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USACE / NAVFAC / AFCEC / NASA UFGS-01 32 17.00 20 (February 2015)  
Change 2 - 11/15

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Preparing Activity: NAVFAC Superseding  
UFGS-01 32 17.00 20 (August 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS  
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SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 32 17.00 20

COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS)

02/15

PART 1 GENERAL

- 1.1 DESCRIPTION
- 1.2 SUBMITTALS
- 1.3 SCHEDULE ACCEPTANCE PRIOR TO START OF WORK
- 1.4 SOFTWARE
- 1.5 QUALIFICATIONS
- 1.6 NETWORK SYSTEM FORMAT
  - 1.6.1 Diagrams
  - 1.6.2 Schedule Activity Properties and Level of Detail
    - 1.6.2.1 Activity Categories
      - 1.6.2.1.1 Procurement Activities
      - 1.6.2.1.2 Government Activities
      - 1.6.2.1.3 Quality Management (QM) Activities
      - 1.6.2.1.4 Construction Activities
      - 1.6.2.1.5 Turnover and Closeout Activities
    - 1.6.2.2 Contract Milestones and Constraints
      - 1.6.2.2.1 Project Start Date Milestones
      - 1.6.2.2.2 Facility Turnover Planning Meeting Milestones
      - 1.6.2.2.3 Substantial Completion Milestone
      - 1.6.2.2.4 Projected Completion Milestone
      - 1.6.2.2.5 Contract Completion Date (CCD) Milestone
    - 1.6.2.3 Work Breakdown Structure & Activity Code
      - 1.6.2.3.1 Work Breakdown Structure (WBS)
      - 1.6.2.3.2 Responsibility Code
      - 1.6.2.3.3 Construction Specification Institute (CSI) Masterformat Code
      - 1.6.2.3.4 Drawing Code
    - 1.6.2.4 Anticipated Weather Lost Work Days
    - 1.6.2.5 Anticipated Restricted Delays
    - 1.6.2.6 Cost Loading
      - 1.6.2.6.1 Cost Loading Activities
      - 1.6.2.6.2 Quantities and Units of Measure
  - 1.6.3 Schedule Software Settings and Restrictions
  - 1.6.4 Required Tabular Reports
- 1.7 SUBMISSION AND ACCEPTANCE
  - 1.7.1 Monthly Network Analysis Updates

1.7.2	As-Built Schedule
1.8	CONTRACT MODIFICATION
1.8.1	No Reservation of Rights
1.9	PROJECT FLOAT
1.10	THREE-WEEK LOOK AHEAD SCHEDULE
1.11	CORRESPONDENCE AND TEST REPORTS
1.12	ADDITIONAL SCHEDULING REQUIREMENTS
PART 2	PRODUCTS
PART 3	EXECUTION
-- End of Section Table of Contents --	

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SECTION 01 32 17.00 20

COST-LOADED NETWORK ANALYSIS SCHEDULES (NAS)  
02/15

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NOTE: This guide specification applies to Design-Bid-Build projects and covers the preparation and use of Cost-Loaded Network Analysis Schedules (NAS) for construction using Primavera P6.

This specification Section applies primarily to MILCON projects and any other similar projects with multiple disciplines working simultaneously. These projects may have known critical completion dates and may involve multiple phases.

Confirm with the Administering FEAD/ROICC that the project schedule should be prepared under the requirements of this section. Further, this section must be reviewed and approved by the administering FEAD/ROICC prior to completion of the Invitation For Bids (IFB).

Coordination is required with Section 01 20 00.00 20, PRICE AND PAYMENT PROCEDURES with selection of "Earned Value Report" rather than "Schedule of Prices" in that section.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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PART 1 GENERAL

1.1 DESCRIPTION

The Contractor is responsible for scheduling procurement, Contractor

quality control and construction, acceptance testing and training. Refer to Specification Section 01 33 00 SUBMITTAL PROCEDURES to determine if any items require Government approval prior to construction; if any are required, include that submittal review time in the schedule.

The schedule is a tool to manage the project, both for Contractor and Government activities. It will also be used to report progress and evaluate time extensions. The Project NAS must be cost-loaded and will provide the basis for progress payments. Use the Critical Path Method (CPM) and the Precedence Diagram Method (PDM) to satisfy time and cost applications. For consistency, when scheduling software terminology is used in this specification, the terms in Primavera's scheduling programs are used.

