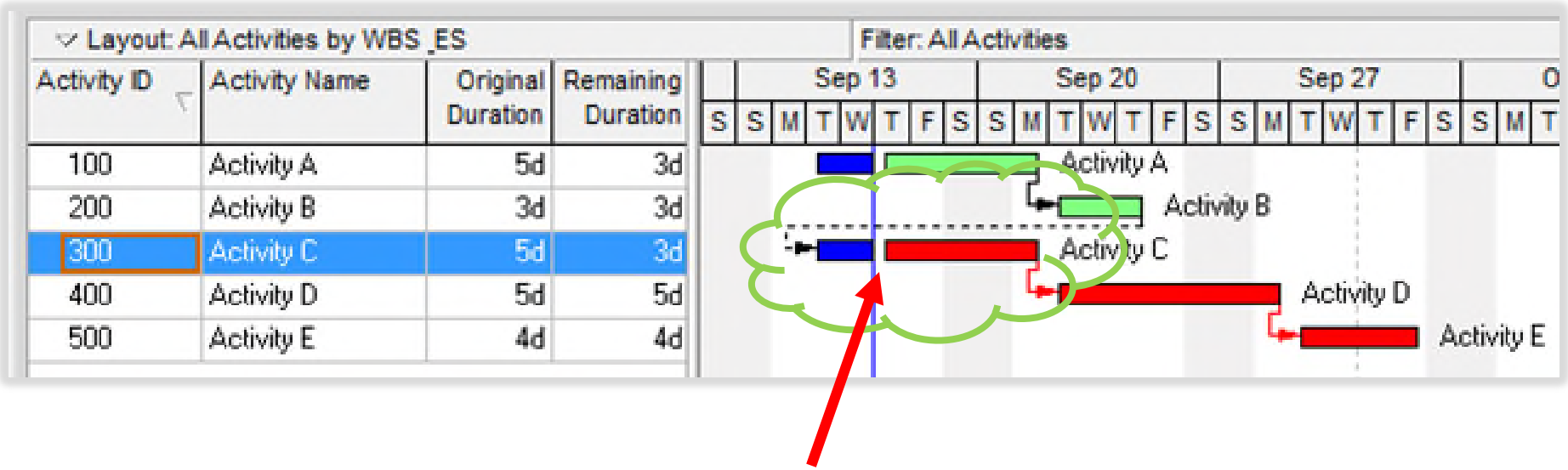
PROGRESS OVERRIDE

- Progress Override calculation ignores or overrides the predecessor activity relationships if the successor activity has started.

- The Progress Override calculation results in an **optimistic representation** of the project status when there is significant out-of-sequence logic.

CPM Calculations

PROGRESS OVERRIDE



Note there is no break in this activity

Also notice that activities A & B are no longer critical and the finish date for activity E is earlier.

Reviewing a CPM Schedule

REVIEWING A CPM SCHEDULE

PURPOSE OF A REVIEW

- To understand the Contractor's plan.
- To check the validity of the Contractor's plan.
- To understand the impact of the Department's obligations on the Contractor's plan.
- Because the Contract requires it!

REVIEWING A CPM SCHEDULE

FUNDAMENTALS OF A COMPREHENSIVE BASELINE REVIEW

Know the Contract Requirements

- **Schedule Specification**
- Plan Details
- Contractual Limitations of Operations
  - Coordination with 3rd Parties
  - Lane Closure Restrictions
  - Holidays and Special Events
- Contractual Deadlines
  - Contract Time
  - Interim Milestones
  - Bonus and I/D Dates/Timeframe
  - Utility Schedules

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

When is the schedule due?

8-3.2.1 Contract Schedule: Submit to the Engineer for acceptance a Critical Path Method (CPM) Contract Schedule for the project within 30 calendar days after execution of the Contract or at the preconstruction conference, whichever is earlier.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

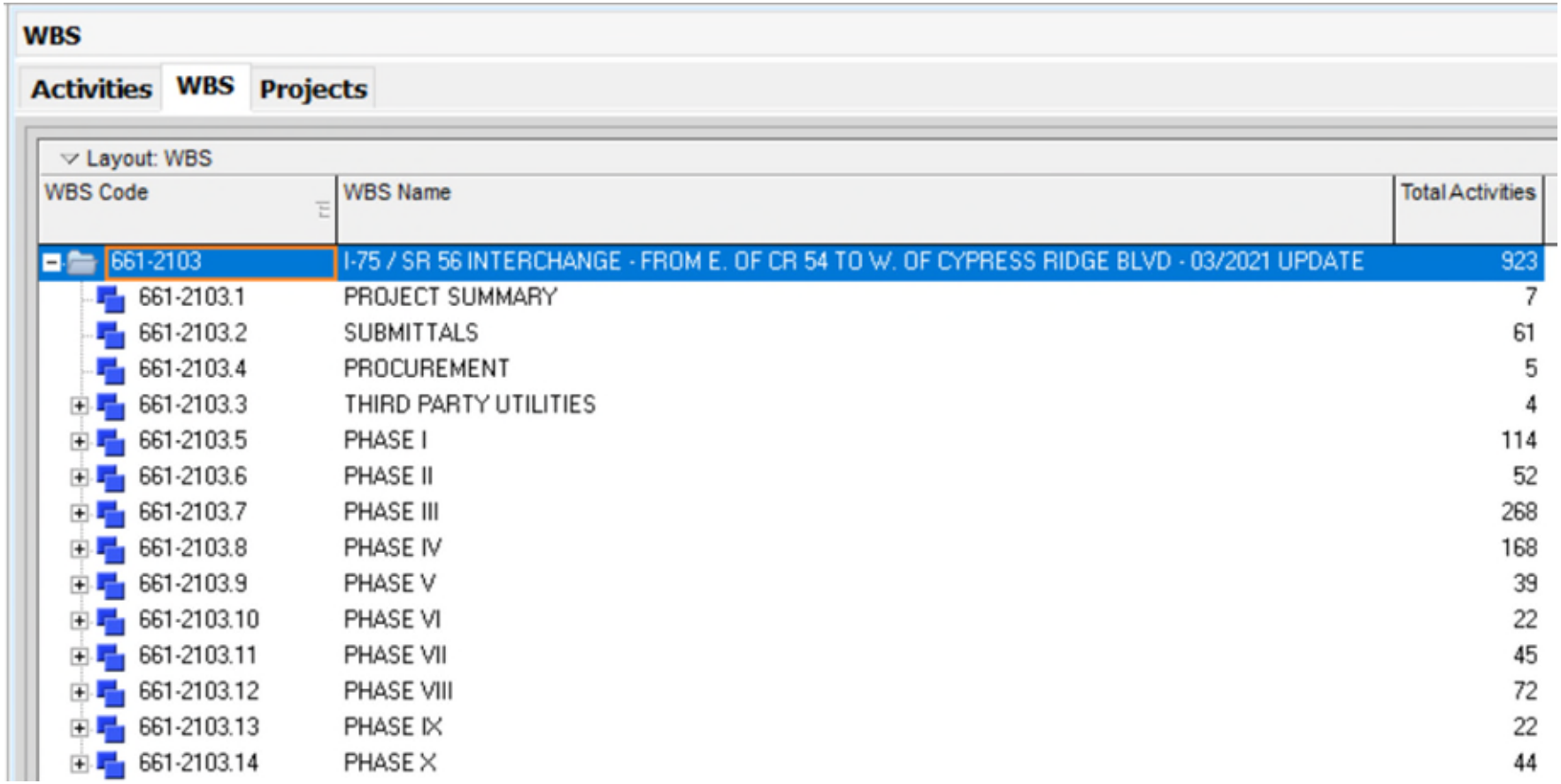
How should the schedule be organized?

8-3.2.1 Contract Schedule: Submit to the Engineer for acceptance a Critical Path Method (CPM) Contract Schedule for the project within 30 calendar days after execution of the Contract or at the preconstruction conference, whichever is earlier.

The Contract Schedule shall include detailed schedule diagrams and schedule data as described below that shows how the Contractor intends to complete the work within the Contract Time. Any Contract defined holidays, suspension days, or weather days that affect the Critical Path will be added as they occur. When the project includes a Maintenance of Traffic plan, the work breakdown structure (WBS) for the Contract Schedule shall be consistent with the Contract Maintenance of Traffic plan, showing activities for each discrete Contract activity to be accomplished within each Maintenance of Traffic phase. When the project does not include a Maintenance of Traffic plan, the WBS shall be consistent with the phasing shown in the Contract Documents. Include activities for deliverables and reviews in the schedule.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



WBS Code	WBS Name	Total Activities
661-2103	I-75 / SR 56 INTERCHANGE - FROM E. OF CR 54 TO W. OF CYPRESS RIDGE BLVD - 03/2021 UPDATE	923
661-2103.1	PROJECT SUMMARY	7
661-2103.2	SUBMITTALS	61
661-2103.4	PROCUREMENT	5
661-2103.3	THIRD PARTY UTILITIES	4
661-2103.5	PHASE I	114
661-2103.6	PHASE II	52
661-2103.7	PHASE III	268
661-2103.8	PHASE IV	168
661-2103.9	PHASE V	39
661-2103.10	PHASE VI	22
661-2103.11	PHASE VII	45
661-2103.12	PHASE VIII	72
661-2103.13	PHASE IX	22
661-2103.14	PHASE X	44

REVIEWING A CPM SCHEDULE

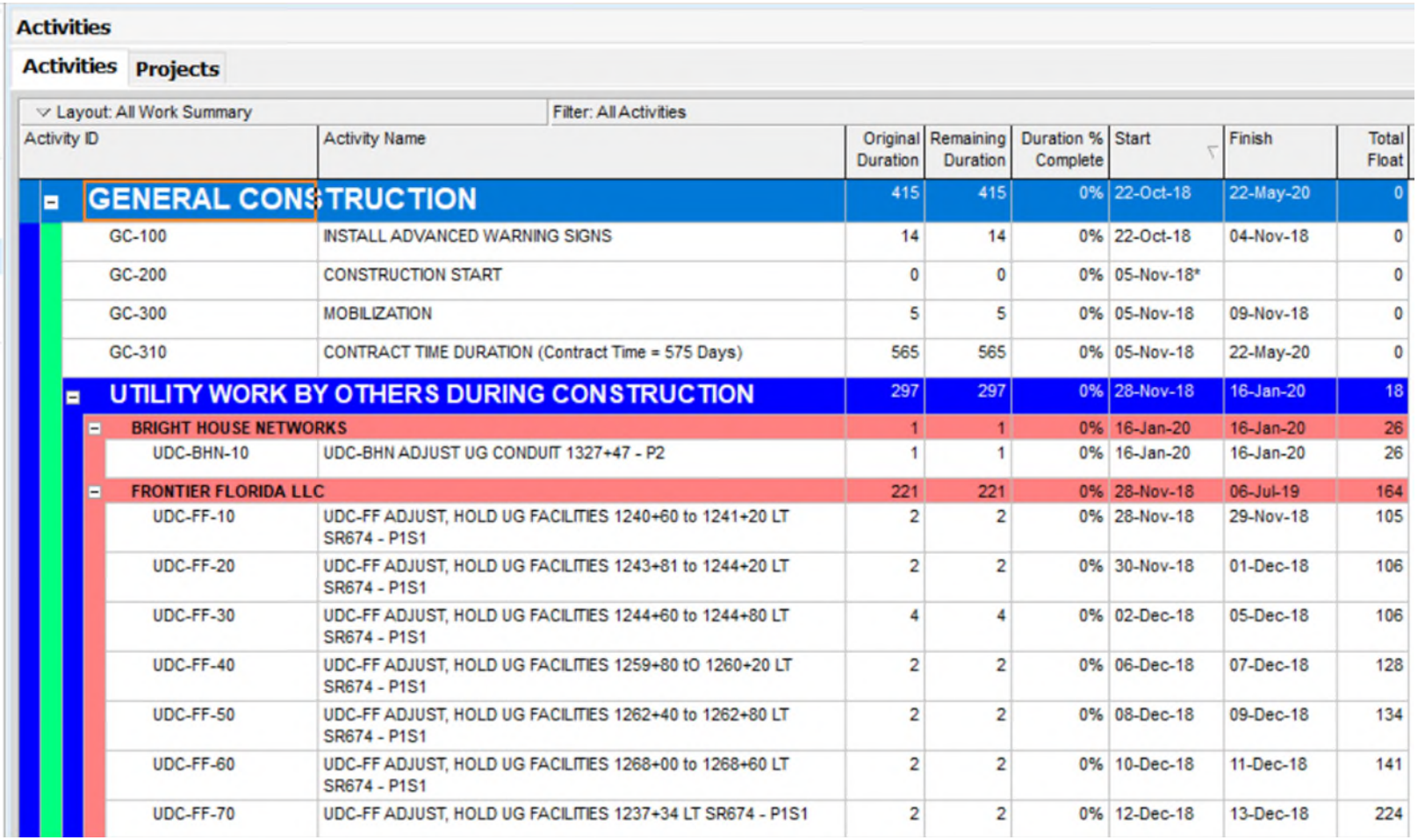
SCHEDULE SPECIFICATION – SECTION 8-3.2

What activities should be included?

include a Maintenance of Traffic plan, the WBS shall be consistent with the phasing shown in the Contract Documents. Include activities for deliverables and reviews in the schedule. Sufficient liaison shall be conducted and information provided to indicate coordination with utility owners having facilities within the project limits. The schedule must incorporate the utility work schedules included in the Contract Documents, unless changed by mutual agreement of the utility company, the Contractor and the Department. Show the interdependence (logic) of the utility work schedule activities with other schedule activities in the Contract Schedule for acceptance by the Department, unless otherwise approved by the Engineer.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



Activities

Activities | Projects

Layout: All Work Summary | Filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Duration % Complete	Start	Finish	Total Float
GENERAL CONSTRUCTION		415	415	0%	22-Oct-18	22-May-20	0
GC-100	INSTALL ADVANCED WARNING SIGNS	14	14	0%	22-Oct-18	04-Nov-18	0
GC-200	CONSTRUCTION START	0	0	0%	05-Nov-18*		0
GC-300	MOBILIZATION	5	5	0%	05-Nov-18	09-Nov-18	0
GC-310	CONTRACT TIME DURATION (Contract Time = 575 Days)	565	565	0%	05-Nov-18	22-May-20	0
UTILITY WORK BY OTHERS DURING CONSTRUCTION		297	297	0%	28-Nov-18	16-Jan-20	18
BRIGHT HOUSE NETWORKS		1	1	0%	16-Jan-20	16-Jan-20	26
UDC-BHN-10	UDC-BHN ADJUST UG CONDUIT 1327+47 - P2	1	1	0%	16-Jan-20	16-Jan-20	26
FRONTIER FLORIDA LLC		221	221	0%	28-Nov-18	06-Jul-19	164
UDC-FF-10	UDC-FF ADJUST, HOLD UG FACILITIES 1240+60 to 1241+20 LT SR674 - P1S1	2	2	0%	28-Nov-18	29-Nov-18	105
UDC-FF-20	UDC-FF ADJUST, HOLD UG FACILITIES 1243+81 to 1244+20 LT SR674 - P1S1	2	2	0%	30-Nov-18	01-Dec-18	106
UDC-FF-30	UDC-FF ADJUST, HOLD UG FACILITIES 1244+60 to 1244+80 LT SR674 - P1S1	4	4	0%	02-Dec-18	05-Dec-18	106
UDC-FF-40	UDC-FF ADJUST, HOLD UG FACILITIES 1259+80 tO 1260+20 LT SR674 - P1S1	2	2	0%	06-Dec-18	07-Dec-18	128
UDC-FF-50	UDC-FF ADJUST, HOLD UG FACILITIES 1262+40 to 1262+80 LT SR674 - P1S1	2	2	0%	08-Dec-18	09-Dec-18	134
UDC-FF-60	UDC-FF ADJUST, HOLD UG FACILITIES 1268+00 to 1268+60 LT SR674 - P1S1	2	2	0%	10-Dec-18	11-Dec-18	141
UDC-FF-70	UDC-FF ADJUST, HOLD UG FACILITIES 1237+34 LT SR674 - P1S1	2	2	0%	12-Dec-18	13-Dec-18	224

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What if the schedule shows early completion?

