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Project Planning and Scheduling Definitions and Concepts Procedure

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1.0 PURPOSE

The purpose of this document is to provide consultants and contractors, working for government Entities, with the basic definitions and concepts needed to achieve a systematic and regimented approach to project planning, scheduling and implementation.

This procedure applies to works performed under all Government construction projects executed throughout the Kingdom of Saudi Arabia.

2.0 SCOPE

Planning and Scheduling is performed during the life of every project, starting as high level plans and schedules, and then maturing as more information becomes available and as the project makes strategic decisions, and into more detailed plans and schedules as project nears execution.

Project-specific requirements will dictate varying planning and scheduling requisites.

3.0 DEFINITIONS

Definitions	**Description**
Activity	A unit of work in a schedule, the basic element for scheduling. It has the following characteristics: • It is measurable and has a defined quantity of work or task to be accomplished (i.e. drawings, material to deliver, cable to install, etc.) • It has a duration with start and finish dates • It has resources allocated to (i.e. quantity, hours) • It is linked to other activities
Activity Codes	Specific codes are assigned to schedule activities that provide a useful means of organizing and communicating the schedule. Proper activity coding allows users to easily filter, group, sort, and export data as required.
Backward Pass	CPM network calculation to determine the latest dates activities can be executed without delaying the earliest determined project completion date (Late Dates). The difference between forward pass (Early Dates) and backward pass (Late Dates) calculations represent the total float. Critical path (zero float) activities have same early and late dates.
Bar Chart	Graphical time-scaled representation of activities.
Bare Schedule	A schedule duration from start to finish, which excludes schedule contingency.
Baseline Schedule	A fixed project timeline that is used for tracking progress upon the project plan and budget or contract performance. It measures the project performance in the major aspects. It becomes the basis to determine schedule deviations. The Original Baseline is the first formal issuance of the agreed/approved schedule. The Current Baseline is the baseline updated with approved Scope Changes.

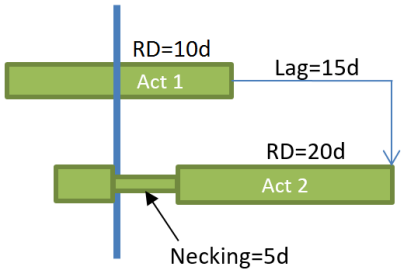
Bow Wave	This is defined as the carryover of unperformed work that has accumulated over a period of time. It refers to the delay of a significant volume of work sufficiently to create a concurrence of work activities that exceeds the resources available to do it, or the craft densities allowable, thereby becoming an impact on the completion date. This effect is often a greater danger to schedule adherence than the well-defined critical path impact. • The delays to individual activities may not impact the critical path, but sufficient aggregation of delays eventually does. • It is important to monitor the impact of increasing craft labor hours to identify the potential bow wave effect before becoming unmanageable. • Continued significant bow wave in front of the data date demonstrates poor forecasting ability by the project team.
Calendars	Used in project schedules to define periods of work and non-work. If required, multiple calendars can be used on the schedule to allow for holidays and/or work conditions specific to each project phase (i.e. engineering activities may be assigned with a 5-day working week, fabrication and delivery activities are usually assigned with a 7-day working week and construction activities are usually assigned with a 6-day working week).
Commissioning	The testing and commissioning team perform system testing and pre-operation commissioning activities. This team is a separate group from construction, although construction may be required to perform some testing as well (i.e. cable continuity, earth faulting, pipe leakage, etc.) before handing over to the testing and commissioning team.
Commodity Curves	These curves are developed to determine the reasonableness of installing each commodity, as well as the sustaining rates required to achieve construction durations and to validate reasonable phasing between commodities. Commodity Curves depict the plan, actual and forecast of bulk commodity quantity engineering release, procurement, and construction installation. See document EPM-KPP-PR-000003 Project Schedule Curves Procedure.

