

SECTION 01310

COST/SCHEDULE INTEGRATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION - The Work specified in this Section consists of developing and maintaining a cost/schedule integration system for this Contract. Planning, scheduling, management, and execution of Work in accordance with Contract Documents is sole responsibility of Contractor.

A. Related General Conditions, Special Provisions Articles and Specification Sections

1. General Conditions Article, Differing Site Conditions.
2. General Conditions Article, Extensions of Time.
3. General Conditions Article, Liquidated Damages.
4. General Conditions Article, Increased or Decreased Quantities.
5. Special Provisions for Liquidated Damages and Weather Delays Caused by Rain
6. Section 01010, Summary of the Work.
7. Section 01018, Authority Furnished Equipment Interface.
8. Section 01200, Contract Meetings.
9. Section 01300, Submittals.
10. Section 01460, Contractor Construction Control Requirements.
11. Section 01505, Mobilization.

B. Generate cost/schedule integration system products using commercially available software program containing direct file interchange capability with the software program used by the Authority. The Authority uses the most current version of Primavera software program, Primavera Project Planner. Provide same format for data used by Primavera batch processing system to exchange cost integrated scheduling system data.

C. Included as Appendix A of this Section are network format files which contain dictionaries for activity codes, activity ID's, resources and cost accounts, as well as report formats. Certain activity codes define a minimum number of submittal, procurement, milestone and summary Work activities and are to be used to develop required scheduling submittals. Establish detailed activities, activity durations, cost and resource loading, and sequencing of Work in developing required schedule submittals. Maintain activity codes; resource accounts; cost accounts; activity ID codes; and report specifications, as provided in network format files, on Project schedule submittals. Do not change dictionary codes or report specifications provided in network format files without prior review and acceptance of CM.

- D. For schedule network, integrated cost and cash-flow submittals covered in this Section include a 1.44 MB 3.5 inch floppy disk, compatible with MS or IBM PC DOS version 3.0 or higher, backup copy of data and a hard copy of information contained on disks.
- E. For scheduling submittals produce original bar chart and time-scaled network diagram submittals on D-Size (22 inches by 34 inches) or E-Size (34 inch by 44 inch) medium suitable for reproduction. Print schedule submittal tabular reports on A-Size (8 1/2 inches by 11 inches) paper.
- F. Contract milestones dates, Authority furnished equipment availability dates, and Real Estate availability dates, as described in the Special Provisions, are unique zero duration activities containing corresponding dates and logic ties. Designate these activities as a "start no earlier than" or "finish no later than" milestone. Each milestone activity will constrain its dependent Work. Assume Notice To Proceed (NTP) is given at day zero for calculation of constraint dates for milestones.
- G. Float is not for exclusive use or benefit of either Authority or Contractor but is an expiring resource available to both parties on a nondiscriminatory basis. Float is used by either party, as needed to meet Contract milestones and Contract completion dates. Contract time extensions for Contract performance will be granted only to extent that delays or disruptions to affected Work paths exceed total float along those paths of current Contract Schedule (updated schedule) in effect at time of delay or disruption. These delays or disruptions must also cause end date of Work to exceed current Contract date or milestone date and be beyond control and without fault or negligence of Contractor or any subcontractor at any tier. If delays or disruptions impact an already negative float path, Contractor will not receive a time extension unless and until activity with highest negative float is driven even further negative. Delays or disruptions will not be a basis for time extension to this Contract unless, and until, such delays or disruptions are resolved as set forth in General Conditions.
- H. Pursuant to float sharing requirements of this Section, use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times or durations are prohibited and use of float time disclosed or implied by use of alternate float suppression techniques shall be shared to proportionate benefit of the Authority and Contractor. Use of any network technique solely for purpose of suppressing float will be cause for rejection of schedule submittal.
- I. Planning units - Scheduling software supports schedule PLANNING UNIT's of Hours, Days, Weeks or Months. The standard time unit applied to the cost/schedule integration system is defined as days. PLANNING UNITS are a prerequisite to, but do not define calendars.
- J. Schedule network - Use Precedence Diagram Method of scheduling.
- K. Analyze in detail activities included in Contract Schedule to determine activity time durations in units of project working days. Base durations on labor (crafts), equipment, and materials required to perform each activity on a normal work day basis. No on-site activity shall have a duration over 20 working days except non-construction activities such as submittals, submittal reviews, procurement and delivery of materials or equipment, and concrete curing. Only on-site construction activities will be shown in their resource loaded state to reflect cost, manpower, materials and equipment, except those activities specifically identified under this Section. Durations shall be the result of definitive manpower and resource planning by the Contractor to perform Work in consideration of contractually defined on-site work conditions. Show manpower to be assigned by craft definition, and equipment, by item designation, for each construction activity for the network on a tabular listing, and include in information furnished in accordance with paragraphs 2.6 and 2.7. Show crafts necessary to execute an activity.

