

AACE International Recommended Practice No. 38R-06

**DOCUMENTING THE SCHEDULE BASIS**  
TCM Framework: 7.2 – Schedule Planning and Development

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## INTRODUCTION

### Scope

This recommended practice (RP) provides an outline and describes a format for the various elements of information that may be included in the schedule basis document. This RP describes the important elements of schedule information that may be included to document the basis and assumptions of this project management tool. This recommended practice includes a checklist in the appendix that can be used to confirm that all elements of the basis document have been considered.

The schedule basis is a document that defines the basis for the development of the project schedule and assists the project team and stakeholders in identifying any key elements, issues and special considerations (assumptions, exclusions, risks/ opportunities, etc.). The project schedule represents the complete logical time-phased representation of the project plan. The schedule basis document may accompany the submittal of the project baseline schedule.

The schedule basis further substantiates the confidence and degree of completeness of the project schedule in order to support change management, reconciliation, and analysis. This document also doubles as a tool for assisting any personnel who are transitioning into the project and may be used in claims situations to illustrate a change of scope.

### Purpose

This AACE International recommended practice is intended to provide a guideline, not to establish a standard for documenting the schedule basis for the planning of projects. This recommended practice is written and intended primarily for use on construction projects by the project team members and stakeholders involved in the planning and scheduling of the project work activities. These RP guidelines may be applicable to many other types of projects. The focus of this recommended practice is on documenting the necessary elements of the schedule basis.

Many project individuals and groups contribute to the planning and development of the project schedule. By documenting the schedule basis, the project team captures the coordinated project schedule development process, which is by nature unique for most construction projects. This improves the final quality and adds value to the project baseline schedule, which serves as the time management navigation tool to guide the project team toward successful project completion. The schedule basis also is an important document used to identify changes during the schedule change management process.

### Background

The requirement to document the basis of the schedule has been an established procedure for several years with many large corporations, and some federal agencies<sup>[4]</sup>. This recommended practice describes the important elements of schedule information that may be included to document the basis and assumptions of this project management tool.

**RECOMMENDED PRACTICE**

Documentation of the schedule basis is an important step in reaching the objective for successful use of the project schedule. Describing the various elements of information in the schedule basis document will provide a better understanding of what is or is not included and what is specifically excluded in the project schedule. A structured approach to that schedule documentation will eliminate much of that uncertainty and provide a clearer understanding of the schedule.

Documenting the basis of the cost estimate (BOE) is a generally accepted practice. That estimate basis is frequently used as a reference related to change management as the project moves forward. Many projects however, have invested less effort or have been less interested in documenting the basis of the project schedule for a variety of reasons. The lack of schedule documentation makes it difficult for the project participants to fully understand the overall planning that was incorporated in the project's schedule, which can have serious adverse effects on the ultimate success or failure of the project to achieve completion in the time forecast in that baseline schedule. Therefore, the basis of that planning process should be documented, as the project schedule is prepared. The schedule basis is not a "one size fits all" document. Using a graded approach for small projects is recommended. Preparation of the schedule basis document should begin concurrently with the first summary version of the project schedule and evolve into further detail as the schedule is developed. The schedule basis should be a life cycle document relating to the baseline schedule and both should be referenced and updated as the project progresses in accordance with the project change management process. Preparation and maintenance of the schedule basis document is the responsibility of the project entity responsible for preparing and maintaining the project schedule. The basis for the project schedule may be organized in an outline similar to a cost estimate basis outline. The schedule basis document describes essential elements of information such as these listed below:

- Project Description, Schedule Integration Process
- Scope of Work (WBS, OBS)
- Execution Strategy
- Key Project Dates
- Planning Basis
- Cost Basis
- Critical Path
- Path of Execution
- Punchlist, Turnover, and System Startup
- Issues and Concerns
- Risks and Opportunities
- Assumptions
- Exclusions
- Exceptions
- Baseline Changes/Reconciliation
- Schedule Reserve
- Project Buy-In