The Contract Schedule may indicate a completion date in advance of the expiration of Contract Time. However, the Department will not be liable in any way for the Contractor's failure to complete the project prior to expiration of Contract Time. Any additional costs, including extended overhead incurred between the Contractor's scheduled completion date and the expiration of Contract Time, shall be the responsibility of the Contractor. The Contractor shall not be entitled to claim or recover any such costs from the Department.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What scheduling method should be used?

8-3.2.2 Schedule Submissions: Develop the schedule in Precedence Diagram Method (PDM) format.

Each schedule submission and monthly update shall include a minimum of the following six items:

REVIEWING A CPM SCHEDULE

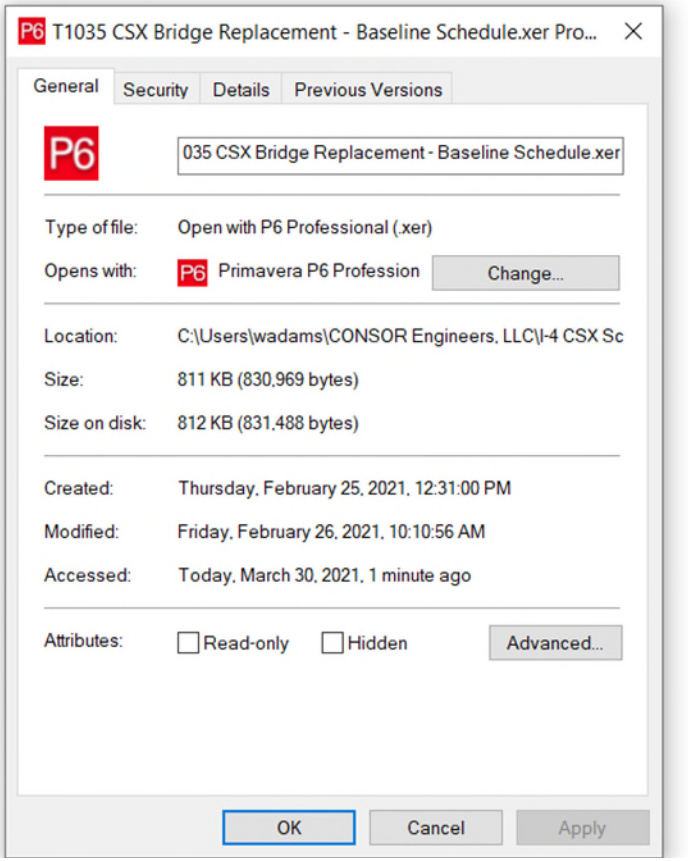
SCHEDULE SPECIFICATION – SECTION 8-3.2

What should be included in the submittal?

1. Submit the files electronically in the current Department version of Oracle Primavera P6 format by exporting the full schedule to an .xer file format.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

2. A Gantt chart grouped by WBS, then phase, sorted by early start then total float. The chart shall include the following columns:

a. Activity ID
b. Activity Name
c. Calendar
d. Activity Type
e. Original Duration
f. Remaining Duration
g. Duration % Complete
h. Early Start
i. Early Finish
j. Late Start
k. Late Finish
l. Total Float

The chart shall also include activity bars using the Oracle Primavera P6 default color coding for the bars. The chart shall be submitted as a Portable Document Format (.pdf) file and formatted on 11 inch by 17 inch landscape oriented sheets, with the activity table and bars.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

T7410 - SR 674 (SUN CITY CTR BLVD) AS-BID CPM BASELINE CONSTRUCTION SCHEDULE — All Work Summary

Activity ID	Activity Name	Calendar	Activity Type	Original Duration	Remaining Duration	Duration % Complete	Early Start	Early Finish	Late Start	Late Finish	Total Float	Budgeted Total Cost
T7410 - SR 674 (SUN CITY CTR BLVD) AS-BID C				522	522	0%	23-May-18	22-May-20	23-May-18	22-May-20	0	$0.00
PRECONSTRUCTION				124	124	0%	23-May-18	12-Nov-18	23-May-18	01-Oct-19	201	$0.00
NOTICE TO PROCEED		TA 10- 7 DAY WORKWEEK		166	166	0%	23-May-18	05-Nov-18	23-May-18	05-Nov-18	0	$0.00
NTP-100	BID DATE	TA 10- 7 DAY WORKWEEK	Task Dependent	1	1	0%	23-May-18	23-May-18	23-May-18	23-May-18	0	$0.00
NTP-200	CONTRACT AWARD DATE	TA 10- 7 DAY WORKWEEK	Task Dependent	34	34	0%	24-May-18	26-Jun-18	24-May-18	26-Jun-18	0	$0.00
NTP-300	CONTRACT EXECUTION DATE	TA 10- 7 DAY WORKWEEK	Task Dependent	13	13	0%	27-Jun-18	09-Jul-18	27-Jun-18	09-Jul-18	0	$0.00
NTP-400	NOTICE TO PROCEED LETTER ISSUED	TA 10- 7 DAY WORKWEEK	Task Dependent	29	29	0%	10-Jul-18	07-Aug-18	10-Jul-18	07-Aug-18	0	$0.00
NTP-500	NOTICE TO PROCEED DATE	TA 10- 7 DAY WORKWEEK	Task Dependent	1	1	0%	07-Aug-18	07-Aug-18	07-Aug-18	07-Aug-18	0	$0.00
NTP-600	FLEXIBLE START DURATION	TA 10- 7 DAY WORKWEEK	Task Dependent	89	89	0%	08-Aug-18	04-Nov-18	08-Aug-18	04-Nov-18	0	$0.00
NTP-700	BEGIN CONTRACT TIME	TA 10- 7 DAY WORKWEEK	Start Milestone	0	0	0%	05-Nov-18		05-Nov-18		0	$0.00
SUBMITTALS		TA 10- 7 DAY WORKWEEK		79	79	0%	27-Jun-18	13-Sep-18	19-Sep-18	02-Aug-19	322	$0.00
QUALITY CONTROL		TA 10- 7 DAY WORKWEEK		42	42	0%	27-Jun-18	07-Aug-18	24-Sep-18	04-Nov-18	89	$0.00
SUB-1000	MAC ENTRY OF CONTRACTOR QUALITY CONTROL PLAN	TA 10- 7 DAY WORKWEEK	Task Dependent	21	21	0%	27-Jun-18	17-Jul-18	24-Sep-18	14-Oct-18	89	$0.00
SUB-2000	APPROVE MAC ENTRY OF CONTRACTOR QUALITY CONTROL PLAN	TA 10- 7 DAY WORKWEEK	Task Dependent	21	21	0%	18-Jul-18	07-Aug-18	15-Oct-18	04-Nov-18	89	$0.00
ENVIRONMENTAL AND PERMITS		TA 10- 7 DAY WORKWEEK		42	42	0%	10-Jul-18	20-Aug-18	24-Sep-18	04-Nov-18	76	$0.00
SUB-1010	SUBMIT EROSION CONTROL PLAN	TA 10- 7 DAY WORKWEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	24-Sep-18	14-Oct-18	76	$0.00
SUB-1020	SUBMIT NPDES NOI PERMIT APPLICATION	TA 10- 7 DAY WORKWEEK	Task Dependent	7	7	0%	10-Jul-18	16-Jul-18	15-Oct-18	21-Oct-18	97	$0.00
SUB-2020	APPROVE NPDES NOI PERMIT APPLICATION	TA 10- 7 DAY WORKWEEK	Task Dependent	14	14	0%	17-Jul-18	30-Jul-18	22-Oct-18	04-Nov-18	97	$0.00
SUB-2010	APPROVE EROSION CONTROL PLAN	TA 10- 7 DAY WORKWEEK	Task Dependent	21	21	0%	31-Jul-18	20-Aug-18	15-Oct-18	04-Nov-18	76	$0.00
NON-STANDARD DRAINAGE		TA 10- 7 DAY WORKWEEK		66	66	0%	10-Jul-18	13-Sep-18	09-Nov-18	13-Jan-19	122	$0.00
SUB-1030	SUBMIT NON-STANDARD DRAINAGE STR SHOP DRAWINGS	TA 10- 7 DAY WORKWEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	09-Nov-18	29-Nov-18	122	$0.00
SUB-2030	APPROVE NON-STANDARD DRAINAGE STR SHOP DRAWINGS	TA 10- 7 DAY WORKWEEK	Task Dependent	45	45	0%	31-Jul-18	13-Sep-18	30-Nov-18	13-Jan-19	122	$0.00
LIGHTING		TA 10- 7 DAY WORKWEEK		66	66	0%	10-Jul-18	13-Sep-18	04-Feb-19	15-Apr-19	214	$0.00
SUB-1050	SUBMIT LIGHTING LOADCENTERS SHOP DRAWINGS	TA 10- 7 DAY WORKWEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	04-Feb-19	24-Feb-19	205	$0.00
SUB-1060	SUBMIT LIGHT POLES LUMINAIRES SHOP DRAWINGS	TA 10- 7 DAY WORKWEEK	Task	21	21	0%	10-Jul-18	30-Jul-18	04-Feb-19	24-Feb-19	205	$0.00

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

3. A Gantt chart with the same columns and bars listed in 8-3.2.2(2), but filtered for the longest path, not grouped but sorted by early start, then early finish. The chart shall be submitted as a.pdf file and formatted on 11 inch by 17 inch landscape oriented sheets, with the activity table and bars.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

T7410 - SR 674 (SUN CITY CTR BLVD) AS-BID CPM BASELINE CONSTRUCTION SCHEDULE — Longest Path

Activity ID	Activity Name	Calendar	Activity Type	Original Duration	Remaining Duration	Duration % Complete	Early Start	Early Finish	Late Start	Late Finish	Total Float	Budgeted Total Cost
GC-200	CONSTRUCTION START	TA10- 5 DAYWORKWEEK	Start Milestone	0	0	0%	05-Nov-18		05-Nov-18		0	$0.00
GC-300	MOBILIZATION	TA10- 5 DAYWORKWEEK	Task Dependent	5	5	0%	05-Nov-18	09-Nov-18	05-Nov-18	09-Nov-18	0	$0.00
GC-310	CONTRACT TIME DURATION (Contract Time = 575 Days)	TA10- 7 DAYWORKWEEK	Level of Effort	565	565	0%	05-Nov-18	22-May-20	05-Nov-18	22-May-20	0	$0.00
P1000-00	PHASE 1 -STA 1198+06 TO STA. 1284+51 LT/RT S.R. 674 - START	TA10- 5 DAYWORKWEEK	Start Milestone	0	0	0%	12-Nov-18		12-Nov-18		0	$0.00
P1S1-000-00	PHASE 1 -SECTION 1 -STA. 1225+00 TO STA. 1305+00 LT S.R. 674 - START	TA10- 5 DAYWORKWEEK	Start Milestone	0	0	0%	12-Nov-18		12-Nov-18		0	$0.00
P1S1-100-10	SETUP MOT & TCD 1225+00 to 1305+00 @ SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	12-Nov-18	13-Nov-18	12-Nov-18	13-Nov-18	0	$0.00
P1S1-110-10	INSTALL EROSION CONTROL MEASURES 1225+00 to 1265+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	12-Nov-18	13-Nov-18	12-Nov-18	13-Nov-18	0	$0.00
P1000-10	PHASE 1 -DURATION (LOE)	TA10- 7 DAYWORKWEEK	Level of Effort	410	410	0%	12-Nov-18	26-Dec-19	12-Nov-18	26-Dec-19	0	$0.00
P1S1-110-20	INSTALL EROSION CONTROL MEASURES 1265+00 to 1285+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	14-Nov-18	15-Nov-18	14-Nov-18	15-Nov-18	0	$0.00
P1S1-110-30	INSTALL EROSION CONTROL MEASURES 1285+00 to 1285+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	16-Nov-18	19-Nov-18	16-Nov-18	19-Nov-18	0	$0.00
P1S1-110-40	INSTALL EROSION CONTROL MEASURES 1285+00 to 1305+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	20-Nov-18	21-Nov-18	20-Nov-18	21-Nov-18	0	$0.00
P1S1-120-10	CLEARING AND GRUBBING, WIDENING, UG 1225+00 to 1265+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	4	4	0%	22-Nov-18	27-Nov-18	22-Nov-18	27-Nov-18	0	$0.00
P1S1-120-20	CLEARING AND GRUBBING, WIDENING, UG 1245+00 to 1265+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	4	4	0%	26-Nov-18	03-Dec-18	26-Nov-18	03-Dec-18	0	$0.00
P1S1-120-30	CLEARING AND GRUBBING, WIDENING, UG 1265+00 to 1265+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	4	4	0%	04-Dec-18	07-Dec-18	04-Dec-18	07-Dec-18	0	$0.00
P1S1-120-40	CLEARING AND GRUBBING, WIDENING, UG 1265+00 to 1305+00 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	4	4	0%	10-Dec-18	13-Dec-18	10-Dec-18	13-Dec-18	0	$0.00
P1S1-150-300	REMOVE EXISTING DRAINAGE 1265+00 to 1305+00 LT SR674 - P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	4	4	0%	14-Dec-18	19-Dec-18	14-Dec-18	19-Dec-18	0	$0.00
P1S1-150-310	CONST (MH-S-31)(2)- 8' OF 24"X36" PIPE (X-CNC-JAC) 1285+05 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	1	1	0%	20-Dec-18	20-Dec-18	20-Dec-18	20-Dec-18	0	$0.00
P1S1-150-320	CONST (MH-S-31)(2) 10.7 OF 24"X36" PIPE (MH-S-33) 1285+05 to 1286+15 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	3	3	0%	21-Dec-18	25-Dec-18	21-Dec-18	25-Dec-18	0	$0.00
P1S1-150-330	CONST (MH-S-33) 6' OF 18" PIPE (INLET-S-32) 1286+15 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	1	1	0%	26-Dec-18	26-Dec-18	26-Dec-18	26-Dec-18	0	$0.00
P1S1-150-340	CONST (MH-S-33)(2) 60' OF 30" PIPE (DBL-MES) 2386+15 to 1287+19 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	27-Dec-18	28-Dec-18	27-Dec-18	28-Dec-18	0	$0.00
P1S1-150-350	CONST (SD-MES) 25 OF 30" PIPE (MH-S-34) 1290+14 to 1290+39 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	31-Dec-18	01-Jan-19	31-Dec-18	01-Jan-19	0	$0.00
P1S1-150-360	CONST (MH-S-34) 16' OF 24" PIPE (X-CNC-JAC) 1290+39 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	1	1	0%	02-Jan-19	02-Jan-19	02-Jan-19	02-Jan-19	0	$0.00
P1S1-150-370	CONST (MH-S-34) 60' OF 30" PIPE (INLET-S-35) 1290+39 to 1291+23 LT SR674- P1S1	TA10- 5 DAYWORKWEEK	Task Dependent	2	2	0%	03-Jan-19	04-Jan-19	03-Jan-19	04-Jan-19	0	$0.00