PART 2 - PRODUCTS

2.1 SUBMITTALS - Submit one original and four copies of Schedule unless specified otherwise. Provide submittals specified in this Section to CM for review and acceptance. See Table 1 for a summary of the submittal frequency.

A. Early Work 120 Days Schedules

1. Submit to CM within 14 days after NTP, an Early Work Contract Schedule containing the master list of submittals, as specified in Section 01300 Submittals, equipment procurement and summary construction activities defined by activity codes provided in network format files included in Appendix A and Contractor's intended sequencing of Work. Schedule shall contain Contractor's detailed activities for first 120 days following NTP. Update accepted Early Work Schedule monthly, as specified, and submit until specified Contractor's Baseline Schedule is fully developed and accepted. Since updates to Early Work Contract Schedule are basis for payment to Contractor during first four month period, submittal and acceptance of such updates will be a condition precedent to making of monthly payment, as referenced in Special Provisions. Include summary bars that reflect the balance of Work to be preformed for remaining Interim and Contract completion milestones.
2. Submit computer generated back-up copy of the Early Work Schedule files, computer generated tabular reports and time scaled network diagrams as defined in network format files included in Appendix A. Submit a written narrative for the Early Work Schedule.
3. Submit partial Schedule of Values within 14 days after NTP. Submittal and acceptance of Schedule of Values will be a condition precedent to making of monthly payment for first four months of Work as referenced in Special Provisions. Identify value of Work planned for first 120 days following NTP. Allocate costs to related resource accounts provided in network format files. Allocate Schedule of Values to activities scheduled to be performed in first 120 days after NTP.

B. Baseline Contract Schedule

1. Submit breakdown of Contract price into individual resource accounts provided in network format files and into individual activities detailed by Contractor in Baseline Contract Schedule, within 45 days after NTP.
2. Submit breakdown of Contract material unit quantities, into Contractor's detailed activities of Baseline Contract Schedule, within 45 days after NTP.
3. Submit cost and resource (manpower, material and equipment) loaded Baseline Contract Schedule, containing detailed activities and intended sequencing of Work included in Contract, within 45 days after NTP. Cumulative amount of cost loaded Work activities shall equal total Contract price. Resource-load detailed activities with manpower, equipment and Contract material unit quantities. Cumulative amount of material unit quantities shall equal total Contract material unit quantities indicated in Schedule Of Quantities And Prices. Submittal and acceptance of Baseline Contract Schedule shall be a condition precedent to making of monthly payments after fourth month of Work as referenced in Special Provisions.
4. Include time-scaled network diagrams, based on working days, as well as computer generated reports. Construct to show the order in which the Contractor proposes to carry out Work, to indicate restrictions of access, and availability and use of access and to show availability of work areas, and availability and use of manpower, materials and equipment. Utilize Baseline Contract Schedule in planning, scheduling, coordinating, and performing the Work under the Contract (including activities of subcontractors,

equipment vendors, and suppliers). Provide CM with written confirmation of concurrence of major (5 percent or more of Contract amount) trade Subcontractors and Suppliers with Baseline Contract Schedule, revisions and updates.

5. Provide CM with a means to monitor and follow progress of all phases of Work, comply with limits imposed by scope of work, with contractually specified interim milestones and completion dates, and with constraints, restraints or sequences included in the Contract. Degree of schedule detail required shall include factors to the satisfaction of the CM, including, but not limited to, the following:
 - a. Physical and structural breakdown of the project;
 - b. Contract interim milestones and Contract completion date, substantial completion dates, constraints, restraints, sequences of Work indicated;-
 - c. Type of Work to be performed, sequences, and labor trades involved;-
 - d. Purchases, master list of submittals, submittal reviews, manufacture, tests, delivery, and installation activities for major materials and equipment, and a separate list of major material items of equipment for which the Contractor intends to seek payment before installation;
 - e. Deliveries of Authority furnished equipment and/or materials in accordance with dates or schedule windows of such times set forth in the Contract or furnished by the Authority;-
 - f. Preparation, submittal and acceptance of shop and/or working drawings and material samples showing a 30-day minimum time specified for the CM's review of normal or routine submittals, so identified in the Specifications, and the same time frame shall be allowed for at least one resubmittal on -submittals so identified in the Contract Documents;
 - g. Approvals required by regulatory agencies or other third parties;
 - h. Schedules for subcontract Work;
 - i. Assignment of responsibility for performing specific activities;
 - j. Access and availability to work areas;
 - k. Identification of interfaces and dependencies with preceding, concurrent and follow-on Contractors and utilities;
 - l. Resource loading for cost, manpower, material, and equipment;
 - m. Actual tests, submission of test reports, and acceptance of test results;
 - n. Start up, testing, training, and assistance required under the Contract;
 - o. Planning for phased or total takeover by the Authority;
 - p. Punchlist and final cleanup; and
 - q. Identification of manpower, material, or equipment restrictions, as well as any activity requiring unusual shift work, such as two shifts, six day weeks, specified overtime, or Work at times other than regular days or hours.

