

Controlling Our Critical Path: A CDOT Guide to Better Project Management Practices

Project Management practices have been a part of the CDOT culture for many years. However, with a transitioning workforce and increasing demands, it is essential that CDOT enhance and prepare its emerging workforce to better utilize those project management practices. The following guidelines are intended to provide direction for employees with Project Management responsibilities and serve in an interim fashion until they can be further embellished and added to the CDOT *Project Development Manual*.

This document does not modify existing CDOT policies and procedures regarding the definition of responsible charge nor does it define Professional Engineer responsibility in regard to the management of construction projects by unlicensed engineers. It also does not change the definition of the Engineer of Record with respect to the activities of the specialty groups. For further information on Professional Engineering responsibilities and/or liability, please refer to CDOT Procedural Directive 508.1 – Professional Engineer’s Stamp.

DEFINITIONS

To begin, it is important that everyone have a basic understanding of the core elements of Project Management, as represented with the following terms and definitions:

PROJECT

A project is a temporary and one-time endeavor undertaken to create a unique product or service, which brings about beneficial change or added value. A project consists of a carefully defined set of activities that uses resources (money, people, materials, energy, space, etc.) to meet its pre-defined objectives. The label of “temporary and one-time endeavor” contrasts with the processes which are semi-permanent or permanent ongoing functional work which creates the same product, service or result over and over. The management of these two systems is often very different and requires varying technical skills and philosophy, hence requiring the application and practice of Project Management.

PROJECT MANAGEMENT

Project Management is the discipline of organizing and managing resources in a way that facilitates the successful project delivery within defined scope, quality, time and cost constraints. At CDOT, Project Management responsibilities will be applied in three phases:

- a) Phase I: Pre-Project Budget
- b) Phase II: Design
- c) Phase III: Construction

A project which is effectively managed has a clearly defined scope and strategy which is well executed, monitored and controlled. In the end, the results meet the anticipations and expectations of the stakeholders.

PROJECT SCHEDULING

Project Scheduling is the task of defining relationships between work activities having duration, events without duration that indicate a significant completion, and milestones that represent major achievements or decision points in a project. Scheduling is an inexact process in that it tries to predict the future. While

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DEFINITIONS (cont.)

It may not be possible to predict with certainty the duration of a project, there are techniques that can increase the accuracy of a reasonable timeline estimate. Project schedules are most effective when the project activities are well-defined and appropriately linked.

WORK BREAKDOWN STRUCTURE (WBS)

Within the Project Schedule, the WBS defines and organizes the scope of a project in a hierarchical structure. The hierarchical structure of a WBS includes a list of project activities which are critical to the scheduling, estimating and budgeting processes of Project Management. In order to be included in the WBS, project activities must meet the following criteria:

- 1) Must have a definable beginning and end,
- 2) Must have a finite duration, with at least one start and one end date,
- 3) Must have an associated level of effort,
- 4) Must have a state of completion that can be estimated and
- 5) Must have a reviewable deliverable at completion of the task/subtask

PROJECT ACTIVITIES AND RELATIONSHIPS

Project activities are the most detailed element of a project schedule and address the following:

- 1) Who is going to do the work?
- 2) When is the work going to be done and how much time will the work require?
- 3) How much is the work going to cost?
- 4) How is the work going to be accomplished?

Relationships of project activities must be established within the project schedule so that an order of completion and dependencies on one another are clearly represented.

PROJECT MANAGER

The Project Manager for any given project is responsible for the following:

- 1) Ensuring that all of the work is being completed on time, within budget and scope, and at the correct performance level.
- 2) Coordinating staff assignments to ensure work is done in a manner which meets the objectives of the project.

It is recommended that the Project Manager not be assigned to perform the engineering or technical work of a project. Technical work should be the assignment of a project's technical staff. This differentiation is pointed out because when conflicts arise, the technical work typically takes priority and management of the work becomes secondary.