Constraints	Used to model conditions that cannot otherwise be represented with normal predecessor/successor logic, and should be kept to a minimum. Constraints are only used to impose restrictions on start and/or finish dates. • Soft Constraints: a schedule date constraint that will only affect the float calculation of the sequence of activities up to that constraint. If implemented properly, the constraint will not override logic nor change the date. Normally used to calculate float to contractual milestones ("Finish on or before"), or to set an end date and started activities ("Expected Finish"). Can also be used to set start dates when proper predecessors are not available ("Start On or After"). • Hard Constraints: a schedule date constraint that overrides schedule logic to some extent to drive a set date. A hard constraint causes and activity to start on or finish on a particular date. The use of this type of constraint needs to be reduced as much as possible. Examples: "Start On", "Finish On" • Mandatory Constraints: a schedule date constraint that completely overrides logic and float calculation. This override also affects all successors to the constraint date. This type of constraint must be avoided without exception. Examples: "Mandatory Start", "Mandatory Finish".
Control Schedule (CS)	Level 3 schedule within the schedule hierarchy, see document EPM-KPP-PR-000002 Project Schedule Hierarchy Procedure.
Contingency	Schedule contingency is time allowance added to the bare schedule duration to provide for uncertainties associated with variables within the project schedule, such as quantities, equipment and material deliveries, fabrication, labor productivity, activity cycle times and durations, and construction interferences. Please see procedure EPM-KPP-PR-000004 Project Schedule Contingency Procedure. Note: • Contingency is not float.
Contractual Milestone	Dated event specified in the contract, usually representing completion of a scope of work. These milestones can be (soft) constraint to the contractual milestone if desired, but care needs to be taken as such practice will deflect attention of the "longest path" critical path.
Cost Performance Index (CPI)	Used to measure the project's health by comparing the project's work performed with the project's budget for such work performed. This can use man-hours or costs for its calculation. CPI = actual work performed / budget of work performed If < 1 means project is performing over budget, if =1 means project is on budget and if >1 means project is performing under budget.
CPI	Cost Performance Index

CPM	Critical Path Method
Critical Activity	An activity on the critical path. Any delay to this activity will have an impact to project completion (or intermediate contractual milestone if constraint).
Critical Path	Is the longest path of a project and defines overall schedule duration. The critical path usually has zero float, or the least float. Total float values of less than one month should be considered critical as well for a multi-year projects. Note: • Care needs to be taken to not focus on critical path only for determining project duration. Project duration is also driven by resource requirement, availability and levelling, and needs to be analyzed separately • Bow wave effects need to be identified and addressed so they don't become critical • Risk analysis might determine different critical paths • Care needs to be taken not to have set intermediate mandatory constraints, as it would generate erroneous critical paths. P6 has a feature to determine "longest path" to overcome this issue, but a clean schedule is the preferable approach.
Critical Path Method (CPM)	Technique used to represent a work flow diagram, or logic network, showing the sequences, duration, and interrelationships of all the work activities on a project. With this method, the longest path can be calculated providing the expected overall project duration (critical path).
CS	Control Schedule
Current Schedule	Original baseline including all schedule evolution (current status, resource progress, scope changes, trends, date forecasts, etc.). Current schedules are not commitments, and are a reflection of current project status and expected future performance. Current schedules form the basis for schedule mitigation actions, which feed back into the schedules once agreed, funded and implemented.
Data Date	Date as of "today" or now through which the project status and progress are determined and reported for analysis and performance measurements. Note: • Most automated scheduling systems use 00:00 as the cut-off time. Henceforth, if the data is to be through a Thursday, the Data Date needs to be Friday. • Dates "to the left" of the Data Date are actual dates "to the right" are forecast dates.

Delay	It refers to a difference between the planned start/finish date and the actual start/finish date. Note: • A schedule activity delay is not necessarily a delay to a contractual milestone or to the critical path, but should always be treated as a schedule impact unless demonstrated otherwise, as most delays will contribute to the "bow wave" effect
Delay mitigation	Fundamental piece of planning and scheduling: identification of all delays, classification of the delays into relevance and impact, communication to the team, and team's actions to recover the delay in order to reduce critical path impact, and equally important, "bow wave" effect impact.
Deliverable	Normally refers to engineering drawings or specifications (i.e. Engineering Deliverables)
Deterministic Schedule	A schedule where the total duration of the project is fixed. On a deterministic schedule, each activity has a planned duration, a predecessor, a successor, and the longest path through the network is the critical path.
Differing Conditions	Conditions different as set out in the contract or schedule basis.
Driving Activity	The preceding schedule activity that pushes the start or finish of a given activity.
EF	Early Finish (Schedule Date)
Engineering Tracker	Tool managed by the engineering team to collect and status all engineering deliverables. It is part of the suite of Level 5 Schedules and provides key input for the statusing of the Level 3 Control Schedule.
Entity	Government Entity responsible for the project's execution. In these procedures, this term may also refer to EPMO if an EPMO is retained by the Entity.
EPMO	Entity Project Management Office
ES	Early Start (Schedule Date)
FF (In context of Relationships)	Finish to Finish
FF (In context of Float)	Free Float
Float	• Free Float (FF): amount of time an activity can be delayed without affecting a successor • Total Float (TF): amount of time an activity can be delayed without affecting project completion • Float Erosion: refers to a reduction in the amount of time that individual non-critical activities can move before driving other activities (free float). Reducing (eroding) the amount of free float in the network reduces flexibility in the sequencing of activities and increases schedule risk