C. Current Contract Schedule Updates

1. Initially, upon acceptance of the Baseline Contract Schedule, establish the Current Contract Schedule from the Baseline Contract Schedule. Thereafter, update the Current Contract Schedule monthly with Data Date designated by CM. Submit updated Current Contract Schedule within two working days after the Data Date. Use updated Current Contract Schedule for subsequent planning, scheduling, managing, monthly progress payments, statusing of the master list of submittals and execution of Work to be accomplished. Obtain CM's prior acceptance before making deviations in logic and activity durations in the Current Contract Schedule. Submittal and acceptance of schedule updates will be a condition precedent to making of monthly payments.
2. Participate with CM in periodic meetings, at least monthly, on dates directed by CM and seven days prior to monthly status Data Date for purposes of reviewing changes to schedule logic and Project status. At meeting held seven days prior to Data Date, provide preliminary updated Current Contract Schedule which projects Project status through Data Date and contains actual start and actual finish dates for activities in progress or completed, remaining durations of activities in progress, earned value of cost-loaded activities, logic changes, new or deleted activities, and new Change Orders.
3. Submit a stand alone portion of the network (fragnet), if current progress reflects negative float of minus 10 days or more for a milestone activity, as indicated by most recent Current Contract Schedule, allowed by Contract Special Provisions as amended by approved Change Orders. Show activities affected, date delay or disruption occurred or how productivity rates were impacted, and unmitigated impacts to schedule caused by delay or disruption. Submit similar fragnet showing Contractor's plan to mitigate delay or disruption and subsequent impacts to schedule at CM's request. Provide written narrative describing circumstances which caused delay or disruption and methodology used to determine extent of delay or disruption. Submission of such fragnets does not constitute permission to proceed with plan. Execute some or all of the following remedial actions, and submit a recovery schedule that may include:
 - a. Increase construction manpower in such quantities and crafts as necessary to eliminate the backlog or work.
 - b. Increase the number of working hours per shift, shifts per working day, working days per week, the amount of construction equipment, or combination of the foregoing to eliminate the backlog or work.
 - c. Reschedule the Work in conformance with the Specification requirements.
4. Before implementing any of the above actions, notify and obtain acceptance from CM. If such actions are accepted, incorporate Current Contract Schedule revisions before next update.
5. Addition of equipment or construction forces, increasing working hours or other methods, manner, or procedure to return to contractually required completion date will not be considered justification for a Change Order, nor be treated as acceleration where the need for a recovery schedule has been caused by the Contractor and/or its Subcontractors or Suppliers, at any tier.
6. When Change Orders or delays are experienced by the Contractor and a time extension is requested, submit to the CM, a written Time Impact Analysis illustrating the influence of each change or delay on current Contract schedule completion date utilizing Current Contract Schedule. Include in each Time Impact Analysis a fragnet demonstrating how the Contractor proposes to incorporate the Change Order or delay into the Current Contract Schedule. The A fragnet shall contain a sequence of new and/or activity revisions that are proposed to be added to the Current Contract Schedule in effect at the time change or delay is encountered to demonstrate influence or delay and method for incorporating the delay and its impact into the schedule as they

are encountered.