## 1.2 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

An "S" following a submittal item indicates that the submittal is required for the Sustainability Notebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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The use of a "G" following a submittal indicates that a Government approval action is required. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

SD-01 Preconstruction Submittals

Qualifications; G[, [\_\_\_\_]]

Baseline Network Analysis Schedule (NAS); G[, [\_\_\_\_]]

SD-07 Certificates

Monthly Network Analysis Schedule Update; G[, [\_\_\_\_]]

SD-11 Closeout Submittals

As-Built Schedule; G[, [\_\_\_\_]]

### 1.3 SCHEDULE ACCEPTANCE PRIOR TO START OF WORK

Participate with the Contracting Officer in a preliminary meeting(s) to discuss the proposed schedule and requirements of this section prior to the Contractor preparing the Project Baseline Schedule. Government review comments on the Contractor's schedule(s) do not relieve the Contractor from compliance with requirements of the Contract Documents. Only bonds may be paid prior to acceptance of the Baseline Network Analysis Schedule (NAS). The acceptance of a Baseline NAS is a condition precedent to:

- a. The Contractor starting work on the demolition or construction stage(s) of the contract.
- b. Processing Contractor's invoices(s) for construction activities/items of work.
- c. Review of any schedule updates.

Submittal of the Baseline Network Analysis Schedule, and subsequent schedule updates, is understood to be the Contractor's certification that the submitted schedule meets all of the requirements of the Contract Documents, represents the Contractor's plan on how the work will be accomplished, and accurately reflects the work that has been accomplished and how it was sequenced (as-built logic).

### 1.4 SOFTWARE

Prepare and maintain project schedules using Primavera P6. Importing data into P6 using data conversion techniques or third party software is cause for rejection of the submitted schedule.

A listing of Primavera P6 settings and parameters which must be used in preparing the Schedules are contained later in this specification section. Deviation from these settings and parameters, without prior consent of the Contracting Officer, is cause for rejection of schedule submission.

### 1.5 QUALIFICATIONS

The designated Scheduler for the project must have prepared and maintained at least 3 previous schedules of similar size and complexity of this contract using Primavera P3, Primavera SureTrak, or Primavera P6. At least one of the three must be in Primavera P6. Submit a resume outlining the qualifications of the Scheduler. Payment will not be processed until an acceptable Scheduler is provided.

### 1.6 NETWORK SYSTEM FORMAT

The system must include time-scaled logic diagrams and specified reports.

#### 1.6.1 Diagrams

Provide Time-scaled Logic Diagram printed in color on ANSI D size sheets. The diagram must clearly show activities on the critical path. Include the following information for each activity:

- a. Activity ID

- b. Activity Description
- c. Original Duration in Work Days
- d. Remaining duration in Work Days
- e. Physical Percent Complete
- f. Start Date
- g. Finish Date
- h. Total Float

#### 1.6.2 Schedule Activity Properties and Level of Detail

The NAS must identify all Government, Construction Quality Management (CQM), Construction activities planned for the project and all other activities that could impact project completion if delayed. Create separate activities for each Phase, Area, Floor Level and Location the activity is occurring. Activity categories included in the schedule are specified below.

With the exception of the Contract Award and Contract Completion Date (CCD) milestone activities, no activity shall be open-ended; each activity must have predecessor and successor ties. No activity must have open start or open finish (dangling) logic. Minimize redundant logic ties. Once an activity exists on the schedule it must not be deleted or renamed to change the scope of the activity and must not be removed from the schedule logic without approval from the Contracting Officer. While an activity cannot be deleted, where said activity is no longer applicable to the schedule but must remain within the logic stream for historical record, it can be changed to a milestone. Document any such change in the milestone's "Notebook", including a date and explanation for the change. The ID number for a deleted activity must not be re-used for another activity. Within the Baseline Schedule no more than 20 percent of the activities shall be critical or near critical. Critical is defined as having zero days of Total Float. "Near Critical" is defined as having Total Float of 1 to 14 days. Contractor activities must be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days.

##### 1.6.2.1 Activity Categories

###### 1.6.2.1.1 Procurement Activities

Examples of procurement activities include, but are not limited to; Material/equipment submittal preparation, submittal and approval of material/equipment; material/equipment fabrication and delivery, and material/equipment on-site. As a minimum, separate procurement activities will be provided for critical items, long lead items, items requiring Government approval and material/equipment procurement for which payment will be requested in advance of installation. Show each delivery with relationship tie to the Construction Activity specifically for the delivery.

