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Guidelines for Preparation of CPM Schedule Volume I

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1. INTRODUCTION

1.1. Purpose and Scope

This document is intended to provide guidance to the Architect/Engineer (A/E) in the development of the Integrated Project Master Schedule (IPMS) and Detailed Design Schedule during the design phase of Medical Center Major New Facilities, Additions and Renovations projects by the United States Veterans Affairs (VA). The VA oversees complex projects throughout the country which require careful planning and execution during the evolution of the projects.

The purpose of the Integrated Project Master Schedule (IPMS) is to determine the number of days that is reasonable to complete the design, construction and activation phases of the project. It also provides a useful road map that can be used by the A/E and the project team to assist them in completing the project successfully.

The IPMS is intended to be a dynamic tool for project control and Earned Value Management (EVM), developed by the A/E with input from all parties involved including the Office of Construction and Facilities Management (CFM) Project Manager, the Department of Veterans Affairs Medical Center (VAMC) Director and Facility Engineer, Veterans' Integrated Service Network (VISN) Capital Asset Manager, VA CAMPS Office, the Office of Strategic Management and Contracting Officer and Peer Reviewers. The IPMS may be used as a reference by the Construction staff as it also encompasses high level activities in the procurement, construction and activation phases.

The VA executes projects using three project delivery methods: Design-Bid-Build, Design-Build and Integrated Design-Build. In Design-Bid-Build, the VA awards a single construction contract to a General Contractor after the design is complete. In Design-Build, the A/E and the Contractor are brought together as a single point of delivery/management. In Integrated Design-Build, the VA contracts a Construction Manager (CM) early to participate in parallel with the A/E in pre-construction activities and manage the overall program from design through activation.

The level of detail of the IPMS that the A/E has to produce during a VAMC project is contingent on the project delivery method. This guideline is written primarily for the Design-Bid-Build Project Delivery System. It could also be applicable to the Integrated Project Delivery System.

It is recognized that several scheduling methods exist and these methods may produce fully acceptable results. It is not the intent of this document to discredit other methods or to discourage creativity and flexibility. Rather, it is the intent of this document to provide

the A/E with a set of approaches, techniques and methods that have been proven over time as acceptable.

It is also recognized that these guidelines cannot cover every situation one may encounter when creating schedules, reviewing schedules or analyzing changes or delays. These guidelines may serve as a starting point for analyzing these unique situations.

This document is solely intended as a guide, it is not intended to dictate means and methods. The A/E is responsible to develop the means and methods and correlate with the VA requirements.

1.2. Applicable Documents

A baseline set of governing documents to be applied on developing the CPM Scheduling Guideline is listed in the following table (Table 1).

Document Title	Document Location
PG 18-15 A/E Submission Requirements for VA Medical Center Major New Facilities, Additions and Renovations.	http://www.cfm.va.gov/contract/ae/aesubmaj/
Design Manual for CPM Schedule & Risk Management for Architect/Engineers (A/E), Department of Veterans Affairs. December 2012.	http://www.cfm.va.gov/til/dManual/
Architectural and Engineering CPM schedules. Section 01 32 16.01.	http://www.cfm.va.gov/til/spec/
A Guide to the Project Management Body of Knowledge (PMBOK@ Guide).	Refer to http://www.pmi.org/
The Associated General Contractors of America, Construction Planning and Scheduling (2nd Edition).	
PMI Practice Standard for Scheduling.	Refer to http://www.pmi.org/

Table 1

1.3. Definitions and Abbreviations

Activity or Event: A discrete, identifiable task or event that takes time, has a definable start and stop date, furthers the work's progress, and can be used to plan, schedule and monitor a project.

Activity, Controlling: The first incomplete activity on the critical path (Also referred to as the controlling operation).

Activity, Critical: Any activity on the critical path.

Activity ID: A unique, alphanumeric, identification code assigned to an activity.

Activity Network Diagram: (Also called a pure-logic diagram) A graphic representation of a CPM schedule that shows the relationships among activities.

A/E: Architect/Engineer.

Bar Chart: (Also called a Gantt chart) A graphical representation of a schedule without relationships. A timescale appears along the horizontal axis.

Calendar Day: A day on the calendar, beginning and ending at midnight.

Completion Date, Contract: The original date specified in the contract for completion of the project or a revised date resulting from authorized time extensions. The contract may also specify completion dates for interim milestones, phases, or other portions of the project.

Completion Date, Scheduled: The completion date projected or forecasted by the schedule. The schedule may also project or forecast interim completion dates for milestones, phases, or other portions of the project.

Constraint: A restriction imposed on the start or finish dates of an activity that modifies or overrides the activity's logic relationships.

Critical Path: The Longest Path through the project network that determines the project duration.

Critical Path Method (CPM): A network analysis technique used to predict duration by analyzing which sequence of activities (which path) has the least

amount of scheduling flexibility (least amount of float). Early dates are calculated by means of a forward pass using a specified start date. Late dates are calculated by means of a backward pass starting from a specified completion date (usually the forward pass's calculated project early finish date).

Data Date: The first day in the initial or baseline schedule and the first day for performance of the work remaining in the Monthly Schedule Update or Revised Schedule. (May also by defined as the date from which a schedule is calculated).

Duration, Original: The estimated time, expressed in workdays, needed to perform an activity.

Duration, Remaining: The estimated time, expressed in workdays, needed to complete an activity.

Float, Free: The amount of time an activity can be delayed and not delay its successor(s).

Float, Total: The amount of time an activity can be delayed and not delay the project completion date.

Fragnet A breakdown of an activity into a number of smaller activities that provide greater detail for the planning, scheduling, monitoring, and controlling the larger activity.

Holidays: Holidays observed by the United States Government are:

- 1st day in January (New Year's Day)
- 3rd Monday in January (Martin Luther King, Jr. Day)
- 3rd Monday in February (President's Day)
- Last Monday in May (Memorial Day)
- 4th day in July (Independence Day)
- 1st Monday in September (Labor Day)
- 2nd week in October (Columbus Day)
- 11th Day in November (Veterans Day)
- 4th Thursday in November (Thanksgiving Day)
- 25th Day in December (Christmas Day)

For holidays that fall on a Saturday, both the Saturday and preceding Friday are considered to be holidays. For holidays that fall on a Sunday, both the Sunday and following Monday are

considered to be a holiday.

Longest Path: The longest continuous sequence of activities that establishes the scheduled completion date.

Milestone: An activity/event, with no duration, that is typically used to represent the beginning or end of the project or its interim stages.

Narrative Report: A descriptive report submitted with each schedule. The required contents of this report are set forth in a scheduling specification.

Open End: The condition that exists when an activity has either no predecessor or no successor, or when an activity's only predecessor relationship is a finish-to-finish relationship or only successor relationship is a start-to-start relationship.

Predecessor: An activity that is defined by schedule logic to precede another activity. A predecessor may control the start or finish date of its successor.

Relationship: The interdependence among activities. Relationships link an activity to its predecessors and successors. (A schedule's relationships are sometimes referred to as the logic of the schedule. Examples of relationships are: finish-to-start, start-to-start, and finish-to-finish).

Relationships between Activities:

a. Finish to Start - The successor activity can begin only when the predecessor completes.
b. Finish to Finish - The finish of the successor activity depends on the finish of the predecessor.
c. Start to Start - The start of the successor activity depends on the start of the predecessor.
d. Start to Finish - The successor activity cannot finish until the current activity starts.

Schedule: A group of activities interconnected by relationships to depict the plan for execution of a project, usually shown by calendar dates.

Schedule, Baseline: The accepted schedule showing the original plan to complete the entire project. (Sometimes known as the as-planned schedule).

Successor: An activity that is defined by schedule logic to succeed another activity. The start or finish date of a successor may be controlled

by its predecessor.

TIL: VA Technical Information Library.

Work Breakdown Structure (WBS): A deliverable-oriented grouping of project elements, which organizes and defines the total scope of a project. Each descending level represents an increasingly detailed definition of a project component. A logical breakdown of project hierarchy or structure.

Working Schedule: A schedule utilized for duration of a project for creation of the baseline schedule and updates.

Work Package: A deliverable at the lowest level of the work breakdown structure. Work package contains activities.

2. SCHEDULING METHOD

2.1. Introduction

Scheduling methods provide the framework within which schedule models are developed. Critical Path Method (CPM) is the VA's chosen methodology for developing project schedules.

In accordance with PG 18-15, the Architect/Engineer (A/E) shall furnish and maintain an Integrated Project Master Schedule (IPMS) utilizing a computer based network analysis scheduling software. The IPMS shall be prepared using the precedence diagramming method (PDM) and shall depict the major phases of the project. The IPMS will provide a summary level schedule for the Procurement, Construction, and Activation phases of the project. The A/E will expand the level of detail for the Design Phase to show in detail how the A/E plans to execute the design.

The A/E shall develop a logic-based network of design activities with empirically derived durations for execution in a realistic and practical manner, in order to establish a meaningful critical path. There must not be any open ends other than the project start and finish milestones. Constraints must be restricted to those that represent external or internal conditions that cannot be feasibly accomplished with activity logic.

The A/E shall also identify and assign resources to the design schedule activities.

2.2. Scheduling Software

The A/E shall propose to the VA, a scheduling tool that is capable of assembling the schedule model and providing the means of adjusting various parameters and components that are typical in a modeling process. It shall be capable of producing the reports required by the VA contract documents. The proposed scheduling tool shall have the capability to:

- Select the type of relationship (such as finish-to-start or finish-to-finish)
- Add lags between activities (applied only on an exception basis)
- Apply resources and use that information along with resource availability to adjust the scheduling of activities
- Add start and finish constraints
- Capture a specific schedule as a baseline or target schedule
- Compare the most recent schedule against the previous one or against a target or baseline to identify and quantify trends or variances
- Define longest path activities

2.3. Assumptions

During development of the IPMS, the A/E shall identify any necessary assumptions and document those assumptions properly. Typical assumptions for a VAMC project may include:

- Normal workday involves an 8-hour shift, Monday through Friday excluding major holidays.
- Allow 45 Calendar Days after receipt of NTP for the A/E to submit a complete CPM Schedule.
- Value Engineering occurs at the end of submission milestones.
- The final CPM schedule in its original form shall contain no contract modifications or changes which may have been incurred during the final CPM schedule development period and shall reflect the entire contract duration as defined in the bid documents.
- All permits will be obtained prior to the Notice-To-Proceed.
- The VA Medical Center will provide input during each phase of the design.
- No single design activity shall exceed 20 work days, except for which the Project Manager and/or the Contracting Officer may approve the showing of a longer duration.
- The A/E will adequately plan his/her work according to the sequence of design provided in the contract documents and prosecute the work in a continuous fashion.

2.4. Scheduling Best Practices

In developing a schedule, at a minimum, the A/E shall adapt the following best practices:

- Clearly define activities supported by specific quantity and scope.
- Provide good logic based on realistic sequence of work agreed by A/E team.
- Do not use negative lags. (See VA NAS Specification).
- Do not use a finish to start relationship with a lag. Instead, an activity must be added to represent actual scope of work.
- A project shall have one beginning and one end except for multiple phased projects. All activities shall have a predecessor and successor except the project's start and finish milestones. No "open ends" will be permitted.
- Durations of work activities shall not exceed the update cycle (20 work days). Longer durations may be used provided there is quantitative means for measuring progress.

- If an activity is a start-to-start relationship- it shall be closed with a finish-to-finish or finish-to-start relationship (No open ends).
- All intermediate milestones (interim completion dates) required for the project shall be shown in the proper logical sequence and input as either the "start-no-earlier-than" or "finish-no-later-than" date. Use of mandatory starts and mandatory finishes is discouraged.

2.5. Risk Analysis

The A/E shall conduct the schedule risk analysis (SRA) based on the detailed design activities, identifying major schedule risk areas and recommended risk mitigation plans.

The risk analysis shall be conducted by a person or firm skilled in developing schedule risk analysis based on the (PDM) CPM schedule techniques for major projects, preferably in the major health care related projects. The cost of this service shall be included in the A/E's proposal.

The Contracting Officer has the right to approve or disapprove the person or firm designated to perform the risk analysis. The risk analysis exercise shall be performed or updated during each design phase as defined in VA PG 18-15 or as directed by the VA Contracting Officer.

According to VA PG 18-15, the A/E shall provide for the VA review and comment, the Risk Management Plan (risk register, recommendations for addressing major risks, mitigation plans, and other related documents) included in the Manual for Preparation of Risk Management Plan for Medical Center Project which is a supplement to this guideline.

As depicted in Table 2 of the RMP, the schedule risk analysis is required over a period of time throughout the different phases (Pre-Design, Schematic Design, Design Development and Construction Documents) of the project.

2.6. Deliverables

VA PG 18-15 requires multiple submissions of the CPM schedule over a period of time that evolves throughout the project. These deliverables are in addition to the monthly schedule updates that the A/E shall submit in accordance with the VA A/E scheduling specification section 01 32 16.01. The below table identifies the phases and the level of detail in which the A/E shall submit the CPM schedules for the VA review and comment:

Design Phase	IPMS Deliverable
Pre-Design	• Anticipated Integrated Project Master Schedule (IPMS) including anticipated duration of each phase of design and construction. • Narrative establishing users' vision, goals, and desired image. • Qualifications for analysis and CPM consultants for approval by VA. • Project risk analysis including Recommendations for mitigation of major risks. • Concise narrative describing integration of existing and new work.
Schematic Design (SD-1)	• Cost loaded Project Master Schedule that identifies major design activities, procurement phase activities and construction phasing sequence with major milestones, and VAMC overlapping activation phase. • Cost Loaded Detailed design schedule identifying major activities, submissions, participants, and milestones including Bid and Award, show activities for each primary design discipline. • Schedule Risk Analysis based on CPM for detailed design and overall construction schedule. • Phasing narrative, plans on reduced site plans and diagram marked on full size drawings for VA review. • Written list of systems divided by technical discipline, including temporary systems by phase.

Table 2

Design Phase	IPMS Deliverable
Schematic Design (SD-2)	• Updated Project Master Schedule and Detailed Design Schedule. • Updated Schedule Risk Analysis. • Phasing narrative, plans on reduced site plans and diagram marked on full size drawings for VA review.
Design Development (DD-1)	• Updated Project Master Schedule and Detailed Design Schedule. • Updated Schedule Risk Analysis. • Updated Phasing narrative, diagram and plans on reduced site plans marked on full drawings for VA review.
Design Development (DD-2)	• Updated Project Master Schedule and Detailed Design Schedule with increased detail. • Updated Schedule Risk Analysis with increased detail in new risks and mitigation plan. • Updated Phasing narrative and Phasing diagram. • Full-size contract drawings for the CPM phasing plans.
Construction Documents (CD-1)	• Updated Project Master Schedule with increased detail. • Updated Schedule Risk Analysis identifying new risks and mitigation actions, particularly in construction areas. • Updated Phasing Narrative and Phasing Diagram. • Full-size contract drawings for the CPM phasing plans.

Table 2 (Continued)

3. GUIDELINE FOR DEVELOPING AN INTEGRATED PROJECT MASTER SCHEDULE (IPMS)

The IPMS is to be a master schedule covering all phases (pre-design, design, procurement, construction and activation) of the current project and integrating other projects within the campus master plan, if applicable. The IPMS is to be prepared in CPM network format. The construction phase is to be a Level 2 schedule while the other phases are to be Level 3 schedules. The A/E shall utilize the IPMS to plan, implement, and effectively control the overall project at a high level.

The development of a CPM schedule to provide management of a typical VAMC project that would follow the specification requirements designated in VA PG 18-15 is a process that involves a series of individual steps, each building upon products of the previous steps and project control. The following are hierarchical steps involved in developing the IPMS.

3.1 Comprehension of the full scope of the project

The A/E shall review and fully understand the project's scope documents. These documents provide the background, information and understanding needed to develop the IPMS. The goal of this process is to ascertain that all aspects of the project scope have been adequately defined and captured in the IPMS.

The A/E shall identify and proactively communicate with the entire project stakeholders, identify all the potential risks involved in each phase of the project, from Pre-Design to Activation. The A/E shall also understand the constraints such as zoning requirements and permitting (environmental).

The IPMS shall depict the complete life cycle of the VA project. A typical VA project life cycle is as follows:

3.1.1 Design

This phase contains the sequence of design activities as detailed in the A/E specifications from Notice-To-Proceed (NTP) to the Design Review Meeting in the Construction Documents (CD1) phase. It also encompasses the minimum submission requirements for the detailed design phase of the Integrated Project Master Schedule (IPMS). This phase captures one conceptual submission, two schematic Design (SD1 and SD2) submissions, two Design Development (DD1 and DD2) submissions and two Construction Documents (CD1 and CD2) submissions. The A/E will be responsible for preparing a detailed design schedule for the project. Refer to Exhibit I.1 depicting a

Level 1 Project Master Schedule. A complete sample of IPMS is available on the VA's Technical Information Library.

3.1.2 Procurement

This phase occurs when a typical VAMC project formally transitions from design preparation into construction mobilization. This phase includes the bidding and award processes. The project's schedule and budget are finalized in this phase. Typical milestone activities included in this phase are in the following sequence:

- Construction Bid Document Printed
- Construction Package Advertised
- Necessary Addenda Issued
- Bids Received and Tabulated
- Analysis of Low Bid and Bidder's Qualifications
- VA Award Construction Contract
- Contractor Furnish Bonds and Insurance
- Contractor Executed and Certified by VA
- Construction Notice To Proceed

3.1.3 Construction

The construction phase presents the actual physical construction of the project. The A/E shall develop a preliminary construction schedule for the purpose of construction phasing and duration. The A/E shall define project constraints, requirements of stakeholders, operation and facility requirements. The A/E shall come up with the construction phasing in collaboration with the VA. The proposed schedule of the construction phase is expected to be a Level 2 schedule in the IPMS. It commences with the issuance of the Construction Notice to Proceed, followed by mobilization of the General Contractor to the site, then the physical construction, commissioning of building systems and finally ends with activities associated with Substantial Completion.

According to VA PG 18-15, during the Pre-Design phase, the A/E in collaboration with the VA and all the project stakeholders shall develop an outline of phasing requirements including anticipated overall construction schedule, considerations that influence phasing, anticipated duration of each phase of construction and a narrative establishing users' vision, goals, and desired image. In this preliminary phase, major milestones for the construction schedule shall be discussed by the project stakeholders.

The A/E shall provide a written narrative to outline phasing requirements and sequence for the construction schedule. The A/E shall justify the phasing and construction

duration suggested. The phasing shall be supported by enough details including trade activities, long lead items and VAMC operational requirements.

All areas of the project included in Construction shall be identified as part of a phase. Each phase description shall include constraints particular to that phase, what other phases must precede it, other contractors working in that phase, and any VA moves/relocation which must precede the start of the phase or phases. If equipment and other removable items require storage and relocation by the VA, these requirements shall be listed in the phasing narrative. Special phasing constraints which may be common to the project during construction should be listed at the end of the narrative and not within each individual phase description.

The A/E shall provide a written list of systems divided by technical discipline, including temporary systems by phase. Additionally, the A/E shall develop a phasing diagram using CPM that shows the sequence and interdependencies of phases within the project.

As the design progresses from pre-design through construction documents, the A/E is responsible to submit an increased level of detail of the construction schedule during each phase. Exhibit I.6 is a sample of a phasing narrative for a typical VAMC project.

3.1.4 Activation Planning/Beneficial Occupancy

The A/E shall communicate with the project stakeholders to understand the complete requirements of a VAMC facility. In this phase, VA medical equipment is installed and activated and the owner's personnel are recruited, trained and mobilized to run the hospital operation.

The Activation phase is very critical to the completion of the project as this is when the beneficial occupancy is achieved and the VAMC or other facilities are ready for veterans use. The VA activation planning phase should commence at the end of Schematic Design (SD-2) phase and should be in parallel with the design and construction phases, overlapping the tail end of construction as necessary.

3.2 Assign Unique Identifiers to the IPMS

The A/E shall assign a unique name and identification number to identify the specific project and each version of the schedule shall have a unique version number or ID. This is essential to allow the proper archiving of project schedules and audit processes.

3.3 Work Breakdown Structure (WBS)

The Integrated Project Master Schedule WBS encompasses the entire project at Level 1. Subsequently, Level 2 of the WBS subdivides the project into major phases that comprise Design, Procurement, Construction and Activation. Level 3 subdivides each of the major work items into work packages as follows:

Pre-Design, Schematic Design SD1 & 2, Design Development DD1 & DD2 and Construction Documents CD1. Level 4 of the WBS shows the twenty seven (27) different design elements. Level 5 of the WBS breaks down the design elements into specific work activities.

The A/E shall develop the WBS to capture the complete project scope in accordance with VA PG 18-15. A typical VA project WBS is as follows:

WBS Level	Title	Description
I	Project	The Project (e.g. VA IPMS)
II	Major Phase	This level subdivides the project into major phases that comprise the project (e.g., design, procurement, construction, activation)
III	Work Package	This level subdivides each of the major work items into work packages or components (e.g., pre-design, schematic design, design development, construction documents)
IV	Major Work Item	This level subdivides each of the major work packages into major work components or deliverables (e.g. architectural design element, site development design, cost estimating, and other
V	Activity	This level subdivides each of the major work items into specific work activities (e.g., prepare and submit basis of design report, VA review and comment on submittals, prepare estimate, and other related work activities)

Table 3

The objective is to establish appropriate levels of schedule detail for planning, scheduling, monitoring, controlling and reporting on the overall project.

The work breakdown structure and the levels of schedule detail established for the project should allow information to be accurately transferred from one level of schedule detail.