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

4. The Schedule log for the calculated schedule, submitted as a.pdf file and formatted on 8-1/2 inch by 11 inch portrait oriented sheets.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Scheduling/Leveling Report - 2021-04-02 12:45:22 - PM.EXE
=========================================================

        Default Project.....................................................T7410-BL00

        Projects:
                T7410-BL00..................................................T7410 - SR 674 (SUN CITY CTR BLVD)
                                                                            AS-BID CPM BASELINE CONSTRUCTION SCHEDULE

Scheduling/Leveling Settings:
-----------------------------
        General
        -------
        Scheduling .........................................................Yes
        Leveling ...........................................................No
        Ignore relationships to and from other projects ....................No
        Make open-ended activities critical ................................No
        Use Expected Finish Dates ..........................................Yes
        Schedule automatically when a change affects dates .................No
        Level resources during scheduling ..................................No
        Recalculate assignment costs after scheduling ......................No
        When scheduling progressed activities use ..........................Retained Logic
        Calculate start-to-start lag from ..................................Early Start
        Define critical activities as ......................................Longest Path
        Compute Total Float As .............................................Finish Float
        Calculate float based on finish date of ............................Each project
        Calendar for scheduling Relationship Lag ...........................Predecessor Activity Calendar

        Advanced
        --------
        Calculate multiple float paths......................................No
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Scheduling/Leveling Report - 2021-04-02 12:45:22 - PM.EXE
=========================================================

        Default Project.....................................................T7410-BL00

        Projects:
                T7410-BL00..................................................T7410 - SR 674 (SUN CITY CTR BLVD)
                                                                            AS-BID CPM BASELINE CONSTRUCTION SCHEDULE

Scheduling/Leveling Settings:
-----------------------------
        General
        -------
        Scheduling .........................................................Yes
        Leveling ...........................................................No
        Ignore relationships to and from other projects ....................No
        Make open-ended activities critical ................................No
        Use Expected Finish Dates ..........................................Yes
        Schedule automatically when a change affects dates .................No
        Level resources during scheduling ..................................No
        Recalculate assignment costs after scheduling ......................No
        When scheduling progressed activities use ..........................Retained Logic
        Calculate start-to-start lag from ..................................Early Start
        Define critical activities as ......................................Longest Path
        Compute Total Float As .............................................Finish Float
        Calculate float based on finish date of ............................Each project
        Calendar for scheduling Relationship Lag ...........................Predecessor Activity Calendar

        Advanced
        --------
        Calculate multiple float paths......................................No
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Statistics:
-----------
        # Projects.....................................................1
        # Activities...................................................619
        # Not Started..................................................619
        # In Progress..................................................0
        # Completed....................................................0
        # Relationships................................................1322
        # Activities with Constraint...................................2
                Project:        T7410-BL00      Activity:       GC-200  CONSTRUCTION START
                Project:        T7410-BL00      Activity:       NTP-700 BEGIN CONTRACT TIME

Errors:
-------
Warnings:
---------
        Activities without predecessors..............................1
                Project:        T7410-BL00      Activity:       NTP-100 BID DATE

        Activities without successors................................3
                Project:        T7410-BL00      Activity:       FC-500  PROJECT COMPLETION (Contract Completion Date: June 1, 2020)
                Project:        T7410-BL00      Activity:       FC-600  WRITTEN NOTICE OF FINAL ACCEPTANCE RECEIVED
                Project:        T7410-BL00      Activity:       NTP-700 BEGIN CONTRACT TIME

        Out-of-sequence activities...................................0

        Activities with Actual Dates > Data Date.....................0

        Milestone Activities with invalid relationships..............0
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Finish milestone and predecessors have different calendars.......16
        Project:        T7410-BL00      Activity:       P1-999-99       PHASE 1 - STA. 1199+06 TO STA. 34+51 LT/RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1-999-99       PHASE 1 - STA. 1199+06 TO STA. 34+51 LT/RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S1-999-99     PHASE 1 - SECTION 1 - STA. 1225+00 TO STA. 1305+00 LT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S2-999-99     PHASE 1 - SECTION 2 - STA. 1305+00 TO STA. 34+51 LT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S3-999-99     PHASE 1 - SECTION 3 - STA. 1225+00 TO STA. 1199+06 LT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S4-999-99     PHASE 1 - SECTION 4 - STA. 1225+00 TO STA. 1285+00 RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S5-999-99     PHASE 1 - SECTION 5 - STA. 1285+00 TO STA. 1352+00 RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S6-999-99     PHASE 1 - SECTION 6 - STA. 1203+60 TO STA. 1225+00 RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P1S6-999-99     PHASE 1 - SECTION 6 - STA. 1203+60 TO STA. 1225+00 RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P2-999-99       PHASE 2 - STA. 1203+60 TO STA. 1352+00 MED S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P2S1-999-99     PHASE 2 - SECTION 1 - STA. 1255+00 TO STA. 1289+24 MED S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P2S2-999-99     PHASE 2 - SECTION 2 - STA. 1325+81 TO STA. 1332+91 MED S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P2S2-999-99     PHASE 2 - SECTION 2 - STA. 1325+81 TO STA. 1332+91 MED S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P3-999-99       PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P3-999-99       PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - FINISH
        Project:        T7410-BL00      Activity:       P3-999-99       PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - FINISH

Scheduling/Leveling Results:
----------------------------
        # Projects Scheduled/Leveled.....................................1
        # Activities Scheduled/Leveled..................................619
        # Relationships with other projects.............................0
        Data Date.....................................................23-May-18
        Earliest Early Start Date.....................................23-May-18
        Latest Early Finish Date......................................22-May-20
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Exceptions:
-----------
        Critical Activities.....................................................168
                Project:        T7410-BL00      Activity:       FC-100  REQUEST FINAL INSPECTION
                Project:        T7410-BL00      Activity:       FC-200  ENGINEER CONDUCT FINAL INSPECTION
                Project:        T7410-BL00      Activity:       FC-300  ENGINEER ISSUE FINAL INSPECTION, PUNCHLIST (SINGLE LIST)
                Project:        T7410-BL00      Activity:       FC-400  PERFORM REMEDIAL WORK, PUNCHLIST (SINGLE LIST)
                Project:        T7410-BL00      Activity:       FC-500  PROJECT COMPLETION (Contract Completion Date: June 1, 2020)
                Project:        T7410-BL00      Activity:       FC-600  WRITTEN NOTICE OF FINAL ACCEPTANCE RECEIVED
                Project:        T7410-BL00      Activity:       GC-200  CONSTRUCTION START
                Project:        T7410-BL00      Activity:       GC-300  MOBILIZATION
                Project:        T7410-BL00      Activity:       P1-000-00       PHASE 1 - STA. 1199+06 TO STA. 34+51 LT/RT S.R. 674 - START
                Project:        T7410-BL00      Activity:       P1-999-99       PHASE 1 - STA. 1199+06 TO STA. 34+51 LT/RT S.R. 674 - FINISH
                Project:        T7410-BL00      Activity:       P1S1-000-00     PHASE 1 - SECTION 1 - STA. 1225+00 TO STA. 1305+00 LT S.R. 674 - START
                Project:        T7410-BL00      Activity:       P1S1-100-10     SETUP MOT & TCD 1225+00 to 1305+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-110-10     INSTALL EROSION CONTROL MEASURES 1225+00 to 1245+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-110-20     INSTALL EROSION CONTROL MEASURES 1245+00 to 1265+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-110-30     INSTALL EROSION CONTROL MEASURES 1265+00 to 1285+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-110-40     INSTALL EROSION CONTROL MEASURES 1285+00 to 1305+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-120-10     CLEARING AND GRUBBING, WIDENING, UG 1225+00 to 1245+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-120-20     CLEARING AND GRUBBING, WIDENING, UG 1245+00 to 1265+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-120-30     CLEARING AND GRUBBING, WIDENING, UG 1265+00 to 1285+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-120-40     CLEARING AND GRUBBING, WIDENING, UG 1285+00 to 1305+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-130-10     INSTALL 40' OF 16" D.I. WM 1236+32 to 1236+69 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-130-20     INSTALL 933' OF 16" HDPE WM 1236+69 to 1246+00 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-130-30     INSTALL 65' OF 16" D.I. WM 1246+00 to 1246+64 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-140-10     INSTALL 73' OF 12" D.I. FM 1239+12 to 1239+80 LT SR674 - P1S1
                Project:        T7410-BL00      Activity:       P1S1-140-20     INSTALL 672' OF 14" HDPE FM 1239+80 to 1246+50 LT SR674 - P1S1
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Project:	T7410-BL00	Activity:	P2S1-250-10	EMBANKMENT 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-260-10	CONST. MIX TYPE B STABILIZATION 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-260-30	CONST. CURB PAD 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-260-50	GRADE, COMPACT TYPE B STABILIZATION 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-260-60	GRADE, COMPACT TYPE B STABILIZATION 1275+00 to 1289+24 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-270-20	SPREAD, COMPACT BASE COURSE 1ST LIFT 1275+00 to 1289+24 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-270-30	SPREAD, COMPACT BASE COURSE 2ND LIFT 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-270-50	FINISH BASE COURSE 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-270-60	FINISH BASE COURSE 1275+00 to 1289+24 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-290-10	CONST. CNC CURB 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-330-10	GRADE, INSTALL PERFORMANCE TURF 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-330-20	GRADE, INSTALL PERFORMANCE TURF 1275+00 to 1289+24 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-340-10	PLACE STRUCTURAL ASPHALT 1255+00 to 1275+00 MED SR674 - P2S1
Project:	T7410-BL00	Activity:	P2S1-999-99	PHASE 2 - SECTION 1 - STA. 1255+00 TO STA. 1289+24 MED S.R. 674 - FINISH
Project:	T7410-BL00	Activity:	P2S2-000-00	PHASE 2 - SECTION 2 - STA. 1325+81 TO STA. 1332+91 MED S.R. 674 - START
Project:	T7410-BL00	Activity:	P2S2-270-30	FINISH BASE COURSE 1325+81 to 1332+91 MED SR674 - P2S2
Project:	T7410-BL00	Activity:	P2S2-330-10	GRADE, INSTALL PERFORMANCE TURF 1325+81 to 1332+91 MED SR674 - P2S2
Project:	T7410-BL00	Activity:	P2S2-340-10	PLACE STRUCTURAL ASPHALT 1325+81 to 1332+91 MED SR674 - P2S2
Project:	T7410-BL00	Activity:	P2S2-370-10	CONST. CNC VAR TRAFFIC SEPARATOR 1328+55 to 1332+86 MED SR674 - P2S2
Project:	T7410-BL00	Activity:	P2S2-999-99	PHASE 2 - SECTION 2 - STA. 1325+81 TO STA. 1332+91 MED S.R. 674 - FINISH
Project:	T7410-BL00	Activity:	P3-000-00	PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - START
Project:	T7410-BL00	Activity:	P3-370-10	PLACE ASPHALT FRICTION COURSE 34+51 to 1203+60 LT SR674 - P3
Project:	T7410-BL00	Activity:	P3-370-20	PLACE ASPHALT FRICTION COURSE 1203+60 to 34+51 RT SR674 - P3
Project:	T7410-BL00	Activity:	P3-370-30	ASPHALT CURE PERIOD 34+51 to 1203+60 LT SR674 - P3
Project:	T7410-BL00	Activity:	P3-370-40	ASPHALT CURE PERIOD 1203+60 to 34+51 RT SR674 - P3
Project:	T7410-BL00	Activity:	P3-380-10	PLACE FINAL PAVEMENT MARKINGS 34+51 to 1203+60 LT SR674 - P3
Project:	T7410-BL00	Activity:	P3-380-20	PLACE FINAL PAVEMENT MARKINGS 1203+60 to 34+51 RT SR674 - P3
Project:	T7410-BL00	Activity:	P3-999-99	PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - FINISH

Activities with unsatisfied constraints.....0

Activities with unsatisfied relationships.....0

Activities with external dates.....0

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

5. A schedule narrative report with the following information:

Requirement	Disposition
• Current project schedule status and identify potential delays	
• A description of the progress made since the previous schedule submission	
• Objectives for the upcoming 30 calendar days	
• Indicate if the project is on schedule, ahead of schedule or behind schedule	
o If ahead or behind schedule, indicate the specific number of calendar days	
o If behind schedule, include a detailed recovery plan that will put the schedule back on track or identify the alleged delay event for which a preliminary request for an extension of Contract Time has been submitted, which if granted by the Department, will account for the amount of time the project is behind schedule, or provide a fully supported request for a Contract Time extension, which if granted by the Department, will account for the amount of time the project is behind schedule.	
• Describe the current critical path and indicate if the critical path has changed within the last 30 calendar days.	
• Discuss current successes or problems that have affected either the critical path's length or have caused a shift in the critical path in the last 30 calendar days.	
• Identify specific activities, progress, or events that may reasonably be anticipated to impact the critical path within the next 30 calendar days, either to affect its length or to shift it to an alternate path.	
• List all changes to schedule logic, calendars, calendar assignments, activity types, activity names, changes to constraints, added activities or duration changes (original and remaining) that have been made to the schedule since the previous submission.	
o For each change, describe the basis for the change and specifically identify the affected activities by Activity ID.	
• Identify any and all activities, either in progress or scheduled to occur within the following 30 days that require Department participation, review, approval, etc.	