###### 1.6.2.1.2 Government Activities

Government and other agency activities that could impact progress must be clearly identified. Government activities include, but are not limited to; Government approved submittal reviews, Government conducted

inspections/tests, environmental permit approvals by State regulators, utility outages, and delivery of Government Furnished Material/Equipment.

#### 1.6.2.1.3 Quality Management (QM) Activities

The Preparatory Phase and Initial Phase for each Definable Feature of Work identified in the Contractor's Quality Control Plan must be added to each Three-Week Look Ahead Schedule referenced in the paragraph THREE-WEEK LOOK AHEAD SCHEDULE. The Follow-up Phase will be represented by the Construction Activities in the Baseline Schedule and in the schedule updates.

#### 1.6.2.1.4 Construction Activities

No on-site construction activity may have a duration in excess of 20 working days. Contractor activities must be driven by calendars that reflect Saturdays, Sundays and all Federal Holidays as non-work days, unless otherwise defined in this contract.

#### 1.6.2.1.5 Turnover and Closeout Activities

Include activities with all items on the NAVFAC Red Zone Checklist/POAM that are applicable to this project. As a minimum, include all testing, specialized inspection activities, Pre-Final Inspection, Punch List Completion, Final Inspection and Acceptance. Add a milestone for the Facility Turnover Planning Meeting at approximately 75 percent construction contract completion or three to six months prior to Contract Completion Date (CCD), whichever is sooner.

#### 1.6.2.2 Contract Milestones and Constraints

##### 1.6.2.2.1 Project Start Date Milestones

Include as the first activity on the schedule a start milestone titled "Contract Award", which must have a Mandatory Start constraint equal to the Contract Award Date.

##### 1.6.2.2.2 Facility Turnover Planning Meeting Milestones

See paragraph ACTIVITY CATEGORIES above.

##### 1.6.2.2.3 Substantial Completion Milestone

Include an unconstrained finish milestone on the schedule titled "Substantial Completion". Substantial Completion is defined as the point in time the Government would consider the project ready for beneficial occupancy wherein by mutual agreement of the Government and Contractor, Government use of the facility is allowed while construction access continues in order to complete remaining items (e.g. punch list and other close out submittals).

##### 1.6.2.2.4 Projected Completion Milestone

Include an unconstrained finish milestone on the schedule titled "Projected Completion". Projected Completion is defined as the point in time the Government would consider the project complete. This milestone must have the Contract Completion (CCD) milestone as its only successor.

#### 1.6.2.2.5 Contract Completion Date (CCD) Milestone

Include as the last activity on the schedule a finish milestone titled "Contract Completion (CCD)". Calculation of schedule updates must be such that if the finish of the "Projected Completion" milestone falls after the contract completion date, then negative float will be calculated on the longest path and if the finish of the "Projected Completion" milestone falls before the contract completion date, the float calculation must reflect positive float on the longest path.

#### 1.6.2.3 Work Breakdown Structure & Activity Code

At a minimum, the Contractor must establish a Work Breakdown Structure (WBS) and provide activity codes identified as follows:

##### 1.6.2.3.1 Work Breakdown Structure (WBS)

Group all activities and milestones within appropriate WBS categories including, at a minimum, the following:

a. Project Milestones:

- (1) Management Milestones
- (2) Project Administrative Meetings

b. Pre-Construction Phase:

- (1) Submittals and Reviews
- (2) Procurement

c. Construction Phase; Create multiple sub-sections in accordance with project specific categories of work including in WBS descending order as follows:

- (1) General Area
  - (a) Type of Work Item
    - 1. Location

d. Commissioning & Testing:

- (1) Specific area/locations of commissioning
- (2) Final Testing
- (3) Training

e. Project Closeout: Include activity items such as Punchlist, Demobilization, O&M, As-built Drawings, and As-built NAS.

f. Modifications: Create multiple sub-sections as the project progresses identified by modifications issued.

##### 1.6.2.3.2 Responsibility Code

All activities in the project schedule must be identified with the party



responsible for completing the task. Activities must not belong to more than one responsible party.

[1.6.2.3.3 Construction Specification Institute (CSI) Masterformat Code

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**NOTE: Retain either or both of the following two paragraphs where justified by project complexity.**  
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Identify all activities in the project schedule with its respective Specification Section number. Activities must not belong to more than one Section number. If an activity does not have an applicable CSI Code (e.g. Mobilize), the code must be "0000".