- a. Each Time Impact Analysis shall demonstrate estimated time impact based on events of delay, date of Change Order, Work Authorization Change Notice or unilateral Change Order given to the Contractor, status of construction at that point in time, and event time computation of activities affected by change or delay. Event times used in analysis shall be those included in latest version of the Current Contract Schedule, in effect at time change or delay was encountered.
 - b. Submit each Time Impact Analysis in triplicate, within five days after a delay occurs. If the Contractor does not submit a Time Impact Analysis for a specific Change Order or delay within specified period of time, the Contractor will be deemed to have irrevocably waived rights to additional time and cost.
 - c. Since float time within Baseline Contract Schedule is jointly owned, it is acknowledged and agreed by the Contractor that Authority caused delays on the project may be offset by Authority caused time savings (including, but not limited to: critical path submittals returned in less time than allowed for in the Contract, acceptance of substitution requests which result in a savings of time along the critical path for the Contractor, etc.). In such an event, the Contractor will not be entitled to receive an extension of time or delay damages until Authority caused time savings are exceeded and Contract completion date also exceeded.
 - d. The CM will accept or reject each Time Impact Analysis. Upon acceptance, a copy of a Time Impact Analysis signed by the CM will be returned to the Contractor for incorporation into the schedule.
 - e. Upon mutual agreement by both parties, incorporate fragnets illustrating the influence of Change Orders and delays into the Current Contract Schedule during first update after agreement is reached.
 - f. In the event the Contractor does not agree with the decision of the CM regarding impact of a change or delay, it will be resolved in accordance with General Condition Article, Disputed Claims Resolution.
- D. As-Built Schedule - Submit As-Built Schedule covering Work performed under the Contract within 30 days after final completion. As-Built Schedule - Certified by planner/scheduler and Contractor's project manager as being the manner in which Contract was executed. Submittal and acceptance of the Schedule will be a condition precedent to reduction/release of retainage at end of Contract.
- E. Schedule Reviews - CM will review and respond to scheduling submittals within seven days after submittal, unless a different review period is specified in this Section. Submit a revised schedule within seven days after receipt of CM's response if changes or additional information is required by CM.
- F. Scheduler - Employ at least one full-time planner/scheduler with experience using automated scheduling systems. Planner/scheduler - Cooperate with CM and be on site full time exclusively for the purpose of continuously monitoring and maintaining Contractor's detailed cost/schedule integration system. - Within 10 days of Contract award, submit to CM, planner/scheduler's resume of experience as a construction project scheduler including professional references who have had experience with individual as a construction project scheduler. CM has right to refuse to accept the planner/scheduler based upon lack of experience of similar Work as required in this Specification. If CM refuses to accept planner/scheduler proposed by Contractor, provide another planner/scheduler meeting experience requirements.
- G. Early Completion Schedule - Contractor agrees that in the event a proposed early completion schedule (or any subsequent update) which is found to be acceptable by the

Authority, indicating a duration which is less than time allowed by Contract for completion of Work or of interim milestone, Contract completion time shall only be shortened by a Change Order to equal Contractors proposed Baseline Contract Schedule duration.

- H. Three Week Rolling Bar Chart Schedule - Once a week, on a day mutually agreed to by the CM and the Contractor, a meeting will be held to assess the progress achieved by the Contractor during previous work week. Submit a manpower/construction report and progress schedule listing activities completed and in progress for the previous week and the activities scheduled for the succeeding two weeks based on the Current Contract Schedule. The Three Week Rolling Bar Chart Schedule shall be provided from the Current Contract Schedule and include all activities scheduled including: activity ID, description, early start and early finish, total float, manpower requirement, original duration, remaining duration, percent complete, performance of the activity, and pertinent remarks as to activity status. The schedule and manpower shall be submitted to the CM before the weekly meeting for review. Submit copies of schedule on 11 inch by 17 inch paper.
- 2.2 PARTIAL SCHEDULE OF VALUES for first four progress payments following NTP - Computer generated tabular reports as defined in network format files included as Appendix A of this Section.
- 2.3 CONTRACT PRICE BREAKDOWN FOR RESOURCE ACCOUNTS - Computer generated tabular reports as defined in network format files included as Appendix A of this Section.
- 2.4 CONTRACT UNIT QUANTITIES BREAKDOWN - Computer generated tabular reports as defined in network format files in Appendix A of this Section.
- 2.5 COST AND RESOURCE LOADED BASELINE CONTRACT SCHEDULE
- A. One computer generated backup copy of Baseline Contract Schedule files.
- B. Computer generated tabular reports as defined in network format files in Appendix A of this Section.
- C. Computer generated bar chart and time-scaled network diagrams as defined in network format files in Appendix A of this Section.
- D. Written narrative for Cost and Resource Loaded Baseline Contract Schedule.
- 2.6 MANPOWER, CASH FLOW, AND PROGRESS CURVES
- A. Manpower - Submit with the Baseline Contract Schedule a histogram depicting total project craft manpower, craft manpower for its own forces and for each of its Subcontractors for each month. Base histogram upon the number of shifts and crew sizes by craft in Baseline Contract Schedule. Update monthly and submit with monthly progress report. Show actual manpower for each month during construction period to date and required manpower for both base scope and Change Order Work each month necessary to complete remaining activities, including Change Order Work, to ensure timely project completion.
- B. Cash Flow
1. Submit with the initial Baseline Contract Schedule a Cash Flow Curve of expected progress payments over the Performance Period. Plot curve using costs assigned to activities on the Baseline Contract Schedule.
 2. Update the curve with actuals from the approved progress payments and forecasted progress payments and submit to the Authority monthly. The total approved progress payments and forecasted progress payments must equal Contract amount including modifications. Derive updated curve from updated Baseline Contract Schedule.

- C. Progress Curves - Submit Scheduled Progress Curves with Baseline Contract Schedule. Show with the curves the cumulative scheduled percent complete of each phase, time-scaled in calendar days from NTP to baseline scheduled completion for each phase. The curves shall be derived from the Cash Flow Curve. Update progress curves monthly showing actual progress, submit to the Authority with each monthly update of the Current Contract Schedule. Include scheduled, actual and forecasted progress, plotted as a time-scaled curve from 0 to 100 percent. Derive scheduled, actual, and forecasted progress from Cash Flow Curve.