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

6. A detailed logic report that provides a list of activities in the schedule sorted by activity ID, no grouping and submitted as a .pdf file and formatted on 8-1/2 inch by 11inch portrait oriented sheets. For each activity listed, the report shall include the activity's predecessors and successors, including the relationship type and lag.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

T7410 - SR 674 (SUN CITY CTR BLVD) AS-BID CPM 05-Apr-21 06:24

Detailed Logic Report

Activity ID	Activity Name		
FC-100	**REQUEST FINAL INSPECTION**		
Activity ID	Activity Name	Relationship Type	Lag
P3-400-10	INSTALL HANDRAIL 1233+00 to 1233+36 LT SR674 - P3	FS	0
P3-380-20	PLACE FINAL PAVEMENT MARKINGS 1203+60 to 34+51 RT SR674 - P3	FS	0
P3-390-20	INSTALL FINAL SIGNING 1203+60 to 34+51 RT SR674 - P3	FS	0
P3-999-99	PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - FINISH	FS	0
Activity ID	Activity Name	Relationship Type	Lag
FC-200	ENGINEER CONDUCT FINAL INSPECTION	FS	0
FC-200	**ENGINEER CONDUCT FINAL INSPECTION**		
Activity ID	Activity Name	Relationship Type	Lag
FC-100	REQUEST FINAL INSPECTION	FS	0
Activity ID	Activity Name	Relationship Type	Lag
FC-300	ENGINEER ISSUE FINAL INSPECTION, PUNCHLIST (SINGLE LIST)	SS	6
FC-400	PERFORM REMEDIAL WORK, PUNCHLIST (SINGLE LIST)	FS	0

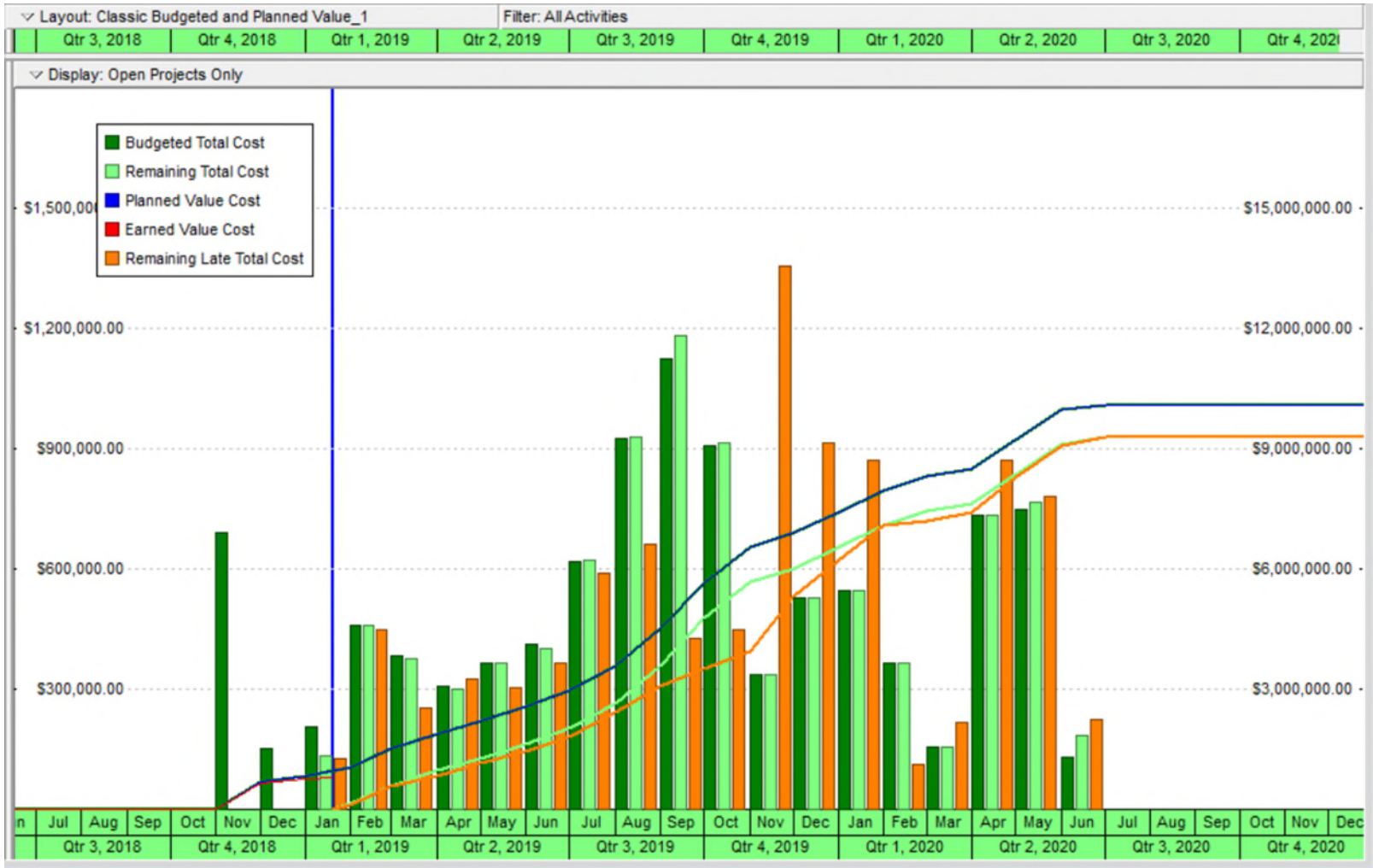
REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2.3

2. A cost account drawdown schedule depicting amount earned by month through project completion. The sum total of the cost accounts shall be equal to the current contract value.

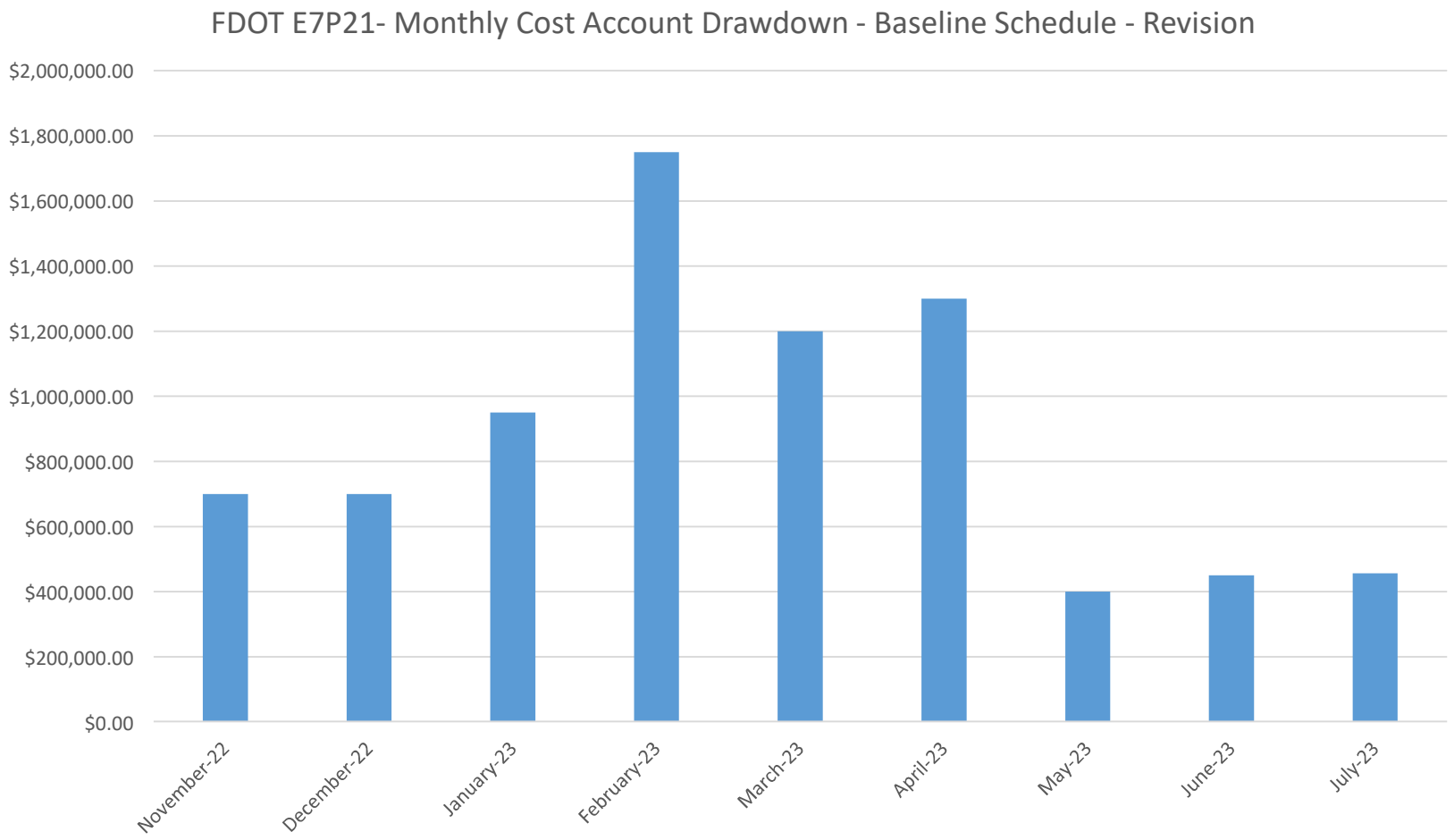
REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2.3



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2.3



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

How long do I have to review the schedule and how long does the Contractor have to fix the schedule?

For each submission of the Contract Schedule and monthly update, the Engineer will have 21 days to accept the Contract Schedule or monthly update or to schedule a meeting, if needed, within that time, with the Contractor to resolve any problems that prevent acceptance of the schedule. Attend the meeting scheduled by the Engineer, and submit a corrected schedule to the Engineer within seven days after the meeting. The process will be continued until a Contract Schedule or monthly update is accepted or accepted as noted by the Engineer.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What tools do I have if the Contractor does not provide the schedule?

The Engineer may withhold monthly payments due for failure of the Contractor to submit an acceptable schedule or monthly updates within the time frame described herein.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Does the Contractor have to include activities for procurement of materials?

8-3.2.3 Schedule Content: All schedule submissions shall comply with the following content guidelines as appropriate to the specific submission:

The schedules shall include the sequence, order, and interdependence of major construction milestones and activities. Include procurement of project specific materials and equipment that require submittals and are not readily available, long-lead time items, and key milestones identified by the Contract.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Should the schedule include shop drawing review activities?

Show the sequence, order, and interdependence of activities in which the work is to be accomplished. Include allowance for Department review, acceptance and return of submittals, samples and shop drawings where Department acceptance is specifically required (in accordance with 5-1.4.6 of the standard specifications). In addition to construction activities,

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

How should submittal activities be included in the schedule?

1. Submittal activities shall include submittal preparation, Department review, and acceptance of submittals. If the Department's action on any submittal is "Not Accepted" or "Revise and Resubmit", a new series of submittal preparation activities shall be inserted into the schedule. Predecessor for the new submittal preparation activity will be the original acceptance activity and the successor of the new acceptance activity will be the fabrication/delivery activity for the equipment or material.

2. Procurement activities shall include all project specific materials and equipment that require submittals and are not readily available, receipt of materials with estimated procurement costs of major items for which payment of stockpiled materials will be requested in advance of installation, fabrication of special material and equipment, and their installation and testing.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Layout: Longest Path | Filter: All Activities

Activity ID	Activity Name	Calendar	Activity Type	Planned Duration	Remaining Duration	Duration % Complete	Early Start	Early Finish	Late Start
SUBMITTALS		T7410 - 7 DAY WORK WEEK		79	79	0%	27-Jun-18	13-Sep-18	19-Sep-18
QUALITY CONTROL		T7410 - 7 DAY WORK WEEK		42	42	0%	27-Jun-18	07-Aug-18	24-Sep-18
ENVIRONMENTAL AND PERMITS		T7410 - 7 DAY WORK WEEK		42	42	0%	10-Jul-18	20-Aug-18	24-Sep-18
NON-STANDARD DRAINAGE		T7410 - 7 DAY WORK WEEK		66	66	0%	10-Jul-18	13-Sep-18	09-Nov-18
SUB-1030	SUBMIT NON-STANDARD DRAINAGE STR SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	09-Nov-18
SUB-2030	APPROVE NON-STANDARD DRAINAGE STR SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	45	45	0%	31-Jul-18	13-Sep-18	30-Nov-18
LIGHTING		T7410 - 7 DAY WORK WEEK		66	66	0%	10-Jul-18	13-Sep-18	04-Feb-19
SUB-1040	SUBMIT LIGHTING CONDUIT, PULL BOXES, CABLE SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	09-Feb-19
SUB-1050	SUBMIT LIGHTING LOAD CENTERS SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	04-Feb-19
SUB-1060	SUBMIT LIGHT POLES, LUMINAIRES SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	10-Jul-18	30-Jul-18	04-Feb-19
SUB-2040	APPROVE LIGHTING CONDUIT, PULL BOXES, CABLE SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	45	45	0%	31-Jul-18	13-Sep-18	02-Mar-19
SUB-2050	APPROVE LIGHTING LOAD CENTERS SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task	45	45	0%	31-Jul-18	13-Sep-18	25-Feb-19