**INFORMATION SOURCES – SCHEDULE BASIS****Project Description, Schedule Integration Process**

This section of the schedule basis may briefly and concisely provide a high-level description of the project. Since this document provides the basis for the development of the schedule, it may also describe the process and personnel involved in the development of the project schedule. The phase of the project (i.e. conceptual, design, procurement, execution, or startup) should also be included in this section of the basis, so that there is an early understanding of the overall completeness of the project design and

procurement information can be determined. The schedule basis document should be updated periodically as the project development progresses as well as when there are any major changes of scope or performance requirements for the project. A checklist may be attached to indicate the available project information (and the degree of completeness). This provides the reader with an understanding of the completeness of the information used during schedule development. The schedule integration process would also describe the inclusion of schedule input from subcontractors, design engineers, vendors, third-parties (such as government agencies and utility companies) and the owner. The project schedule should include the input of engineering, procurements, owner furnished fixtures and equipment, work by other contractors, as well as the start up and commissioning "by others". The basis may describe those as schedule "linkage points" if that work is scheduled separately and not included in the scope of the schedule.

### Scope of Work

The scope of work (what it includes, as well as what it excludes) may be documented and attached as a supporting document to the schedule basis. The work breakdown structure (WBS) defined in the planning stage would be included in this section of the basis. The WBS may identify all the work to be executed as per the contract. Also, this section may include the organizational breakdown structure (OBS) and the division of responsibility (DOR) or responsibility assignment matrix (RAM) so that the schedule can clearly and concisely represent the responsible parties to their appropriate scope items. Including this DOR listing will help eliminate omissions to the project scope as well as minimize redundancy or overlap of responsibilities of project team personnel and contractors. The level of design completion should be identified in the schedule basis document. The schedule basis includes all of the important project conditions, and potential issues or impacts to the project. Risks and schedule contingencies are discussed in detail later in the schedule basis.

### Execution Strategy

The execution strategy may describe and identify these items.

1. Briefly describe the type of work (new project, addition or expansion, revamp, renovation, relocation).
2. Briefly describe the execution strategy, specifically whether the project is considered one of the following:
  - a. Standard or phased execution (standard workweek, spot overtime, non-shutdown)
  - b. An aggressive execution approach (non-standard workweek, high overtime)
  - c. Options to accelerate the schedule and constructability issues (reference checklist in Appendix A)
  - d. Fast-track approach (engineering incomplete or phased design/procurement at the start of construction plus aggressive execution).
  - e. Shut-down (planned shut-down/outage periods, non-standard workweek, high overtime).
3. Briefly describe the contracting strategy:
  - a. Self perform, prime contractor, multiple contracts, alliance, joint venture.
4. Briefly describe the procurement strategy.
5. Briefly describe the contract type:
  - a. Lump sum, fixed price, cost plus, unit price, guaranteed maximum price (GMP), design build, public-private partnership (PPP), 3<sup>rd</sup> party CM, etc.
  - b. The contract performance period as defined by the contract documents. (I.e.: from the "notice to proceed" (NTP) date to the contract completion date, or commencement date to contract completion date.)
  - c. The project contracting strategy may be included to describe the various means and methods of completing the project.
6. Identify the cash flow profile (availability of funds) for the project. Note that this information may be privileged or confidential and not included in the basis document.

7. Optionally identify the average and peak resource demand for the project, as well as the average and peak performance progress that the project can attain. This information is especially important in situations where resources are constrained or especially limited in availability.

### **Key Project Dates**

Describe the key milestone dates, such as the project start and completion dates, regulatory/environmental key dates, and key interface dates. If the schedule is prepared as a re-baseline, then a key project dates' report identifying any significant variances between any previously "approved" schedules and the current schedule needs to be prepared and attached. Also, this section may identify the statutory holidays to be recognized, planned turn-around/shut-down dates, holiday breaks, local weather impacts and anticipated lost productivity time periods, and extended workweek time periods.

In addition, key procurement milestones/activities may be identified and described in the schedule basis. The source of time frames must also be explained for the procurement bid, award, fabrication, and delivery activities. Key submittals (such as permitting applications) should be included in the project schedule and described in the schedule basis – particularly those that can impact the time of performance on the project. Those scheduled submittal activities should include adequate time to develop and submit the shop drawings, significant material samples, mock-ups, as well as review/approval time frames for the architect/engineers and owner, along with planned time for construction.