For the purpose of this resource document, a project's technical staff shall refer to those assigned the oversight and/or direct application of engineering principles to a project. Where applicable, a licensed engineer in this capacity shall assume all appropriate professional liability associated with the exercising of engineering decisions. For further information on Professional Engineering responsibilities and/or liability, please refer to CDOT Procedural Directive 508.1 – Professional Engineer's Stamp.

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DEFINITIONS (cont.)

RESIDENT ENGINEER

For the purpose of this resource, the Resident Engineer refers to the supervisor of an engineering staff assigned the task of applying technical expertise to a project from scoping through construction. It is recommended that the Resident Engineer serve as the Project Manager for projects under their direct supervision and be responsible for the successful coordination, oversight and completion of all Project Management-related activities detailed within these guidelines. The Resident Engineer may delegate Project Management activities and tasks, as deemed appropriate, but should retain the appointment as Project Manager and responsibility for their successful completion. The appointment of Project Management responsibilities to any particular person does not transfer license liability which otherwise resides with licensed Professional Engineers involved on a project, i.e. lead designer, construction project engineer, etc. For further information on Professional Engineering responsibilities and/or liability, please refer to CDOT Procedural Directive 508.1 – Professional Engineer’s Stamp.

STEPS OF GOOD PROJECT MANAGEMENT

Successful project management relies on the following work processes:

- 1) **INITIATE** – Define what is to be done to meet the requirements of the project; Authorize the work on the project; Establish the project team; Define the authority, responsibility, and accountability of the project team; Establish the scope of the project; Communicate with all project team members and Region management personnel, as appropriate; Consider a Team Charter for complicated projects.
- 2) **PLAN** – Define what must be done and by whom, how will it be done, when must it be done, how much will it cost and what will be done with it; Establish contingency plans.
- 3) **EXECUTE** – Commence performance of the technical work and implementation of the project plan.
- 4) **MONITOR AND CONTROL** – Assess the quantity and quality of the work; Comparing where the project is to where it is supposed to be; Taking action to correct for any deviations in the project plan; Perform iterations of Steps 1, 2 and 3, as needed.
- 5) **CLOSE** – Identifying lessons learned; Identify pitfalls for future projects; Celebrate your accomplishments.

PITFALLS

By acknowledging lessons learned from others, our transition to a more Project Management-oriented organization can occur more smoothly. Examples of Pitfalls include the following:

- a) You cannot control your project if you do not have a plan.
- b) Involve the people who must do the work in the development of the plan.
- c) Be prepared to revise the plan – the plan WILL change!
- d) Do not attempt to serve as a single point of knowledge for the project.
- e) Disseminate information...nobody ever complains that they are being told too much, but they usually resent being told too little.
- f) Identifying and documenting risks is like putting up lighthouses...fewer shipwrecks.

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DEFINITIONS (cont.)

BASELINE SCHEDULE

This schedule details anticipated project activities, durations and resource allocations and is developed prior to the commencement of any project activities. At the point of acceptance by all project participants, a finalized version of the baseline schedule is saved by the Project Manager and remains unchanged throughout the duration of the project.

WORKING SCHEDULE

This schedule details actual project activities, durations and resource allocations. This schedule is updated regularly by the Project Manager and reflects actual progress of work activities throughout the duration of the project. At any time, a comparison may be made between the working and baseline schedules to assess the progress of a project. The Project Manager should perform a comparison, at least monthly, to assist with the identification and management of unanticipated obstacles.

WORK-HOUR ESTIMATE

This estimate details the personnel work-hours projected to complete the project activities reflected in the project schedule. When labor rates are applied, the Work-Hour Estimate represents a significant portion of the Project Estimate. The Work-Hour estimate is required on all projects prior to the obligation of project funds. On projects with consultant contracts, the Work-Hour Estimate along with the Scope of Work should serve as the basis for the negotiation of final work-hours.

PROJECT ESTIMATE

The Project Estimate is the summary of total costs for a project. This estimate is often broken out into ROW, Utilities, Design, Environmental and Miscellaneous (RUDEM) phases. Additionally, the Project Estimate will include projected costs for Construction of the project. Reasonably accurate Project Estimates are important, as budgets and project limits are often established from them.