Force Majeure	Event causing a schedule impact that could not be reasonably anticipated.
Forward Pass	CPM network calculation to determine the earliest dates activities can be executed determined by activity duration and logic links.
Fragnet	An extract of the schedule developed to represent commonly used work flows, it is a template that can be replicated.
FS	Finish to Start (Relationship)
IFC	Issued for Construction
IFF	Issued for Fabrication
Installation Rates	Quantity installation of commodities over time • Peak Installation Rates: highest installation rate over time. Normally 1.5 times the average installation rate. • Sustained Installation Rates: average rate quantity installed between 10% and 90% total quantity installation completion. This is to exclude from the installation rate calculation the very unproductive initial and final periods. This rate is then used to determine sustained manpower demands.
Key Commodities	Commodities identified as representative of project progress, and loaded to the Control Schedule.
Lag	A time delay inserted between two linked activities. It is common to use on start-start relationships and finish-finish relationships, but should be avoided for finish-start relationships. Instead, discrete activities should be used in order to provide the necessary traceability. Note: • Negative lags should be avoided at all cost, as they generate logic violations once those activates get statused.
LD (In context of Contract)	Liquidated Damage
LF	Late Finish (Schedule Date)
Level of Effort (LoE)	It is a general or support activity that doesn't produce definitive end products or outcome (e.g. project management, contract management, project accounting). This type of activity spans from the earliest linked predecessor to that latest linked successor. Note: Level of Effort activities are also known as Hammock Activities
Line of Balance	Also called March Chart or Time Chainage. Schedule technique used for linear construct over long distance A to B on a time distance diagram. Example of construction of electric transmission lines, pipelines, railroad, motorway, and similar.

Logic	• Hard/Essential Logic: logic determined by distinct design or construction restraints performed in a given sequence (e.g. a second floor cannot be constructed unless the first floor is structurally complete) • Soft/Preferred Logic: logic as determined, not by physical character, but by expediency and judgment by schedule owner (team) or by resource levelling requirements.
Late Start	Late Start (Schedule Date)
Management Schedule (MS)	Highest level schedule within the schedule hierarchy, see document EPM-KPP-PR-000002 Project Schedule Hierarchy Procedure.
Mechanical Completion	Varies between projects and is defined in contract. Normally the completion of construction activities, including pre-commissioning testing, before handover to the Commissioning groups.
Milestone	A zero-duration event of significant importance to the project, with a specific and unique definition. It can be contractual milestones, intermediate milestones, handover milestones, delivery milestones, interface milestones.
Mitigation	Schedule delay or impact recovery measure.
MS	Management Schedule
MR	Material Requisition (See Engineering or Procurement Procedures)
Near Critical Path	The second, third and fourth longest sequence of activities from data date (time now) and program end date.
Necking	Feature in some automated scheduling software to indicate than an activity is suspended from progressing. Very useful visualization when started activities end dates are pushed to the right by finish to finish relationships. 
NTP	Notice to Proceed (Contracts).
PEP	Project Execution Plan (Construction).
Percent Complete	The estimate of amount of work complete for an activity or work breakdown structure component as of a specific data date. It shall be determined by deliverable or quantity tracking tools.
Performance Indexes	Used to depict project's performance in single factors. See definition of cost performance index (CPI) and schedule performance index (SPI).

Plan	Used to describe the execution strategy of a project or facility considering full understanding of scope, technical standards, major equipment, resource availability, industry practice and past experience. This is responsibility of the project team and forms the basis for the schedule development.
Predecessor	An activity that must start before its successor. An activity can have multiple predecessors, each with a different relationship to it.
Procurement Tracker	Tool managed by the procurement team to collect and status all procurement deliverables through the whole cycle (i.e. from Material Requisition (MR) generation by engineering, through to on-site delivery). It is part of the suite of Level 5 Schedules and provides key input for the statusing of the Level 3 Control Schedule.
Progress Override	A methodology for automated scheduling software to handle "out of sequence" statused activities. In this case, if a successor has been actualized, all predecessor relationships become irrelevant, even if they are in the future. See also Retained Logic.
Project Execution Plan (PEP)	Governing document that establishes the means to execute, monitor and control the project. This deliverable also serves as main communication vehicle to ensure that everyone is aware and knowledgeable of project objectives and how they will be accomplished.
Quantity Tracking	Tool managed by the construction team to collect and status commodities installation. It is part of the suite of Level 5 Schedules and provides key input for the statusing of the Level 3 Control Schedule and the commodity installation curves. It also tracks the expended hours against the budget in order to calculate Procurement cost performance (CPI).
Relationships	The logic ties connecting the sequence of schedule activities. There are four (4) types of logical relationships: • Start to Start (SS): succeeding activity cannot start until preceding activity started. These relationships need to be accompanied with a finish to finish relationship. • Start to Finish (SF): seldom used. • Finish to Start (FS): absolute preferred method of relating activities. Succeeding activity cannot start until predecessor has finished. • Finish to Finish (FF): succeeding activity cannot finish until preceding activity finished.
Retained Logic	A methodology for automated scheduling software to handle "out of sequence" statused activities. In this case, if a successor start has been actualized ahead of a predecessor finishing, the remaining duration of the successor will be driven by the predecessor relationship, independent of the fact that the successor start was actualized. See also Progress Override.