- 2.7 CONSTRUCTION EQUIPMENT - Submit with Baseline Contract Schedule a tabular report listing each major piece of construction equipment and each major piece of construction equipment for each of its Subcontractors for each month. Separately describe, identify and number each major piece of the Contractor's and the subcontractor's equipment in the report. Base tabular report upon number of shifts and crew sizes by craft in the Baseline Contract Schedule. Update monthly per the Current Contract Schedule and submit with Monthly Progress Report. Show in update the actual construction equipment for each month during construction period to date, and the required construction equipment for each month necessary to complete remaining activities, including Change Order work, on the early finish date.

2.8 MONTHLY UPDATED CURRENT CONTRACT SCHEDULE

- A. One computer generated backup copy of Monthly Updated Current Contract Schedule files.
- B. Computer generated tabular reports as defined in network format files in Appendix A of this Section.
- C. Computer generated bar chart and time-scaled network diagrams as defined in network format files in Appendix A of this Section.
- D. Written narrative for updated Current Contract Schedule.

2.9 FRAGNETS

- A. One computer generated backup copy of Fragnet files.
- B. Computer generated tabular reports as defined in network format files in Appendix A of this Section.
- C. Computer generated network diagrams as defined in network format files in Appendix A of this Section.
- D. Written narrative of fragnet assumptions.

- 2.10 CONTRACT TIME-SCALED NETWORK DIAGRAMS - Submit computer generated time-scaled network diagram entitled "Current Time-Scaled Network Diagram" with submittal of items referenced below. Submit one reproducible original and four copies produced on D-Size (22 inch by 34 inch) or E-Size (34 inch by 44 inch) paper.

- A. Submit with initial Early Work Schedule submittal.
- B. Submit with cost/resource-loaded Baseline Contract Schedule submittal.
- C. Submit every month with Updated Current Contract Schedule.

- 2.11 WRITTEN NARRATIVE REPORTS - Include a "stand-alone" narrative of sufficient detail to explain basis of Contractor's submittal with each schedule submittal.

- A. Early Work and Baseline Contract Schedule Submittals - Explain determination of activity durations and describe Contractor's approach for meeting required interim and final

completion milestone dates, as specified in the Contract. Include as a minimum: basis and assumptions used in preparing submittal, including crew sizes, equipment requirements, and anticipated delivery dates; restraints; critical path activities; production rates; activities requiring overtime or additional shifts; activities that contain time contingencies for impacts to be expected from normal rainfall; holidays and other non-work days; potential problem areas; permits; coordination required with Authority, railroads, utilities and other parties; and long lead delivery items requiring more than 30 days from order to delivery. Identify work items that may be expedited by use of overtime or additional shifts. Identify and explain sequencing and other constraints such as manpower, material, and equipment. Include listing of holidays and special non-work days.

- B. Current Contract Schedule Submittals - State in narrative, Work actually completed and reflect progress along critical path in terms of days ahead of or behind allowable dates. Specific requirements of narrative are as follows:
1. If updated Current Contract Schedule indicates an actual or potential delay to Contract completion date or interim milestone dates as specified under Special Provisions or modified by Change Order, identify causes of delays, disruptions and interruptions and provide explanation of Work affected and proposed corrective action to meet milestone dates involved or to mitigate potential delays or disruptions. Document and log in a matrix format activities with nonmitigated negative float until the negative float is mitigated. Identify deviations from previous month's critical path. The matrix will include applicable activity number, description, accepted planned start and finish dates, current start and finish dates, and float quantity.
 2. Identify by activity number and description, activities in progress and which activities are scheduled to be completed during the next update period.
 3. Identify by activity number and description, activities to be started during the month following the report period. Show Contractor's forecast early and late start and finish dates.
 4. Discuss added Change Order Work items.

PART 3 - EXECUTION

- 3.1 FAILURE OF THE CONTRACTOR to prepare, submit and update schedules and reports in accordance with these Specifications will be cause for the Authority to assess liquidated damages in amounts as shown in Special Provisions, Progress Schedules Assessment of Liquidated Damages. Update Schedules and Reports are due each month. Prepare and deliver to the Authority within first two working days after data date.
- 3.2 EARLY WORK SCHEDULE
- A. Show activities that will or may affect milestone completion dates including planning, mobilization, submittals, procurement, fabrication, and construction during first 120 days after NTP. Include activities and milestones that will or may affect or be affected by activities of Authority, utilities, and other third parties. Network format files, in Appendix A of this Section, present a framework for preparation of Early Work and Baseline Schedules.
 - B. Describe Contractor's approach to mobilization, procurement, and construction during first 120 days, including crew sizes, equipment and material delivery, site access, submittals and permits.
- 3.3 FOUR MONTH SCHEDULE OF VALUES
- A. Allocate applicable Contract costs to related resource account categories provided in network format files, in Appendix A of this Section, and to Contractor's detailed activities,

included in Early Work Schedule, to be completed or partially completed during four month period following NTP.

