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SCHEDULE DEVELOPMENT

SAMPLE

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SCHEDULE DEVELOPMENT

TCM Framework: 7.2 – Schedule Planning and Development

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TABLE OF CONTENTS

Table of Contents	1
1. Introduction	1
2. Recommended Practice	2
2.1. Different Types of Schedules	2
2.2. The Components of Schedule Development ^[1]	4
2.3. Proper Level of Detail	8
2.4. Development of Project Schedules	10
2.5. Roles and Responsibilities	13
3. Conclusion	13
References	13
Contributors	14

1. INTRODUCTION

This recommended practice (RP) is to be used for schedule development. Schedule development is the process of translating the project scope into activities, contractual milestones, logical relationships, durations, resource availabilities, time constraints, and other schedule basis information into the project schedule model. It involves analyzing the technical and programmatic information about an asset or project to create the as-planned schedule model. This model presents a set of logically sequenced activities that may be resource- and/or cost-loaded, and is presented in the form of a time-phased action plan.

This document is intended to provide a guideline, not establish a standard.

The outputs of the schedule planning process are inputs for schedule development. Schedule planning translates work package scope into manageable activities and determines the manner and sequence (i.e., logic) in which these activities are best performed. Schedule development allocates the available resources to activities in the schedule model in accordance with cost and resource planning and alternative allocation criteria while respecting project constraints affecting the schedule (e.g., contract milestone dates).

Schedule development generally includes iteratively refining schedule planning outputs (e.g., planned durations, means and methods, workflow sequence, and/or preferential logic) in a way that realistically, if not optimally, achieves project objectives for time (e.g., milestones, overall project duration), cost (e.g., cash flow), and others (e.g., performance requirements) ^[1].

An effective schedule will integrate with project technical documents, scope of work, contracts, and other project attributes that have an impact on the project schedule. A well-developed schedule contains an appropriate level of detail to enable effective project management. The schedule development process may use various techniques such as Critical Path Method (CPM), Critical Chain Method, and Program Evaluation and Review Technique (PERT). These techniques will be reviewed briefly in this recommended practice and considerations for their use will be discussed.

August 13, 2020

Schedules provide a platform for communicating, executing (controlling and monitoring), reporting, and presenting a baseline for project progress and performance measurement. It also provides a means for collecting and recording project progress, a basis for processing payment applications to support work performed, and a platform for analyzing project alternatives and decision making. Budgets, costs, resources, risks, and other information logs can be integrated into a project schedule to provide a basis for an integrated project control system. Furthermore, courts use and rely upon schedules for assessing requests for equitable adjustments including delay and disruption claims.

2. RECOMMENDED PRACTICE

2.1. Different Types of Schedules

Schedules serve different purposes. A brief description of the most common types of schedules is provided. Identifying the purpose for each schedule is essential to guide its development process. Different types of schedules can be characterized based on criteria such as level of schedule, scheduling method, and end use.

From the level of scheduling perspective, schedules are differentiated by the degree of detail in the schedules. The main levels of schedules are as follows^[3]:

Level 1: A Level 1 schedule is a high-level schedule that reflects key milestones and summary activities by major phase, stage or project being executed. This schedule level may represent summary activities of an execution stage, specifically engineering, procurement, construction and start-up activities. Typically represented in Gantt format and depending upon when and how developed a Level 1 schedule may or may not be the summary roll-up of a more detailed CPM schedule. Level 1 schedules provide high-level information that assist in the decision-making process (go/no go prioritization and criticality of projects). Specifically, a project may be considered part of a program of projects (whether completed, in progress, or not yet started). The level 1 schedule assists in defining the necessity of implementing actions and course correction (if warranted, it may be necessary for high level management to intercede in the execution of the project). Audiences for this schedule Level include, but are not limited to client, senior executives and general managers.

Management summary schedules generally include the timeline for and status of key project deliverables, phases, processes, gating, milestones and constraints. They provide a graphical management summary of the overall project plan so project leaders can communicate concise schedule information and project status at a project management level^[19].