Schedule	A time and resource control and management tool that identifies activities for the entire project with time scales, required resources and logic links. It is built based on the project execution plan (see Project Execution Plan). • Schedule Health: set of metrics used to determine the quality of a schedule (note: this does not validate the quality of a plan). • Schedule Risk: assessment of risk to durations of activities by the project team, see document EPM-KPP-PR-000004 Project Schedule Contingency Procedure. • Schedule Variance: quantification of change in time (normally in days) of activity early starts or finishes.
Schedule Dates	Schedule dates are calculated dates based on activity durations and relationships in a CPM network. For activities, the calculated dates are: • Early Start (ES): The earliest possible start date of an activity as allowed by the activity predecessors. • Early Finish (EF): The earliest possible finish date of an activity as allowed by the activity predecessors. • Late Start (LS): The latest possible start date of an activity as allowed by the activity successors, without affecting the project's end date. • Late Finish (LF): The latest possible finish date of an activity as allowed by the activity successors, without affecting the project's end date.
Schedule Package	Group of interrelated documents establishing the Contract or Project Schedule. Includes quantity installation curves, staffing requirements, progress curves, risk & mitigations, schedule basis and narrative.
Schedule Performance Index (SPI)	A ratio of work performed to work scheduled. SPI = actual work performed / planned work to be performed If < 1 means project behind schedule, if =1 means project on schedule and if >1 means project ahead of schedule.
Scheduling	The process of converting plan sequences of logically interlinked activities with durations determined either by historic reference, team experience or by quantity evaluation, into a calendar.
Short Term Work Plan	A Tracker or Level 5 schedule that shows detailed activities to occur in the next few weeks, in order to achieve low level coordination and restriction identification. Use of spreadsheets as working tool is the best approach.
Skyline	Form of schedule representation of milestones over time, typically used for handover milestones; see document EPM-KPP-PR-000003 Project Schedule Curves Procedure.
Successor	An activity that must start after another activity. An activity can have multiple successors, each with a different relationship to it.
Target Schedule	A schedule that is more aggressive than the contractual schedule, developed by the project team in order to push to achieve an earlier completion date than the contractual completion date.

TF	Total Float
Unit of Measure (UoM)	The unit used to measure a particular commodity (e.g. linear meters (m) for cable, or cubic meter (m^3) for concrete).
Unit Rate (UR)	The hours to achieve a unit of work (e.g. concrete installation UR = 25mh/m^3).
UOM	Unit of Measure
UR	Unit Rate
WBS	Work Breakdown Structure
Work Breakdown Structure (WBS)	A hierarchical and incremental decomposition of a project work scope into smaller components. A WBS is often arranged in a tree structure or as an indented list showing a subdivision or area required to achieve an objective. The structure should always refer to physical volumes (e.g. from area, to facility, to building, to room), and not from physical to for example system or discipline (from building, to system, to commodity).

4.0 REFERENCES

1. EPM-KPP-PR-000002 - Project Schedule Hierarchy Procedure
2. EPM-KPP-PR-000003 - Project Schedule Curves Procedure
3. EPM-KPP-PR-000004 - Project Schedule Contingency Procedure
4. EPM-KPP-PR-000005 - Project Contractor Requirements Procedure
5. EPM-KPP-PR-000006 - Project Schedule Standards and Quality Procedure
6. EPM-KPP-PR-000007 - Project Schedule Lookahead Procedure
7. EPM-KPP-PR-000008 - Project Schedule Claims Procedure

5.0 RESPONSIBILITIES

5.1 Project Manager

The Project Manager is responsible for the overall Project Execution Plan (PEP) and for ensuring that all departments having an input to the project schedule adhere to this procedure.

5.2 Construction Manager

The Construction Manager is responsible for determining the construction execution plan, which will be the basis of the project plan. Construction manager is also responsible that all construction departments having input to the project schedule adhere to this procedure and take full responsibility and ownership of the schedule.

5.3 Department Managers

The Department Managers have the responsibility for completing the works and own the schedule for their departments. They have to designate a point of contact with the responsibility to provide accurate and timely update to the departments progress tracker (lower level schedules), and provide information to Project Controls to enable higher level schedule updates to be maintained.