For a typical VAMC project, as many as five levels of schedule detail may be utilized by the A/E. A description of these levels follows:

Level 1: Integrated Project Master Schedule – Consists of a bar chart or a time-scaled network of 15 to 50 activities. This level of detail can be useful for periodic management briefings and reporting. (See Exhibit I.1)

Level 2: Summary Design Schedule – Design activities are summarized in this schedule to cover all phases of the project. This is the schedule that is used to plan, implement, and control the various design phases such as SD1, SD2, DD1, etc. (See Exhibit I.2)

Level 2: Overall Construction Schedule – A/E shall develop a construction schedule based on phasing, major trade activities at summary level (Level 2), long lead items, overall critical path, and VAMC operational needs. This schedule is intended to validate the phasing and anticipated construction duration. (See Exhibit I.3)

Level 3: Detailed Design Schedule – Detailed design activities are provided to show staff requirements, task deliverables and subcontract requirements of each discipline. (See Exhibit I.4)

The following levels are more detailed schedules which the A/E may use at their discretion:

Level 4: One- or two-month Look-Ahead Schedules – Schedules that are prepared each week and in advance of the next two or three weeks of planned efforts. These may be prepared for each of the major design disciplines and may be in bar chart form or in simple network abstracts. These schedules should include the identification of all required resources (equipment and manpower by craft/trade) on a daily basis. (See Exhibit I.5)

Level 5: Daily Work Schedules – These schedules are used mainly for construction; however, the A/E may develop and use them to manage detailed design activities These schedules should be prepared at least one day in advance and with the participation of field superintendents, area supervisors, craft supervisors, foremen, and so on. The objective is to plan, schedule, and coordinate on a daily basis the required labor, construction equipment, and materials needed for each work task. In addition, they need to communicate work task versus cost accounting information essential for

capturing and documenting actual field costs. These include not only base contract work, but also changes, problems, and areas of potential disputes. Such schedules can also aid in capturing manpower data and measuring labor productivity.

3.4 Define Project Milestones

Milestones are key events or significant points in time during the life of a project. Once the A/E has a feel for the overall scope of the project, he or she can begin to determine the project's major and minor milestones. Milestones should have zero duration and be used as the bench marks to measure progress against.

They can also reflect the start and finish points for various project events or conditions and/or identify external constraints or interim deliverables. At a minimum the detailed design schedule, developed by the A/E shall contain start and finish milestones culminating to each design phase (Pre-Design, SD1, SD2, DD1, DD2, and CD1). This will facilitate tracking of the A/E progress for each contractual deliverable.

3.5 Establish Project Calendars and Work Periods

The A/E shall determine, in conjunction with the project team, the work periods which need to be selected for the design phase of the project. These work periods may be different for specific activities or portions of the project including resources. The A/E shall consider the following prior to establishing a calendar:

- The proposed number of working days in a week
- The number of hours to be worked each day
- Any periods of scheduled overtime work or non-working time (e.g. shutdowns)
- The holidays to be observed during the life of the contract (by day, month, and year)

All of these elements play a major role in determining the number and structure of the project calendars required for the IPMS. The use of multiple calendars introduces significant complexity to the calculation of float and the critical path. However, while scheduling is simplified by the use of a single calendar, the A/E shall be cognizant that one calendar may not suffice for effectively managing the project.

The A/E shall utilize project calendars which are adequate and reasonable to perform the scope of work, based on normal working times. The project calendar then may be used as the primary or default calendar for the project. A limited number of customized calendars may then be used for areas of the project requiring different working times.

The sample IPMS includes a 5-day work week calendar w/holidays for all activities in the detailed design schedule and 7-day workweek calendar with no holidays for the summary level construction activities.

3.6 Activity Identification/Coding

The A/E shall assign unique number to each activity/event with numbers ranging from 1 to 99998 only for the activity identification. The A/E shall utilize software where once the activity ID is created, it will not change due to the addition or deletion of activities, this is paramount to guarantee the traceability of the schedule

The CPM schedule activities should be generally coded in such a way to reflect disciplines, phase or location of the work. The A/E shall develop a coding structure to facilitate the selection and sorting of the schedule data, and to facilitate the development and maintenance of the IPMS, as well as meeting the project reporting requirements. A well designed coding structure is also very helpful in analyzing project performance data by facilitating aggregation selection and sorting to highlight trends and anomalies.

The IPMS shall be categorized and the activities/events coded as listed below:

RESP: Responsibility determines the party responsible for the activity as shown below:

Architect
Mechanical Engineer
Fire Protection Engineer
Electrical Engineer
Veteran Affairs
Other Government Agencies

AREA: The A/E shall use this code to assign design element coding such as Architectural, HVAC, Fire Protection, and other related design element coding.

PHASE: The A/E shall use this code to divide the items of work into different phases within the Project such as Pre-Design, Schematic, Design Development, and other project phases.

3.7 Activity Definition

The A/E, in conjunction with the project team members responsible to perform the work of the project, should create the list of activities that will need to be performed to complete the project. The Sample IMPS includes activities related to the design submission requirements for VAMC Major New Facilities, Additions and Renovation as detailed in PG 18-15.

The A/E shall consider the following to break down the scope of work into manageable activities for the detailed schedule of the design, procurement and activation:

- The A/E shall show a concise description of the work represented by the activity/event (35 characters or less including spaces preferred).
- The A/E shall describe work activities/events clearly, so the work is readily identifiable for assessment of completion. Activities/events labeled "start," "continue," or "completion," are not specific and will not be permitted. Lead and lag time activities will not be acceptable.
- The A/E shall designate a single entity that shall be responsible for performing the activity. This does not preclude the idea that multiple resources may be required to accomplish the activity, but it does require that a single entity is responsible for its performance. That person should be the same one who will report progress on the activity (Performance Responsibility).
- Duration of activities/events shall be in work days.
- Activities/events shall have cost assigned to them. Cost shall not exceed $99,999 per activity.
- The A/E shall show activities/events for work for each discipline.
- Each activity/event on the computer-produced schedule shall contain as a minimum, but not limited to, activity/event ID, duration, predecessor and successor relationships, area code, trade code, description, budget amount, early start date, early finish date, late start date, late finish date and total float. Work activity/event relationships shall be restricted to finish-to-start and start-to-start without lead or lag constraints (Exception allowed with approval).
- The A/E shall break up the work into activities/events of duration no longer than 20 work days each, except for which the Project Manager and/or the Contracting Officer may approve the showing of a longer duration (long, continuous design activities and procurement activities where a single work item such as fabricating and delivering/shipping a component to a remote site).
- The A/E shall adhere to the VA NAS specification for A/E design.

For the summary level construction schedule, the A/E shall break down the schedule into the proposed phasing plan. The A/E shall assign reasonable durations to the activities and assign a 5-day work week calendar to each construction activity contained in the IPMS.

When complete, the A/E shall confirm that the activity list in the IPMS shall describe 100% of the work required to complete the project in its entirety, although the construction element of the IPMS will be developed at a summary level until the time for that work draws nearer.

3.8 Activity Sequencing

The A/E shall show on the CPM Schedule the sequence and interdependence of work activities/events required for complete performance of all items of work. For instance, in the design component of the IPMS, the A/E shall depict in sequence the relationship between A/E submittals, VA Approval, Peer Reviews, Design Review meetings, and other required work activities/events.

Work activity/event relationships shall be restricted to finish-to-start and start-to-start with no lag constraints. Activity/event date constraints not required by the contract will not be accepted unless submitted to and approved by the Contracting Officer.

The A/E shall make a separate written detailed request to the Contracting Officer identifying these date constraints and secure the Contracting Officer's written approval before incorporating them into the CPM Schedule. The Contracting Officer's separate approval of the CPM Schedule shall not excuse the A/E of this requirement (See NAS Specification).

In the construction phase of the IPMS, the A/E shall depict in sequence the interdependencies among the construction phasing from the issuance of the Construction Notice-To-Proceed all the way through Project close out activities. This shall include constraints particular to each phase, what other phases must precede it, other contractors working in that phase, and any VA moves/relocation which must precede the start of the phase or phases.

3.9 Estimating Activity Duration

The A/E shall define the activities/events first, and then the A/E shall tie the activities/events logically into the overall schedule sequence and then the A/E shall focus on how long it will take to accomplish the work. The A/E shall use the following guidelines in estimating activity durations for design, procurement and activation:

- Expert judgment guided by historical information.
- Analogous estimating based on experience on similar projects.
- Parametric estimating based on formulas describing relationships among project parameters and time.
- Use of simulations to develop distributions of probable duration of each activity
- Consider each activity/event independently.
- Skip around the network when assigning duration estimates to specific activities. Avoid following a path of activities all the way through the network and to the end.

- Activity duration shall be in work days based on physical work content. Example: Complete SD-2 foundation design, 50 drawings (1,000 man-hours, 20 days with 4 structural designers).
- The A/E shall break up the work into activities/events of duration no longer than twenty (20) work days, except for the construction schedule and for which the Project Manager and/or the Contracting Officer may approve the showing of a longer duration. Exceptions to this rule are procurement activities, certain approvals, concrete curing, and so on.

In order to estimate duration for the construction and activation phases of the IPMS, the A/E shall coordinate with the VA and the project stakeholders. The A/E shall assign reasonable durations to each component of the construction phasing in the IPMS. The A/E shall take into consideration physical conditions, safety requirements, and any labor agreements that may be in effect. The activity duration for the Level 2 construction schedule shall be in calendar days with the timescale showing months and years.

3.10 Cost Loading Requirement

The A/E shall cost load all work activities pertaining to the design phase of the project from concept design through construction documents in the IPMS. The A/E is not responsible for cost loading the procurement, construction, and activation phases. The cost loading shall reflect the appropriate level of effort of the work activities/events. The cumulative amount of all cost loaded design activities/events (including alternates) shall equal the total contract price for the engineering part of the IPMS. Prorate overhead, profit, and general conditions on all work activities/events for the entire project length. The A/E shall generate from this information cost projection curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place based on both early and late finish dates. These cost projection curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading. In the event of disapproval, the A/E shall revise and submit in accordance with NAS specifications. Negative work activity/event cost data will not be acceptable, except on VA issued contract changes.

The A/E is expected to update the cost at the end of each deliverable. For example, once the schematic development SD1 phase is completed and submitted to the VA for review and comment, the A/E shall cost load the affected design activities associated with the deliverable. Exhibit I.7 depicts a sample design phase baseline cost projection S-curve that should be produced by the A/E upon completion of each deliverable.

3.11 Analyzing the Schedule Output

Once complete with developing the IPMS, the schedule will contain a number of unique activities, of varying durations, logically linked together. The A/E shall analyze the IPMS to calculate the dates and other values of the IPMS.

The A/E shall provide to the VA Project Manager, Contracting Officer and CPM Schedule Analyst, all computer-produced time/cost schedules and reports generated from the software as required by the A/E spec.

The Project Manager shall identify the different report formats such as early start total float report, and late start total float report, that the A/E shall provide based upon the schedule output.

The A/E shall generate cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Contracting Officer to assist him in determining approval or disapproval of the cost loading.

3.12 Narrative Report

As part of the schedule development, the A/E shall submit a baseline schedule narrative report and subsequent monthly narrative report as part of his monthly review and update, in a form agreed upon by the A/E and the Contracting Officer. The narrative report shall include, at a minimum: changes due to design affecting construction; a description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities/events and completion dates; and an explanation of corrective action taken or proposed. A typical breakdown of a design schedule outline narrative report is included as Exhibit I.8.

In addition to providing a narrative report, the IPMS developed by the A/E should allow for high level schedule reporting based on the need of the VA and the project stakeholders. For instance, the A/E shall provide the longest path of the project during each schedule update as depicted in Exhibit I.9.

3.13 Approving the Schedule

Within 30 calendar days after receipt of Notice to Proceed, the A/E shall submit for the Project Manager and Contracting Officer's review; three copies of the complete CPM Schedule and an electronic backup file from the scheduling software, The submittal shall also include three copies of a computer-produced activity/event ID schedule showing project duration; phase completion dates; and other data, including event cost.

The final CPM Schedule in its original form shall contain no contract modifications or changes which may have occurred during the final CPM Schedule development period and shall reflect the entire contract duration as defined in the bid documents.

The A/E, VA and key stakeholders shall be actively involved in reviewing the results of the initial scheduling process. The review shall consider the analyzed project end date, milestone completion dates and resource requirements to determine the acceptability of the schedule.

These iterations continue until an acceptable project schedule is developed, one that all of the relevant project stakeholders can agree with.

3.14 Baselining the Schedule

Once agreed by all project stakeholders, the A/E shall designate the final version of the initial schedule as the Baseline. This baseline becomes the benchmark against which project performance will be measured. In accordance with good scheduling practices, the A/E shall have a Baseline Schedule in place before the execution of the project work commences. Once the Baseline has been agreed, reports are distributed in accordance with the project's communication plan.

4 UPDATING/MAINTAINING THE INTEGRATED PROJECT MASTER SCHEDULE (IPMS)

The primary purpose of updating the IPMS is to report on and evaluate the current status of the work, based on progress to date, and to forecast a realistic project completion date given that progress.

The A/E will be responsible for updating the detailed design activities of the IPMS on a monthly basis to facilitate progress payments. However, at the submission of each deliverable (SD1, SD2, DD1, DD2), the entire schedule shall be updated to evaluate the effects of changes/improvements in the design.

Monthly progress meetings shall be held on dates mutually agreed to by the Project Manager and/or Contracting Officer and the A/E. The A/E shall update on a monthly basis the project schedule, including actual start and finish dates, and actual % complete of each activity in progress. All schedule data required shall be accurately filled in and completed prior to the monthly progress meeting. The A/E shall provide this update to VA three (3) work days in advance of the progress meeting. Job progress will be reviewed to verify:

1 Physical percent complete (%) of each activity.

2 Actual start and/or finish dates for updated/completed activities/events.

3 Remaining duration, required to complete each activity/even started, or scheduled to start, but not completed.

4 Logic, time and cost data for change orders, and supplemental agreements that are to be incorporated into the CPM schedule.

5 Percentage for completed and partially completed activities/events.

6 Logic and duration revisions to keep the schedule current.

7 Activity/event duration and percent complete shall be updated independently.

With each invoice, the A/E shall submit an updated schedule and the following reports, for review and approval, to the Project Manager:

1. Detailed Design Schedule, including Critical Path (Longest Path),
2. Cost Earned Report as basis for the Invoice,
3. Sixty (60) day look Ahead/Hot list report,
4. Update Schedule Narrative that explains all the changes performed to the schedule.

5. CHANGE ORDERS

The IPMS in its original form shall contain no contract modifications or changes which may have been incurred during the final CPM schedule development period and shall reflect the entire contract duration as defined in the bid documents. These changes/delays shall be entered at the first update after the final CPM schedule has been approved.

The A/E should provide their requests for time extension for contract time as a result of contract changes/delays in the design phase after the first schedule update. The time extension must be supported by CPM data and analysis, justification narrative, related documents and etc for VA approval.

The A/E shall submit each request for a change in the contract completion date to the VA in accordance with the provisions specified under Article, FAR 52.243 -4 (Changes), VAAR 852.236 – 88 (Changes – Supplements). The A/E shall include, as a part of each change order proposal, a fragnet showing all CPM logic revisions, duration (in work days) changes, and design cost changes, for work in question and its relationship to other activities on the approved CPM schedule (See Exhibit I.10 as a reference). All delays due to non-work activities/events such as RFIs, weather, strikes, and similar non-work activities/events shall be analyzed on a month by month basis.

6. EXHIBITS

Exhibit I.1. Level 1 Schedule for a Typical VAMC Project

Exhibit I.2. Level 2 Schedule for a Typical SD-1 VAMC Project

Exhibit I.3. Level 2 Schedule for a Typical Construction Phase in VAMC Project

Exhibit I.4. Level 3 Schedule for a Typical SD-1 VAMC Project

Exhibit I.5. Level 4 Schedule (60-day look ahead) for a Typical SD-1 VAMC Project

Exhibit I.6. Sample Phasing Narrative for a Typical VAMC Project

Exhibit I.7. Cost Projection S-Curve for a Typical Design Phase in VAMC Project

Exhibit I.8. Sample Outline for a Schedule Narrative Report

Exhibit I.9. Longest Path for a Typical Design Phase in VAMC Project

Exhibit I.10. Schedule Impact Analysis – Sample Change Order Fragnet

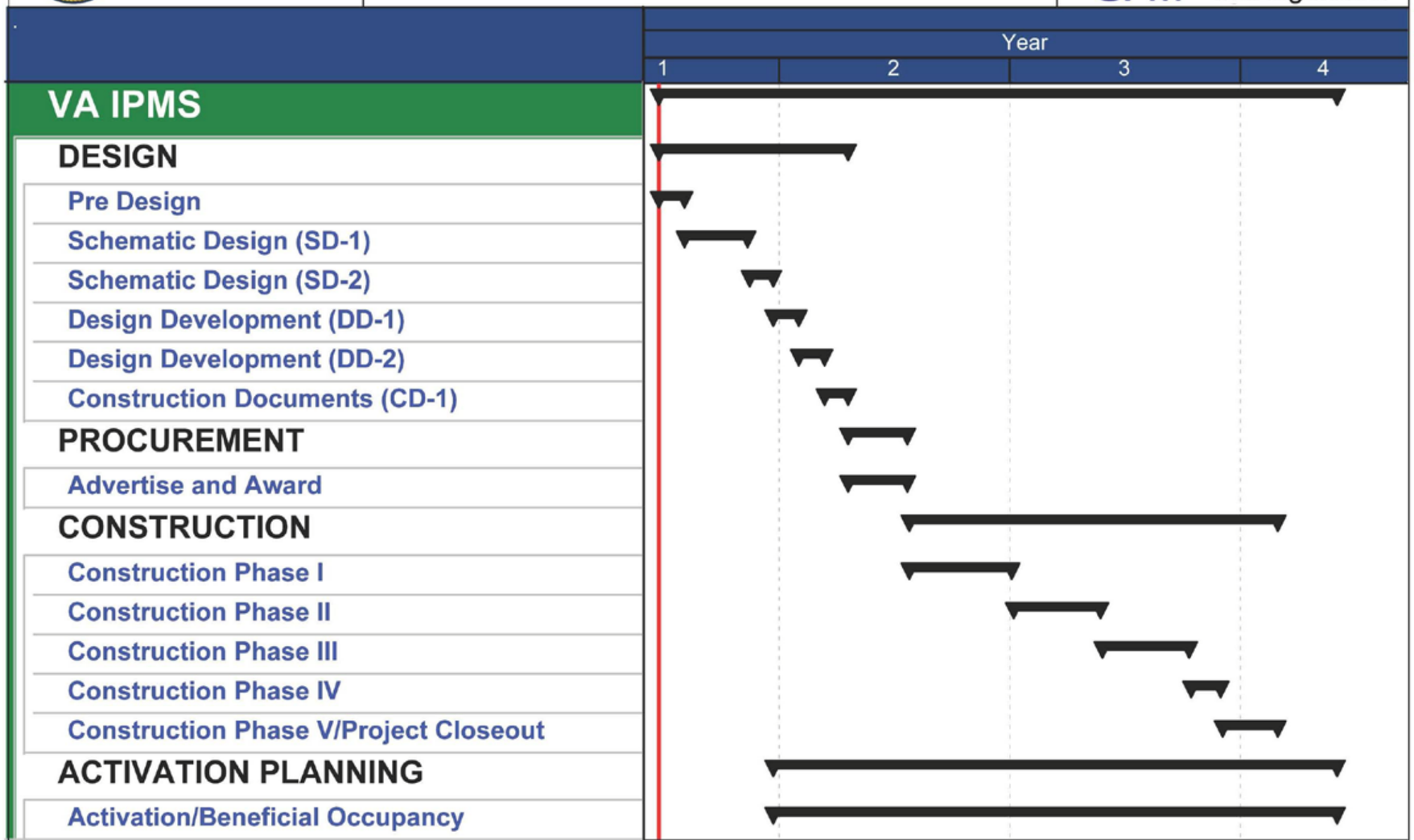
EXHIBIT I.1

Department of Veterans Affairs

Level 1 Schedule for a Typical VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management



Critical Remaining Work — Summary — Milestone

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EXHIBIT I.2

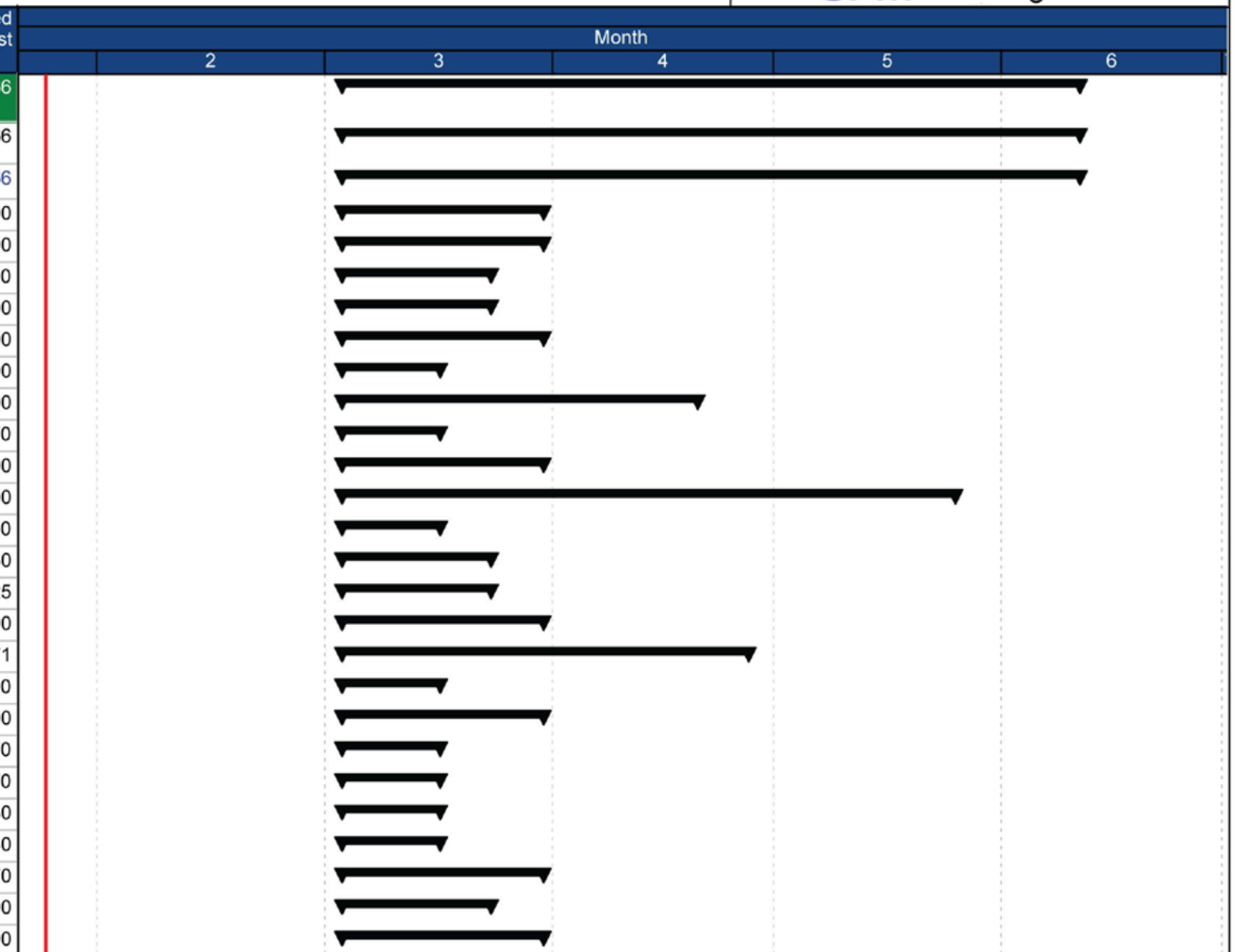
Department of Veterans Affairs

Level 2 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

	Original Duration	Budgeted Total Cost
VA IPMS	73d	$77,666
DESIGN	73d	$77,666
Schematic Design (SD-1)	73d	$77,666
Architectural Design	20d	$2,800
Automatic Transport Design	20d	$4,600
Building Information Model (BIM) Design	15d	$700
Commissioning Design	15d	$1,100
Cost Estimating Design	20d	$1,500
Critical Path Method Design	10d	$1,000
Electrical Design	35d	$4,500
Environmental Impact Design	10d	$970
Fire Protection Design	20d	$5,000
Heating, Ventilating & Air Conditioning Design	60d	$5,200
Historic Preservation Design	10d	$550
Incineration/Waste Disposal Systems Design	15d	$5,350
Integrated Design & Construction Design	15d	$5,525
Interior Design	20d	$4,490
Plumbing/Sanitary Design	40d	$5,871
Security Design	10d	$900
Site Development Design	20d	$3,200
Space Planning Design	10d	$770
Specifications Design	10d	$570
Steam Distribution Design	10d	$4,830
Steam Generation Design	10d	$5,040
Structural Design	20d	$1,070
Sustainability Design	15d	$3,090
Telecommunications Design	20d	$2,990