REVIEWING A CPM SCHEDULE

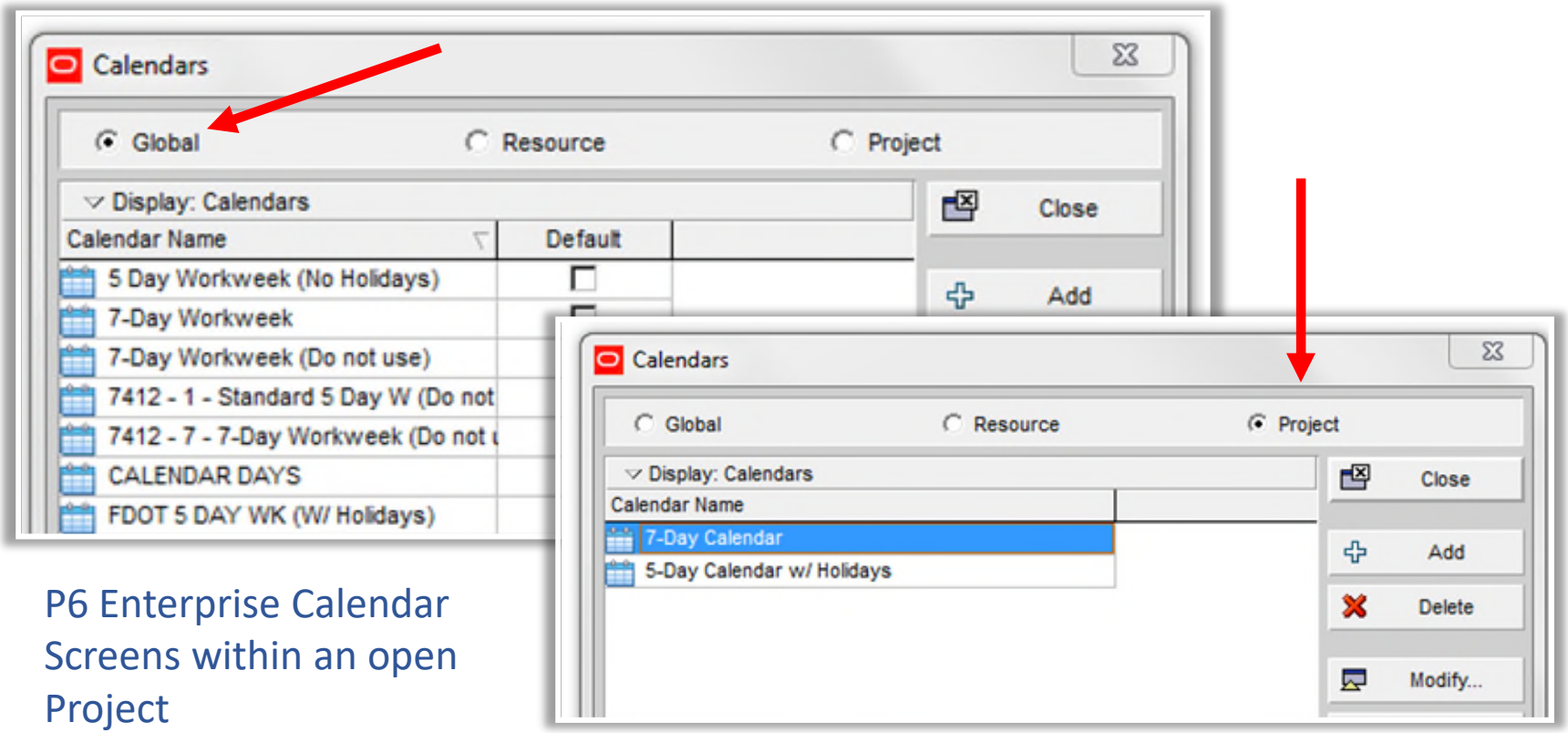
SCHEDULE SPECIFICATION – SECTION 8-3.2

What calendars should be included in the schedule and should they include holidays?

1. All activities shall be assigned to a specific project calendar within the software. Specific project calendars will be defined within the software to include planned work days and planned non-work days. These project calendars will include both Contractor and Contract defined holidays and suspension days as non-workdays. The use of global calendars is not permitted. Project calendars shall not inherit holidays from global calendars. Work shifts identified for each project calendar shall be consistent with the Contractor's planned workdays. Actual start and finish date times shall be consistent with the work shift hours on the calendar assigned to the activities.

REVIEWING A CPM SCHEDULE

Check to see what calendars have been set up for the schedule – are there **global calendars** or **project calendars**?

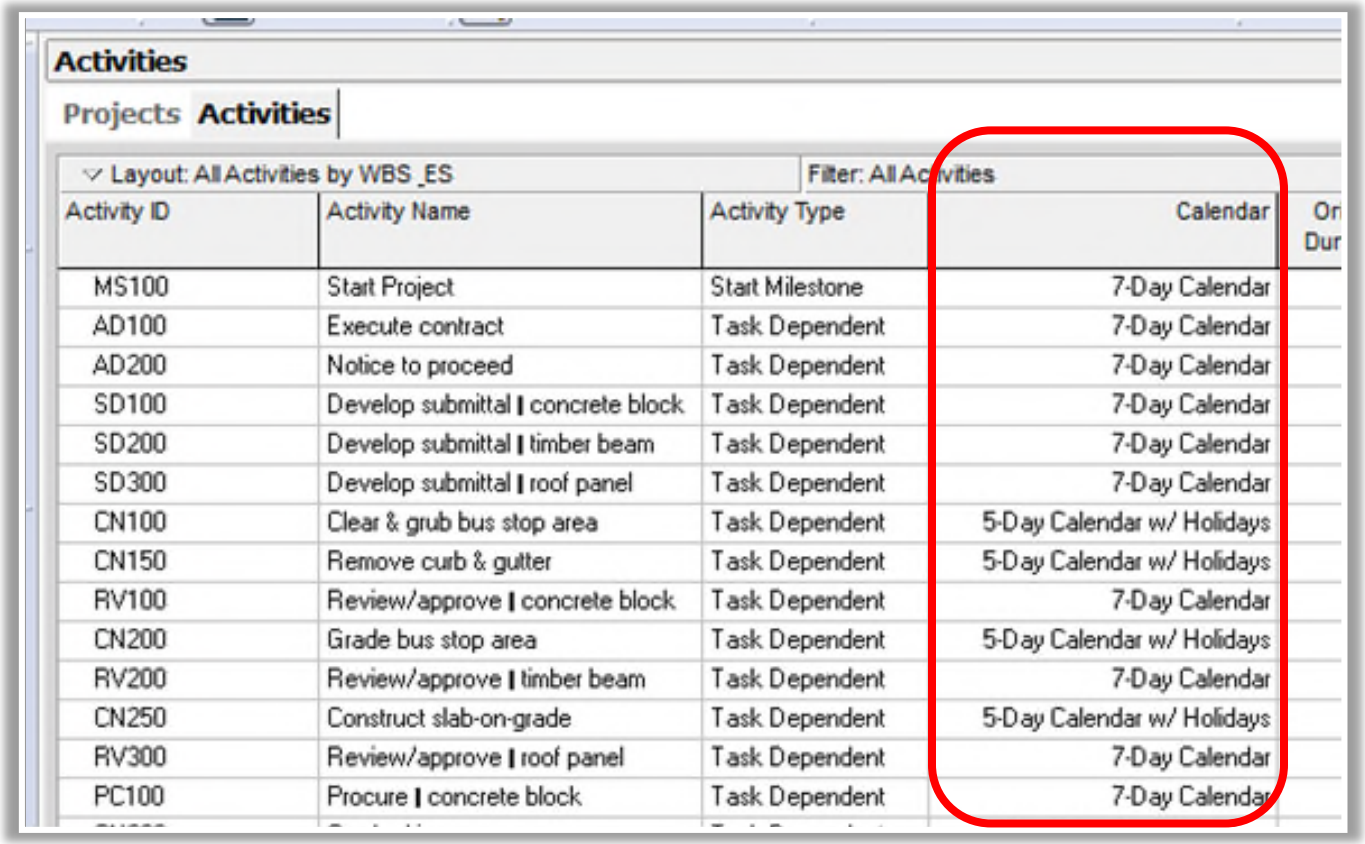


P6 Enterprise Calendar Screens within an open Project

REVIEWING A CPM SCHEDULE

Check to see what calendars have been set up for the schedule – are there **global calendars** or **project calendars**?

P6 Activity List Screen with Calendar Column Selected



Activities

Projects | Activities

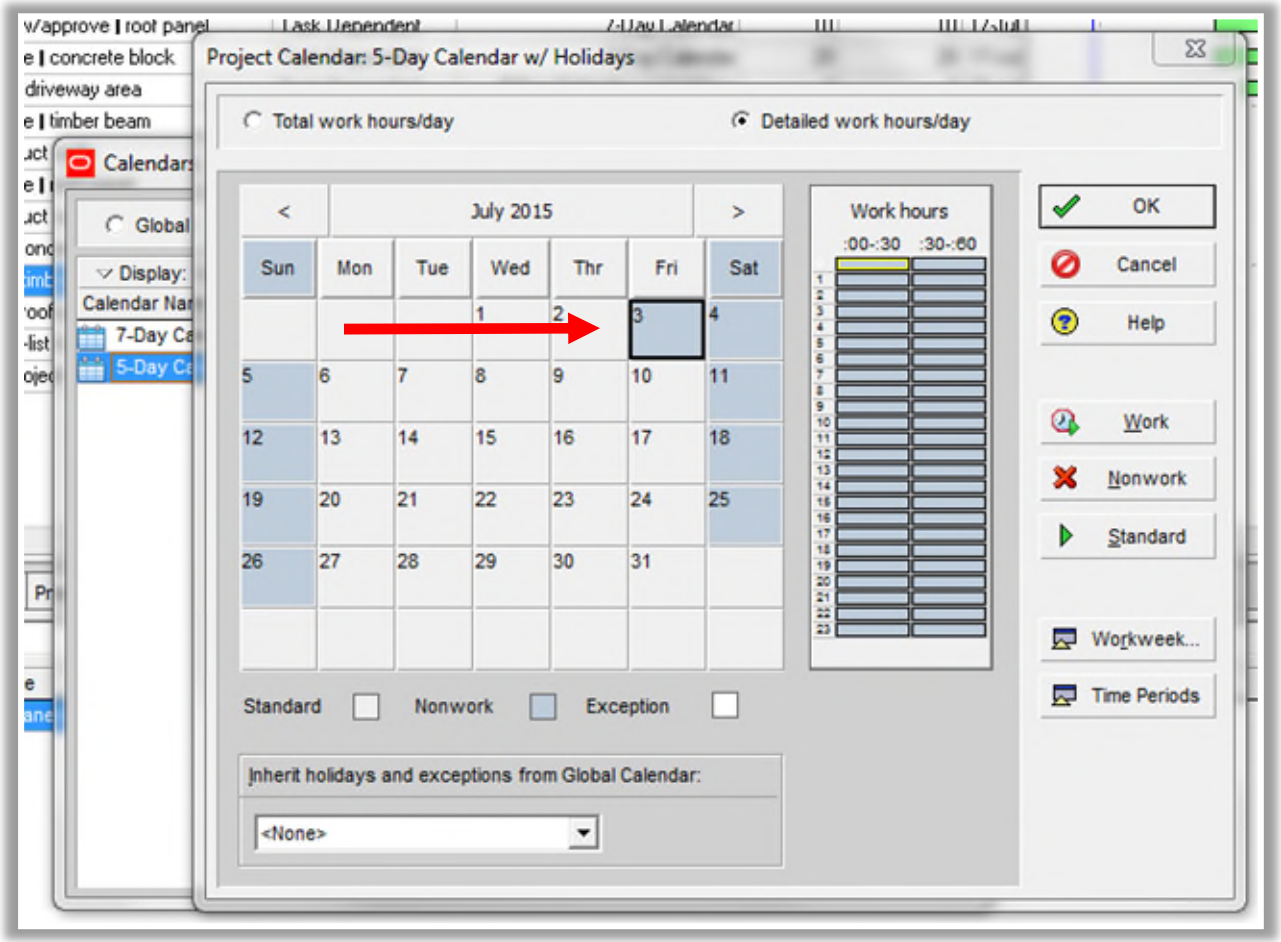
Layout: All Activities by WBS_ES | Filter: All Activities

Activity ID	Activity Name	Activity Type	Calendar	Or Dur
MS100	Start Project	Start Milestone	7-Day Calendar	
AD100	Execute contract	Task Dependent	7-Day Calendar	
AD200	Notice to proceed	Task Dependent	7-Day Calendar	
SD100	Develop submittal | concrete block	Task Dependent	7-Day Calendar	
SD200	Develop submittal | timber beam	Task Dependent	7-Day Calendar	
SD300	Develop submittal | roof panel	Task Dependent	7-Day Calendar	
CN100	Clear & grub bus stop area	Task Dependent	5-Day Calendar w/ Holidays	
CN150	Remove curb & gutter	Task Dependent	5-Day Calendar w/ Holidays	
RV100	Review/approve | concrete block	Task Dependent	7-Day Calendar	
CN200	Grade bus stop area	Task Dependent	5-Day Calendar w/ Holidays	
RV200	Review/approve | timber beam	Task Dependent	7-Day Calendar	
CN250	Construct slab-on-grade	Task Dependent	5-Day Calendar w/ Holidays	
RV300	Review/approve | roof panel	Task Dependent	7-Day Calendar	
PC100	Procure | concrete block	Task Dependent	7-Day Calendar	

REVIEWING A CPM SCHEDULE

Verify if holidays and other non-work periods are shown on the calendars used for the schedule.

P6 Calendar Detail Screen in Enterprise Calendars within an Open Project



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Does the schedule have to be cost loaded?

2. A cost account drawdown schedule depicting amount earned by month through project completion. The sum total of the cost accounts shall be equal to the current contract value.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Does the schedule have to include any type of activity coding?

3. At a minimum, each schedule activity shall contain codes by:
   a. Responsibility: including, but not be limited to, Department, Utility, Contractor/subcontractor, supplier/vendor, consultant, etc.
   b. Phasing: identify the appropriate Maintenance of Traffic phase or subphase.

The required coding can be accomplished by WBS codes or project activity codes.