]1.6.2.3.4 Drawing Code

Identify all activities in the project schedule with its respective Drawing Code. The Drawing Code is the Sheet Number on the primary project drawing which indicates work to be performed. If an activity does not have an applicable Drawing Code (e.g. Mobilize), the code must be "0000".

]1.6.2.4 Anticipated Weather Lost Work Days

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**NOTE: Check with FEAD/ROICC for Monthly Anticipated Adverse Weather Delays for the project site and edit the calendar below accordingly. Choose either NOAA historical monthly averages as the basis for establishing non-workdays or insert the table below indicating a default value of 2 days per month unless more current or base-specific data is available to insert into the table. NOAA historical data may not be available for all OCONUS locations.**  
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Use the [National Oceanic and Atmospheric Administration's (NOAA) historical monthly averages for days with precipitation, using a nominal 30-year, greater than 2.5 mm 0.10 inch amount parameter, as indicated on the Station Report for the NOAA location closest to the project site][following schedule of anticipated monthly non-work days due to adverse weather] as the basis for establishing a "Weather Calendar" showing the number of anticipated non-workdays for each month due to adverse weather, in addition to Saturdays, Sundays and all Federal Holidays as non-work days.

[

MONTHLY ANTICIPATED ADVERSE WEATHER DELAYS											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]	[2][_]

]

Assign the Weather Calendar to any activity that could be impacted by adverse weather. The Contracting Officer will issue a modification in accordance with the contract clauses, giving the Contractor a time extension for the difference of days between the anticipated and actual adverse weather delay if the number of actual adverse weather delay days

exceeds the number of days anticipated for the month in which the delay occurs and the adverse weather delayed activities are critical to contract completion. A lost workday due to weather conditions is defined as a day in which the Contractor cannot work at least 50 percent of the day on the impacted activity.

#### ]1.6.2.5 Anticipated Restricted Delays

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**NOTE: Retain paragraph if base access restrictions  
are anticipated during the project timeframe. Edit  
bracketed selections as required.**  
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Unless otherwise noted or defined in Section 01 14 00 WORK RESTRICTIONS, allow in the schedule a total of [5 lost workdays per calendar year][\_\_\_\_\_] for instances where base access is not permitted due to a restriction or closure which causes a delay in the work. A lost workday is defined as a day which the Contractor cannot work at least 50 percent of the day on the closed installation. If the installation is closed for a period longer than [5 lost workdays per calendar year][\_\_\_\_\_] , the Contracting Officer will issue a no cost contract modification as applicable in accordance with the contract clauses extending the contract completion date where the critical path has been impacted.

#### ]1.6.2.6 Cost Loading

##### 1.6.2.6.1 Cost Loading Activities

Assign Material and Equipment Costs, for which payment will be requested in advance of installation, to their respective procurement activity (i.e., the material/equipment on-site activity). Assign cost for material/equipment, paid for after installation; labor; and construction equipment to their respective Construction Activities. The value of commissioning, testing and closeout WBS section may not be less than 10 [\_\_\_\_\_] percent of the total costs for Procurement and Construction Activities. Evenly disperse overhead and profit to each activity over the duration of the project.

##### 1.6.2.6.2 Quantities and Units of Measure

Each cost loaded activity must have a detailed quantity breakdown and unit of measure. Lump sum costing is not acceptable.

#### 1.6.3 Schedule Software Settings and Restrictions

- a. Activity Constraints: Date/time constraint(s), other than those required by the contract, are not allowed unless accepted by the Contracting Officer. Identify any constraints proposed and provide an explanation for the purpose of the constraint in the Narrative Report as described in paragraph REQUIRED TABULAR REPORTS.
- b. Default Progress Data Disallowed: Actual Start and Actual Finish dates on the CPM schedule must match the dates on the Contractor Quality Control and Production Reports.
- c. Software Settings: Handle schedule calculations and Out-of-Sequence progress (if applicable) through Retained Logic, not Progress Override. Show all activity durations and float values in days. Show

activity progress using Remaining Duration. Set default activity type to "Task Dependent".

- d. At a minimum, include the following settings and parameters in Baseline Schedule preparation:

(1) General: Define or establish Calendars and Activity Codes at the "Project" level, not the "Global" level.

(2) Admin Drop-Down Menu, Admin Preferences, Time Periods Tab:

(a) Set time periods for P6 to 8.0 Hours/Day, 40.0 Hours/Week, 172.0 Hours/Month and 2000.0 Hours/Year.