- B. Submit computer tabular report containing following data per activity: activity I.D., activity description, cost and resource account number; cost and resource account description; cost and resource account budget; total Contract material quantities and unit costs; cumulative quantities and cost to date; material quantities and cost this period; and estimated material quantities and cost at completion.

3.4 CONTRACT PRICE BREAKDOWN, UNIT QUANTITY BREAKDOWN - Provide a tabular report showing following data per cost and resource account: cost and resource account number; cost and resource account description; cost and resource account budget.

3.5 BASELINE CONTRACT SCHEDULE - DETAILED COST AND RESOURCE LOADED NETWORK

- A. Provide Contractor's detailed activities and sequencing for Work included in the Contract. Assign a unique activity identification for each detailed activity.
- B. Cost sums and unit quantity sums of cost and resource loaded activities shall equal Contract award amounts plus approved Change Order amounts. Assign General Requirement costs not specifically assigned to Work activities to hammock activity representing entire Contract duration. Budget per cost account shall equal approved Contract award amounts plus approved Change Order amounts. Include cost account number and related resource account numbers, identified in network format files in Appendix A of this Section, in cost and resource loaded activities. Enter dollar amounts used for cash-flow calculations into scheduling software financial window. Approved activity budget dollar value shall equal forecast dollar value. Submittal items may only be paid for out of General Requirements pay item.
- C. Indicate Contractor's best estimate for original durations, early dates, late dates, logic ties, constraint dates, and total float. Schedule activities in the sequence which Contractor intends to perform Work.
- D. Include activities for installation and testing of Authority and Contractor furnished mechanical and electrical equipment required to support follow-on contractors. Include as a minimum: Elevators; Escalators; Air Handling Units; Sump Pumps; Supply Fans; Air Filters; Exhaust Fans; Motor Operated Dampers; Fire and Smoke Dampers; Sound Attenuators; and CIC Panels. Identify equipment by sort code that would allocate locations by survey station points and by associated finish work.
- E. Cost and resource (manpower and equipment) load activities for installation and testing of materials and equipment.
- F. Include following activity sequence for major material and equipment procurement: Submittal Preparation; Review for Acceptance; and Fabricate/Deliver. Divide procurement items that may contain multiple submittals occurring at different time intervals into separate sequences that can be tracked on an individual basis. Include a minimum original duration of 20 working days in Review-for-Acceptance activities. Include a minimum duration of 20 working days for re-review. Re-submittal activities shall contain submittal preparation activities for other material and equipment procurement (non-major) to Schedule. Network format files in Appendix A of this Section contain activity codes and values for submittal and procurement activities that are to be used in the Contract. Submit for CM's review and acceptance, a listing of proposed activity codes, code values and titles using examples given as a guide for Project.
- G. Baseline Contract Schedule activity requirements are as follows:
 1. Activity descriptions - Briefly convey scope and location of Work indicated.

2. Activities - Discrete items of Work accomplished under Contract that provide measurable and recognizable parts of Work.
3. Include as Contract deliverables, submittal and approval of permit applications and variances, samples of materials, Shop Drawings, Working Drawings, Inspection and Test Plans, Safety and Security Plans, and Site Traffic Control Plans. Include activities of Authority that may affect progress as well as those of affected utility companies and other similarly involved third parties. Include activities in the Baseline Contract Schedule as stipulated in General Requirements.
4. Work activities - Show duration in work days, costs, and unit quantities for material manpower and equipment where applicable.
5. Work activities - Durations of 20 working days or less except for non-construction activities such as procurement of materials, or fabrication of equipment. Should a Work activity require more than 20 working days, subdivide Work activity to define appropriate Work items.
6. Critical paths - Defined as the sequence(s) of Activities with the least amount of float.
7. Failure to include any element of Work required for performance of the Contract in Baseline Contract Schedule will not excuse Contractor from completing Work required to achieve milestone completion, notwithstanding acceptance of Baseline Contract Schedule submittals.
8. Activities that are susceptible to weather delays caused by rain shall contain time contingencies for those potential delays. The time contingencies shall be described in the appropriate activity log windows of scheduling software. In scheduling the Work, Contractor shall plan for normal rainfall (including its subsequent effects on days following extremely heavy rain) as listed in the Special Provision Article, WEATHER DELAYS CAUSED BY RAIN.