DRAWDOWN SCHEDULE

This schedule details the expenditure projections for a given total project budget. The schedule reflects anticipated expenditure to occur over a 12-month period. This schedule may be completed using either a linear distribution (total project budget divided by # of months to complete the total project) or a weighted distribution which reflects the completion of high-cost project elements within the actual project schedule. In order to be most useful, the drawdown schedule must include expenditure projections for each phase of the project, ie. ROW, Utilities, Design, Environmental and Miscellaneous (RUDEM) and Construction.

ADVERTISEMENT DATES

The Advertisement Date is the milestone where construction funds are authorized and obligated for the project. This date also serves as the commencement of the period when a project is open for job showings and acceptance of bid proposals. CDOT recognizes three types of Advertisement or “Ad” dates, for use in project schedules. These “Ad” dates are recognized in CDOT’s business application system (SAP):

- a) Initial Planned Ad date - This is the Ad date that each region puts forth prior to July 1st of every year for the upcoming fiscal year’s projects going to bid. This date is entered into SAP by the Region Business Manager.
- b) Current Planned Ad date - This is the Ad date which is current and officially agreed to by the RTD. The Current Planned Ad date will match the Initial Planned Ad date until such time during the course of the fiscal year that the RTD has concurred with the necessity to change.

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Changes to the Current Planned Ad date are entered into SAP by the Region Business Manager.

- c) Scheduled Ad date. This is a working Ad date generated by the CPM scheduling software based on the most current scheduling information. This Ad date primarily serves as a barometer of progress in the total project. When indicated by a Scheduled Ad date which exceeds the Current Planned Ad date, the Project Manager will conduct a further assessment of the project and give consideration to a revision to the Current Planned Ad date (including consulting with the appropriate Region and project personnel).

PHASE I: PRE-PROJECT BUDGET PHASE

Before a project can be budgeted, a good schedule and project estimate (phased, as appropriate) are required. This assures that the Resident Engineer, Specialty Units, Region Business Office and Region Management all have the same understanding of the project scope and the anticipated costs to move the project through the project development process. In order to accomplish this in a proficient and satisfactory manner, the following tasks must be completed:

- 1) **Preliminary project scoping activities for a given fiscal year will be conducted prior to May 1st of each prior fiscal year.** This allows for budgets and ad dates to be entered into the system by the May 1st deadline.
- 2) **Region scoping pools will be established by each Region.** In order to address costs associated with these pre-budget activities, each Region will need to set up scoping pools. To help with the tracking of the pool costs, pools could be set up for specific regional programs, (i.e. scoping pools for resurfacing, bridge, and regional priority and safety projects.) Charges incurred in the pre-budget phase of project development will be charged to the appropriate scoping pool. By using a pay back methodology, a Region will only have to set up a pool once with an initial amount of funds.
 - a) Design/Build projects will be set up as projects. These types of projects may have unique requirements for budgeting so Project Managers should consult the Innovative Program Delivery Guidelines for specific information on project setup requirements.
- 3) **The Resident Engineer is responsible for a draft baseline schedule that identifies key project milestones and related activities.** The purpose of this schedule is to:
 - a) Identify and specify actual activities in the schedule to ensure adequate planning of the work has been achieved, as well as to permit accurate monitoring and evaluation of the project's progress.
 - b) Identify the need for CDOT and/or consultant personnel resources.
 - c) Identify activities that are critical in ensuring the timely achievement of project deadlines.
 - d) Identify associated dates with respect to the deliverables of other project specialty groups.
 - e) Identify specific deadlines from CDOT Management or Region work plans.
 - f) It must consider critical processes such as STIP/TIP/Long Range Plan amendments and project budgeting.
 - g) Identify specific milestones to allow Region management to easily track project progress.

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PHASE I: PRE-PROJECT BUDGET PHASE (cont.)