Safety and quality are both important to the project and if there are key project quality control "hold points" and/or inspections, these key scheduled events need to be visible and described in the basis for the schedule.

### **Planning Basis**

The planning basis describes the methods and sources used for determining the project schedule, including:

- Identify resource planning methodology, crew size/mix expectations, etc. and capacity planning (maximum resources allotted). The resource plan may include a travel/housing plan, as well as an understanding of local hire vs. travel cards.
- Activity identification, duration estimating: defines methodology use to establish activity durations, which may include information on planned crew mixes or crew sizes.
- Identify the project calendars, shift calendars, crew calendars and weather calendars (if any) for the project.
- Identify storage facilities, lay-down areas, staging areas and their planned usage.
- Identify the cost estimate version and issue date, funding sources and cash flow profiles.
- Identify source and methodology for determining logic and sequencing.
- Identify labor productivity adjustments, including protective equipment, congestion (or confined space) assessment, extended work hours, and local weather work limitations.
- Identify construction equipment utilization plan.
- Identify interfaces with the existing plant and facilities in "brown field" development
- Document sources of planned production rates.
- Identify equipment, modular, fabrication, vendor shop inspections, and bulk delivery methodologies/strategies, long lead procurements. This includes timing issues such as planning for as late as possible deliveries.
- Identify any planned technology implementation (such as building information modeling (BIM)).
- Identify basis for any contractor schedules included. Include subcontractor interfaces/limits of work.
- Identify basis for start-up and commissioning sequencing requirements.
- Identify owner requirements (regulatory, environmental, LEED certification, other quality/inspection requirements).

**Critical Path**

The purpose of completing this portion of the document is to inform the project team as well as others of the current critical path(s) and near-critical paths of the project. Note: depending on the required level of detail, the complexity of the project, and the geographical size of the project, you may have more than one critical path.

The amount of detail required to describe the critical path is up to the discretion of the project team. However, it should provide enough detail so that all project participants can focus on the areas that could potentially affect the outcome of the project. The critical path described here need not be a detailed CPM of the schedule, but rather a higher level of description. A detailed CPM critical path schedule and near critical activities list may be attached to the schedule basis document.

**Path of Execution**

Briefly describe the high level execution sequencing of the project, and the “area” paths of execution (routing of people and equipment while on the site or premises). This will assist the project team in determining the prioritization or postponement of modules and installation of equipment to allow equipment and resources to be used more efficiently and effectively.

**Punchlist, Turnover & System Startup**

Punchlist, turnover, commissioning and system startup activities require a realistic basis for inclusion in the schedule, especially when such sequences involve lengthy, complicated, or technically demanding actions. If this work will be performed “by others” (such as an independent agency), then an explanation about when coordination will be completed and the details incorporated into the project schedule.

System functional testing: such as HVAC balancing, life safety and fire alarm/fire suppression system tests, plumbing hydrostatic or pressure tests, mechanical or electrical equipment preliminary operations, and any other scheduled or required “pre-commissioning” work needs to be described in the schedule basis.

**Issues & Concerns**

A number of issues and concerns will surface during the development of the schedule. The purpose of this section is to identify any issues or concerns that could not be resolved prior to the approval of the schedule, or the turnover of the schedule to the implementation team, etc.

An issues and concern log identifying open as well as closed items may be provided to the project team for review. Data listed here may be legally or politically sensitive and must be vetted to insure accuracy and appropriateness.

**Risks & Opportunities**

The risks and opportunities section is often used to provide an understanding of the critical risks that may occur during the execution of the project. The items presented here may indicate the magnitude (impact) and the probability of occurrence. A qualitative risk assessment may be completed and all risks may be identified on the risk event log. Please note: any risk events that have a high probability (80%+) of occurring (and a medium to low impact to the project) are sometimes managed as if the event will happen and therefore, the management team may apply the appropriate schedule reserves and buffers necessary for controlling the activities and the overall project.

A quantitative risk assessment may be completed in order to identify the appropriate schedule reserve to ensure successful project completion. The project team may determine the optimistic, pessimistic and most likely durations for the activities in order to calculate the expected durations. This process identifies what the project team may expect in regards to activity durations.