5.4 Project Controls Manager

The Project Controls Manager is responsible for ensuring the planning department is well staffed, the project is properly planned and the plan is updated, analyzed and reported against.

5.5 Lead Planner

The Lead Planner is responsible for ensuring all project activities are properly scheduled and integrated, align to the project execution plan, ensuring that all requirements of this procedure are followed and progress on the project is updated and analyzed through regular project reviews, initiating corrective actions. The Lead Planner is responsible for the preparation of schedule information for inclusion in the Project Monthly report and for maintaining the Management Level Schedule. The Lead Planner provides supervision, coordination and guidance to Area Planners.

5.6 Planner

The Planner is responsible for preparing, maintaining and updating the Control Schedule and various trackers within their area of responsibility. The planners are responsible for reviewing the Employer’s contractual obligations together with engineering and procurement interfaces to determine any impact on construction that require mitigating to achieve project completion. Planners notify the Lead Planner and relevant department managers (and/or department planner) of significant deviations from the baseline or target schedules for corrective action

5.7 Department Planner

Each department, including Engineering, Procurement and Contracts, shall designate a point of contact to be responsible for providing schedule information to the project controls department for weekly update of the detailed implementation schedules. Department planners ensure the schedule accurately depicts the actual start and finish dates and sequence of works. The department planner is also responsible for distribution of the updated 3 week look ahead schedule.

5.8 Planning Responsibilities

Ownership of each project plan belongs to the project managers. They are responsible for the means and methods employed in the plan, including those noted below, as well as the achievability of the schedule:

- Means and methods used to perform the work (Implementation Plan)
- Workflow logic, interrelationships and interdependencies of work activities
- Completeness of scope and activities for the given work
- Reasonableness of activity durations
- Resource densities / limits for confined areas or the use of scarce resources
- Technical approach, specifications, and standards
- Constraints and input from other parties and external sources
- Achievability of productivity and installation / production rates
- Specification of requisite technical resources, materials, and equipment
- Specification of personnel and labor types to achieve the given work schedule
- Maximum attainable production / installation rates
- Assurance
- Safety of approach
- Cost-effectiveness of approach
- Correctness of deliverables at schedule end date
- Overall achievability of the schedule

5.9 Scheduling Responsibilities

The plan is based on input from all team members, and complied into a schedule by the project planners. The planning process encompasses the technical integrity of the schedule including aspects noted below, as well as the viability of the plan in terms of logic, logistics, etc.:

- Integrity of plan logic (Lead Planner)
- Critical path identification, analysis and recommended mitigation (Lead Planner)
- Plan review and improvement suggestions (Team)
- Optimum level of detail for each schedule (Lead Planner)
- Viability of interfaces between departments, contractors, organizational entities (Lead Planner)
- Reasonableness of activity durations (Team, Lead Planner)
- Availability of resources within acceptable float periods (Team, Lead Planner)
- Compatibility of schedule with current project schedule requirements (Lead Planner)
- Compatibility of schedule with contract schedule requirements (Lead Planner)
- Compatibility with owner’s contract schedule specification requirements (Lead Planner)
- Coordination across disciplines, departments, and external entities (Team, Lead Planner)

- Completeness of scope of work (Team, Lead Planner)
- Compatibility with budget and forecasts (Team, Lead Planner)
- Cost effectiveness of schedule approach (Team, Lead Planner)
- Hierarchical integrity (Lead Planner)
- Compatibility with project schedule priorities (Team, Lead Planner)
- Overall achievability of the schedule, with the level of required confidence (Lead Planner)

6.0 PROCESS

6.1 Planning and Scheduling Concept

6.1.1 Introduction

Effective planning and scheduling is based on the following basic principles:

a. Communication: planning is timely communication, securing agreement, effective priority setting, productive client negotiation, publishing and socialization, and regular feedback on status.
b. Team effort: planning cannot and shall not be done by planners only. It is the responsibility of the whole project team.
c. A project is not driven by the critical path only. Schedule achievement depends also on the project's ability to mobilize required workforce, efficiently complete work, and effectively identify and resolve progress restrictions.

6.1.2 Definition of Project Planning

Project planning is breaking the scope of work into discrete portions per the project execution plan, with defined stages and designated resources. Project planning is the responsibility of the project team and forms the basis for the project schedule development.