(b) Use assigned calendar to specify the number of work hours for each time period: Must be checked.

(3) Admin Drop-Down Menu, Admin Preferences, Earned Value Tab:

(a) Earned Value Calculation: Use "Budgeted values with current dates".

(4) Project Level, Dates Tab:

(a) Set "Must Finish By" date to "Contract Completion Date".

(5) Project Level, Defaults Tab:

(a) Duration Type: Set to "Fixed Duration & Units".

(b) Percent Complete Type: Set to "Physical".

(c) Activity Type: Set to "Task Dependent".

(d) Calendar: Set to "Standard 5 Day Workweek". Calendar must reflect Saturday, Sunday and all Federal holidays as non-work days. Alternative calendars may be used with Contracting Officer approval.

(6) Project Level, Calculations Tab:

(a) Activity percent complete based on activity steps: Must be Checked.

(b) Reset Remaining Duration and Units to Original: Must be Checked.

(c) Subtract Actual from At Completion: Must be Checked.

(d) Recalculate Actual units and Cost when duration percent(%) complete changes: Must be Checked.

(e) Link Actual to Date and Actual This Period Units and Cost: Must be Checked.

(f) Price/Unit: Set to "\$1/h".

(g) Update units when costs change on resource assignments: Must be Unchecked.

(7) Project Level, Settings Tab:

(a) Define Critical Activities: Check "Total Float is less than or equal to" and add "0d".

(8) Work Breakdown Structure Level, Earned Value Tab:

(a) Technique for Computing Performance Percent Complete: "Activity percent complete" is selected.

(b) Technique for Computing Estimate to Complete (ETC): "PF = 1" is selected.

#### 1.6.4 Required Tabular Reports

Include the following reports with the Baseline, Monthly Update and any other required schedule submittals:

a. Log Report: Listing of all changes made between the previous schedule and current updated schedule.

b. Narrative Report: Identify and justify:

(1) Progress made in each area of the project;

(2) Critical Path;

(3) Date/time constraint(s), other than those required by the contract

(4) Changes in the following; added or deleted activities, original and remaining durations for activities that have not started, logic, milestones, planned sequence of operations, critical path, and cost loading;

(5) Any decrease in previously reported activity Earned Amount;

(6) Pending items and status thereof, including permits, changes orders, and time extensions;

(7) Status of Contract Completion Date and interim milestones;

(8) Current and anticipated delays (describe cause of delay and corrective actions(s) and mitigation measures to minimize);

(9) Description of current and future schedule problem areas.

Each entry in the narrative report must cite the respective Activity ID and Activity Description, the date and reason for the change, and description of the change.

c. Earned Value Report: List all activities having a budget amount cost loaded. Compile total earnings on the project from notice to proceed to current progress payment request. Show current budget, previous physical percent complete, to-date physical percent complete, previous earned value, to-date earned value and cost to complete on the report for each activity.

d. Schedule Variance Control (SVC) Diagram: With each schedule

submission, provide a SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates and 2) Earned Value to-date. Revise Cash Flow S-Curves when the contract is modified, or as directed by the Contracting Officer.

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**NOTE: Retain the following paragraph where  
justified by project complexity.**  
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[e. Daily Reported Production Activity: Submit on a monthly basis, in electronic spreadsheet format, a summary of daily reported production activity for the reporting month in the update schedule. Use the following columns for reporting:

- (1) Date
- (2) Activity ID
- (3) Work Description
- (4) Contractor
- (5) Billable Hours]

## 1.7 SUBMISSION AND ACCEPTANCE

### 1.7.1 Monthly Network Analysis Updates

Meet with Government representatives at monthly intervals to review and agree on the information presented in the updated project schedule. The submission of an acceptable, updated schedule to the Government is a condition precedent to the processing of the Contractor's invoice. Submit an acceptable, updated schedule to the Government regardless of whether a Contractor's invoice is submitted for the given period. The Contractor and Government must consent to agree on percentage of payment for each activity progressed during the update period. Monthly update schedules must incorporate as-built events as they occurred and provide ongoing status of anticipated finish dates. As-built events must correspond to contemporaneous records including but not limited to submittals, daily production reports and quality control reports.

Provide the following with each Schedule submittal:

- a. Time-Scaled Logic Diagram.
- b. Reports listed in paragraph entitled "REQUIRED TABULAR REPORTS."
- c. Data disks containing the project schedule. Include the back-up native .xer program files.