3.6 BASELINE CONTRACT SCHEDULE CHANGES - When commencing new Work associated with a Change Order or a Work Authorization Change Notice, incorporate Work into the Current Contract Schedule submittal as new activities after discussion with CM concerning how change will be placed into the revised Baseline Contract Schedule. After an official Change Order or Work authorization Change Notice has been issued for Work, add it to the schedule. CO's and WACN's added to the schedule are resource - loaded with material unit quantities and corresponding cost account, resources account codes, activity description, and accepted costs. The activity ID identifies the CN number of the change. Time extensions may not be incorporated into schedule for changes or delays without an approved Change Order. Zero duration activities may be added until time extensions are official.

3.7 FRAGNETS

- A. Submit revised Current Contract Schedule within 14 days of request, if Contractor falls behind in prosecution of Work, as indicated by negative critical path, or submittal of Current Contract Schedule no longer appears to represent actual prosecution of Work.
- B. Properly connect to, and constrain by, previously existing predecessor and successor activities, as applicable, activities of revised portion(s) of schedule. Band impacted activities in separate networks (fragnets), indicating specific delay or impact issue and submit to CM for review. Combine accepted fragnets into Current Contract Schedule. CM will review aggregate impact to critical path and make a recommendation regarding Contractor's request for time extension to Contract to the Authority.
- C. Time extensions will be granted only to the extent that equitable time adjustments for activity or activities affected exceed total or remaining float along critical path of activities at time of

actual delay, or at time Change Order, Work Authorization Change Notice, or unilateral Change Order was issued. Float or slack time is not for the exclusive use or benefit of the Contractor but is an expiring resource available to all parties as needed to meet Contract milestones and Contract completion date. Time extensions will not be granted nor delay damages paid until a delay occurs:

1. Which is beyond the control and without the fault or negligence of the Contractor and its Subcontractors or Suppliers, at any tier; and
2. Which extends actual performance of Work beyond applicable current Contract completion date and most recent date predicted for completion of project on accepted schedule update, current as of the time of the delay or as of time of issuance of Change Order, Work Authorization Change Notice or unilateral Change Order.

3.8 VARIANCE REPORTS - Submit a monthly comparison of consecutive updated Current Contract Schedules and report noncritical (more than 15 days of total float) activities which have been delayed 20 or more working days, and critical (15 days or less total float) activities which have incurred any delay. Include:

- A. Activity I.D. number code and description
- B. Previous scheduled early start/finish dates.
- C. Current scheduled early start/finish dates.
- D. Working days remaining to complete the activity.
- E. Percentage complete of the activity.
- F. Remaining total float of each activity.
- G. Reason for the delay and mitigation measures to be implemented, in the narrative.

3.9 AS-BUILT SCHEDULE - Submit within 30 days after substantial completion. As a condition precedent to release of retention by the Authority, identify last update to Current Contract Schedule submitted as "As-Built Schedule." Reflect exact manner in which the project was actually constructed, (including start and completion dates, activities, sequences, and logic). Certify by the Contractor's Project Manager and Construction scheduler that it is a true reflection of the way the project was actually constructed.

PART 4 - MEASUREMENT AND PAYMENT

4.1 PHYSICAL PROGRESS MEASUREMENT

- A. This Section is intended to inform Contractor how CM will calculate "Physical progress" for management reporting to the Authority. Physical progress will be measured as sum of earned dollar values of activities identified as representing physical construction divided by "Physical Progress Budget." Activities and physical progress budget will be developed by CM. Physical progress budget is defined as summed dollar values of cost loaded activities identified as representing physical construction in accepted cost and resource loaded Baseline Contract Schedule. Determine percent complete for cost-loaded activities as follows: For activities loaded with Contract unit quantities, calculate percent complete by dividing units of Work in place by total units of Work forecast. For activities loaded with lump sum costs, calculate percent complete by estimating percent of Work in place. Only activities representing physical progress (Work in place) will be included in physical progress calculation. Physical costs will be used as a basis for physical progress measurement.
- B. Monthly schedule submission, showing updated activity, resource and cost data in

accordance with requirements of this Section, and General Conditions Article, Progress Payments will be the basis upon which progress payments and requests are reviewed for acceptance by CM. The start of the 30 day progress payment cycle will not begin until the Contractor has an accepted updated Current Contract Schedule and the Payment Application has been signed by the Contractor and accepted by the CM.

4.2 PAYMENT for Work of this section will be made under:

Item No. 01000.01 - General Requirements - per lump sum.