6.1.3 Definition of Project Scheduling

Project scheduling is the process of converting the project plans into the project schedule that represents how and when the project will deliver the project scope. It also serves as a communication tool and as a basis for performance reporting. The project schedule integrates and logically organizes project plan components such as activities, resources, and logical relationships. The project schedule is developed based on historic reference, team experience and quantity evaluation. The process to create and maintain the project schedule is depicted in the following figure:

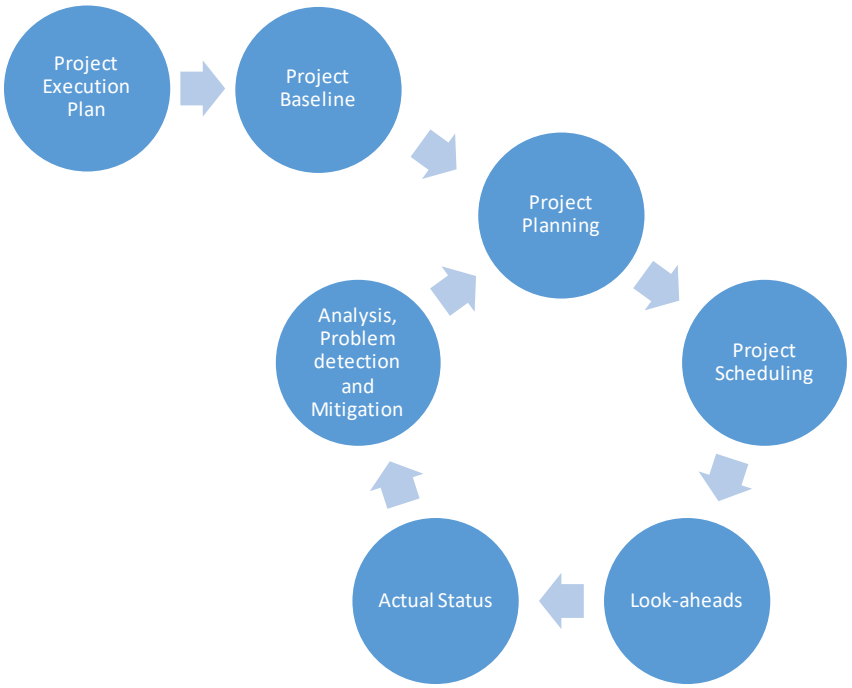


Figure 1: Planning and Scheduling Process

In order to validate the schedule, the activities need to be resource loaded with key commodities and direct manpower in order to produce quantity release and installation distribution, and craft resources requirement.

To make any project information relevant from a planning perspective, all quantities, man-hours, percentages, dates, statistics, etc. need to be published against a plan. This applies to all levels (high level management schedule to lowest level trackers and deliverable lists), to all departments, in all reports.

The project schedule is a visual communication tool that:

- Represents the entire project scope of work
- Report project status
- Defines key contractual performance milestones
- Establishes priorities
- Identifies critical path
- Establishes internal and external interfaces

6.1.4 Project Schedule Drivers

6.1.4.1 Critical Path

The critical path is initially the main driver that determines the project schedule duration.

6.1.4.2 Quantity Work-off

Quantity work-off is the second driver used to determine the project schedule duration. This driver is usually underestimated in its importance as teams tend to focus on critical path only. The principle is: what are the key quantities to work off, the Unit Rate (UR), manpower and construction equipment requirements, and what is the sustained production requirement. Once agreed, start controlling against those planned requirements. Any deviation from the planned work-off shall be treated as a schedule delay.

Quantity work-offs shall also be applied to the production of documents, such as engineering specs and drawings, generation of purchase orders, system handovers, punch list work-off, etc.

6.1.5 Schedule Hierarchy

The Project Schedule Hierarchy is used to provide the project team with useful project schedules and sufficient supplementary information to monitor schedule progress, status, changes, and impacts. Further details are provided in document EPM-KPP-PR-000002 Project Schedule Hierarchy Procedure, including the principles of generation of schedules at the different levels within the schedule hierarchy.