Critical Remaining Work — Summary — Milestone

Page 1 of 1

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EXHIBIT I.3

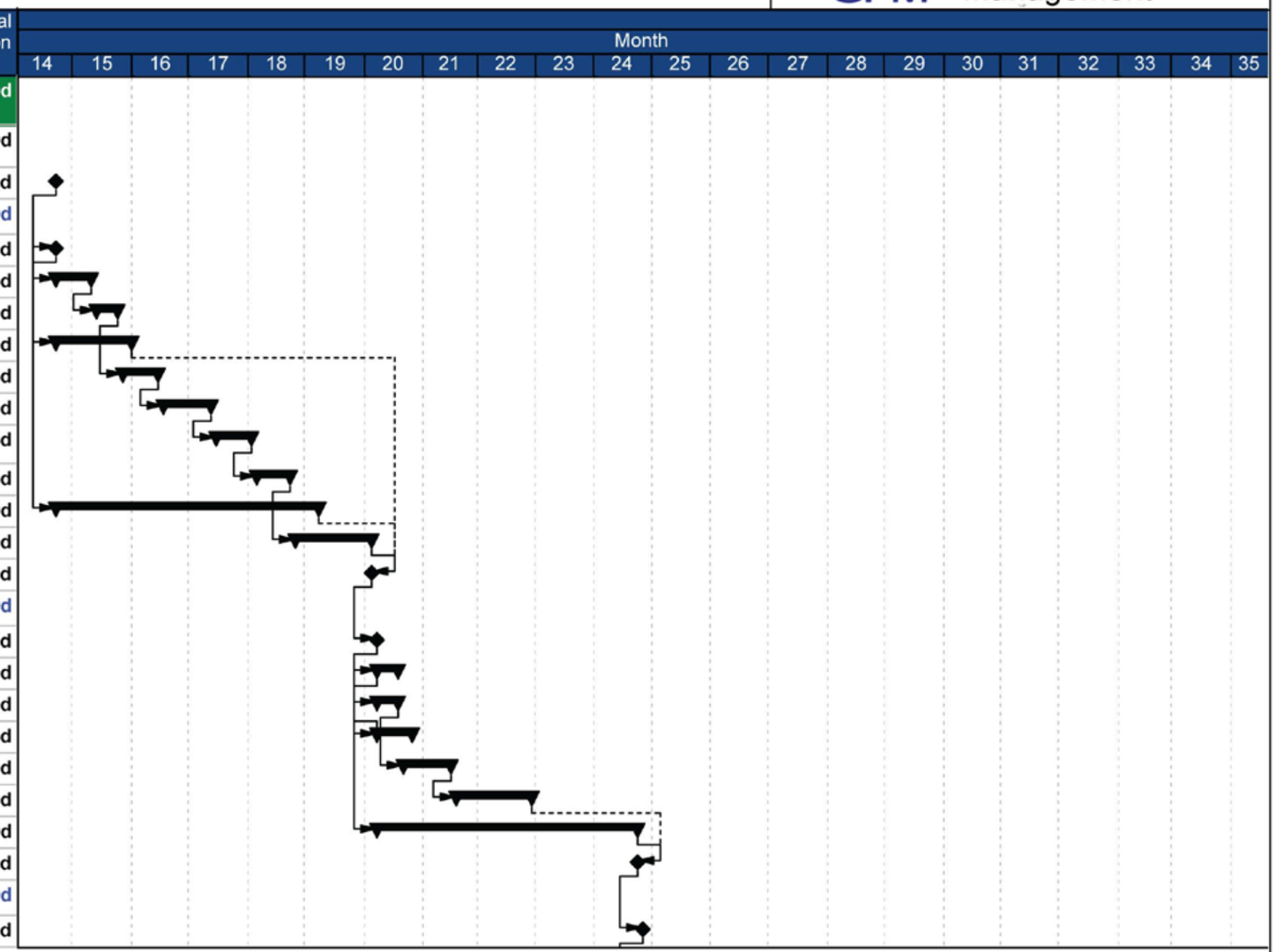
Department of Veterans Affairs

Level 2 Schedule for a Typical Construction Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration
VA IPMS		**420d**
CONSTRUCTION		**420d**
A15620	Notice To Proceed	0d
Construction Phase I		**120d**
A15630	Start of Phase I	0d
A15640	Begin Staging	15d
A15670	Install Erosion and Sediment Control Devices	10d
A15650	Obtain All Permits	30d
A15680	Building Excavation	15d
A15690	Foundations and Footings	20d
A15700	Storm Water Management System at the Site Pro...	15d
A15710	Storm Water Management System Placement	15d
A15660	Procure All Items of Work	100d
A15720	Demolish/Install Chilled Water Piping/Pumps	30d
A15730	End Phase I	0d
Construction Phase II		**100d**
A15740	Start Phase II	0d
A15770	Penetrate Walls	10d
A15780	Cut and Patch Roof Areas	10d
A15760	Partial Demolition of Existing Building at Connect...	15d
A15790	Enclose Structure	20d
A15800	Install Heating/Chilled Water Piping And Electrica...	30d
A15750	Shell and Core Construction	100d
A15810	End Phase II	0d
Construction Phase III		**100d**
A15820	Start Phase III	0d



Remaining Work ◆ Milestone
Critical Remaining Work

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EXHIBIT I.3

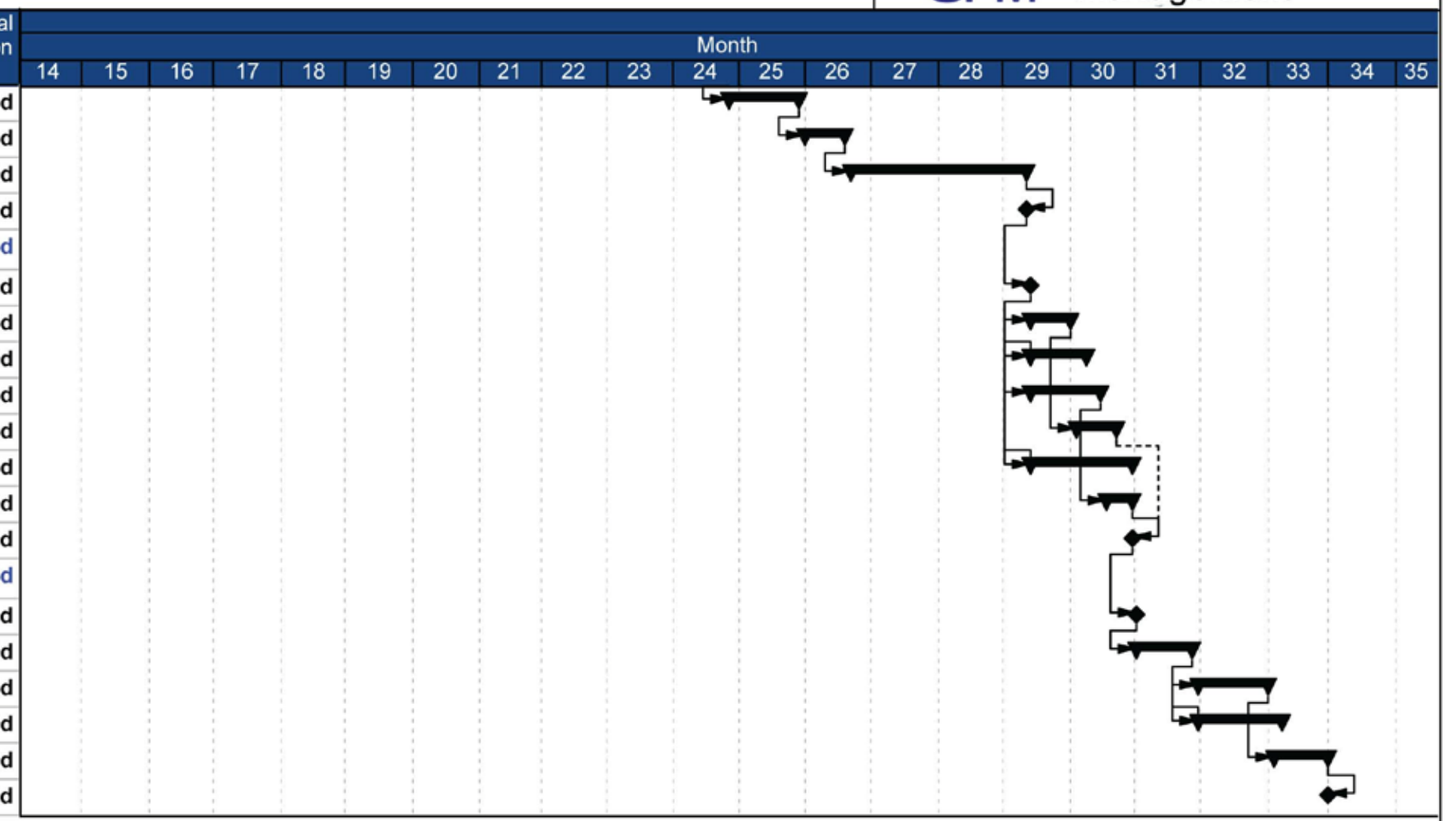
Department of Veterans Affairs

Level 2 Schedule for a Typical Construction Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration
A15830	Piping For Mechanical Structures	25d
A15840	Road Excavation	15d
A15850	Building Systems Installation	60d
A15860	End Phase III	0d
Construction Phase IV		**35d**
A15870	Start Phase IV	0d
A15920	Test and Balance Systems	15d
A15910	Install Temperature Controls	20d
A15890	Exterior Finishes	25d
A15930	Equipment Start Up	15d
A15880	Interior Finishes	35d
A15900	Site Grading	10d
A15940	End Phase IV	0d
Construction Phase V/Project Closeout		**65d**
A15950	Start Phase V	0d
A15960	Final Inspections	20d
A15980	O&M Manuals	25d
A15970	Record Drawings	30d
A15990	Training of VA Personnel on All Equipment	20d
A16020	End of Phase V	0d



Remaining Work ◆ Milestone
Critical Remaining Work

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EXHIBIT I.4

Department of Veterans Affairs

Level 3 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
VA IPMS		73d	$77,666	0d
DESIGN		73d	$77,666	0d
Schematic Design (SD-1)		73d	$77,666	0d
A16100	Start Schematic Design (SD1)	0d	$0	0d
A1130	VA CFM Review and Comment on SD1 Deliverables	10d	$3,500	0d
A1460	Design Review by Peer Reviewer - Schematic Design (SD-1)	10d	$1,700	0d
A6070	Design Review Meeting - Schematic Design 1	3d	$850	0d
A16110	End Schematic Design (SD1)	0d	$0	0d
Architectural Design		20d	$2,800	40d
A1120	Prepare and Submit Updated Basis of Design Report - SD1	10d	$900	40d
A1150	Prepare and Submit SD-1 Drawings (# of Drawing Sheets)	20d	$1,900	40d
Automatic Transport Design		20d	$4,600	40d
A2350	Prepare and Submit Reports for New and Existing Facilities including a Narrative- SD1	10d	$900	45d
A2370	Prepare and Submit Calculations - SD1	15d	$1,200	45d
A2790	Prepare and Submit Drawings (# of Drawing Sheets) - SD1	20d	$2,500	40d
Building Information Model (BIM) Design		15d	$700	45d
A3810	Prepare and Submit Updated BIM Management Plan - SD1	15d	$700	45d
Commissioning Design		15d	$1,100	45d
A4300	Prepare and Submit Commissioning Reports (Team Organization, BOD, Draft Commissioning Plan, Issue Log) - SD1	15d	$1,100	45d
Cost Estimating Design		20d	$1,500	40d

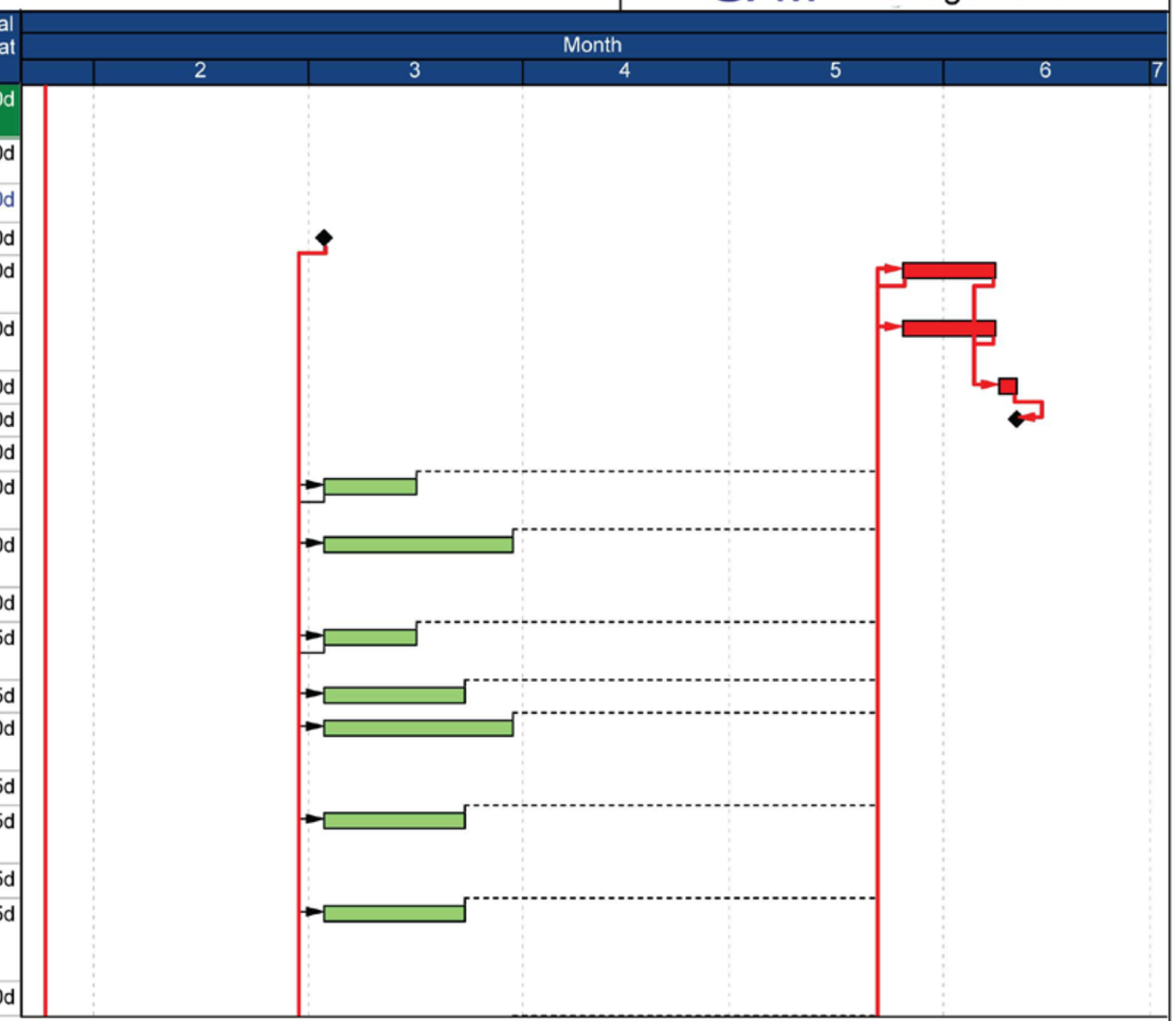

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EXHIBIT I.4

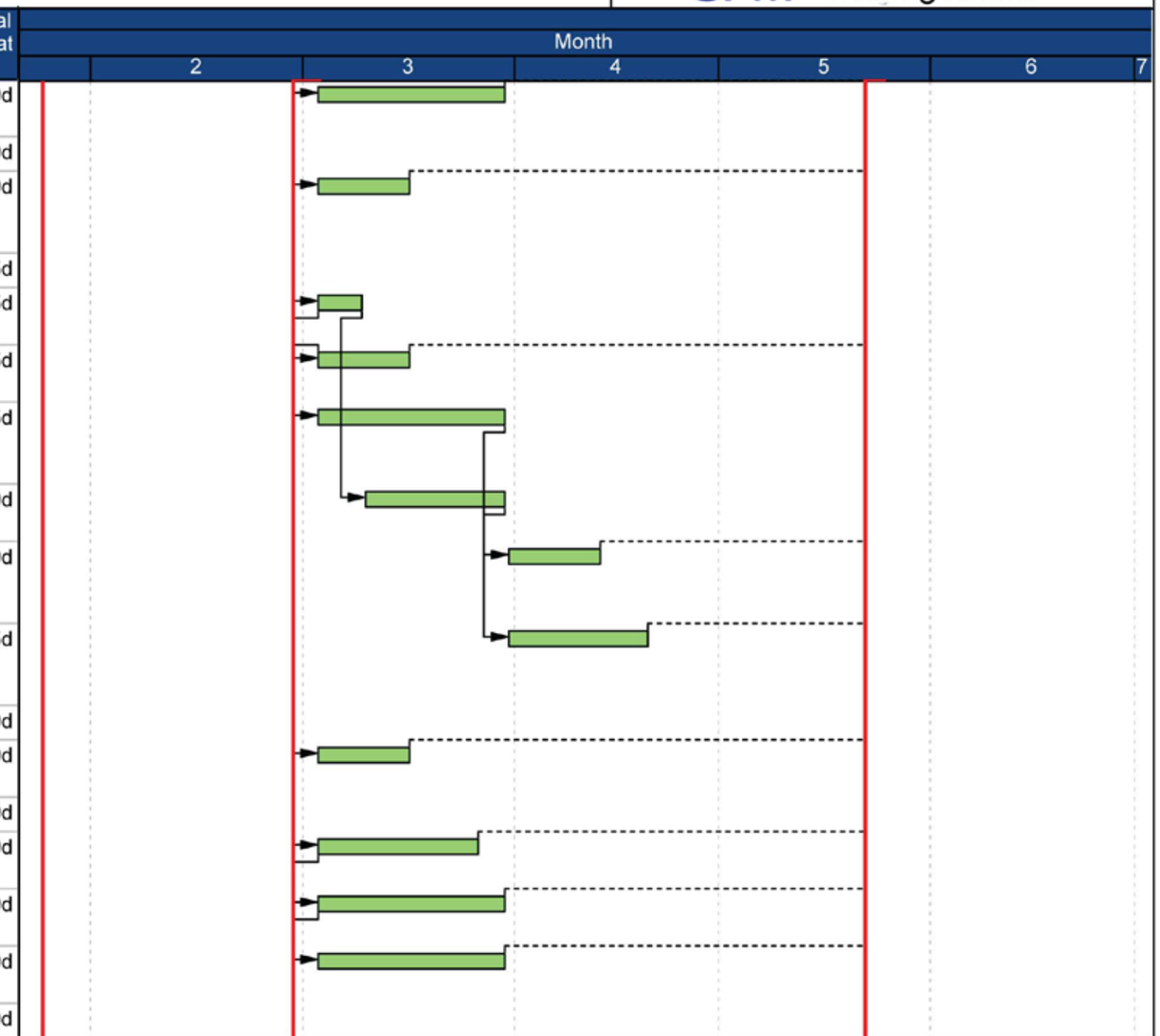
Department of Veterans Affairs

Level 3 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A4420	Prepare and Submit WBS II Level 2 Estimate and Reports - SD1	20d	$1,500	40d
Critical Path Method Design		10d	$1,000	50d
A4930	Prepare and Submit Updated Basis of Design Reports (Program,Quals, Risk Analysis, etc...) - SD1	10d	$1,000	50d
Electrical Design		35d	$4,500	25d
A5390	Prepare and Submit Elec D. Calculations (Existing peak demand readings)- SD1	5d	$250	25d
A5370	Prepare and Submit Elec D. Updated Basis of Design Reports - SD1	10d	$1,000	25d
A5810	Prepare and Submit Elec. D Drawings (Medium and low Vol. elect. power distribution) (# of Drawing Sheets) - SD1	20d	$1,250	25d
A5820	Prepare and Submit Elec. D. Calculations (Preliminary mechanical equipment)- SD1	15d	$750	30d
A5380	Prepare and Submit Elec. D. Calculations (Loads associated with electrical system)- SD1	10d	$500	30d
A5400	Prepare and Submit Electrical Design Drawings (Location of main electrical areas) (# of Drawing Sheets) - SD1	15d	$750	25d
Environmental Impact Design		10d	$970	50d
A6010	Prepare and Submit Environmental Impact Design Reports - SD1	10d	$970	50d
Fire Protection Design		20d	$5,000	40d
A6770	Prepare and Submit Fire Protection Design Updated Basis of Design Reports - SD1	18d	$1,000	40d
A6790	Prepare and Submit Fire Protection Design Calculations - SD1	20d	$1,700	40d
A7130	Prepare and Submit Fire Protection Design Drawings (# of Drawing Sheets) - SD1	20d	$2,300	40d
Heating, Ventilating & Air Conditioning Design		60d	$5,200	0d