REVIEWING A CPM SCHEDULE

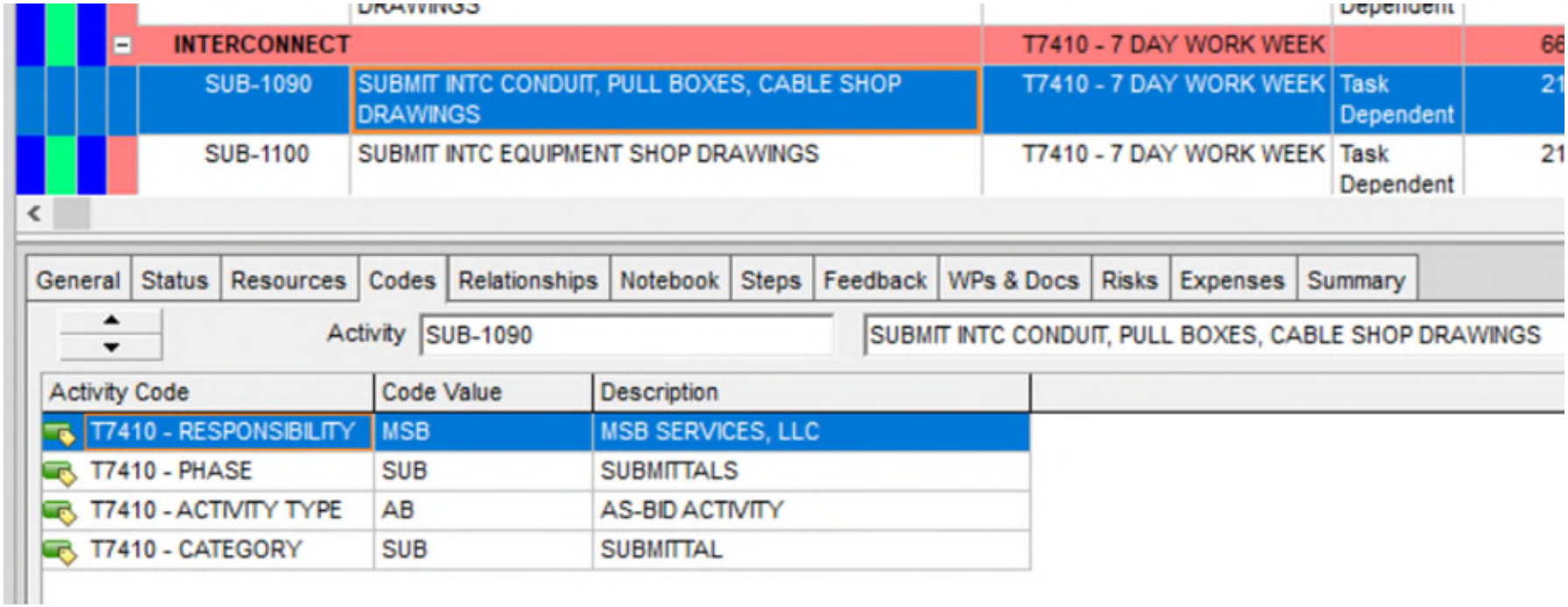
SCHEDULE SPECIFICATION – SECTION 8-3.2

Layout: Project Status

WBS Code	WBS Name
T7410-BL00	T7410 - SR 674 (SUN CITY CTR BLVD) AS-BID CPM BASELINE CONSTRUCTION SCHEDULE
T7410-BL00.1	PRECONSTRUCTION
T7410-BL00.1.1	NOTICE TO PROCEED
T7410-BL00.1.2	SUBMITTALS
T7410-BL00.1.9	MATERIAL PROCUREMENT
T7410-BL00.1.3	UTILITY WORK BY OTHERS PRIOR TO CONSTRUCTION
T7410-BL00.6	GENERAL CONSTRUCTION
T7410-BL00.6.4	UTILITY WORK BY OTHERS DURING CONSTRUCTION
T7410-BL00.6.6	PHASE 1 - STA. 1199+06 TO STA. 34+51 LT/RT S.R. 674 - START
T7410-BL00.6.7	PHASE 1 - STA. 1199+06 TO STA. 34+51 LT/RT S.R. 674 - FINISH
T7410-BL00.6.1	PHASE 2 - STA. 1203+60 TO STA. 1352+00 MED S.R. 674 - START
T7410-BL00.6.2	PHASE 2 - STA. 1203+60 TO STA. 1352+00 MED S.R. 674 - FINISH
T7410-BL00.6.3	PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - START
T7410-BL00.6.5	PHASE 3 - STA. 1203+60 TO STA. 1334+86 LT/RT S.R. 674 - FINISH
T7410-BL00.5	FINAL COMPLETION

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



REVIEWING A CPM SCHEDULE

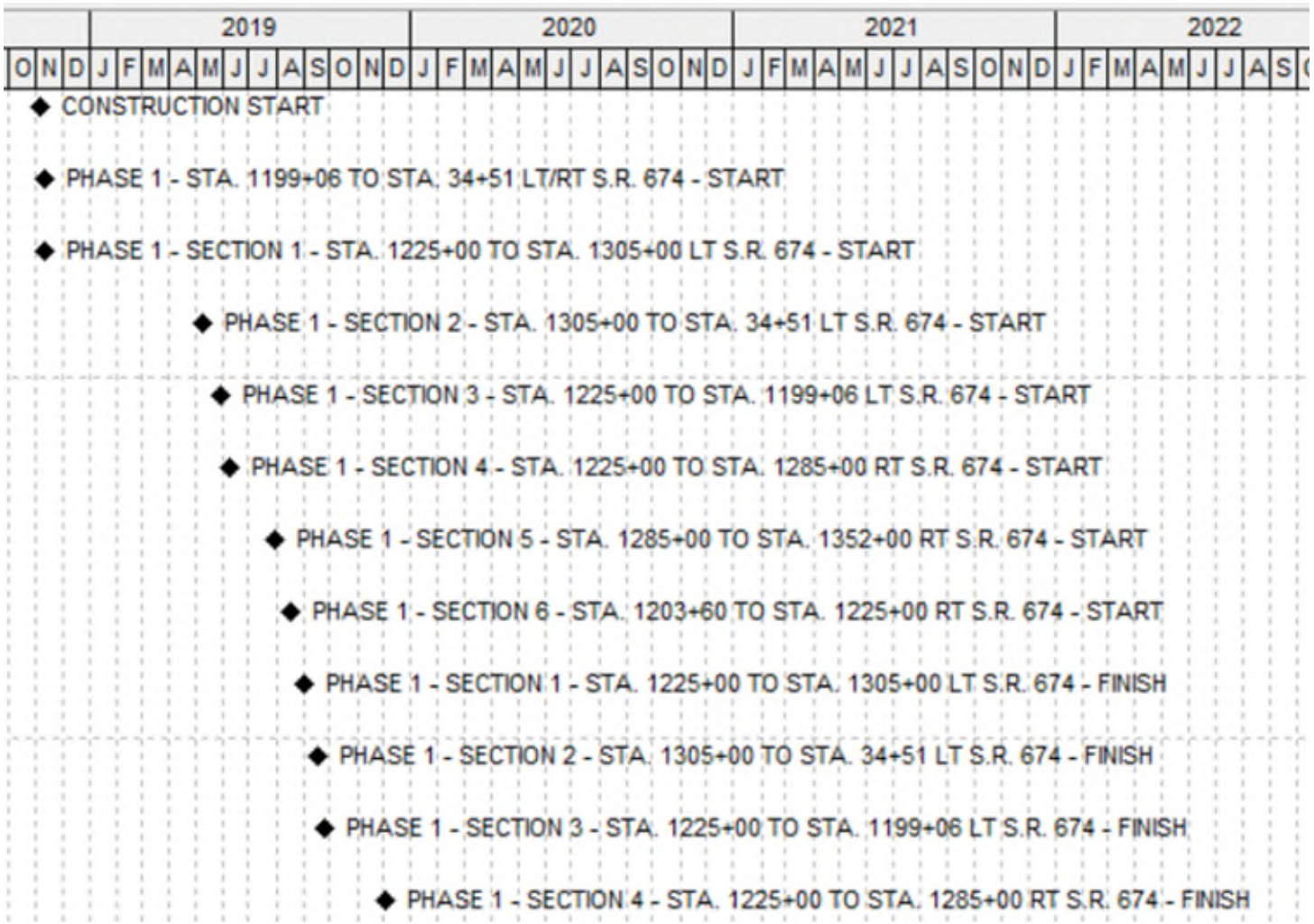
SCHEDULE SPECIFICATION – SECTION 8-3.2

Are milestones required to be included in the schedule?

4. Key milestones as identified by Contract. At a minimum, the start and finish of each Maintenance of Traffic phase or subphase shall be represented by a milestone activity. Milestone activities shall be start or finish milestone type activities, as appropriate.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What is the maximum duration for an activity?

5. All non-procurement activities must be less than or equal to 20 workdays unless approved by the Engineer. Sufficient explanation for activities over 20 day shall be provided for the Engineers review and approval.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Activity ID	Activity Name	Calendar	Activity Type	Planned	Remaining Duration	Duration % Complete	E
P2S2-350-10	MILLING AND RESUFACING 1203+60 tO 1352+00 MED SR674 - P2S3	T7410 - 5 DAY WORK WEEK	Task Dependent	14	14	0%	3
P3-370-30	ASPHALT CURE PERIOD 34+51 to 1203+60 LT SR674 - P3	T7410 - 5 DAY WORK WEEK	Task Dependent	14	14	0%	2
P3-370-40	ASPHALT CURE PERIOD 1203+60 to 34+51 RT SR674 - P3	T7410 - 5 DAY WORK WEEK	Task Dependent	14	14	0%	0
SUB-1000	MAC ENTRY OF CONTRACTOR QUALITY CONTROL PLAN	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	2
SUB-2000	APPROVE MAC ENTRY OF CONTRACTOR QUALITY CONTROL PLAN	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	1
SUB-1010	SUBMIT EROSION CONTROL PLAN	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	1
SUB-2010	APPROVE EROSION CONTROL PLAN	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	3
SUB-1030	SUBMIT NON-STANDARD DRAINAGE STR SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	1
SUB-1040	SUBMIT LIGHTING CONDUIT, PULL BOXES, CABLE SHOP DRAWINGS	T7410 - 7 DAY WORK WEEK	Task Dependent	21	21	0%	1

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What information must be provided for each activity?

6. All activities must include adequate detailed activity descriptions to describe the work that is included. In each activity, through the activity name, user defined field, or cost account, give quantity and unit of measure so that the amount of work the activity involves is clearly communicated.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Activity ID	Activity Name	Calendar	Activity Type	Original Duration	Remaining Duration	Duration % Complete	Early Start	Early Finish	Late Star
P1S1-120-80	CLEARING AND GRUBBING, SIDEWALK 1285+00 to 1305+00 LT SR674 - P1S1	T7410 - 5 DAY WORK WEEK	Task Dependent	2	1	50%	15-Jul-19	15-Jul-19	22-Jul-19
P1S1-130-10	INSTALL 40' OF 16" D.I. WM 1236+32 to 1236+69 LT SR674 - P1S1	T7410 - 5 DAY WORK WEEK	Task Dependent	1	1	0%	13-Feb-19	13-Feb-19	13-Feb-1
P1S1-130-20	INSTALL 933' OF 20" HDPE WM 1236+69 to 1246+00 LT SR674 - P1S1	T7410 - 5 DAY WORK WEEK	Task Dependent	10	10	0%	14-Feb-19	27-Feb-19	14-Feb-1
P1S1-130-30	INSTALL 65' OF 16" D.I. WM 1246+00 to 1246+64 LT	T7410 - 5 DAY WORK WEEK	Task	1	1	0%	28-Feb-19	28-Feb-19	28-Feb-1

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

Activity P1S1-130-10 INSTALL 40' OF 16" D.I. WM 1236+32 to 1236+69 LT SR674 - P1S1

Resource ID Name	Price / Unit	Rate Type	Rate Source	ıary Resou	Budgeted Units
1080_27116_U_T7410.UTILITY FIXTURE-LINE STOP ASSEMBLY, FURNISH AND INSTALL, 16" (EA)	$10,000.00/EA	Price / Unit	Resource	☐	2
1050_51216_U_T7410.UTILITY PIPE-DUCTILE IRON/CAST IRON, FURNISH & INSTALL, WATER/SEWER, 16" (LF)	$325.00/LF	Price / Unit	Resource	☐	53

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

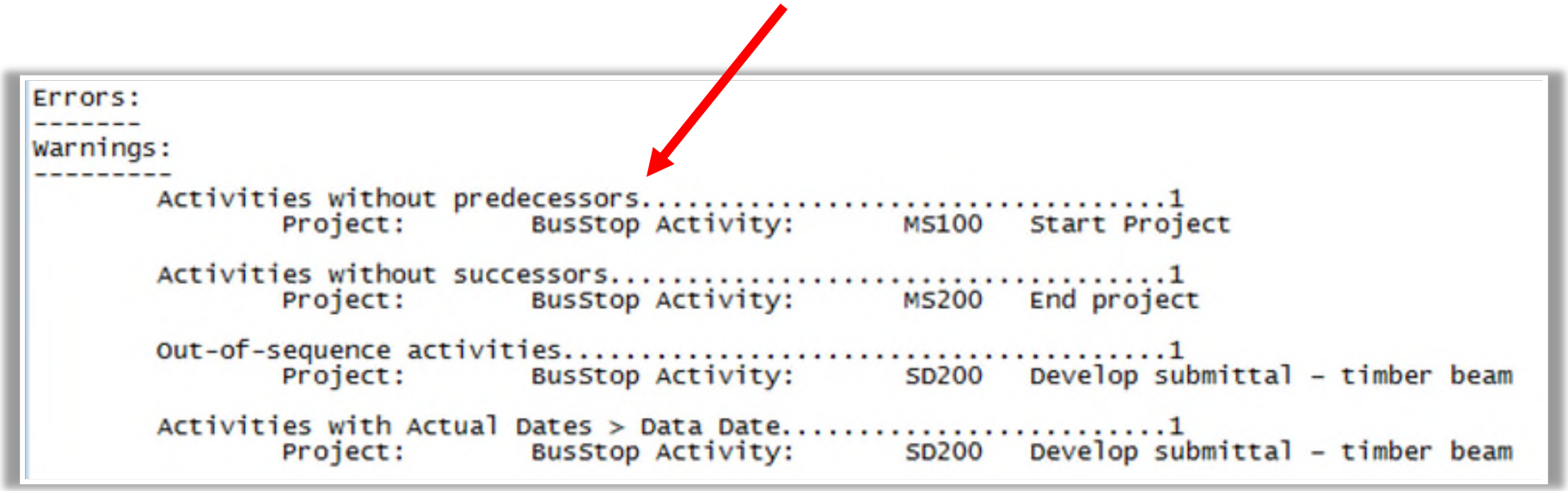
How many open-ended activities are allowed in the schedule?

7. Only two open-ended activities (the first and the last) are allowed.

What is an open-ended activity?

REVIEWING A CPM SCHEDULE

Is there only one activity with no predecessor?