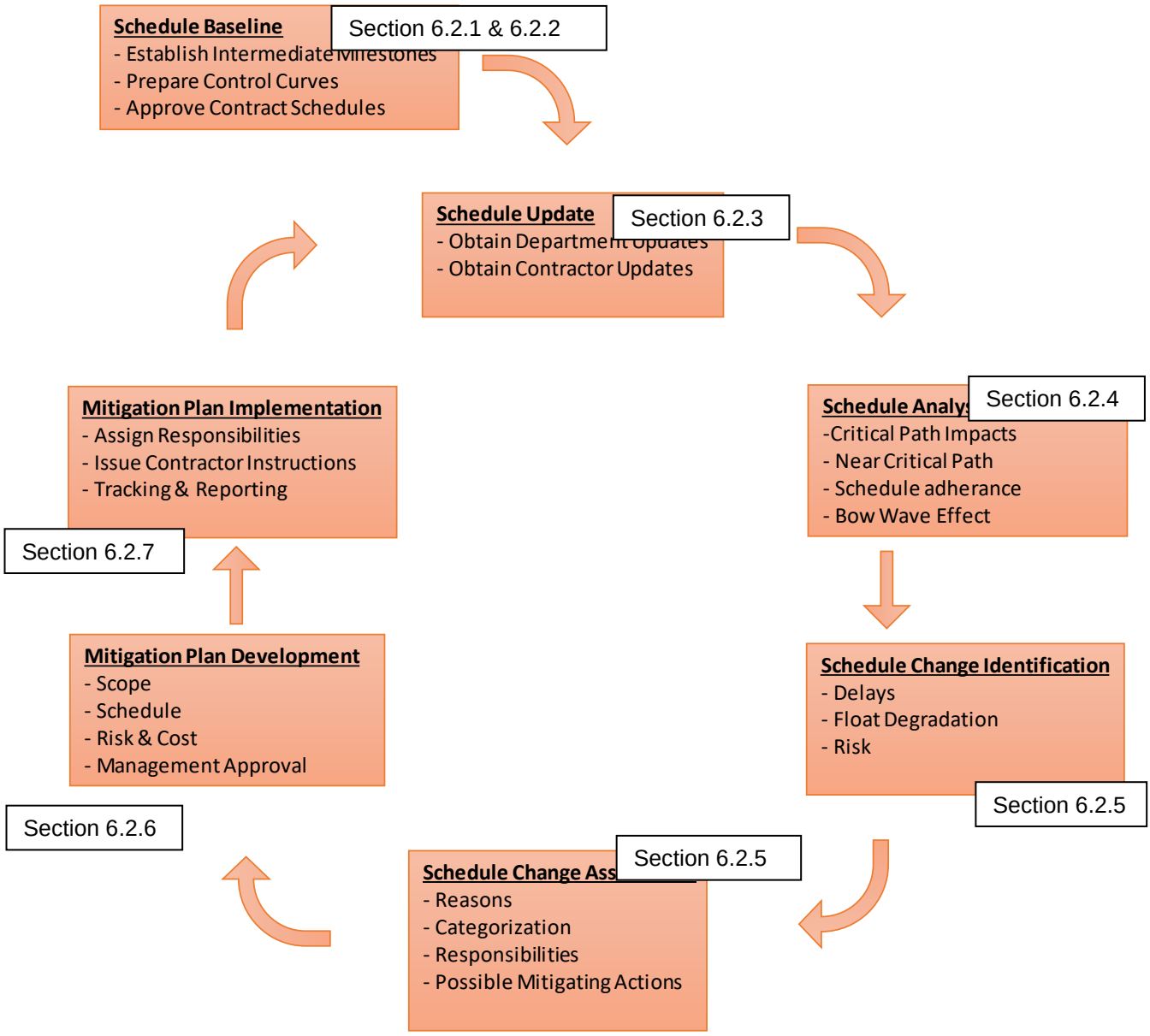
6.1.6 Schedule Package

A Schedule Package is a group of interrelated documents establishing the Contract or Project Schedule, containing:

- Basis and assumptions narrative
- Level 1 Schedule
- Level 3 Schedule
- Critical path
- Major milestones
- Progress curves
- Staffing curves
- Commodity curves
- Risks and opportunities
- Schedule Basis (for Baseline Schedule Packages)

6.2 Planning and Scheduling process

The project team participates in schedule management from preparation, baselining, updating, identification of risks, problems and changes, through recovery plan implementations as outlined in Figure below. Schedule issue identification requires the comparison of the schedule progress update to the requirements of the baseline or target schedule and associated production curves, the assessment of changes, the determination of cause, and the development of a recovery plan and contractual remedies as appropriate. Schedule changes are evaluated at the Control Schedule (CS) level against the current Baseline or Target Schedule.



6.2.1 Schedule Baseline (Original & Current)

The starting point for schedule change identification is the establishment of a Schedule Baseline. The Baseline provides a robust achievable schedule with quantified time phased deliverables that allow the project to determine potential impacts related to:

- The schedule as a whole
- Project milestone dates
- Non-critical path related, disruption, peak resource and volume of work

Project Controls manages the Baseline schedule under Scope Change Management to maintain an approved Current Baseline schedule which, in contractual terms, represents the project's current commitment with respect to any and all provisions in the contract.

The current Baseline Schedule is the benchmark for measuring schedule changes or impacts for the life of the project.

6.2.2 Target Schedule

The project may choose to develop an alternative schedule that attains an earlier completion date than the committed completion date. Schedule changes on target schedules are project internal events which can be treated critical at project management discretion, but not claimed as project impacts externally.

6.2.3 Schedule Update

Project Controls manages the Current Schedule (CS) through periodic updates of progress status and revisions and to include adjustments and alignment to current execution and methods.