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Critical Remaining Work

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EXHIBIT I.4

Department of Veterans Affairs

Level 3 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A7400	Prepare and Submit HVAC Design Calculations (Estimated heating and cooling Rqmts) - SD1	18d	$650	0d
A7380	Prepare and Submit HVAC Design Updated Basis of Design Reports - SD1	20d	$1,200	0d
A7740	Prepare and Submit HVAC Design Drawings (Heating Plant) (# of Drawing Sheets) - SD1	20d	$850	0d
A7410	Prepare and Submit HVAC Design Calculations (8,760-hours basis energy analyses) - SD1	20d	$750	22d
A7420	Prepare and Submit HVAC Design Drawings (Cooling Plant) (# of Drawing Sheets) - SD1	20d	$900	0d
A7750	Prepare and Submit HVAC Design Drawings (Air Handling) (# of Drawing Sheets) - SD1	20d	$850	0d
Historic Preservation Design		10d	$550	50d
A7910	Prepare and Submit Historic Preservation Design Reports - SD1	10d	$550	50d
Incineration/Waste Disposal Systems Design		15d	$5,350	45d
A8420	Prepare and Submit Incineration/Waste Disposal Systems Design Updated Basis of Design Reports - SD1	10d	$1,000	45d
A8440	Prepare and Submit Incineration/Waste Disposal Systems Design Calculations - SD1	15d	$2,000	45d
A8780	Prepare and Submit Incineration/Waste Disposal Systems Design Drawings (# of Drawing Sheets) - SD1	15d	$2,350	45d
Integrated Design & Construction Design		15d	$5,525	45d
A8950	Prepare and Submit Integrated Design and Construction Design Updated Basis of Design Reports - SD1	10d	$975	45d
A8970	Prepare and Submit Integrated Design and Construction Design Calculations - SD1	15d	$1,850	45d

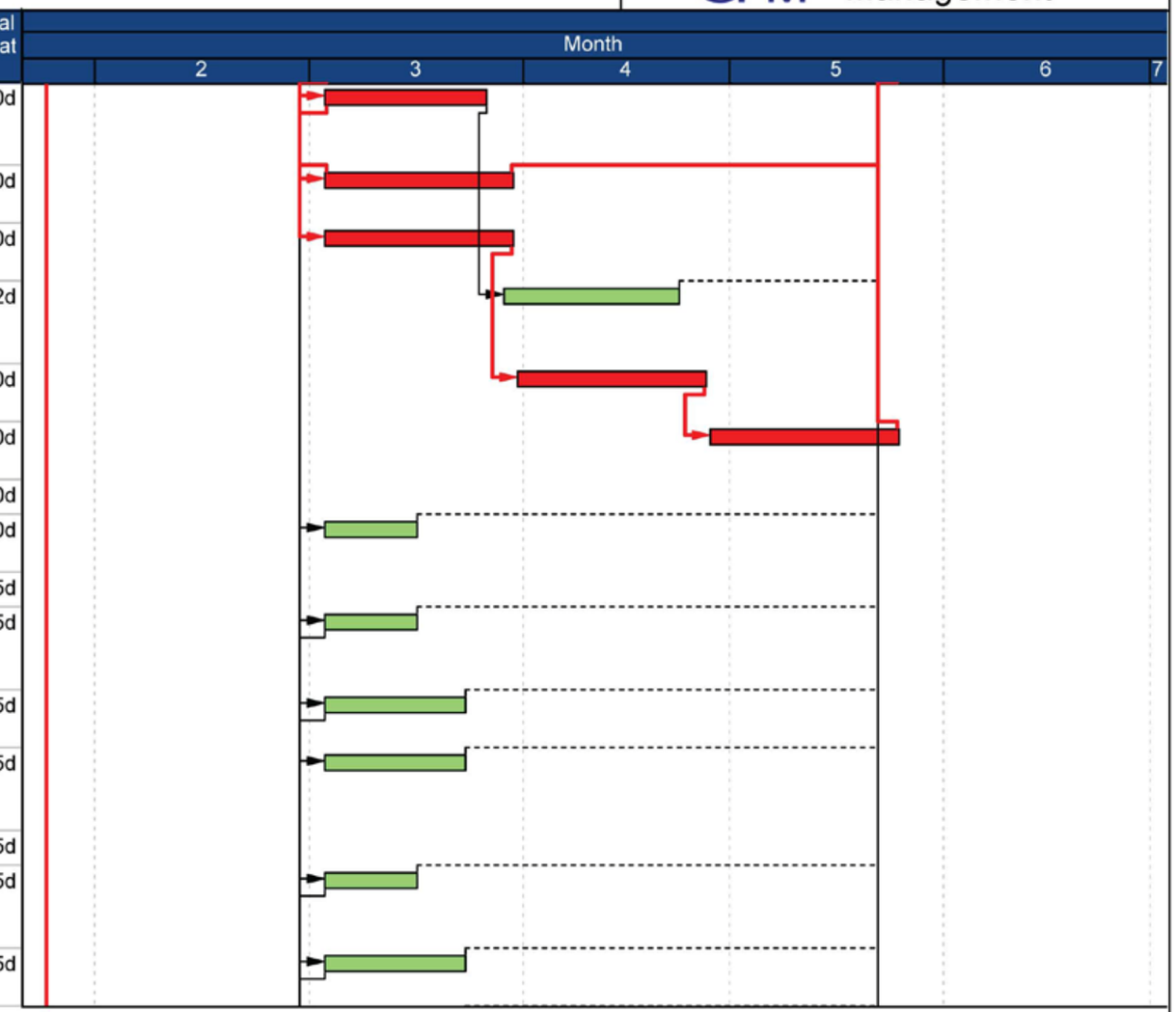

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EXHIBIT I.4

Department of Veterans Affairs

Level 3 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A9310	Prepare and Submit Integrated Design and Construction Design Drawings (# of Drawing Sheets) - SD1	15d	$2,700	45d
Interior Design		20d	$4,490	40d
A9480	Prepare and Submit Interior Design Updated Basis of Design Reports (Finish Schedule, Finish Sample Boards, etc...) - SD1	10d	$890	40d
A9840	Prepare and Submit Interior Design Drawings (Fully Developed Design for All Spaces) (# of Drawing Sheets) - SD1	20d	$2,100	40d
A9490	Prepare and Submit Interior Design Calculations - SD1	20d	$1,500	40d
Plumbing/Sanitary Design		40d	$5,871	20d
A9990	Prepare and Submit Plumbing/Sanitary Design Updated Basis of Design Reports - SD1	15d	$1,200	20d
A10350	Prepare and Submit Plumbing/Sanitary Design Drawings (Facility location) (# of Drawing Sheets) - SD1	20d	$1,440	20d
A10000	Prepare and Submit Plumbing/Sanitary Design Calculations (Reduce water consumption strategies)- SD1	20d	$900	20d
A10010	Prepare and Submit Plumbing/Sanitary Design Calculations (Size of new equipmetn)- SD1	18d	$891	22d
A10360	Prepare and Submit Plumbing/Sanitary Design Calculations (Type and size of utilities)- SD1	20d	$1,440	20d
Security Design		10d	$900	50d
A10580	Prepare and Submit Security Design Updated Basis of Design Reports (COOP Requirements, etc...) - SD1	10d	$900	50d
Site Development Design		20d	$3,200	40d

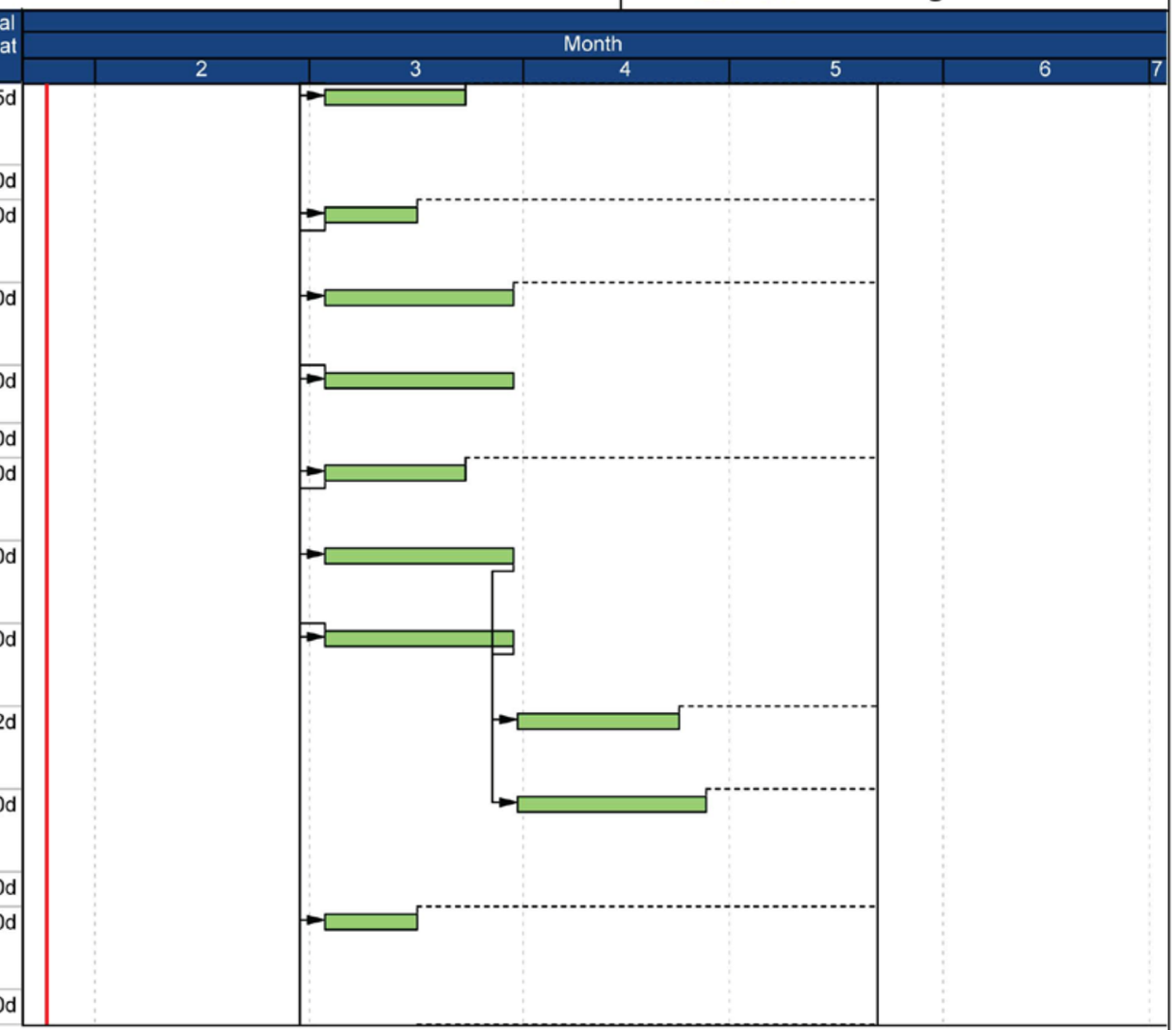

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EXHIBIT I.4

Department of Veterans Affairs

Level 3 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A11170	Prepare and Submit Site Development Design Updated Basis of Design Reports - SD1	10d	$1,100	40d
A11640	Prepare and Submit Site Development Design Drawings (# of Drawing Sheets) - SD1	20d	$2,100	40d
Space Planning Design		10d	$770	50d
A11660	Prepare and Submit Space Planning Design Updated Basis of Design Reports - SD1	10d	$770	50d
Specifications Design		10d	$570	50d
A12190	Prepare and Submit Table of Contents of Applicable Specification Sections - SD1	10d	$570	50d
Steam Distribution Design		10d	$4,830	50d
A12660	Prepare and Submit Steam Distribution Design Updated Basis of Design Reports - SD1	10d	$980	50d
A13150	Prepare and Submit Steam Distribution Design Calculations - SD1	10d	$1,400	50d
A13170	Prepare and Submit Steam Distribution Design Drawings (# of Drawing Sheets) - SD1	10d	$2,450	50d
Steam Generation Design		10d	$5,040	50d
A13190	Prepare and Submit Steam Generation Design Updated Basis of Design Reports - SD1	10d	$990	50d
A13680	Prepare and Submit Steam Generation Design Calculations - SD1	10d	$1,450	50d
A13700	Prepare and Submit Steam Generation Design Drawings (# of Drawing Sheets) - SD1	10d	$2,600	50d
Structural Design		20d	$1,070	40d
A13720	Prepare and Submit Structural Design Updated Basis of Design Reports - SD1	20d	$1,070	40d
Sustainability Design		15d	$3,090	45d

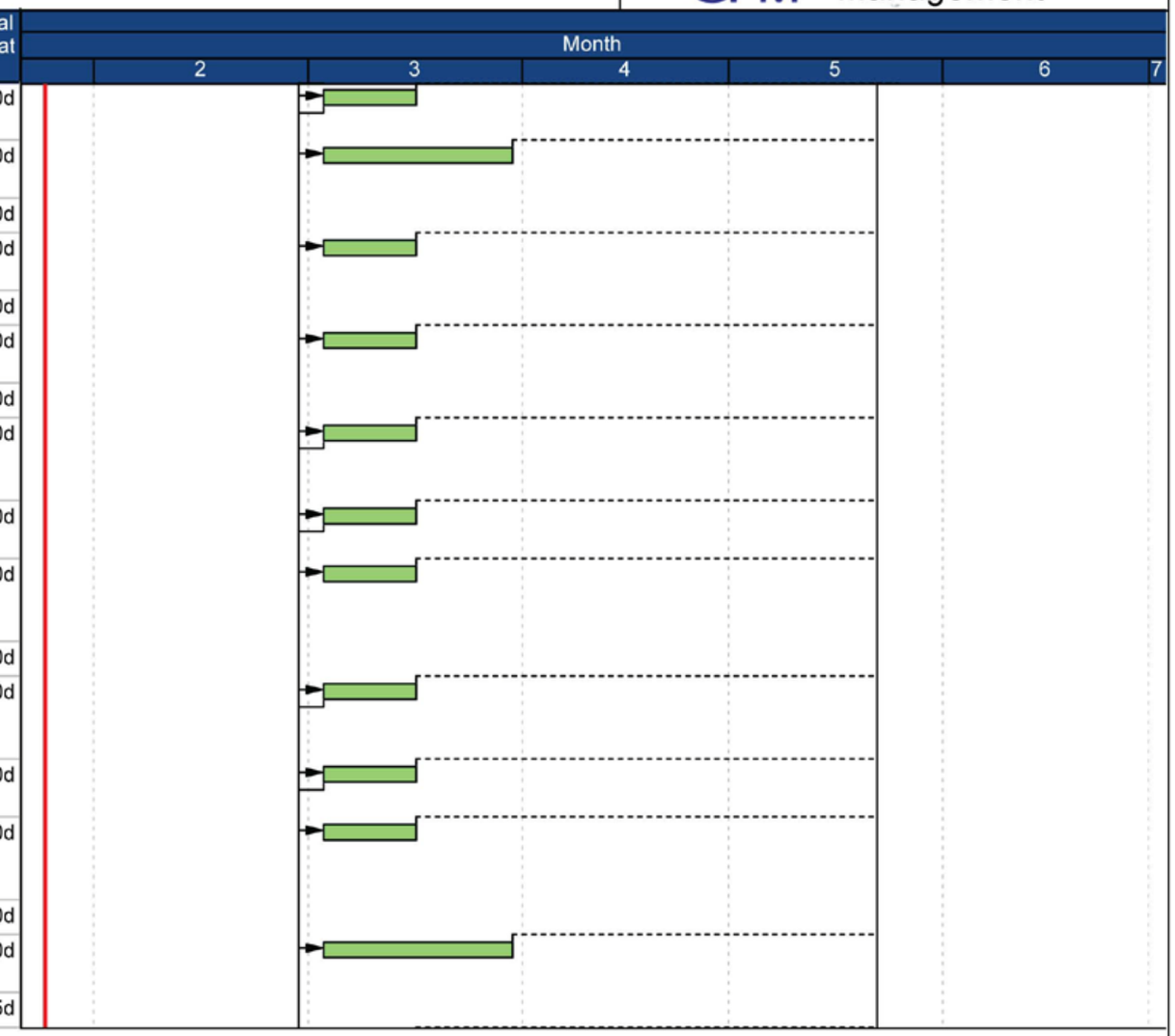

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EXHIBIT I.4

Department of Veterans Affairs

Level 3 Schedule for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A14280	Prepare and Submit Sustainability Design Updated Basis of Design Report - SD1	10d	$970	45d
A14720	Prepare and Submit Sustainability Design Basis of Sustainability Design Report - SD1	10d	$890	50d
A14300	Prepare and Submit Sustainability Design Calculations - SD1	15d	$1,230	45d
Telecommunications Design		20d	$2,990	40d
A15030	Prepare and Submit Telecommunications Design Updated Basis of Design Report - SD1	10d	$1,090	40d
A15050	Prepare and Submit Telecommunications Design Drawings (# of Drawings Sheets) - SD1	20d	$1,900	40d

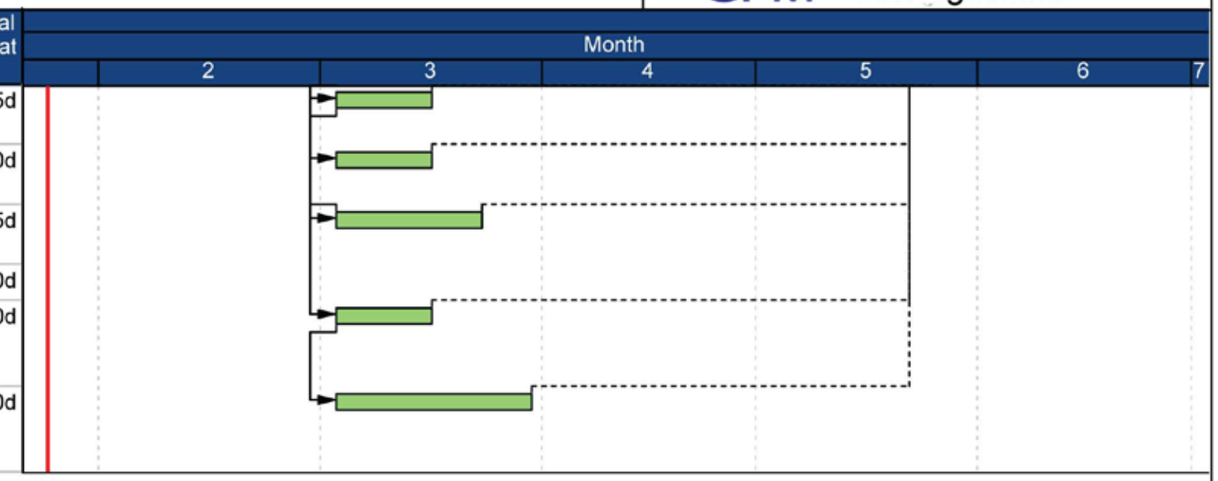

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EXHIBIT I.5

Department of Veterans Affairs

Level 4 Schedule (60 day look ahead) for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
VA IPMS		73d	$77,666	0d
DESIGN		73d	$77,666	0d
Schematic Design (SD-1)		73d	$77,666	0d
A16100	Start Schematic Design (SD1)	0d	$0	0d
A1130	VA CFM Review and Comment on SD1 Deliverables	10d	$3,500	0d
A1460	Design Review by Peer Reviewer - Schematic Design (SD-1)	10d	$1,700	0d
A6070	Design Review Meeting - Schematic Design 1	3d	$850	0d
A16110	End Schematic Design (SD1)	0d	$0	0d
Architectural Design		20d	$2,800	40d
A1120	Prepare and Submit Updated Basis of Design Report - SD1	10d	$900	40d
A1150	Prepare and Submit SD-1 Drawings (# of Drawing Sheets)	20d	$1,900	40d
Automatic Transport Design		20d	$4,600	40d
A2350	Prepare and Submit Reports for New and Existing Facilities including a Narrative- SD1	10d	$900	45d
A2370	Prepare and Submit Calculations - SD1	15d	$1,200	45d
A2790	Prepare and Submit Drawings (# of Drawing Sheets) - SD1	20d	$2,500	40d
Building Information Model (BIM) Design		15d	$700	45d
A3810	Prepare and Submit Updated BIM Management Plan - SD1	15d	$700	45d
Commissioning Design		15d	$1,100	45d
A4300	Prepare and Submit Commissioning Reports (Team Organization, BOD, Draft Commissioning Plan, Issue Log) - SD1	15d	$1,100	45d
Cost Estimating Design		20d	$1,500	40d