### 1.7.2 As-Built Schedule

As a condition precedent to the release of retention and making final payment, submit an "As-Built Schedule," as the last schedule update showing all activities at 100 percent completion. This schedule must reflect the exact manner in which the project was actually constructed.

## 1.8 CONTRACT MODIFICATION

Submit a Time Impact Analysis (TIA) with each cost and time proposal for a proposed change. TIA must illustrate the influence of each change or delay on the Contract Completion Date or milestones. No time extensions will be granted nor delay damages paid unless a delay occurs which consumes all available Project Float, and extends the Projected Finish beyond the Contract Completion Date.

- a. Each TIA must be in both narrative and schedule form. The narrative must define the scope and conditions of the change; provide start and finish dates of impact, successor and predecessor activity to impact period, responsible party; describe how it originated, and how it impacts the schedule. The schedule submission must consist of three native files:
  - (1) Fragnet used to define the scope of the changed condition
  - (2) Most recent accepted schedule update as of the time of the proposal or claim submission that has been updated to show all activity progress as of the time of the impact start date.
  - (3) The impacted schedule that has the fragnet inserted in the updated schedule and the schedule "run" so that the new completion date is determined.
- b. For claimed as-built project delay, the inserted fragnet TIA method must be modified to account for as-built events known to occur after the data date of schedule update used.
- c. All TIAs must include any mitigation, and must determine the apportionment of the overall delay assignable to each individual delay. The associated narrative must clearly describe the findings in a chronological listing beginning with the earliest delay event.
  - (1) Identify types of delays as follows:
    - (a) Excusable Delay: Force-Majeure (e.g. weather) - Contractor may receive time extension, but time will not be compensable.
    - (b) Inexcusable Delay: Contractor Responsibility - Contractor will not receive time extension.
    - (c) Compensable Delay: Government Responsibility - Contractor may receive compensable time extension.
  - (2) If a combination of any of the delay types outlined above occurs, it is considered Concurrent Delay, which will require an analysis of the facts to determine compensability and entitlement to any time extension under the applicable contract clauses.
- d. Submit Data disks containing the narrative and native schedule files.
- e. Unless the Contracting Officer requests otherwise, only add conformed contract modifications into the Project NAS.

### 1.8.1 No Reservation of Rights

All direct costs, indirect cost, and time extensions will

be negotiated and made full, equitable and final at the time of modification issuance.

#### 1.9 PROJECT FLOAT

Project Float is the length of time between the Contractor's Projected Completion Milestone and the Contract Completion Date Milestone. Project Float available in the schedule will not be for the exclusive use of either the Government or the Contractor.

The use of Resource Leveling or other techniques used for the purpose of artificially adjusting activity durations to consume float and influence critical path is prohibited.

#### 1.10 THREE-WEEK LOOK AHEAD SCHEDULE

Prepare and issue a 3-Week Look Ahead schedule to provide a more detailed day-to-day plan of upcoming work identified on the Project Network Analysis Schedule. Key the work plans to NAS activity numbers and update each week to show the planned work for the current and following two-week period. Additionally, include upcoming outages, closures, field evaluation tests, preparatory meetings, and initial meetings. Identify critical path activities on the Three-Week Look Ahead Schedule. The detail work plans are to be bar chart type schedules, derived from but maintained separately from the Project NAS on an electronic spreadsheet program and printed on 216 by 279 mm 8-1/2 by 11 inch sheets as directed by the Contracting Officer. Activities must not exceed 5 working days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work. Deliver three hard copies and one electronic file of the 3-Week Look Ahead Schedule to the Contracting Officer no later than 8 a.m. each Monday and review during the weekly CQC Coordination or Production Meeting.

#### 1.11 CORRESPONDENCE AND TEST REPORTS

All correspondence (e.g., letters, Requests for Information (RFIs), e-mails, meeting minute items, Production and QC Daily Reports, material delivery tickets, photographs) must reference Schedule activity IDs that are being addressed. All test reports (e.g., concrete, soil compaction, weld, pressure) must reference schedule activity IDs that are being addressed.

#### 1.12 ADDITIONAL SCHEDULING REQUIREMENTS

Any references to additional scheduling requirements, including systems to be inspected, tested and commissioned, that are located throughout the remainder of the Contract Documents, are subject to all requirements of this section.

### PART 2 PRODUCTS

Not used.

### PART 3 EXECUTION

Not used.

-- End of Section --