The basis of the schedule may include an explanation about how any potential schedule impacts have been “addressed” in the project schedule: weather; labor strikes or shortages, procurement delivery delays, etc. The schedule risk basis may address those potential risk issues and explain how or if there is any related “schedule contingency” factored into the schedule. Finally, the schedule basis may also describe how the schedule has been evaluated in relation to the cost estimate using a “time versus cost” analysis in addressing the potential for schedule risks and impacts.

### **Assumptions**

Briefly describe the assumptions used while developing the schedule. Assumptions identify the parameters and conditions used for determining the outcome (project start to completion dates) of the project schedule.

Some examples of assumptions are: fabrication shops will complete the required work as per our priorities and timing, the required craft is available, the project will not require any overtime, all project funding is available at project start, etc.

### **Exclusions**

Describe items that have not been included and therefore not supported during the development of the schedule. Some examples or exclusions might be:

- Specialty contractors/resources.
- Sharing of equipment (such as cranes, excavators, etc.).

### **Exceptions**

The exception section may identify any significant deviations from standard operating practices for developing schedules, including the planning process, reviews and acceptance of the project schedule. Any deliverables identified on the schedule input checklist (in Appendix A) not provided or that did not meet the degree of completeness necessary for the proper development of the schedule may be identified as an exception. If there are any deviations or exceptions from that scheduling specification, describe that variation and submit a request for approval to the project owner.

### **Baseline Changes, Reconciliation**

This baseline reconciliation section should be completed when the baseline has changed or if/when a more detailed schedule has been developed. This provides a better understanding as to why the schedule has changed from its original or the previously baseline schedule. If there has been a change to the schedule and a recovery plan or a reconciliation effort has been completed, describe the events pertaining to the mitigation of the contributing factors to the delay or acceleration.

## Schedule Reserve

Based on the completed schedule risk assessment (see “risks and opportunities” above) and the assessment of the expected completion dates, the project team can then determine the required schedule reserve for the successful completion of the project. Schedule reserve (or contingency) can be expressed either as a number of days or the money required to mitigate the identified risk. Provide a table or schedule as an attachment to the schedule basis, identifying what activity or event has schedule reserve, and the value applied.

## Project Buy-In

Because the schedule basis is such an important document, it likely will not be the creation of just one individual, such as the project scheduler. The project management team including craft superintendents, key subcontractors and technical specialists (i.e. rigging and safety) should be involved in the preparation and review of the schedule basis document. The basis document may not be considered to be a valid description of the project schedule unless it has been approved by the appropriate members of the project management team. Incorrect or faulty information contained in this document may later be detrimental to support a fair resolution of disputes or interpretation of contract documents.

## A Graded Approach

Smaller projects may use a graded approach to development of the basis document. A graded approach would apply a fit-for-use abbreviated version of the full basis table of contents. However, it must still cover all the key basis items. An example of a graded or abbreviated table of contents is as follows:

- Scope of work
- Work breakdown structure
- Key assumptions and constraints
- Issues and impacts (risk)
- Inclusions and specific exclusions
- Schedule change order process
- Integration & progress reporting process
- Key procurements and submittals

## SCHEDULING TECHNIQUES AND SOFTWARE

The basis of the schedule should also cover special issues related to the scheduling software and techniques utilized to develop the schedule. Each type and version of scheduling software offers different and changing features and limitations. Contract scheduling specifications may require a specific type of software or require or regulate use of specific software features.

Contractual issues such as scheduling software compatibility may dictate a sub-optimal process. Other issues regulating the basis of the schedule include:

- The use of logical relationships (some software only allows a single relationship between any two activities).
- Inter-project dependencies.
- Lags and leads.
- Constraints.
- Multiple calendars established for project holidays and non-work periods.
- Resource loading.
- Resource leveling.

- CPM software rules settings.
- Interface with cost control system

The schedule basis may include the activity coding dictionary used in the schedule to provide for sorting, organization, and filtering capabilities for the various schedule report layouts.