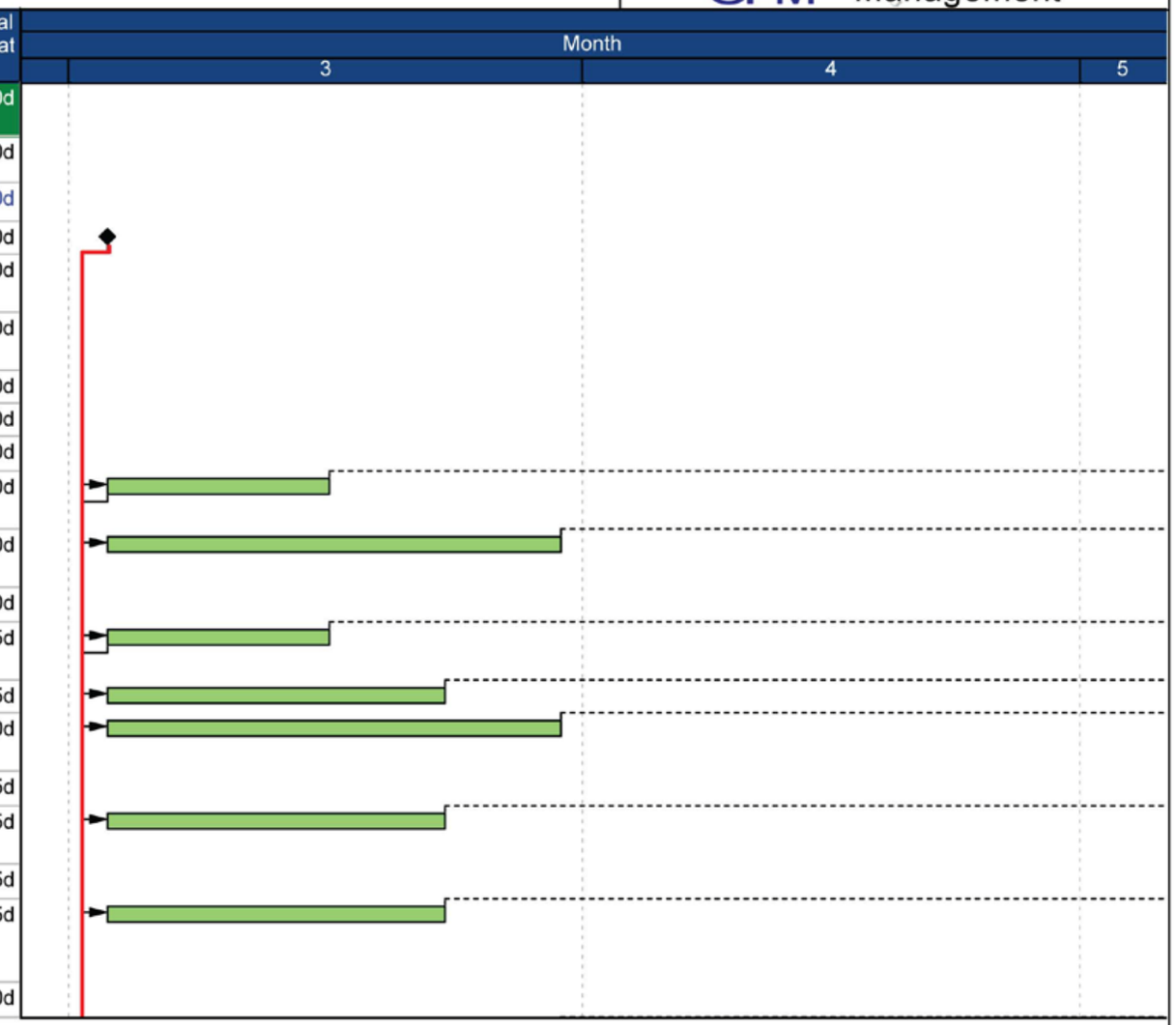

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EXHIBIT I.5

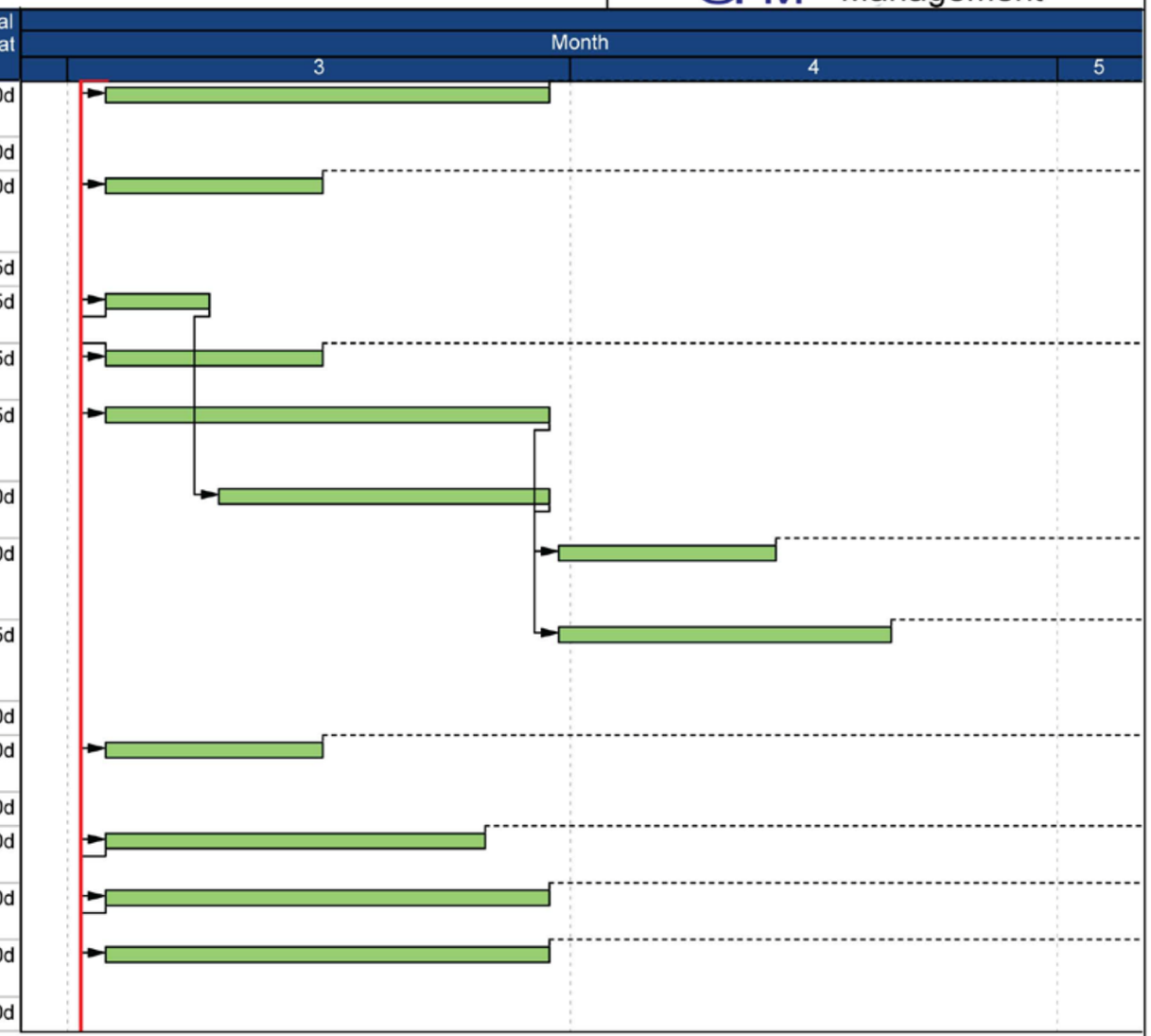
Department of Veterans Affairs

Level 4 Schedule (60 day look ahead) for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A4420	Prepare and Submit WBS II Level 2 Estimate and Reports - SD1	20d	$1,500	40d
Critical Path Method Design		10d	$1,000	50d
A4930	Prepare and Submit Updated Basis of Design Reports (Program,Quals, Risk Analysis, etc...) - SD1	10d	$1,000	50d
Electrical Design		35d	$4,500	25d
A5390	Prepare and Submit Elec D. Calculations (Existing peak demand readings)- SD1	5d	$250	25d
A5370	Prepare and Submit Elec D. Updated Basis of Design Reports - SD1	10d	$1,000	25d
A5810	Prepare and Submit Elec. D Drawings (Medium and low Vol. elect. power distribution) (# of Drawing Sheets) - SD1	20d	$1,250	25d
A5820	Prepare and Submit Elec. D. Calculations (Preliminary mechanical equipment)- SD1	15d	$750	30d
A5380	Prepare and Submit Elec. D. Calculations (Loads associated with electrical system)- SD1	10d	$500	30d
A5400	Prepare and Submit Electrical Design Drawings (Location of main electrical areas) (# of Drawing Sheets) - SD1	15d	$750	25d
Environmental Impact Design		10d	$970	50d
A6010	Prepare and Submit Environmental Impact Design Reports - SD1	10d	$970	50d
Fire Protection Design		20d	$5,000	40d
A6770	Prepare and Submit Fire Protection Design Updated Basis of Design Reports - SD1	18d	$1,000	40d
A6790	Prepare and Submit Fire Protection Design Calculations - SD1	20d	$1,700	40d
A7130	Prepare and Submit Fire Protection Design Drawings (# of Drawing Sheets) - SD1	20d	$2,300	40d
Heating, Ventilating & Air Conditioning Design		60d	$5,200	0d



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Critical Remaining Work

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EXHIBIT I.5

Department of Veterans Affairs

Level 4 Schedule (60 day look ahead) for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A7400	Prepare and Submit HVAC Design Calculations (Estimated heating and cooling Rqmts) - SD1	18d	$650	0d
A7380	Prepare and Submit HVAC Design Updated Basis of Design Reports - SD1	20d	$1,200	0d
A7740	Prepare and Submit HVAC Design Drawings (Heating Plant) (# of Drawing Sheets) - SD1	20d	$850	0d
A7410	Prepare and Submit HVAC Design Calculations (8,760-hours basis energy analyses) - SD1	20d	$750	22d
A7420	Prepare and Submit HVAC Design Drawings (Cooling Plant) (# of Drawing Sheets) - SD1	20d	$900	0d
A7750	Prepare and Submit HVAC Design Drawings (Air Handling) (# of Drawing Sheets) - SD1	20d	$850	0d
Historic Preservation Design		10d	$550	50d
A7910	Prepare and Submit Historic Preservation Design Reports - SD1	10d	$550	50d
Incineration/Waste Disposal Systems Design		15d	$5,350	45d
A8420	Prepare and Submit Incineration/Waste Disposal Systems Design Updated Basis of Design Reports - SD1	10d	$1,000	45d
A8440	Prepare and Submit Incineration/Waste Disposal Systems Design Calculations - SD1	15d	$2,000	45d
A8780	Prepare and Submit Incineration/Waste Disposal Systems Design Drawings (# of Drawing Sheets) - SD1	15d	$2,350	45d
Integrated Design & Construction Design		15d	$5,525	45d
A8950	Prepare and Submit Integrated Design and Construction Design Updated Basis of Design Reports - SD1	10d	$975	45d
A8970	Prepare and Submit Integrated Design and Construction Design Calculations - SD1	15d	$1,850	45d

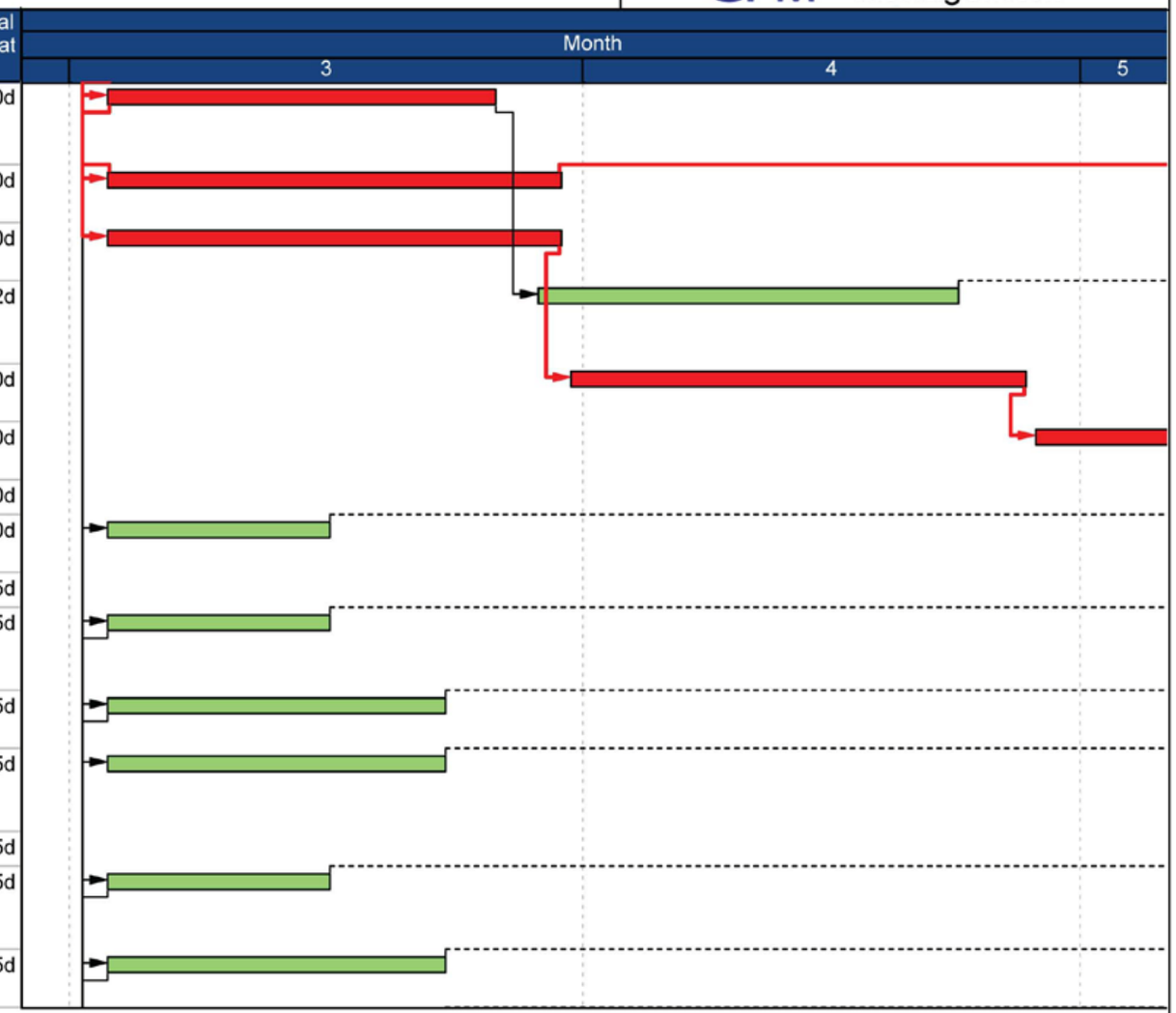

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EXHIBIT I.5

Department of Veterans Affairs

Level 4 Schedule (60 day look ahead) for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A9310	Prepare and Submit Integrated Design and Construction Design Drawings (# of Drawing Sheets) - SD1	15d	$2,700	45d
Interior Design		20d	$4,490	40d
A9480	Prepare and Submit Interior Design Updated Basis of Design Reports (Finish Schedule, Finish Sample Boards, etc...) - SD1	10d	$890	40d
A9840	Prepare and Submit Interior Design Drawings (Fully Developed Design for All Spaces) (# of Drawing Sheets) - SD1	20d	$2,100	40d
A9490	Prepare and Submit Interior Design Calculations - SD1	20d	$1,500	40d
Plumbing/Sanitary Design		40d	$5,871	20d
A9990	Prepare and Submit Plumbing/Sanitary Design Updated Basis of Design Reports - SD1	15d	$1,200	20d
A10350	Prepare and Submit Plumbing/Sanitary Design Drawings (Facility location) (# of Drawing Sheets) - SD1	20d	$1,440	20d
A10000	Prepare and Submit Plumbing/Sanitary Design Calculations (Reduce water consumption strategies)- SD1	20d	$900	20d
A10010	Prepare and Submit Plumbing/Sanitary Design Calculations (Size of new equipmetn)- SD1	18d	$891	22d
A10360	Prepare and Submit Plumbing/Sanitary Design Calculations (Type and size of utilities)- SD1	20d	$1,440	20d
Security Design		10d	$900	50d
A10580	Prepare and Submit Security Design Updated Basis of Design Reports (COOP Requirements, etc...) - SD1	10d	$900	50d
Site Development Design		20d	$3,200	40d

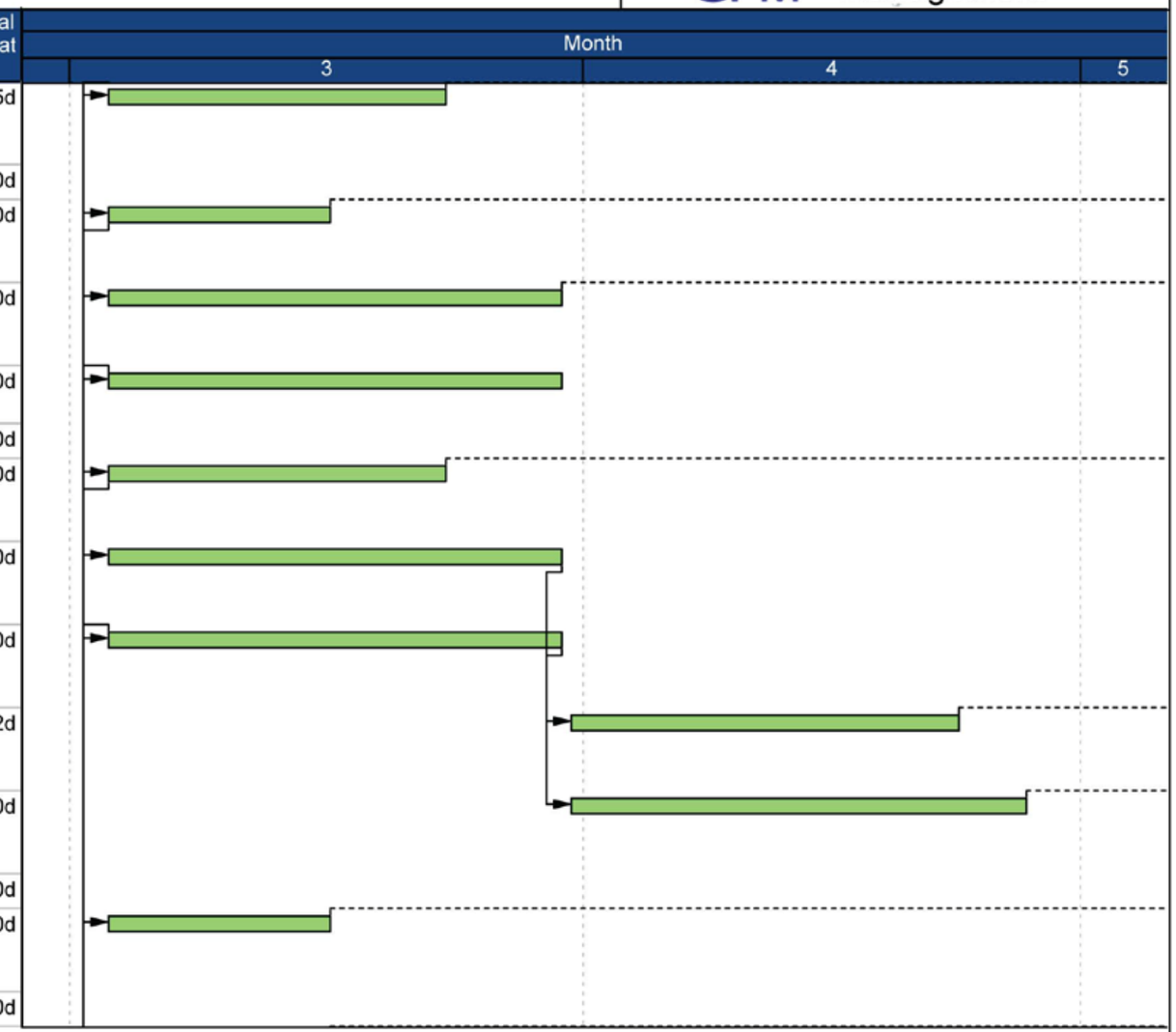

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EXHIBIT I.5

Department of Veterans Affairs

Level 4 Schedule (60 day look ahead) for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A11170	Prepare and Submit Site Development Design Updated Basis of Design Reports - SD1	10d	$1,100	40d
A11640	Prepare and Submit Site Development Design Drawings (# of Drawing Sheets) - SD1	20d	$2,100	40d
Space Planning Design		10d	$770	50d
A11660	Prepare and Submit Space Planning Design Updated Basis of Design Reports - SD1	10d	$770	50d
Specifications Design		10d	$570	50d
A12190	Prepare and Submit Table of Contents of Applicable Specification Sections - SD1	10d	$570	50d
Steam Distribution Design		10d	$4,830	50d
A12660	Prepare and Submit Steam Distribution Design Updated Basis of Design Reports - SD1	10d	$980	50d
A13150	Prepare and Submit Steam Distribution Design Calculations - SD1	10d	$1,400	50d
A13170	Prepare and Submit Steam Distribution Design Drawings (# of Drawing Sheets) - SD1	10d	$2,450	50d
Steam Generation Design		10d	$5,040	50d
A13190	Prepare and Submit Steam Generation Design Updated Basis of Design Reports - SD1	10d	$990	50d
A13680	Prepare and Submit Steam Generation Design Calculations - SD1	10d	$1,450	50d
A13700	Prepare and Submit Steam Generation Design Drawings (# of Drawing Sheets) - SD1	10d	$2,600	50d
Structural Design		20d	$1,070	40d
A13720	Prepare and Submit Structural Design Updated Basis of Design Reports - SD1	20d	$1,070	40d
Sustainability Design		15d	$3,090	45d