As a minimum, project milestones will include the following (order may vary):

- Completed Survey
- Prelim. Horiz. and Vert. Alignments
- Prelim. Hydraulic Information
- Structure Selection Report
- Field Inspection Review (FIR)
- Utility Clearance
- Final PS&E
- Form 128 Signature (Top Portion)
- Final ROW Plans
- Final Office Review (FOR)
- Environmental Clearance
- Right of Way Clearance
- Shelf Date
- Advertisement Date

Additional milestones may be added, as needed, based on the complexity of individual projects. For projects involving consultants, the project schedule should include milestones and activities related to the contracting/task order process, ie. SOW, SOI, RFP, Short List, Interviews, Consultant Selection and Notice to Proceed. Where applicable, the project schedule should also include appropriate milestones and activities related to the administration of IGA's.

- 4) **The Resident Engineer will be responsible for the development of a preliminary work-hour estimate for the project.** This work-hour estimate will be required on all projects, regardless of personnel involved (State or consultant) and shall represent reasonable work-hours needed to complete all project activities. On projects which involve consultant contracts, the work-hour estimates shall be done independently of any consultant-provided estimate and shall serve as a resource in work-hour negotiations.
- 5) **The Resident Engineer will provide a copy of the baseline schedule and preliminary work-hour estimate to all internal specialty units at least two weeks prior to the project Scoping Review Meeting.** The CDOT specialty unit manager will be notified by the RE of project scoping activities on all projects. For both in-house and consultant design projects, the CDOT specialty unit manager, or designee, will participate in the scoping activities when the project involves their discipline or when requested by the RE. The CDOT specialty unit manager will review the project in advance and prepare any information that may be needed for the scoping meeting, ie the structural engineer would review and present existing bridge information on projects involving structures.
- 6) **The CDOT specialty unit manager will review the RE's baseline schedule on both in-house and consultant design projects and recommend changes as needed to accommodate the project work activities identified for the subject discipline.** The specialty unit manager may recommend additions to the minimum milestones as needed for the specific needs of the project. For example, on a retaining wall project that requires extensive geotechnical work that will be in the critical path, additional milestones pertaining to this work may be recommended. The CDOT specialty unit manager will participate in the development of the consultant scope-of-work and write the portions pertaining to their discipline as needed or assigned by the RE. The specialty unit manager will provide review and comments to the RE on the final draft of the consultant scope-of-work.
- 7) **The CDOT specialty unit manager will provide the RE with an independent work-hour estimate to accomplish the specialty project work.** Critical assumptions on which the estimate is based will be included in the submittal. The specialty unit manager will attend work-hour negotiation meetings, or provide consultation, as requested by the RE or Agreements on consultant design projects. Project schedule review comments and work-hour estimates may be prepared the CDOT

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PHASE I: PRE-PROJECT BUDGET PHASE (cont.)

specialty unit manager's designee, but will be reviewed and submitted to the RE by the specialty unit manager.