TABLE 1
SUBMITTAL FREQUENCY OF REQUIRED PROJECT CONTROL DOCUMENTS

REPORTING FREQUENCY AFTER NTP OR AS SPECIFIED*

Description of Schedule or Report	Within 14 Calendar Days	Within 30 Calendar Days	Within 45 Calendar Days	Updated 1st day each month
1. Early Work 120 day schedule	X*			X
2. Partial Schedule of values	X*		X*	
3. Baseline Contract Schedule			X*	X
4. Current Contract Schedule				X
5. Equipment Schedule			X*	X
6. Cash Flow Curve				X
7. Manpower Curve				X
8. Weekly Work Schedule**				
9. As-Built Schedules and Reports		30 days After final completion		

* After Notice of Award where indicated

**Submit three Week Rolling Schedule on a weekly basis.

END OF SECTION

Instructions to Specifier

Section **01310**

COST/SCHEDULE INTEGRATION SYSTEM

INCLUDE THIS SECTION IF WORK SPECIFIED HEREIN IS APPLICABLE TO THIS CONTRACT;
EDIT THIS SECTION TO MAKE IT CONTRACT SPECIFIC.

Do not make site specific changes to this document without specific approval from MTA program control.

DOCUMENT CHANGE RECORD

SECTION 01310, COST/SCHEDULE INTEGRATION SYSTEM

PRIMARY RESPONSIBILITY - MTA

SECONDARY RESPONSIBILITY - CM - Project Manager -

BASELINE REVISIONS:

> GAA = 07.20.94 Baseline, Rev. 0
 GAB = 12.09.94 Baseline, DRAFT Rev. 01: Changes proposed under SBCN 29 from M. Heitmeyer. The entire section was modified from C0351 waiver. See Conformed copy of C0351 for source of changes.
 = **01.13.94** Baseline Rev. 001: Processed SBCN DE307-29.00 approved 12/28/94, moved to Baseline directory and replaced LKG's configuration disk under SWR# 02338
 GAC= 08/23/95 Corrected misspelled word in 1.2.D and changed RCC to MTA on this sheet, RWV.
 GAC = 11.06.95 DRAFT, Rev. 002, per SBCN No. 58, SWR# 2931, Operator I.D.:BJ, affecting: 0
 GAC= 02/21/96 DRAFT, Rev. 002, SWR#03036, SBCN 58, Corrected format, grammar, usage and conformed document to MTA standard practice. RWV.
 GAC = 05.06.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03125, I.D.:dzm, Remarks:None, affecting: 0
 GAC = 06.14.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03185, I.D.:BJ, Remarks:None, affecting: 0
 GAC = 06.17.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03185, I.D.:BJ, Remarks:None, affecting: 0
 GAC = 08.08.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03257, I.D.:dzm, Remarks:None, affecting: 0
 GAC = 08.09.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03266, I.D.:dzm, Remarks:None, affecting: 0
 GAC = 08.16.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03275, I.D.:AES, Remarks:Baseline Specification, affecting: 1.1.A, 1.1.C, 1.1, 1.1.G, 1.1.I, 2.1, 2.1.A, 2.1.B, 2.1.C, 2.1.D, 2.1.E.2.1.F, 2.1.H, 2.1.A, 2.1.B, 3.4, 3.5, 3.5.A, 3.5.E, 3.5.G
 GAC = 08.19.96 DRAFT, Rev.:002, SBCN#:58, SWR#:03275, I.D.:AES
 GAC = 08.21.96 APPROVED, Rev.:002, SBCN#:58, SWR#:03282, I.D.:dzm, Remarks:Moved to Baseline Guide_sp.ecs, affecting: **Error! Reference source not found.**
 GAD = 10.09.96 WORKING, No update Modified codes in the Tables at the end of the Document.I.D.:rwv
 GAD = 10.10.96 WORKING, I.D.:PJT, Remarks:Modified codes in Tables, tested Ctrl M #D, affecting: **Error! Reference source not found.**
 GAD = 04.01.97 DRAFT, Rev.:003, SBCN#:76, SWR#:03757, I.D.:MSF, Remarks:Per Heitmeyer/Masserat, affecting: **Error! Reference source not found.**
 GAD = 04.01.97 DRAFT, Rev.:003, SBCN#:76, SWR#:03757, I.D.:msf, Remarks:per Heitmeyer/Masserat, affecting: **Error! Reference source not found.**
 GAD = 04.02.97 DRAFT, Rev.:003, SBCN#:76, SWR#:03757, I.D.:msf, Remarks:per Heitmeyer/Masserat, affecting: 0
 GAD = 04.14.97 DRAFT, Rev.:003, SBCN#:76, SWR#:03860, I.D.:PJT, Remarks:None, affecting: 0
 GAD = 06.24.97 DRAFT, Rev.:003, SBCN#:76, SWR#:04034, I.D.:EZI, Remarks:"Cancel EMC file-Transfer by disk to MTA per MTA letter#R95-DE100-DZ, dated June 10, 1997."

CONTRACT REVISIONS:

Before Bid:

>

Bid Level (Addenda):

>

Conformed (Change Notice/Change Orders):