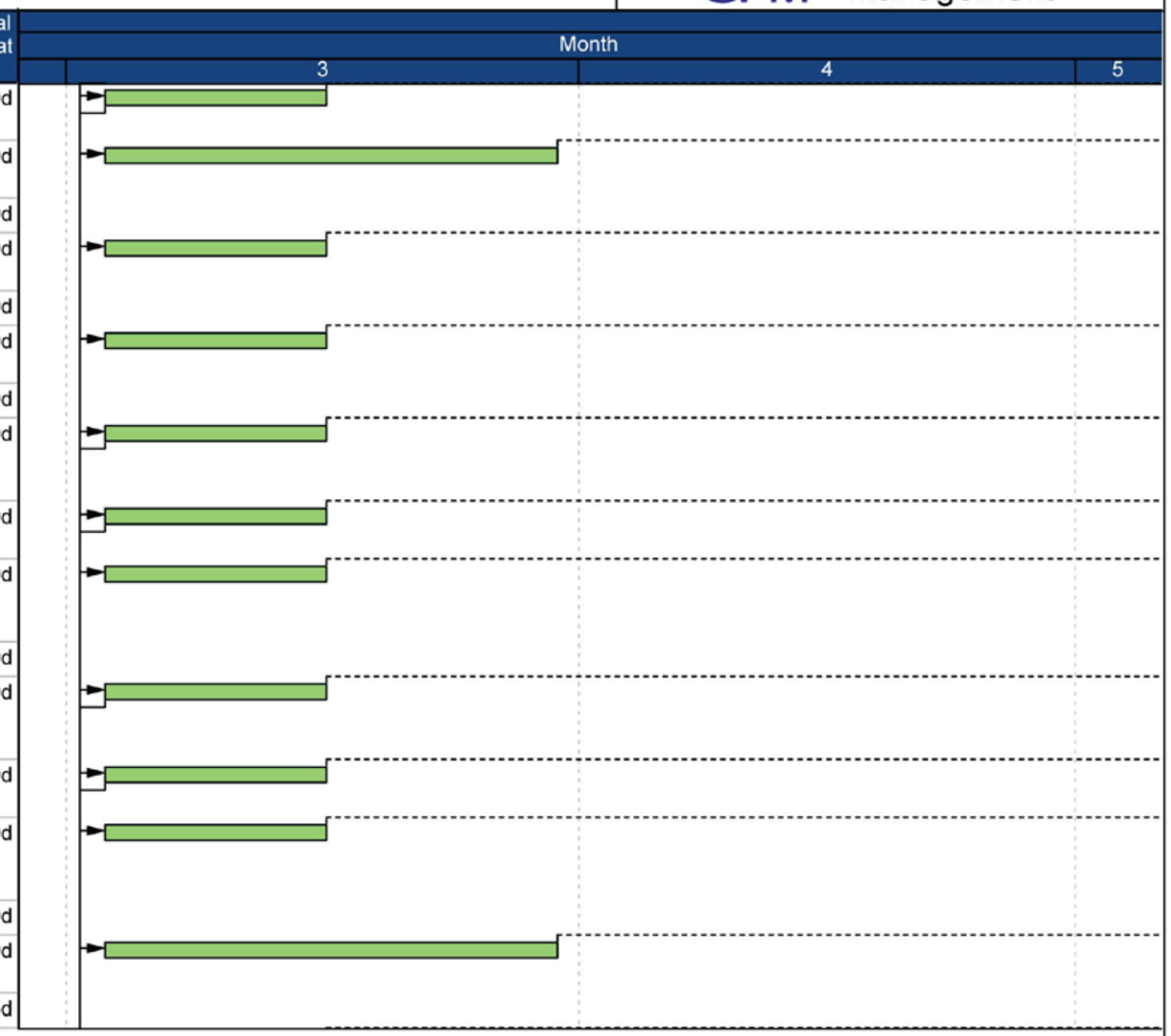

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EXHIBIT I.5

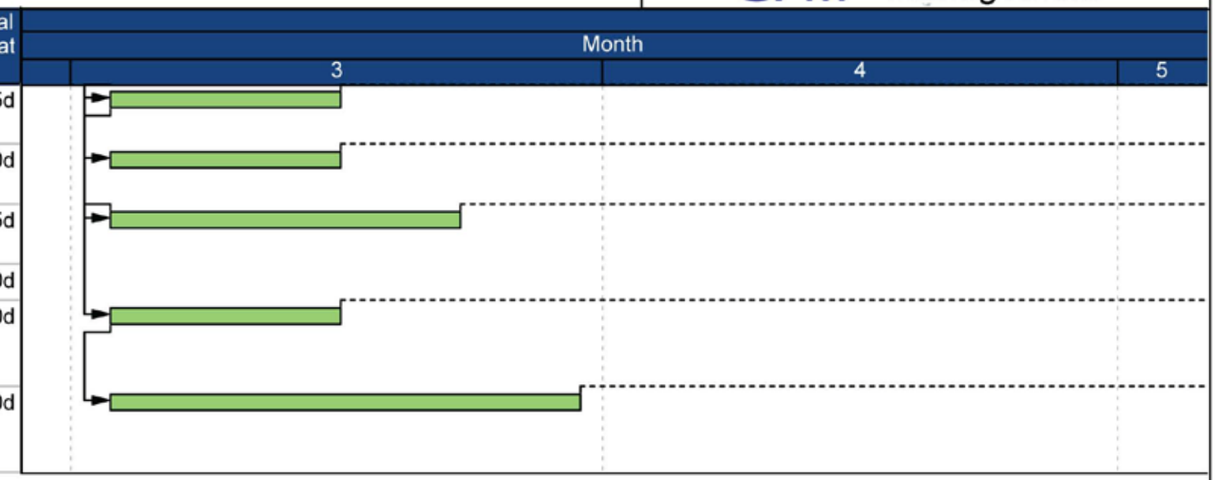
Department of Veterans Affairs

Level 4 Schedule (60 day look ahead) for a Typical SD-1 VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A14280	Prepare and Submit Sustainability Design Updated Basis of Design Report - SD1	10d	$970	45d
A14720	Prepare and Submit Sustainability Design Basis of Sustainability Design Report - SD1	10d	$890	50d
A14300	Prepare and Submit Sustainability Design Calculations - SD1	15d	$1,230	45d
Telecommunications Design		20d	$2,990	40d
A15030	Prepare and Submit Telecommunications Design Updated Basis of Design Report - SD1	10d	$1,090	40d
A15050	Prepare and Submit Telecommunications Design Drawings (# of Drawings Sheets) - SD1	20d	$1,900	40d



Remaining Work
Critical Remaining Work
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EXHIBIT I.6

SAMPLE PHASING NARRATIVE

GENERAL: Work under this contract shall be divided into phased areas with durations. The contractor shall perform the work in each phase in the sequence shown on the phasing plan. All work in each phase must be completed prior to VA occupancy of a phase and the start of work in a subsequent phase (except as noted). A detailed narrative description of each phase is as follows:

PHASE 1 (Main Public Entrance, New Water Line, Parking, Asbestos Abatement, and Covered Walkway): Upon the receipt of the Notice to Proceed and prior to the start of Phase 3, the contractor shall start and complete all contractual work involved in Phase 1 areas; including all temporary signage to direct traffic flow, main public entrance, parking, and asbestos abatement in the pipe basement, the installation of the new water line as noted on the contract drawing and the covered walkway.

PHASE 2 (Chiller Building and Portion of the Site Work): Upon receipt of the Notice to Proceed, the contractor shall start and complete all contractual work involved in Phase 2 areas, including the chiller building, site utilities, roads, parking, walkways, and landscaping with the following construction restraints:

a. This must be completed no later than the completion of Phase 3.

b. The new water line as noted on the contract drawing shall be accomplished during Phase 1.

PHASE 3 (New Outpatient/Clinical Addition): Upon completion of Phase 1 areas and prior to the start of Phase 4, the contractor shall start and complete all contractual work involved in Phase 3 with the following construction restraints:

a. The wall penetrations on the first and second floors of the existing Building 1, between Column Lines 11 and 12, shall be accomplished during this Phase 3.

b. The wall penetration on the second floor of the existing Building 1, east of Column Line 8, shall be accomplished during Phase 4.

c. The wall penetration on the second floor of the existing Building 1, west of Column Line 15, shall be accomplished during Phase 5.

d. The contractor shall provide temporary dust partitions (coordinate with Resident Engineer) on all of the above wall penetrations, to separate the construction areas from the VA occupied areas.

e. This work must be closely coordinated with the Phase 2 activities.

EXHIBIT I.6

PHASE 4 (Pipe Basement, First and Second Fl: Upon completion of Phases 2 and 3, the VA will have fourteen (14) calendar days to move, then release Phase 4 areas to the contractor. The contractor shall then start and complete all contractual work involved in Phase 4.

PHASE 5 (Pipe Basement, First and Second Floor West Wing): Upon completion of Phase 4, the VA will have fourteen (14) calendar days to move, then release Phase 5 areas to the contractor. The contractor shall then start and complete all contractual work involved in Phase 5 areas.

SPECIAL PHASING REQUIREMENTS

a. Contractor shall construct dust partitions prior to the start of demolition and they must remain in place until the completion of that phase or subsequent phases where required.

b. Contractor shall perform all work in or adjacent to VA occupied areas in such a manner to ensure:

1) The continuous and uninterrupted use of all occupied areas, including the applicable mechanical and electrical systems serving these areas.

2) Protection of patients and personnel in occupied areas from the hazards and dust associated with a construction environment.

3) The work areas are to be kept clear, clean, and free of loose debris, construction materials and partially installed work which would create a safe hazard or interfere with patient and personnel duties and traffic. The contractor shall sweep the areas clean at the end of each work day and make every effort to keep dust and noise to a minimum at all times.

c. Temporary interruptions or shutdown of any utility or electrical/mechanical system should be requested from the R/E 48 hours prior to the desired time, and should be performed at times other than the station's normal hours of operation or as directed by the R/E.

d. Two weeks (14 calendar days) prior to starting work in any phase the contractor shall notify the R/E, in writing, of date he plans to complete the preceding phase. In no case will be contractor begin work in any phase without obtaining written approval from the R/E.

e. The sequence of work and durations as shown on the phasing diagram on Drawing CPM-___ are contractual and the contractor must complete all in each phase with the VA inspecting and accepting the work, prior to the contractor proceeding to the next scheduled phase.

f. The sample CPM Network Drawings CPM-1 is for the contractor's information. The sample network indicates the level of detail and technique which will be required on the contractor's network and described in the NAS Section of the Specifications. The CPM notes and legend on Drawing CPM-1 are contractual.

EXHIBIT I.6

STANDARDIZED DEFINITIONS:

JOINT OCCUPANCY - Those area(s) designated as being jointly occupied means that the contractor will be able to complete the work necessary in the building(s), room(s), or area(s) designated in particular phase, while remaining occupied by the VA personnel and/or patients. The contractor shall, in all jointly occupied area(s), protect VA personnel/patients and existing equipment from the hazards of dust, materials, tools, etc., associated with a construction environment. The contractor shall keep these jointly occupied area(s) clear, clean, and free of loose debris, construction materials and partially installed work which would create a safety hazard or interfere with VA personnel or patients. The contractor will pay particular attention to leaving these jointly occupied area(s) clean at the end of each work shift.

VACATED AREA(S) - Those area(s) designated as being vacated area(s) means that the contractor will be able to complete the work necessary in the building(s), room(s), or area(s) designated in a particular phase, without the presence of VA personnel and/or patients. In equipment from the hazards of dust, materials, tools, etc., associated with a construction environment; however, the contractor will be required to observe any restraint(s) outlined under the "Special Phasing Requirements", section 01010, of the Contract Specifications.

ROOM BY ROOM BASIS - Those area (s) designated as being completed on a room by room basis means that the contractor will be allowed to complete the work necessary in that room, whether the particular room is a 'jointly occupied area' or a 'vacated area', and that all work in that particular room must be completed in full and accepted by the VA prior to starting work in another room so designated in that particular phase. The contractor will observe those phasing restraint(s) outlined and pertaining to 'jointly occupied' areas or 'vacated area' under Section 01010 of the Contract Specifications.

AFTER NORMAL WORKING HOURS - Those area(s) designated as being worked after normal working hours means that the contractor will be able to perform the work necessary in the building(s), room(s), or area(s) designated in a particular phase, only during the hours that the VA considers to be other than their normal hours. Normal hours are 8:00 am to 4:30 PM. The contractor must allow enough time at the end of each shift to clean and return the area(s) back to the station prior to the start of the station's normal hours of operation. Existing equipment in the area(s) shall be protected from the hazards of dust, materials, tools, etc., associated with a construction restraint(s) as outlined and pertaining to these area(s), under the "Special Phasing Requirements", Section 01010, of the Contract Specifications.

EXHIBIT I.6

PHASING PLAN

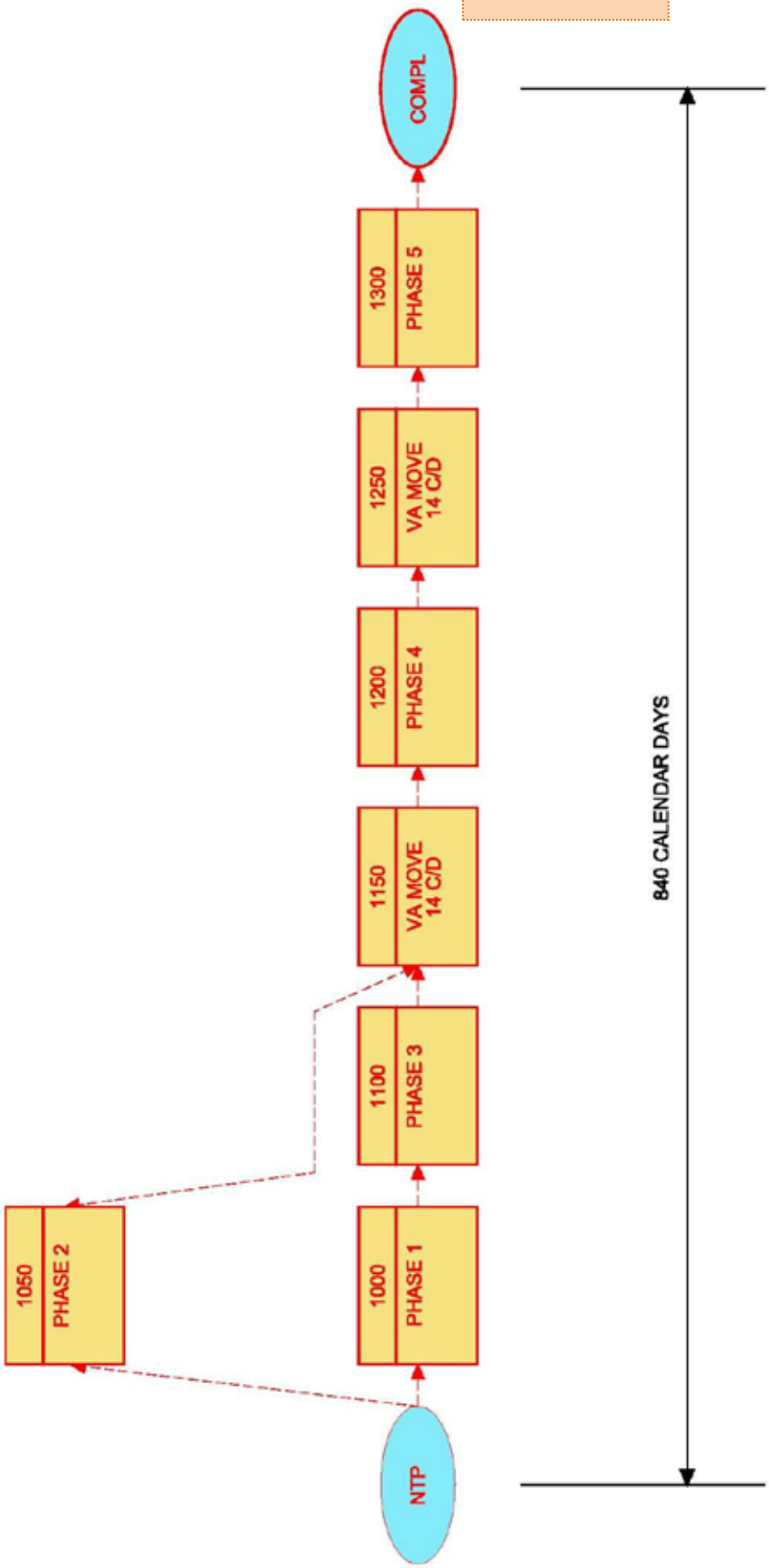

EXHIBIT I.6

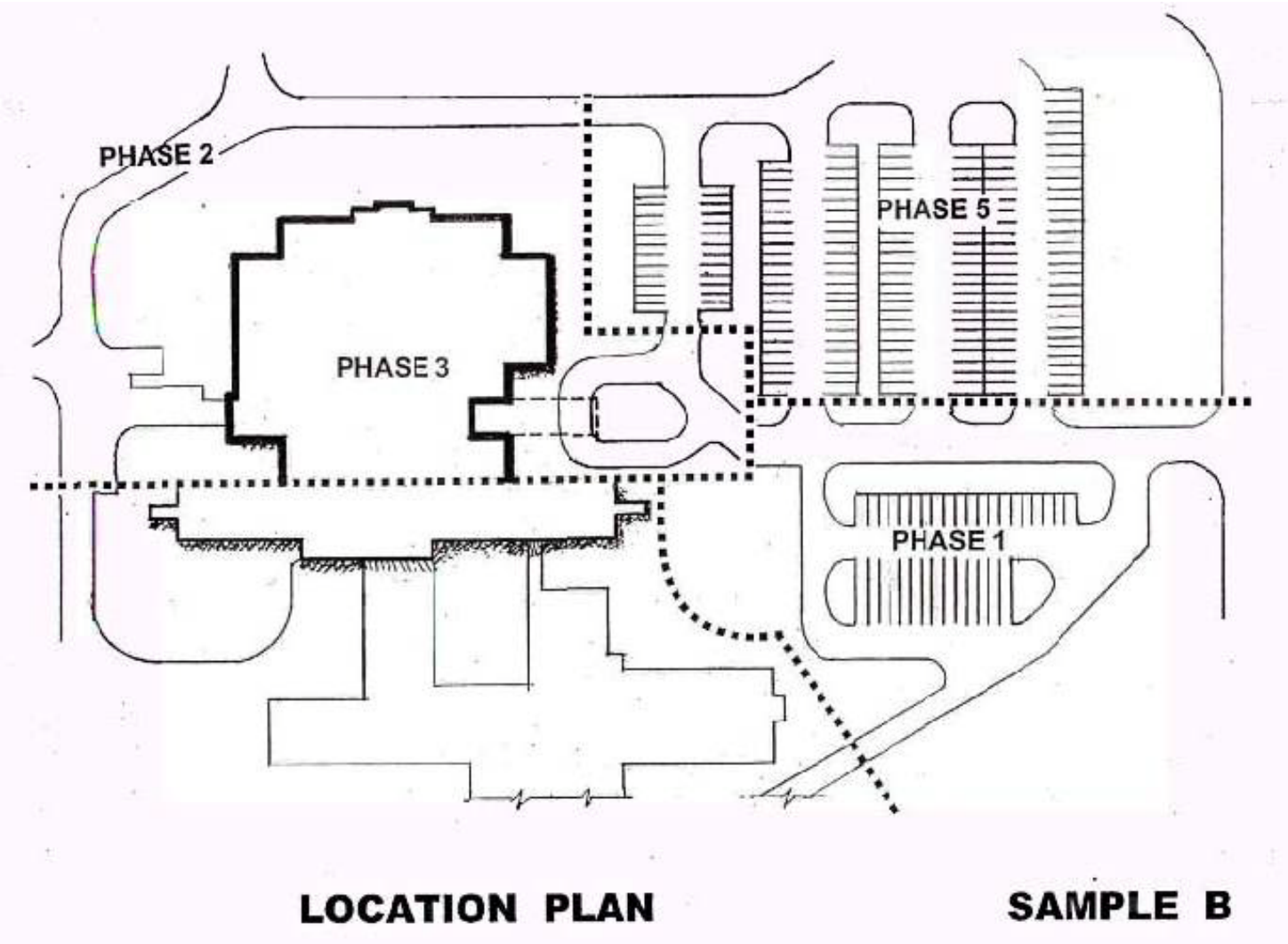

EXHIBIT I.6

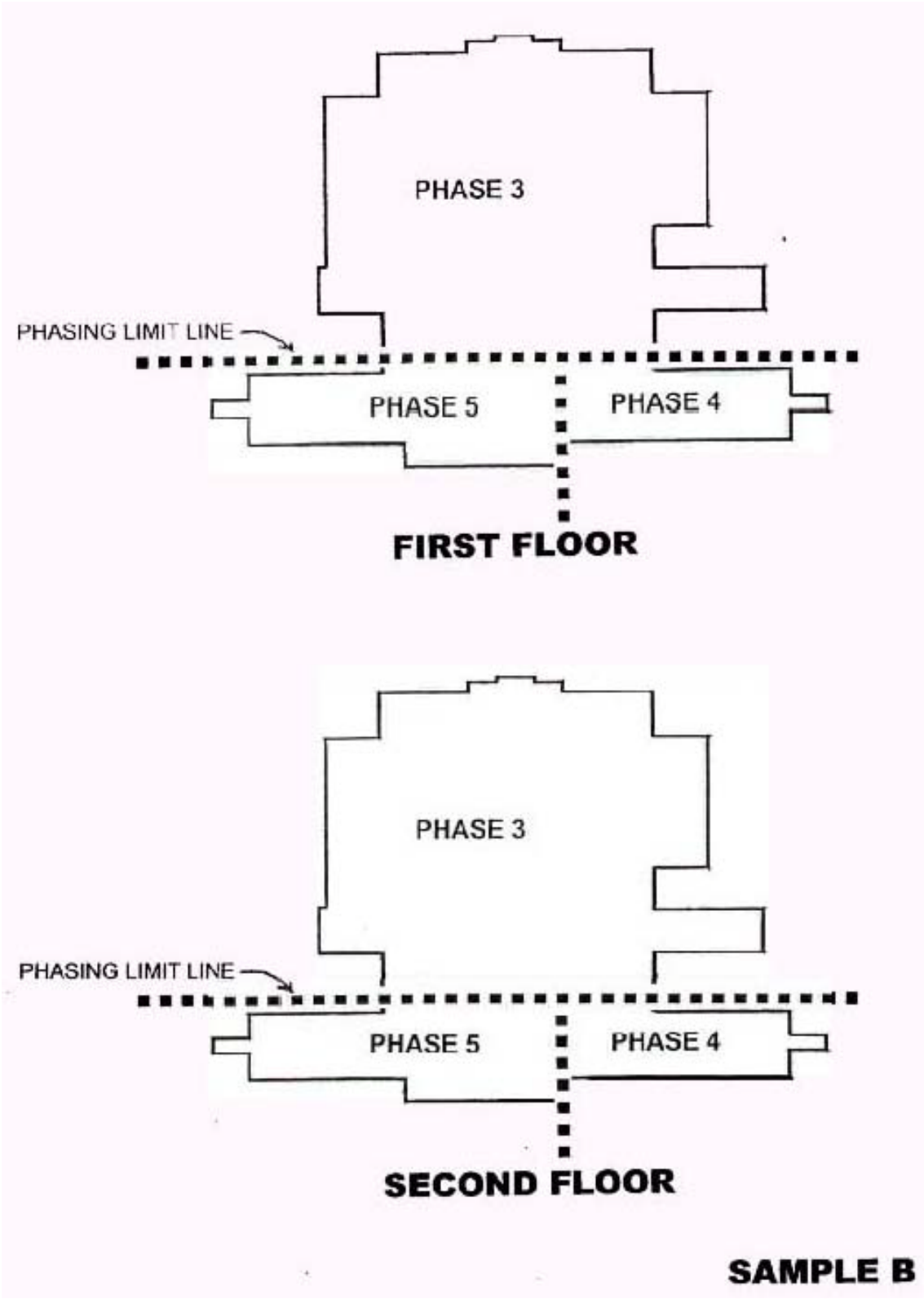
PHASE 3
PHASING LIMIT LINE
PHASE 5
PHASE 4
FIRST FLOOR
PHASE 3
PHASING LIMIT LINE
PHASE 5
PHASE 4
SECOND FLOOR
SAMPLE B