Milestone schedules are among the least complex types of summary schedules, typically comprised of key events or milestones that depict the start or completion of key phases or tasks of a project, and can be presented in a tabular or time-scaled format for management level reporting and decision making. This schedule is typically included in management level progress reports and typically includes milestones and summary activities.

Level 2: Level 2 schedules are generally prepared to communicate the integration of work throughout the life cycle of a project. Level 2 schedules may reflect, at a high level, interfaces between key deliverables and project participants (contractors) required to complete the identified deliverables. Typically presented in Gantt (bar chart) format and rarely in CPM network format Level 2 schedules provide high-level information that assist in the project decision-making process (re-prioritization and criticality of project deliverables). Level 2 schedules assist in identifying project areas and deliverables that require actions and/ or course correction. Audiences for this type of schedule include, but are not limited to general managers, sponsors, and program or project managers.

August 13, 2020

These project level schedules are an activity and deliverable-centered plan that is typically comprised of the major project phases (e.g., conceptual design, detailed-design, procurement, construction, commissioning, and close-out phases) and features of work. They may be presented in a time-scaled network logic diagram or bar chart.

Level 3: Level 3 schedules are generally prepared to communicate the execution of the deliverables for each of the contracting parties. The schedule should reflect the interfaces between key workgroups, disciplines, or crafts involved in the execution of the stage. Typically presented in Gantt or CPM network format and is generally the output of CPM scheduling software. Level 3 schedules provide enough detail to identify critical activities. Level 3 schedules assist the team in identifying activities that could potentially affect the outcome of a stage or phase of work, allowing for mitigation and course correction in short course. Audiences for this type of schedule include, but are not limited to program or project managers, CMs or owner's representatives, superintendents, and general foremen.

Level 4: Level 4 schedules are prepared to communicate the production of work packages at the deliverable level. This schedule Level should reflect interfaces between key elements that drive completion of activities. Typically presented in Gantt or CPM network format Level 4 schedules usually provide enough detail to plan and coordinate contractor or multi-discipline/craft activities. Audiences for this type of schedule include but are not limited to project managers, superintendents, and general foremen.

Level 5: Level 5 schedules are prepared to communicate task requirements for completing activities identified in a detailed schedule. Level 5 schedules are usually considered working schedules that reflect hourly, daily or weekly work requirements. Depending on these requirements, the level 5 schedules are usually prepared a day or week in advance. Typically Level 5 schedules are presented in an activity listing format without time scaled graphical representation of work to accomplish. Level 5 schedules are used to plan and schedule utilization of resources (labor, equipment and materials) in hourly, daily or weekly units for each task. Audiences for this type of schedule include but are not limited to superintendents, general foremen and foremen.

There are several methods for developing schedules. These may include the following: narrative schedule, Gantt or bar chart, CPM, critical chain method, linear schedule, and PERT. These methods are described in the *Tools and Techniques* section of this recommended practice.

Schedules can also be defined by their intended purpose:

- A master schedule is a complicated schedule incorporating multiple related projects (e.g., program management), or unrelated projects (e.g., a portfolio management of unrelated projects), or parts, phases, or specialty trade schedules of a project, or any other combinations of the aforementioned.
- A baseline schedule: A static project schedule that reflects all formally authorized scope and schedule changes against which project performance is measured.
- A schedule update: A statused, dynamic version of the baseline schedule that reflects the most current information on the project. The most recent version is also known as the control schedule.
- A recovery schedule is a plan for recovering time lost on the project (i.e. slippage)^[2] through means that typically involve resequencing schedule logic, adjusting available work time, and/or adjusting activity durations to align the project with the most recent schedule that pre-dated the slippage.
- A look-ahead schedule includes a select set of activities for a short time-period, typically within the upcoming two- to six-week timeframe. This schedule highlights the near-term tasks projected to be performed in a given period of time to identify upcoming priorities for each of the project team