The schedule basis may describe any use of “preferential logic” which is defined by AACE as “the contractor’s approach to sequencing the work over and above those sequences indicated in or required by the contract documents. Examples include equipment delivery/setup restraints, crew movements, concrete form reuse, special logic (lead/lag) restraints, etc. that are factored into the schedule which would mask the associated activity float times.”<sup>[12]</sup>

Ownership and use of schedule float is a significant concern that may be clarified by the contract and based upon the project requirements. Any scheduling software technique used for handling project planning assumptions and constraints (such as funding limitations) may also be described. It is important to insure that all of the requirements from the contract schedule specifications are incorporated in the baseline project schedule. If there are any deviations or exceptions from that scheduling specification, describe that variation and submit a request for approval to the project owner.

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## APPENDIX A: FORMAT FOR THE BASIS OF THE SCHEDULE

- I. Project introduction: project title, contract number, date of contract documentation
- II. Project description, schedule integration process
  - a. Introduction and description of the project
  - b. Schedule integration process
    - i. Integration of engineering, procurement deliveries, owner furnished fixtures or equipment, or commissioning “by others”
    - ii. Integration and coordination with subcontractors
    - iii. Master project schedule – responsibility of owner, GC, or CM
  - c. Schedule development checklist
- III. Scope of work. Includes:
  - a. Work breakdown structure
  - b. Organizational breakdown structure
    - i. Project team & stakeholders
  - c. Division of responsibility
  - d. Regulatory permits and licensing
  - e. Scope exclusions and inclusions
- IV. Execution strategy
  - a. Define project type
  - b. Funding (identify the funding source and cash flow profiles)
  - c. Contracting strategy
  - d. Procurement strategy
  - e. Constructability issues
    - i. Resource demand
    - ii. Logistics
  - f. Total number of calendar days: from start date to end date
  - g. Contract performance periods
  - h. Acceleration – options to improve schedule
- V. Key project milestones and key events
  - a. Key interface dates
  - b. Winter productivity dates, summer extended workweek dates
  - c. Source of time frames for bids, award, fabrication, and delivery
  - d. Basis of time frames for shop drawings, review and approval
  - e. Key material samples and submittals
  - f. Mock-ups–construct/erect, review and approval dates
  - g. Safety and quality: hold points and key inspection dates
- VI. Planning basis
  - a. Resource planning methodology, crew size expectations and capacity planning
    - i. Travel & housing plan, as well as an understanding of local hire vs. travel cards.
  - b. Activity identification, duration estimating: define methodology for establishing activity durations, which may include crew mixes, crew sizes
  - c. Project calendars, shift calendars, and crew calendars
  - d. Storage facilities, lay-down areas, staging areas usage plan
  - e. Logic and sequencing methodology
  - f. Labor productivity adjustments & congestion assessment
    - i. Extended work hours, winter work
    - ii. Document all production rates
  - g. Equipment utilization plan

- h. Equipment, modular, fabrication and bulk delivery methodologies/strategies
  - i. Basis for contractor schedules
  - j. Start-up and sequencing requirements
  - k. Owner requirements (regulatory, environmental, quality/inspection requirements)
- VII. Critical path(s)
- a. Description (written) of critical path(s)
- VIII. Path of Execution
- a. Description of “execution sequencing”
    - i. Execution priorities list
  - b. Path of Execution
    - i. Identifies access restrictions
- IX. Punchlist/turn-over/system start-up
- a. Testing and functional checkout: mechanical, electrical, plumbing, pre-commissioning
- X. Issues and concerns list/log
- XI. Risk and opportunities
- a. Qualitative risk assessment
    - i. Risk event log
  - b. Quantitative risk assessment
    - i. Schedule risk assessment
      - 1. Probability report
  - c. “Time versus cost” comparison with budget
- XII. Assumptions report
- XIII. Exclusions report
- XIV. Exceptions report
- XV. Baseline changes/reconciliation
- a. Baseline change (not a recovery plan, used for stage/gate processes)
  - b. Reconciliation between master and contractor schedules
- XVI. Schedule reserve
- a. Schedule “confidence” report
  - b. Application of schedule reserve (for scheduled activities)
  - c. Schedule identifying activities with schedule reserve
- XVII. Scheduling techniques and software
- a. Software compatibility with other project control systems
  - b. Logical relationships
  - c. Leads/lags
  - d. Constraints used
  - e. Multiple calendars used
  - f. Activity coding structure/dictionary
  - g. Float usage
  - h. Preferential logic
  - i. Compliance with contract scheduling specifications