- 8) **The Resident Engineer will be responsible for coordinating the project Scoping Review Meeting.** This meeting shall include representatives from all appropriate specialties. The purpose of this meeting will be to discuss the scope of the proposed project and to identify appropriate project Work Breakdown Structure (WBS) elements, work activities, durations and relationships, as well as to thoroughly assess the draft baseline schedule and preliminary work-hour estimate. The Resident Engineer and the other specialties will consider current work load factors and future projects that may have an impact on their work activities and durations. Feedback obtained from the Scoping Review Meeting will be used by the Resident Engineer and accurately reflected in the draft baseline schedule and preliminary work-hour estimate. Refer to the *Project Development Manual* for specific details on the Scoping Review Meeting.
- 9) **The Resident Engineer will provide the revised draft baseline schedule and work-hour estimate to all key specialties (Bridge, ROW, Environmental, Traffic, Materials, etc.) for final resolution of any potential conflicts of logic or deliverables.** Upon this review, any changes will be incorporated by the Resident Engineer.
- 10) **A Region Management team (as a minimum, the Program Engineer, ROW Manager and Environmental Manager and Resident Engineer) will review and approve the draft baseline schedule and preliminary work-hour estimate, including milestone dates, critical path activities and specific deliverables.** The Ad date reflected in the schedule will be addressed at this time and, if agreed to, will be accepted as the project Initial Planned Ad date for use in the project set-up.
- 11) **Upon review by the Region Management team, the Resident Engineer will make any necessary modifications to the draft baseline schedule and preliminary work-hour estimate.** These modifications will be the last changes to either document. The Resident Engineer will save and refer to these files as the final baseline schedule and final work-hour estimate. These final documents shall not be altered at any time during the remainder of the project.
- 12) **The Resident Engineer will develop a preliminary cost estimate for the project, including estimates for each phase of the project (Right of Way, Utilities, Design, Environmental, Miscellaneous and Construction).** The Resident Engineer should consider the phase and respective personnel resources (in-house or consultant). The phased estimates will include any respective consultant services for the project.
- 13) **The CDOT specialty unit manager will participate in the development of the consultant scope-of-work and write the portions pertaining to their discipline as needed or assigned by the RE.** The specialty unit manager will provide review and comments to the RE on the final draft of the consultant scope-of-work. Alternatively, the specialty unit manager may provide the RE with a separate consultant scope of work and preliminary cost estimate for consultant services that the specialty unit manager may choose to directly contract for.
- 14) **The CDOT Specialty Unit manager will provide the Resident Engineer with a cost estimate for each phase of the project, as appropriate, to accomplish the specialty project work.** Construction, right of way, and utility cost estimates will be rough at this phase of the project. The

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PHASE I: PRE-PROJECT BUDGET PHASE (cont.)

Specialty Unit managers will be responsible for updating these cost estimates and keeping the Resident Engineer informed of significant changes throughout the project design.

- 15) **The Resident Engineer will review the preliminary cost estimate with the Program Engineer and make revisions, where appropriate.** Any revisions made to the cost estimate must be reviewed with affected specialty units prior to finalizing.
- 16) **The Resident Engineer will provide the Initial Planned Ad date and project cost estimate to the RTD and Region Business office.** This will be done by July 1 of each year for all planned projects. The Region Business Office will use this project information for entry into CDOT's business management system (SAP).
- 17) **The Resident Engineer will develop a closure document that will include the final baseline schedule and work-hour estimate, along with documented assumptions and risks associated with the project scope and schedule and any other relevant information used in developing the project schedule.** This document will be kept in the project files with copies provided to the RTD, Program Engineer, and appropriate Specialty Unit managers.

PHASE II: DESIGN

Upon obligation of the project funds, project activities may commence and charges assessed against their appropriate project phase. During this phase, the following tasks will be completed:

- 1) **The Resident Engineer will be responsible for meeting the Current Planned Ad date of a project.** As the Project Manager, the Resident Engineer will be responsible for the management of unexpected changes to the schedule, including those that could affect Specialties Units and the overall project delivery by the approved Current Planned Ad date.
- 2) **The Resident Engineer will maintain good communications with the Specialty Units involved on the project.** Person to person communication (telephone or face to face) is the preferred method for discussing project issues, especially those which could affect the overall project schedule. Conversations must be followed up with email or other written documentation, as record of the discussion and any decisions or commitments made.
- 3) **The Resident Engineer will coordinate revisions to the project cost estimate, as necessary, at all major project milestones (Field Inspection Review, Final Office Review, etc.) in order to assess unforeseen budgetary needs.** Specialty Units will provide updated cost estimates, as requested. In addition, the Resident Engineer will ensure that the Cost Estimates Unit is provided current project cost estimates for review and assessment.
- 4) **The Resident Engineer will submit any changes in the project scope or budget to the Region Program Engineer for approval.** When a change in project scope and/or budget is determined, the Resident Engineer must inform all members of the project team of the change(s). Changes that affect the budget or STIP/TIP/Long Range Plan must be considered, including the time required for budget actions and/or STIP/TIP/Long Range Plan amendments. If the changes require a new budget request and/or STIP/TIP/Long Range Plan amendments, the Resident Engineer will reflect these impacts in the project's working schedule.