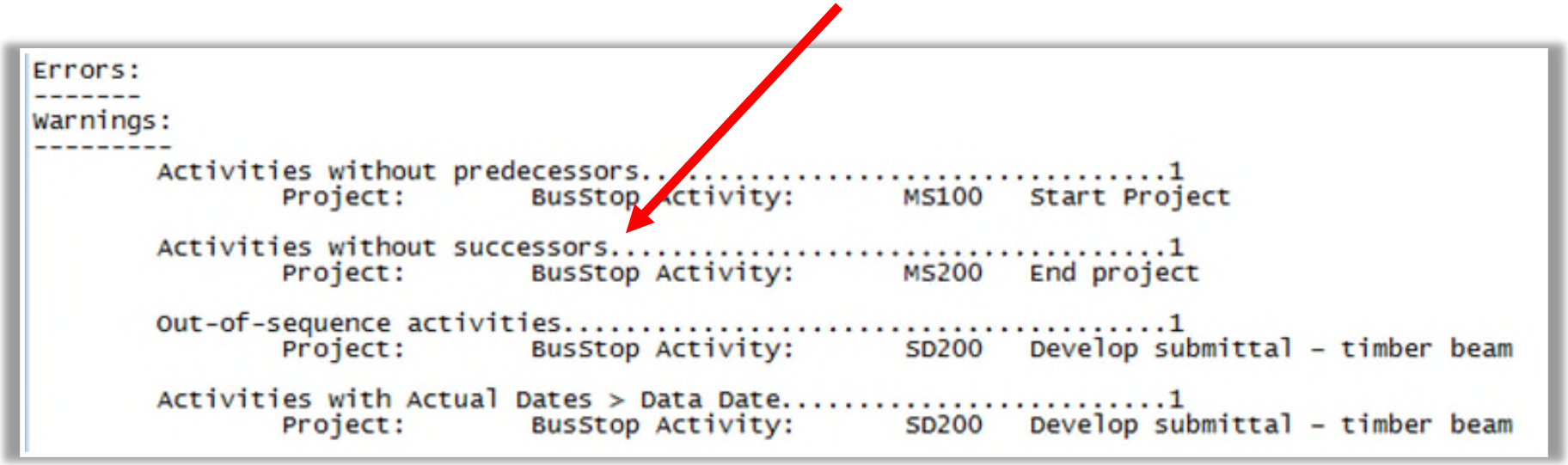


```
Errors:
-------
Warnings:
---------
        Activities without predecessors.....................................1
                Project:        BusStop Activity:       MS100   Start Project

        Activities without successors.......................................1
                Project:        BusStop Activity:       MS200   End project

        Out-of-sequence activities..........................................1
                Project:        BusStop Activity:       SD200   Develop submittal - timber beam

        Activities with Actual Dates > Data Date............................1
                Project:        BusStop Activity:       SD200   Develop submittal - timber beam
```

P6 Schedule Text File

REVIEWING A CPM SCHEDULE

Is there only one activity with no successor?



```
Errors:
-------
Warnings:
---------
        Activities without predecessors.....................................1
                Project:        BusStop Activity:       MS100   Start Project

        Activities without successors.......................................1
                Project:        BusStop Activity:       MS200   End project

        Out-of-sequence activities..........................................1
                Project:        BusStop Activity:       SD200   Develop submittal - timber beam

        Activities with Actual Dates > Data Date............................1
                Project:        BusStop Activity:       SD200   Develop submittal - timber beam
```

P6 Schedule Text File

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Are constraints allowed in the schedule?

8. Constraints shall only be used for "project start," and "project completion." Constraints shall not override logic. The project start constraint shall be the Contract execution date. The project completion date shall be the Contract completion date plus any Contract defined holidays and suspension days included on the longest path. The use of any other imposed constraints is not allowed without specific approval by the Engineer. Any other desired constraints must be submitted to the Engineer with the rationale for the use of each desired additional constraint. If allowed by the Engineer, the rationale should be recorded in the activity's notebook field. Mandatory constraints (start and finish) violate network logic and shall not be used.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Statistics:
-----------
        # Projects.....................................................1
        # Activities...................................................622
        # Not Started..................................................556
        # In Progress..................................................15
        # Completed....................................................51
        # Relationships................................................1335
        # Activities with Constraint...................................2
                Project:        T7410-PS02      Activity:       GC-200  CONSTRUCTION START
                Project:        T7410-PS02      Activity:       NTP-700 BEGIN CONTRACT TIME
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Is out of sequence progress allowed in the schedule?

9. Out of sequence progress shall be corrected on each monthly update by modifying the schedule logic so that the logic accurately depicts the actual sequence of the work. The Retained Logic setting shall be used when calculating the schedule.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

From the Schedule Log File

```
Errors:
-------
Warnings:
---------
        Activities without predecessors.....................................1
                Project:        BusStop Activity:       MS100   Start Project

        Activities without successors.......................................1
                Project:        BusStop Activity:       MS200   End project

        Out-of-sequence activities..........................................1
                Project:        BusStop Activity:       SD200   Develop submittal - timber beam

        Activities with Actual Dates > Data Date............................1
                Project:        BusStop Activity:       SD200   Develop submittal - timber beam
```

REVIEWING A CPM SCHEDULE

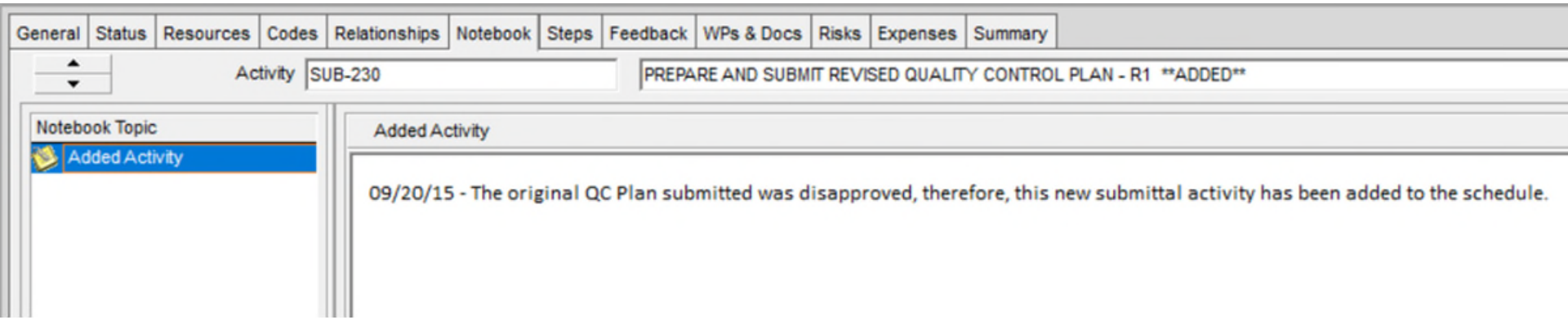
SCHEDULE SPECIFICATION – SECTION 8-3.2

If there are changes to activities, how are the changes supposed to be documented?

10. All changes to activities shall be recorded with a note in the activity notebook field. The notebook entry shall include, as a minimum, the date and reason for the change, as well as reference to a document wherein the Engineer acknowledges and accepts the change.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Is resource leveling allowed?

11. The use of resource leveling, either manual or automatic, is prohibited.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Scheduling/Leveling Settings:
-----------------------------
        General
        -------
        Scheduling .....................................................Yes
        Leveling .......................................................Yes
        Ignore relationships to and from other projects .................No
        Make open-ended activities critical ............................No
        Use Expected Finish Dates ......................................Yes
        Schedule automatically when a change affects dates .............No
        Level resources during scheduling ..............................Yes
        Recalculate assignment costs after scheduling ..................No
        When scheduling progressed activities use ......................Retained Logic
        Calculate start-to-start lag from ..............................Early Start
        Define critical activities as Total Float less than or equal to .0
        Compute Total Float As .........................................Finish Float
        Calculate float based on finish date of ........................Each project
        Calendar for scheduling Relationship Lag .......................Predecessor Activity Calendar
        Preserve scheduled early and late dates.........................Yes
        Level resources only within activity Total Float................No
        Level Priority 1................................................Activity Leveling Priority - Ascending
        Level all resources.............................................Yes
```

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

If the Contractor wants to delete activities from the schedule, is that allowed?

12. Activities shall not be deleted from the schedule. If an activity is not required, then upon approval from the Engineer, the Contractor shall provide actual start and finish dates equal to the date of the Engineer's approval, shall add the word "Removed" to the activity name and shall make a notebook entry explaining the reason for removing the activity from the planned work.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Activity ID	Activity Name	Calendar	Activity Type	Original Duration	Remaining Duration	Duration % Complete	Start	Finish
BHN-210-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S135, S138 572+00 to 572+45 LT SR43 - PH2	E1O56 - 7 DAY WW	Task Dependent	3	0	100%	27-Aug-15 A	27-Aug-15 A
BHN-220-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S142, S143 573+60 to 575+70 LT SR43 - PH2	E1O56 - 7 DAY WW	Task Dependent	4	0	100%	26-Aug-15 A	26-Aug-15 A
BHN-230-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S200 576+90 to 577+85 LT SR43 - PH2 **DELETED**	E1O56 - 7 DAY WW	Task Dependent	0	0	100%	08-Sep-15 A	08-Sep-15 A
BHN-240-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S201, S204, S205, S208 578+85 to 580+95 LT SR43 - PH2	E1O56 - 7 DAY WW	Task Dependent	3	0	100%	09-Sep-15 A	10-Sep-15 A
BHN-250-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S212	E1O56 - 7 DAY WW	Task	3	0	100%	10-Sep-15 A	10-Sep-15 A

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

Activity BHN-230-DC

BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S200 576+90 to 577+85 LT SR43 - PH2 **DELETED**

Notebook Topic

Deleted Activity

Deleted Activity

BHN determined that planned work was not required.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What if there were activities left out of the initial schedule?

13. Activities shall be added to the schedule upon notifying the Engineer when it is determined that a Contract work element was omitted from the previous accepted Contract schedule or update or if work is added to the Contract, or to reflect a time extension in accordance with 8-7.3.2.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What if the Contractor wants to change the description of an activity?

14. Activity names shall only be changed to reflect changes to the scope of the work element represented by the activity, not as a way to remove and replace activities. Changes to activity names shall be approved by the Engineer.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

What types of activities can the Contractor use in the schedule?

15. Unless otherwise approved by the Engineer, activity types shall be defined as milestones, level-of-effort, WBS summary or task dependent. Resource dependent type shall not be used. All activities shall have percent complete type set to duration and duration type set to either fixed duration and unit/time or fixed duration and units.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

Activity ID	Activity Name	Calendar	Activity Type	Original Duration	Remaining Duration	Duration % Complete	Start	Finish
BHN-210-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S135, S138 572+00 to 572+45 LT SR43 - PH2	E1O56 - 7 DAY WW	Task Dependent	3	0	100%	27-Aug-15 A	27-Aug-
BHN-220-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S142, S143 573+60 to 575+70 LT SR43 - PH2	E1O56 - 7 DAY WW	Task Dependent	4	0	100%	26-Aug-15 A	26-Aug-
BHN-230-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S200 576+90 to 577+85 LT SR43 - PH2 **DELETED**	E1O56 - 7 DAY WW	Task Dependent	0	0	100%	08-Sep-15 A	08-Sep-
BHN-240-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S201, S204, S205, S208 578+85 to 580+95 LT SR43 - PH2	E1O56 - 7 DAY WW	Task Dependent	3	0	100%	09-Sep-15 A	10-Sep-
BHN-250-DC	BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S212	E1O56 - 7 DAY WW	Task	3	0	100%	10-Sep-15 A	10-Sep-

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

Activity: BHN-230-DC — BHN - ADJUST 5-2" CONDUITS W/ FOC TO AVOID S200 576+90 to 577+85 LT SR43 - PH2 **DELETED**

Activity Type: Task Dependent

- Finish Milestone
- Level of Effort
- Resource Dependent
- Start Milestone
- Task Dependent
- WBS Summary

Duration Type: Fixed Duration & Units

% Complete Type: Duration

Responsible Manager: Enterprise

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

How is the Total Float supposed to be calculated?

8-3.2.5 Float: Float is defined as the amount of time the finish of an activity can be delayed. Two kinds of float are possible: Total float is how much an activity can be delayed without affecting the finish date of the project or an intermediate deadline (constraint); it is the difference between the late finish date and the early finish date. Free float is how much an activity can be delayed without affecting its earliest successor.

Float is not for the exclusive use or benefit of either the Department or the Contractor.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Scheduling/Leveling Settings:
-----------------------------
        General
        -------
        Scheduling .....................................................Yes
        Leveling .......................................................Yes
        Ignore relationships to and from other projects ................No
        Make open-ended activities critical ............................No
        Use Expected Finish Dates ......................................Yes
        Schedule automatically when a change affects dates .............No
        Level resources during scheduling ..............................Yes
        Recalculate assignment costs after scheduling ..................No
        When scheduling progressed activities use ......................Retained Logic
        Calculate start-to-start lag from ..............................Early Start
        Define critical activities as Total Float less than or equal to .0
        Compute Total Float As .........................................Finish Float
        Calculate float based on finish date of ........................Each project
        Calendar for scheduling Relationship Lag .......................Predecessor Activity Calendar
        Preserve scheduled early and late dates.........................Yes
        Level resources only within activity Total Float................No
        Level Priority 1................................................Activity Leveling Priority - Ascending
        Level all resources.............................................Yes
```

REVIEWING A CPM SCHEDULE

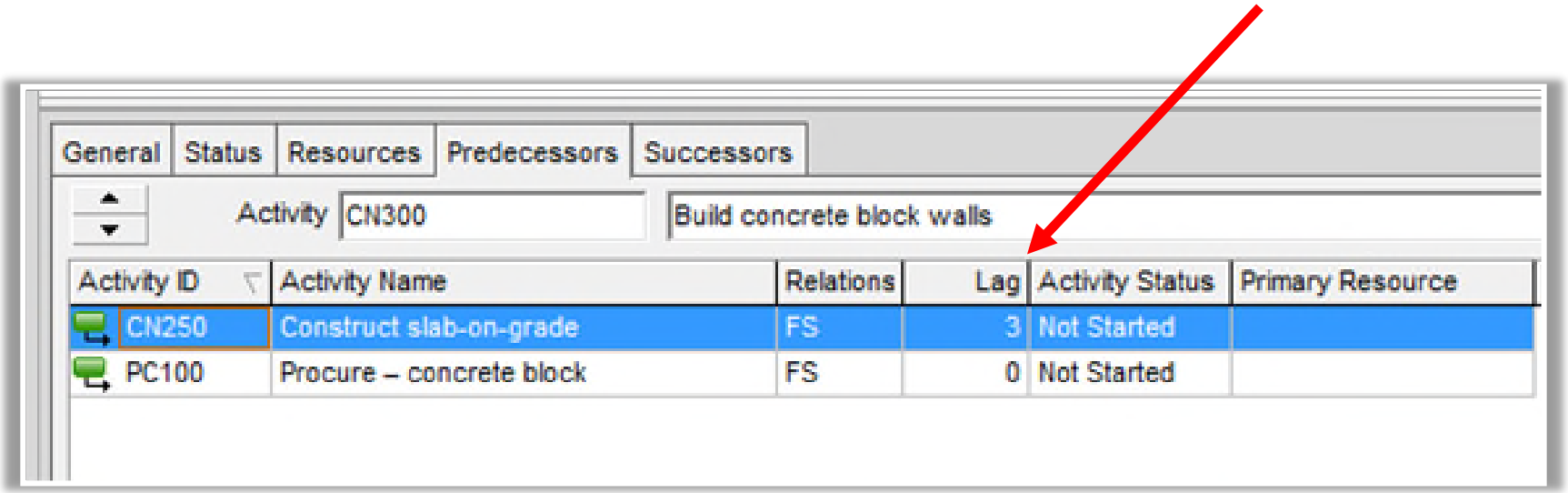
SCHEDULE SPECIFICATION – SECTION 8-3.2

Are Float suppression techniques allowed?