The CS is re-calculated relative to the current Data Date, and the calculation results are examined by the Lead Planner compares and analyses the CS against the Current Baseline Schedule in search of changes and potential impacts.

6.2.4 Schedule Analysis

Contractor schedules are to be analyzed using two methodologies:

1) Update of Contractor milestones in Project Schedule
2) Analysis of contractor schedule in native form, having the contractor's perform such analysis as per contractual requirements.

The Lead Planner establishes a regime for monitoring schedules and reports and must ensure that:

- The Contract baseline schedule is approved in a timely manner and is accurate
- Updates on current schedules are done based on facts and supported by proper documentation
- Any changes are included in the narrative issued with the updates
- Project Controls provides prompt and proper notification of any delays, out of sequence work or longer durations.

To do this Lead Planner need to:

- Understand the contract and contract law with respect to the schedule
- Understand the schedule approval requirements under the contract and the governing law

- Pro-actively manage and mitigate delays, reflect commercially significant events and impacts in the project's control schedule and maintain notes against activities
- Maintain discipline on the proper documentation and reports that will be relied upon in the event of contract settlement negotiations, such as:
    - Contract Baseline schedule with milestones, quantities, manpower and progress work off commitments
    - Project daily reports and Daily Force Reports
    - Schedule Log Notes/Notebook Topics - objective and fact based, not judgmental or prejudicial
    - Quantity progress and performance reporting
    - Contractual Notices

6.2.4.1 Unacceptable Practices:

Prompt recognition and treatment of schedule changes, whether the source, is imperative. The schedule practices such as those described below, are unacceptable for both project and contractor schedules:

(a) Unwarranted Shortening of the To-Go Critical Path

Ad hoc fixes to the CS to bring an impacted date back on schedule by changing logic, overlapping activities, or shortening durations without a recovery plan are unacceptable. When a contract milestone date is impacted, a recovery plan and contract actions are initiated. Any recovery plan that involves shortening the to-go activities must be substantiated, priced, and approved by project management before incorporation into the CS.

(b) Excessive Schedule Contingency Drawdown

The Project Lead Planner keeps an accounting of schedule contingency used to recover critical path impacts. If schedule contingency has used to a level where it is determined that any further expenditure would leave an insufficient amount to cover to-go work risks, a wholesale project recovery plan is developed. Schedule contingency is never used to offset owner-caused impacts. Schedule contingency expenditure must be approved by Project Management.

(c) Incorrect Use of Negative Float

Any impact to an intermediate or final contract milestone date is depicted in the CS by allowing the subject milestone date to slip to the impacted date – not by hard constraining the contract completion date and just showing negative float against the constrained date.

Otherwise it will be interpreted in litigation as conveying to Owners that the completion date has negative float but can be met – it shows on-time completion.

Although useful for internal schedule analysis, schedules showing negative float by contractual dates by hard constraining the completion date should not be given to owners unless liability for the delay has been agreed to by the contracting parties and a recovery plan is in preparation.

The preferred update methodology is to show the completion date free to slip to a new forecasted completion date, thereby indicating the need for a recovery plan or a time extension.

6.2.5 Schedule Change Identification and Assessment

Timely, accurate, and categorical evaluation of schedule changes is essential. These changes need to be classified as to reasons and responsibilities.

The Lead Planner is responsible for ensuring that such evaluations are performed and crucial schedule events are communicated to management, to timely drive development of mitigation, recovery and/or contractual measures.

6.2.6 Mitigation Plan Development

The mitigation plan need not be a formal package, but it should consist of a brief cover narrative and existing documentation to show work activities, budget, and schedule, describing and quantifying the necessary corrective measures.

6.2.6.1 Mitigation Plan Preparation

The Lead Planner provides the nature and magnitude of the impact on the current schedule, management ground rules, and suggested recovery measures, and leads the project team effort to prepare a mitigation plan.

6.2.6.2 Mitigation Plan Pricing

Project Controls prices the mitigation plan and obtains the project team's approval and coordinates a project management review. When applicable, the costs of not adopting the recovery plan and invoking liquidated damages, extended overhead, etc., are provided as part of the review package.

6.2.6.3 Mitigation Plan Approval

The mitigation plan undergoes final review and buy-in by the project team and approval by the project manager.

6.2.7 Mitigation Plan Implementation

The project manager decides when to implement the mitigation plan, taking into consideration contractor's contractual liability and any negotiations regarding the schedule impact/change order. The option is to not adopt the mitigation plan and draw down on schedule contingency or inform the entity of an actual or potential delay.

Once approved for implementation, actions get assigned, are documented and tracked through completion by Lead Planner.

7.0 ATTACHMENTS

N/A