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PHASE II: DESIGN (cont.)

The Resident Engineer will be responsible for discussing any potential changes to the Current Planned Ad date with the appropriate Region Program Engineer, the Region Business Manager and the Region Transportation Director. Communication with these individuals needs to occur as soon as the Resident Engineer is aware of the contributing issues. The Resident Engineer will document the reasons for the requested Current Planned Ad date change and communicate these details to all affected staff and Specialty Units associated with the project.

- 5) **The Region Business Manager will communicate the final decision, regarding approval or rejection to a change in the Current Planned Ad date, to the Chief Engineer, OFMB, and the Contracts and Agreements unit for tracking purposes.** The Resident Engineer will provide a document summarizing the issues which support the schedule change. The issues will be reflected through changes to the project working schedule so that their progress may be monitored.
- 6) **The Resident Engineer will update the working schedule monthly to reflect accurate progress in the project activities.** Changes to the working schedule which affect common milestones or the Current Planned Ad date will not be made by any Specialty Unit without prior discussion with and approval by the Resident Engineer. This monthly update should reflect all information current at the time of any Region Plan Status or Financial Planning Meetings, as detailed below:

REGION PLAN STATUS MEETING

- a) Each Region will hold a Region Plan Status Meeting which will serve to facilitate information exchange and to assess the status of both design and construction projects. These meetings must be held at a minimum of every two months, but can be held more frequently at the discretion of each region. These meetings do not take the place of individual Project Status meetings that are often held more frequently and involve more technical detail and assessment.
- b) The Region Plan Status Meeting should be facilitated by the Region's Program Engineers and will review the progress of projects in each Program area. The focus of these meeting should be more on critical project details. At a minimum, the following individuals are recommended to attend the Region Plan Status Meetings:
 - i. All Program Engineers
 - ii. Resident Engineer
 - iii. Environmental
 - iv. Right of Way/ Survey
 - v. Utilities
 - vi. Bridge
 - vii. Hydraulics
 - viii. Traffic
 - ix. Business Office
 - x. Materials
 - xi. Maintenance
- c) All Program Engineers should attend the entire Region Plan Status Meeting in order to better understand the Region's activities and to make better resource decisions based on the needs of the full region.

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PHASE II: DESIGN (cont.)

- d) Region Plan Status Meetings can be conducted with scheduled time slots for each Resident Engineer or with all Resident Engineers from a respective Program Area, as determined appropriate by the Program Engineers.
- e) In order to provide meaningful information at these meetings, a Project Status Report is recommended to be completed by each Resident Engineer and made available for the Region Plan Status Meeting. With the following information, this report will allow for a thorough review of each project managed within the residencies:
 - i. Current Project Budget
 - ii. Dates of Scheduled Project Milestones
 - iii. Dates of Actual Project Milestones
 - iv. Initial Planned, Current Planned and Scheduled Ad Dates

Discussions at the Region Plan Status Meetings should center on issues that affect the project schedule, have fiscal impacts, involve issues of risk or require a change in the allocation of resources.

- f) Prior to these meetings, the Resident Engineer and Specialty Units should discuss the status of their projects with their staff. The Resident Engineer and Specialty Units should come to these meetings prepared to discuss the latest project information. Updated working schedules and work-hour estimates should be available for each project.
- g) Specialty unit schedules, work-hour estimates, and project cost estimates will be updated as necessary by specialty unit managers. The preliminary estimates provided in Phase I will be based on the best information available at the time. Although provisions for change, and identification of assumptions, should be a part of the original estimates, the estimates will be reviewed for modification as the project progresses. The Specialty Unit managers will keep the Resident Engineer informed of any activities or decisions that may affect these estimates for the specialty portion of the project work
- h) The Region Plan Status Meeting discussions with the specialty units should allow the Resident Engineers an opportunity to update milestone dates, activity durations, etc. as required. All changes will be updated in the working schedule and will be communicated to the project team and Program Engineer, as they are made.
- i) Involvement of the Program Engineer will be necessary if specialty unit resources need to be adjusted to meet project milestones. In some cases, all of the Region Program Engineers and affected Specialty Unit managers will need to meet and discuss resources to ensure that key region priorities are properly addressed.