EXHIBIT I.7

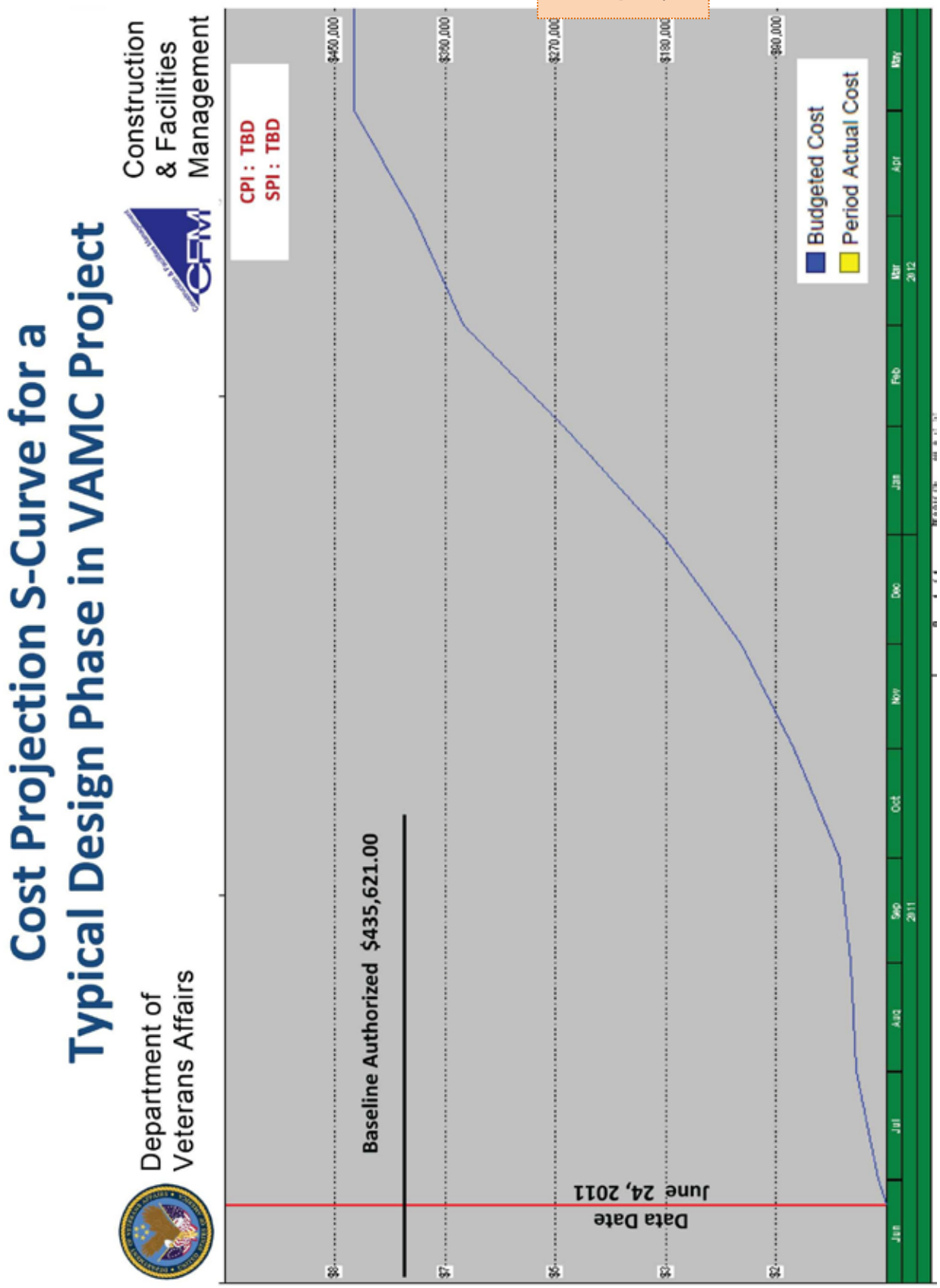
Department of Veterans Affairs
Cost Projection S-Curve for a Typical Design Phase in VAMC Project
Construction & Facilities Management
CPI : TBD
SPI : TBD
Baseline Authorized $435,621.00
Data Date June 24, 2011
$450,000
$360,000
$270,000
$180,000
$90,000
$8
$7
$6
$5
$4
$3
Budgeted Cost
Period Actual Cost
Jun
Jul
Aug
Sep 2011
Oct
Nov
Dec
Jan
Feb
Mar 2012
Apr
May

EXHIBIT I.8

SAMPLE OUTLINE FOR A NARATIVE REPORT

Progress of Contract Work

In this section, the A/E will provide in narrative format the current progress of the contract work

Description of Work Accomplished per period

In this section the A/E will discuss in detail the overall scope of work and the phase of work and the work accomplished during each update period

Comparison of Actual Work Progress versus Schedule

In this section, the A/E will describe in detail the comparison between the actual progresses against what was planned.

Shop Drawing Preparation and Review Status

In this section, the A/E will discuss in detail the preparation and review status of any shop drawings that may adversely impact the completion of the design phase

Changes or Additions to Scope

In this section, the A/E will provide a detail explanation of any changes or additions to the original scope and how they are impacting the overall schedule.

Detail Time Impact Analysis must be supported by CPM data at the time the event in question occurs.

Causes of Delays

In this section, the A/E will discuss in details all causes of delays and potential delays to the design phase of the project

Changes in Logic, Sequence, Durations, or Activities and Reasons Therein

In this section, the A/E will include in detail all changes in logic, sequence, durations, or activities as it relates to the design activities contained in the detailed design schedule

Actions Proposed to Restore Schedule

In this section, the A/E will provide in detail, actions that will be taken to restore the design schedule in the instance where there is a delay.

Problems or Changes Anticipated or Expected

In this section, the A/E will itemize in minute detail, the problems or changes anticipated during each design schedule update. This will help in circumventing potential delays.

Changes in Payment Schedule

In this section, the A/E will explain in detail the changes in payment schedule during each design schedule update

Explanation for Out of Sequence Activities

In this section, the A/E will provide a detailed explanation of out of sequence design activities during each schedule update.

EXHIBIT I.9

Department of Veterans Affairs

Longest Path for a Typical Design Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
VA IPMS		129d	$101,440	0d
DESIGN		129d	$101,440	0d
Pre Design		28d	$19,025	0d
A15530	Start Pre-Design	0d	$0	0d
A1060	VA CFM Review and Comment on Pre Design Deliverables	10d	$3,500	0d
A15520	Design Review Meeting - Conceptual Design	3d	$850	0d
A15600	End Pre-Design	0d	$0	0d
Architectural Design		15d	$915	0d
A1080	Prepare and Submit Basis of Design Report - Conceptual Design	15d	$900	0d
A1090	Prepare and Submit Concept Assessments	15d	$15	0d
Cost Estimating Design		15d	$3,000	0d
A4370	Prepare and Submit WBS II Level 1 Estimate - Conceptual Design	15d	$3,000	0d
Critical Path Method Design		15d	$3,500	0d
A4880	Prepare and Submit Basis of Design Reports (Program,Quals, Risk Analysis, etc...) - Conceptual Design	15d	$3,500	0d
Security Design		15d	$2,500	0d
A10520	Prepare and Submit Site Assessment/Existing Conditions for Security Design	10d	$1,500	0d
A10540	Prepare and Submit Security Design BOD and Concept Assessments	15d	$1,000	0d
Site Development Design		15d	$1,750	0d
A11110	Prepare and Submit Site Assessment/Existing Conditions Reports for Site Development Design	10d	$1,000	0d

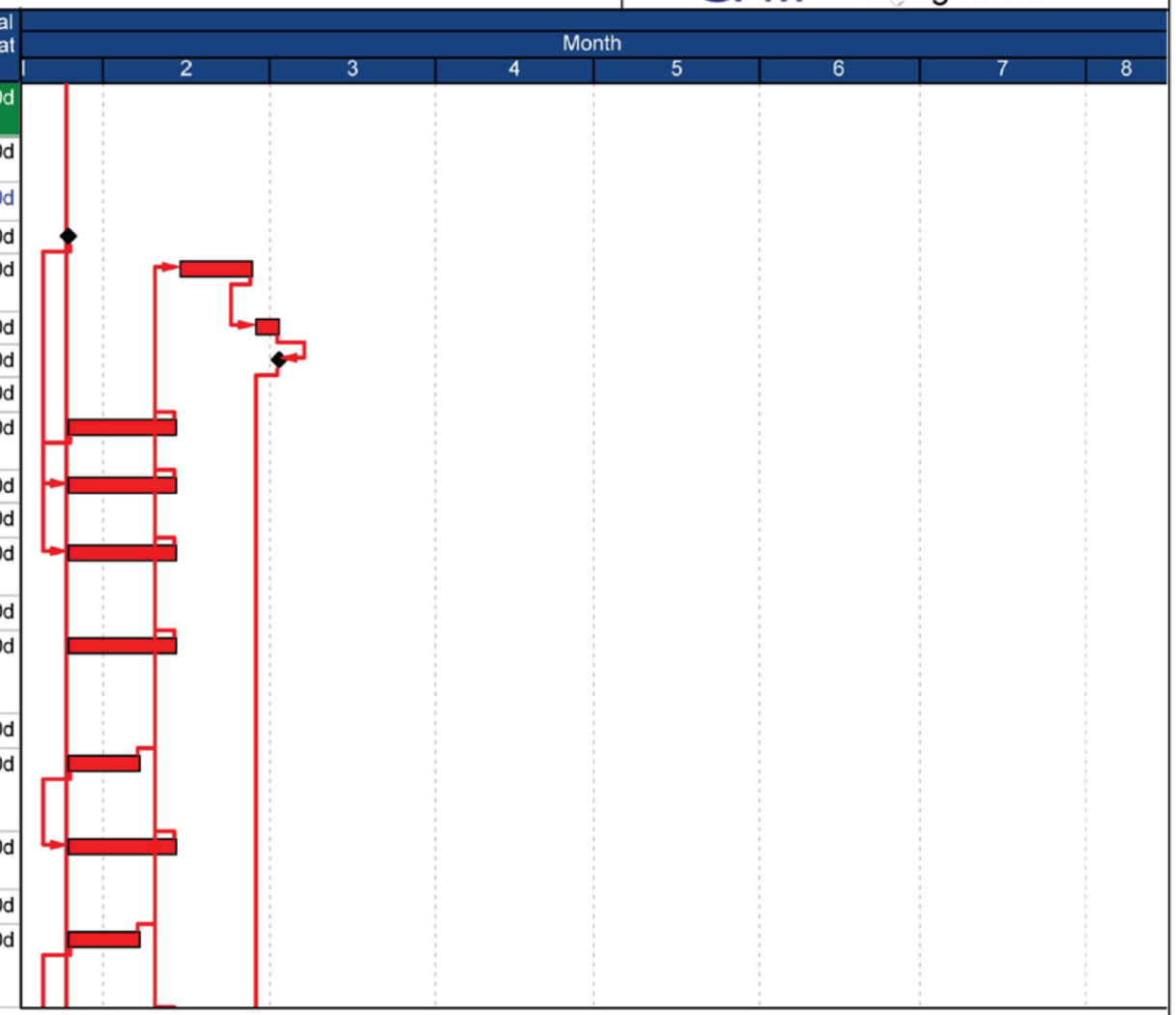

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EXHIBIT I.9

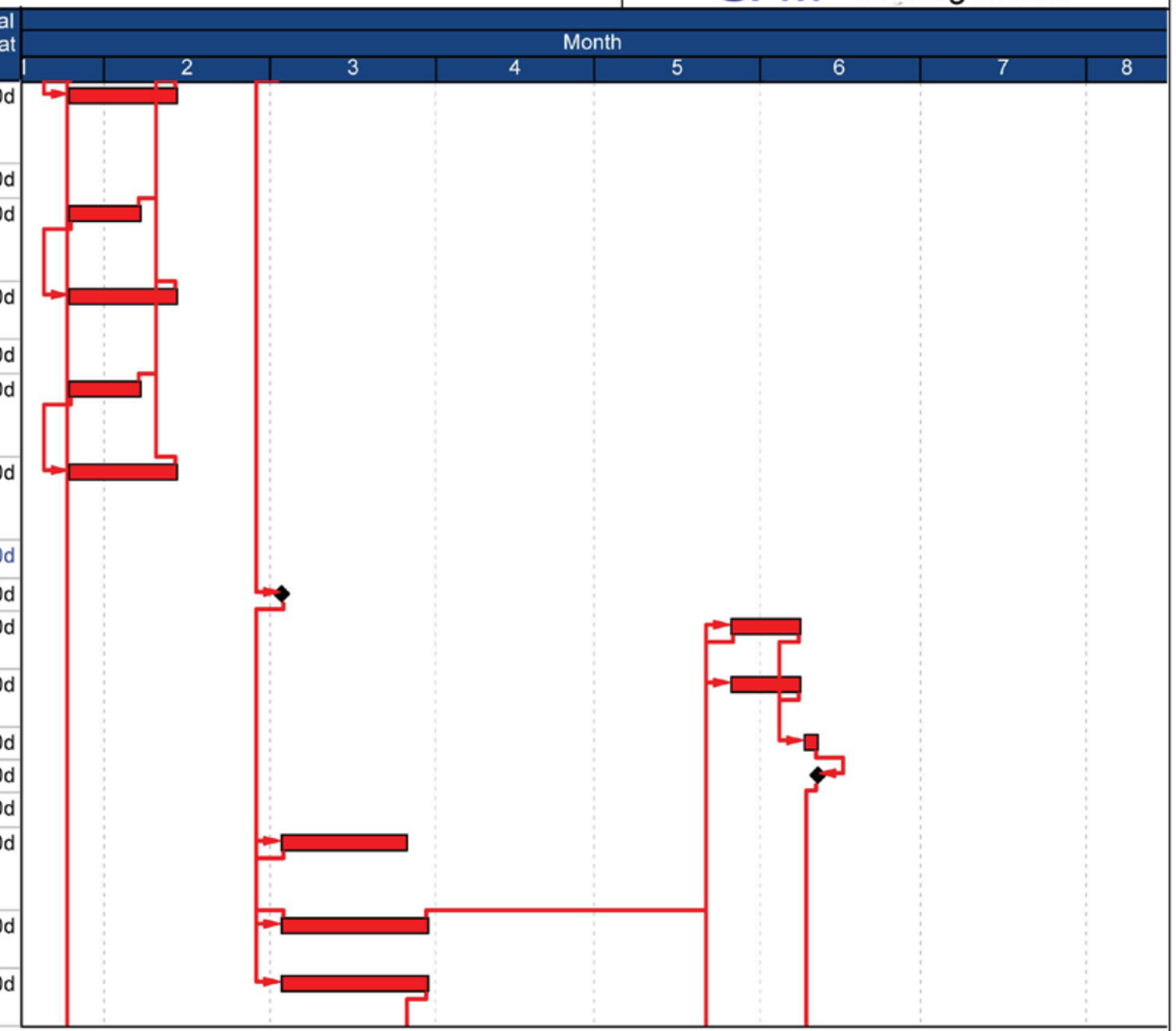
Department of Veterans Affairs

Longest Path for a Typical Design Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A11130	Prepare and Submit Site Development Design BOD Narrative and Conceptual Plans - Conceptual Design	15d	$750	0d
Sustainability Design		15d	$1,010	0d
A14210	Prepare and Submit Site Assessment/Existing Conditions Reports for Sustainability Design	10d	$10	0d
A14240	Prepare and Submit Sustainability Design Concept Assessments - Conceptual Design	15d	$1,000	0d
Utilities Design		15d	$2,000	0d
A15470	Prepare and Submit Utilities Design Site Assessment/Existing Conditions Reports (Existing Waste Disposal Process, etc..)	10d	$900	0d
A15490	Prepare and Submit Utilities Design Reports (Assessment of Cogeneration System, etc..) - Conceptual Design	15d	$1,100	0d
Schematic Design (SD-1)		73d	$10,500	0d
A16100	Start Schematic Design (SD1)	0d	$0	0d
A1130	VA CFM Review and Comment on SD1 Deliverables	10d	$3,500	0d
A1460	Design Review by Peer Reviewer - Schematic Design (SD-1)	10d	$1,700	0d
A6070	Design Review Meeting - Schematic Design 1	3d	$850	0d
A16110	End Schematic Design (SD1)	0d	$0	0d
Heating, Ventilating & Air Conditioning Design		60d	$4,450	0d
A7400	Prepare and Submit HVAC Design Calculations (Estimated heating and cooling Rqmts) - SD1	18d	$650	0d
A7380	Prepare and Submit HVAC Design Updated Basis of Design Reports - SD1	20d	$1,200	0d
A7740	Prepare and Submit HVAC Design Drawings (Heating Plant) (# of Drawing Sheets) - SD1	20d	$850	0d



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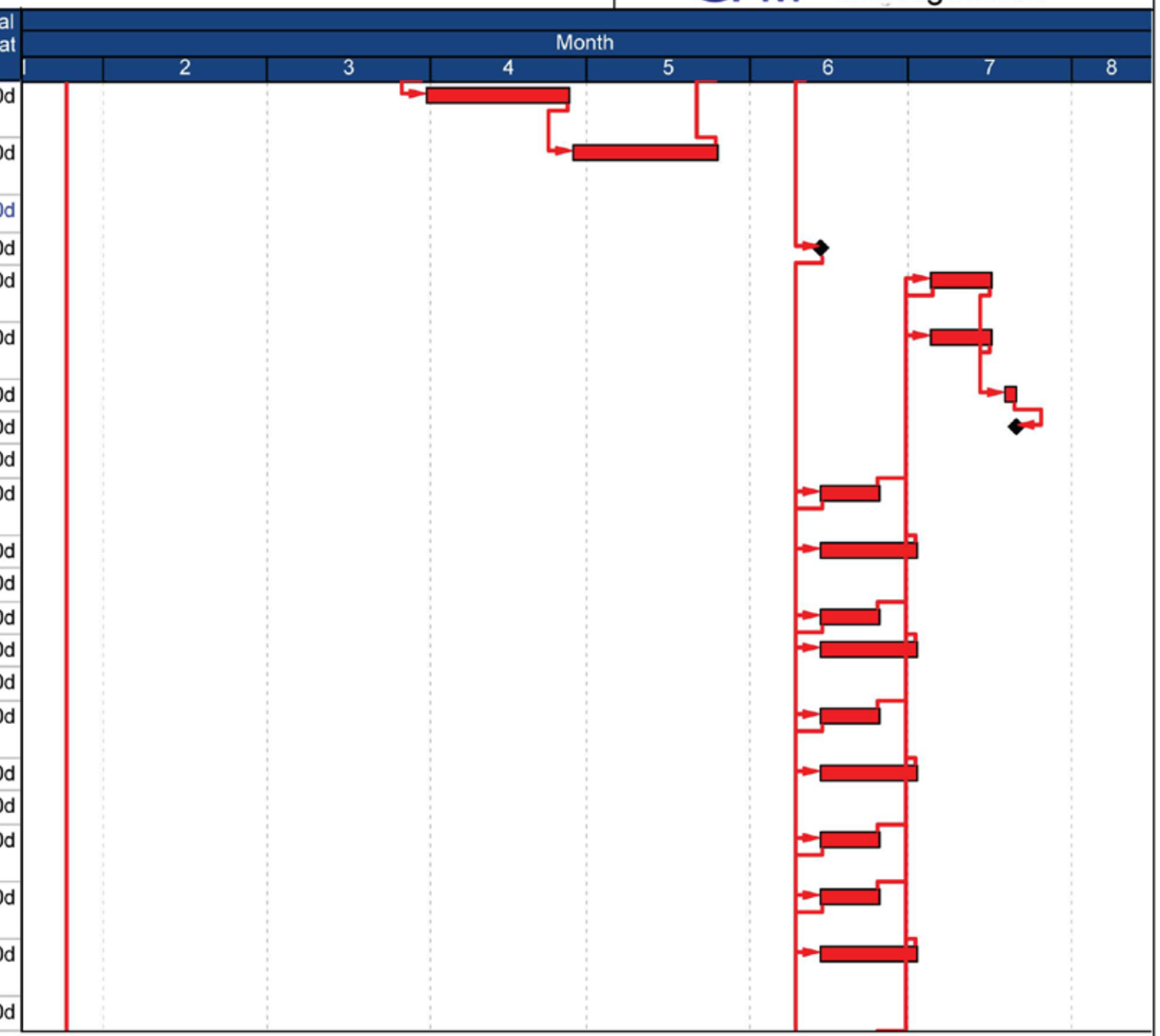
Department of Veterans Affairs

Longest Path for a Typical Design Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A7420	Prepare and Submit HVAC Design Drawings (Cooling Plant) (# of Drawing Sheets) - SD1	20d	$900	0d
A7750	Prepare and Submit HVAC Design Drawings (Air Handling) (# of Drawing Sheets) - SD1	20d	$850	0d
Schematic Design (SD-2)		28d	$71,915	0d
A16120	Start Schematic Design (SD2)	0d	$0	0d
A1690	VA CFM Review and Comments on SD2 Deliverables	10d	$3,500	0d
A1710	Design Review by Peer Reviewer - Schematic Design (SD-2)	10d	$1,480	0d
A2020	Design Review Meeting - Schematic Design 2	3d	$850	0d
A16130	End Schematic Design (SD2)	0d	$0	0d
Architectural Design		15d	$3,090	0d
A1670	Prepare and Submit Updated Basis of Design Report - SD2	10d	$1,190	0d
A1680	Prepare and Submit SD-2 Drawings	15d	$1,900	0d
Automatic Transport Design		15d	$2,960	0d
A2440	Prepare and Submit Updated Reports - SD2	10d	$980	0d
A2460	Prepare and Submit SD-2 Drawings	15d	$1,980	0d
Building Information Model (BIM) Design		15d	$2,600	0d
A3460	Prepare and Submit Updated BIM Management Plan - SD2	10d	$900	0d
A3480	Prepare and Submit BIM Drawings - SD2	15d	$1,700	0d
Fire Protection Design		15d	$4,340	0d
A6860	Prepare and Submit Fire Protection Design Updated Basis of Design Reports - SD2	10d	$1,100	0d
A7150	Prepare and Submit Updated Fire Protection Design Calculations - SD2	10d	$1,190	0d
A6880	Prepare and Submit Fire Protection Design Drawings - SD2	15d	$2,050	0d
Heating, Ventilating & Air Conditioning Design		15d	$4,610	0d