Use of float suppression techniques, such as preferential sequencing (arranging critical path through activities more susceptible to Department caused delay), special lead/lag logic restraints, zero total or free float constraints, extended activity times, positive relationship lags, or imposing constraint dates other than as required by the contract, shall be cause for rejection of the project schedule or its updates. The use of finish-to-start lags greater than zero days, start-to-start lags that exceed the duration of the predecessors, or finish-to-finish lags that exceed the duration of the successor, shall not be used without the expressed approval of the Engineer. The use of Resource Leveling, or similar software features, for the purpose of artificially adjusting activity durations to consume float and influence the critical path is expressly prohibited.

REVIEWING A CPM SCHEDULE

Verify all relationship lags to make sure float has not been sequestered?



P6 Activities Detail Screen with Predecessors Tab Selected

REVIEWING A CPM SCHEDULE

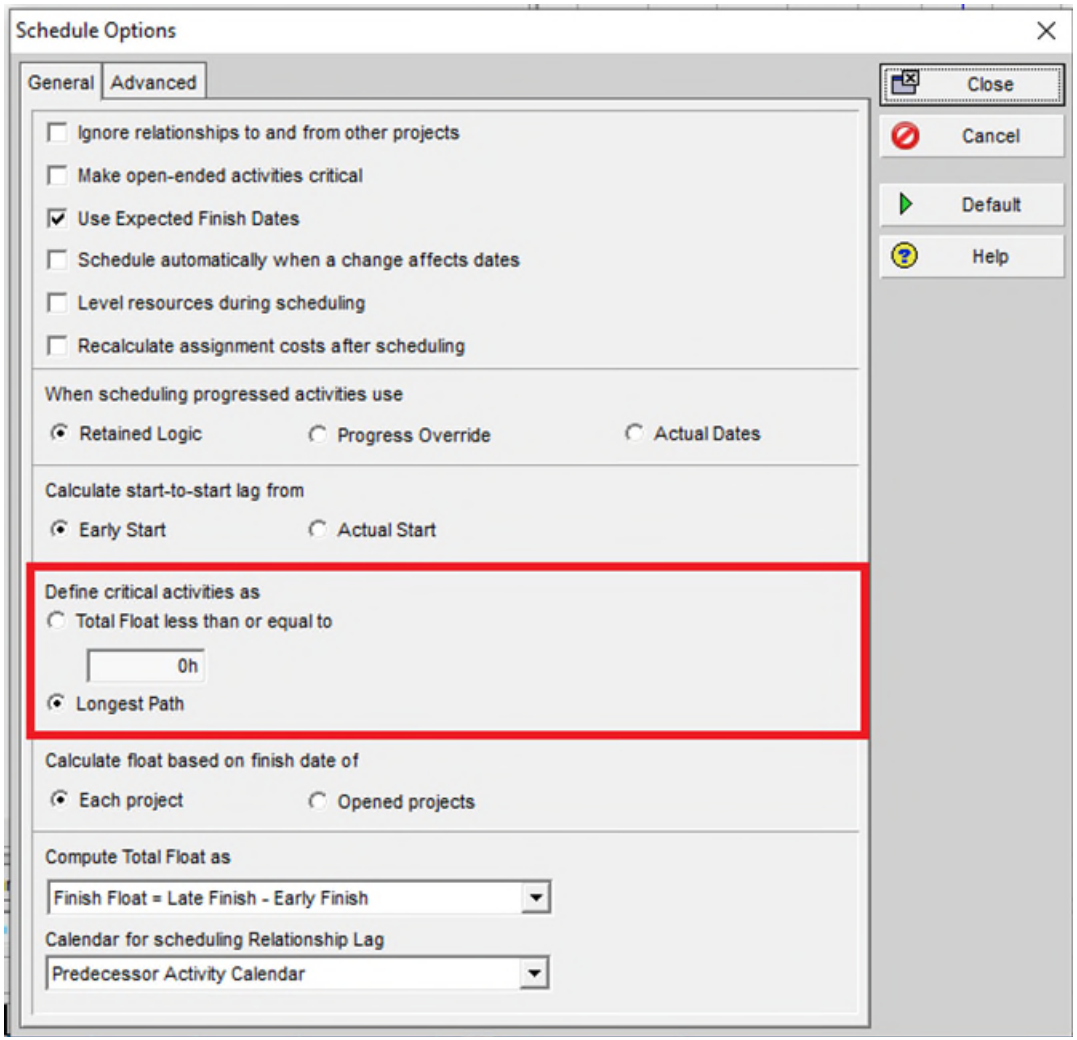
SCHEDULE SPECIFICATION – SECTION 8-3.2

What is the Critical Path?

8-3.2.6 Critical Path: The critical path shall be defined as the longest path and is represented by the longest logical path through the remaining activities, resulting in the earliest calculated completion date. There may be more than one longest path in the schedule. However, the use of float suppression techniques as described in 8-3.2.5 shall not be used to force the schedule to have more than one longest path.

REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2



REVIEWING A CPM SCHEDULE

SCHEDULE SPECIFICATION – SECTION 8-3.2

```
Scheduling/Leveling Settings:
-----------------------------
        General
        -------
        Scheduling ..................................................Yes
        Leveling ....................................................No
        Ignore relationships to and from other projects .............No
        Make open-ended activities critical .........................No
        Use Expected Finish Dates ...................................Yes
        Schedule automatically when a change affects dates ..........No
        Level resources during scheduling ...........................No
        Recalculate assignment costs after scheduling ...............No
        When scheduling progressed activities use ...................Retained Logic
        Calculate start-to-start lag from ...........................Early Start
        Define critical activities as ...............................Longest Path
        Compute Total Float As ......................................Finish Float
        Calculate float based on finish date of .....................Each project
        Calendar for scheduling Relationship Lag ....................Predecessor Activity Calendar
```

TIME EXTENSIONS

SCHEDULE SPECIFICATION – SECTION 8-3.7

How is schedule used for a Time Extension?

8-3.2.7 Time Extensions: The Contractor is responsible for submitting a request for Contract Time extension in accordance with 8-7.3.2. An extension of time shall be considered only to the extent that an event impacts the completion date of the schedule such that the impacted completion date is later than the Contract completion date as adjusted previously. The Pre-event Schedule is defined as the latest accepted update of the Contract schedule, statused (actual start dates added, actual finish dates added, remaining durations adjusted) to the end of the day before the start of the event. The Post-event Schedule is defined as the accepted update of the Contract Schedule just after the end of the event and destatused (actual start dates removed, actual finish dates removed, remaining durations adjusted) to the end of the last day of the event.

As a minimum, time extension requests shall contain:

1. A descriptive summary of the event
2. A written analysis supported by a:
    a. Pre-event Schedule
    b. Post-event Schedule
3. Schedule submittal items 1, 2, 3 and 4 required in 8-3.2.2 shall be provided for the Pre-event and Post-event schedules

Time extensions shall not be considered for proposals that do not include full documentation described above. Once a time extension has been approved by the Engineer, the Contract completion date shall be changed accordingly.

As-Built Schedule

SCHEDULE SPECIFICATION – SECTION 8-3.2.8

Is a final As-Built Schedule required and if so, when?

8-3.2.8 As-Built Schedule: As a condition for final payment of the project, submit the as-built schedule within 10 days of Final Acceptance. The as-built schedule shall describe the actual order and start and stop times for all activities by the Contractor.

Schedule Review Tools

Schedule Review Tools

Submittal Content Checklist

Submittal Content Checklist - Verison 3/2021 (FDOT 8-3.2 Rev. 1-23-19 Spec)

Pass/Fail	Checklist Item	Spec
	Electronic .xer file included	8-3.2.2.1
	Gantt Chart of **all activities** grouped by WBS then phase, sorted by Early Start then Early Finish then Total Float.	8-3.2.2.2
	a. Activity ID	
	b. Activity Name	
	c. Calendar	
	d. Activity Type	
	e. Original Duration	
	f. Remaining Duration	
	g. Duration % Complete	
	h. Early Start	
	i. Early Finish	
	j. Late Start	
	k. Late Finish	
	l. Total Float	
	m. Budgeted Total Cost	
	Gantt Chart **filtered for longest path**, **not grouped** but sorted by Early Start then Early Finish then Total Float.	8-3.2.2.3
	a. Activity ID	
	b. Activity Name	
	c. Calendar	
	d. Activity Type	
	e. Original Duration	
	f. Remaining Duration	
	g. Duration % Complete	
	h. Early Start	
	i. Early Finish	
	j. Late Start	
	k. Late Finish	
	l. Total Float	
	m. Budgeted Total Cost	
	Schedule Log for the calculated schedule in pdf format on 8-1/2 x 11, portrait	8-3.2.2.4
	Schedule Narrative Report (see separate Checklist)	8-3.2.2.5
	A detailed logic report that provides a list of activities in the schedule sorted by activity ID, no grouping and submitted as a .pdf file and formatted on 8-1/2 inch by 11inch portrait oriented sheets. For each activity listed, the report shall include the activity's predecessors and successors, including the relationship type and lag.	8-3.2.2.6
	A chart showing the budgeted total cost versus time shall be submitted as a pdf file and formatted on 8-1/2 inch by 11 inch landscape oriented sheets. The chart shall include the following two curves:	8-3.2.2.7
	a. budgeted total cost versus time based on the early dates.	
	b. budgeted total cost versus time based on the late dates.	

Schedule Review Tools

Narrative Review Checklist

Narrative Review Checklist - Version 3/2021 (FDOT 8-3.2 REV 1-23-19 Spec)

Requirement	Disposition
• Current project schedule status and identify potential delays	
• A description of the progress made since the previous schedule submission	
• Objectives for the upcoming 30 calendar days	
• Indicate if the project is on schedule, ahead of schedule or behind schedule	
○ If ahead or behind schedule, indicate the specific number of calendar days	
○ If behind schedule, include a detailed recovery plan that will put the schedule back on track or identify the alleged delay event for which a preliminary request for an extension of Contract Time has been submitted, which if granted by the Department, will account for the amount of time the project is behind schedule, or provide a fully supported request for a Contract Time extension, which if granted by the Department, will account for the amount of time the project is behind schedule.	
• Describe the current critical path and indicate if the critical path has changed within the last 30 calendar days.	
• Discuss current successes or problems that have affected either the critical path's length or have caused a shift in the critical path in the last 30 calendar days.	
• Identify specific activities, progress, or events that may reasonably be anticipated to impact the critical path within the next 30 calendar days, either to affect its length or to shift it to an alternate path.	
• List all changes to schedule logic, calendars, calendar assignments, activity types, activity names, changes to constraints, added activities or duration changes (original and remaining) that have been made to the schedule since the previous submission.	
○ For each change, describe the basis for the change and specifically identify the affected activities by Activity ID.	
• Identify any and all activities, either in progress or scheduled to occur within the following 30 days that require Department participation, review, approval, etc.	

Schedule Review Tools

Initial Schedule Review Checklist

Baseline Review Checklist - Verison 3/2021 (FDOT 8-3.2 Rev. 1-23-19 Spec)

General Items Checklist

Pass/Fail	Type	Checklist Item	How to Check
	Activities	Verify that all key milestones are included in the schedule as either a Start milestone or a Finish milestone.	Visual review of Gantt chart
	Activities	Verify that Start and Finish milestones are included for the beginning and ending of each MOT phase.	Visual review of Gantt chart
	Activities	Verify that the first activity is "Contract Execution".	Visual review of longest path Gantt chart
	Activities	Are owner and third party activities included in the schedule?	Visual review of Gantt chart
	Activities	Verify that activities are cost-loaded and that cost loading sums to the contract amount.	Visual review of Gantt chart
	Activities	Verify that only milestones, level-of-effort, WBS summary or task dependent activity types are included. **Resource dependent type activites are not allowed.**	Visual review of Gantt chart
	Activities	Verify that all activities have percent complete type set to duration and duration type set to either fixed duration and unit/time or fixed duration and units.	In-depth review of the .xer file
	Activities	Verify that there are adequate submittal/review & approval/fabrication & manufacturing activities.	Visual review of Gantt chart

Schedule Review Tools

Update Schedule Review Checklist

Update Review Checklist - Verison 3/2021 (FDOT 8-3.2 Rev. 1-23-19 Spec)

Pass/Fail	Type	Checklist Item	How to Check
	Date	Is the data date correct? It should be the Estimate Cut-off date.	Verify against earliest activity in the schedule
	Date	Are there any actual dates reported after the data date? If so, they need to be removed.	Visual review of Schedule Log pdf file
	Date	Were any previously reported actual dates modified in the update and if so, why?	Should be identified in Narrative. Comparison of new actual dates from using the Schedule Comparison Tool
	Date	Were there any activities that finish later that expected during the update period? If so, why?	Comparison of newly completed activities to planned completion dates from previous update
	Date	Were there variances to any milestones? If so, why?	Comparison of milestone dates from Gantt Chart
	Calculation	Verify the total float calculation method. **(Should be Finish Float)**	Visual review of Schedule Log pdf file

Schedule Review Tools

Calendar Comparison Tool

Calendar Holidays - CPM Baseline - December 16, 2018 Update

Contract	Section 8-6.4	Time Start		7/9/2019
Cal 1	5 day	Cur. Days	355	
Cal 2	7 day	Contract Finish Date		6/27/2020
		Holidays Rem.	12	7/9/2020
		Pending Time	0	7/9/2020
		Schedule Compl. Date		6/29/2020
		Sched. Early/Late		10.00

Allowable rem. holidays on calendar 1

Date	Day of Week	Contract	Contractor 1	Contractor 2				
7/4/2019	Thursday, July 4, 2019							
7/5/2019	Friday, July 5, 2019							
9/6/2019	Friday, September 6, 2019	x	x					
9/7/2019	Saturday, September 7, 2019	x	x					
9/8/2019	Sunday, September 8, 2019	x	x					
9/9/2019	Monday, September 9, 2019	x	x					
11/27/2019	Wednesday, November 27, 2019	x	x					
11/28/2019	Thursday, November 28, 2019	x	x					
11/29/2019	Friday, November 29, 2019	x	x					
11/30/2019	Saturday, November 30, 2019	x	x					
12/1/2019	Sunday, December 1, 2019	x	x					
12/23/2019	Monday, December 23, 2019							
12/24/2019	Tuesday, December 24, 2019	x	x					
12/25/2019	Wednesday, December 25, 2019	x	x					
12/26/2019	Thursday, December 26, 2019	x	x					
	Total	12	12	0	0	0	0	

c = complete
x = allowable planned holiday
z = non-allowable planned holiday