FINANCIAL PLANNING MEETINGS

- a) Separate meetings are recommended for the purpose of discussing project financial and planning issues. The purpose of having a separate meeting is that these issues often are of Regional significance and do not require the participation of Specialty Unit staff. These meetings are also recommended to be held monthly because of the constantly changing financial picture.

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PHASE II: DESIGN (cont.)

- b) At a minimum, the following individuals should attend the Financial/Planning meetings:
 - i. Program Engineers
 - ii. Region Business Managers
 - iii. Region Planning Staff
 - iv. RTD (when needed)
- 7) **The Resident Engineer is responsible for the completion of a monthly Drawdown Schedule detailing the project expenditures over a twelve (12) month span for Pre-Construction projects/activities and over the contract duration for Construction projects/activities.** Drawdown Schedules will distribute the expenditures in a fashion which represents the peaks and valleys of project activities and related costs. The Drawdown Schedule should present expenditure distribution in the following phases of every project, as appropriate:
 - a) Right of Way
 - b) Utilities
 - c) Design (include IGA's, Access and Permits, etc)
 - d) Environmental
 - e) Miscellaneous
 - f) Construction (based on a preliminary construction estimate)

Key issues that should be considered when developing Drawdown Schedules include:

- a) Work by staff or consultant
 - b) Public process required
 - c) Plan or environmental review
 - d) Consultants billing cycle
- 8) **On consultant Design Projects, the Resident Engineer will ensure that contracts include the requirement for the consultant to submit updated Drawdown Schedules once a month with each billing.** This task also implies that the Resident Engineer will ensure Drawdown Schedules are received, reviewed and accepted prior to invoice approval and payment.
 - 9) **The Resident Engineer will be responsible for developing and maintaining an all-inclusive master Drawdown Schedule for his/her respective residency.** This master Drawdown Schedule will contain expenditure projections for all in-house design projects, consultant design projects and construction projects.
 - 10) **The Resident Engineer will be responsible for entering updated Drawdown Schedule information into CDOT's business management system (SAP) on a monthly basis.**

PHASE III: CONSTRUCTION

Upon entering the construction phase, a project will continue to require adequate project management until completion of the work activities and acceptance of the project. The following activities are expected to be completed:

- 1) **The Resident Engineer will discuss the status of Construction projects as a part of the Region Plan Status Meetings.**

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PHASE III: CONSTRUCTION (cont.)

- 2) **The Resident Engineer will prepare a status report for each Construction project on a monthly basis.** This report may be similar to the existing Form 110 Report. At a minimum, the report will include contract time remaining, percent of work completed and budget information. The purpose of this review will be to discuss contractor progress and specialty unit concerns with these projects. This review will also allow for an evaluation of the project's budget, as well as provide an opportunity for the Region Business Office to receive notification of additional funding needs so that the process to secure funds may commence.
- 3) **The Construction Project Engineer will be responsible for obtaining a monthly Project Payment Schedule from the project Contractor.** Per CDOT Specifications, the Contractor is required to submit this schedule on a monthly basis prior to processing of the monthly pay estimate. The Project Engineer will review the Payment Schedule for compliance with the project specifications.
- 4) **The Resident Engineer is responsible for ensuring construction project Drawdown Schedules are entered into CDOT business management system (SAP) and updated on a monthly basis.** Key issues that should be considered with a Construction Drawdown Schedule include:
 - a. Ordered/stockpiled materials
 - b. Contract award versus actual start date
 - c. All salient features and anticipated construction production rates
 - d. Seasonal activities
 - e. High- vs. low-cost items of work