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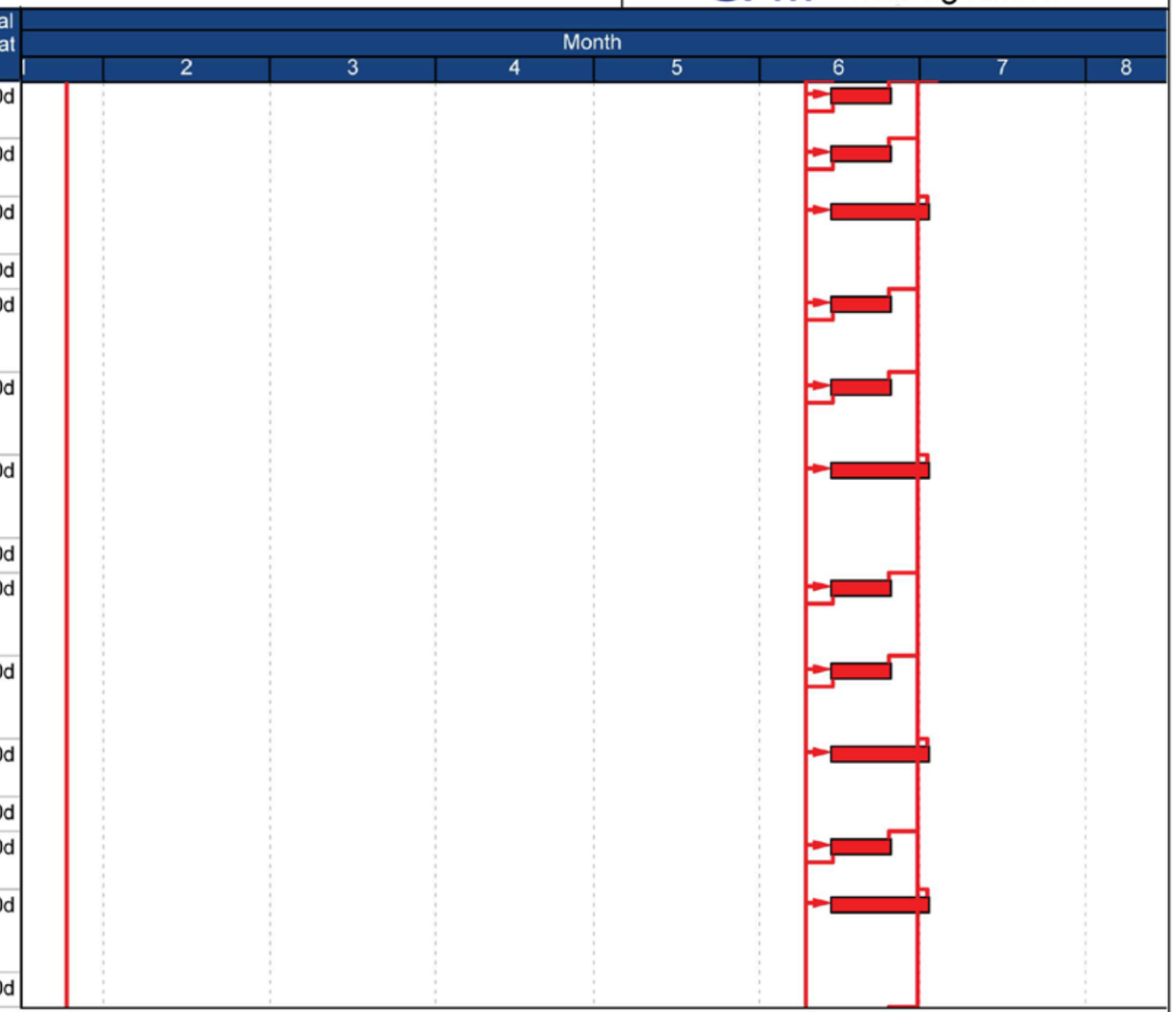
Department of Veterans Affairs

Longest Path for a Typical Design Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A7470	Prepare and Submit HVAC Design Updated Basis of Design Reports - SD2	10d	$910	0d
A7760	Prepare and Submit Updated HVAC Design Calculations - SD2	10d	$1,300	0d
A7490	Prepare and Submit HVAC Design Drawings - SD2	15d	$2,400	0d
Incineration/Waste Disposal Systems Design		15d	$4,100	0d
A8510	Prepare and Submit Incineration/Waste Disposal Systems Design Updated Basis of Design Reports - SD2	10d	$1,000	0d
A8800	Prepare and Submit Updated Incineration/Waste Disposal Systems Design Calculations - SD2	10d	$1,200	0d
A8530	Prepare and Submit Updated Incineration/Waste Disposal Systems Design Drawings - SD2	15d	$1,900	0d
Integrated Design & Construction Design		15d	$3,970	0d
A9040	Prepare and Submit Integrated Design and Construction Design Updated Basis of Design Reports - SD2	10d	$800	0d
A9330	Prepare and Submit Updated Integrated Design and Construction Design Calculations - SD2	10d	$1,170	0d
A9060	Prepare and Submit Integrated Design and Construction Design Drawings - SD2	15d	$2,000	0d
Interior Design		15d	$3,840	0d
A9570	Prepare and Submit Interior Design Updated Basis of Design Reports - SD2	10d	$1,140	0d
A9590	Prepare and Submit Updated Interior Design Drawings (Fully Developed Design for All Spaces) Drawings - SD2	15d	$2,700	0d
Plumbing/Sanitary Design		15d	$5,900	0d



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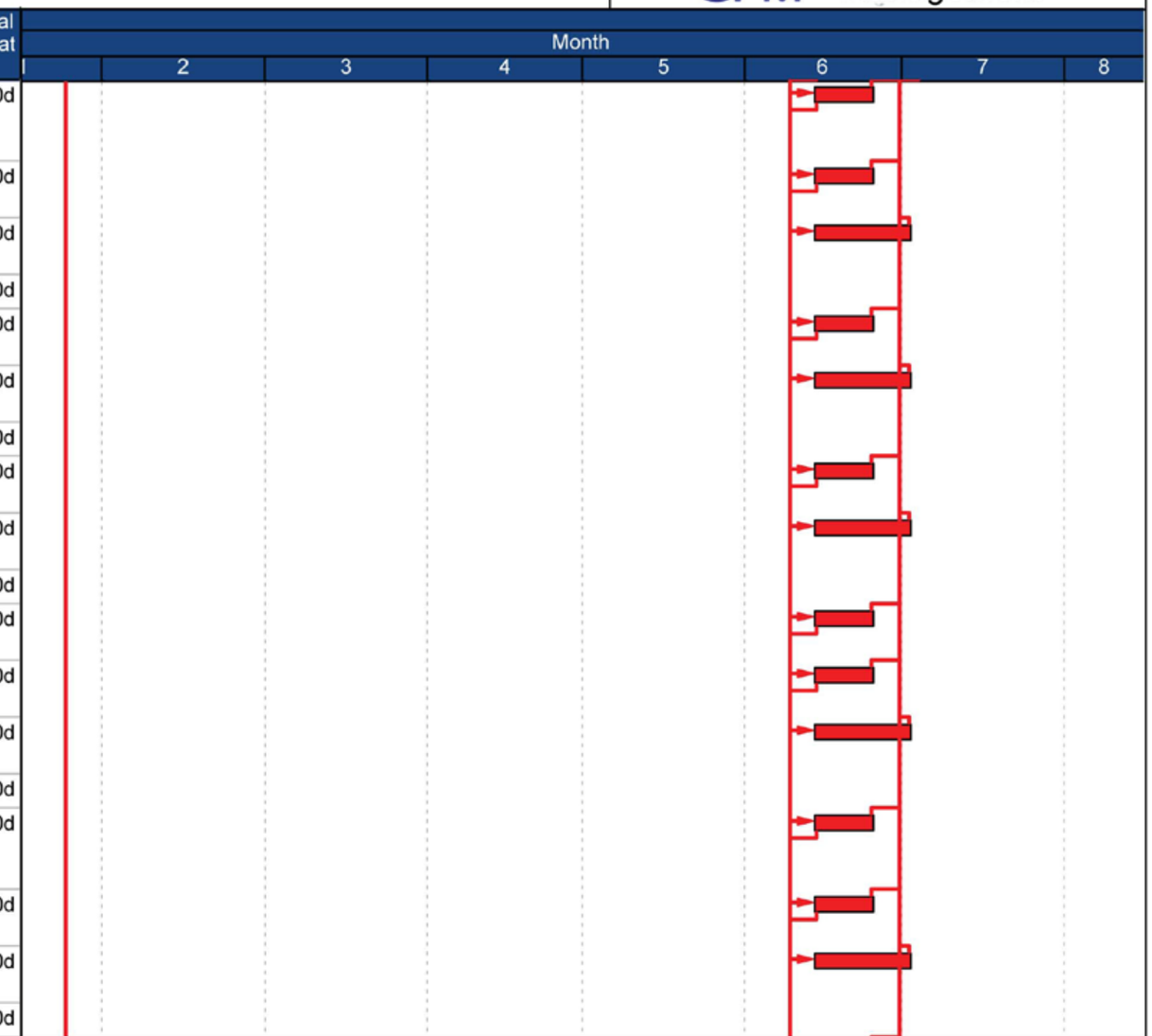
Department of Veterans Affairs

Longest Path for a Typical Design Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A10080	Prepare and Submit Plumbing/Sanitary Design Updated Basis of Design Reports - SD2	10d	$1,560	0d
A10370	Prepare and Submit Updated Plumbing/Sanitary Design Calculations - SD2	10d	$1,890	0d
A10100	Prepare and Submit Plumbing/Sanitary Design Drawings - SD2	15d	$2,450	0d
Security Design		15d	$2,500	0d
A10670	Prepare and Submit Security Design Updated Basis of Design Reports - SD2	10d	$1,000	0d
A10690	Prepare and Submit Security Design Drawings - SD2	15d	$1,500	0d
Site Development Design		15d	$4,130	0d
A11240	Prepare and Submit Site Development Design Updated Basis of Design Reports - SD2	10d	$1,130	0d
A11260	Prepare and Submit Site Development Design Drawings - SD2	15d	$3,000	0d
Space Planning Design		15d	$2,580	0d
A11750	Prepare and SubmitSpace Planning Design Updated Basis of Design Reports - SD2	10d	$500	0d
A12040	Prepare and Submit Space Planning Design Calculations - SD2	10d	$980	0d
A11770	Prepare and Submit Space Planning Design Drawings - SD2	15d	$1,100	0d
Steam Distribution Design		15d	$3,140	0d
A12730	Prepare and Submit Steam Distribution Design Updated Basis of Design Reports - SD2	10d	$950	0d
A13000	Prepare and Submit Steam Distribution Design Calculations - SD2	10d	$990	0d
A12750	Prepare and Submit Steam Distribution Design Drawings - SD2	15d	$1,200	0d
Steam Generation Design		15d	$4,840	0d



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Department of Veterans Affairs

Longest Path for a Typical Design Phase VAMC Project

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Budgeted Total Cost	Total Float
A13260	Prepare and Submit Steam Generation Design Updated Basis of Design Reports - SD2	10d	$1,100	0d
A13530	Prepare and Submit Steam Generation Design Calculations - SD2	10d	$1,690	0d
A13280	Prepare and Submit Steam Generation Design Drawings - SD2	15d	$2,050	0d
Structural Design		15d	$7,050	0d
A13790	Prepare and Submit Structural Design Updated Basis of Design Reports - SD2	10d	$1,400	0d
A14060	Prepare and Submit Structural Design Calculations - SD2	10d	$2,200	0d
A13810	Prepare and Submit Structural Design Drawings - SD2	15d	$3,450	0d
Sustainability Design		15d	$2,800	0d
A14740	Prepare and Submit Sustainability Design Updated Basis of Design Report - SD2	10d	$1,200	0d
A14750	Prepare and Submit Sustainability Design Calculations - SD2	15d	$1,600	0d
Telecommunications Design		15d	$3,635	0d
A15120	Prepare and Submit Telecommunications Design Updated Basis of Design Report - SD2	10d	$1,400	0d
A15140	Prepare and Submit Telecommunications Design SD-2 Drawings	15d	$2,235	0d

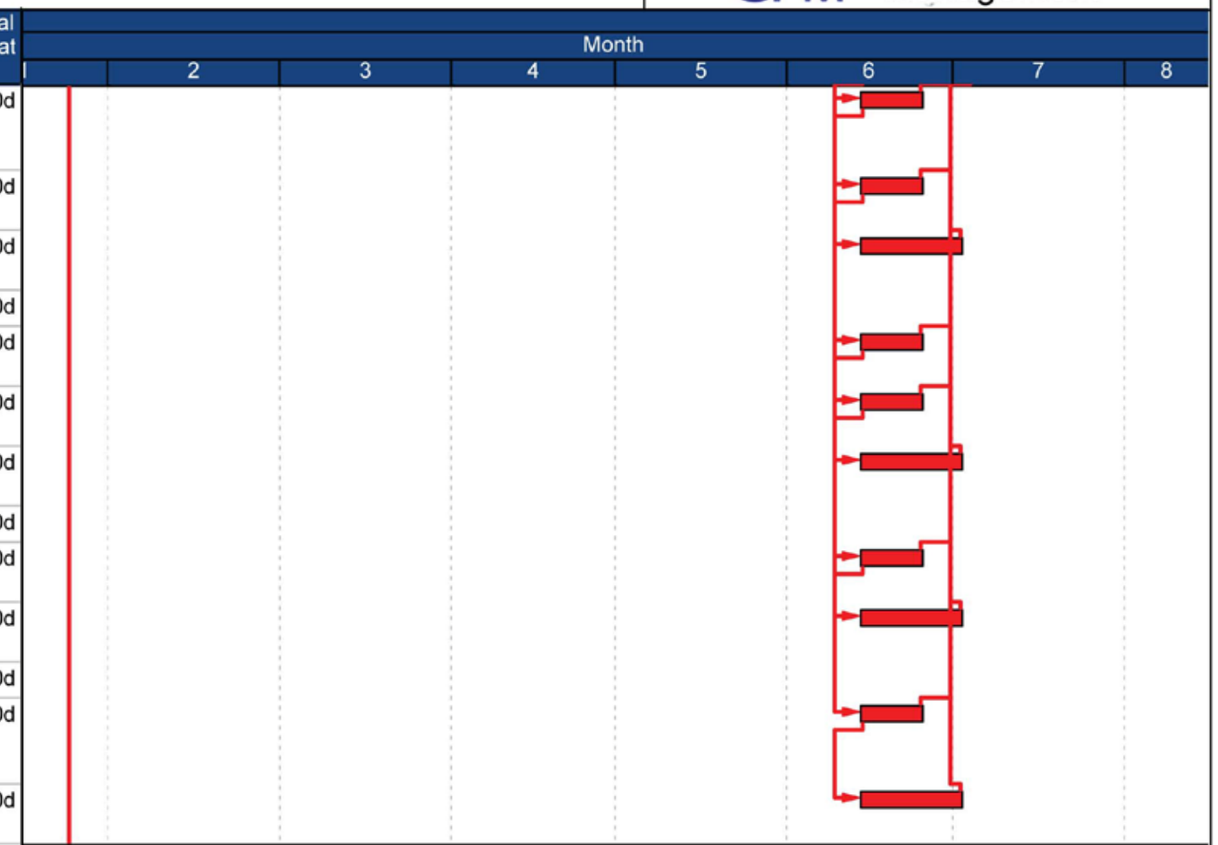

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EXHIBIT I.10

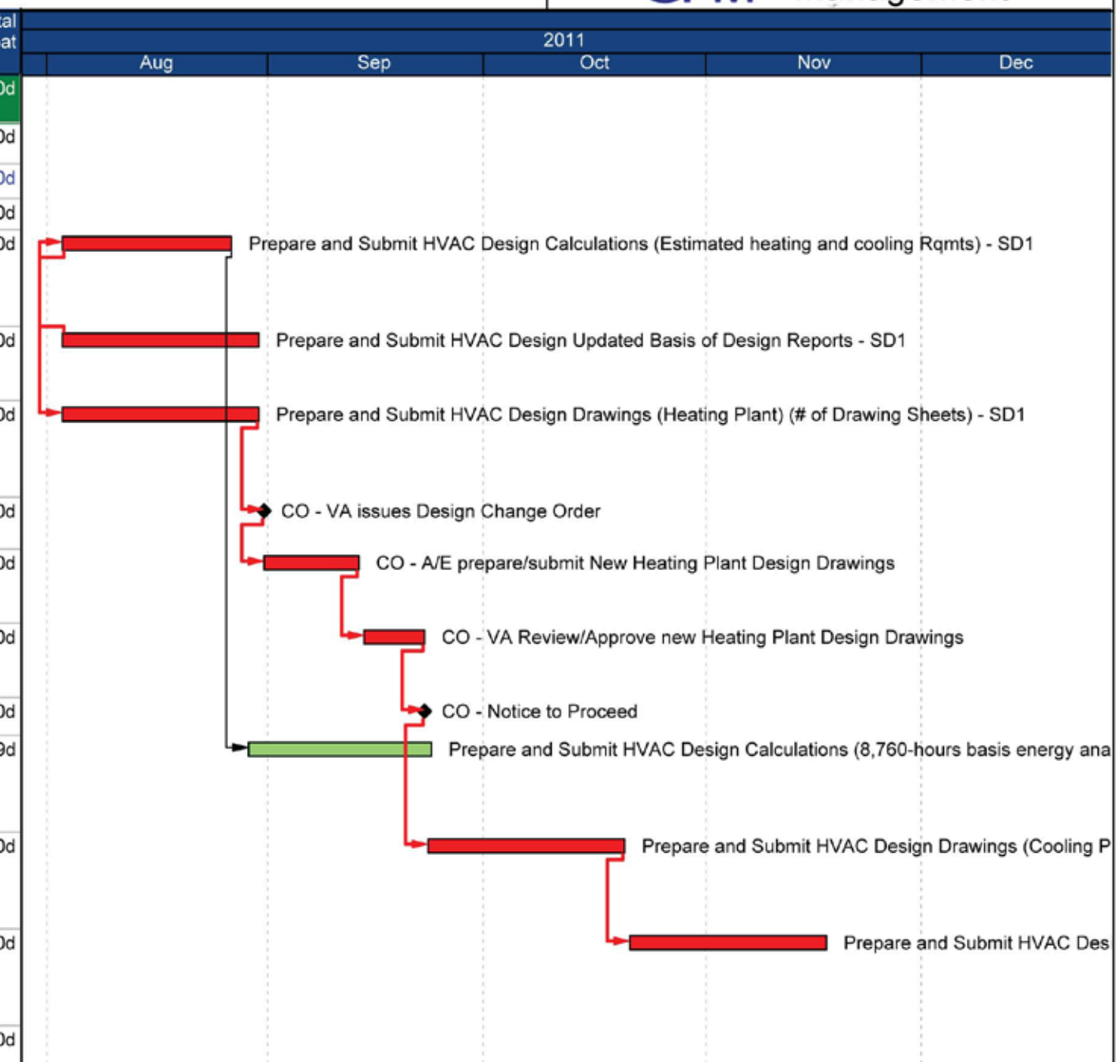
Department of Veterans Affairs

Schedule Impact Anlysis - Sample Change Order Fragnet

(Time-Scaled Logic Diagram)

Construction & Facilities Management

Activity ID	Activity Name	Original Duration	Start	Finish	Contractual Start Date	Contractual Finish Date	Total Float
VA IPMS		756d	03-Aug-11	25-Jun-14	03-Aug-11	02-Jun-14	0d
DESIGN		77d	03-Aug-11	17-Nov-11	03-Aug-11	25-Oct-11	0d
Schematic Design (SD-1)		77d	03-Aug-11	17-Nov-11	03-Aug-11	25-Oct-11	0d
Heating, Ventilating & Air Conditioning Desi...		77d	03-Aug-11	17-Nov-11	03-Aug-11	25-Oct-11	0d
A7400	Prepare and Submit HVAC Design Calculations (Estimated heating and cooling Rqmts) - SD1	18d	03-Aug-11	26-Aug-11	03-Aug-11	26-Aug-11	0d
A7380	Prepare and Submit HVAC Design Updated Basis of Design Reports - SD1	20d	03-Aug-11	30-Aug-11	03-Aug-11	30-Aug-11	0d
A7740	Prepare and Submit HVAC Design Drawings (Heating Plant) (# of Drawing Sheets) - SD1	20d	03-Aug-11	30-Aug-11	03-Aug-11	30-Aug-11	0d
COA7430	CO - VA issues Design Change Order	0d	31-Aug-11				0d
COA7440	CO - A/E prepare/submit New Heating Plant Design Drawings	10d	31-Aug-11	13-Sep-11			0d
COA7450	CO - VA Review/Approve new Heating Plant Design Drawings	7d	14-Sep-11	22-Sep-11			0d
COA7460	CO - Notice to Proceed	0d		22-Sep-11			0d
A7410	Prepare and Submit HVAC Design Calculations (8,760-hours basis energy analyses) - SD1	20d	29-Aug-11	23-Sep-11	29-Aug-11	25-Oct-11	39d
A7420	Prepare and Submit HVAC Design Drawings (Cooling Plant) (# of Drawing Sheets) - SD1	20d	23-Sep-11	20-Oct-11	31-Aug-11	27-Sep-11	0d
A7750	Prepare and Submit HVAC Design Drawings (Air Handling) (# of Drawing Sheets) - SD1	20d	21-Oct-11	17-Nov-11	28-Sep-11	25-Oct-11	0d
ACTIVATION PLANNING		638d	16-Jan-12	25-Jun-14	22-Dec-11	02-Jun-14	0d



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